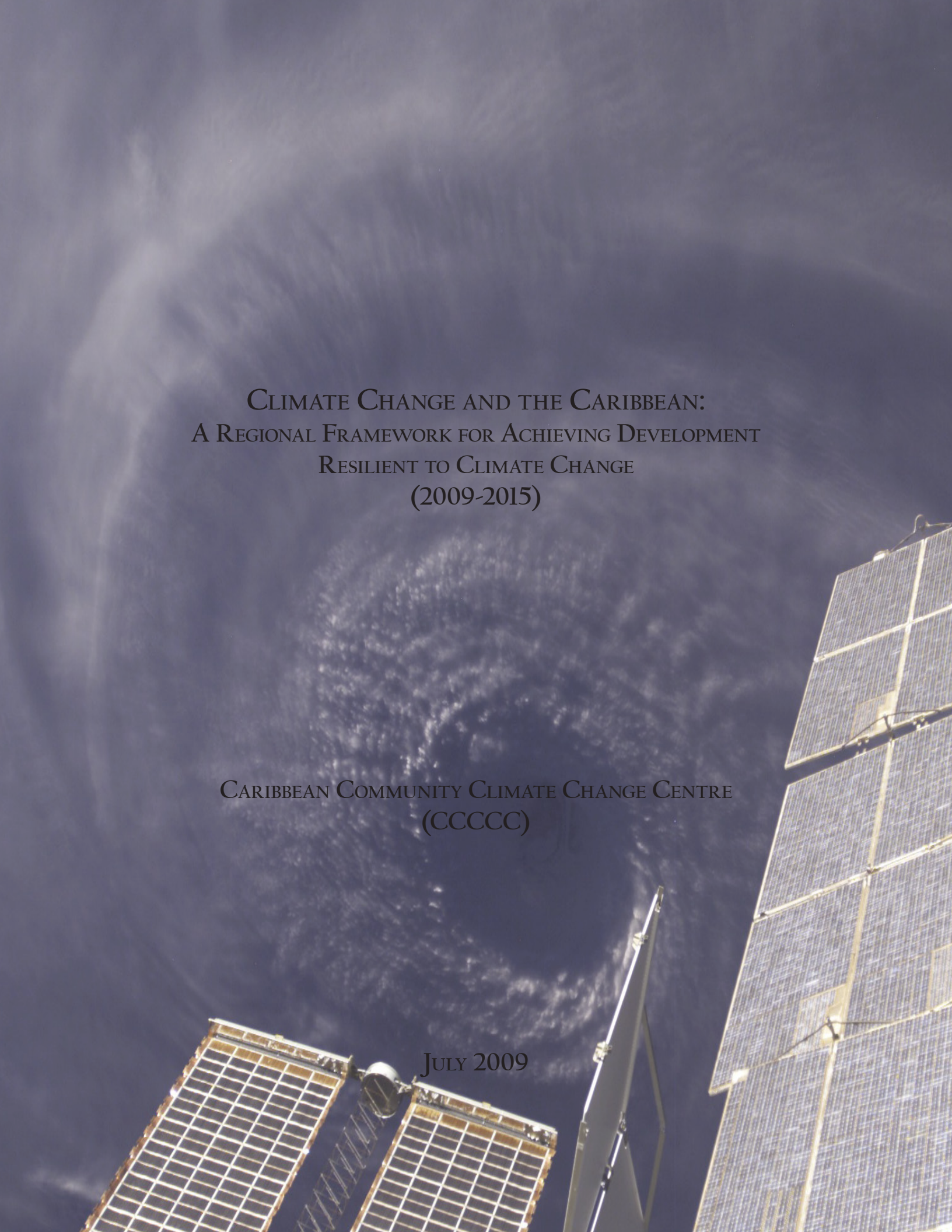

Climate Change and the Caribbean:
A Regional Framework for Achieving Development Resilient to Climate Change
(2009-2015)

Caribbean Community Climate Change Centre
(CCCCC)

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Executive Summary

The Caribbean Community Climate Change Centre (CCCCC) has prepared this framework document at the request of CARICOM Heads of State participating in the First Congress for the Environmental Charter and Climatic Change, held at Ávila Mountain, Caracas, 11-13 October 2007.[1] The strategic vision driving this regional strategy is to lay the ground for a "regional society and economy that is resilient to a changing climate." The seriousness of the challenge global climate change (GCC) poses to the development prospects of small island and low-lying costal states is addressed in the Barbados Plan of Action (BPoA), as the first of 14 priority areas for achieving sustainable development.

