Global Environment Outlook

for Youth in the Caribbean

A Vision for Change!

UNEP CCA CYEN

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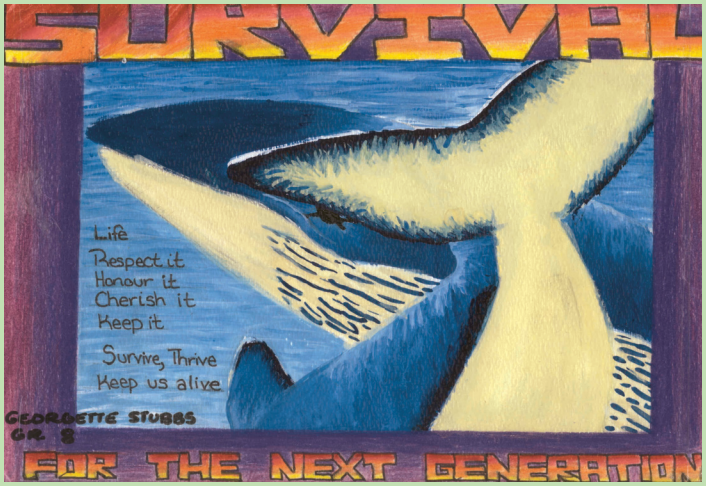

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Prologue

Youth is one of nine major groups that are recognized in the context of Agenda 21. As part of the Caribbean's commitment to the Programme of Action for the Sustainable Development of Small Island Developing States (BPOA), the Johannesburg Plan of Implementation (JPOI) of the World Summit on Sustainable Development, and the Mauritius Strategy for Implementation (MSI), we initiated the GEO Youth of the Caribbean assessment to afford young people in the Caribbean the opportunity to contribute to sustainable development policies and actions. We promote youth participation in on-going decision-making processes, since these decisions will impact their present living conditions as well as influence their future.

Countries of the Caribbean, especially Small Island Developing States (SIDS), face numerous development and environmental challenges. Due to its particular economic, social and geographical conditions, people of this region are particularly vulnerable to global changes such as commodity markets and global warming. Their development and management options are often limited by small population sizes as well as the national economies that depend heavily on a few limited sectors.

Giving our youth venues to discuss openly environmental issues and share their innovative ideas for more sustainable future is a great way to plant a sense of environmental stewardship in the leaders of tomorrow. For a decade, the GEO for Youth in Latin America and the Caribbean project, to which this GEO Youth of the Caribbean assessment is part of, has expanded to provide such opportunities to young people throughout the region.

The Caribbean process was carried with the united efforts of youth organisations, community groups, schools and individuals that have resulted in the production of this report, supported by a partnership among the United Nations Environment Programme (UNEP), the Caribbean Conservation Association (CCA) and the Caribbean Youth Environment Network (CYEN).

Through this report, young people of the Caribbean voice their concerns toward environmental damage and rapid change. It also conveys youthful vision and recommendations for what must be done, proposing strategies for sustainable development. It is a showcase of their holistic vision and eagerness to initiate concrete actions to address environmental problems and development challenges. The perspective of youth, as presented in this report, shall encourage today's decision-makers to develop and implement better policies and action plans pave a way for a more prosperous and sustainable Caribbean.

We recognize the contribution that youth can and must make to achieve a sustainable development, and that this publication would inspire you too join in our endeavours.

Ricardo Sánchez Sosa	Osmond Harewood	Andrée Griffith
Regional Director	Regional Chairman	Acting Executive Director
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Background

The GEO for Youth of the Caribbean report is part of the Global Environment Outlook (GEO) programme of the United Nations Environment Programme (UNEP), an integrated environmental assessment process that began in 1995. Evaluations of the state of the environment at the global, regional, national, and sub-national levels are regularly updated to provide guidance for decision-making on the development of policies, environmental protection measures, and resource allocation. The reports warn the international community about environmental deterioration and call for a reversal of negative trends.

The youth component of the GEO process presents the environmental concerns and proposals of young people. Young people are critical stakeholders in environmental issues due to their determining influence on present and future development trends. Indeed population forecasts indicate that nearly 60% of the population in Latin America and the Caribbean will be below the age of 30 in 2005 (ECLAC, 2004). UNEP's commitment to involve youth, between the ages of 15 and 25, in environmental management led to the launch of the GEO for Youth in Latin America and the Caribbean initiative in 1999 by the Regional Office for Latin America and the Caribbean (ROLAC). Due to the success of the project's first publication GEO for Youth: Open Your Eyes to the Environment in 2001, national and sub-regional processes were initiated throughout Latin America and the Caribbean. The resulting network of youth environmentalists enables environmentally conscious and committed youth to share experiences and develop skills in project design, implementation, and evaluation.

The GEO for Youth of the Caribbean project began in 2003 through collaboration between UNEP, the Caribbean Conservation Association (CCA), and the Caribbean Youth Environment Network (CYEN). The participation of youth from 14 Caribbean countries (13 English-Speaking territories and Dutch-speaking Suriname) make this a lively network committed to increasing public awareness and fostering innovative action to improve the environmental situation in the Caribbean. The GEO for Youth of the Caribbean report showcases research, case studies, personal experiences, and artistic contributions from over 150 young people that describe the present state of the Caribbean's environment and propose strategies to alter negative trends. The projects presented in this report should inspire youth to participate in environmental management, and to build rewarding partnerships that will bring environmental issues to the forefront of development strategies in collaboration with other sectors of society and government.

Message from the Editors



Hi!!

This publication, the Global Environment Outlook for Youth in the Caribbean report, represents our views of the Caribbean environment.

It is a step toward the realisation of our vision, to have a youth population that is fully aware of environmental issues. We believe that as major stakeholders living in fragile and diverse ecosystems, it is very important to share our concerns. Also, it is critical for us to show you how we the youth can and are working together to prevent the further destruction of our environment; and ensure its survival for present and future generations. We hope that you will be inspired and empowered to take up the baton, recognising that the future of the environment depends on us.

Many thanks to our peers who have made contributions to this report. We hope that you enjoy it!

Credits: Suparna Bera, Guyana

THE EDITORIAL TEAM

Description

The State of the Environment in the Caribbean

The first section presents key challenges and emerging issues affecting eight environmental areas of high importance in the Caribbean: the atmosphere; biodiversity; coastal and marine zones; forests; land and food; natural disasters; urban areas; and water.

Youth in Action

The second section shows the environmental activities and projects that youth in the Caribbean implement and participate in. The group directory provides opportunities for those interested in joining or collaborating with environmental programmes involving youth.

Future Outlook

The third section presents negative and positive scenarios of the future, based on current problems facing the eight environmental areas highlighted. To reverse the negative outcome of current trends, solutions are proposed that could bring about a positive future.

Conclusions and Recommendations

The final section is a call for reflection and action. The youth of the Caribbean propose concrete strategies to address the root causes of environmental degradation, with emphasis on the participatory importance of involving various sectors of society and government in decision-making processes.

The State of the Environment in the Caribbean

Introduction

Geographic Background

The Caribbean lies in the tropics and consists of a chain of islands, which forms the eastern boundary of the Caribbean Sea. This chain extends over 4000km from the Bahamas in the north to the low-lying continental states of Guyana and Suriname in the south, with the state of Belize to the west on the Central American landmass. Each state also has its own unique plant and animal life, but many share similar natural resources, such as the Caribbean Sea. It is one of the world's most colourful bodies of water, rich with marine life, as well as being an important crossroad for ocean shipping. The Caribbean island states vary in size, topography and geology, as they are in fact the isolated upper parts of partially submerged chain of mountains scattered over the seabed. Past volcanic activity has given rise to three principle geological formations throughout the region, which have led to three prevailing types of topography. For instance, the landscapes of St. Kitts and Antigua consists of hilly country sides that are more gently sloped than the sharply divided Blue Mountains in the eastern Jamaica and the Pitons in south-western St.Lucia. Just as the sizes of the Caribbean countries vary so too do their population densities. The size of the island does not necessarily indicate the size of the population. For instance, Dominica measures 750km^2 and has a total population of approximately 71,000 persons while Barbados has approximately half of that surface area with three times the population. As it relates to the economic sectors within Caribbean states, there is a great dependence on the coast for fishing and tourism. There is also a heavy reliance on the land for agriculture and housing.

Socio-economic and Environmental Concerns

With the exception of the mainland territories of Guyana, Suriname and Belize, Caribbean islands are relatively small. Most of these island states depend upon the Tourism and Agricultural industries for foreign exchange and economic growth. Intensive agricultural practices, over-fishing, the expansion of the tourism industry and continual extraction of minerals have led to the over-use and depletion of natural resources and have negatively affected the environment

A map of the Caribbean, provided by Suparna Bera, Guyana.

throughout the region. With the continued development of technology and the extension of sectors, environmental problems such as the excessive generation of pollutants and waste products, misuse of agro-chemicals, poor drainage systems and air pollution occur.

"In solidarity with Nature"
Nature is an important part of life
Created by God for you and me
To experience many adventures
A place where every human wants to be

So glancing, beautiful and clean,
We all recognize her might, her eye-catching green,

Let us care more for nature
From the top to every root
Care more for our country
Stand side by side for the greater good.

Melvin Alvares, Suriname

These environmental issues should be of concern, and can be minimised in many ways such as promoting and investing in renewable sources of energy, reducing the harvesting of our natural resources and recycling products. There must be a stop to the unsustainable economic practices that have become a custom in our societies.

Sadly, very few people realise that a "quick dollar" is a small gain when compared to the cost of remedying the consequences of our actions. Therefore youth need to be involved in far-reaching policy changes.

A Call to the Youth

In recent years, youth issues have gained more recognition and Caribbean governments have responded by establishing ministries or departments to coordinate youth development activities with education, sports, and culture as the focal points of these programmes. These features are used as vehicles to deliver important messages to youth on subjects such as HIV/AIDS and substance abuse. However environmental education has yet to be effectively integrated into youth programmes on a regional scale. Although small and often financially limited environmental ministries in the Caribbean do offer financial and technical assistance to youth groups, this aid is mainly accessible to school environmental clubs and not to the wider youth population. The reality is that environmental protection and sustainable development have not fully penetrated decision making processes and are sometimes viewed as constraints to the economic development of a nation. Youth involvement in national planning related to the environment has therefore been minimal in some countries. Though consultations with the youth occur, they appear to be secondary to other interests.

Policymakers may feel that youth are not aware of the needs of the country, but as citizens, we have to know what is going on, and must stand up for our right to make changes that will better our environment and our lives. Thus youth need to advocate to governments the important role they have to play in determining the best course of national development and in choosing the most suitable ways to achieve sustainable development.

Policy and Action

In the Caribbean we are faced with challenges of unsustainable patterns of production and consumption, which put pressure on our limited and fragile natural resources. This leads to increase of vulnerability to natural hazards, increased poverty, ill-health and loss of economic and cultural opportunities. As a result when we in the Caribbean discuss sustainable development strategies as it relates to Small Island Developing States (SIDS) we are looking at strategies that consist of progress in social development, complemented and combined with an awareness of the environmental implications of using our natural resources in industrial and economic development. Adopting such a concept of sustainable development has

"A call for caring for the environment"

Trees, plants, animals… our surroundings. Every part is important, so there is no such thing as "small" damage done to the environment. We have to learn how to appreciate our environment and not to destroy it. Caring for our country means to act in a certain way. Every single person has their own responsibility. Stop dumping garbage everywhere. Factories have to control the release of gases. Pollution of water and air can cause serious problems for our lives. We pollute the air we breathe, we poison the fish we eat, and our waters are filled with garbage. So where and when does this all stop? We cannot sacrifice the beauty of nature and our health for "development". Let us change our behaviour towards the environment in our own community. Caring for our country and nature can be very pleasant.

Tahira Gilliot, Suriname

Introduction

presupposed that we as small islands in the Caribbean would put certain instruments in place as it relates to development activities. This is where the young people of the Caribbean have a vital role in ensuring that the process of sustainable development is taken forward. Among the youth there need to be the adoption of practices that cultivate their minds and that fosters sustainable development. In this way, issues regarding the environment can be of utmost importance in all areas of Caribbean development now and in the future.

Since 1992 at the United Nations Conference on Environment and Development (UNCED) held in Rio de Janeiro and the ensuing Rio Declaration and Agenda 21, educating young people have been used to assist in overcoming the challenges our people have created. There has been attempts to make a shift towards, 'sustainable development thinking', so as to increase the number of people who can reflect on the ecological, economic and social consequences of their actions and modify their practices. This has been seen through the modification of curricula across the region, mostly at the tertiary level, which engages environmental concerns. However the magnitude and importance of such a move has not been adequately reflected through changing behaviours and practices. This could be as a result of the failure to institute this curricula change from early childhood and where it has been done, it has not be taken seriously by parents nor has it been adequately emphasized in educational policy.

A drawing depicting jewels of the sea.
Source: Bahamas

In addition we can also refer to the 1994 conference on Sustainable Development of Small Islands held in Barbados which outlines specific policies, actions and measures to be taken at the national, regional and international levels to enable Small Island Developing States to achieve sustainable development. At this conference the youth are called upon to be fully involved in the process. Here it was recognised that sustainable development was a people-centred process that required the active involvement, both as contributors and beneficiaries, of all social groups, in particular women and youth. Overall, our best hope for achieving sustainable development is through partnerships

"Mother Nature"

Mother Nature cries and cries
As she watches her creation die
Turquoise ocean now turn brown
Toxic factories bring a frown
Trees which once were a squirrel's nests
Now stand proudly as a wooden chest.
What was once a world of tranquility
Seems to lack too much sensitivity.
Mother Nature has a hole in here heart
From the pain which only man could start.
Where is the love for Earth that you once knew?
Where are forests that I gave you?
Why are the fish dying in the sea?
What happened to your island's biodiversity?
Mother Nature wants to give up.
With pollution everywhere, where is the hope?
Our endemic creatures are becoming extinct,
We're begging the world to take time to think.
I love my country and the land that I live,
And twenty years from now, I would want clean air to breathe.
Mother Nature bears her painful grief
Until the world allows full relief.

Carina Altenor, St. Lucia

and the context here is a partnership where the youth partner with their environment by playing an active role in keeping it safe for future generations.

In recent years, scientific research has shown that the chemical composition of the atmosphere is changing as a result of both natural and human activities. In the Caribbean, the major cause of its deterioration is air pollution, which has very serious implications for human health. The recent rapid increase in urbanisation is a major factor causing a decrease in the air quality. Major causes of the air pollution in the region result from the following:

- Particulates from soil erosion, construction, and the burning of sugar cane and domestic waste.
- Congestion caused by the influx of vehicles, many without adequate emission control devices.
- Inefficient energy use.

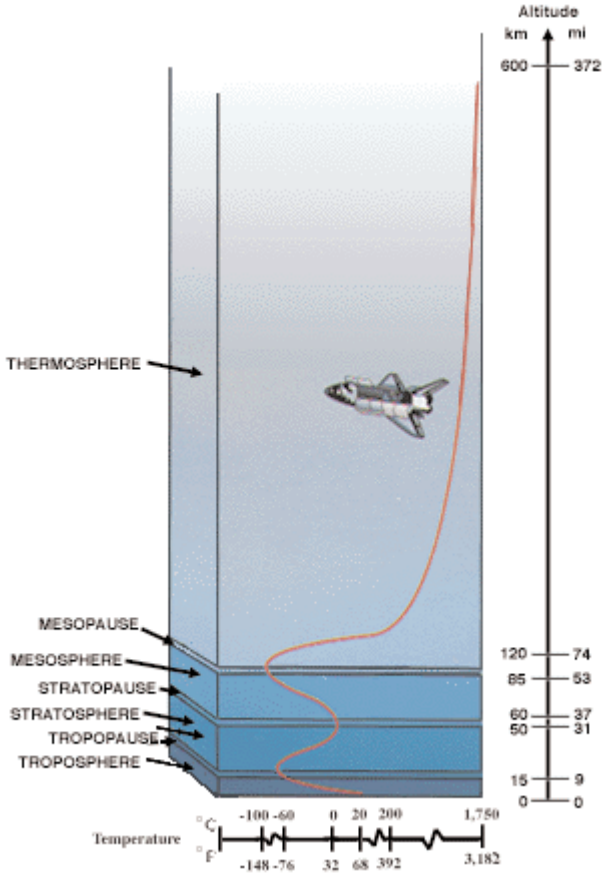


Image of the cross-section of atmosphere
Source: http://www.nasa.gov

- Noise pollution from social activities and the use of heavy machinery
- Volatile pesticide residues from spraying in the agricultural industry.

"Vehicle emissions damage human health"

Unfortunately as the number of used vehicles increases, so too does the amount of carbon dioxide in the atmosphere. Our clean, healthy breathable air is being replaced with tons of carbon dioxide molecules, which are being deposited on a daily basis and can be detrimental to human health.

Peron Gustave, St. Lucia

Sahara dust occasionally clouds the Caribbean sky and is also a significant contributor to poor air quality in the Caribbean. It is most visible during the spring and summer months. This dust is brought to the Caribbean by the "trade winds" and can cause respiratory ailments. The dust turns skies around the north-eastern Caribbean sea hazy, reducing visibility and leading to this poor air quality. In Trinidad, at the University of the West Indies (UWI), scientists have been investigating the possible cause and effect between the African dust in the air and emergency admissions of children with acute asthma. Many locals in the Caribbean recognise a relationship between dust storms and observed increases in human health problems. This tends to raise concern about our air quality and its effects on human health.

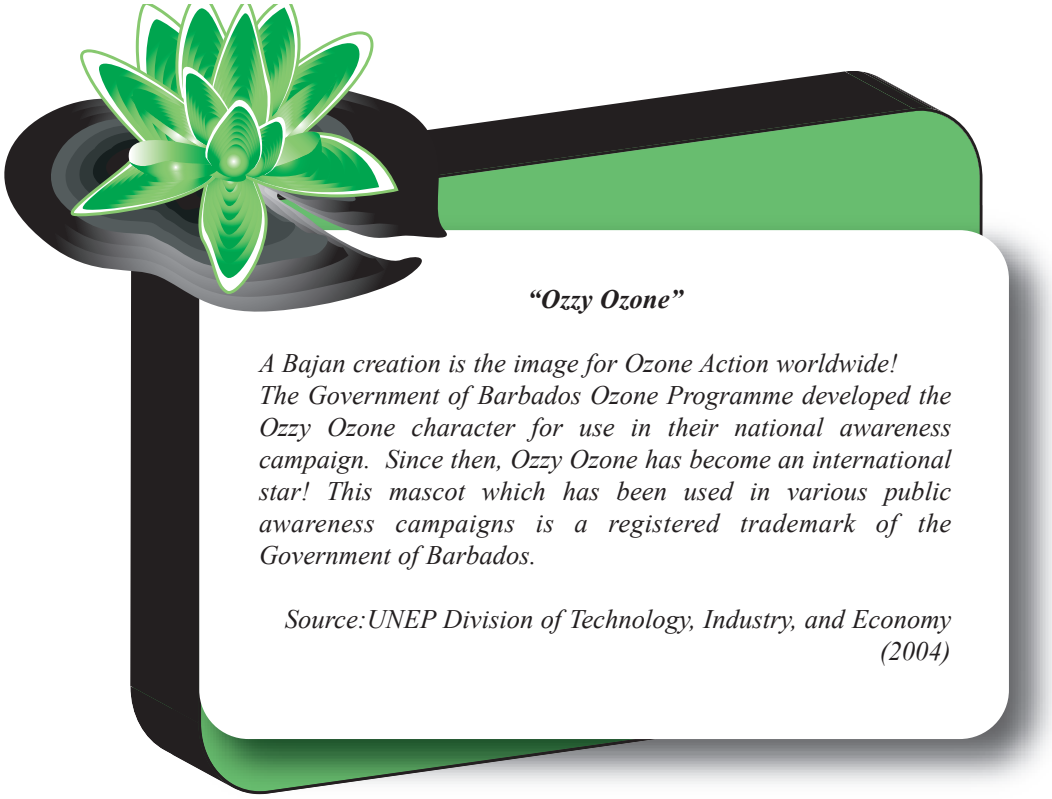
Ozone Depletion

The ozone layer protects all life on earth by preventing harmful quantities of the sun's ultraviolet (UV) rays from reaching the Earth's surface. In the 1970s, it was discovered that some man-made chemicals, including chlorofluorocarbons (CFC's) when released into the air, posed a threat to the stability of the ozone layer (UNEP DTIE Ozone Action Programme, 2002). Destruction of the ozone forms what are commonly referred to as 'ozone holes', which allow more UV rays to reach the earth's surface and increase

incidences of skin cancer, cataracts and weakened immune systems (UNEP DTIE OzonAction Programme, 2002).
Damage to the ozone layer would take 50 years to repair if no further ozone-depleting substances were released into the atmosphere (UNEP DTIE OzonAction Programme, 2002). The Vienna Convention for the Protection of the Ozone Layer (1985) and the Montreal Protocol for the Phase-out of Substances that Deplete the Ozone Layer (1987) attempted to bring about change and encourage the use of ozone friendly alternatives. Following this, 189 countries have agreed to phase out ozone-depleting substances. Today more than 90% of the global production and consumption of those substances has indeed been phased out and consistent progress is being made towards reduction and elimination of any remaining production and consumption. However, much work remains to be done and there are challenges to overcome before the job is complete, as stated by Kofi Annan, Secretary-General of the United Nations (International Day for the Preservation of the Ozone Layer, 2004). This therefore calls for a position among policymakers that is receptive to offering technical and financial assistance towards reducing the consumption of some ozone depleting substances in the Caribbean region as well as in other developing countries.

