# EXECUTIVE PROFILE OF ENVIRONMENTAL MANAGEMENT

## CARIBBEAN SUB-REGION

**Prepared for the**

**Inter-American Development Bank**
**Regional Policy Dialogue**

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## Foreword

I would like to thank David Wilk of the Inter-American Development Bank for hiring me to undertake this study and for providing important direction and comments on earlier drafts. I would also like to thank the many people who contributed their time and insights to this report through interviews and discussions. I would like to express my special appreciation to Susan Granger Tyler and René Aubourg, who assisted me with the research for this report and provided constructive comments on early drafts. I would also like to thank Ruth Gutierrez and Antonio Hill, who have translated this report into Spanish.

## Executive Summary

This Executive Profile of Environmental Management for the Caribbean Sub-Region was prepared for the Inter-American Development Bank (IDB) Regional Policy Dialogue. The Regional Policy Dialogue is an initiative by the IDB to promote the establishment of regional networks in which IDB borrowing member countries can share experiences and formulate regional responses to common policy issues. For the purposes of this analysis, the Caribbean sub-region (hereafter referred to as "the Caribbean" or "the sub-region") contains eight countries. These countries are: Bahamas, Barbados, Dominican Republic, Guyana, Haiti, Jamaica, Suriname, and Trinidad and Tobago.

This Profile provides an overview of environmental management priorities, achievements, and challenges in the sub-region. It also provides some recommendations for sub-regional initiatives that could be pursued through the Dialogue. Throughout this paper, environmental management issues are divided into three categories: natural resources management, urban environmental management, and environment and competitiveness.

### ENVIRONMENTAL MANAGEMENT PRIORITIES

There is a significant amount of variation among the countries in the Caribbean sub-region. Despite these variations, all of these countries are facing a surprisingly similar set of environmental management priorities. In reviewing these priorities it is important to consider that the cause and impact of these priorities are principally local, not global.

#### *Natural Resources Management Priorities*

**Watersheds.** Loss of forest cover, unsustainable agricultural practices, fires, mining activities, and other developments in the upper watersheds are contributing to watershed degradation that has significant implications for future development in the sub-region. The most significant implications of watershed degradation in the sub-region are the threat to drinking water supplies and coastal ecosystems.

**Coastal and Marine Ecosystems.** The economy of the Caribbean sub-region depends very heavily on coastal and marine resources. Coastal areas in the Caribbean are coming under extreme pressure due to unmitigated development, pollution, over-exploitation of resources, and growing conflicts between competing resource uses. It is estimated that two-thirds of Caribbean reefs are at risk.

**Biodiversity.** Biodiversity in the Caribbean is under tremendous pressure due to habitat destruction, overexploitation and harvesting of species, and pollution. The implications of biodiversity loss to the Caribbean sub-region include loss of existing tourism and exploitative activities, as well as the opportunity costs of foregoing potential new exploitative and non-exploitative activities such as tourism and new biological and chemical discoveries.

**Other Issues.** While not of the highest priority in the sub-region as a whole, mining and the management of forests as commercial resources are of particular concern for some countries.

### *Urban Environmental Management Priorities*

**Solid Waste.** Most of the countries in the Caribbean sub-region lack proper sanitary landfill facilities. Solid waste collection is a significant problem for many urban and rural areas. Concern with solid waste management in the Caribbean is compounded by the lack of hazardous waste management facilities in the sub-region. The lack of adequate solid waste management presents a significant short- and long-term environmental and public health threat in the sub-region.

**Wastewater.** Wastewater is a significant source of pollution in the Caribbean, with sewage being the single greatest source of concern. Sewage can contaminate bathing areas and public water supplies. In several countries in the Caribbean, potable water supplies are under threat from sewage contamination. Contamination caused by sewage poses a very significant threat to coral reefs and other ecosystems. In addition to sewage, there are significant concerns with localized impacts of commercial and industrial effluent.

**Other Issues.** While not of the highest priority in the sub-region as a whole, air pollution is a significant concern in several countries. The principle cause of concern with regard to air pollution is motor vehicles, although other important sources include power generation, industry, and landfill fires. Another important issue in the Caribbean is agricultural chemical use. Very little documentation exists, but there are concerns about the toxicity, quantity, application, and disposal of agricultural chemicals.

### *Environment and Competitiveness*

**Adaptation to a New Paradigm.** The biggest priority for the environment and competitiveness is adapting to a new paradigm in which environmental management is becoming more relevant to competitiveness. Increasingly, environmental management is becoming a threshold of entry into international trading systems, with countries, companies, and customers all imposing their own environmental management requirements and expectations on trading partners, suppliers, and service providers. At the same time, environmental management presents competitiveness opportunities in such areas as sustainable tourism, organic farming, certification, and long-term cost savings.

## ACHIEVEMENTS IN ENVIRONMENTAL MANAGEMENT

Although some laws and agencies have existed for decades, it is only in the past 10 years or so that environmental management has started to receive serious attention in the Caribbean—and it is only in the past 5 years or so that environmental management efforts have begun to develop momentum. Because responses to environment management needs have started to gain momentum in the Caribbean only recently, it is difficult, and perhaps even premature, to

identify many specific environmental management achievements. It is more appropriate to look for clear signs of progress.

***General Achievements***

**Legal and Institutional Framework.** The most significant sign of progress in the Caribbean in the past 5 years has been the establishment of national legal and institutional frameworks for environmental management. All of the countries in the sub-region have a lead agency for environmental management and most have established framework legislation, regulations, or standards. Although these new frameworks are largely untested, they form an important platform for future achievement.

**Human Resources.** There has been significant progress in the development of an environmental management human resource base in the Caribbean. There is now a cadre of experienced environmental management professionals in public and private organizations in the Caribbean.

**Public Awareness and Participation.** Awareness of and concern for environmental issues has increased significantly in the sub-region. The policy development and environmental impact assessment (EIA) processes have introduced new levels of public awareness and participation, offering opportunities for public input through consultations and formal notice-and-comment proceedings.

**Services Sector.** The growth of the sub-regional consulting and contractor environmental services sector presents has created a capacity to meet environmental management needs from within the region. The services sector provides a career path that can attract people into the environmental sector, while retaining expertise in the sub-region.

***Natural Resources Management Achievements***

**Regulatory.** Examples of some early regulatory accomplishments in the sub-region include the establishment of coastal zone management programs in Barbados and Jamaica. The Barbados program in particular has been successful in establishing the basis for an integrated approach to coastal zone management. Another important sign of progress is forest and biodiversity conservation programs in Suriname and Guyana. Both of these countries have established significant new reserve areas for conservation and research.

**Non-Regulatory.** Co-management is a process in which natural resource users or NGOs are given management responsibility for natural resources. Co-management represents a cost-effective and sustainable alternative to government management of these resources. Although experience with co-management in the Caribbean has been limited, there have been some encouraging experiments in the sub-region.

### *Urban Environmental Management Achievements*

**Regulatory.** The establishment and implementation of EIA procedures in Bahamas, Barbados and Jamaica has had a positive impact on development projects there. New EIA processes in Trinidad and Tobago and Guyana will begin to have a greater impact on development projects in those countries. Several countries have established new pollution control requirements and standards, but it is generally still too early to assess the performance of those new requirements.

**Non-Regulatory.** Jamaica and Trinidad and Tobago have both implemented some community-based projects to address solid waste and environmental contamination issues. Barbados is making significant investments to improve its sewerage systems.

### *Environment and Competitiveness Achievements*

Many companies in the Caribbean sub-region have begun to implement environmental management systems. These systems vary from ISO14001-based systems to the Green Globe certification program for hotels. It appears that many firms have adopted management systems to save money and to brand themselves as environmentally friendly. This is particularly encouraging, because it debunks the prevailing notion that environmental management and economic development are competing interests.

## CHALLENGES IN THE SHORT, MEDIUM AND LONG-TERM

There are a number of challenges that countries in the sub-region must overcome to address the environmental management priorities.

### *General Challenges*

**Integration.** Environmental management is still seen as separate from and subservient to socio-economic development interests. This lack of integration limits the degree to which environmental issues are considered—and, consequently, limits the resources that are available for environmental management.

**Information.** There is a lack of good information about the status of the environment in the Caribbean, and a further lack of information about the clear human health and economic consequences of environmental degradation. Better information is needed for effective planning and regulation, and to promote greater integration and public involvement.

**Land Use Planning.** Planning is of critical importance in the Caribbean, where land is scarce, populations are growing, and ecosystems are fragile and threatened. To date, however, the Caribbean has not benefited from strong planning. In many respects, planning is seen as impeding development, not supporting it.

**Land Tenure.** Land tenure is also a significant challenge to environmental management in many countries. In many countries in the sub-region, governments own significant portions of

land that they do not have the resources or political will to control. Many people in the sub-region who occupy government or former government lands do not enjoy clear title to land. This frustrates long-term investment in land utilization choices that may be more sustainable.

**Public Awareness.** Although public awareness of environmental issues has increased significantly, there is still little environmental ethic in the Caribbean. The low level of public commitment to environmental management means that environmental issues are easily marginalized.

**Institutional Development.** Despite the successes in human resources development, there remain some critical challenges to meet the human resource demands of environmental management in the sub-region. However, the human resource issue needs to be seen as part of a larger institutional development issue. Unlike many other parts of the public service, environmental agencies are competing directly with the private sector for a limited human resource base. Public agencies need to develop working conditions that promote the retention of qualified staff. Recognizing that resources will always be limited, agencies also need to come to see themselves as facilitators of environmental management, employing both regulatory and non-regulatory approaches.

**Financing.** Many of the financing problems in the region are resource allocation issues that can be addressed through improved integration. However, the solid waste and wastewater sectors in particular present some serious financing challenges beyond resource allocation.

### *Natural Resources Management Challenges*

Land use planning and integration are the most significant challenges to the natural resources management priorities of watersheds, coastal and marine ecosystems, and biodiversity. Other important challenges include institutional capacity, land tenure, and public awareness and education.

### *Urban Environmental Management Challenges*

Land use planning, institutional capacity, public awareness, and integration are also significant challenges to the urban environmental management priorities of solid waste and wastewater. Small and medium-sized enterprises also present a special challenge. The awareness of and capacity for environmental management in these firms is limited, while regulation of these companies can consume significant resources. Another important challenge to addressing the urban environmental management priorities financing. The costs of solid waste and sewerage projects can be prohibitive.

### *Environment and Competitiveness Challenges*

There are several challenges that the sub-region faces in adapting to the new paradigm of environment and competitiveness. One challenge is simply overcoming organizational inertia to appreciate that environmental management—both as a challenge and an opportunity—is now

an established part of the trade and business reality. Another challenge is the lack of information, resources, and capacity within small and medium-sized companies to adapt to this new reality.

### *Long-Term Issues*

Some of the longer term issues facing the Caribbean include:

**Climate Change.** The countries of the Caribbean are vulnerable to global climate change. Sea level rise, sea temperature rise, and greater extremes in weather conditions all could have serious implications for development in the sub-region. It is important that countries in the sub-region participate in efforts to reduce and stabilize greenhouse gas emissions, particularly where such participation will provide opportunities for foreign direct investment and technology transfer that will have immediate local environmental and economic benefits. It is also important that countries in the sub-region incorporate climate change into their planning processes, and build capacity for adaptation.

**Urbanization.** With the exception of Haiti and Guyana, the majority of the populations in all countries in the sub-region live in urban areas. Urbanization has increased significantly over the past 20 years in all of the countries in the sub-region, and can be expected to continue. Urbanization concentrates pollution and creates significant environmental health challenges. It also presents significant public service challenges, as the basic design and infrastructure of the urban areas in the region was not designed for large concentrated populations.

**Energy.** It is estimated that electricity demand in the Caribbean will increase by 3.2 percent to 6.7 percent per year over the next 10 years (UNEP, 1999). This rising energy demand has the potential to create additional environmental stresses through air and water pollution.

**Economic Transformation and Diversification.** All of the island states in the sub-region are highly dependent on their natural resources, yet those natural resources are limited and threatened. The challenge facing the countries in the sub-region is to pursue an economic development path that is consistent with the limits of the natural resource base. One component of this path lies in the pursuit of more sustainable exploitative and non-exploitative natural resource-based activities. However, another big component of this path lies in diversifying the economies of the sub-region to reduce their direct reliance on natural resources through a focus on services and information technology.

## DIALOGUE OPPORTUNITIES

There are a number of opportunities for the IDB and the member countries to use the Regional Policy Dialogue to address the environmental management priorities of the sub-region. These opportunities include:

**Sub-Regional Networking.** There is a tremendous opportunity to establish a practical and sustained network at a technical level to provide clear mechanisms for sharing information,

experience, and technical expertise. This networking could occur through conferences, technical exchanges, and Internet-based communication.

**Baseline and Economic Studies.** There is a great opportunity to develop baseline studies on the state of the Caribbean environment at a sub-regional level, and to translate that information into basic economic and human terms. A sub-regional study that presents case studies of a cross section of issues in the sub-region would provide important information to policymakers and technicians in a more cost-effective manner than exhaustive country-by-country studies.

**Experimentation with Non-Traditional Mechanisms.** Experimenting with non-traditional mechanisms such as market-based instruments, public disclosure, and certification and branding on a sub-regional basis would limit risks while providing broad base of experience upon which to draw lessons and best practices.

**Economic Reform and Good Governance.** The World Bank has referred to national economic policies as, "pollution's hidden half." The IDB should continue to support the reduction of barriers to trade, privatization of state industries, the development of stock markets, the elimination of subsidies, and transparency in government decision-making. While not sufficient in and of themselves, all of these measures enable improved environmental management.

**Other Opportunities.** Additional opportunities that could be explored through the Regional Policy Dialogue include further promotion of environmental management systems, co-management and community-based projects, and non-traditional education.

## Introduction

This Executive Profile of Environmental Management for the Caribbean Sub-Region was prepared for the Inter-American Bank (IDB) Regional Policy Dialogue. The Regional Policy Dialogue is an initiative by the IDB to promote the establishment of regional networks in which IDB borrowing member countries can share experiences and formulate regional responses to common policy issues. The Dialogue also provides an additional opportunity for member countries to inform IDB's operations.