Global climate change is the most serious threat to sustainable development facing CARICOM states. While the contribution of CARICOM countries to greenhouse gas emissions is quite negligible, according to a recent report of the Intergovernmental Panel on Climate Change (IPCC)[2] the projected impacts of global climate change on the Caribbean region are expected to be devastating. These impacts would be reinforced due to the limited adaptive capacity of the CARICOM small island and low-lying coastal states. Specifically, GCC is expected to result in more hostile regional climate change and rising sea levels. Rising sea levels, together with the associated coastal erosion and salt water intrusion, an escalation in the frequency and intensity of tropical storms and hurricanes, and disruptions in rainfall and fresh-water supply threaten the very existence of the CARICOM countries.

The vulnerability of CARICOM countries to climate events is evidenced by the impact of hurricanes, tropical storms, and flooding in the region. Between 1995 and 2000, the region experienced its highest recorded level of hurricane activity. Over the last three decades, the Caribbean region has suffered direct and indirect losses estimated at between US$700 million and US$3.3 billion owing to natural disasters associated with extreme weather events.[3]

The Fourth Assessment Report (FAR) of the IPCC noted that "warming of the climate system is unequivocal, as is now evident from observations of increases in global average air and ocean temperatures, widespread melting of snow and ice, and rising global average sea level." In fact, 11 of the last 12 years (1995-2006) rank among the twelve warmest in the instrumental record of global surface temperature, recorded since 1850. Earlier IPCC projections of a rise in temperature of between 0.15 to 0.3 degrees centigrade per decade are now supported by an observed global value of 0.2°C per decade. For the next two decades, a warming trend of about 0.2°C is projected for a range of green house gas (GHG) emission scenarios. Even if the concentration of all greenhouse gases and aerosols remains constant at 2000 levels, further warming of about 0.1°C per decade is expected. As a consequence, it is anticipated that sea levels and global sea water

[1] Participating at this event were Latin American and Caribbean Heads of State, as well as LAC ministers of foreign affairs and tourism.
[2] Intergovernmental Panel on Climate Change (IPCC 2007), "Fourth Assessment Report, Climate Change 2007: Synthesis Report, An Assessment of the Intergovernmental Panel on Climate Change http://www.ipcc.ch/pdf/assessment-report/ar4/syr/ar4_syr.pdf
[3] 2002 report by the Inter-American Development Bank entitled "Natural Disasters in Latin America and Caribbean: An Overview of Risk" http://www.iadb.org/res/publications/pubfiles/pubWP-434.pdf

temperature will increase; weather patterns will change resulting in an increase in the frequency and intensity of extreme weather events, such as droughts, floods, and possibly hurricanes.

Furthermore, a recent report[4] commissioned by the British Government calls for immediate action to deal with these issues and emphasises that any delay will only result in significant increases in the costs of responding. The report estimates that delayed action to mitigate climate change will lead to overall damage costs equivalent to losing at least 5 percent of global gross domestic product (GDP) each year, with higher losses in most developing countries. Taking into account a wider range of risks and impacts, damage estimates could approach 20 percent of GDP or more. In contrast, the costs of action—reducing GHG emissions to avoid the worst impacts of climate change—can be limited to around 1 percent of global GDP each year.

In this global context, CARICOM countries have considerable cause for concern as the threats posed to the region's development prospects are severe and adaptation will require a sizeable and sustained investment of resources that governments will find very difficult to provide on their own.

This regional framework provides a roadmap for action over the period 2009-2015, and builds on the groundwork laid by the Caribbean Community Climate Change Centre (CCCCC). The objectives of this document are to establish direction for the continued building of resilience to the impacts of GCC by CARICOM states. The framework document focuses on the identification and consolidation of a set of complementary activities that utilise the CCCCC and other regional institutions' current capacity and experience in addressing adaptation to climate change. This framework is comprised of four key strategies and associated goals designed to significantly increase the resilience of the CARICOM economies:

1. Mainstreaming climate change adaptation strategies into the sustainable development agendas of CARICOM states.

2. Promoting actions to reduce greenhouse gas emissions through energy efficiency, conservation, and switching to renewable energy sources.

3. Encouraging action to reduce the vulnerability of natural and human systems in CARICOM countries to the impacts of a changing climate.

4. Promoting action to derive social, economic, and environmental benefits through the prudent management of standing forests in CARICOM countries.