Facts to Know

- Residue from an ozone-depleting substance can react with ozone molecules and impair their ability to absorb UV radiation for as long as the residue remains. Each residue can destroy thousands of ozone molecules through sequential reactions. That's why even a little can do a lot of damage. **Source: US EPA 2004**
- Did you know that dark-skinned and fair-skinned people are equally at risk for the reduction of the body's defenses to disease due to high levels of exposure to UV-B radiation? Skin pigmentation might protect from sunburn, but not from the negative effects of UV rays on the immune system. Excessive sun exposure can reduce the skin's defense against illnesses such as malaria and herpes. A thinner ozone layer means more exposure to UV rays on a daily basis. **Source: R OzonAction Programme, 2002**



"Ozzy Ozone"

A Bajan creation is the image for Ozone Action worldwide! The Government of Barbados Ozone Programme developed the Ozzy Ozone character for use in their national awareness campaign. Since then, Ozzy Ozone has become an international star! This mascot which has been used in various public awareness campaigns is a registered trademark of the Government of Barbados.

Source: UNEP Division of Technology, Industry, and Economy (2004)

- UV radiation has effects on food production and affects different aspects of the process.
- Rice and soybean plants would be smaller and yield less grain.
- Some plants could lose some nutritional value or become more toxic.
- The production of chemicals in plants that protect against disease and insect attack would change, possibly making plants more vulnerable to disease and pests.
- Fish populations would decline as a result of reduced quantities of the tiny marine organisms that fish eat.

Source: UNEP DTIE OzonAction Programme, 2002

Global Warming and Climate Change

It should be noted that climate change and ozone depletion are related. Both are the effects of human activity on the global atmosphere and many ozone-depleting substances are powerful greenhouse gases that contribute to global warming. Global warming is a phenomenon where the balance of gases that form our atmosphere, particularly "greenhouse gases" such as carbon dioxide, nitrous oxide and methane, change as a result of human activity causing the climate to also change. An increase in these gases causes the earth's atmosphere to get noticeably warmer and this has and will continue to affect weather patterns. It must be noted however that even though ozone depletion is an important issue as it relates to climate change, we find that the patterns of energy production and consumption have not been sustainable and is therefore a major threat to the environment. We in the Caribbean are heavily dependent on petroleum products for electricity generation and transport and it is the energy-generating sector that is a major contributor of air borne emissions in the region. All this is expected to change the rainfall patterns that have prevailed for thousands of years in the Caribbean, thus affecting our agriculture, causing sea level rise and affecting the livelihood of many people.

Climate Change and its Impact within the Caribbean

Climate change has serious implications for Caribbean people. Every year the number and intensity of hurricanes rise, with governments not adequately preparing for the occurrence. This has led to the increasing loss of homes and lives due to flooding. Furthermore most of the agreements that exist do not form national policies, and need to be revised to address the particular needs of Caribbean people. The climate is changing and it will have a negative impact on pro-poor growth and levels of vulnerability and poverty. The poor in many Caribbean countries are more at risk from these impacts because of their limited capacity to cope with existing climate variability and future change.

Case Study on the Possible Impacts of Climate Change on Barbados

In the Global Environmental Outlook report for Barbados, anticipated local impacts of climate change include:

- *An even faster change in average sea level, with associated possibilities for increased coastal flooding and shoreline instability*
- *Possible changes in weather patterns, including the potential for increases in the intensity and frequency of tropical storms and hurricanes*
- *Potential changes in precipitation patterns could affect groundwater recharge and consequently the drinking water supply of many communities*
- *Tourism, infrastructure, agriculture, water resources and human health could also be negatively affected, as they are all sensitive to fluctuations in rainfall, temperature and sea level*

Source: Ministry of Physical Development and Environment, 2001

Nevertheless, there have been some developments in the international community that show the need to take action on issues of climate change and global warming. In 1988, the United Nations Environment Programme (UNEP) in collaboration with the World Meteorological Organisation (WMO) created the Intergovernmental Panel on Climate Change (IPCC). The purpose of this body was to assess the scientific knowledge surrounding climate change induced by human activity. In addition, a treaty called the UN Framework Convention on Climate Change (UNFCCC) was an important step towards, reducing global warming. This was later strengthened by the more legally binding measures of the Kyoto Protocol, which came into effect on February 16, 2005. At this time 141 countries, including 11 Caribbean countries had consented to be bounded by this agreement. (Source: UNFCCC, 2005).

The Caribbean Response to Climate Change

At the 1994 Small Island Developing States (SIDS) conference in Barbados, an initiative was undertaken by the Caribbean Community (CARICOM) that became known as the Caribbean project for Planning for Adaptation to Climate Change (CPACC). The main reason for the formulation of this project was the growing concerns of regional governments about sea level rise and climate change.

Some of the CARICOM member states asked the Organisation of American States (OAS) to assist in designing a project for submission to the Global Environment Facility (GEF). The goal of the CPACC project was to build capacity in the Caribbean region for the adaptation to climate change impacts, particularly sea level rise. This was achieved through the completion of vulnerability assessments, adaptation planning, and capacity building activities.

Participating countries in CPACC included the majority of CARICOM members including Antigua and Barbuda, the Bahamas, Barbados, Belize, Dominica, Grenada, Guyana, Jamaica, Saint Lucia, St. Kitts and Nevis, St. Vincent, and Trinidad and Tobago. CPACC consisted of four regional projects and five pilot projects. Some of the achievements as a result of this CPACC initiative include:

- Increased appreciation of climate change issues at the policy-making level - CPACC enabled more unification among regional parties and better articulation of regional positions for negotiations under the United Nations Framework Convention on Climate Change (UNFCCCC) and the Kyoto Protocol.
- Articulation of national climate change adaptation policies and implementation plans - Such policies and plans were formulated in 11 participating countries.
- Establishment of a sea level and climate monitoring system - A total of 18 monitoring systems, along with the related data management and information networks, were installed in 12 countries.

The skies of Dominica.
Provided by Suparna Bera, Guyana.

Biodiversity

The Convention on Biological Diversity (CBD) defines biodiversity as "the variability among living organisms from all sources, including terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems"(UNEP, 1999). Biodiversity is of extreme importance because living organisms are co-dependent: every living organism benefits from and is directly affected by the conditions of its environment.

Biodiversity in the Caribbean

The Caribbean is one of the most biologically diverse regions in the world, with a large variety of plant and animal species. In Jamaica, for example, out of the 24 species of lizards, 20 are endemic (UNEP, 1999). There is also a high level of plant diversity in the region, with 58% of the 12,000 species being endemic. Jamaica is known for its rich plant diversity while Trinidad and Tobago has approximately 420 species of birds, 100 species of mammals, and 85 reptiles including 55 species of snakes and 25 species of amphibians.

Coral reefs, sea-grass meadows and mangroves are large contributors to the biological diversity of the region and are among the best known marine and coastal ecosystems in the wider Caribbean. Coral reefs and sea-grass beds are diverse ecosystems, which support a large number of different reef fish species and other organisms. Another example of the region's rich biodiversity is the coast of Belize, along which can be found the second largest barrier reef in the world. Antigua and Barbuda also have coral reefs covering approximately 25 km^2 (Status on Coral Reefs of the World, 2000). As it relates to terrestrial ecosystems in the Caribbean we can refer to Guyana where more than 80% is still covered by forests, ranging from dry evergreen and seasonal forests to mountain and lowland evergreen rain forests. These forests are home to more than a thousand species of trees (**Source: http://en.wikipedia.org/wiki/Guyana)**

Loss of Biodiversity in the Caribbean

The Caribbean has lost many of the native species that once inhabited it, especially those that lived in forest areas. Natural disasters such as hurricanes, tsunamis, volcanoes, and earthquakes have destroyed many habitats, as have human developments on these small and often crowded islands. The major causes of loss of biodiversity throughout the Caribbean include:

- Habitat fragmentation
- Deforestation
- Chemical pollution and eutrophication
- Fisheries operations
- Climate change
- Invasive species

Habitat Fragmentation

Habitat fragmentation occurs when there is breaking up of continuous ecosystems into fragments surrounded by unsuitable habitats (UNEP, 1999). It is seen as one of the leading causes of loss to biodiversity. Essentially habitats are altered and destroyed for various reasons; this is true especially along the coast in island states to allow for development of houses, hotels and factories. In many cases mangroves are removed to make room for concrete

"Biodiversity and forest management in Guyana"

Guyana's Iwokrama International Centre for Rain Forest Conservation and Development is an organization which integrates human needs and values into business development and conservation strategies. The Iwokrama forest reserve covers one million acres of untouched land and is located in the heartland of the country. It has been identified as one of four remaining untouched forests in the world, housing a diverse number of species.

(www.iwokrama.org)

structures. Mangroves act as natural barriers along the coast, preventing erosion and providing homes to many bird species, oysters and crabs among others and when removed these species are displaced. Even threatened species such as turtles turn away from the beaches because the habitat that they once used as nesting grounds is now unsuitable. Many habitats in countries such as Guyana and Suriname are destroyed from activities such as logging, dredging, mining and other developments.

Invasive Species

Invasive or exotic species are those that have been introduced either by accident or intentionally to a country where they are not naturally found. They become a threat to native species when they proliferate and compete for space and food or sometimes even prey on the native species e.g. the giant African Snail and Cane Toad. Human settlement has led to the introduction of exotic plants and animals for landscaping, hunting, livestock production or biological pest control. Plant species can grow rapidly and cut off access to water, light and nutrients to native plant species, thus driving them to extinction.

The important shipping and cruise ship industries in the Caribbean have introduced numerous marine species from faraway regions through the ballast water of ships. Measures must be taken to prevent exotic marine and terrestrial species from being transported so as to protect the diversity in the Caribbean.

Impact on Biodiversity due to Climate Change

The prediction related to climate change also has serious implications for biodiversity in the Caribbean. The related effect of sea-level rise can cause severe damage to mangroves. If this ecosystem is flooded, then its natural filtering properties, i.e. filtering of run-off from land, are rendered useless. In this way, not only are the mangrove ecosystems affected, but also the coral communities, which depend on them for these very services. Climate change predictions also imply that there will be a rise in surface temperature. This will drastically affect corals as they function at an optimum temperature; if this ecosystem is affected then all the dependent organisms in turn will be affected. Climate change is occurring and its impacts on corals are just one example of how biodiversity is affected.

Human Activity

As a result of humanity's continued advancement, we have been able to alter the environment more than any other species. Heavy industrialisation along the coast has contributed to marine pollution by run-off or effluent, which pose a significant threat to marine life as well as human health. Any development will have environmental impacts; the construction of golf courses, roads, hotels on the beaches, factories and other industries have placed significant pressure on the environment. Lead author of Reefs at Risk in the Caribbean, Lauretta Burke expressed concern about the growing destruction of biodiversity when she stated, "many reefs are subject to multiple threats, such as over-fishing and run off of pollution and sediments of the land". It is therefore estimated that two-thirds of the region's reefs are threatened from these direct human pressures."

Policy and Action

One of the most effective mechanisms for conserving biodiversity is to prevent habitat destruction and alteration. 76% of all endangered species in the Caribbean are threatened by habitat loss or modification (UNEP, 1999). Regionally, the Caribbean Conservation Association (CCA) is one of the oldest environmental organisations, which work towards sustainable management of the region's natural and cultural resources (www.ccanet.net). The Convention on Biological Diversity (CBD) encourages governments to act in a more responsible manner to manage their resources. In the Caribbean, Jamaica, Trinidad & Tobago, Barbados and Guyana to name a few, are signatories to the CBD. However, its ratification does not necessarily suggest that national legislation has been put into place and will be enforced. Other programmes include the Specially Protected Areas and Wildlife in the Wider Caribbean Region (SPAW), the Convention on the International Trade of Endangered Species (CITES), and the Bonn and Western Hemisphere Conventions. In St. Lucia the government has

"The Giant African Snail in the Caribbean"

There are several species of exotic snails considered to be serious pest of plants and threats to public health. Giant African snails-Achatina achatina L., Achatina fulica Bowdich, Archachatina marginata S., and other species in the family Achatinidae (Gastropoda)-are large, terrestrial snails of African origin that cause extensive damage to plants in tropical and subtropical agricultural systems and the environment.

The Giant African Snail, specifically the Achantina fulica is one of those pests introduced into the Caribbean that has been most damaging. It is known to eat at least 500 different types of plants, including breadfruit, cassava, cocoa, papaya, peanut, rubber, and most varieties of beans, peas, cucumbers, and melons. These snails are also known to carry organisms that can cause serious diseases in humans. Handling live snails and allowing their mucus to contact human mucous membranes such as those in the eyes, nose, and mouth can transfer these organisms.

Believed to be originally from East Africa, A. fulica has established itself throughout the IndoPacific Basin, and has also been introduced to the Caribbean islands of Martinique and Guadeloupe. In recent times A.fulica infestations were detected on Saint Lucia and Barbados and has been a concern for health and agricultural officials.

Source: http://www.aphis.usda.gov/pppq/ep/emerging-posts/gas.html

Dedra Bartlett, Barbados

started a biodiversity awareness campaign where the Ministry of Agriculture, Forestry and Fisheries of late is taking steps to disseminate information on biodiversity on the island; through various programmes on biodiversity. It is hoped that these programmes will empower individuals and groups to use their biological diversity sustainably.

"Industrial Activities Put AquaticLife at risk"

The spill that occurred at the Omai Gold Mines in Guyana in August, 1995 is a good example of the hazards of industrial waste. Effluent containing cyanide overflowed from one of the pits after heavy rainfall, contaminating one of Guyana's main river, the Essequibo River. Drastic consequences ensued, as a large number of animals were poisoned, shoals of fish were killed and declared unsuitable for human consumption.

(www.forests.org)

Conservation policy in the Caribbean

1945: The Wildlife Protection Act, Jamaica
- Protects designated species of wildlife

1978: The Grenada Marine Boundaries Act

1995: The Environmental Management Act, Trinidad and Tobago,
- Established the Environmental Management Authority, which aims to develop and implement programmes for the wise use of the environment.

1998: The Coastal Zone Management Act, Barbados
- Provides a comprehensive statutory basis for coastal management and planning

Sources: The Biodiversity Strategy and Action Plan of Grenada, the National Biodiversity Strategy and Action Plan for the Report of the Workshop on the Implementation of Jamaica's Obligation under the CBD, Kingston Jamaica, NRCA, FIELD, COMSEC.

Coastal and Marine Zones

The marine and coastal environment is very important to the sustainability and survival of the Caribbean people as they represent an essential natural resource. These coastal and marine ecosystems have a high level of fragile biodiversity that are being destroyed by the development of shorelines, over-fishing, improper disposal of industrial waste, oil spills, inadequate sewage and solid waste management, and tourism. Consequently, there is an ongoing challenge to the Caribbean's development needs without destroying its marine flora and fauna and the natural environment necessary for their survival.

Coral Reefs

Coral reefs are one of the world's most complex and biologically diverse ecosystems. They provide habitats and shelters for numerous organisms such as spiny lobsters, octopuses, reef fishes, barracudas, mackerels, bonitos, sharks, sponges, soft corals, sedentary polychaetes, algae and sea grasses. Coral reefs are not only important because they protect the coastline from destructive wave action that occurs during storms and hurricanes but because they are also a source of sand and medicines. Pollutants that are washed into the sea due to the improper disposal of waste, deforestation and dredging activities, help to destroy coral reefs. Coastal developments also destroy mangroves, which essentially co-exist with coral reefs. Mangrove systems act as a natural filter of the run-off from land thus preventing pollutants from entering the ocean. In some Caribbean territories, specifically Barbados large-scale destruction of coral ecosystems (primarily sea grasses, mangroves and coral reefs) results in a loss of habitat for endangered species such as the Hawksbill turtle, which play a significant role in the tourism industry of Barbados.

"Rescuing a wetland located in an urban setting"

The Graeme Hall Swamp is the most significant wetland remaining in Barbados. It covers an area of thirty-two hectares and is located near Bridgetown in a densely populated area This swamp is home to a wide variety of resident and migratory birds and is a nesting site for the Cattle Egret. In addition, over twenty species of fresh -and brackish- water fish reside there. It has been recently developed as a bird sanctuary and interpretive centre to protect this vibrant ecological system.

Facts to Know
Countries in the Caribbean with Protected Coral Reefs

Bahamas	- Exuma National Air and Sea Marine Park
Barbados	- Folkstone Marine Park
Belize	- Bacalar Chico Marine and Wildlife Reserve and Hol Chan Marine Reserve
BVI	- The Wreck of the Rhone
Dominica	- Soufriere Scott's Head Marine Reserve
St. Lucia	- Soufriere Marine Management Area

Mangroves/Wetlands

Mangroves can exist at the mouth of rivers where they act as filters for sediments brought down by the river or run-off from land. Sediments are deposited here due to the intricate interlacing of the prop roots of the mangrove plants. Mangroves also provide safe resting spots for migratory birds and habitats for many bird species and animals, for example, snakes and oysters. It also acts as a spawning ground and nursery for many fishes and shellfishes. It is estimated that 60 - 70% of our coastal fishes depend upon wetlands for their survival. Mangroves also act as buffer zones, which are areas that act as shock absorbers and protect the coast from erosion due to strong waves or adverse weather systems such as hurricanes. Wetlands have suffered significantly from the indiscriminate cutting of mangroves, the dumping of garbage, the release of raw sewage, the over-harvesting of crabs, and other activities that have reduced their ecological and economic value.

The List of RAMSAR Wetlands Sites in the Caribbean
September 16, 2004

Trinidad and Tobago:	Nariva Swamp
Saint Lucia:	Mankoté Mangrove and Savannes Bay
Netherlands (Aruba):	Het Spaans Lagoen
Jamaica :	Black River Lower Morass
Belize:	Crooked Tree Wildlife Sanctuary
Bahamas:	Inagua National Park
	Great Inagua Island

Source: http://ramsar.org/sitelist.doc

Industrial Waste and Oil Spills

Oil spills and discharge of industrial waste have serious effects on our coastal activities, marine life and even our health. The main threat posed to living resources by oil spills and water-in-oil emulsions is that the oil smothers the organism or blocks its airway. The animals and plants most at risk are those that come into contact with the contaminated sea surface. These include: marine mammals and reptiles, birds that feed by diving or forming flocks on the sea, marine life on shorelines, and animals and plants in aquatic farming facilities. Reproduction, growing and feeding patterns of individual marine organisms are impaired by prolonged exposure to a concentration of oil or oil components that is far lower than the one that causes death. Mangrove trees have complex breathing roots above the surface of the organically rich and oxygen-depleted mud in which they live. Oil may block the openings of the air-breathing roots of mangroves or interfere with the trees' salt balance, causing leaves to drop and subsequently die.

Industrial spills also have been known to occur as a result of severe weather events in the Caribbean. Intense security measures are required to protect industrial infrastructure from the damage of hurricanes, floods, forest fires, and other extreme environmental events.