This Executive Profile of Environmental Management for the Caribbean Sub-Region is one of four such Executive Profiles. There are three other similar profiles for the three other IDB sub-regions: Central America, the Andes, and the South America. For the purposes of this analysis, the Caribbean sub-region (hereafter referred to as "the sub-region") contains eight countries. These countries are: Bahamas, Barbados, Dominican Republic, Guyana, Haiti, Jamaica, Suriname, and Trinidad and Tobago.

Following this introduction, this Executive Profile has three sections. Section I provides an overview of priority environmental management issues in the sub-region. Section II discusses recent accomplishments in environmental management. Section III provides an overview of the critical challenges that Caribbean countries need to overcome to address their priorities and build on their accomplishments. This section also provides some suggested actions for the countries to consider coming out of the Regional Dialogue.

In the spirit of the Regional Policy Dialogue's intent to promote regional networking, this Profile does not present country-by-country summaries. Rather, it synthesizes individual country issues and experiences to produce a regional perspective. Information from individual countries is only provided for reference or example.

In this analysis, environmental management issues are broken down into three classifications. "Natural resources management" refers to "green" issues and other resource-related issues. "Urban environmental management" refers to "brown" issues of pollution control, urbanization, and industrial and agricultural pollution. "Environment and competitiveness" refers to the way in which environmental management interacts with the competitiveness of countries and companies.

This Profile was prepared through a review of existing documents and through interviews with IDB personnel, member country officials, and representatives from non-governmental and international organizations in the sub-region. A complete list of documents and individuals consulted to prepare this Profile is included in Appendix A and B. Although this document represents a good faith effort to synthesize the inputs from all of these sources, this document is the work of a consultant and does not necessarily reflect the views or opinions of the IDB or its member countries. All conclusions and any unintentional misrepresentations of fact are solely attributable to the author.

# I. Environmental Priorities in the Caribbean Sub-Region

## Overview

For the purposes of this analysis, there are eight countries in the Caribbean sub-region (hereafter referred to as "the sub-region"). These countries are: Bahamas, Barbados, Dominican Republic, Guyana, Haiti, Jamaica, Suriname, and Trinidad and Tobago. There is a significant amount of variation among these countries. Some of these countries are middle income countries, and some of them are lower income countries. Some of these countries are part of the South American mainland, others are larger islands, and others are small islands or archipelagoes. Some of these countries are heavily industrialized, while others rely predominantly on tourism or agriculture.

**Basic Socioeconomic Data for the Caribbean Sub-Region**

| | Population | Population Growth (%) | Urban Population (%) | Area ($km^2$) | Per Capita GDP (US$) |
|---|---|---|---|---|---|
| Bahamas | 302,000 | 1.3 | 88.5 | 13,880 | 14,900 |
| Barbados | 268,000 | 0.5 | 50.0 | 430 | 9,700 |
| Dominican Republic | 8.6 million | 1.8 | 65.0 | 48,730 | 2,313 |
| Guyana | 863,000 | 0.8 | 38.2 | 215,000 | 831 |
| Haiti | 8 million | 2.0 | 35.7 | 27,750 | 475 |
| Jamaica | 2.6 million | 0.8 | 56.1 | 10,990 | 2,654 |
| Suriname | 415,000 | 0.4 | 74.2 | 163,000 | 1,154 |
| Trinidad and Tobago | 1.3 million | 0.6 | 74.1 | 5,130 | 5,462 |

World Bank. All data from 2000, except Suriname per capita GDP, which is from 1996.

**Composition of GDP for Caribbean Sub-Region**

| | Percentage of GDP | | |
|---|---|---|---|
| | Agriculture | Industry | Services |
| Bahamas | n/a | n/a | n/a |
| Barbados | 6.7 | 20.6 | 72.6 |
| Dominican Republic | 10.5 | 31.9 | 57.6 |
| Guyana | 21.6 | 27.7 | 50.8 |
| Haiti | 31.4 | 18.7 | 49.9 |
| Jamaica | 7.1 | 28.2 | 64.7 |
| Suriname | 9.1 | 23.3 | 67.6 |
| Trinidad and Tobago | 1.9 | 39.5 | 58.6 |

World Bank. All data from 2000, except Barbados, Haiti, and Suriname which are from 1996.

Despite these variations, all of these countries are facing a surprisingly similar set of environmental management priorities. As one would expect, each country does have some specific issues that are unique to its individual development situation, but all of these countries share a core set of priority environmental issues.

This remainder of this section provides an overview of the important environmental issues facing the Caribbean sub-region. This section focuses on three natural resource management issues (watersheds, coastal and marine ecosystems, and biodiversity), two urban environmental management issues (solid waste and wastewater), and one environment and competitiveness issue (adaptation to a new paradigm) that appear to be critical priorities throughout the sub-region. It is difficult to describe each of these priorities discretely, as they are all inter-related and inter-dependent in some way or another. Nevertheless, this section provides a brief overview of each priority issue and its implications for development in the sub-region. Other issues that are of importance to certain portions of the sub-region are also discussed.

**Environmental Management Priorities in the Sub-Region**

| | |
|---|---|
| **Natural Resources Management** | ? Watersheds<br>? Coastal and Marine Ecosystems<br>? Biodiversity<br>? Other (Forests and Mining) |
| **Urban Environmental Management** | ? Solid Waste<br>? Wastewater<br>? Other (Air Pollution and Agricultural Chemicals) |
| **Environment and Competitiveness** | ? Adaptation to a New Paradigm |

## Natural Resources Management

### *Watersheds*

The maintenance of upper watersheds is critical to the future development of the Caribbean, particularly the island nations. Loss of forest cover, unsustainable agricultural practices, fires, mining activities, and other developments in the upper watersheds are contributing to watershed degradation that has significant implications for future development.

One of the most significant implications is the threat to freshwater supplies. Many countries in the Caribbean sub-region face significant challenges in maintaining freshwater supplies. In many countries, the annual per capita freshwater availability falls far below the 1,000 cubic meter commonly used to measure scarcity. For example, the WHO has classified Barbados as one of the ten most arid countries in the world (UNEP, 1999). In Jamaica, it is estimated that 13 percent of rural households have to walk more than 1,000 yard to get water and 8 percent rely on surface water with no treatment (IDB, 2000). Several countries in the Caribbean, including Bahamas, Barbados, and Trinidad and Tobago, have already turned to desalinization to meet growing water needs.

Depletion of upper watersheds exacerbates seasonal wet-dry variation while limiting groundwater recharge. In Haiti, for example, it is estimated that infiltration rates for rainwater have been reduced from 40 percent to 10 percent (Ministry of the Environment, 1999). The silt and pollution resulting from activities in the upper watershed have a significant impact on the efficiency and effectiveness of waterworks. As described further below, it also has impacts on the coastal zone, particularly coral reefs. Countries that rely on surface water must rely on

increasingly heavier levels of treatment to produce potable water. There are serious concerns about the impacts of pollution and saline intrusion on precious groundwater resources. There are indications that groundwater supplies in several countries are under threats from sewage and leaking underground storage tanks. Over abstraction of groundwater combined with sea level rise could lead to significant saline intrusion.

**Changes in Forest Cover in the Caribbean Sub-Region**

| | Decrease in Forest Cover 1990-1995 (%) | Original Forest as Percent of Total Land Area (%) | Current Forest as Percentage of Original (%) |
|---|---|---|---|
| Bahamas | 2.61 | 68.4 | 0 |
| Barbados | 0 | n/a | n/a |
| Dominican Republic | 1.60 | 97.7 | 25.1 |
| Guyana | 0.05 | 98.9 | 97.4 |
| Haiti | 3.49 | 93.2 | 0.8 |
| Jamaica | 7.45 | 96.7 | 35.6 |
| Suriname | 0.8 | 91.7 | 95.6 |
| Trinidad and Tobago | 1.55 | 93.5 | 35.5 |

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***Coastal Zone and Marine Ecosystems***

The economy of the Caribbean sub-region depends very heavily on coastal and marine resources. The vast majority of the population of the Caribbean sub-region lives in the coastal zone. Most of the physical development in the Caribbean sub-region is in the coastal zone. The economies of most countries in the Caribbean depend on coastal resources for tourism and fishing. For example, it is estimated that tourism contributes up to one-third of Caribbean GDP (UNEP, 1999).

Despite, and in large part because of, this dependence on the coastal zone, coastal areas in the Caribbean are coming under extreme pressure due to unmitigated development, pollution, over-exploitation of resources, and growing conflicts between competing resource uses.

Coral reefs in the Caribbean are under significant threat. It is estimated that the wider Caribbean region contains 12 percent of the world's coral reefs and that two-thirds of Caribbean reefs are under medium to high risk (UNEP, 1999). In many parts of the sub-region coral reefs are severely damaged or are in danger of being lost. For example, the coral cover on the reefs along the north coast of Jamaica is reported to have declined from 52 percent to 3 percent over the period from the late 1970s to early 1990s (Hughes, 1994). The threat to coral systems is particularly troubling since there is growing reason to believe that reefs are an integral part of the global marine ecosystem.

Primary threats to the coastal zone include sewage, solid waste, and watershed issues described above. The transport of eroded soils to the sea by rivers has led to the increased turbidity of

coastal waters, placing an increasing amount of stress on coastal ecosystems, particularly coral reefs. Most of the suspended and dissolved materials carried by these rivers are derived from natural processes. However, human activities have contributed to this load significantly through the erosion of river basin watersheds caused by deforestation, urbanization, agriculture, industry, and the discharge of a variety of pollutants into these waters. Pollution, particularly from sewage, contributes to nutrient loading process that can choke the coral systems.

Although coral reefs need special attention, it is important to recognize that other aspects of coastal and marine ecosystems are also important and threatened. Mangrove swamps, sea grass beds, beaches, and freshwater swamps provide critical habitat for land and marine life, while providing important protection against storm surges, coastal erosion, and pollution impacts. Unmitigated development in the coastal zone exacerbates beach erosion, concentrates pollution loads, disturbs critical coastal habitats, and creates conditions that exacerbate the damages of seasonal storms.

Even areas with no significant coral reefs such as Guyana and Suriname face significant coastal zone challenges. Fishing is still an important contribution to the economies of all of these countries. Guyana's situation is somewhat unique in that a large portion of its population lives at or below sea level due to reclamation schemes during the colonial period. The coastal zone provides critical habitat for bird and other species.

With many of the economies of the region being so heavily dependent on tourism and fishing, the implications for the deterioration of coastal and marine ecosystems for Caribbean development are potentially devastating.

***Biodiversity***

The Caribbean sub-region is of extreme significance to global biodiversity conservation. There is significant national and regional endism in the region. Conservation International has identified the area of the Caribbean from Southern Florida to Trinidad as of the five "hottest of the hotspots" for global biodiversity conservation. Guyana and Suriname are part of the Guianas Forest Ecoregion, which has been recognized internationally for its conservation importance. An estimated 40 percent of the region's flowering tree species and 138 tree species are endemic. Botanical explorations and forest inventories continue to find new species to science. Most of the island states in the Caribbean have significant levels of terrestrial and marine endism. Although levels of endism in the Caribbean are not as spectacular as in other parts of the world, the endism is significant in light of the relatively small size of most of the countries in the region. Furthermore, parts of the Caribbean are important habitat for migratory species, including waterfowl and turtles. It is estimated that half of the total population of migratory bird species that visit the entire coast of the South American mainland are found in Suriname, which only contains 2 percent of South America's coastline.

Coastal and marine ecosystems in the Caribbean are also of global significance. One recent study by UNEP estimates that the area of the entire world's coral is only 284,000 square kilometers (significantly less that the combined area of Guyana and Suriname), yet this area

contains up to 70 percent of all of the fish stocks in the world. Some scientists estimate that less than 10 percent of the species living on coral reefs have been identified. This means that coral reefs may be just as important as rainforests as a source for new chemicals to benefit humankind. For example, the drug AZT, which is used to treat HIV and AIDS, is derived from chemicals extracted from a sponge, which lives on a Caribbean reef. More than half of all new cancer drug research focuses on marine organisms (UNEP, 2001).

While the global importance of Caribbean biodiversity must be celebrated, it is also extremely important to recognize the national and regional importance of Caribbean biodiversity. The region's biodiversity is already or has the potential to make very significant contributions to local development. Nature-based tourism is a growing sector in the Caribbean. In many countries, scuba diving, bird watching, turtle watching, and other ecosystem oriented tourist products offer significant opportunities for future tourism growth. The preservation of biodiversity in the Caribbean is also essential for the maintenance of ecosystems that support economic activities, particularly fisheries. Furthermore, there are many unknown potential future contributions to science and technology that the region's rich biodiversity may have to offer.

Biodiversity in the Caribbean is under tremendous pressure due to habitat destruction, invasion of exotic species, overexploitation and harvesting of species, and pollution. The implications of biodiversity loss to the Caribbean sub-region include loss of existing tourism and exploitative activities, as well as untold opportunity costs for new exploitative and non-exploitative activities, including tourism and new biological and chemical discoveries.

**Known Total and Endemic Species in the Caribbean Sub-Region**

| | **Mammals** | | **Birds** | | **Reptiles** | | **Amphibians** | | **Higher Plants** | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Total | Endemic | Total | Endemic | Total | Endemic | Total | Endemic | Total | Endemic |
| Bahamas | 12 | 3 | 88 | 3 | 35 | 17 | 2 | 0 | 1,218 | 118 |
| Barbados | 6 | 0 | 24 | 0 | 9 | 3 | 1 | 0 | 572 | 3 |
| Dominican Republic | 20 | 0 | 136 | 0 | 117 | 34 | 35 | 15 | 5,657 | 1,800 |
| Guyana | 193 | 1 | 678 | 0 | n/a | 2 | n/a | 14 | 6,409 | n/a |
| Haiti | 3 | 0 | 75 | 1 | 108 | 35 | 56 | 27 | 5,242 | 1,623 |
| Jamaica | 24 | 2 | 113 | 26 | 36 | 27 | 24 | 21 | 3,308 | 923 |
| Suriname | 180 | 2 | 603 | 0 | 151 | 0 | 95 | 8 | 5,018 | n/a |
| Trinidad and Tobago | 100 | 1 | 260 | 1 | 70 | 3 | 26 | 3 | 2,259 | 236 |

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***Other Important Natural Resources Management Issues***

As described above, watersheds, coastal and marine ecosystems, and biodiversity are the highest priority natural resource management issues in the Caribbean. There are a number of related issues that, while not of the highest priority in the sub-region, are still significant—particularly for specific countries. These issues are described briefly as follows.