Implementation

The framework is formulated from the perspective of CARICOM governments and their development partners, including civil society. Specific roles are envisaged for governments, the private sector, civil society, and regional organisations, including the CCCCC, and the

[4] "Stern Review on the Economics of Climate Change, Summary of Conclusion," HM Treasury, 2006, http://www.hm-treasury.gov.uk/media/3/2/Summary_of_Conclusions.pdf

international community. Specifically, one of the principal tasks of governments will be to provide an appropriate political, legal, and administrative environment, to include monitoring and enforcement. Private sector involvement will focus on the development and implementation of corporate environmental policies that emphasise prospective and compensatory climate hazard risk management principles.

Citizens will also be expected to take full responsibility for availing themselves of appropriate information to guide decision-making on climate hazard risk management, whether at the individual, organisational, or community level. The framework also recognises that regional organisations have a critical role to play in supporting climate hazard risk management activities through the sharing of information among key agencies and individuals, and in supporting the development of national capacities.

It is envisaged that the framework will help facilitate the ongoing involvement of the international community with a view to efficiently strengthening the capacity of the CARICOM countries to adapt to a changing climate. Among other activities, the international community will be invited to support training and education for climate hazard risk management, and share information with the region that can address existing hazard management challenges. The CCCCC will have primary responsibility for coordinating the strategy's implementation in collaboration with the relevant regional and national institutions, and for providing technical support and guidance as required by the respective implementing agencies and/or countries through their national contact points.

The CARICOM countries' involvement in the implementation, monitoring and review of the framework will be facilitated at three levels:

1. Establishment of an Oversight Committee on Climate Change, chaired by the prime minister with responsibility for sustainable development and emergency management (currently, St. Lucia), to include the prime ministers with lead responsibility for tourism (Bahamas), agriculture, (Guyana), as well as the prime ministers of the countries holding the chairmanship of the Council for Trade and Economic Development (COTED) and the Council for Foreign and Community Relations (COFCOR), respectively, to serve as a bridge between the framework's policy, foreign relations, and scientific dimensions;

2. The Council of Trade and Economic Development will establish a climate change committee to oversee implementation of the framework (e.g., conducting periodic reviews of policies designed to address the adverse effects of a changing climate); and

3. Establishment of a Regional Commission on Climate Change, to provide oversight concerning the design and establishment of appropriate decision-support systems that will help to build the region's resilience to a changing climate.

Financing

Implementation of the framework's strategy will require financial resources to support the actions and responsibilities of the implementing organisations. However, not all actions recommended in this framework represent new sources of financing, as some can be mainstreamed, even though there will be need for additional funding, particularly for pilot adaptation interventions, as well as communications, outreach, and capacity-building activities.

The CCCCC will assume lead responsibility for the framework, working in close collaboration with national governments, the CARICOM Secretariat, regional institutions, civil society and private sector entities, and for mobilising financial and other resources required for its successful implementation. There is potential for immediate support from the European Union through the recently announced "Global Climate Change Alliance" (GCCA). Moreover, there will be increased interest and support for adaptation as the Nairobi Work Program of the United Nations Framework Convention on Climate Change (UNFCCC) continues to take shape, and the CCCCC should endeavour to remain at the cutting edge of these developments to ensure early access to financial and technical support as these initiatives develop. In addition, the region should explore innovative financing mechanisms for climate change adaptation, such as establishing a regional carbon market as an additional source of financing.

The framework envisages that the financing of disaster risk reduction initiatives will be treated as a development priority within the budgeting process, and that all government entities will advance the goals and objectives of the framework by ensuring that disaster risk reduction is taken into account in the design of development programmes and projects.

In addition to the current financing arrangements for post-disaster rehabilitation and reconstruction, provided through external loans and local revenue (Sinking Fund), the CARICOM governments will explore the feasibility of establishing a Natural Hazard Risk Management Fund to finance prospective disaster risk management initiatives. It is envisaged that such a fund could be patterned on the environmental levy concept and/or could be built around user fees, charges on polluters, special-purpose lotteries, and licenses. It is also envisaged that the creation of such a fund should be linked to a review of the use of available financing mechanisms, such as fiscal incentives for various economic stakeholders.

The CCCCC, in collaboration with regional stakeholders, will develop a detailed implementation plan, including implementation timelines for the different components and a budget, taking into consideration the various regional and international agreements and their associated targets. The financial resources will be mobilised from various sources including:

- CARICOM governments;
- innovative financing mechanisms, to include a regional adaptation fund, clean development mechanisms (CDMs), carbon levy, etc.;
- multilateral and bilateral donor funds, to include regional and international (multilateral, bilateral, and philanthropic) funds such as the Pilot Program on

Climate Resilience (PPCR), the Special Climate Change Fund, the Adaptation Fund, and Global Environment Facility (GEF) resources; and

- private sector financing, to include contributions from the business community and philanthropic organisations.