Municipal Waste

In the Greater Caribbean, it was estimated that between 80% to 90% of wastewaters were discharged directly into coastal waters without any treatment (UNEP, 2001). This untreated sewage contains high levels of nutrients that fosters the growth of algae (eutrophication). These fast-growing algae grow on corals and blocks sunlight from penetrating to the coral, causing bleaching. Coral bleaching is a common stress response of corals to many of the various disturbances such as those already mentioned. The tissues of corals themselves are actually not the beautiful colors of the coral reef, but are instead clear. The corals receive their coloration from the zooxanthellae living within their tissues. Zooxanthellae live symbiotically within the coral polyp tissues and assist the coral in nutrient production through its photosynthetic activities. Bleaching, or the paling of zooxanthellate invertebrates, occurs when the densities of zooxanthellae decline or the concentration of photosynthetic pigments within the zooxanthellae fall. This bleaching could cause the destruction of major reef tracts and the extinction of many coral species. There is not only the high risk of this happening in the Caribbean but it

"Hurricane causes fuel and oil spill in the Bahamas"

Hundreds of gallons of diesel fuel and lubricating oil spilled into the ocean at Clifton Pier, New Providence, Bahamas in September 2004 from 'The Contrader', a 280-feet cement tanker that capsized during sea surges caused by Hurricane Jeanne. Four days later, despite desperate attempts to contain the spill through the use of floating booms to set up a perimeter around the ship and contain the lube oil, the fluids continued to pour into the ocean within the contained area. Thus, peat sorb - an environmentally- friendly oil-absorbing material- was applied. In addition to the more than 200 gallons of diesel and lube oil collected, an additional 15,000 gallons of diesel and an undetermined amount of oil remained onboard the vessel.

Frederick Arnett (Bahamas)

must be noted that in heavily developed coastal areas, untreated sewage continues to seep into freshwater sources due to the high water tables and permeable soils and expose the population to serious risks of disease.

Coastal Erosion and Sedimentation

Coastal erosion mainly occurs due to loss of vegetation cover and poor management of agricultural land and is a major cause of degradation in shallow coastal waters. In the Greater Caribbean, the sediment load deposited in coastal waters is estimated to be more than 10 million tonnes per year (UNEP, 2001). This accumulation of sediments has a negative effect on marine waters as it prevents light from penetrating the surface of these water bodies. This causes the corals to become weak and eventually die from smothering. If heavy coastal erosion occurs this also puts stress on structures built on the coast and essentially washes away the land. In Trinidad and Tobago, the new North Coast Road from Charlotteville to L'Anse Fourmi is an example of a coastal infrastructure project that is causing major erosion and silt accumulation in the fringe of coral reefs.

Tourism

Caribbean coastal and marine zones are the ideal spots for tourists seeking a 'sun, sand and sea' holiday. With the high number of tourists visiting the region annually, our marine and coastal resources are being exploited at a significant rate. For example, tourists break off the corals for souvenirs or cruise ships and local ferries anchor and often drag across these precious coral reefs. In addition, it is estimated that tourists generate 50% more garbage than residents, often dumping their garbage on or into these coastal and marine zones while sailing.

Sand mining

With the increase in population in many Caribbean states, there is an increased need for housing. This, along with other factors, has led to illegal mining of sand from the beaches in some territories. While sand is important aesthetically for many of our tourism-driven economies, it is essential in the balance of coastal processes. Sand is produced naturally from wave action on rocks and the slow degeneration of corals skeletons. Additionally, sand mining in one area can affect the structure of the coast along the same area. The photos on page 26 are of an area affected because sand mining was occurring further along the beach.

Over-fishing

In the Caribbean region, fisheries have long been the mainstay of coastal communities, particularly in the island nations. In recent years there has been an increase in the demand for fish because of its high protein content. Furthermore the open access of reef fisheries, typically with few regulations, makes reef fish particularly susceptible to overexploitation. To ensure the supply of fish to the population, some governments in the Caribbean have subsidised the cost of fuel, fishing gear and even fleets, thus enabling more fishing at a reduced cost. In order to increase the daily fish-catch, fishermen have employed fishing methods such as harvesting species during spawning periods and dynamite fishing. The most damaging form of overfishing in the Caribbean has been the targeting of spawning aggregations. It has been documented that

Suparna Bera, Guyana.

where fishermen know the location of such spawning aggregations, they tend to remove the entire population of a species over the course of just a few nights. As a result of these unsustainable practices, some species of aquatic organisms have become extinct or have been added to the list of endangered species. Some of these include several of the larger grouper and snapper species in the region.

Policy and Action

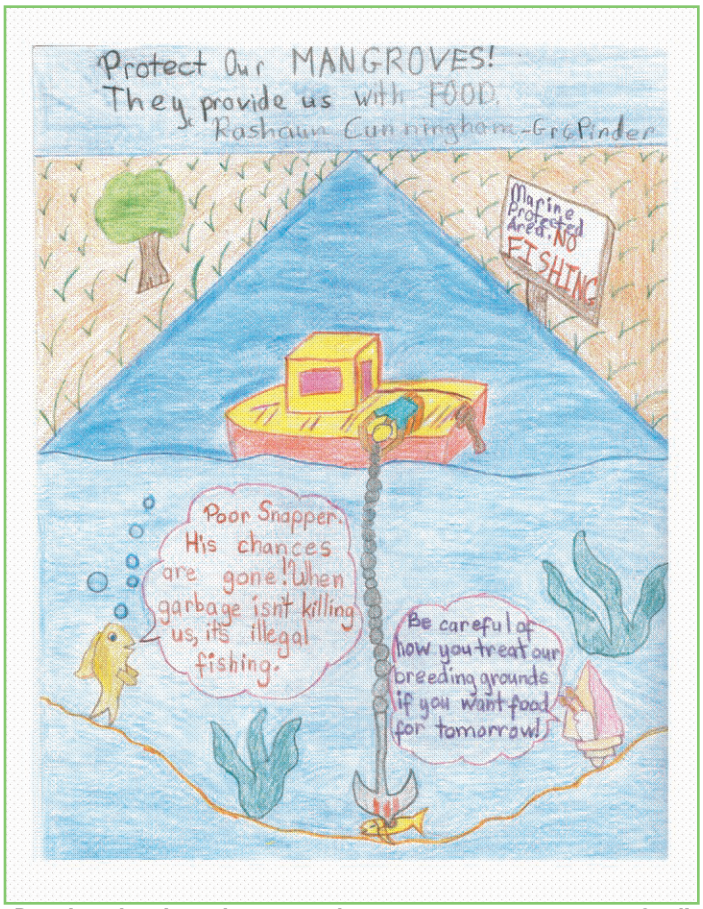
These pressures highlighted should not be only seen as having a great impact on coastal and marine zones. We must also acknowledge the impact it has on humans. Therefore in recognising the overall impact of these pressures we must implement and upscale policies to address them. As it relates to marine water quality and the destruction of aquatic life, there has been the implementation of various management tools to protect, maintain or restore natural and cultural resources in coastal and marine waters. In the Caribbean we have used Marine Protected Areas (MPAs), which have different characteristics depending on the issues that they are addressing. For example, there are a significant amount of MPAs that have been developed as fisheries management tools and these have been used in a way that not only protects marine life but also with proper management, have become sustainable tourist attractions. The value ascribed

Photo showing beach-side graves exposed by erosion related sand mining. Provided by Suparna Bera, Guyana.

Photo showing beach erosion. Provided by Suparna Bera, Guyana.

Photo showing accelerated coastal erosion caused by sand mining that is possibly exacerbated by rising sea level. Provided by Suparna Bera, Guyana.

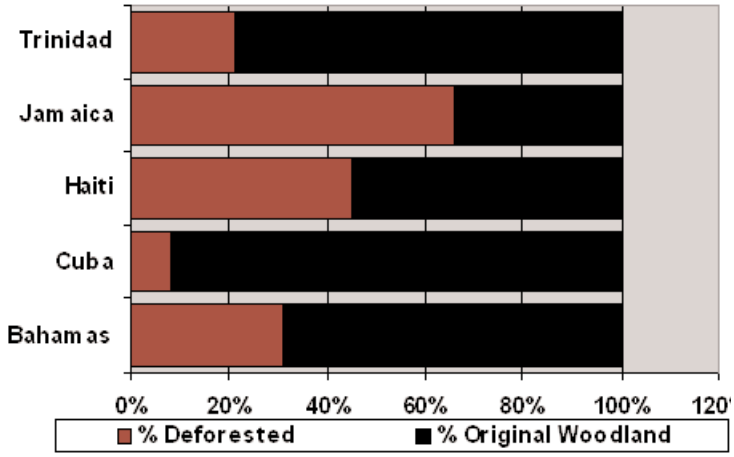
to MPAs can be examined if we look at the Nelson's Dockyard Marine Park in Antigua and Barbuda and the revenue it raises yearly to the tune of approximately US$7 million per year on local natural values of mangroves, beach and shorelines and coral reefs and marine areas. A lot of this revenue has been raised due to the offering of unique ecosystems that are attractive to tourists. However we know that the number of tourists visiting the region is growing and in some instances exceeding our carrying capacity. Therefore in our planning and actions we must continue to manage these MPAs in a way that ensures this management tool's capability of continued protection of our natural resources.



Drawing showing why we need to protect our mangroves. Credit: Rashaun Cunningham-Gropinder, Bahamas

Forests

Forests form an essential part of our environment and are vital as a watershed. Due to the thick humus layer, loose soil, and soil-retaining powers of the trees' long roots, forests are vitally important for preserving adequate water supplies. Almost all water ultimately feeds from forest rivers and lakes and from forest-derived water tables. In addition, the forest provides shelter for wildlife, recreation and aesthetic renewal for people, and irreplaceable supplies of oxygen and soil nutrients. The forests in the region are



Source: Caribbean Environment Outlook, UNEP, 1999

primarily tropical rain forests, tropical moist forests and tropical dry forests. The forests are home to many Caribbean plants and animals and also provide a source of food, medicinal products, lumber and a source of income from handicrafts and tourism.

Present State of Forests

In some Caribbean territories, natural forested areas have disappeared rapidly over the last 20 years. The following graph shows that in countries such as Jamaica around 50% of the natural wooded areas were lost between 1980 and 1995, greatly increasing the risk of landslides and the damage resulting from massive soil erosion.

Forests

Deforestation

In Guyana and Suriname, there is severe deforestation as a result of large and small-scale mining/mineral extraction, logging, the establishment of irrigation schemes, extension of urban areas, and the lack of protected area systems. Sections of the forest in Guyana are leased to foreign companies, which mine materials such as gold, diamonds and bauxite.

"The effects of mining on forests in Guyana"

In Guyana there are mining companies, which have signed contracts with the Guyana Government to use sections of the forest for mining for many years. While the Government is receiving revenue for the use of land, the forest is being used in an unsustainable manner. When the trees are removed, soil erosion occurs and the use of chemicals such as cyanide and mercury used by miners add further complications

Quacy Grant, Guyana

In the case of extensive logging, which is also carried out in some parts of the Caribbean, for example, Suriname and Guyana, some companies export the timber at a faster rate than the trees can replenish themselves.

Forest Fires

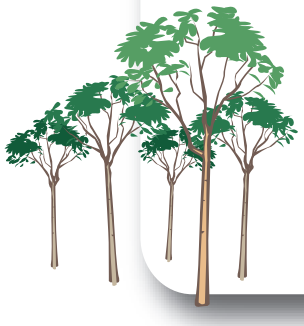
Although wildfires are rare in most of the Caribbean, they can destroy wide expanses of forests in some areas. Tropical forest fires are an emerging threat in areas with a dense coverage of forests, such as Guyana and Suriname, where 90 - 95% of the land is covered by lush vegetation (Cochrane, 2002). Several fires raged across Guyana and Suriname in 1998, affecting diverse ecosystems such as tropical moist forests, coastal swamps and mangroves as well as rural communities. Many of these remote areas were far from any fire response services, so it was difficult to control the spread of the fires that consumed trees and brush dried out by the hot weather. These complex forests ecosystems, home to numerous species of plants and animals are difficult to re-establish after the destruction caused by forest fires, (Cochrane.2002). However, forest fires are necessary in some forest ecosystems, such as the pine forests of Abaco National Park in the Bahamas where fires clear undergrowth and help pine seeds germinate.

Policy and Action

With these evident threats to forests reserves in the Caribbean there is a need for a sustainable forest management system. This is necessary even though islands in the Caribbean account for only one percent of the world's forest area because of the large number of endemic plants and the importance of forest cover for the local economies i.e tourism. Various Caribbean countries have implemented different solutions to counteract the problem of

"Preventing Forest Fires"

The Tobago House of Assembly Department of Natural Resources and the Environment has taken upon itself to protect the nation from forest fires. This has come about from the inability of the fire services to effectively combat forest fire and the extremely low precipitation that fell during the wet season of 2004. In preparation for the fire season, the department has invested in additional firefighting equipment. Interested members of the public were invited to attend firefighting training sessions. These individuals will be paid as fire wardens in the upcoming season. Improved monitoring and reduced response time is expected to control the spread of forest fires in Tobago.



Sebrenia Roberts, Trinidad and Tobago

¨Banana plantations destroy forests in St. Lucia¨

In recent years, deforestation was very common in St. Lucia, because the banana industry was blooming with success. Banana farmers were destroying the country's lush green vegetation inch by inch. Trees were being cut down every other day; flora and fauna were being destroyed and replaced by banana plantations. Additionally, charcoal production was a common practice. In more recent years, because of the decline in the banana industry, deforestation is slowly subsiding.

Peron Gustave, St. Lucia

¨Reforestation in Dominica¨

The "One-Million Tree" project is a private initiative of a concerned individual that focuses on planting mostly red cedar trees in Dominica. Furthermore the Rainforest Aerial Tram has a project for schools encouraging students to plant a tree and contribute positively to the environment. School children are then rewarded with a free ride in the aerial tram where they enjoy a beautiful view of the lakes and forests of Morne Trois Pitons National Park.

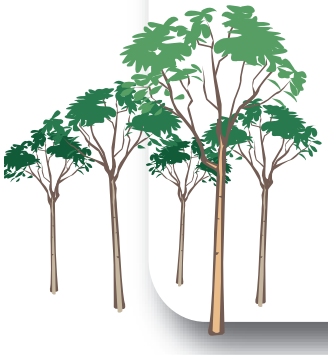
Shantelle Graham, Dominica

deforestation. These include reforestation programmes or moratoriums on logging activities. If we do not act, our forests will continue to be destroyed or utilised unsustainably; our environment and lifestyles will be severely damaged. Many commendable projects are being carried out to counteract the devastating effects, and we should all follow these examples and call on our governments and businesses to take similar actions. Let us choose the proactive approach rather than reactive one.

¨Moratorium on logging in Tobago¨

After seeing the drastic effects of legal and illegal logging, in 2004, the Tobago House of Assembly declared a moratorium on logging of both private and state lands on the island. This ban will continue indefinitely until the government is satisfied with the state of island forests. The moratorium means that logging is prohibited and punishable by law.

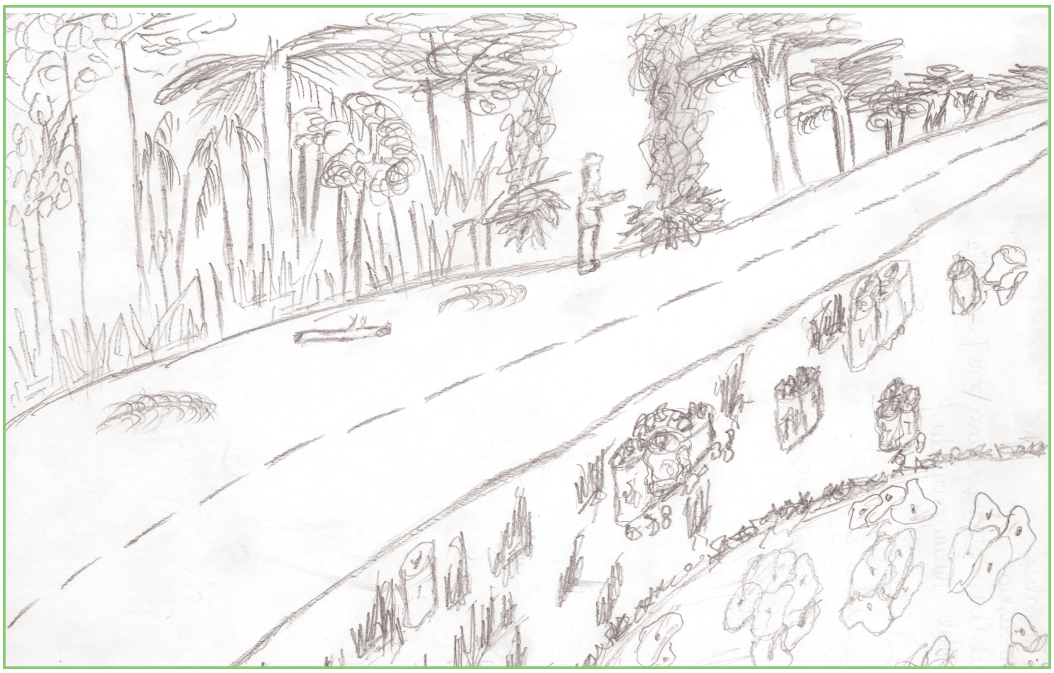
¨Reforestation programmes in Trinidad and Tobago¨



The government of Trinidad and Tobago has pledged a considerable amount of funds to the establishment of a National Reforestation and Watershed Rehabilitation Programme, which will last over ten years. 33,000 acres of land are to be replanted with trees, of which 1000 acres will be in Tobago, and the programme could be expanded. In Tobago, the reforestation will empower communities by providing renewable forest products that will enable communities to improve socially, economically, and environmentally.

Sebrenia Roberts, Trinidad and Tobago

Forests



Drawing showing deforestation. Credits: Naam Mahabier, Suriname

Drawing showing deforestation. Credits: Derrick Kammeron, Suriname

Land and Food

We all need land and food for survival, but when land is developed with no proper planning; we find ourselves being more concerned with gaining instant profit at the expense of the land rather than getting involved with environmentally friendly practices which can provide sustainable services and goods. As a result our actions have severe implications on the land, the environment as a whole, and ultimately ourselves.

Land degradation

Land degradation is the disintegration of the earth's solid surface. The main cause of land degradation within the Caribbean is erosion which can be caused by factors such as deforestation, poor drainage systems, exploitation of land for agricultural purpose and, agrochemical degradation. Unfortunately these are primarily a result of human impacts, lack of efficient physical planning and development of land. Land is one of the natural elements that ensure sustainable development and makes a country wealthy (UNEP, 2001). With this statement in mind, we can see that degradation poses a serious threat to social and economic development in the Caribbean.

Deforestation, which is one of the main causes of land erosion and land degradation in the Caribbean, has been on the increase in recent times. The cutting of native trees and vegetation for agricultural purposes, especially monoculture crops, reduces biodiversity and has adverse effects on the environment. Clearing or cutting also causes soil erosion, which results in landslides. These landslides lead to a reduction in soil fertility. As a result farmers may desert their lands because they become too unsuitable and too infertile to cultivate.

The effects of land degradation were recently seen in St. Lucia during September of 2004. St. Lucia experienced severe landslides, which devastated this country, taking thousands of lives and destroying infrastructure and crops.

Poor Drainage Systems

Drainage management systems are important features of development and physical planning for communities in both urban and rural areas in the Caribbean. Poor drainage wreaks havoc on the physical environment by inducing soil erosion, which makes the land more susceptible to landslides and flooding and increases the infertility and unproductiveness of the soil.

House collapses, family escapes death in Trinidad

A dazed Isaac blamed the disaster on the heavy rains that fell on Saturday which she said resulted in a land slip, and caused the three bedroom wooden structure, which rested on a cliff, to fall apart. Isaac also said poor drainage in the area contributed to the land-slippage that caused their home to collapse. Isaac's neighbour, Gloria Harley, said she was worried that her home may be the next to fall apart as result of poor drainage in the area which was also causing cracks in the walls of her home.

"Right now my gallery falling apart. I don't want this to happen to me. We have very poor drainage in this area."

Harley said that the resident's pleas, to various persons in authority to initiate work to put proper drainage systems in the area, had fallen on deaf ears.

(www.trinidadexpress.com, October 2004)

In many Caribbean countries, land use planning and land management is hardly practiced. This has led, in some instances, to inappropriate land usage and increasing land degradation. Such a situation is particularly problematic in the smaller Caribbean islands, characterised by limited land space and competing as well as conflicting land usage.

(www.welcometothecaribbean.com)

Land and Food

Land use

The issues related to small size in the Caribbean has been a factor influencing the type of land use in the Caribbean. The special land tenure systems, soil types, climactic conditions raises alot of issues as it relates to urban settlement, agriculture, tourism and other land use choices. Land use changes in the region have also been linked to the restructing of the natural environment.