As discussed previously, deforestation is a significant concern for many countries in the region. In most of the countries in the sub-region, forest management is part of larger concerns about watershed management and biodiversity conservation. However, management of forests as commercial resources is a particular concern for Jamaica, Dominican Republic, Trinidad and Tobago, Guyana, and Suriname. Guyana and Suriname are unique in the region in that they have virgin forested areas that dwarf the total land mass of the other countries in the sub-region.

Bauxite, gold, and diamond mining is also a significant challenge for Guyana and Suriname, although Jamaica, Haiti, Dominican Republic, and Trinidad and Tobago all are dealing with mineral or aggregate mining issues. Mining is believed to be a significant source of turbidity in these countries, and there have been specific instances of contamination from mercury and cyanide in Suriname and Guyana respectively. One particular challenge facing Guyana and Suriname is smaller mining operations, many of which are believed to be illegal.

**Urban Environmental Management Priorities**

***Solid Waste***

Solid waste management is a critical issue for the Caribbean sub-region. Most of the countries in the Caribbean sub-region lack proper sanitary landfill facilities. Most solid waste is disposed of in unlined dumps or degraded landfills with little or no active management. Very little is understood about the environmental characteristics of Caribbean solid waste disposal sites, but experience from other countries would suggest that many of these sites are contributing significant leachate loads to the environment.

In addition to problems with disposal facilities, there are significant problems with the solid waste collection system. Collection is a significant problem for many urban and rural areas. Litter is also a very significant problem in all parts of the Caribbean sub-region. Although consciousness has improved somewhat, there is very little public consciousness about proper management practices for solid waste or the implications of its mismanagement.

In addition to land generated wastes, the Caribbean also has a problem with ship-generated wastes. There are very few facilities in the Caribbean that can accept ship-generated wastes, and discharges from freighters, cruise ships, and yachts are a concern. Although ship-generated waste is a significant concern, it is important to put the issue of ship-generated waste in perspective. There is no doubt that ship-generated waste presents a significant problem in the Caribbean and contributes to significant environmental damage is specific instances. However, the issue of land-generated solid waste is a significantly greater and more pressing threat to human health and the environment.

The implications of the solid waste for development in the sub-region are significant and numerous. First, the lack of adequate solid waste facilities can present a significant short- and long-term environmental and public health threat. Burning of open dumps is a significant source of air pollution in several countries. Many present dump sites are situated on swamps or unstable soils, raising concerns about long-term contamination of groundwater and surface

water. Access to many dump sites is minimally controlled, creating opportunities for scavenging that raises significant potential public health concerns. Second, improperly managed wastes—even non-toxic wastes—can contribute to significant environmental problems. In addition to its aesthetic impacts, litter is known to exacerbate drainage problems, particularly in urban areas. Litter and large debris clog channels and drains, greatly contributing to flooding. Inappropriately managed solid waste also creates habitat for disease vectors such as vermin and mosquitoes.

One particular problem with solid waste management is the siting of new facilities. Island states in particular have limited land and most current and potential disposal sites are located near populations. Governments have already faced significant community opposition to the siting of new landfills or the expansion of existing ones. At the same time, there are communities that currently earn their livelihoods by salvaging existing landfills. Governments will face significant stakeholder pressure when they attempt to close existing sites.

Concern with solid waste management in the Caribbean is compounded by the lack of hazardous waste management facilities in the sub-region. None of the countries in the Caribbean region have adequate facilities to handle hazardous wastes. Hazardous wastes can be thought of in three categories: used oil, household hazardous wastes, and commercial and industrial hazardous wastes. All of the countries in the Caribbean would have these wastes. The less industrialized and more tourist-focused economies would have mostly the first two types of wastes, while the more industrialized countries would have all three types of waste in significant abundance. There are some facilities in Trinidad and Tobago that can process used oil, but there are very few options for hazardous waste disposal in the sub-region, and no process for sorting or separately managing these wastes.

It is important to recognize that the issue of hazardous waste is quite dynamic. As countries in the sub-region move to implement water effluent requirements, it is likely that hazardous waste volumes will grow. Companies will be removing hazardous wastes from their effluent. They will need viable disposal options for what is likely to be a more concentrated form of waste.

The lack of adequate hazardous waste regulations and facilities can create significant health concerns. In Trinidad and Tobago and Jamaica, for example, lead-bearing wastes have contributed to incidences of lead poisoning. Furthermore, the disposal of toxic effluent in sewer systems can compromise the effectiveness of public treatment works.

***Wastewater***

Wastewater is a significant source of water pollution in the Caribbean, with sewage being the single greatest source of concern. PAHO has estimated that only between 2 and 16 percent of the population of CARICOM countries is served by properly functioning sewage systems. Even where sewer systems exist, the treatment plants are frequently not working. Sewage from several major cities in the sub-region is currently discharged untreated into the environment. Many rural communities in the Caribbean are served by non-sewer systems such as septic systems and pit latrines. For example, it is estimated that only 36% of Jamaica's 1.3 million

rural population had access to water toilets, with the remainder using pit latrines and other systems. (IDB, 2001). If not maintained properly, these systems can also contribute to surface and groundwater contamination. Furthermore, in many countries of the Caribbean, gray water (i.e., non-toilet wastewater from sinks, tubs, and laundry) is diverted from septic and sewage systems and is discharged directly into the environment.

Sewage has serious implication for development in Caribbean sub-region. Sewage can contaminate bathing areas and public water supplies. In several countries in the Caribbean, potable water supplies are under threat from sewage contamination. Contamination caused by sewage poses a very significant threat to coral reefs and other ecosystems.

In addition to sewage, there are significant concerns with localized impacts of commercial and industrial effluent. Sources of greatest concern include oil refineries, sugar factories and distilleries, food processing operations, soft drink and alcohol manufactures, and chemical processing and manufacturing industries. Discharges from smaller and diffuse sources such as auto garages, restaurants, and agricultural operations are also a significant concern. Mineral and aggregate mining is also a significant source of concern in a number of countries. Suriname and Guyana, for example, have both had significant incidences of pollution from small and large gold mining operations. As with sewage, industrial and commercial pollution jeopardize damage ecosystems and water supplies.

**Access to Water and Sanitation in the Caribbean Sub-Region[1]**

| | Population with Access to Safe Water (%) | Population with Access to Sanitation (%) |
|---|---|---|
| Bahamas | 94 | 82 |
| Barbados | 100 | 100 |
| Dominican Republic | 65 | 78 |
| Guyana | 91 | 88 |
| Haiti | 37 | 25 |
| Jamaica | 86 | 89 |
| Suriname | n/a | n/a |
| Trinidad and Tobago | 97 | 79 |

WRI

[1] WHO defines reasonable access to safe drinking water in urban areas as access to piped water or a public standpipe within 200 meters of a dwelling or housing unit. In rural areas, reasonable access implies that a family member need not spend a "disproportionate" part of the day fetching water. Urban areas with access to sanitation services are defined as urban populations served by connections to public sewers or household systems such as pit privies, pour-flush latrines, septic tanks, communal toilets, and other such facilities. Rural populations with access to sanitation services are defined as those with adequate disposal such as pit privies and pour-flush latrines. Data are self-reported and may not be comparable among countries.

### *Other Important Urban Environmental Management Issues*

Air pollution is a significant concern in Jamaica, the Dominican Republic, and Trinidad and Tobago. Concerns about growing air pollution have also been expressed in the Bahamas and Barbados. The principle cause of concern with regard to air pollution is motor vehicles, although other important sources include power generation, industry, and landfill fires. Air pollution can have immediate and long-term effects on human health.

**Air Pollution in Trinidad and Tobago (1993)**

| | Total emissions (metric tons) | Attributable to vehicle emissions (%) |
|---|---|---|
| Suspended Particulate Matter | 46,711 | 8 |
| Sulfur Dioxide | 23,718 | 23 |
| Nitrogen Oxide | 76,110 | 71 |
| VOCs | 24,196 | 44 |
| Lead | 16 | 94 |
| Carbon Monoxide | 22,920 | 27 |

Environmental Management Authority

Another important issue in the Caribbean is agricultural chemical use. Very little documentation exists, but there are concerns with the toxicity, quantity, application, and disposal of agricultural chemicals. Anecdotal evidence suggests that farmers frequently develop "cocktails" of various chemicals, use the chemicals in excessive quantity, and do not observe appropriate management practices such as withdrawal times.

## Environment and Competitiveness

### *Adaptation to a New Paradigm*

The highest priority environment and competitiveness issue in the sub-region is adapting to a new paradigm in which environmental management is becoming increasingly relevant to global competitiveness. Increasingly, environmental management is becoming a threshold of entry into international trading systems, with countries, companies, and customers all imposing their own environmental management requirements and expectations on trading partners, suppliers, and service providers. At the same time, environmental management presents competitiveness opportunities in such areas as sustainable tourism, organic farming, and certification. For many industries, environmental management can also provide short- and long-term cost savings in terms of reduced resource use and reduced waste.

It is not sufficient for governments and companies in the sub-region simply to acquiesce to this new paradigm. They must seize it and own it. Governments must move to ensure that their own requirements comply with international treaties and are generally consistent with the requirements of their major trading partners. Governments must also establish conditions that can facilitate the private sector's adaptation to this new paradigm, particularly among small and medium-sized enterprises. At the same time, companies in the sub-region must recognize that,

in addition to creating thresholds to entry, environmental management issues can create substantial new business opportunities. Companies in the sub-region risk missing out on a new generation of technology, process, customer relationship, and branding opportunities if they do not come to see environmental management as a fundamental business strategy issue.

**Concluding Thoughts**

There are many important environmental issues in the Caribbean sub-region. When resources are limited it is important to establish priorities, as it not always possible to address every issue. This section has identified some critical natural resources management and urban environmental management priorities for the Caribbean sub-region: watersheds, coastal and marine ecosystems, biodiversity, solid waste, and wastewater. This section has also discussed the importance of adapting to a new paradigm of environment and competitiveness in the sub-region.

In reviewing these priorities it is important to consider two things. First, with the exception of the competitiveness issue, the cause and impact of these priorities are principally local, not global. There is no external force to blame for these issues, and the greatest impacts of these issues will be felt first at the local level. Countries therefore need to look internally for solutions. Second, these issues are common to all countries irrespective of their economic base or development situation. Every country in the sub-region—rural or urban, industrialized or agrarian, commercial or tourist, middle income or lower income—faces these issues. No country can say, "That's not our problem." This commonality creates a sense of urgency for all countries in the sub-region, but it also presents great opportunities for sharing of information and human resources within the sub-region.

# II. Achievements

Although many laws and agencies have existed for decades, it is only in the past 10 years or so that environmental management has started to receive serious attention in the Caribbean—and it is only in the past 5 years or so that environmental management efforts have begun to develop momentum. Many of the lead environmental agencies in the sub-region are less than 5 years old, and none is older than 10 years. Because responses to environment management needs have started to gain momentum in the Caribbean only recently, it is difficult, and perhaps even premature, to identify many specific environmental management achievements. It is more appropriate to look for clear signs of progress. This section therefore identifies some of the areas where clear environmental management progress has been made in the Caribbean.

This section begins with a discussion of some general areas of progress that have broad application to most aspects of environmental management. The section then continues with discussion of areas of progress that are more specific to the natural resource and urban environment issues discussion in Section I.

## General Areas of Progress

There are four areas of general progress in environmental management in the Caribbean sub-region. These are: legal and institutional framework, human resources, public awareness and participation, and service sector.

### *Legal and Institutional Framework*

The most significant sign of progress in the Caribbean in the past 5 years has been the establishment of national legal and institutional frameworks for environmental management. The fact that nearly all of the sub-region's representatives to the Dialogue represent some type of national environmental institution is an indication of the progress that has been made to strengthen the legal and institutional framework for environmental management. Almost all of the countries in the sub-region have enacted framework legislation for environmental management, established lead agencies for environmental management, and developed some type of national environmental policy and/or action plan. There is now a clear policy focal point for environmental management, and an emerging legal framework to support it.

Environmental impact assessments or some other form of environmental clearance are now required in Bahamas, Barbados, Guyana, Jamaica, and Trinidad and Tobago. Bahamas, Barbados, and Jamaica in particular appear to have had some early successes in shaping new developments through the EIA process. The EIA processes in Trinidad and Tobago and Guyana are more nascent, but the legal framework for EIAs is now clearly established in law.

Jamaica and Trinidad and Tobago have established specific national numerical liquid effluent discharge standards, and the rules and regulations to enforce those standards are imminent. Barbados and Guyana are in the process of developing similar standards. Barbados and Jamaica have made significant progress in developing coastal zone management programs.