While it is difficult to estimate the potential economic consequences of climate change on CARICOM countries, due to varying global climate change scenarios, limited geographical projections for the region, and an inadequate inventory of vulnerable assets and resources in these economies, a recent study suggests that in a "no-adaptation" scenario, such losses could be on the order of 5 to over 30 percent of GDP on average (annualized values), with an even broader range for some specific countries.

Global warming and associated climate change, together with the consequent rise in sea levels, is going to increase the economic and social vulnerability of CARICOM countries in most cases. The rationale for advocating greater investment in comprehensive and effective measures to address the impacts of a changing climate and reduce the region's vulnerability is that this approach builds the resilience of countries to respond in a comprehensive manner to the economic, environmental, and social challenges that will accompany a changing climate. The framework is aimed at incorporating climate change as part of the national planning process for both social and economic development.

Honourable Stephenson King
Prime Minister of St. Lucia

Preface

I wish to congratulate the Caribbean Community Climate Change Centre for undertaking and completing the process of consultations leading to this very important document, the Caribbean's Regional Framework for Achieving Development Resilient to Climate Change. It provides us with an appropriate set of guidelines for moving forward with an agreed action programme for the Community as a whole. It helps us to frame the context of the Community's negotiations leading up to the Conference of the Parties in Copenhagen in December 2009, on which so much of the future of this planet depends and, indeed, the sustainability prospects of the small island and low-lying countries that make up the CARICOM Member States.

The guidelines offered in this framework for the links between energy and climate change, the priorities for mitigation and adaptation—especially those related to disaster management—, the arguments for supporting a low-carbon intensive development pathway and for avoided deforestation are all essential prerequisites for the region's development. In addition, the structures proposed are intended to facilitate more cohesive approaches on the part of CARICOM leaders, whether political, technical, or practitioner.

The framework also has significance for ensuring synergies between the coordinating role of the Caribbean Community Secretariat and the Caribbean Community Climate Change Centre in the execution of their respective roles as the coordinating and implementing agencies, and in advancing the region's positions within the international negotiating theatres.

It is my hope that this document will be regarded as essential reading for all, particularly those that are responsible for the development of climate change programmes at the regional and national levels. I welcome a healthy debate on the priorities established in this framework and a continuing refinement of the strategies for its implementation.

In this regard the Information, Education and Communication Subcommittee of the CARICOM Task Force on Climate Change and Development, the information clearinghouse identified in the framework, must play an active role in ensuring that the process of information dissemination and feedback among stakeholders keeps this a living document, owned by a cross-section of stakeholders, including the general public. Sustainable development offers an opportunity for this region to demonstrate the value of functional cooperation in a community for all. This document is a catalyst for action.

Stephenson King
Prime Minister
St. Lucia
Lead Head for Sustainable Development
Caribbean Community

Foreword

Despite the fact that Caribbean Community countries have been very minor contributors to global warming and its consequential impact on climate change, the potential damage of this phenomenon to our development efforts and, indeed, to our way of life, is enormous. In fact, some damage is already evident, and clearly increasing. It is therefore absolutely necessary that all our countries identify and implement, in the shortest possible timeframe, a series of measures designed to minimise and mitigate the effects of global warming and climate change on our countries and populations, and that we step-up our efforts to help bring about an appropriate change in behaviour at the global level in order to address the root causes of the problem.

The situation is made even more urgent by the fact that the countries of the Caribbean Community have limited capacity in terms of absorbing the adverse effects of climate change and changing our social and economic behaviour with a view to reducing greenhouse gas emissions. This reflects, on the one hand, relatively low levels of economic activity and limited resources in our region, and, on the other, limited emissions in the first place.

In order to achieve maximum effect, Caribbean countries need to act in concert to build resilience to global climate change at the regional level, enlist the support of the international community for our regional initiatives, and for the required meaningful responses at the global level. The Caribbean Community Climate Change Centre has been working to develop a regional strategy, and has produced this regional framework covering the period 2009-2015, which identifies a set of approaches and activities which are within the implementation capacity of the

Centre and other regional institutions. The Centre has identified four main areas for involvement and effort over the next five years:

1. mainstreaming climate change into the sustainable development agenda and work programmes of public and private institutions in all Caribbean Community countries at all levels;

2. promoting systems and actions to reduce the vulnerability of Caribbean Community countries to global climate change wherever possible;

3. implementing adaptation measures to address key vulnerabilities in the region, including enhancing the reliability of water supply systems, improving coastal and marine infrastructure, and adapting tourism infrastructure and activities to climate change;

4. promoting measures to derive benefit from the prudent management of forests, wetlands, and the natural environment in general, and to protect that natural environment; and

5. promoting actions and arrangements to reduce greenhouse gas emissions, including those aimed at energy-use efficiency by increasingly resorting to low-emission renewable energy sources.