Urbanisation & Industrialisation

The increase in urbanisation and industrialisation within the Caribbean region are exhausting our natural resources and are the primary cause of many hazardous environmental problems. Due to urbanisation and industrialisation, Caribbean nations are experiencing a dramatic loss of biodiversity, a shortage of freshwater, deficient food supply, overpopulation and poverty. **(UNEP, 2001)**.

Additionally, wastes, which result from industrialisation and urbanisation, also produce destructive effects on soil and landscapes **(UNEP, 2001)**. Urban sprawl tend to cause loss of habitat and the elimination of native plants and animals with unplanned urban growth leading to building on risky lands, including steep slopes and floodplains (UNEP, 2004), thus increasing the vulnerability of people to natural disasters.

Changes in the Rural Areas

Across the Caribbean there have been changes in the rural landscapes as it relates to land use. Forestland in some territories has been cleared for agricultural pursuits. In other territories, specifically Barbados where tourism is a vital foreign exchange earner, rural land has been converted into golf courses and tour sites for adventure tours.

Furthermore in some territories over use of the land for agricultural purposes occur in rural, poor communities.

Countries characterised by smaller land areas have experienced problems related to population pressure, which have negatively affected their eco-systems. Barbados, Jamaica and the Organisation of Eastern Caribbean States (OECS) have experienced environmental problems resulting from urban growth and developments in the tourism sector. These include the cutting of mangroves, the blasting of sand from rivers and beaches, and the leveling of trees.

(www.welcometothecaribbean.com)

Mining

Countries relying on mineral extraction such as Jamaica, Guyana, Suriname and Trinidad and Tobago experience many environmental problems. Those countries producing bauxite/alumina are affected by problems related to mined-out lands and toxic 'red mud' lakes (storage areas in which the residual from processing bauxite into alumina is deposited). (www.welcometothecaribbean.com). Mining of diamonds, gold, bauxite and other precious minerals have been a means of economic growth in the Caribbean, however these activities generate thick, slurry and harmful

"Chemicals used in gold mining jeopardise a community's source of water"

In October 2004, residents of Groete Creek- a small tributary of the Essequibo River (the largest river in Guyana) - complained that the water appeared "murky" for many miles. This was predicted to be the result of gold mining that was taking place in the area. Residents are now unable to use the water in the creek as they once did for domestic purposes in the dry season. If nothing is done about this situation, light will not be able to penetrate the surface of the water to allow the aquatic green organisms to photosynthesise. If this continues, the aquatic organisms will gradually die out. This will affect our aquatic biodiversity.

Quacy Grant, Guyana

chemicals that often pollute the land, air, and waterways. These can cause disruption and destruction to ecosystems and have severe implications for natural resources and human health. Furthermore in order to produce crop yields that satisfy human needs and to maintain soil fertility, nutrients are needed in the soil, but where these mining activities occur the land is not suitable for food production activities.

National Parks and Reserves

Two popular national reserves in Suriname are: The Brownsberg Nature Reserve and The Central Suriname Nature Reserve. The development of national parks and reserves are aimed to preserve a nation's culture and biodiversity. However they face many challenges, especially with governmental and developmental agencies that battle for land so as to provide housing or for industrial sites.

The Lucayan National Park located in the Northern Bahamas is a 40 acre park east of Freeport, Grand Bahama. It encompasses one of the world's most extensive underwater cave systems charted to over 6 miles, some of which were the site of pre-Columbian burials. Above ground, the Lucayan National Park contains all the vegetative zones representative of the Bahamas.

(www.bahamas.gov.bs)

The Bahamas National Trust acquired The Rand Nature Centre, which is a 100 acre nature centre in Freeport, Grand Bahama in 1992. The centre features a Caribbean pine forest, countless native orchids and flowering plants, and a variety of bird life. Nestled in the heart of Freeport, the Rand Nature Centre provides visitors with a close-up view of Grand Bahamas' original ecosystem.

(www.bahamas.gov.bs)

Waste disposal

We all know the importance of a clean and healthy environment. Governments and environmental organisations are taking actions on various levels to increase the awareness on this issue. Still we can see all kinds of improper waste disposal. People do not seem to realise the negative consequences of their actions on groundwater and their contribution to soil contamination and the outbreak of diseases. In Tobago, there is only one place where solid waste is supposed to end up: the Studley Park Integrated Waste Facility. At this landfill, garbage of all kinds is dumped and covered with soil. Dumping any kind of garbage and littering is illegal in Tobago, yet the problem is still common. There are many areas where people can dump truck loads of their garbage without being seen. Any undeveloped area a little way off the main road usually is a site for illegal dumping. It is also easy to dump garbage off of steep hillsides, either into thick bush or into the sea (Environment Tobago, 1989). In Dominica contamination of rivers from the disposal of solid waste has resulted in damage to sensitive aquatic and coastal ecosystems. (Ministry of Agriculture and the Environment, National Biodiversity Committee of Dominica, 2003). In spite of a long established system of waste management, which includes government programmes as well as private entities and business houses, waste management has proven to be a major challenge over the past decade, especially in Barbados (Ministry of Housing Lands and the Environment Government of Barbados, 2003).

Photo showing a dump in Antigua. Source: Environmental Awareness Group, Antigua and Barbuda.

Land and Food

Loss of Dominica's biodiversity is caused primarily by conversion of natural land areas into the agricultural and residential development areas. This occurs because farmers generally consider that the rate of return from development of the land is greater than that of conservation. The benefits gained from development of the land will be greater than the cost because the farmer (or any individual land owner) has a positive rate of time preference, therefore making it more profitable to develop the land than to conserve it. Most of the benefits of conservation are intangible, with no markets existing for them.

(Ministry of Agriculture and the Environment, National Biodiversity Committee - Dominica, 2003)

Agriculture

The agricultural sector plays a major role in the economic development of most Caribbean countries. However in our efforts to strengthen our economies we do not take certain aspects of sustainable development into account, such as efficient agricultural practices. Chemical fertilisers and pesticides are admittedly used improperly and there is even a lack of awareness of their long-term effects on human health and the environment.

Presently Guyana produces a fairly large amount of food which can sufficiently feed its population but it is not affordable for everyone. Farming is one of Guyana's most beneficial economic activities. The future of land and food depends on how the people of today use their available resources for development. As the population increases more food will be required to prevent starvation among the citizens. Therefore the government would have to discover methods of providing enough food. Through science and technology, soil tests can be done to determine the absent nutrients. Those nutrients would be provided in forms of fertilizers and manure.

Nadine Persaud and Divya Shivdas, Guyana

Often pesticides and other such chemicals are used indiscriminately with the idea that the more chemicals used the higher the yield and the quality of the products. This is a misconception and is a major cause of pollution to important waterways, degradation to natural resources and causes harm to other organisms.

Many environmental problems, especially those on land use and food production techniques originate from the lack of responsibility within the region. Land degradation, improper land use, improper waste disposal and inefficient agricultural methods are a result of the bad practices and decisions that have been made in the past and are still being made today. It must be reiterated that preserving our land and food supplies for the future is the task that the youth of the Caribbean must rise up and accept.

Policy and Action

It has been argued that land use planning ensures the use of land resources in an organised fashion so that the needs of the present and future generations can be best addressed. Land use planning can ensure that each area of land within a geographical setting will be used so as to provide maximum social benefits, including food production, without degradation of the land resource. From this perspective it is imperative that young people move from being passive actors to active actors who recognise that their own change and involvement in development planning would affect a whole chain of actors. Education and training, especially in agriculture, is particularly key as it relates to young people, since empowering them to make informed choices can lead to meaningful, enjoyable lives and contribute to the sustainable development of the Caribbean region. Furthermore, the young people in the Caribbean need to start advocating for the use of particular farming methods, forestation, land clearance, or pollution abatement and for policies that encourage certain land uses rather than others in the interest of protecting the environment. Some countries in the Caribbean have already adopted educational measures to ensure sustainable land use.

Photo showing youth clean-up in Georgetown Guyana.
Provided by Quacy Grant, Guyana

Natural Disasters

Natural disasters are seen as those, which impact negatively on man and are caused by the physical environment that is extraneous to human action (CARICOM Environment Figures 2002). Disasters occur frequently, are extremely detrimental and are one of the major causes of environmental degradation in the Caribbean.

Vulnerability on the Caribbean region

Caribbean islands are vulnerable to disaster of many kinds as every year; they are left to face the impact of hurricanes and storms, which can cause severe damage. In some instances, islands have to face violent eruptions of volcanoes, which have crippled countries. These natural disasters tend to affect the islands in the Caribbean in a variety of ways, which range from the exodus of people from the country to a break down in productive sectors such as tourism and agriculture. Furthermore vulnerability in the Caribbean region to disaster can be examined as it relates to the vulnerability of populations as a result of limited disaster preparedness initiatives, for example, lack of building codes in some territories.

Drawing of Forest Litter.
Provided by Vanessa Kammeron, Suriname

Regional Effects

Hurricanes, landslides and floods are the most frequent causes of natural disasters in the Caribbean and have historically caused considerable loss of life and economic disruption to Caribbean countries. Volcanoes and earthquakes occur less frequently. Nevertheless all of the natural disasters that affect the Caribbean have very similar impacts on the lives of people and their environment. Volcanoes sometimes trigger earthquakes, which can cause the collapse of various structures (e.g. buildings, walls and bridges

etc.), as well as destroy electricity poles, exposing live wires, which can start fires. Tsunamis can be generated in different ways but in the Caribbean volcanoes and earthquakes mainly generate these. Floods are quite common in low-lying regions of the Caribbean. The situation is exacerbated by deforestation, and improper solid waste disposal.

The four major natural hazards, which threaten the Caribbean region, are:

1. Hurricanes and tropical storms
2. Floods and associated hazards such as landslides
3. Volcanic eruptions
4. Earthquakes
5. Droughts

Hurricanes

The Caribbean is known for the frequent occurrence of hurricanes. The Caribbean lies in the North Atlantic Ocean, one of the six main tropical areas of the Earth, where hurricanes may develop every year. Within the 114 years between 1886 and 1999, approximately 1050 tropical storms have been recorded in the North Atlantic. About half of these attained hurricane strength. Of the hazards in the Caribbean, hurricanes have the potential to be the most devastating. They originate over warm tropical oceans and their duration and intensity are generally fuelled by water vapour that is pushed up from the warm ocean surface. Hurricanes are extremely common in the Caribbean as it lies within the "hurricane belt". Although each year could bring a hurricane, it is unpredictable how often the destructive ones will hit the region e.g. Hurricane Janet in Grenada in 1955 and hurricane Gilbert in Jamaica in September 1988. However, the pattern in recent times has been a reduction of deaths and injuries because of better warning systems and other preparedness activities and an increase in property damage because of commercially-driven unsuitable building practices and locations.

Facts to Know

Hurricane in Grenada

On September 7th, 2004 hurricane Ivan, completely destroyed the island of Grenada. It was one of the worst disasters in the history of the Caribbean with damages affecting up to 90% of the island's crops, vegetation, livestock and structures such as homes, schools and other buildings were. With sustained winds of about approximately 130 mph the hurricane measured approximately 300 miles in diameter. Many lives were lost and the island is still in the process of recovery.

Floods

Floods are caused by heavy rains and are generally the after effects of tropical storms, hurricanes and tidal waves. A large number of fatalities occur during floods as well as extensive damage to vegetation, livestock and property. This is especially true during 'flash flood' events, which thankfully rarely occur in the islands. The flooding that occurred in Guyana in January 2005 is another horrific reminder of nature's force. Residents along the coast and in the capital of Georgetown were living with water in their homes from 2 - 4 weeks, depending on their location along the coast. Generally, lower lying areas will be more susceptible to flooding than higher and sloping ground.

Photo showing a house being destroyed by floods in Jamaica..

"Guyana Floods"

Floods in Guyana come sometimes, and go soon
Unlike the monsoon and the typhoon
With their regular devastating doom.
Our tides, creeks and rivers rise high
But thank God never cause our people to die.

Yes, sometimes heavy rains
Can bring immense pains
Swell grey-brown seas
Till they leap and break protective walls with ease
To hungrily cover the land.

High dank waters can cause alarm
Destroy and damage homes and many a farm
Snuff the life out of livestock
Drown out livelihood and cause disease
But Guyanese cope with and recover from all of these.

Guyana is a beautiful tropical land
Kissed by trade winds, washed with sun
Touched by God's hand
Guyanese never have to run
From natural disasters that bring nationwide destruction.

Montague McPherson, Guyana

Flooding has been the cause of many deaths and of much property damage in the region. Clearly location is critical when it comes to flood risk. Low-lying lands, riverbanks and lands adjacent to gullies are to be avoided, as these areas are prone to flooding. Drainage systems and structures in the Caribbean are generally designed for rainfall events however such systems have become overloaded with time and there is a degree of flooding when rainstorms and hurricanes are experienced.

Volcanoes

There are 19 live volcanoes in the Caribbean. Every island from Grenada to Saba is subject to the direct threat of volcanic eruptions, however, islands such as Anguilla, Antigua, Barbuda, Barbados, British Virgin Islands, most of the Grenadines and Trinidad and Tobago which are not volcanic, are subject to volcanic hazards such as severe ash fall and volcanically generated tsunamis. Large quantities of ash produced during a volcanic eruption can be thick enough to collapse roofs, destroy vegetation and cause aircraft, ship and car engines to malfunction. They can also be very dangerous to people's health since even the finest fractions of ash may cause serious respiratory problems if they are inhaled. This hazard may persist long after the eruption itself has ended and can affect neighbouring islands as well.
(Source: (http://www.uwiseismic.com/Volcanoes/volc_haz .html).

Facts to Know
Volcanic disasters in the Caribbean over the past 50 years:
Soufriere (Guadeloupe), 1976-1977
Minor phreatic eruption. No casualties but economic cost estimated at US $50,000,000
Soufriere (St. Vincent), 1979
Moderate explosive eruption. No casualties but economic losses to the order of US $ 100,000,000
Soufriere hills (Montserrat), 1995- present
Moderate explosive/effusive eruption. About 20 deaths. Complete destruction of capital, Plymouth. Economic cost not yet estimated but in excess of US $500,000,000.

There have been at least 15 other eruptions, fortunately they have not resulted in large numbers of deaths or destroyed enough property to be ranked as disasters.

Earthquakes

The Caribbean is an island arc system formed at a convergent plate boundary. This is the main cause of the volcanic and seismic activity in this region. Most of the earthquakes occurring in the Caribbean are either tectonic or volcanic in origin. Tectonic earthquakes are generated

when plates move and accumulated energy is released, while the movement of magma within the Earth's crust generates volcanic earthquakes. The majority of earthquake events occur to the east of the northern island chain with an epicentre cluster occurring between Guadeloupe and Dominica around 150 miles east of these islands. Another epicenter cluster occurs to the North West and South East of Trinidad but earthquake events occur throughout the island chain inclusive of Barbados. However, the frequency is greater around Dominica and Trinidad and structural damage is a frequent occurrence, but not loss of life.

Droughts

There are distinct dry and rainy seasons in our region, but sometimes the dry seasons are prolonged causing droughts. When this happens, there is a shortage of water, which in turn impacts crops and livestock, and can cause forest fires.

Planning and Policy Action

Natural disasters cannot be prevented, but much can be done to reduce the long-term effects in our region. The frequency of disasters and their associated damages in the Caribbean region is a trend, which results from growing vulnerability, and may reflect changing climate patterns. These trends make necessary for the region to break the cycle of destruction and reconstruction and address the root causes of vulnerability, rather than merely treating its symptoms when disasters happen. Proper planning and implementation of laws such as enforcing zoning codes, strict building codes, and instituting public awareness programme can reduce the long term effects of disasters. The whole concept of a building code tends to place attention on the differing factors that determine a building's resilience when subjected to the forces of high winds, ground shaking or flooding, all forces common in the natural hazards that affect the Caribbean. However most of our concentration has been on building codes to with stand hurricane events but not much focus is on designs against earthquakes. Nevertheless the design, citing and detailing of a building all contribute to its ability to survive the effects of a natural hazard.

In the Caribbean there have been the development of the Caribbean Emergency Response Agency (CDERA), an inter-governmental regional disaster management organisation. Its main function is to make an immediate and coordinated response to any disastrous event affecting islands states once they request assistance. CDERA uses a strategy known as the Comprehensive Disaster Management Strategy. This CDM strategy envisions the integration of disaster management into long-term planning and development processes. This strategy mandates pro-active management throughout all phases of the disaster cycle. These include prevention and mitigation of the likely impact of disasters, especially hurricanes; preparedness and response before and during the event; and recovery and restoration. Furthermore the CDM strategy places great emphasis on the benefits of investing in disaster mitigation before it strikes. Its focus is on the building of roads, drainage systems, buildings, electrical and water lines and other civic installations in ways that make them as storm resistant as possible.

"Natural Disasters in Guyana"

Drought is also a critical natural disaster in Guyana. The prolonged drought causes widespread deprivation and loss throughout the country. The most acute problems facing the population as a result of this are lack of drinking water and a shortage of food. The acute shortages of food and potable water have subjected almost the entire population of indigenous communities to the threat of starvation as these communities depend mainly on fishing and farming for survival. In Guyana, a severe drought called El Nino occurred in October 1998. This drought affected many persons and was a threat to the agricultural sector of the community.

Krystle Dazzell and Taralyn Harris, Guyana

Electrical poles damaged by Hurricane Ivan in Jamaica.

Urban Areas

Urbanisation is the increase over time in the population of cities in relation to the region's rural population. Urbanisation has intense effects on the ecology of a region and on its economy. Many urban areas in the Caribbean lie on the coast. Most rural families count at least one member of the household that has left for urban centres. However little thought is given to how infrastructure development, industrial relations, commercial growth, city layout and increased consumption of energy are affecting the environment. Many Caribbean countries are currently experiencing a range of urban problems some of which includes inadequate infrastructure facilities such as drainage, solid waste disposal, sewerage and water supply systems, which are necessary for public health and well-being. Furthermore there is the absence of adequate road networks that can accommodate the increasing number of vehicles, declining housing and the proliferation of derelict buildings, particularly in city centres. The problem is getting so large that even social and community services are unable to cope with the growing number of issues that confront urbanising neighbourhoods, such as overcrowding, substandard accommodation, poverty and crime.

Urban Planning

Urban planning involves determining and drawing up plans for the future physical arrangement of a community. According to the 1999 UNEP Caribbean Environment Outlook report, 35.4% of the people in the Caribbean region lived in urban areas in 1950, whereas in 1970, the urban population had increased to 47.4%. By 1995, the urban population had reached 62.4% in the Caribbean, that is a near double in less than 50 years (UNEP, 1999). Planning ensures that we are sustainably able to meet the needs of communities in urban areas. This can be done through mechanisms of zoning, which ensure that people in urban areas can enjoy facilities and structures for comfortable lifestyles i.e have trees, and through the consideration of the impacts of all developments. Urban planning can involve the installation of urban infrastructure including public parks, sustainable urban drainage systems, and greenways which can be planned before urbanisation takes place, or afterward to revitalised an area and create greater livability within a region.

Urbanisation and Water

The increasing urban population in the Caribbean is exerting stress on the water supply and wastewater distribution systems. Regular investment in the maintenance and expansion of water supply and wastewater systems is required to preserve water quality for human and environmental health. Care is also needed to ensure that efficient systems are put in place so that water is not consumed at an unsustainable rate and remains available for other living organisms. To deal with this, sometimes governments impose a flat fee for water consumption or a water meter system where consumers are charged depending upon their demand.

Urbanisation and Coastal Zones

The effects of a rapid rate of urbanisation on our marine and coastal environment are being neglected. In order for buildings to be constructed, areas must be cleared, and sometimes mangroves are destroyed. Furthermore as

Urban Areas

"Crisis in the water distribution system in Roseau, Dominica"

Even with its pristine waters rushing from luscious green mountain peaks, Dominica, specifically the capital Roseau, is still affected by urbanisation as it pertains to water distribution. A few years ago, improvement works were carried out on the water distribution and sewage lines in Roseau. This was as a result of increased demand for safe drinking water from a larger urban population and because of old water and sewage distribution lines. Residents faced periods of water supply shortages and complained of poor water quality, sedimentation, impurities, and even fecal deposits from damaged sewage lines in the water. This situation was not substantiated by tests, but it still caused a major stir among the residents.

Delroy Williams, Dominica

Photo showing Pointe Seraphine, St. Lucia.
Provided by Dexter Penn, British Virgin Islands

urbanisation takes place, the amount of solid waste material and sewage generated increases without enough treatment plants for adequate processing of these materials. Sometimes this means that raw sewage is dumped into the ocean; large pieces of non-biodegradable waste material that enter the marine environment choke some of the marine organisms that mistake the floating debris for food. Due to the increasing demand for cruise-ship tourism and urban development more hotels, sea ports and harbours have to be built putting increased pressures on the environment.