**Selected Recent Legal and Institutional Achievements in the Caribbean Sub-region**

| | Agencies | Legislation | Rules and Standards |
|---|---|---|---|
| Bahamas | ?? Bahamas Environment, Science, and Technology (BEST) Commission | ?? Conservation and Protection of the Physical Environment of the Bahamas Act (1997) | ?? Environmental Health (Collection and Disposal of Solid Waste) Regulations 1998<br>?? Conservation and Protection of the Physical Landscape of The Bahamas Regulations 1997 |
| Barbados | ?? Ministry of Physical Development and Environment<br>?? Coastal Zone Management Unit<br>?? Environmental Engineering Division | ?? Coastal Zone Management Act (1998)<br>?? Marine Pollution Control Act (1998) | |
| Dominican Republic | ?? Secretaría de Estado de Recursos Naturales y Medio Ambiente | ?? Ley General Sobre Medio Ambiente y Recursos Naturales (2000) | |
| Guyana | ?? Environmental Protection Agency | ?? Environmental Protection Act (1996) | ?? Environmental Protection (Air Quality) Regulations 2000<br>?? Environmental Protection (Water Quality) Regulations 2000<br>?? Environmental Protection (Hazardous Waste Management) Regulations 2000<br>?? Environmental Protection (Noise Management) Regulations 2000<br>?? Code of Practice for Forestry Operations (1999) |
| Haiti | Ministry of the Environment | | |
| Jamaica | ?? Ministry of Land and Environment<br>?? National Environment and Planning Agency (formerly Natural Resources Conservation Authority) | ?? National Resources Conservation Act (1991)<br>?? Water Resources Act (1995) | ?? Stack Emissions Standards (1997)<br>?? Ambient Air Quality Standards and Regulations (1996)<br>?? Sewage Effluent Standards (1996)<br>?? Trade Effluent Standards (1995)<br>?? Motor Vehicle Emission Standards (1996) |
| Suriname | ?? National Institute for Environment and Development of Suriname (NIMOS) | | |

| | Agencies | Legislation | Rules and Standards |
|---|---|---|---|
| Trinidad and Tobago | ?? Environmental Management Authority | ?? Environmental Management Act (1995/2000)[2] | ?? Noise Pollution Rules (2000)<br>?? Certificate of Environmental Clearance Rules (2000)<br>?? Environmentally Sensitive Areas Rules (2001)<br>?? Environmentally Sensitive Species Rules (2001)<br>?? Water Effluent Standards (1998) |

Again, it is important to stress that the fact that the development of the legal and institutional framework for environmental management is fairly recent. It is therefore difficult and somewhat premature to assess performance at this stage. Some examples and anecdotal evidence is provided later in this section.

***Human Resources***

The second important sign of progress has been the development of human resources for environmental management. As described in the next section, the issue of human resources continues to be a significant challenge to environmental management in the Caribbean. Nevertheless, there has been significant progress in the development of an environmental management human resource base in the Caribbean. There is now a cadre of experienced environmental management professionals in public and private organizations in the Caribbean. Environmental management is definitely seen as a growing career option for the college-bound, and there are a number of competent people in the public and private sectors in the sub-region.

***Public Awareness and Participation***

The third important achievement has been in the increase of awareness of and concern for environmental issues. Again, this issue is described as a significant challenge in the next section. However, it is important to recognize that significant progress has been made in this area. This change can be difficult to document, but most people interviewed for this Profile identified an increase in news stories and special events as indicators of growing awareness of environmental issues. The policy development and EIA processes have introduced new levels of public awareness and participation, offering opportunities for public input through consultations and formal notice-and-comment proceedings. The Trinidad and Tobago Environmental Management Authority has conducted two sets of environmental literacy surveys that clearly show an increase in environmental literacy in the past five years.

***Services Sector***

The fourth important sign of significant progress has been the growth of the local environmental services sector. Jamaica, Trinidad and Tobago, and Barbados in particular play

[2] Environmental Management Act was originally enacted in 1995. Act was repealed and enacted without amendment by a special majority in 2000 to address some Constitutional issues.

host to quite a number of firms and individual consultants that offer a wide variety of environmental services. The regional service sector is still in its early development stage. The sector is still quite dynamic, with frequent entrance and exits of firms. There are also legitimate questions about the capacity and qualifications of the sector. Nevertheless, there are many firms and individuals that have managed to stay in business for several years. Furthermore, a number of locally owned firms have succeeded where foreign firms have failed.

The importance of the growth of the sub-regional environmental services sector cannot be discounted for several reasons. First, it represents a growing capacity to meet environmental management needs from within the region. Consultants and contractors can be a highly cost-effective way of obtaining services which may only be needed on a periodic basis. This is true not only for governments, but for the private sector as well. The growth of a services sector is one way the sub-region will address the human resources challenges described in the next section. The IDB has recognized the importance of the environmental services sector. The IDB's Multi-lateral Investment Fund (MIF) has identified this as an objective for its environment sector projects. Second, the services sector provides a career path that can attract people into the environmental sector, while retaining expertise in the sub-region. Finally, the growth of the services sector represents an important economic growth opportunity. Services in general are increasingly important to the economies of the sub-region. The development of a strong regional environmental services sector creates economic growth and diversification opportunities.

**Natural Resources Management**

As discussed in Section I, the natural resource management priorities for the Caribbean Sub-Region are watersheds, coastal and marine ecosystems, and biodiversity. Other important issues include forestry management and mineral resources.

***Regulatory Achievements***

Examples of some early regulatory accomplishments in the sub-region include the establishment of coastal zone management programs in Barbados and Jamaica. The Barbados program in particular has been successful in establishing the basis for an integrated approach to coastal zone management. Another important sign of progress is forest and biodiversity conservation programs in Suriname and Guyana. Both of these countries have established significant new reserve areas for conservation and research.

Some specific examples of achievements in this area include:

*Barbados Coastal Zone Management*

Barbados has made significant progress in establishing a strong legal, institutional and technical framework for integrated coastal zone management. One unique characteristic of Barbados is that it has managed to retain the public nature of its beaches. There are no private beaches in Barbados. Beach activities such as vending are regulated, but all beaches in Barbados are open

to the general public. Pursuant to the Coastal Zone Management Act of 1998, Barbados has developed a draft Coastal Zone Management Plan. This plan lays out the framework for the future development and protection of the Barbados coast, and establishes principles for such aspects as marine ecological reserves, building set-backs from the high water mark and along coastal cliffs, and the protection of benthic communities. The Coastal Zone Management Unit in the Ministry of Environment, Energy, and Natural Resources has overall responsibility for coastal zone planning, regulation, and research in Barbados. Although the Unit is relatively small, it is technically competent and motivated. The Unit works closely with the Town and Country Planning Division to review new developments in the coastal zone to ensure impacts are minimized. On the basis of successful pilot projects that were financed by IDB assistance, Barbados is now contemplating a series of major investments that will improve the condition of viability of key coastal areas.

*Forest and Biodiversity Conservation in the Guianas*

Guyana and Suriname are part of the Guianas Forest Ecoregion, which has been recognized internationally for its conservation importance. An estimated 40 percent of the region's flowering tree species and 138 tree species are endemic. Botanical explorations and forest inventories continue to find new species to science. The coastlines of the Guianas region are of important international value due to the habitat and nesting grounds that they provide for migratory birds and marine turtles. It is estimated, for example, that Suriname's 400 km coast hosts 50 percent of the migratory bird species that visit the 18,000 km South American coast. Suriname harbors more rainforest than all of the countries of Central America combined.

Guyana and Suriname have taken important measures to conserve their rainforest and associated biodiversity. In 1998, the government of Suriname, with support from Conservation International, the Goldman Foundation, the GEF, UNDP, and UN Foundation created the Central Suriname Nature Reserve. This conservation area of 1.6 million hectares joins three existing protected areas, thus making it one of the largest nature reserves in South America. The reserve harbors jaguar, giant armadillo, giant river otter, tapir, sloth, eight species of primates, and 400 bird species. The Central Suriname Nature Reserve was named a UNESCO World Heritage Site in 2000.

The Iwokrama International Rain Forest Program in Guyana was launched in 1990. Iwokrama is a reserve of 360,000 hectares of rain forest. Iwokrama's objective is to determine the extent to which sustainable utilization of tropical forest resources is compatible with their conservation, and to determine the impact of such utilization on biodiversity. Iwokrama's rain forests are in this respect a 'living laboratory' for research on these issues. Iwokrama has received support from many donors, including the Government of Guyana, the Commonwealth Secretariat, and the Global Environment Facility. An international Board of Trustees jointly appointed by the Government of Guyana and the Commonwealth Secretariat governs the Centre.

***Non-Regulatory Achievements***

Co-management is a process in which natural resource users or NGOs are given management responsibility for natural resources. Co-management represents a cost-effective and sustainable alternative to government management of these resources. Although experience with co-management in the Caribbean has been limited, there have been some encouraging experiments in the sub-region. Some examples of achievements in this area include:

*Nature Seekers Incorporated*

Nature Seekers Incorporated (NSI) of Trinidad and Tobago, a community-based NGO, has established a successful stewardship program for leatherback turtles in Matura, Trinidad. In recent years, leatherback turtles have come under severe threats due to habitat disturbance, poaching, and indiscriminate slaughter. NSI now bears primary responsibility for the conservation of marine turtles in Matura. NSI patrols the beaches of Matura on a nightly basis to protect the nesting turtles from slaughtering and egg poaching. Scientific data are collected on individual turtles during the season regarding turtle numbers, measurements, physical condition, weather condition and other information related to hatchlings and hatchling emergencies. NSI has embarked on a turtle-tagging project to determine the population size of leatherback turtles nesting in Trinidad and Tobago. This project involves the application of two unique numbered metal tags through the trailing edge of a fore and rear flipper and a coded passive integrated transponder (PIT) tag into the shoulder of an adult leatherback. This community program attracts over 6,000 visitors annually. The vast majority of these visitors are nationals, demonstrating that there can be a strong local interest in ecotourism opportunities. NSI acts as an approved tour guide agency to facilitate the viewing of turtles and to prevent their harassment and disturbance. The total number of visitors is controlled by a carrying capacity of 200 visitors per night. This project supports and encourages the community in the decision making process. It sustains the involvement of the community in natural resource management and it allows them to realize the values of the economic potential as well as the sustainable livelihood that can be derived from conserving and protecting the natural resources. Twenty community members are now employed as guides or patrols during the six-month turtle season every year. NSI has attracted and transformed eight poachers and children of poachers to become conservationists. Due to the community efforts at Matura, the slaughtering of egg-bearing leatherback turtles has been reduced from 30 percent to zero. The program has been replicated in several other communities in Northeast Trinidad and many critical leatherback nesting sites in Trinidad are now managed by community-based groups.

*Co-Management in Jamaica*

The Negril Environmental Protection Area and Negril Marine Park (Jamaica) were declared under the Natural Resources Conservation Authority (NRCA) Act in 1997 and 1998 respectively. The Marine Park falls within the boundaries of the Environmental Protection Area (EPA), as will other proposed protected areas outlined in the Environmental Protection Plan for the area. The NRCA has delegated responsibility for managing the EPA to the Negril Area

Environmental Protection Trust (NEPT) and the Marine Park to the Negril Coral Reef Preservation Society (NCRPS), which works closely with NEPT.

Sixteen local organizations from the Negril area joined forces to form NEPT in 1994. NEPT's role according to the EPA (prepared in 1995 and updated in 1997) is to lead local organizations with respect to the implementation of the Plan, with its Board functioning as the Environmental Protection Management Advisory Council referred to in the EPA regulations. NEPT's Board, its structure and operation, enables the organization to play its role as a leader and coordinator for environmental activities and as the Management and Advisory Council for the EPA. The Board is composed of twenty members, with thirteen representing specific organizations. This helps ensure a broad-based representation so important for a local advisory committee. It also ensures a wide range of skills and representation from local stakeholders.

Through NEPT, local efforts towards environmental conservation and sustainable development within the Negril EPA are coordinated. Its office, staff, and facilities support its own work as well as that of area organizations. In addition to managing the Negril EPA, activities focus on community education, environmental monitoring, fundraising, and a wide variety of environmental improvement projects in the EPA (SIDSNET).

**Urban Environmental Management**

As discussed in Section I, the urban environmental management priorities for the sub-region are solid waste and wastewater. Other important issues include air pollution and agricultural chemicals.

***Regulatory Achievements***

The establishment and implementation of EIA procedures in Bahamas, Barbados and Jamaica has had a positive impact on development projects there. New EIA processes in Trinidad and Tobago and Guyana will begin to have a greater impact on development projects in those countries. Several countries have established new pollution control requirements and standards, but it is generally still too early to assess the performance of those new requirements.

***Non-Regulatory Achievements***

Jamaica and Trinidad and Tobago have both implemented some community-based projects to address solid waste and environmental contamination issues. Barbados is making significant investments to improve its sewerage systems, and has had some positive experience in encouraging the use of alternative energy. Some specific examples of achievements in this area include:

*Lead Remediation in Trinidad and Tobago*

In 1993, cases of lead poisoning were diagnosed in children from the Demerara Road area in Northeast Trinidad. Investigations revealed that during the late eighties and early nineties lead

waste from a smelter was used to pave the roadway and raise the level of some houses. Some residents were found to have blood lead levels as high as 160 mg/l, 10 mg/l being a safe limit and levels above 45mg/l requiring hospitalization. Some residents relocated but many refused. In 1997 the EMA was mandated to clean up the site.

Before the beginning of the project, the EMA held discussions with all the stakeholders to assess its scope and to develop an education and awareness program. Both local and international agencies offered their expertise in the development and execution of the cleanup. The education and awareness program started in September 1998 and included community discussions and lectures. An EMA project officer worked very closely with the community and innovative methods, including a street theater, were used to educate residents about the dangers of lead contamination. Site remediation of contaminated materials began on June 5, 2000, and was completed by August 25, 2000. The lead contamination was removed and the site completely remediated. Secondary remediation, i.e., the disposal of mattresses, cushions, etc., that may have contained lead dust or particles, was also completed. Some of the children from the area, as well as affected adults, were treated for lead poisoning. Important lessons from the project include: (1) The community must be informed of what is being done at each step of the process. It is even more critical that residents be kept informed with respect to the results of the health tests performed on them; (2) Identifying and appointing a leader in the community to work in tandem with the remediating organization is essential; and (3) A community project officer who can relate to the people of the community and gain their trust is essential to the success of the project (SIDSNET).