I am very happy to be associated with this important initiative of the Caribbean Community Climate Change Centre at this very critical time, and I pledge the support of my regional colleagues for the serious work that lies ahead.

Chairman of CARICOM
Hon. Dean Oliver Barrow
Prime Minister of Belize

Climate Change and the Caribbean: A Regional Framework for Achieving Development Resilient to Climate Change (2009-2015)

1.0 Introduction

The Caribbean Community Climate Change Centre (CCCCC) has prepared this framework document, *Climate Change and the Caribbean: A Regional Strategy for Achieving Development Resilient to Climate Change* (2009-2015), at the request of CARICOM Heads of State participating in the First Congress for the Environmental Charter and Climatic Change, held at Ávila Mountain, Caracas, from 11-13 October 2007.[5] The CCCCC coordinates the Caribbean region's response to climate change. Officially opened in August 2005, the Centre is the lead agency for information on climate change issues and the region's response to managing and adapting to climate change.

In most cases, the issue of global warming, its associated climate change, and rise in sea levels is going to increase the Caribbean region's vulnerability. The rationale for advocating greater investment in comprehensive and effective measures to mitigate global climate change (GCC) and reduce the region's vulnerability is that this approach endeavours to build the resilience of countries to respond comprehensively to the economic, environmental, and social challenges that GCC will bring. The framework's strategy advocates incorporating climate change as part of the national planning process for both social and economic development.

Climate change poses a major risk to development in the Caribbean. Most CARICOM Member States have ratified the United Nations Framework Convention on Climate Change (UNFCCC). Several Member States have also ratified the Kyoto Protocol, almost all have submitted their first National Communications to the UNFCC Conference of the Parties, United Nations Framework Convention on Climate Change, and many have established climate change coordinating mechanisms. In addition, a number of the Member States have prepared national climate change adaptation policies. In response to the priority accorded to the issue of climate change in the Barbados Programme of Action (BPoA), the region has systematically been addressing the issue of capacity-building to climate change since 1998. Caribbean countries have implemented a range of national enabling activities and participated in a number of major regional projects designed to build institutional, national, and human capacities. This has resulted in a better understanding of actual and potential climate impacts on the region. The most important activities to date include:

- National Enabling Activities (NEAs): The completion of First National Communications, Green House Gas Inventories, and Vulnerability Assessments with assistance from a Global Environmental Facility-funded initiative, supported

[5] Participating at this event were Latin American and Caribbean Heads of State, as well as LAC ministers of foreign affairs and tourism.

by the United Nation Development Programme's National Communications Support Programme.

- The Caribbean Planning for Adaptation to Climate Change (CPACC) project (1998-2001): This GEF Stage I project was implemented by the World Bank and executed by the Organization of American States. It responded to mandates in the SIDS/BPoA at the national, regional and international levels. It has assisted CARICOM countries develop national programmes to address the challenges of climate change, including the design of a Regional Sea Level/Climate Monitoring Network, and regional database and information systems to help regional and national institutions acquire, analyse, store, and disseminate data. In addition, National Climate Committees were established in all CPACC participating countries.
- The Adaptation to Climate Change in the Caribbean (ACCC) project (2001-2004): This is a CIDA-funded initiative that provided an effective bridging facility between CPACC and the Mainstreaming Adaptation to Climate Change (MACC) project. It built on the foundation laid by CPACC, including addressing some of the gaps identified during implementation of the CPACC project. This Project facilitated the establishment of the Caribbean Community Climate Change Centre (CCCCC) that was founded at Belmopan, Belize (2003).
- The Mainstreaming Adaptation to Climate Change (MACC) project (2003-2009) is being finalized by the CCCCC with GEF funding through the World Bank: This project focuses on creating an enabling environmental to enhance adaptation programmes across the region by:
    1. developing national policy frameworks for adaptation;
    2. mainstreaming climate change issues into key sectoral activities;
    3. preparing national pilot adaptation projects;
    4. strengthening public awareness and participation in climate change programmes;
    5. further strengthening of the knowledge base; and
    6. facilitating the development of monitoring, analysis, and the building of regulatory planning instruments for mainstreaming climate change issues in the region.
- The Implementation of Adaptation Measures in Coastal Zones (SPACC) project (2006 – 2011):This is a GEF activity which is funded through the World Bank to implement specific (integrated) pilot adaptation measures that primarily address the impacts of climate change on the natural resource base of Dominica, St. Lucia and St. Vincent and the Grenadines. Project activities include the design and implementation of adaptation measures to reduce the vulnerability of buildings to hurricanes, enhance water capture and use; pilot renewable energy options, support land use planning and management, and reduce anthropogenic stress on national parks and key natural habitats, while at the same time enhancing ecosystem resilience.