Pollution control

It is urgent and important to implement pollution control, since the impact of individual consumption and waste-generation patterns is compounded by population growth. The knowledge and technology needed for effective pollution control are now available: in certain industries, nearly pollution-free, closed-loop factories have been developed. However, the initial expense of investing in upgrades of factories is always discouraging because it is sometimes seen to be too costly. What is helpful today is that emerging nations have expressed concern over pollution and recognise that it may impede their economic development. As a result environmental action at the governmental level will become a reality only when people demand it and only when nations are willing to agree on appropriate international standards. However action at the individual level is the first step.

A photo showing a house that has been damaged by the floods caused by Hurricane Ivan, Grenada.

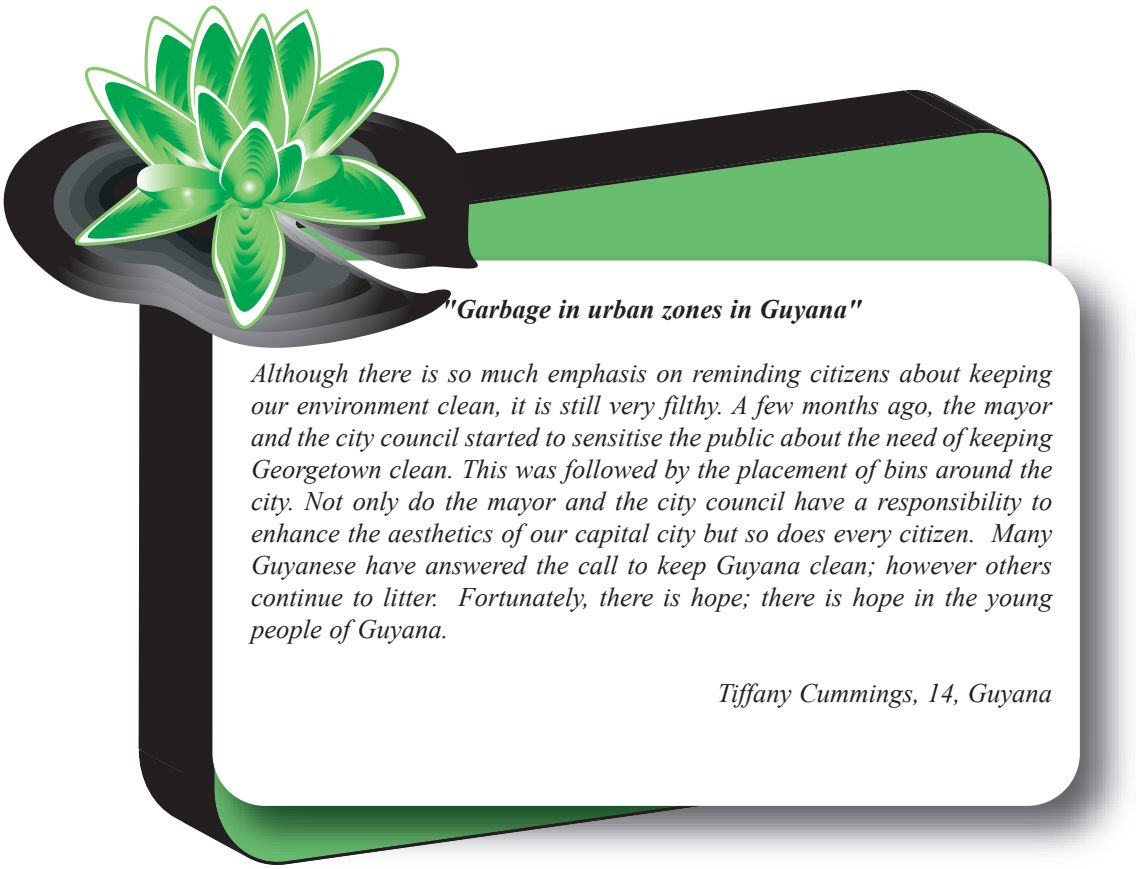
Policy and Action

The process of urbanisation comes with its set of problems as it relates to our environment in the Caribbean. However we must note that there are avenues by which this problem can be addressed. For some having urban infrastructure installed before urbanisation occurs is necessary. It may also require that local governments and other stakeholders take the challenges of urbanisation seriously and adopt integrative and participatory human settlements policies.

In June 1996 the Second United Nations Conference on Human Settlements (Habitat II) was held in Istanbul, Turkey. It is here that the Caribbean, having noted huge challenges to be faced during this millennium in the field of land use and urban and housing development, agreed to update their human settlements policies. In existence and brought to the table at this conference, was the Regional Plan of Action, which made important contributions to urban and land use policies in the region. It laid the groundwork for a multifaceted understanding of settlement processes that would permit policies to make greater contributions to sustainable development of human settlements. It also identified relevant subject areas in which efforts to improve the urban and housing situation of Latin America and the Caribbean needed to be concentrated, and it produced a range of policy agreements that are still adhered to in the region. The Plan of Action's most important contribution, however, would appear to be that it increased the viability of the countries' efforts to forge a vision of the region's spatial dimension and a common approach to realising the potentials of its territory and cities. Through these mechanisms, as young people we can engage governments to address the issues that we as youth seen as pertinent to our existence through the participatory policy process and at the same time have these policies put into action.

Water

Water is vital and essential to all our needs. It is said by palaeontologists that water was a prerequisite for the advance forms of life we know today. The human body contains two-thirds water and most of the important functions in the body need water to ensure that they carry out the processes efficiently.



"Garbage in urban zones in Guyana"

Although there is so much emphasis on reminding citizens about keeping our environment clean, it is still very filthy. A few months ago, the mayor and the city council started to sensitise the public about the need of keeping Georgetown clean. This was followed by the placement of bins around the city. Not only do the mayor and the city council have a responsibility to enhance the aesthetics of our capital city but so does every citizen. Many Guyanese have answered the call to keep Guyana clean; however others continue to litter. Fortunately, there is hope; there is hope in the young people of Guyana.

Tiffany Cummings, 14, Guyana

Water

Water Management

On a planet where approximately 70% of the Earth's surface is covered by water it seems ludicrous to be concerned with dwindling water supplies. But if we closely examine the situation, we will see that whilst global water supplies are abundant, only 2.5% is fresh water. Of that 2.5%, 70% is frozen in polar ice-caps and the other 30% is distributed in the atmosphere, surface water and in aquifers. Less than 0.01% of the planet's water is fit for human consumption. The economic and social well-being of Caribbean countries is dependant upon the quality and quantity of their water. However, the ability of the small countries to effectively manage the water sector is often constrained by limited land size and a limited human resource base.

In the Caribbean region, people conserve water through a variety of methods, specifically through the collection of rainwater for domestic uses. But in many places the hydrological cycle has been interrupted largely due to anthropogenic activities such as deforestation and urbanisation. These activities have reduced ground infiltration and percolation and increased surface runoff. Contaminants have also made their way to our water table and into the ground water. In addition, with prices of about US$0.90 to desalinate 1m^3 of seawater, desalination is far too expensive to be an option for the developing world (Ephraim, 2003). Therefore effective water-saving and management strategies are still needed to mitigate declining water supplies.

Pollution and Misuse

Water pollution can be defined as contamination of water resources by substances harmful to living organisms. The major causes of fresh water pollution stem from activities in various sectors including the agriculture industry, tourism development, improper sewage and solid waste treatment, poor water management, illegal dumping in gullies and littering. However with the pollution of water and the increased demand for potable water it will be even more difficult to fulfill those demands for growing populations. Presently, 31 countries (less that 8% of the World's population) face chronic freshwater shortages. To avoid severe water shortages, countries must implement programmes in which water is used with discretion, conservation techniques learnt, pollution is minimised and the supply and demand of water is managed.

Policy and Action

An important step in protecting our fresh water resources in the Caribbean is through educational and awareness programmes. It is vital for the public to know how their everyday activities affect their environment; if we are to influence a change in their lifestyles. It has long been recognised that retaining vegetation and ground cover in a

Excerpt from "The Joy of Water"

As a Piscean I am a water sign, which may explain my fascination, interest and sheer enjoyment of this multifaceted element. I find the qualities and power of water endlessly fascinating. It is incredible how vital it is to human survival, health and wellness, and it is indeed the very basis of life. As friends and family well know I am always to be found with a glass or bottle of water nearby and regularly extol the benefits of drinking an optimum amount of water daily. I also take delight in the external effects of water, not just as a necessary cleanser but as the source of many experiences of upliftment and joy.

Terri Henry, NAYA, Dominica

watershed helps to hold back rainwater and decreases down-stream floods. Sound farming and forestry practices can reduce runoff and therefore minimise pollution. Retaining crop residues on fields, reducing flooding events when possible and minimising ploughing and forest cutting on steep slopes, protects watersheds.

Each of us can conserve much of the water we use and avoid pollution and misuse of water in many simple ways without seriously changing our lifestyles. Simple steps like taking shorter showers, avoid leaving the water from running while brushing your teeth or washing dishes, the use of water-conserving appliances: low-flow showers, low-flush toilets and aerated faucets, as well as fixing leaking faucets, tubs and toilets, carefully disposing items such as used motor oil, household hazardous waste and batteries, and utilising recycled (grey) water for lawns, house plants and car washing, are a few of the ways each of us can contribute to conserving this precious resource.

There are several concerns regarding water resources in Barbados. With respect to maintenance of quality and supply, they include: the rapidly increasing demand on consumption of residential, commercial, tourism and industrial development; the increase in use of agrochemicals which have the potential to impact negatively on the quality of ground water; increase waste from the release of hazardous chemicals and substances into the environment; and reducing rates of aquifers recharge due to increase in runoff associated with urban development. The Government has undertaken and is actively considering policy options to address the concerns in the areas of demand management, supply management and augmentation, institutional restructuring and capacity building and policy legislation. There is some measure of urgency attached to finalising sustainable solutions to water resources management given in particular the scarcity issue. Timely policy response to, and implementation of findings and recommendations of recent studies will be key in this regard. (Ministry of Physical Development and Environment, 2001)

"Water use is on the rise"

There is increasing water use today, which is due to population dynamics such as population growth, increase in population density, migration and urbanisation. As a result more and more water is being used in areas such as agriculture, in households, sanitation and waste disposal and fisheries. Consequences of this increase in water usage include the depletion of surface and ground water, water pollution, land and ecosystem degradation and declining fisheries. As a result, human beings face food shortages, water related illnesses, slowed economic growth, population displacement and conflicts over water.

Joanne Hamilton, Barbados

"The role of youth in water conservation"

The future of water in the Caribbean is not very promising, however this can be changed if persons (mainly youth as they are the present and future generations) are educated and made aware of how their various actions significantly affect our water resources and the environment.

Joanne Hamilton, Barbados

Water

"Water pollution in Guyana"

The word Guyana means 'Land of many waters,' however, the quality of water leaves much to be desired. It is interesting to note that the worst form of water pollution occurs on coastlines and estuaries close to the city. In Georgetown, for example, there are lots of manufacturing industries that produce industrial waste, which is poured into rivers. These wastes contain metallic salts and other toxic, corrosive and colored materials. Domestic pollution and return-flow from irrigation may contain numerous such pollutions including chloride and nitrates.

This will definitely cause environmental problems and will in turn affect the lives of Guyanese. The organic wastes are distributed by domestic sewage from both rural and urban areas and by industrial waste of animal/plant origin. The breakdown of organic waste by bacteria removes oxygen from water resulting in the death of aquatic organisms. In some areas in Georgetown and on the coastline, sediments from land erosion, slippages and particles washed from hard-surfaced areas such as streets, buildings and airports contribute significantly to water pollution. Sediments, which fill streams and rivers necessitate excessive dredging and increase the treatment cost for domestic and industrial water supply as well as sewage.

One recommendation is that the Environmental Protection Agency (EPA) put measures in place to limit the amount of waste dumped into our waterway and process waste before they are discharged. Also, laws should be introduced by the government for illegal dumping of waste. Heavy fines must be imposed on those who break the law.

Teon Loncke, Guyana

Excerpt from "The Joy of Water"

Science teaches us that incredibly water is a constant cycle- there is no more or no less water on the planet since the dawn of creation. Through the natural cycle of renewal and recycling we are afforded the privilege of drinking and bathing in water as it is evaporated, transpired, perspired and transformed from one form to the next. Because I recognise the value and water as such a sacred resource and I know the nature of its existence, I am led to play an important part in its conservation and care. I take care not to pollute by using harsh chemicals when I wash my clothes and myself. I am mindful not to use chemical sprays in my garden in order not to pollute the water running into our rivers and streams. I also realise that all of nature is intricately connected, so look to the wider environment and how it is linked to the water cycle.

Water like everything in life has to be balanced yet the effect of climate change on rainfall has been causing either droughts or floods. These are extreme symptoms of the world in chaos and illness and these issues must be addressed by all people and their governments. Let's enjoy water for life.

Terri Henry, NAYA, Dominica

"Personal Experience"

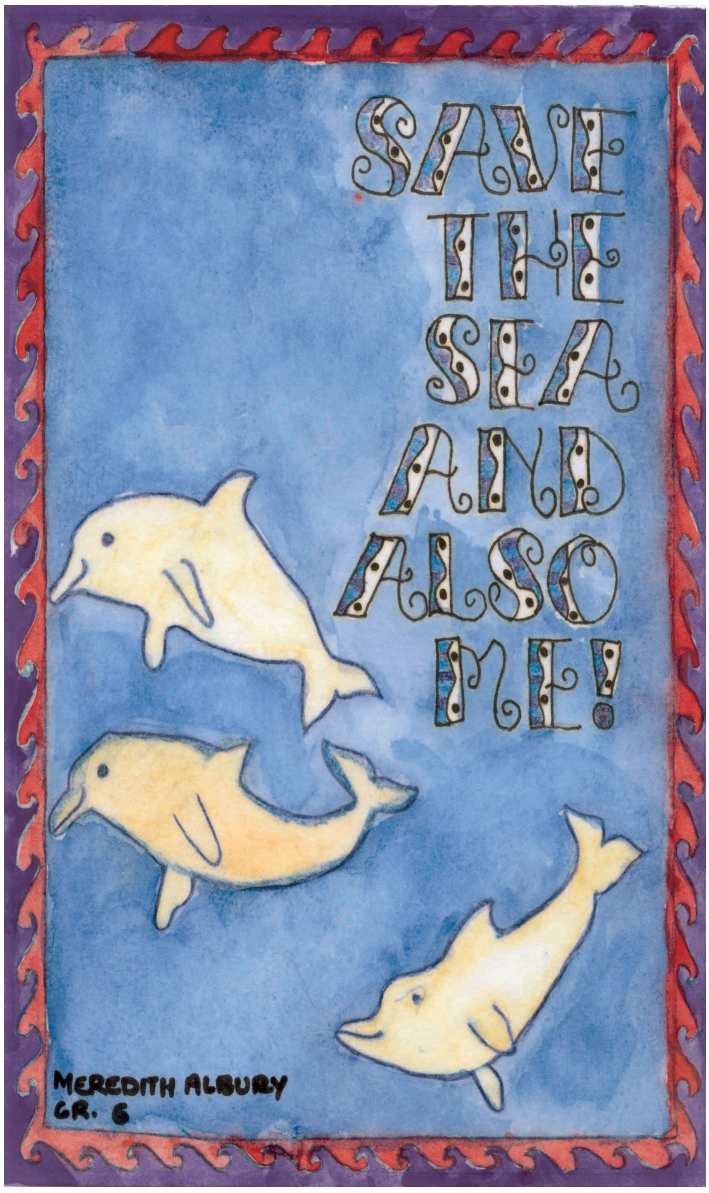
Living in the lush island of Dominica with its 365 rivers and travelling within the Caribbean region allows me to indulge in my favorite activities on a regular basis. The following is a list of some of the ways I enjoy the truly blissful, varied and multiple pleasures of water in nature.

Floating luxuriously within rock pools of seawater at the base of a winding rainforest trail. Created by solidified volcanic lava and sculpted into shape by relentless and constant crashing waves these three basins allow you to swim and benefit from the saltwater and vibrant energy of the Atlantic Ocean. The union of earth and water naturally crafts dramatic patterns and the terrain is constantly rearranged and reinvented. For a moment the wild and free ocean is tamed and contained within these chiseled structures before being replaced with fresh surges in a never-ending cycle of renewal. I feel replenished and whole.

Discovering the mysterious world beneath tropical waters. The, intricately designed and delicate corals softly sway with the rhythm of the waves and a numerous variety of multi-colored fish swim either alone or in collective shoals. Hours pass as I glide through the water observing and becoming lost within this secret underwater Garden of Eden. I truly appreciate the privilege of being able to dip in, to briefly be a part of this hidden ecosystem and view the spectacles that occur in this often forgotten but incredibly beautiful and wonder-filled landscape.

Submerging myself into and under a pool of hot sulfur water. I allow all my aches and pains to be eased away by the combination of heat and healing minerals dissolved within. I am soothed to sleep and enter a deep state of relaxation during which time by body is restored and replenished. Lazily I awake and spend time contemplating the joy of such tranquility. I am guided to emerge and wake up my being in the coolness of the river below…

Henry, Dominica



Water

Drawing showing a stream of water.
Credits: Lachmie Devi Lall, Guyana

Youth in Action

Environmental Youth Projects in the Caribbean

Youth Involvement in Wildlife Management Programmes

The North Rupununi District Junior Wildlife Clubs, Guyana

How can 8 year old children become integrally involved in wildlife management in one of the last four remaining pristine tropical forests? One option is through the North Rupununi District Junior Wildlife Clubs. Hidden in the country of Guyana on the border of the lush Guiana Shield and arid savannah, the North Rupununi District has some of the world's highest recorded levels of biodiversity. The area has long been inhabited by the Makushi people of Guyana, and now the Makushi youth are playing an increasingly significant role in the conservation of their traditional land through the North Rupununi District Junior Wildlife Clubs. The Wildlife Clubs are an integral component of current wildlife monitoring efforts through practical education.

Photo showing the the North Rupununi parade in Guyana. Credit: Arnold Jacobus, Guyana

The Kilgwyn Project: Wetland Clean-Up and Restoration in Tobago

Environment Tobago, Trinidad and Tobago

For over twenty years, the Kilgwyn wetland was used as a dump site. Environment TOBAGO cleaned up most of the area with the help of volunteers and sponsors in December 2002. In November 2003, the final clean-up was done in an attempt to turn the area into a nature reserve. The Tobago House of Assembly (THA) commended the effort and pledged its support. Consequently, from September 2004 to May 2005, the Institute of Marine Affairs conducted research in that area on the THA's request.

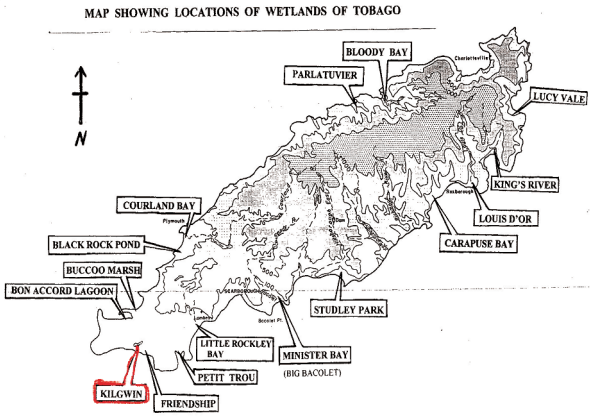


Photo showing a map of the wetlands in Tobago. Provided by Environment Tobago, Trinidad and Tobago

Photo showing before the clean-up of Kilgwyn wetland. Credit: Sebrenia Roberts, Trinidad and Tobago

Photo showing activities during the clean-up of Kilgwyn wetland. Credit: Environment Tobago, Trinidad and Tobago

Above: Photo showing the planting mangrove trees in the cleaned up wetland. Credit: Environment Tobago, Trinidad and Tobago

The Floating Classroom

Environmental Awareness Group, Antigua and Barbuda

The Environmental Awareness Group's Floating Classroom, launched in 2000, has been a highly successful educational field trip, exposing the wonders of our native species and environment to primary school children. The Floating Classroom is made possible through the generous support of the Organization of American States (OAS) and the International Fund for Animal Welfare (IFAW). In 2004, Grade 3 students from the New Winthorpes Primary School in Antigua participated in an educational excursion to the offshore islands of Antigua, home to Antigua's most endangered species including the rare Antiguan Racer snake. Participants then wrote letters of appreciation to the EAG office that described their learning experience.