*Jamaica Community Solid Waste Initiative*

The communities of Pimento Walk, Parry Town, Spring Piece and Snow Hill are located in the watershed area directly above the Ocho Rios Bay, Jamaica. The area consists of a mixture of formal and informal households, schools, churches and small commercial enterprises. A major source of garbage within the community dumps is from households; roads traversing the community are in very poor condition and in some cases only accessible by tracks. Due to these conditions and resource constraints, solid waste collection service was not being provided to the area. In addition to the problem of solid waste collection and dumps within the communities, there are also a number of illegal dumps which contractors used for the disposal of solid wastes.

The Project grew out of a partnership between the USAID-funded Coastal Water Quality Improvement Project (CWIP) and the communities. The first meeting between CWIP and the communities took place in October 1999. At the meeting, it became clear that the community had extensive knowledge of the problem and its negative impacts on the town of Ocho Rios and the Bay. A workshop to develop a project profile was held and at subsequent meetings a Steering Committee was put in place. An assessment of all the communities indicated that approximately 22 containers or 396 drums would contain the communities garbage with a twice a week pick up. To date, the project has successfully made a general clean up of backyards and open spaces in the communities. Drums have been placed at pre-identified locations and heavy-duty equipment has been contracted to cleanup 11 illegal dumps. An environmental education

program has been conducted in the four communities and a weekly collection system has been implemented.

A major achievement is the establishment of a Steering Committee for the project. This body represents four communities and is part of the Government's plans to increase community participation. The Steering Committee has already negotiated an agreement with the Parish Council to come under their collection system, which will constitute the next step of the project. Placement of containers, beautification of the area, the strategic placement of signs, and a best-kept community competition will complete the project. One important lesson from this project is that Communities are able to address their own problems with proper financial resources and technical and organizational development support (SIDSNET)

*Barbados Solar Water Heaters*

In 1974, Barbados introduced a tax incentives for homeowners to invest in solar energy. From 1994 to 1997, it is estimated over 30,000 solar hot water systems have been installed, producing an estimated cumulative savings of US$66 million (UNEP, 1999).

**Environment and Competitiveness**

Many companies in the Caribbean sub-region have begun to implement environmental management systems. These systems vary from ISO14001-based systems to the Green Globe certification program for hotels. It is difficult to estimate the number percentage of companies that are implementing environmental management systems, but anecdotal evidence suggests that it is a significant trend. There appear to be several motivations for these company actions. First, many companies have foreign ownership and management that establish certain minimum operating standards. These companies are required by their stakeholders to implement basic management systems. Second, concerned with pending legal requirements, many companies have decided to get their house in order by adopting a management systems approach. Third, it appears that many firms have adopted management systems to save money and to brand themselves as environmentally friendly. This is particularly encouraging, because it debunks the prevailing notion that environmental management and economic development are competing interests. Some specific examples of achievements in this area include:

*Sustainable Tourism*

There have been a number of initiatives in the tourism sector to promote more environmentally sustainable practices. In 1995, the Caribbean Hotels Association created the Caribbean Alliance for Sustainable Tourism (CAST). CAST is an agreement between the Caribbean Hotel Association, Green Globe 21 and the International Hotel Environment Initiative (IHEI). CAST provides education and training on sustainable tourism. Many participants in the CAST program have realized cost savings through more efficient energy, water, and solid waste management initiatives. In collaboration with CAST, the Caribbean Tourism Organization (CTO) is now leading an effort to establish a Blue Flag certification program in the Caribbean. The Blue Flag scheme is a voluntary certification program for

beaches and marinas that has been operating in Europe since the mid-80's. In May 2001, the CTO, the Caribbean Conservation Association (CCA), and the Caribbean Hotel Association established a regional consortium to implement the Caribbean Blue Flag (CBF) Campaign. The Blue Flag Criteria for the Caribbean will be developed by the consortium in consultation with Caribbean countries.

**Achievements with Regard to Specific Environmental Management Priorities**

| | Regulatory | Non-Regulatory |
|---|---|---|
| **Natural Resources Management** | | |
| Watersheds | No clear achievements as yet | No clear achievements as yet |
| Coastal and Marine Ecosystems | Barbados and Jamaica coastal zone management programs | No clear achievements as yet |
| Biodiversity | New reserve areas in Guyana and Suriname<br>National Biodiversity Strategy and Action Plan (NBSAP) completed or underway in most countries | Jamaica and Trinidad and Tobago co-management projects (see text) |
| Other (Forests, Mining) | Code of Forestry Practices in Guyana | No clear achievements as yet |
| **Urban** | | |
| Solid Waste | IDB-funded projects being implemented in Bahamas, Barbados, Jamaica, Guyana | Jamaica and Trinidad and Tobago community-based projects (see text) |
| Wastewater | EIA procedures in Bahamas, Barbados, Jamaica, Guyana, and Trinidad and Tobago<br>Wastewater regulations and standards in Jamaica and Guyana | Some new sewerage projects in sub-region |
| Other (Air Pollution, Agricultural Chemicals) | No clear achievements as yet | No clear achievements as yet |
| **Competitiveness** | | |
| Adapting to the New Paradigm | | Services sector<br>Management systems |

## III. Challenges in the Short, Medium and Long Terms

Although there are some significant signs of progress in the sub-region, the Caribbean faces many challenges to effective environmental management. This section describes some critical challenges that countries in the sub-region must overcome to address the priorities described in section I, and build on the successes described in section II.

### Integration

Although important progress has been made, much work still needs to be done to integrate environmental management into mainstream development in the Caribbean. For the most part, environmental management is still seen as separate from and subservient to socio-economic development interests. This lack of integration limits the degree to which environmental issues are considered, and, as a consequence, limits the resources that are available for environmental management.

There appear to be two major contributing factors to this lack of integration. The first major factor is the way in which environmental degradation in the Caribbean is occurring. Politicians and the populace tend to react to a crisis: a single defining event that establishes the situation and serves as a rallying point for action. In general, environmental degradation in the Caribbean is occurring slowly over time, and has yet to manifest itself any single defining event or moment. The defining crisis moment may never come. More than one person interviewed for this profile drew an analogy to a frog is a pan of water. The stated (although assuredly untested) belief is that frog placed in hot water will jump out immediately, while a frog placed in cool water that is gradually heated will stay put.

The second major contributing factor to the lack of integration is the paucity of clear information about the human health and economic consequences of environmental degradation. If one accepts that environment management is generally not a policy priority in the sub-region, then it is critical to translate the costs of environmental degradation and the benefits of environmental management into credible economic and human health terms. For example, it is one thing to say that air pollution is bad. It is quite another to say that air pollution is reasonably believed to contribute to X number of sicknesses per year resulting in Y costs in terms of lost productivity and healthcare costs. Without this translation, it will continue to be very difficult to integrate environmental management into the mainstream.

Unfortunately, very little work has done in the sub-region to make this necessary translation. It is generally understood that pollution and environmental degradation is bad, but there is very little information that describes the human health and economic consequences. Where immediate economic impacts are clear, there tends to be more decisive action. For example, the threat of losing markets for fish, shrimp, conch, and other marine products due to trade restrictions related to conservation and sanitation prompted very rapid changes in national legislation and practices in Jamaica and Trinidad and Tobago.

Measures to address the priorities described in Section I all depend on altering behavior and investing public and private money. Addressing the problems of sewage and solid waste management will require tremendous investments. Given that resources are limited and that there are numerous issues competing for capital investment, it is critical that these investment costs be justified through clearly defined benefits. Some interventions, such as upper watershed management, may actually present considerable cost savings opportunities in terms of increased reliability of water supply and reduced treatment costs. There is an apparent engineering bias in the management of water systems. Water management tends to be seen in terms of engineering solutions (treatment works, drainage systems), rather than system-based solutions. Global experience has demonstrated that, in many instances, upper watershed interventions can be more cost-effective than downstream engineering works.
Again, those cost-benefit tradeoffs need to be documented and clearly communicated to policymakers.

**Information**

In the past 15 years it has been recognized internationally that the publication of information about environmental releases and environmental conditions can contribute significantly to environmental management efforts. Publication of data about company performance forces companies to consider information that they might not have previously collected, empowers citizens, and encourages improved behavior. Publication of data about ambient environmental conditions makes the citizenry more aware of their surroundings and encourages them to be more conscious of their own behavior—and more demanding of government and companies. Even if not published widely, basic environmental information provides a basis for decision making and prioritization of scarce resources.

Unfortunately, there is surprisingly little information about actual state of the environment in the Caribbean, and even less information about he environmental performance of companies. What little information that does exist is not readily available to the public in an accessible form and context. A recent attempt by the Environmental Management Authority in Trinidad and Tobago to prioritize environmental issues in a systematic manner was thwarted by a lack of good information. There are very little baseline data against which to assess degradation or improvement.

Lack of information should not be an excuse for inaction. Most countries in the sub-region are undertaking management initiatives on the basis of the best information available and anecdotal evidence about the most significant problems. Nevertheless, environmental management efforts in the sub-region are hampered by a lack of information. There needs to be a concerted effort to develop good information and to establish program to convey that information to the public and decision makers in the sub-region.

**Land Use Planning**

Planning is of critical importance to all aspects of environmental management in the Caribbean. In a situation where land is scarce, populations are growing, and ecosystems are fragile and

threatened, careful methodological planning that is based on a fundamental understanding of environmental systems is essential. To date, however, the Caribbean has not benefited from strong planning. Many of the problems facing the region are a direct result of haphazard or weak planning. Stresses on coastal areas, developments in critical watersheds, development without extension of sewage services, and mingling of industrial and residential activities all result from poor planning or a lack of enforcement in the planning process. The EIA processes that are now being implemented in many countries in the sub-region are starting to address some of these planning issues. However, many of the impacts of poor planning result from the cumulative activities, where none of the individual activities would require an EIA.

A number of factors contribute to this planning problem. First, the economies of the Caribbean sub-region are small and fragile. Societies are small. In this context, it is very difficult for political leaders to say "no" to any type of development. Planning is seen as undermining development, not supporting it. Second, planning has tended to be a centralized process. A centralized approach to planning at the national level limits community ownership of the planning process. Most states in the Caribbean sub-region remain highly centralized. The planning process presents an opportunity to give more responsibility and authority to local communities.

**Land Tenure**

Land tenure is also a significant challenge to environmental management in many countries. In many countries in the sub-region, governments own significant portions of land that they do not have the resources or political will to control. Many people in the sub-region who occupy government or former government lands do not enjoy clear title to land. This frustrates long-term investment in land utilization choices that may be more sustainable. Lack of clear land tenure acts as a deterrent to investments in soil conservation and longer-term tree crops in many countries. Lack of land tenure can contribute to slash-and-burn agriculture, soil erosion, and the construction of temporary housing structure that lack adequate sanitary facilities.

**Public Awareness**

Although public awareness has increased significantly in the past several years, much further work is necessary to promote an environmental ethic in the Caribbean. The fact that littering continues to be a common problem throughout the sub-region demonstrates this. The low level of public commitment to environmental management has a direct impact on the level of public resources that are available for environmental management. Because they generally lack a broad-based constituency, environmental issues are easily marginalized.

**Institutional Development**

Institutional development is a critical challenge to environmental management in the Caribbean. One aspect of this is human resources. Given the relatively recent emphasis on environmental management in the sub-region, human resource capacity is still catching up to meet rising demands in the sector. Many of the Caribbean countries are particularly challenged

in this regard due to their relatively small population bases. Even if the breadth of skills is present, there is very little depth upon which to draw. The issue of human resources is not just a public sector issue; companies also need qualified personnel to manage the environmental aspects of their operations, and NGOs need qualified people to act as advocates and to manage projects. There are both skill and experience dimensions to the human resources issue. The skill dimension can be addressed through education and training, but the experience dimension requires time and mentoring. Both dimensions are necessary to address human resource issues.

There is no doubt that the continued building of human resource capacity in the sub-region is a critical need. However, the issue of human resource capacity is being addressed. As discussed in the previous section, the environmental field in the Caribbean is a growing field. Capability will continue to expand over time, as long as resources are dedicated to practical training and people have the opportunity to gain experience which can only come over time.

While human resources is an important issue, it is only one aspect of institutional development. There are other more significant institutional development issues in the sub-region that present their own challenges and exacerbate the human resource capacity challenge.

Environmental management is a dynamic and highly skilled field. Unlike many other parts of the public service, environmental agencies are finding themselves in direct competition with the private sector for what has already been established as a limited human resource base. At the same time, public sector salaries are low and the work environment generally does not encourage or reward performance. As a result of this, public sector environmental agencies in the Caribbean have a difficult time attracting and retaining skilled staff. Many government agencies experience rapid turnover and have trouble retaining senior managers as they lose the most qualified personnel to the private sector or to opportunities outside the sub-region. This problem is not unique to the environmental sector, but it is particularly pronounced. These larger institutional development issues suggest that, while short-term training courses and tertiary education programs are a necessary part of capacity building in the region, they will not be sufficient.

Even if they can find ways to address some of these larger institutional issues, it is doubtful whether environmental agencies in the sub-region will ever have large staff complements with great depth and breadth of skills and experience. The resources are just not there in most of these countries to support large agencies. Agencies that do attempt to develop large staff complements risk attracting the least able and least motivated in the environmental sector and/or subjecting themselves to high levels of turnover that will undermine productivity and frustrate the development of good institutional experience and memory.

It is important to appreciate that a certain level of turnover can actually be a positive phenomenon, particularly if departing staff remain in the sub-region. Turnover can ensure that government environmental agencies remain fresh and can provide an important opportunity to strengthen and shape the environmental management capacity of the private sector. However, public agencies need to be able to develop institutional memory while retaining core

competencies. They also need to be able to attract, develop, and retain senior managers who can guide agency development.

Accepting that large-scale public service reform may not happen for a long time, it is important to promote meaningful institutional development within the existing framework. There are a number of ways to do this. First, agencies will need to focus on developing and retaining a small cadre of highly motivated professionals. While they may not be able to compete on salaries, government environmental institutions may be able to offer benefits that make them competitive with the private sector. Independence, belief in mission, institutional impact, education and travel opportunities, clear career development tracks, flexible working hours, and other benefits can create attractive working conditions. All environmental agencies in the sub-region need to develop clear human resource strategies that focus on attracting, developing, and retaining staff within whatever confines exist. The lead environmental agencies in Guyana, Jamaica, Suriname, and Trinidad and Tobago are semi-autonomous executive agencies that have some degree of freedom from normal public service practices.