The Centre was formed by agreement among CARICOM Member States and it has permanent capacity to build on the significant contribution of the CPAAC, ACCC, and MACC projects, and in sensitising the CARICOM countries to the importance of building mechanisms to address the negative consequences of climate change. It is intended to network with and draw on the resources of other institutions in the region undertaking work in the area. The Centre has been very instrumental in guiding the region's adaptation programme by ensuring that it followed the guidelines of the Intergovernmental Negotiating Committee that recommended the following stages outlined below:

- Stage I: Planning, which includes studies of possible impacts of climate change, to identify particularly vulnerable countries or regions and policy options for adaptation and appropriate capacity building;
- Stage II: Measures, including further capacity-building, which may be taken to prepare for adaptation, as envisaged in Article 4.1(e); and
- Stage III: Measures to facilitate adequate adaptation, including insurance, and other adaptation measures as envisaged by Article 4.1(b) and Article 4.4.

Belize City flooding, June 2008.

This regional framework document provides the opportunity to systematically address the development challenges posed by climate change for the Caribbean.

This document briefly examines the global and regional context of climate change and the threats to the development prospects of the world and the Caribbean region, highlighting the region's vulnerability to climate change. This document further proposes a number of strategic objectives aimed at building resilience to a changing climate, and provides a guide for implementing the framework.

It bears mentioning that the framework incorporates the major components of the Mainstreaming Adaptation to Climate Change (MACC) project. The project's main objective is to mainstream climate change adaptation strategies into the sustainable development agendas of the small island and low-lying countries of the CARICOM.

Implementation of the framework will require financial resources to support the actions and responsibilities of implementing organisations. The total estimated cost of implementation over the period 2009-2015 is approximately US$22.91 million, of which $6.5 million is being requested to implement the framework.

Approximately $14.9 million of the budget is earmarked for the Project Implementing Unit (PIU) of the CCCCC for mainstreaming climate adaptation strategies into the sustainable development agendas of the small island and low-lying countries of the CARICOM. This component of the framework, to be funded separately, will provide support to CARICOM and the PIU for the

efficient and timely execution of projects, including project management, and the planning, monitoring, and evaluation of activities over the framework's duration.

1.1 Global Context of Climate Change

The first significant act of the international community in response to the critical issue of climate change was the establishment of the Intergovernmental Panel on Climate Change (IPCC) to provide the scientific and technical advice needed to guide a political response. In 1990, the Panel produced its first assessment report, which prompted the United Nations General Assembly to call for a global treaty to address the threat of human interference with the climate system. After two years of negotiations, the United Nations Framework Convention on Climate Change (UNFCCC) was adopted at the milestone 1992 United Nations Conference in Rio de Janeiro. The UNFCCC entered into force in 2004 with the objective, "to achieve stabilization of greenhouse gas concentrations in the atmosphere at a low enough level to prevent dangerous anthropogenic interference with the climate system." The Kyoto Protocol, an amendment to the UNFCCC, was adopted in 1997, and entered into force in 2005. Most provisions of the Kyoto Protocol apply to the developed countries and stipulate mandatory greenhouse gas (GHG) emissions cuts by 5.8 percent of their 1990 levels, to be achieved between 2008 and 2012.

> "Climate change could have global security implications on a par with nuclear war unless urgent action is taken."

The global community is preparing to enter into negotiations for a successor treaty to Kyoto. For these negotiations, a GHG emissions reduction regime, which will result in about a 2°C rise in global temperatures, appears to be an acceptable target for the developed countries. For the Caribbean region, however, which is already struggling to cope with the vagaries of present day climate variability, this 2-degree increment is unacceptable and the region should campaign vigorously to attain agreement for a much more aggressive mitigation regime that would see global temperatures stabilize below this 2-degree increment. The global emissions budget now stands at 397 ppm, and stabilization, at a level that would produce the projected 2°C rise, would require global emissions to be stabilized at 550 ppm.