Dear E.A.G.,

Thank you for taking us on the trip to Great Bird Island. The boat ride was nice. I learned that snakes eat lizards. We had a nice time with you. We are happy we saw the Atlantic Ocean and the Caribbean Sea.

Malcolm, Antigua and Barbuda

Dear E.A.G.,

I am writing to let you know how I spent my time on the trip to Great Bird Island. I was in group C and enjoyed the trip over to the island. I learned that there are plants that are important for holding the sandy shore in place such as sea grapes and coconut palm. Also the most common plants that grow on Great Bird Island are yellow balsam, and it grows on rocky parts. Thank you very much for the trip.

Crystal, Antigua and Barbuda

Environmental Youth Projects in the Caribbean

During the summer of 2004, seven of the EAG Racers braved the elements and packed up to go camping on Rendezvous Bay, Antigua. The EAG President and the Youth Development Officer accompanied the Racers on their adventure. The group hiked from Carlisle Bay, on the south coast of Antigua, to Rendezvous Bay, where they set up camp. At the site, the Racers learned basic camping skills and were given instruction on environmental surveying techniques, bird identification and watching, and astronomy. Again the participants wrote about the lessons they learned during this encounter with nature.

Through the EAG's Rendezvous with Nature activities, young people in Antigua discover that camp is a form of youth development, since participants learn what to do in a camp. Survival skills, outdoor activities, and nature observation lead to a deeper appreciation of the natural environment.

Stars

On the first night of our camping trip, we were visited by Donald who told us a little about the stars. We started to look in the sky at around 9:30 pm. He also told us how stars were used in the olden days to help guide travelers.

Adrian Andre, Antigua and Barbuda

Protection

When camping, always walk with the following: insect protection, sun protection, rain protection, and foot protection.

Mark Ralph, Antigua and Barbuda

How to light a bonfire

To light a bonfire, you first collect flammable material. At the camp on the beach, there were coconut husks, coconut branches, driftwood, and dry grass. When we finished collecting the material, we dug a pit and put the wood and other materials in it. We put the dry grass and twigs in strategic positions of the bonfire. Then we lit twigs and dry grass, and the other materials caught ablaze. When extinguishing the fire, we threw sand on the embers.

Gavin Andre, Antigua and Barbuda

From Litter to Glitter

Government of Barbados,
Solid Waste Project Unit Barbados

Over one hundred children paraded before the judges for Junior Kadooment 2004, displaying the creativity and beauty of "From Litter to Glitter". The band produced by the Solid Waste Management Programme and De Hullabaloo Crew captured second prize in the environmental category. PET plastic bottles, straws, plastic plates and carton centres from toilet and hand towel rolls were all transformed from litter to glitter. The "Beauty of Recycling" section was described by a local newspaper as one of the more colourful sections on parade and was carried on the front page of a local newspaper. Overall, eighteen bands participated in the event.

The "Litter to Glitter" Kadooment Band consisted of the five sections described below and on the following page.

Section One: A Good Day
Size: 40 members (girls only)
Age Range: 4-14

Day by day we must fight the battle against pollution for if we do not, a bad day awaits us. Barbados is a paradise and we must continue to treat it that way. Every day that we do our best to keep Barbados clean is a GOOD DAY!

Section Two: Toxic City
Size: 40 members (Boys & Girls)
Age Range: 6-15

Have you ever wondered what our little island of Barbados would look like if we didn't take care of our environment? Imagine mountains of smelly garbage, rodents, flies, polluted waters, toxic gases and deadly diseases. We would be living in a toxic environment that is not very desirable. This TOXIC CITY will spell the end of the road for our beautiful little island Barbados.

Section Three: Earth Defenders
Size: 35 members (Boys and Girls) Age range: 4-10

Every little child grows up learning of superheroes such as Superman, and Spiderman. But they do not learn of those superheroes which are right under their noses - the Sanitation Workers, workers from the National Conservation Commission, and even individuals such as the late Dr. Colin Hudson. These persons worked tirelessly to protect our environment from the evils of littering. Let us hail these people for the fantastic job they are doing, and let us highlight them as superheroes - our EARTH DEFENDERS!

Section Four: De Right Step
Size: 35 Members (Girls and Boys)
Age Range: 4-10

Plastics are one of the most damaging items in the environment. Yet we show very little concern with the casual way in which we dispose our plastic bottles, bags, straws, cups and forks. We are stepping in the wrong direction.

The right step is reducing the amount of plastic waste we are producing and go in the direction of protecting our fragile environment.

Recycling is the right step!

Section Five: The Beauty of Recycling
Size: 40 Members (Girls Only)
Age Range: 4-14

We make too much litter and this is very harmful to us all. If we were more creative we can fine many useful ways to reuse things that we just throw away. Almost everything we use in today's world can be reused. Let's reduce the litter by recycling.

Recycling is Beautiful!

Environmental Youth Projects in the Caribbean

Tobago's Youth getting involved in the Solution to Sewage Pollution!

Buccoo Reef Trust
Trinidad and Tobago

Sewage pollution is one topic that many people would rather not address, but the youth of Tobago are getting involved in all kinds of ways. Five students from Bishop's High School in Tobago participated in the 2004 NIHERST Caribbean Youth Science Forum (CYSF) at the University of the West Indies - St. Augustine campus from August 1-8, 2004. Youth representatives from Grenada, Antigua, Barbados, Bahamas, Tortola, and Trinidad also participated. The group from Tobago consisted of five young people who made a presentation on "Pollution and its Effects on the Environment". They investigated the measures taken by local authorities to address the impacts of sewage on the reef.

From Out of the Blue (Buccoo Reef Trust, 2004)

World Ozone Day 2004 Poster Competition

Environment Management Authority / Ozone Unit
Trinidad and Tobago

The Poster Competition was a component of the World Ozone Day Celebrations for 2004, in which the Ozone Unit of the Environmental Management Authority endeavoured to both educate the public about the causes and effects of ozone depletion, as well as highlight local and global efforts made thus far to preserve, protect and rehabilitate the ozone layer. This poster competition was intended to get youth involved in CFC phase-out activities through the adoption of ozone-friendly practices at an early age. There was a category for ages 11 years and under and another for 12-16 years. Advertisements were placed in the newspapers, and the response to the poster competition was truly encouraging. Approximately 75 posters were received, an inspiring indication that young people in Trinidad and Tobago are very much interested in the preservation and wise use of the environment. Some art teachers encouraged entire classes to enter the competition as part of a class project. These posters are intended to appear in a calendar to raise awareness about ozone depletion.

Grafton Beach Clean-Up

Environment Tobago
Trinidad and Tobago

Photo showing Grafton Beach before cleanup. Provided by Sebrenia Roberts, Tobago

Grafton Beach cleanup, garbage collection. Provided by Sebrenia Roberts, Tobago

Grafton Beach after cleanup. Provided by Sebrenia Roberts, Tobago

Bequia Glass Litter Project

Bequia Community High School
St. Vincent and the Grenadines
Herman L. Belmar
Bequia Community High School
P. O. Box 75, Port Elizabeth,
Bequia, St. Vincent & the Grenadines
Tel: + 1 784 458 3385
humpback@caribsurf.com, humpback_1952@yahoo.com
http://www.unesco.org/csi/smis/siv/Caribbean/svgact17-townhall4.htm
Students in Bequia have addressed the growing problem of broken glass on the playing field, school compound, drains and beaches by not only doing cleanups, but by undertaking a glass re-use programme for which they won the 1997 UNESCO Caribbean Sea Science and Technology Award and the 1999 Commonwealth Youth Service Award. The students have expanded this project to include their families and their community. Now, the school is a drop-off point for unwanted bottles. Students break these bottles into small pieces and mix them with cement and reinforced steel to produce park benches for their school yard and community areas. Some benches use logs salvaged from cleared building lots as seats and backs. The glass is also used to make patio tiles. The environment is now a safer place as a result of their efforts.

Photo showing the glass recycling project of the Bequai youth. Credits: Community High School.

Group directory

Antigua and Barbuda

The Environmental Awareness Group (EAG)
Cooks Hill Gray's Farm, St. John's Antigua
Tel: (268) 462-6236
Fax: (268) 463-7740
http://www.antiguanracer.org/html/partners/eag.htm
http://www.antiguanice.com/clubs/eag/eag.htm
eag@candw.ag

The Environmental Awareness Group (EAG) is involved in a wide variety of environmental and education activities in Antigua & Barbuda. The EAG gives slide shows, talks, and conducts field trips on environmental topics for schools, community groups and businesses. They also provide advocacy and training for tour guides that focuses on increasing environmental sensitivity and stewardship so that the tourism sector can play a significant role in the management of natural tourist attractions. The EAG coordinates youth programmes related to community forestry, marine and coastal resources and offshore island programmes that focus on conservation of local wildlife and ecosystems.
Source: http://www.antiguanice.com/clubs/eag/eag.htm

Bahamas

Dolphin Encounters Limited
Dolphin Encounters - Head Offices
Paradise Island-1 Marina Drive
P.O.Box N 7448
Tel: (242) 363-6790

Dolphin Encounters Limited
Blue Lagoon Island
P.O.Box CB-10977
Tel: (242) 394-2200
www.dolphinencounters.com

Dolphin Encounters Limited (DEL), a world renowned tourist attraction, has played an integral role in the tourism sector of the Bahamas as well as spreading conservation and awareness in the community. DEL has effectively

promoted environmental awareness through its non-profit projects and educational programmes such as Project Green, Beach Buddy, and Marine Educational Poster Contests in the school system. Students learn within the classroom and are able to practice activities such as: painting creative conservational messages on garbage cans; participating in beach cleanups; and partaking in environmental poster competitions.

Barbados

Caribbean Conservation Association (CCA)
"Chelford"
Bush Hill, The Garrison, St. Michael
Barbados
outreach@ccanet.net
http://www.ccanet.net

For nearly four decades, the Caribbean Conservation Association (CCA) has worked unceasingly in the region to enhance the quality of life for present and future generations by initiating, advocating and advising on environmentally-sound policies, programme and practices, which contribute to the sustainable management of the region's natural and cultural resources.

CCA works closely with: Governments, Non-Governmental Organizations, Private Sector entities, Educational institutions and individuals, as well as its partners and sponsors, regionally and internationally, to bring its projects and programme to fruition.

CCA is extremely interested in young people and welcomes their input, hence its involvement in youth-related projects such as the Global Environmental Outlook for Youth in the Caribbean (GEO-YC) and the UWI/CCA internship programme.

Caribbean Youth Environment Network - Regional Office
Mailing address:
P.O. Box 915, Cheapside
Bridgetown,Barbados BB 11000
Street address:
c/o CPDC 'Halsworth'
Welches, St. Michael, Barbados
Tel: (246) 437-6055
Fax: (246) 437-3381
executivecoordinator@cyen.org
www.cyen.org

The Caribbean Youth Environment Network (CYEN) is a regional non-profit, non-governmental organisation whose membership comprises youth groups, individual youth members and affiliates in fifteen Caribbean territories that represent the English, Spanish and French language groupings. It aims to promote youth to take positive action on issues related to environment and sustainable development. Since its creation in 1992, the network has coordinated or participated in a number of activities and projects at the national, regional and international levels. Significantly, the network has frequently sourced and financed short-term training scholarships for youth to attend leadership and other training courses. CYEN frequently represents the position of Caribbean youth at regional and international meetings.

Dominica

Close Encounters with Agriculture
National Association of Youth in Agriculture, Inc. (NAYA)
Malcolm Wallace / Delroy Williams
c/o Division of Agriculture
Botanical Gardens
Roseau, Dominica
naya_da@hotmail.com / cini26@hotmail.com

The National Association of Youth in Agriculture, Inc. (NAYA) offers the following activities to primary and secondary school students of Dominica:

- Field trips to holdings of experienced, successful farmers
- Agriculture expositions
- Lectures and practical sessions
- Scholastic competitions including public speaking and school quizzes

Through these activities, NAYA intends to increase education concerning agricultural matters and foster an increased awareness of agriculture in schools. NAYA aims to stimulate public discussion about the role of agriculture and to provide national exposure to successful farmers and alternative farming practices.

Guyana

Guybernet
17F Garnett Street
Campbellville, Georgetown, Guyana
Tel: (592) 223-8241
Fax: (592) 226-2804
gybernet@networksgy.com

Guybernet is a non-profit, non-governmental organisation led by young people. Environmental sustainability is one of the focal areas of the organisation. Guybernet undertakes projects such as clean-up campaigns, tree-planting, and "green walks" that harness the energy of the young people to an issue that affects current and future generations. Guybernet engages young people in Guyana in panel discussions and national consultations that provide an opportunity for the youth to share their ideas and brainstorm to develop solutions to these environmental national concerns. Their ideas and propositions are often presented to the leaders of Guyana's political parties, members of the diplomatic corps, civil society, and international organisations based in Guyana.

North Rupununi Junior Wildlife Development Council

Bina Hill
North Rupununi
C/O Samantha James
Iwokrama
77 High Street
Kingston, Guyana
sjames@iwokrama.org
pinkyallicock@yahoo.com

Credit: Arnold Jacobus, Guyana

The North Rupununi Junior Wildlife Development Council assists and facilitates a network of Junior Wildlife Clubs in the communities of the North Rupununi District of Guyana. The Wildlife Clubs were created in 2000 through a partnership of the Iwokrama International Centre and the North Rupununi District Development Board. The clubs involve youth as an integral part of existing wildlife management and monitoring programmes, and they allow students to gain firsthand experience in natural resource management and conservation. This successful youth-driven programme has a club in all 14 communities in the North Rupununi and a total of 366 members who participate in wildlife research and raise conservation awareness. The network of Junior Wildlife Clubs ensures the continuity of natural resource management and wildlife monitoring programmes by giving local youth the practical experience necessary to become future environmental leaders of the region.

St. Lucia

Caribbean Youth Environment Network - St. Lucia Chapter
c/o Department of Youth & Sports
Barnard Hill
Castries
St. Lucia
Tel: (758) 454-6283 or (758) 285-4429
Fax: (758) 4546283
cyenstlucia@lycos.com

The St. Lucia chapter of CYEN coordinates the participants in St. Lucia's International Coastal Clean-up (ICC). The chapter recruits and raises awareness of local volunteers in St. Lucia for coastal clean-ups and other environmental events. Schools, community organisations, and other interest groups are mobilised to action.

St. Vincent and the Grenadines

Bequia Community High School
Herman L. Belmar
Bequia Community High School
P. O. Box 75, Port Elizabeth,

Bequia, St. Vincent & the Grenadines
Tel: (784) 458 3385
humpback@caribsurf.com, humpback_1952@yahoo.com
http://www.unesco.org/csi/smis/siv/Caribbean/svgact17-townhall4.htm

JEMS Progressive Community Organization
Enhams
Enhams Post Office, St. Vincent
Email: Jemssvg@homail.com

The JEMS Progressive Community Organisation was established in St Vincent and the Grenadines as an environmental and sustainable development organisation in 1978. It achieved success through its action in responding to the extensive exploitation of the Kingshill Forest Reserve located in the immediate community. The members of the community, especially the youths, participated in community clean-up campaigns and leadership training. The organisation has established a day-care centre in Enhams where conservation is taught to children, and an adult literacy project that focuses on environmental issues and provides skills training to unemployed youth and women.

JEMS Progressive Community Organisation acts as a development catalyst to enhance the capacity of youth and residents while empowering them through training and other innovative strategies to manage the resource base of their communities, to alleviate poverty, develop sustainable livelihoods and positively impact on national policies and programmes.

Suriname

The Foundation for Youth Welfare
Prinsessestreet 3
Paramaribo, Suriname
Tel: (597) 888 9533 or (597) 484708

The Foundation for Youth Welfare is a non-profit, NGO committed to improving the lives of young people in Suriname. They involve youth in educational, recreational, creative, and productive activities based on the idea of sustainable development. Their goal is to set up multifunctional centres in the future to accommodate youth, enabling them to develop their skills and to participate in community development. The Foundation implemented several activities in collaboration with the Youth Centres section of the Department of Youth Affairs as well as the United Nations Development Programme in Suriname.

"Coastal Clean-up in St. Lucia Caribbean Youth Environment Network - St. Lucia Chapter"

On the third Saturday in September of every year, hundreds of young volunteers all over St. Lucia are deployed to virtually every beach or shoreline in St. Lucia to pick up manmade trash and debris for the International Coastal Clean-up (ICC). The Caribbean Youth Environment Network (CYEN) St. Lucia Chapter is mandated to coordinate the St. Lucia leg of the ICC. The organisation is responsible for the mobilisation and sensitisation of local volunteers in St. Lucia for the event - including schools, community groups, church groups, dive clubs, and other interest groups.

Peron Gustave, St. Lucia

"The Youth Environment Brigade in Suriname"

For me, it is very difficult to understand why some people dump their garbage on the streets, why they treat their own community like this. There are a few people who understand the importance of the environment and treat it with care. That is why people should be more educated about this issue through the media. It can have a positive effect on our way of thinking and acting. In 2003, I became a member of the Youth Environment Brigade, so taking care of nature in all possible ways became one of my main activities. I have experienced how pleasant it is to live in a healthy and clean environment. That is why I will do my very best to keep it that way and tell others in my community about my experiences. I hope this can bring a lasting change for the future of my community.

Gabrielle Aloepoe, Suriname

Some of the activities include:

- Capacity-building workshops for youth to improve their creative and productive capabilities
- Educational field trips during summer vacation
- Collecting youth contributions for the GEO for Youth of the Caribbean report

Trinidad and Tobago

Eco-Leaders Programme
Institute for Future Global Leaders (IFGL)
Student Activity Centre
University of the West Indies, St. Augustine
Trinidad
ifgl1998@yahoo.com

The Eco-Leaders Programme is a capacity-building framework for young environmental leaders in Trinidad and Tobago. It aims to ensure their participation in policy development with respect to environmental conservation. The IFGL is engaged in a partnership with the Ministry of Public Utilities and Environment of Trinidad and Tobago to bring youth to the centre of the government's strategy for environmental conservation and sustainable development. The Eco-Leaders Programme is made up of the following three phases:

1. Showcase of youth-led environmental projects at the community level, which were contributed to the GEO for Youth of the Caribbean report and a National Environmental Outlook for Youth
2. Capacity-building of young environmental leaders
3. Implementation of three pilot projects

Environmental Management Authority

National Ozone Unit
8 Elizabeth Street, St. Clair,
Port of Spain
Trinidad and Tobago
Tel: (868) 628-8042
Contacts: Anil Sookdeo (National Ozone Officer)
anilsookdeo@ema.co.tt
Marissa Gowrie (National Ozone Assistant,
mgowrie@ema.co.tt
http://www.ema.co.tt

The National Ozone Office promotes environmental education that touches on the issue of ozone depletion. On World Ozone Day, in September, the office announces the winners of a poster competition in which local schools participated.

Photo showing submissions at the Ozone Day competition. Credits: Marissa Gowrie, TrinidadTobago

Photo showing submissions at the Ozone Day competition (12-16yrs) group. Credits: Marissa Gowrie, Trinidad Tobago

Photo showing the contributors receiving group prizes at the Ozone Competition. Credits: Marissa Gowrie, Trinidad Tobago

Group Directory

Environment Tobago

P.O. Box 503
Scarborough, Tobago
Republic of Trinidad and Tobago, West Indies
Tel: (868) 660 7642
envirtob@tstt.net.tt
www.scsoft.de/et

Environment Tobago, the premiere environmental NGO in Tobago, was founded in March 1995. Their mission is to conserve Tobago's natural and living resources, advance the knowledge and understanding of such resources, promote their wise and sustainable use while demonstrating their essential relationship to human health and the quality of life. Environment Tobago has undertaken several activities geared towards youth development and sustainability such as:

- **Keep a Clean School Competition**
  An annual competition open to all schools in Tobago. Schools are judged in pre-arranged categories and awards are presented to those deemed the cleanest school on the island.
- **Environmental Calypso Competition**
  This competition began in February 2004, when school children under the age of thirteen were asked to compose and sing an environmental calypso.
- **Monthly Coastal/ Wetlands Cleanups**
  Due to the accumulation of garbage on various beaches and in wetlands around the country, a monthly clean up programme was initiated.
- **Celebrating Days of Environmental Importance.**
  Days such as World Wetlands Day, Biodiversity Week, and World Environment Day are celebrated. On such days, lectures and various programmes in collaboration with other agencies are carried out.