Second, agencies need to outsource a significant amount of work, relying on consultants and contractors wherever feasible. As noted in the previous section, there is a growing environmental services sector in the sub-region. Agencies need to rely on this sector. Several agencies in the sub-region are developing fee structures for approvals and permits to ensure that sufficient resources are available to hire this expertise.

Third, government responsibilities for environmental management need to be streamlined and tightly coordinated. Governments need to minimize the transactions costs associated intra-governmental coordination so that the maximum amount of resources can be applied to actual environmental management activities. This is particularly true for the issues of watersheds and coastal and marine resources where management areas do not usually correspond with administrative, cultural, and community boundaries.

Fourth, although regulation and enforcement are critically important, agencies will need to be facilitators of environmental management as much as they are directors of it. To the maximum extent practicable, agencies need to rely on non-regulatory approaches such as education, market-based instruments, co-management, public-private partnerships, management systems, awards programs, and outright cajolery.

Fifth, governments need to recognize that institutional capacity can be a limiting factor for small and medium-sized companies. Governments need to develop innovative education and technical assistance facilities for this sector.

Finally, agencies in the sub-region need to rely on each other. There is a tremendous need and opportunity for sub-regional collaboration. This issue is discussed further in Section IV.

**Financing**

Many of the financing problems in the region are resource allocation issues that can be addressed through improved integration. However, the solid waste and wastewater sectors in particular present some serious financing challenges beyond resource allocation. For example, it is estimated that providing adequate sewerage for Kingston, Jamaica will cost $300 million. The cost of the Barbados South Coast Sewerage Project, which will provide sewerage and primary treatment to a 12-kilometer stretch of coast, exceeds $90 million. A similar project planned for the West Coast of Barbados will likely exceed $100 million. In addition to the costs of new solid waste facilities, the closure and post-closure management costs of existing dump sites could be astronomical. To meet these needs, governments in the sub-region will need to seek international funding and pursue innovative measures, such as privatization.

**Global Issues and Multi-Lateral Agreements**

Global issues are important for the Caribbean. In particular, the issues of global climate change, biodiversity, transboundary shipments of waste, marine pollution and ship-generated wastes, and trade-related environmental issues are all significant issues of concern for Caribbean countries. Multi-lateral agreements that address these issues can have significant positive and negative implications for development the sub-region. These agreements present funding opportunities and opportunities to exert control over issues over which the countries in the sub-region have little direct control. However, these agreements can also create potential constraints on development in the sub-region while creating significant implementation costs.

For these reasons, it is imperative that Caribbean governments track and participate in these multi-later agreements. However, there are several challenges that governments in the sub-region must overcome. First, there is very little understanding at the highest policy levels as to the need for and implications of these agreements. In a number of instances, countries in the sub-region have signed onto agreements with little understanding of the financial and institutional requirements required for implementation. Second, for the reasons described above, there is limited institutional capacity in the sub-region to implement and participate in these multi-lateral agreements. Direct costs of meaningful participation in international meetings aside, the time required to implement and participate in these agreements can exact a significant opportunity cost in terms of staff time and management focus. Third, a focus on global issues can perpetuate a notion that environmental management is an externally driven problem, and, as a consequence, the solutions must also be external. Caribbean countries must address global issues and find meaningful ways to participate in multi-lateral agreements. However, the causes and solutions of the priority environmental management issues in the sub-region are predominantly local. Governments in the sub-region need to stay focused on these priorities, while recognizing that donor funding to address these issues will be limited.

**Most Significant Challenges with Regard to Environmental Management Priorities**

| | Integration | Information | Land Use Planning | Land Tenure | Public Awareness | Institutional Development | Financing | Global Issues |
|---|---|---|---|---|---|---|---|---|
| **Natural Resources Management** | | | | | | | | |
| Watersheds | X | X | X | X | X | X | | |
| Coastal and Marine Ecosystems | X | X | X | | X | X | | X |
| Biodiversity | X | X | X | X | X | X | | X |
| **Urban Environmental Management** | | | | | | | | |
| Solid Waste | X | X | | | X | X | X | X |
| Wastewater | X | X | X | | X | X | X | |
| **Environment and Competitiveness** | | | | | | | | |
| Adapting to the New Paradigm | X | X | | | | X | | X |

Please note: All challenges are relevant to all issues. This table highlights the most significant challenges for each issue.

## Long-Term Challenges

The preceding parts of this section have discussed some immediate challenges and opportunities to environmental management in the Caribbean sub-region. This last part discusses a number of longer term challenges facing the region. Although the impacts of the challenges are only beginning to be understood today, they have potentially serious implications and merit attention.

### *Climate Change*

The countries in the Caribbean sub-region, particularly the island states, are vulnerable to global climate change. Irrespective of its cause, climate variability, in terms of more severe storm activity and greater extremes in wet and dry conditions, could have serious implications for the region. Sea level rise could affect coastal areas and freshwater aquifers. Coral reefs are believed to be particularly vulnerable even to fairly slight changes in sea temperature and level. For example, it is estimated that the El Niño event in 1998 caused the loss of 90 per cent of the corals in some parts of the Indian Ocean, representing 5% of the world's reef area. Coral bleaching has been documented in several parts of the Caribbean.

The IPCC has calculated the costs of protecting Caribbean shorelines from future sea level rise is US$11.1 billion in new construction costs alone, which is well beyond the combined investment capacity of their economies. Although Caribbean states all make contributions to greenhouse gas emissions, the marginal contributions of the sub-region to global emissions are relatively modest. Climate change is one environmental management issue over which the countries in the sub-region have little control.

Accepting that situation, there are a number of concrete actions that Caribbean countries can take. First, the countries in the Caribbean need to participate in global efforts to stabilize and reduce emissions of greenhouse gases. In many instances, such measures should provide immediate local benefits through improved energy efficiency and reduced pollution. Countries in the Caribbean should support the Clean Development Mechanism and other similar initiatives that will provide opportunities for foreign direct investment in more efficient technologies and improved forest management practices. In addition to assisting in global efforts to address global warming, such investments will provide also immediate local environmental and economic benefits. It is in the collective and individual interests of the countries of the Caribbean to promote such measures. Second, the countries of the Caribbean need to prepare to adapt to potential climate change as best as they can. This includes increasing capacity to understand the potential long-term implications of climate change on Caribbean economies and considering potential climactic and sea level changes in planning and development decisions.

***Urbanization***

Rates of urbanization have significantly in the Caribbean and are projected to continue to increase. The majority of the population in all countries except Guyana and Haiti now live in urban areas.

Urban areas in the sub-region are still relatively small when compared to urban areas internationally, although the metropolitan areas of Santa Domingo and Port au Prince exceed 4 million and 2 million people respectively. Nevertheless, urbanization will present a growing issue in the Caribbean, creating an increased need for environmental health-related services and contributing to concentrations of pollution if not managed. This is particularly true since the infrastructure and layout of many Caribbean cities were not developed to support large concentrated populations.

**Actual and Projected Urban Population as Percentage of Total Population**

| | 1960 | 1980 | 2000 | 2020 |
|---|---|---|---|---|
| Bahamas | 73.6 | 75.2 | 88.5 | 92.2 |
| Barbados | 35.5 | 40.2 | 50 | 61.1 |
| Dominican Republic | 30.2 | 50.5 | 65 | 74.6 |
| Guyana | 29.0 | 30.6 | 38.2 | 51.1 |
| Haiti | 15.6 | 23.7 | 35.7 | 48.0 |
| Jamaica | 33.8 | 46.8 | 56.1 | 65.9 |
| Suriname | 47.2 | 44.8 | 74.2 | 63.4 |
| Trinidad and Tobago | 64.4 | 62.8 | 74.1 | 80.6 |

FAO (1960, 1980, 2020) and World Bank (2000)

### *Energy*

With the exception of Trinidad and Tobago, all of the countries in sub-region are dependent on petroleum imports for their energy. It is estimated that electricity demand in the Caribbean will increase by 3.2 percent to 6.7 percent per year over the next 10 years (UNEP, 1999). For example, it is estimated that Jamaica and Barbados will need to double their 1995 generating capacity by 2015. This rising energy demand has the potential to create additional environmental stresses through air and water pollution. Meeting new generating capacity can require significant investment, while escalating reliance on petroleum imports create foreign exchange demands and subjects the sub-region's economies to price shocks. Caribbean countries will need to develop energy strategies that include such measures as alternative energy, cleaner fuels, integrated resources planning, demand-side management, and full cost pricing, and energy taxes.

### *Economic Transformation and Diversification*

All of the island states in the sub-region are highly dependent on their natural resources, yet those natural resources are limited and threatened. The challenge facing the countries in the sub-region is to pursue an economic development path that is consistent with the limits of the natural resource base. One component of this path lies in the pursuit of more sustainable exploitative and non-exploitative natural resource-based activities. However, another big component of this path lies in diversifying the economies of the sub-region to reduce their direct reliance on natural resources through a focus on services and information technology.

# IV. Dialogue Opportunities

Since the purpose of the Regional Policy Dialogue is to promote regional networking for environmental management, this section presents some recommendations for concrete action that could be taken at a regional or sub-regional level. All of these recommendations provide opportunities for country and Bank participation.

## Sub-Regional and Regional Networking

There is very little systematic sharing of information within the sub-region, despite the fact that the countries share common priorities and are grappling with many of the same issues at the same time. When regional and sub-regional meetings do occur, they tend to be more at a political level with little sustained "take-home" effect.

There is a tremendous opportunity to establish a practical and sustained network at the sub-regional or regional level to provide clear mechanisms for sharing information, experience, and technical expertise. This networking could come in three forms. First, continuing on the precedent of the Regional Dialogue, there should be regular meetings of country environmental management personnel at the technical level. Rather than focus on policy makers, these meetings should instead focus on technicians, providing a forum for participants to share information and experiences, while providing an ideal situation for shared training. For example, participants could share experiences in EIAs, permit writing, and monitoring to identify best practices and learn from the mistakes of others.

Second, some type of Internet-based platform should be developed through which countries can readily obtain information from other countries about their environmental management programs. There are a number of Internet-based resources in the region. IDB and UNEP have collaborated to develop CEPNET, which is intended to provide access to national data. The UNDP and UNECLAC web sites have some case studies and project summaries. IDB's web site provides access to some studies and project information. These existing sites are all useful, but there is a need for an interactive platform that is specifically dedicated to supporting public sector environmental practitioners in the sub-region. For example, this platform could provide also provide bulletin boards and list servers through which an individual in one country could rapidly seek and obtain information or advise from other countries in the region.

Third, without compromising their sovereignty, the countries in the region should examine opportunities to collaborate on the development of standards and regulations. Even if the final results vary by country, there should be scope for the countries to collaborate on development. By pooling their information, resources, and experiences, the countries in the sub-region should be able to develop a regulations and standards more efficiently.

Fourth, the countries in the sub-region should establish a more formal and sustained approach to technical cooperation and exchange. Rather than develop depth in all areas, countries could seek to develop centers of excellence in particular areas, relying on the input of other countries. To reduce costs, wherever practical, this technical cooperation could be by telephone and

Internet. Exchanges also provide opportunities for on-the-job training to bolster experience. For example, a country wanting to build up its capabilities in a particular area could detail staff for a month to another country that has stronger capabilities in that area.

There is significant scope for IDB to facilitate and support these efforts. As a regional institution, there is tremendous opportunity for IDB to act as an information clearinghouse. Through its country representations, the Bank can strengthen its role in providing advice and technical cooperation.

Examples of networking at the sub-region and regional levels include:

***CEPNET***

The Information Systems for the Management of Marine and Coastal Resources (CEPNET) is a joint IDB-UNEP project that seeks to establish an Internet-based Wider Caribbean environmental information network. The main objective of the project is to strengthen the coastal and marine resources management capabilities of the IDB Bank member countries participating in the CEP. Each participating country implements an information clearinghouse Web page with the purpose of disseminating data on coastal and marine information, and of providing information services like: access to databases and reports; access to information with map interfaces; basic Geographic Information Systems (GIS) services; and news on national and regional environmental issues. The agreement for CEP was signed by both parties in the fall of 1994 and implementation is ongoing.

***Land-Based Sources Protocol***

The Convention for the Protection and Development of the Marine Environment in the Wider Caribbean Region, commonly referred to as the Cartagena Convention, establishes a framework for environmental management in the wider Caribbean. On October 9, 1999, the parties to the convention adopted the Protocol on the Prevention, Reduction, and Control of Marine Pollution from Land-Based Sources and Activities (LBS Protocol). The LBS Protocol recognizes the important contributions of domestic wastewater to pollution in the Caribbean and establishes regional effluent limitations for the control of sewage and a timeline for their implementation. The Protocol is the first regional environmental agreement to establish specific effluent limitations and a timeline for their implementation. The LBS Protocol provides a framework for collaboration on marine pollution issues in the wider Caribbean.

***Regional Watershed and Coastal Areas Project***

The Caribbean Environmental Health Institute, a CARICOM organization based in St. Lucia, is currently leading an effort to develop a GEF-funded project entitled, Integrating Management of Watersheds and Coastal Areas in Small Island Developing States in the Caribbean. The overall objective of the proposed project will be to assist participating countries in improving their watershed and coastal zone management practices in support of sustainable development. The project will include components addressing the following areas of concern: coastal area

management and biodiversity; tourism development; protection of water supplies; land based sources of pollution; and climate change. Activities to be undertaken during the full project may include but will not be limited to demonstration projects in the fields of marine pollution reduction and waste management, freshwater resource management, land use, soil degradation and watershed management. Addressing water resource management and conservation under conditions of stress may include pilot projects demonstrating innovative approaches to: water storage, distribution, treatment and re-use, and to the conservation of scarce resources in high demand sectors such as tourism. The project may also include pilot activities addressing information, management, policy and economic failures where these are identified as critical elements in the causal relationships between environmental issues and problems and the societal causes of such problems. All of the countries in the Caribbean sub-region will participate in the project.