The UNFCCC also commits the developed countries to assisting developing countries in meeting the costs of adaptation to the adverse effects of climate change, estimated by the World Bank to be between US$10 and 40 billion per year.[6] This figure far exceeds available funding through the Global Environment Facility (GEF) Special Climate Change Fund. As of April 2007, the three funds had reserve allocations and pledges totalling approximately US$200 million. In addition, the Adaptation Fund under the Kyoto Protocol of the UNFCCC receives a 2 percent share of the proceeds from the Clean Development Mechanism (CDM). The World Bank estimates that this will have total funding of US$100 to 500 million by 2012. However, while the funds are

[6] World Bank, Latin America and Caribbean Region (2008), Operational Innovation in Latin America and the Caribbean, "The Caribbean Catastrophe Risk Insurance Facility, Providing Immediate Funding After Natural Disasters," Volume 2 Number 1, March 2008 World Bank, Latin America and Caribbean Region (2008), http://siteresources.worldbank.org/INTENBREVE/Newsletters/21829873/ONS4-CCRIFComplete.pdf

technically adequate to respond to the challenges of achieving climate-resilient development, the sums of money flowing through these instruments need to be substantially increased.

The issue of global warming, its associated climate change, and rise in sea levels seriously threaten development prospects worldwide. The International Institute for Strategic Studies (IISS) in a recent report entitled "Strategic Survey 2007," noted that climate change "...could have global security implications on a par with nuclear war unless urgent action is taken."[7] Additionally, climate issues are gaining increasing importance on the global political agenda. In April 2007, the United Nations Security Council discussed climate change for the first time. Climate change is a serious threat to human security and many governments have committed themselves to ensuring the successful implementation of international agreements relating to climate issues. These commitments were triggered, primarily, by concerns over human-induced climate change, its potential adverse impacts, and its challenge to the goal of sustainable development. [8]

These concerns are articulated in the Fourth Assessment Report (FAR) of the Intergovernmental Panel on Climate Change (IPCC), [9] which noted that "warming of the climate system is unequivocal, as is now evident from observations of increases in global average air and ocean temperatures, widespread melting of snow and ice, and rising global average sea level." In fact, 11 of the last 12 years (1995-2006) rank among the twelve warmest in the instrumental record of global surface temperature recorded since 1850. Earlier IPCC projections of a rise in temperature of between 0.15 to 0.3 degrees centigrade per decade are now supported by an observed global value of 0.2°C per decade. For the next two decades, a warming trend of about 0.2°C is projected for a range of greenhouse gas (GHG) emission scenarios. Even if the concentration of all greenhouse gases and aerosols remains constant at 2000 levels, further warming of about 0.1°C per decade is expected. As a consequence, it is anticipated that sea levels and global sea water temperature will increase; weather patterns will change resulting in an increase in the frequency and intensity of extreme weather events, such as droughts, floods, and possibly hurricanes.

"For the next two decades, a warming trend of about 0.2° celsius is projected for a range of greenhouse gas emission scenarios."

Furthermore, a recent report[10] commissioned by the British Government calls for immediate action to deal with these issues and emphasises that any delay will only result in significant

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[7] International Institute for Strategic Studies (IISS) (2007). "Strategic Survey 2007, The Annual Review of World Affairs": http://www.iiss.org/publications/strategic-survey-2007/strategic-survey-2007-contents

[8] "Security Council holds first-ever debate on the impact of climate change on peace, security, hearing over 50 speakers," United Nations Security Council, SC/9000, 17 April 2008, Department of Public Information, News and Media Division, New York, http://www.un.org/News/Press/docs/2007/sc9000.doc.htm

[9] Intergovernmental Panel on Climate Change (IPCC 2007), "Fourth Assessment Report, Climate Change 2007: Synthesis Report, An Assessment of the Intergovernmental Panel on Climate Change: http://www.ipcc.ch/pdf/assessment-report/ar4/syr/ar4 syr.pdf

[10] "Stern Review on the Economics of Climate Change, Summary of Conclusion," HM Treasury, 2006, http://www.hm-treasury.gov.uk/media/3/2/Summary_of Conclusions.pdf

increases in the costs of responding. The report estimates that delayed action to mitigate climate change will lead to overall damage costs equivalent to losing at least 5 percent of global gross domestic product (GDP) each year, with higher losses in most developing countries. Taking into account a wider range of risks and impacts, damage estimates could amount upwards of 20 percent of GDP or more. In contrast, the costs of action—reducing GHG emissions to avoid the worst impacts of climate change—can be limited to around 1 percent of global GDP each year.

Against this global backdrop, CARICOM countries have considerable cause to be concerned that while the region's contribution to GHG emissions causing global climate change is negligible, the threats posed to its development prospects are severe—and such adaptation will require a sizeable and sustained investment in resources that the region is unable to provide on its own.