Photo of the best school garden.
Credits: K. Hall Private Primary School, Tobago.

Photo showing the Kilgwyn wetland clean-up project, Tobago. Credits: Environment Tobago, Trinidad and Tobago

Photo of the best recycling initiative.
Credits: Michael Mason Hall Secondary School, Tobago

Photo taken on World Environment Day.
Credits: Plymouth School for the Hearing Impaired, Tobago

Future Outlook

Atmosphere

Pessimistic Outlook

Over the next 20 years, the increased burning of fossil fuels for energy, increased emissions from vehicles and industrial processes, will inundate the atmosphere with polluted air and an unmanageable amount of greenhouse gases. Respiratory ailments will therefore be characteristic of almost every individual and there will be soaring atmospheric temperatures that will result in sporadic weather. Consequently, there will be an elevation of the destruction of ecosystems (such as coral reefs that need specific conditions to thrive), habitat and eventually a detrimental and irreplaceable loss of Biodiversity. Continued use of CFCs, will result in a larger ozone hole. As a result, damaging UVA and UVB rays will further penetrate our atmosphere and cause severe health damage, especially in the form of ultraviolet keratitis of the eyes (or flash burn) which is the most common radiation injury. Cases of cataracts will also increase as well as skin cancer, which are already causing increased health concerns. Sun protection will be a must and air purifiers, for those fortunate enough to afford them, will be become a necessity. Predicting the future extent of climate change remains difficult and

"A Glance into the Future"

Sweltering heat and gray skies are the order of the day now,
There are a few trees left though, maybe a few dogs and one very slim cow,
A heavy gray canopy of cloud is always present,
And death by respiratory ailments seems imminent,
No one listened to the warnings to reduce the greenhouse gases /like Carbon Dioxide and Methane,
Now for the first time in the Caribbean, we are faced with the possibility of acid rain,

It's play time for the kids so they go into the artificial playground built on the third floor,
Because there are such high levels of noxious gases, the days of playing outside are no more.
Life is just different since the ozone hole got so much more profound,
SPF 60 everyday, air purifiers and cancer patients are all around.
Things didn't have to be this way, But people ignored all the warnings day after day after day,
And now, this is the state of the atmosphere in the Caribbean;
A region once known for the beautiful sand, sea and sun is now in a state of desperation

Jasmine Hamilton, Barbados

uncertain, with predictions tending to be less confident and consistent for particular regions. However in the Caribbean region we will face severe weather events, such as tropical cyclones, which are likely to become increasingly frequent and intense, involving heavy rainfall, high winds and storm surges. Furthermore sea levels are expected to rise, with severe implications for coastal areas and low-lying islands in particular.

Optimistic Outlook

Air pollution affects both the state of the environment and human health at the local, regional and global levels. However we in the Caribbean, even though not large contributors to greenhouse gas emissions, are making a contribution to the process of minimising damages to the environment. We recognise the negative possibilities are endless, if the atmosphere is not properly taken care of now and that if there is an increase in environmental laws then atmospheric pollution can be minimised and even prevented. There are several laws e.g. the Montreal Protocol, which are already in place to reduce the use and manufacture of CFC's. This treaty for the protection of the ozone layer was a very positive step towards the improvement of the quality of the atmosphere. In the Caribbean there is already a reduction in the use of CFC's, and ozone friendly products are in greater use.

- Alternative energy sources can be used. This will greatly reduce the level of greenhouse gases present in the atmosphere.
- In an attempt to reduce and/or control emissions from cars, catalytic converters should be implemented. They function by converting harmful gaseous emissions from cars into environmentally friendly gases.

If these measures are implemented, a positive outlook for the future state of the atmosphere is possible. We foresee that, by 2025, there will be several laws in place to protect the atmosphere. As a result, the atmosphere will be in a better state and the air that we breathe will be fresh, seas will be clean and the atmosphere will protect a healthy environment for all living organisms.

"A positive change…"

Our surroundings, everything we can see and a glance of nature…The trees, plants, animals, and humans. All these things are very beautiful, but this beauty is changing dramatically due to our attacks on the environment. Instead of attacking, let us start to protect nature, otherwise we will have to suffer the consequences in the future… massive environmental disasters!

In the past, I have damaged the environment myself, but now there has been a positive change! I try to encourage my friends and family to care for the environment and not to damage its beauty. We all can make this positive change…

Jo-Anne Redout, Suriname

"At present, more and more factories are being constructed around the region"

Due to the air pollution caused by the smoke stacks, the people and environment continue to suffer from ill health. It is also detrimental to human well-being and health when everyday chemicals and gases combine into the atmosphere, causing the ozone layer to be destroyed. If this practice is continued, there will be a great change in the climate and weather. Government as well as humans alike (both young and old) should monitor their activities all the days of their lives and play their part in the protection of the environment.

Jessica Bellevue, Dominica

Biodiversity

We must recognise that the human race cannot exist alone on this planet. The balance of plants and animals is essential for the existence of every other organism.

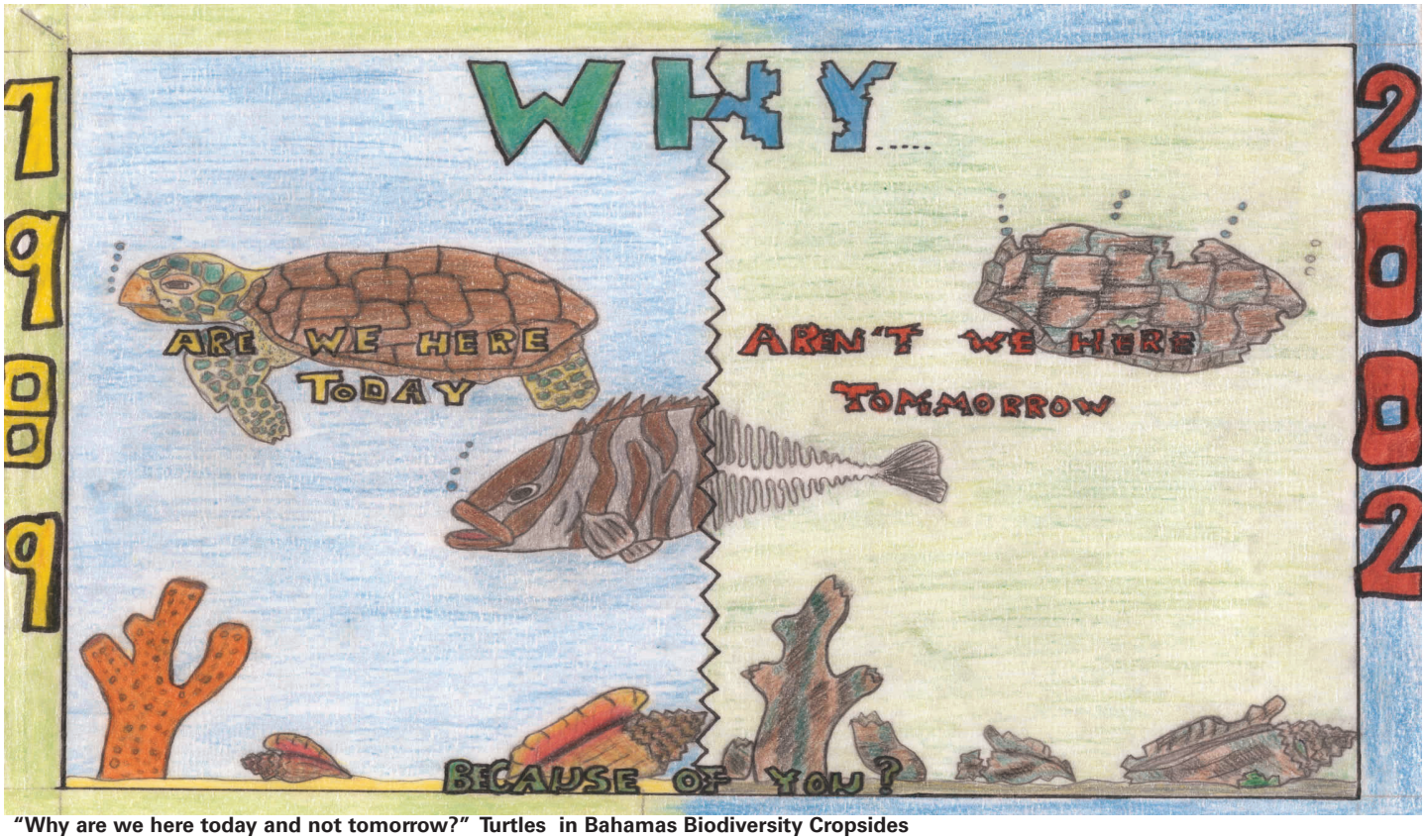
Pessimistic Outlook

If our response to biodiversity in the region continues along the current path, by the year 2025 most of our biological diversity will be lost. In essence, there will be a domino effect from what started 20 years earlier. Through the expansion of human settlements, deforestation, natural hazards, trade and the exploitation of species, most of our biological diversity will be on its way to extinction. One such species is the Leatherback sea turtle found in the Caribbean region, which as a result of poaching will be close to extinction. There will be an increase in the number of hotels and structures being built along coastal areas and as a consequence there will be a continued loss of habitats for these turtles. In addition, with the development of new technologies and increased capacity to fish, there is also threat to the stock of fish remaining in the ocean. The numbers that have been caught have been observed to be decreasing; naturally this should be a serious concern for us, as we depend on fish and fish products as a high source of protein. The Caribbean will be struggling to grasp for whatever remains of its once rich biodiversity.

Optimistic outlook

On the other hand if we change and adapt our current practices to more sustainable ones there is hope for our future. The sustainable use of forest products and fish resources can be managed in many ways. Local practices, national legislation and international obligations show us that our forests will not be easily renewable and must therefore be protected. Protected areas such as the Pine Forest in Abaco (Bahamas), Central Suriname Nature Reserve (Suriname), The Main Ridge Rain Forest (Tobago) and the Morne Trois Pitons National Park (Dominica) will be maintained as reserves in addition to other areas in the region. While other resources cannot be established as a protected area, such as living organisms, other measures can be taken to protect the numbers that remain or to help restore species populations to a healthy level. Future generations will enjoy species of fish that humans consume if sustainable practices, such as restricted net size or restriction on the number of fish caught, are implemented. Organizations such as the International Commission for the Conservation of Tuna and Tuna-like Species (ICCAT) help by raising awareness about the current fish stocks; therefore collaboration with international organizations such as these, can ensure that we secure food sources. Also programmes that encourage the regeneration of corals also help to protect these diverse ecosystems upon which many organisms rely. This gives us hope for the future, as new ways are learnt on how to regenerate an ecosystem. We as young persons can see that biodiversity conservation is a critical environmental issue and each nation must put measures in place to conserve the living heritage of that country.

> "Conservation International's mission is to conserve the Earth's living natural heritage, our global biodiversity, and to demonstrate that human societies are able to live harmoniously with nature."
>
> (Conservation International, 2004)



"Why are we here today and not tomorrow?" Turtles in Bahamas Biodiversity Cropsides
Credit: Dolphin Encounters Ltd., Bahamas

Forests

In 2004, the forests of the Caribbean were under serious threat from deforestation, road development, the sale of state-owned forestland without public consultation; forest fires, and improper management of recreational activities that threaten the remaining forests. If this continues for the next 20 years, what will happen to our forests?

Pessimistic outlook

Intense destruction of the natural forest has taken place in various Caribbean nations. Continuing destruction will jeopardise forests in the long term, and all of the following negative effects are likely to occur:

- Acceleration of soil erosion resulting in compacted top soil, reduced land infiltration rates, which will hinder the replenishment of local water tables and lead to a lack of drinking water in some areas.
- Irregular stream flow due to reduced water volume reaching the water table.
- Reduced biological activity in the soil, resulting in low soil fertility and poor soil structure, which will reduce the productivity of forests.
- Loss of biodiversity and endangered species due to the absence of their forest habitat.
- Environmental and climatic changes resulting in higher temperatures, increased exposure to hurricanes, changes in rainfall patterns, and droughts.
- Industries such as tourism and timber that rely on forest services will suffer economic losses.
- Livelihood that depend on food, medicine, and income from the forests will not be sustained, forcing people to migrate in order to survive.

Optimistic outlook

However, if certain changes are implemented now, the environmental situation can improve by 2025. Some proposed changes include:

- Sustainable use of forest products.
- Holding public consultations about the use of forest resources.
- Enforcing legislation to protect forests.
- Educating children and various stakeholder groups about how to care for forests in order to preserve them for future generations.
- Implementing reforestation programmes involving schools, community members, and various sectors of society.
- Developing and using alternative products instead of timber.
- Improving management of forests to respond to fires and other threats earlier.

With these changes, our forests will have the opportunity to thrive and be available for future generations. It will prevent organisations, companies, and groups from cutting down or damaging the forest without putting in place recourse actions to keep our forest resources alive.

Reforestation programmes will guarantee that forests will spring back to a sustainable state. The use of alternative products instead of wood will offer a further guarantee that the forests will be safe, as fewer trees will have to be cut for the purposes of wood. In 2025, there will be a quick response to any threats to the forest thanks to improved forest management practices that involve all stakeholders, especially youth, in consultation, implementation, monitoring, and decision-making processes. More youth programmes such as the North Rupununi District's Junior Wildlife Clubs in Guyana will involve local youth in forest management programmes.

"Youth as an Integral Part of Wildlife Management Programs"

The North Rupununi District Junior Wildlife Clubs

The North Rupununi District sits on the border of the lush Guyana Shield and arid savannah, which provide habitats to hundreds of species of plants and animals. The Junior Wildlife Clubs were created in 2000 through a partnership between the Iwokrama International Centre and the North Rupununi District Development Board in order to involve youth in existing wildlife management and monitoring programmes. Students gain hands-on experience in natural resource management and conservation. By involving local youth in wildlife management, the region is preparing for the future and ensuring the continuity of natural resource management and research programmes.

Pessimistic Outlook

If the countries of the Caribbean continue along their current path of destruction, the future will be very bleak for our region, especially in terms of our quality of life. In the circle of life, every organism is dependant upon another for survival. For example, the value of coastal and marine environments may appear to be trivial, but when mangrove ecosystems are destroyed, coral reefs suffer, fish would have no nurseries and run-off from the land contaminates the reef ecosystem with toxins and silt, smothering them. The reliance of the Caribbean islands on tourism will be in great danger as coasts are destroyed. The improper planning of hotels along the coast put the lives of people and of these structures in harm's way should a hurricane threaten the island.

Optimistic Outlook

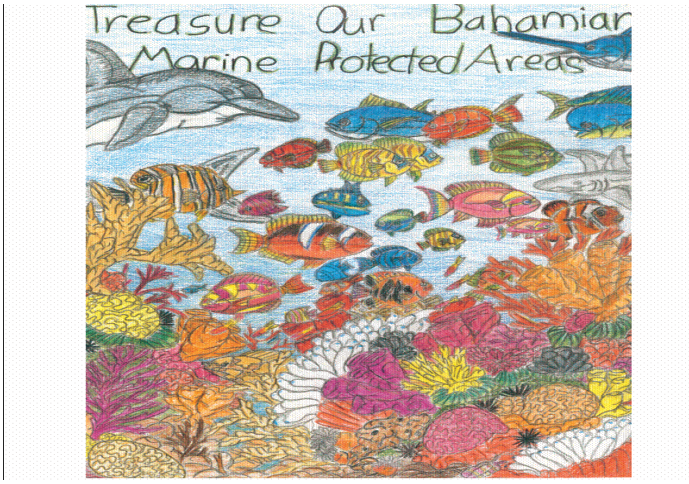
If the people of the Caribbean begin to understand the importance of the coastal and marine zones, this will contribute to the sustainable utilisation of these critical ecosystems. We hope that this will encourage the public to lobby for their rights to be involved in the development of coastal structures. Environmental protection policies will be used to formulate laws, which will be properly enforced and there will be a greater appreciation for Marine Protected Areas aimed at protecting and aiding the regeneration of coral reefs and other aquatic ecosystems. Not only will this benefit the lives of the people but also ensure that people are aware that ecosystems such as mangroves and coral reefs are essential to the wider community. The tourist industry needs to be a vital part of this campaign, for the efforts to be of significance. It is this industry that relies heavily on our natural resources and if they know the importance of protecting and using them sustainably then their industry becomes sustainable and our environment is secured.

Beachfront hotels adversely affect the shoreline in St. Lucia

In St. Lucia, many of our coastal areas are slowly becoming the front for large hotels, thus decreasing the number of accessible coastlines. Moreover, some of these properties are built with little concern for our environment, therefore making the shoreline more susceptible to hurricanes and storms. If we continue on this trend, we will be wanting for undeveloped coastlines.

Angela St. Denis - St. Lucia

Drawing of damage done (toxic TV underwater)
Credit: Dolphin Encounters Ltd., Bahamas



"Treasure our marine protected areas"
Credit: Dolphin Encounters Ltd., Bahamas

Land and Food

Pessimistic Outlook

Unsustainable practices such as land degradation, improper land use, unethical waste disposal and inefficient agriculture methods are increasingly becoming a problem for many Caribbean countries and threaten the livelihood and health of thousands of people within the region. Pesticides continue to be used improperly and will further threaten our health. These may include: increased incidence of diseases, a dramatic increase in the loss of biodiversity, infertile and unproductive land and poverty. In the near future these biological, social and economic crises will result in the abandonment of some islands within the region.

Optimistic outlook

However, there is hope if we are willing to change our thinking, attitude and actions towards the environment. In some countries within our region, efforts are being made to ensure the preservation of our natural resources, especially our land and food. Organic food techniques are being implemented. There is a dire need for us to embrace these environmentally conscious efforts so that we can build a brighter and better future. In order to achieve this goal within the Caribbean, we need to be unified in our thinking and encourage educational awareness and environmental policies. By doing so, we will ensure the sustainable development of our land for future generations.

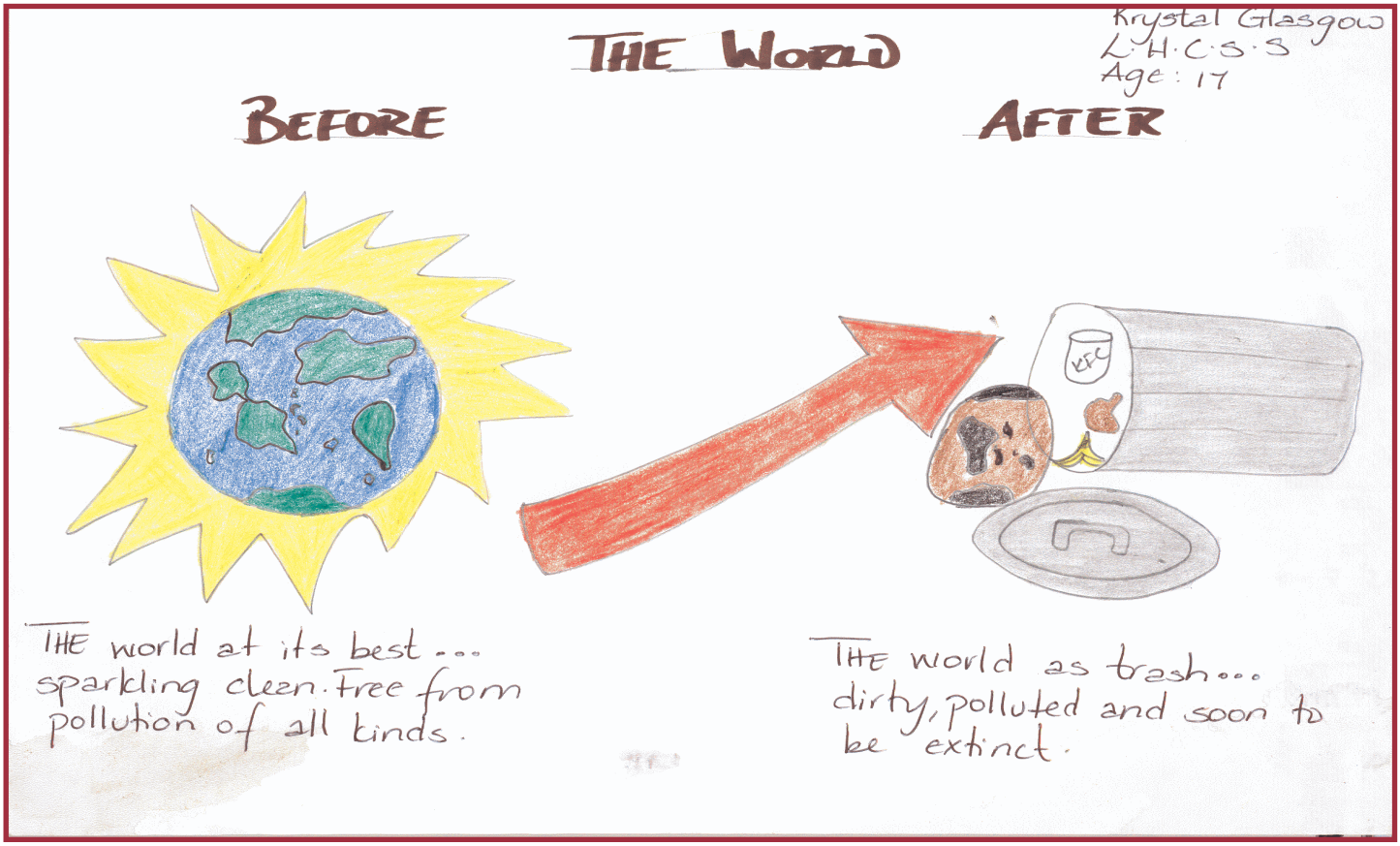


Photo of before and after (garbage). Drawing by Krystal Glasgow, St. Lucia.
Credit: Quacy Grant, Guyana

Pessimistic Outlook

Though ultimately these natural disasters are totally inevitable to most of the Caribbean, it had been said that due to humanity's continued ignorance, negligence, stubbornness and in some cases, blatant disregard for nature and its several duties, the quantity and magnitude of natural disasters will most likely escalate to an alarming rate. With increased carbon emissions, climate change will cause heavier rainfall, which will eventually lead to flooding, while other places will suffer from drought. If we continue to build our homes on hills and hotels along the coast, we are putting ourselves at risk. Furthermore, the existence of poverty in our society poses problems for dealing with the issues contributing to natural disaster in the region. Poor people, who have few alternatives, are faced with the choice of using unsustainable economic activities that are detrimental to the environment or starving themselves.