***Caribbean: Planning for Adaptation to Global Climate Change***

Caribbean Planning for Adaptation to Global Climate Change (CPACC) is designed to support the participating Caribbean countries in preparing to cope with the adverse effects of global climate change, particularly sea level rise in coastal and marine areas. The project is being executed through the cooperative effort of twelve CARICOM countries and participating institutions over a period of four years by a combination of national pilot/demonstration components and regional components. The project is financed by the Global Environment Facility (GEF) and is executed by the Organization of American States (OAS). The project is assisting national governments and the University of the West Indies Centre for Environment and Development (UWICED) to: (i) strengthen the regional capability for monitoring and analyzing climate and sea level dynamics and trends, seeking to determine the immediate and potential impacts of GCC; (ii) identify areas particularly vulnerable to the adverse effects of climate change and sea level rise; (iii) develop an integrated management and planning framework for cost-effective response and adaptation to the impacts of GCC on coastal and marine areas; (iv) enhance regional and national capabilities for preparing for the advent of GCC through institutional strengthening and human resource development; and (v) identify and assess policy options and instruments that may help initiate the implementation of a long-term program of adaptation to GCC in vulnerable coastal areas.

CARICOM is currently working with the OAS to establish the Caribbean Climate Change Center (CCCC). The CCCC will be a CARICOM specialized agency with independent management that will serve as a regional mechanism to articulate, support and sustain the program of action on climate change adaptation for the Caribbean. One project likely to be executed by the Center is the follow-on project to CPACC, entitled Mainstreaming Adaptation to Global Climate Change (MACC). Like CPACC, this project will be funded by the Global Environment Facility (GEF), with co-funding from several other donors. The principal areas of activity of MACC will be: (a) the introduction of climate change in national and sectoral planning and investment decisions; (b) assisting countries with activities considered under the UNFCCC Stage II Adaptation; and (c) expanding the region's participation in global climate change monitoring, modeling and impact assessment in support of adaptation planning.

### *CaMMP*

In 2001, the Caribbean Conservation Association (CCA) established the Coastal and Marine Management Program (CaMMP). The objective of the CaMMP is to implement a series of projects to improve food security and livelihoods for coastal communities in the Caribbean by improving the governance of fisheries and increasing public participation in planning and policy development. The first project under CaMMP the Coastal Resources Co-Management Project (CORECOMP) which is funded by a three-year grant of U.S.$303,000 from the Oak Foundation of Massachusetts through the World Resources Institute. CORECOMP activities will be undertaken over the next three years in Barbados, Belize, Grenada and Nicaragua.

### *CREP*

The Caribbean Regional Environmental Program (CREP) is designed to strengthen regional co-operation and build capacity in conservation management and sustainable development of amenity areas in the Caribbean Region. CREP is funded by the European Union and is being implemented by the CCA on behalf of CARIFORUM (with the exception of Haiti and the Dominican Republic, which are being addressed under a separate EU-funded program).[3] CREP will contribute to developing environmental education and awareness in the Caribbean and implement projects to demonstrate that environmentally sound planning can create economically sustainable activities in areas such as fisheries, tourism and agriculture. The program is designed to last four years and its work plan is built four issues: developing and strengthening a regional environmental information network; promoting environmental public education and awareness; building the capacity of regional environment institutions; and establishing sustainable use demonstration sites in natural areas having significant ecological, social, recreational and economic value.

## Baseline and Economic Studies

There is a tremendous need for baseline studies on the state of the environment in the Caribbean and analyses that translate that information into basic economic and human terms. This analysis does not need to be comprehensive to be effective. It would be just as effective and far more manageable to develop a set of case studies from countries in the sub-region for a cross-section of issues. The study could focus on five to ten specific areas, detailing the state of the environment and the estimated human health and environmental impacts. Such a study would provide significant support to promoting the environmental management agenda in the sub-region. There is ample opportunity for the IDB to support the development of this type of information and for the countries in the sub-region to share in its development.

[3] The Caribbean Forum of African, Caribbean and Pacific (ACP) States (CARIFORUM) is a grouping of Caribbean States which are signatories to the Lomé IV Convention. CARIFORUM includes all of the members of the Caribbean sub-region, as well as other states in the Caribbean region.

**Non-Traditional Education**

There are significant opportunities to experiment with non-traditional environmental education that takes a social marketing approach to behavior change. Some of these things can be done on a regional basis.

**Experimentation with Non-Traditional Mechanisms**

The lack of financial and human resources will limit the effectiveness of traditional regulatory mechanisms. There is tremendous opportunity in the Caribbean to pursue non-traditional environmental management mechanisms such as market-based instruments, public disclosure, and certification and branding. The World Bank has developed extensive experience with non-traditional methods of pollution control including public disclosure and emissions trading. IDB should work with countries in the sub-region to experiment with the implementation of some of these approaches on a pilot basis.

**Co-management and Community-Based Pilot Projects**

Given that resources are limited and that there is a need to promote greater ownership of environmental management in society as a whole, governments in the Caribbean need to give serious consideration to delegating responsibility for environmental management to NGOs, community groups, public/private partnerships, and the private sector. Privatization and/or community ownership of sewage and solid waste systems can relieve government's burden while promoting investment. Co-management of watersheds and protected areas can also reduce government's burden while providing important experience to strengthen NGO and local community cohesion and capacity. By acting as facilitators, governments can leverage resources while further integrating environmental management into the mainstream of development.

Large-scale "top-down" investment and institutional development projects are necessary, but the project preparation lead-time can be long and such projects frequently encounter delays during execution. It is interesting to note that many of the specific achievements identified in the previous section are small, focused projects that are based on some type of community involvement and co-management. Small, discrete projects provide opportunities to test policy innovations, while producing clear results that can be documented and replicated. They provide opportunities for greater community and stakeholder participation, which increases ownership of environmental management. Taken collectively, many small projects can therefore create "bottom-up" momentum toward larger projects.

With IDB and donor assistance, governments in the sub-region should work with NGOs to develop and fund more of these small projects. The transactions costs associated with many small projects can be high, so some innovative mechanisms need to be found to manage small projects cost-effectively. However, it should be noted that the transactions costs of large projects can also be very high, particularly when they stall. Furthermore, projects that are

based on co-management and community participation are likely to be more cost-effective in the long-term.

**Management Systems and Environmental Branding**

Governments in the region should encourage and facilitate the adoption of environmental management systems by the private sector. Environmental management systems have proven to be very effective internationally in promoting compliance and improved environmental performance. Through the Multi-Lateral Investment Fund (MIF), the IDB is already financing one project in Jamaica that will assist small and medium sized enterprises in adopting environmental management systems. IDB should continue to work with sub-regional governments, trade associations, and NGOs to develop and support projects that promote the implementation of environmental management systems on a national and sub-regional basis. IDB should also work with the private sector to develop environmental branding opportunities similar to Green Globe and Blue Flag for the tourism and manufacturing sectors in the sub-region.

**Macroeconomic Reform and Good Governance**

Closed markets, state ownership of companies, subsidies, economic stagnation, poverty, and corruption are some of the greatest obstacles to environmental management. In its study, *Greening Industry*, the World Bank states:

> National economic policies affect industrial emissions so strongly that they constitute "pollution's hidden half." Recent research shows that cleaner production generally results from economic reforms—reducing barriers to international trade, privatizing state industries, developing new stock markets, eliminating subsidies for energy and raw materials, and deregulating domestic industries.

Economic reform by itself may not be sufficient to achieve environmental management goals. After all, the increased industrial activity associated with economic growth can increase pollution levels, especially in the short-term. This points out the need for integrating environmental management into broader socio-economic development efforts. However, continuing to support democracy, economic reform, and economic development are some of the most effective ways in which IDB can support environmental management in the sub-region.

## Annex I: Sub-Regional Data

| | Bahamas | Barbados | Dominican Republic | Guyana | Haiti | Jamaica | Suriname | Trinidad and Tobago |
|---|---|---|---|---|---|---|---|---|
| Area ($km^2$) | 13,880 | 430 | 48,730 | 215,000 | 27,750 | 10,990 | 163,000 | 5,130 |
| *Population*[4] | | | | | | | | |
| Population | 302,000 | 268,000 | 8.6 million | 863,000 | 8 million | 2.6 million | 415,000 | 1.3 million |
| Population Growth (%) | 1.3 | 0.5 | 1.8 | 0.8 | 2 | 0.8 | 0.4 | 0.6 |
| Urban Population 1960 (%) | 73.6 | 35.5 | 30.2 | 29 | 15.6 | 33.8 | 47.2 | 64.4 |
| Urban Population 1980 (%) | 75.2 | 40.2 | 50.5 | 30.6 | 23.7 | 46.8 | 44.8 | 62.8 |
| Urban Population 2000 (%) | 88.5 | 50 | 65 | 38.2 | 35.7 | 56.1 | 74.2 | 74.1 |
| Urban Population 2020 projected (%) | 92.2 | 61.1 | 74.6 | 51.1 | 48 | 65.9 | 63.4 | 80.6 |
| ***GDP***[5] | | | | | | | | |
| Per Capita GDP (US$) | 14,900 | 9,700 | 2,313 | 831 | 475 | 2,654 | 1,154 | 5,462 |
| Agriculture | n/a | 6.7 | 10.5 | 21.6 | 31.4 | 7.1 | 9.1 | 1.9 |
| Industry | n/a | 20.6 | 31.9 | 27.7 | 18.7 | 28.2 | 23.3 | 39.5 |
| Services | n/a | 72.6 | 57.6 | 50.8 | 49.9 | 64.7 | 67.6 | 58.6 |
| ***Forests***[6] | | | | | | | | |
| Decrease in Forest Cover 1990-1995 (%) | 2.61 | 0 | 1.6 | 0.05 | 3.49 | 7.45 | 0.8 | 1.55 |
| Original Forest as Percent of Total Land Area (%) | 68.4 | n/a | 97.7 | 98.9 | 93.2 | 96.7 | 91.7 | 93.5 |
| Current Forest as Percentage of Original (%) | 0 | n/a | 25.1 | 97.4 | 0.8 | 35.6 | 95.6 | 35.5 |
| ***Coastal and Marine Ecosystems***[7] | | | | | | | | |
| Length of Coastline (km) | 11,238 | 97 | 1,612 | 1,154 | 1,977 | 895 | 620 | 704 |
| Population with 100km of coast | 99.6 | 100 | 100 | 76.6 | 99.6 | 100 | 87 | 100 |
| Number of Scleractinia (Reef-forming) Coral Genera | 24 | 26 | 25 | n/a | 25 | 25 | n/a | 25 |
| Average annual marine fish catch (metric tons) | 1,510 | 3,162 | 11,058 | 36,507 | 3,733 | 7,296 | 12,660 | 13,518 |
| Average annual mollusks and crustaceans catch (metric tons) | 8,442 | n/a | 2,906 | 14,015 | 1,477 | 2,610 | 243 | 685 |

[4] Population and population from World Bank (2000). Urban population from FAO.
[5] World Bank. All data for 2000, except Suriname per capita GDP and Barbados, Haiti, and Suriname GDP composition are from 1996.
[6] WRI EarthTrends.
[7] WRI EarthTrends.

| | Bahamas | Barbados | Dominican Republic | Guyana | Haiti | Jamaica | Suriname | Trinidad and Tobago |
|---|---|---|---|---|---|---|---|---|
| ***Biodiversity***[8] | | | | | | | | |
| Mammals (Total) | 12 | 6 | 20 | 193 | 3 | 24 | 180 | 100 |
| Mammals (Endemic) | 3 | 0 | 0 | 1 | 0 | 2 | 2 | 1 |
| Birds (Total) | 88 | 24 | 136 | 678 | 75 | 113 | 603 | 260 |
| Birds (Endemic) | 3 | 0 | 0 | 0 | 1 | 26 | 0 | 1 |
| Amphibians (Total) | 35 | 9 | 117 | n/a | 108 | 36 | 151 | 70 |
| Amphibians (Endemic) | 17 | 3 | 34 | 2 | 35 | 27 | 0 | 3 |
| Reptiles (Total) | 2 | 1 | 35 | n/a | 56 | 24 | 95 | 26 |
| Reptiles (Endemic) | 0 | 0 | 15 | 14 | 27 | 21 | 8 | 3 |
| Higher Plants (Total) | 1,218 | 572 | 5,657 | 6,409 | 5,242 | 3,308 | 5,018 | 2,259 |
| Higher Plants (Endemic) | 118 | 3 | 1,800 | n/a | 1,623 | 923 | n/a | 236 |
| ***Water and Sanitation***[9] | | | | | | | | |
| Population with Access to Safe Water (%) | 94 | 100 | 65 | 91 | 37 | 86 | n/a | 97 |
| Population with Access to Sanitation (%) | 82 | 100 | 78 | 88 | 25 | 89 | n/a | 79 |
| Sewerage effluents with some degree of treatment (%) | 80 | 100 | 48.7 | 0 | 50 | n/a | 0.1 | 65 |
| Population with sewerage connection (%) | 14.1 | 1.89 | 20.1 | 8 | 0 | 29.1 | 0 | 19.5 |
| Population with in-situ treatment (%) | 85.9 | 97.5 | 69.4 | 76.7 | 26.4 | 61.4 | 85.9 | 80.1 |
| Population with no sewerage service (%) | 0 | 0.7 | 10.5 | 15.3 | 73.6 | 9.6 | 14.1 | 0.4 |
| ***Energy***[10] | | | | | | | | |
| Energy Consumption Per Capita (kg oil equivalent) 1997 | n/a | n/a | 673 | n/a | 227 | 1,575 | n/a | 6,419 |
| Final Consumption of Electricity (millions of metric tons of oil equivalent) 1997 | n/a | n/a | 432 | n/a | 27 | 477 | n/a | 370 |
| Energy Imports (millions of metric tons of oil equivalent) 1997 | n/a | n/a | 4,021 | n/a | 480 | 3,352 | n/a | 2,140 |
| Energy Exports (millions of metric tons of oil equivalent) 1997 | n/a | n/a | 0 | n/a | 0 | 67 | n/a | 7,003 |
| Passenger Cars per 1000 people 1996 | 162 | 132 | 28 | n/a | 4 | 41 | 122 | 94 |
| Annual Per Capita Motor Gasoline Consumption (liters) 1997 | n/a | n/a | 97 | n/a | 14 | 216 | n/a | 322 |
| CO2 emissions per capita (kg) 1996 | 5,978 | 3,145 | 1,619 | 1,138 | 139 | 4,029 | 5,115 | 17,508 |

[8] WRI EarthTrends.
[9] PAHO 2001.
[10] WRI EarthTrends.