Optimistic Outlook

However, in the event that humanity responds to the desperate cries of nature, institutes and respects the necessary precautionary measures in his or her country, there will most likely be fewer and hopefully less intense natural disasters due to proper planning and implementation. The use of planning and management tools will ensure that precautionary measures, such as building codes and ensuring coastal structures are erected with setbacks,minimise the effects of any natural disaster. If we use a proactive approach then we are likely to save many lives, minimise damage to our cities and ensure a speedy recovery. Finding, alternative sustainable livelihood practices for poor communities, present the opportunity for us to successfully address the problems that we face as it relates to natural disasters in the region.

Photo of floods in Jamaica caused by Hurricane Gustav. Provided by CYEN, Barbados.

Photo of land slippage in Jamaica caused by Hurricane Gustav. Provided by CYEN, Barbados.

Urban Areas

Pessimistic Outlook

In the next 20 years, the Caribbean islands' landscape will change. There will be no more trees within the urban areas and the beauty of the city will be tall buildings and packed streets. There will no longer be little trees in culverts along the roadside as developers will see no need for them. Industrial areas will be greatly increased with many more factories across the Caribbean. As a result of dredging to accommodate the expansion of urban areas along the coasts, certain sea shell species of marine life will cease to exist, while the list of endangered species will grow due to the continuous destruction of their habitats in the process. Solid waste will be a bigger problem as our rivers, seas and waterways will become dumping grounds for garbage of all sorts. With the increased urbanisation there will be increased energy consumption and demands for water supplies.

Optimistic outlook

The youth of the Caribbean are being challenged to believe that things can change positively with urbanisation within the next 20 years if we make important changes now. Decentralisation of business opportunities that are currently concentrated in urban areas is a good way to ease the stress of the city, as persons will no longer view the city as a necessity but as a choice. Their small or large hometown will be of equal importance as the city. There will be trees replanted for:

- Shade
- Aesthetics
- A source of oxygen and balance: the availability of trees will reduce the hazards of emissions and fumes resulting from their photosynthesis process which converts carbon dioxide to oxygen.

The use of vehicles powered by alternative fuels or by fuel cells is another way to make a positive change. There is a significant potential for these alternative fuels and vehicles, as these cars will help urban areas to become healthier and safer environments.

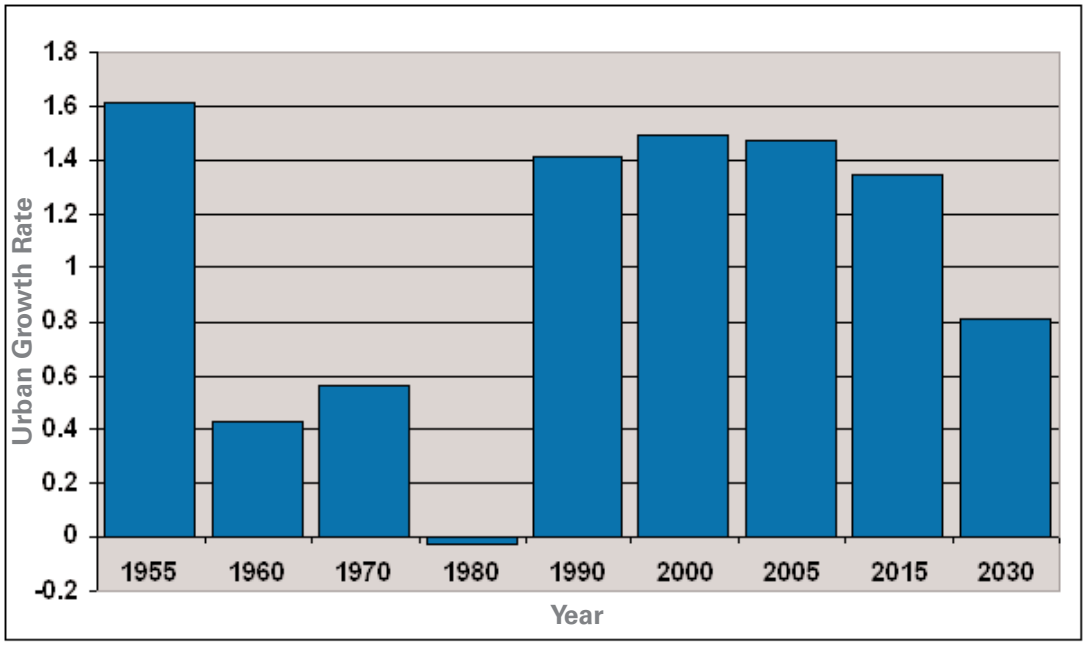


Chart showing the urban growth rate of Barbados 1955 to 2005; prognosis 2015 to 2030
Data Source: UN Common Database (UN Population Division estimate)
Credit: http://globalis.gvu.unu.edu/indicator_detail.cfm?IndicatorID=136&Country=BB

There is no quick fix or simple solutions when it comes to safeguarding and managing a resource that is in as much demand as water. It is evident that to maintain our most precious resource, our managerial capacity has to be upgraded since the current strategies were developed for past human and natural needs and are not appropriate to our present needs.

Pessimistic Outlook

Some of us tend to take this precious resource for granted but the truth remains that we cannot go one day without water. We use water in order to exist. If water conservation techniques are not implemented and attitudes and behaviours do not change, then surely we can predict that by 2020 there will be even more serious shortages of water. Millions of lives will be affected as we struggle to obtain a resource that was once in abundance just as the air we breathe.

Optimistic Outlook

Water is important to our national economies, our leisure and even our culture. The sustainable management of water resources is of central importance to poverty alleviation, people's health, and the protection of the environment. Our culture and lifestyles are key factors in the equitable distribution of water. Our water use must be through sustainable practices with aims of safeguarding this resource for our future generations. Initiatives that focus on the political commitment to consider water as an integral part of sustainable human development and strive to adapt water resources management to the needs of the poor are important to protecting this valuable resource. Furthermore, changes in attitude and actions will bring about a positive difference. With this we hope that people will realise the value of water and remember conservation practices like turning off the tap when they are brushing their teeth. *Remember, every drop counts!*

Initial contribution of HRH the Prince of Orange to the Panel of the UN Secretary General in preparation for the Johannesburg Summit

"Some forecasts show that by 2025 more than 3 billion people will face water scarcity. But this is not because the world lacks water. The world water crisis is a crisis of governance - not one of scarcity. At the global scale, there is enough water to provide 'water security' for all, but only if we change the way we manage and develop it. As we focus on the smaller scale level, looking at regions or watersheds, approaches to water scarcity will require clear policy choices. The scarcity of water is a very relative concept that can only be seriously addressed by taking a cross-sectoral perspective, looking at a basket of factors, including socio-economic, technical and institutional aspects of water use. This is the emerging concept of integrated water resources management."

Source: (No Water, No Future, 2004)

"Imagine that you get up in the morning, the sweet sounds of rain against the windows of your island home. You look out and the world sings to you, water makes it possible. Crystal clear water is available right in the comfort of your home; residues are not even in the back of your mind because you know that the process of getting that water to you is in the hands of responsible persons, in your hands.

The fish in the rivers seem to smile at you when you cross the bridge on your way to school, saying thank you for they can enjoy a swim in the sparkling water. I can also refresh myself after a hard day's work in the cool calmness that is fresh river water. The small currents massaging all the muscles in my aching back; drifting my mind to a place free of the day's troubles."

Delroy Williams, Dominica

Conclusion

Rectifying this negative process impacting the environment in the Caribbean region requires that we as Caribbean people embrace a change in mindset, lifestyle, and perception of the importance of the environment in our lives. Further we must understand and recognise that our lives invariably impact the end result of our environment. Each person, regardless of age, social status or educational background, must develop a sense of personal responsibility and accountability for sustainability in the environment. Most importantly, we must each realise and acknowledge that our demands for unsustainable goods and services are resulting in the steady increase of irreparable damage to the environment. In order to remedy the environmental degradation-taking place, we must endeavor to make decisions daily, which will increase environmentally-friendly practices through sustainable development and work tirelessly to minimise the destructive effects of past decisions. By assuming a more proactive role through proper planning and conservation efforts, we can begin the transformation that is required to achieve a more sustainable environment. The most important change required by the region at present, is a transformation in the psyche of our people. Without this change there will be no foundation for the implementation of recommendations made earlier in the publication. As youth of the Caribbean, the leaders in years to come, we are responsible for putting our words into action, to make our voices heard and to share our experiences and convictions with our communities and the world, assuming our role as leaders in society today.

Glossary

Acid rain. Phenomenon produced by a concentration of nitrogenous and sulphurous gases in the atmosphere which, when combined with humidity and cloud water, falls to earth as rain and causes corrosive effects.
Agrarian reform. Redistribution of cultivable land, often to landless peasants.
Anthropocentrism. Considering human beings as the most significant entity in the universe.
Aquifer. A water-bearing stratum of permeable rock, sand, or gravel.
Arid. Dry, sterile soil where vegetation cannot grow.
Atoll. A coral island, consisting of a reef surrounded by a lagoon.
Bentonite. A type of clay
Biodiversity. (Biological diversity) This refers to a number of different species of plants and animals in an environment.
Biomass. The amount of living matter in an ecological unit determined by area or volume. From the energy point of view, it is the amount of biological material expressed as a unit of measure (kilogram, tonne, etc.) that may be burnt to produce energy.
Biota. The flora and fauna of a region.
Biotechnology. Applied biological science to create or modify biological products or processes for specific uses.
Carbon sinks. Areas capable of absorbing large quantities of carbon dioxide.
Cataract. Clouding of the lens of the eye or its surrounding transparent membrane.
Climate change. Environmental phenomenon whose main effects are warming of the surface of the earth, increased rainfall, etc. Mostly caused by human activities.
CO. Carbon monoxide.
CO^2. Carbon dioxide.
Conservation. Whatever is designed to protect resources, particularly those that are renewable. It does not mean banning the use of resources, but of promoting their rational use to benefit the greatest number of people while at the same time favouring their renewal.
Chlorofluorocarbons (CFCs). Molecules of chloride, fluoride and carbon used in, for example, refrigerators and air conditioners.
Decibel. Unit used to measure the intensity of sound.
Deforestation. Process of environmental deterioration consisting of destroying and eliminating vegetation in a determined geographic area.
Desertification. The process of transforming once flourishing land into desert or arid land.
DNA. Any of various nucleic acids that are usually the molecular basis of heredity.
Drip irrigation. Irrigation by allowing water to slowly drip onto plants.
Ecosystem. Biotic community (vegetable and animal) inhabiting a determined geographic area and all the non-biological conditions (soil, climate, humidity, temperature, etc.) that characterise them.
Effluent. Waste water discharge.
Endemic. Belonging or native to a particular place.
Environment. The combination of physical, chemical, and biotic (living) factors that act upon an organism or an ecological community and ultimately determine its form and survival.
Environmental awareness. Measure of how much the inhabitants of a locality know about their surroundings and their degree of concern, interest or concern about present environmental problems.
Environmental impact. Possible alteration to the environment as a result of human activities or external influences.
Environmental problem. Combination of anomalous situations known as problems that affect the environment and hinder the harmonious interaction between society and nature.
Epidemic. Disease that attacks various people at the same time and in the same place.
Eutrophication. Increase of nutritive substances in freshwater lakes and reservoirs which causes an excess of phytoplankton.
Exotic species. Animals or plants introduced to a new environment, different from their original one; they may be dangerous to native species.
Extinction. Gradual or total disappearance of an animal or vegetable species from natural causes or as a result of

Glossary

human activities.

Food chain. Succession of organisms that constitute a continuation of food energy from one organism to another; the cycle in which organisms hunt or are hunted by others.

Fossil fuels. Fuels (coal, gasoline or natural gas) that originate in the organic remains of plants or animals that lived millions of years ago.

Fragile ecosystems. Ecosystems in which living conditions are at the limits of tolerance or where the risk of destruction is very high.

Glacier. A large body of ice moving slowly down a slope or valley or spreading out ward on a land surface.

GMO. Genetically modified organism.

Greenhouse effect. The absorption by the atmosphere of infrared radiation or heat. The gases that cause the greenhouse effect are almost all composed of natural compounds: water vapour, carbon dioxide, methane and nitrous oxide, which make the Earth habitable. Human activity has increased the concentration of these natural greenhouse gases while at the same time adding new and powerful gases that absorb the infrared radiation, causing rapid climate changes.

Heavy metals. High density metals that are frequently toxic to human health, for example, zinc, lead and mercury.

Hectare. Measure of area that contains 10,000m^2 (about 2.5 acres).

Hydrocarbon. An organic compound containing only carbon and hydrogen and often occurring in petroleum, natural gas, coal, and bitumen.

Irrigation. Practice of watering crops by artificial means.

Land reform. See agrarian reform.

Land tenure. The right to use and possess land.

Leach. Remove soluble elements from soil by percolation (infiltration of water into soil).

Leachate. A solution or product obtained by leaching.

Liana. Woody vine or climbing plant of tropical rainforests that root in the ground.

Lifestyle. The typical way of life of an individual, group or culture.

Livestock. Farm animals kept for use or profit.

Mangrove. Tropical shrub or tree found along muddy or saltwater shorelines.

Marginalised zones. Areas with serious environmental problems, usually taken to mean the very poor areas on the outskirts of cities.

Natural disasters. Serious and unforeseen events, natural catastrophes worsened by human activity. Examples are: earthquakes, volcanic eruptions and floods.

Natural protected areas. Special areas that countries set aside as protected, or as reserves, to prevent their destruction and conserve their plants, animals and ecosystems.

Outcrop. The part of a rock formation that appears on the surface of the ground.

Ozone layer. An atmospheric layer 20 to 30 miles thick that is normally characterised by high ozone (O^3), which blocks most solar ultraviolet radiation from entry into the lower atmosphere.

Pesticides. Substances of chemical or biological origin used to protect some plants against diseases or pests.

pH. The measure of acidity and alkalinity of a solution on a scale of 1 to 14, where 7 represents neutrality, lower than 7 indicates increasing acidity, and higher than 7 indicates increasing alkalinity.

Photovoltaic. Relating to, or utilising the generation of a voltage when radiant energy falls on the boundary between dissimilar substances (as two different semiconductors).

Photovoltaic process. Converting solar light into energy.

Phytoplankton. Diminutive aquatic plants; source of food for fishes.

Plantlet. A small or young plant.

Pole. Extremity of the axis of rotation of a sphere, such as the Earth.

Poverty. The lack of means to satisfy basic needs.

Presbyopia. A loss of vision making it difficult to focus sharply.

Protocol. Amendment or addition to a treaty or convention.

Quarry. An open excavation from which building stone is usually obtained.

Residue. What remains when a process is finished.

Sanitation. A combination of work, techniques and facilities designed to establish, improve or maintain healthy

conditions.
Scrubland. An area covered with small, stunted vegetation or trees.
Sediment. Solid fragments of inorganic material from eroded rocks and carried by water, wind or ice.
Slash-and-burn. Felling and deliberately burning trees to clear land, especially for agriculture.
SO^2 . Sulphur dioxide.
Stratosphere. The part of the Earth's atmosphere that extends from about 7 miles above the surface to 31 miles.
Subsoil. The stratum of weathered material that underlies the surface soil.
Sustainable development. Development designed to satisfy present needs while permitting future needs to be safeguarded.
Swamp. A wetland dominated by woody vegetation.
Symbiosis. The living together in more or less intimate association or close union of two dissimilar organisms.
Tectonics. A branch of geology concerned with the structure of the crust of a planet, like Earth, with the formation of folds and faults in it. Usually used to refer to earthquakes.
Thermal inversion. Natural phenomenon where the lower layers of air are colder than the higher layers so that they become stagnant. In some places, like cities, atmospheric contaminants do not disperse as they should, causing damage to health.
Topoclimatic. Relation between climate and land elevation.
Transgenic. Having chromosomes into which one or more genes from a different species have been incorporated either artificially or naturally (e.g. transgenic mice).
Troposphere. The lowest, densest part of the Earth's atmosphere where most weather changes occur and temperature generally decreases rapidly with altitude and which extends from the earth's surface to the bottom of the stratosphere.
UV-B rays. Solar radiation (ultraviolet rays) that may be either beneficial or potentially dangerous. UV rays from one part of the spectrum (UV-A) make plants grow and are used in some medical and dental procedures; ultraviolet rays from other parts of the spectrum (UV-B) may cause skin cancer or otherwise damage tissue. The atmosphere's ozone layer forms a protective shield that partially prevents UV rays from penetrating to the Earth's surface.
Watershed. A region or area bounded peripherally by a divide and draining ultimately to a particular watercourse or body of water.

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List of Acronyms

BSTP: Barbados Sea Turtles Project
CARICOM: Caribbean Community
CBD: Convention on Biological Diversity
CCA: Caribbean Conservation Association
CCD: Convention to Combat Desertification
CDERA:Caribbean Disaster Emergency Response Agency
CO^2: Carbon Dioxide
COMSEC: Commonwealth Secretariat, Commonwealth Science Council
CI: Conservation International
CITES: Convention on International Trade in Endangered Species of Fauna and Flora
CPDC: Caribbean Policy Development Centre
CYEN: Caribbean Youth Environment Network
CYSF: Caribbean Youth Science Forum
DEL: Dolphin Encounters Limited
DYEO: Dominica Youth Environment Organisation Inc.
EMA: Environmental Management Authority
EPA: Environmental Protection Agency (United States)
FAO: Food and Agriculture Organization
FIELD: Foundation for International Environmental Law and Development
GEO: Global Environment Outlook
GMO: Genetically Modified Organism
ICC: International Coastal Clean-up
IFAW: International Fund For Animal Welfare
IFGL: Institute for Future Global Leaders
LAC: Latin America and the Caribbean
NAYA: National Association of Youth in Agriculture Incorporated
NIHERST: National Institute of Higher Education, Research, Science and Technology
NIYA: Nature Isle Youth Alliance
NGO: Non-Governmental Organization
NRAC: Natural Resources Conservation Authority
OAS: Organisation of American States
SPAW: Specially Protected Areas of Wildlife
THA: Tobago House of Assembly
UNCED: United Nations Conference on the Environment and Development
UNEP: United Nations Environment Programme
UNESCO: United Nations Educational, Scientific and Cultural Organisation
UNCLOS: United Nations Law of the Sea
UNFCCC: United Nations Framework Convention on Climate Change
WIDECAST: Wider Caribbean Sea Turtle Conservation Network
Y- FOCUS: Youth- Freeing Our Community Using Skills
YEAH: Youth for Environmental Awareness of Habitats

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CYEN - Guyana
CYEN - Trinidad and Tobago
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