## Annex II: Summary of Achievements

### Table II-1: Legal and Institutional Achievements

| | Recent Legislation, Rules, and Standards | Comments |
|---|---|---|
| **Bahamas** | **Framework Legislation:**<br><br>None<br><br>**Other Legislation:**<br><br>**Conservation and Protection of the Physical Environment of the Bahamas Act (1997).** This Act created a list of protected trees and provided for improved regulation of the cutting or excavation of hills for fill and the clearing of land for development.<br><br>**Rules and Standards:**<br><br>**Environmental Health (Collection and Disposal of Solid Waste) Regulations 1998.** Establishes new requirements for commercial and domestic solid waste collection and disposal.<br><br>**Conservation and Protection of the Physical Landscape of the Bahamas Regulations 1997.** Implements the Act. | **Bahamas Environment, Science, and Technology (BEST) Commission (1994)** is the lead coordinating agency for environmental management and implements EIA requirements. Bahamas has implemented environmental impact assessment (EIA) requirements as a matter of policy. All major developments are now subject to EIA requirements.<br><br>**Department of Environmental Health Services** is responsible for implementing new solid waste regulations. |
| **Barbados** | **Framework Legislation:**<br><br>None<br><br>**Other Legislation:**<br><br>**Coastal Zone Management Act (1998).** Establishes broad institutional and legal framework for coastal zone management, including the establishment of a Coastal Zone Management Plan.<br><br>**Marine Pollution Control Act (1998).** The Marine Pollution Control Act is broad authorizing legislation for environmental protection and applies to most sources of marine-based and land-based pollution. The Act authorizes the development of subsidiary standards and regulations for land based sources, seabed activities, dumping activities, and airborne sources. | **Coastal Zone Management Unit** is responsible for coastal zone planning, regulation, and research under the Coastal Zone Management Act.<br><br>**Environmental Engineering Division** is Responsible for most aspects of environmental regulation, including water, air, and solid waste under Marine Pollution Control Act.<br><br>Barbados implements EIA requirements through its Town and Country Planning approval process. |

| | Recent Legislation, Rules, and Standards | Comments |
|---|---|---|
| **Dominican Republic** | **Framework Legislation:**<br><br>**Ley General Sobre Medio Ambiente y Recursos Naturales (2000).** General framework legislation that establishes the Secretaría de Estado de Recursos Naturales y Medio Ambiente and authorizes the development of regulations for environmental and natural resources management. | **Secretaría de Estado de Recursos Naturales y Medio Ambiente** has overall responsibility for environmental policy and management under the Ley General Sobre Medio Ambiente y Recursos Naturales. |
| **Guyana** | **Framework Legislation:**<br><br>**Environmental Protection Act (1996).** Establishes the framework for environmental management in Guyana, establishes EIA requirements, and authorizes the development of subsidiary rules and standards.<br><br>**Rules and Standards:**<br><br>Environmental Protection (Air Quality) Regulations 2000<br><br>Environmental Protection (Water Quality) Regulations 2000<br><br>Environmental Protection (Hazardous Waste Management) Regulations 2000<br><br>Environmental Protection (Noise Management) Regulations 2000<br><br>Code of Practices for Forestry Operations (1999)<br><br>Mining regulations under development and expected in 2002 | **Environmental Protection Agency** has overall responsibility for coordinating and implementing environmental policy and management.<br><br>**Natural Resources and Environment Advisory Committee (NREAC)** is a high-level body consisting of the heads of agencies with responsibility for environment and natural resources management. The NREAC meets regularly to ensure inter-agency coordination and communication.<br><br>**Guyana Forestry Commission** is responsible for enforcing the new Code of Practices for Forestry Operation through timber sales agreement contracts.<br><br>The Environment Protection Act establishes authority for environmental impact assessments. |
| **Haiti** | | **Ministry of the Environment.** Overall policy and implementation responsibility for environmental management. The Ministry has developed an Environmental Action Plan (1999) that will serve as a basis for future achievements in the sector. |

| | Recent Legislation, Rules, and Standards | Comments |
|---|---|---|
| **Jamaica** | **Framework Legislation:**<br><br>**National Resources Conservation Act (1991).** Broad authorizing legislation for environmental management.<br><br>**Other Legislation:**<br><br>Water Resources Act (1995)<br><br>**Regulations and Standards:**<br><br>Stack Emissions Standards (1997)<br><br>Ambient Air Quality Standards and Regulations (1996)<br><br>Sewage Effluent Standards (1996)<br><br>Trade Effluent Standards (1995)<br><br>Motor Vehicle Emission Standards (1996)<br><br>Sewage Regulations and Stack Emissions Regulations to be implemented in 2002 | **National Environment and Planning Agency (formerly Natural Resources Conservation Authority)** has policy and regulatory responsibility for environment and natural resources management.<br><br>**Water Resources Authority** has responsibility for water resources planning and allocation under the Water Resources Act.<br><br>Under the Natural Resources Conservation Act, Jamaica has established a permitting and licensing procedures for new developments that includes EIA requirements. |
| **Suriname** | **Framework Legislation:**<br><br>Under development<br><br>**Other Legislation:**<br><br>Forest Act (1992)<br><br>**Rules and Standards:**<br><br>To be developed | **National Institute for Environment and Development of Suriname (NIMOS).** NIMOS has overall policy coordination responsibility for environmental management in Suriname.<br><br>**Forest Service** has responsibility for implementing the Forest Act. |

| | Recent Legislation, Rules, and Standards | Comments |
|---|---|---|
| **Trinidad and Tobago** | **Framework Legislation:**<br><br>**Environmental Management Act (1995/2000)**[11]. Establishes the Environmental Management Authority, outlines the framework for environmental management, and authorizes the development of subsidiary rules and standards.<br><br>**Other Recent Legislation:**<br><br>**Forest Act Amendments** (1999)<br><br>**Sawmills Act Amendments** (1999)<br><br>**Rules and Standards:**<br><br>Noise Pollution Rules (2001)<br><br>Certificate of Environmental Clearance Rules (2001)<br><br>Environmentally Sensitive Areas Rules (2001)<br><br>Environmentally Sensitive Species Rules (2001)<br><br>Water Effluent Standards (1998)<br><br>Water Pollution Control Rules (slated for enforcement in 2002)<br><br>Vehicle Emission Standards (draft)<br><br>Diesel Fuel Standards (draft) | **Environmental Management Authority** is the lead coordinating and regulatory agency under Environmental Management Act.<br><br>**Forestry Division** is responsible for implementing recent forest and sawmill amendments which tighten controls on cutting and processing of trees. Also responsible for as wildlife conservation and management of forest reserves and protected areas.[12]<br><br>"Environmental Police" have been used by the EMA to enforce outdated legislation (e.g., litter requirements, "visible vapor" requirements for automobiles) while new requirements are being developed.<br><br>Prior to 2001, some EIA requirements had been enforced through existing planning approval system (Town and Country Planning) |

[11] Environmental Management Act was originally enacted in 1995. Act was repealed and enacted without amendment by a special majority in 2000 to address some Constitutional issues.

[12] Trinidad and Tobago has long history of establishing forest reserves for watershed management. The first forest reserve in the Western Hemisphere was established in Tobago in 1765 for the "protection of the rains."

**Table II-2: Selected Achievements with Regard to Environmental Management Priorities**

| Priority | Regulatory | Non-Regulatory |
|---|---|---|
| **Watersheds** | **Sub-Region:**<br><br>EIA requirements in Bahamas, Barbados, Jamaica, Guyana, and Trinidad and Tobago contribute to watershed management efforts.<br><br>**Bahamas:**<br><br>Conservation and Protection of the Physical Environment of the Bahamas Act (1997). This Act created a list of protected trees and provided for improved regulation of the cutting or excavation of hills for fill and the clearing of land for development<br><br>**Jamaica:**<br><br>National Forest Management and Conservation Plan completed and approved in 2000.<br><br>Local Forest Management Plans being developed.<br><br>Draft Watershed Policy being developed.<br><br>National Integrated Watershed Management Council established. | **Jamaica:**<br><br>USAID-funded "Ridge-to-Reef" Project 2000-2004 to fund capacity building for implementation or soil and water conservation best management practices.<br><br>**Trinidad and Tobago:**<br><br>Fondes Amandes Community Reforestation Project is a community-based watershed protection project that involves reforestation, forest and wildlife protection, and organic farming. |

| Priority | Regulatory | Non-Regulatory |
|---|---|---|
| **Coastal and Marine Ecosystems** | **Sub-Region:**<br><br>EIA requirements in Bahamas, Barbados, Jamaica, Guyana, and Trinidad and Tobago contribute to coastal zone management efforts.<br><br>**Barbados:**<br><br>Barbados Coastal Zone Management Act and Coastal Zone Management Plan establishes strong framework for coastal planning and regulation. A comprehensive monitoring and GIS system has been established<br><br>**Guyana:**<br><br>Integrated Coastal Zone Management Action Plan drafted.<br><br>**Jamaica:**<br><br>Draft coastal zone management policy prepared<br><br>Coastal water quality monitoring program implemented<br><br>Community-based monitoring programs implemented in Negril, Ocho Rios, and Port Antonio<br><br>Jamaica Coral Reef Action Plan reviewed | **Jamaica:**<br><br>Community-based coastal zone management initiatives being developed and implemented through USAID-funded Coastal Water Quality Improvement Project (CWIP). |

| Priority | Regulatory | Non-Regulatory |
|---|---|---|
| **Biodiversity** | **Sub-Region:**<br><br>National Biodiversity Strategy and Action Plan (NBSAP) completed or underway in most countries.<br><br>EIA requirements in Bahamas, Barbados, Jamaica, Guyana, and Trinidad and Tobago contribute to biodiversity conservation.<br><br>**Guyana:**<br><br>The Iwokrama International Rain Forest Program in Guyana was launched in 1990. Iwokrama is a reserve of 360,000 hectares of rain forest. Iwokrama's objective is to determine the extent to which sustainable utilization of tropical forest resources is compatible with their conservation, and to determine the impact of such utilization on biodiversity.<br><br>**Suriname:**<br><br>In 1998, the government of Suriname, with support from Conservation International, the Goldman Foundation, the GEF, UNDP, and UN Foundation created the Central Suriname Nature Reserve. This conservation area of 1.6 million hectares joins three existing protected areas, thus making it one of the largest nature reserves in South America. | **Bahamas:**<br><br>The Bahamas National Trust is a non-profit organization established under the Bahamas National Trust Act in 1959. It is responsible for establishing and managing national parks and protected areas<br><br>**Jamaica:**<br><br>The Negril Environmental Protection Area and Negril Marine Park were declared under the Natural Resources Conservation Authority Act in 1997 and 1998 respectively. The NRCA has delegated responsibility for managing the Protection Area to the Negril Area Environmental Protection Trust (NEPT) and the Marine Park to the Negril Coral Reef Preservation Society (NCRPS).<br><br>**Trinidad and Tobago:**<br><br>Nature Seekers Incorporated (NSI) of Trinidad and Tobago, a community-based NGO, has established a successful stewardship program for leatherback turtles in Matura, Trinidad. The program has been replicated in several other communities in Northeast Trinidad and many critical leatherback nesting sites in Trinidad are now managed by community-based groups. |
| **Other (Forests, Mining)** | **Guyana:**<br><br>Code of Forestry Practices establishes environmental management requirements for forest operations. | |

| Priority | Regulatory | Non-Regulatory |
|---|---|---|
| | **Urban** | |
| **Solid Waste** | **Sub-region:**<br><br>IDB-funded projects being implemented in Bahamas, Barbados, Jamaica, Guyana<br><br>**Bahamas:**<br><br>Solid Waste Regulations<br><br>**Jamaica:**<br><br>Draft solid waste policy and regulations being developed | **Bahamas:**<br><br>Solid waste management facilities upgraded through IDB-funded project.<br><br>**Jamaica:**<br><br>Community-based solid waste management project in Ocho Rios has improved solid waste management practices.<br><br>**Trinidad and Tobago:**<br><br>Lead-contaminated site at Demerara Road remediated with community participation. |
| **Wastewater** | **Sub-region:**<br><br>EIA procedures in Bahamas, Barbados, Jamaica, Guyana, and Trinidad and Tobago.<br><br>New wastewater regulation and/or standards in Guyana and Jamaica. | **Barbados:**<br><br>Southcoast Sewerage Project will significantly upgrade sewage treatment.<br><br>**Jamaica:**<br><br>Wastewater advisory and monitoring committees established in Ocho Rios and Negril to enhance community participating in wastewater management. |
| **Other (Air Pollution, Agricultural Chemicals)** | **Sub-region:**<br><br>Bahamas, Dominican Republic, Haiti, and Jamaica have completed phase out of leaded gasoline. | |

| Priority | Regulatory | Non-Regulatory |
|---|---|---|
| **Competitiveness** | | |
| **Adapting to the New Paradigm** | | **Sub-region:**<br><br>Significant growth in sub-regional environmental consulting and contractor services sector.<br><br>Caribbean Hotels Association Caribbean Alliance for Sustainable Tourism (CAST) program promoting sustainable tourism.<br><br>Implementation of environmental management systems by many countries in the sub-region |

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## Annex IV: Interviewees

### National contacts

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