1.2 Regional Context of Climate Change

Global climate change is the most serious threat to sustainable development facing CARICOM states. Although the contribution of CARICOM countries to global greenhouse gas emissions is negligible, according to a recent report of the Intergovernmental Panel on Climate Change (IPCC),[11] the projected impacts of global climate change are expected to be devastating. These impacts would be reinforced due to the limited adaptive capacity of CARICOM small island and low-lying coastal states. Specifically, GCC is expected to result in more hostile regional climate change and rising sea levels. The rising sea levels with associated coastal erosion and salt water intrusion, an escalation in the frequency and intensity of tropical storms and hurricanes, and disruptions in rainfall and fresh-water supply threaten the very existence of the small island and low-lying costal states of the Caribbean.

"Between 1995 and 2000 the region experienced the highest level of North Atlantic hurricane activity on record."

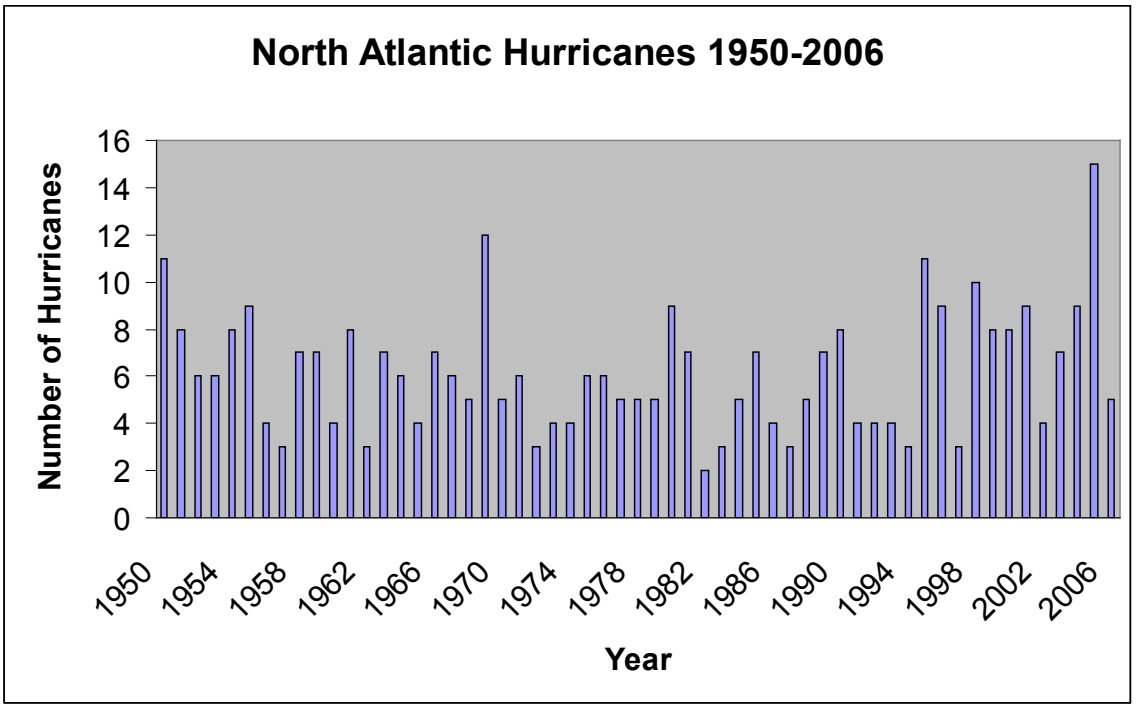
The vulnerability of CARICOM states to climate events is evidenced by the impact of hurricanes on the region. Intense hurricane activity in the region was significantly higher between 1995 and 2000, when the region experienced the highest recorded level of hurricane activity.

Intense hurricane activity in the region was significantly higher during the 1950s and 1960s, in comparison to the 1970s, 1980s, and the first half of the 1990s, with the exception of 1988, 1989, and 1995. As shown in Figure 1, between 1995 and 2000 the region experienced the highest level of North Atlantic hurricane activity on record. Over the last three decades, the Caribbean region has suffered direct and indirect losses estimated at between US$700 million and 3.3 billion, owing to natural disasters associated with extreme weather events.[12] While estimating the potential economic consequences of the impacts of climate change on the Caribbean is difficult,

[11] Intergovernmental Panel on Climate Change (IPCC 2007), "Fourth Assessment Report, Climate Change 2007: Synthesis Report, An Assessment of the Intergovernmental Panel on Climate Change": http://www.ipcc.ch/pdf/assessment-report/ar4/syr/ar4_syr.pdf

[12] 2002 report by the Inter-American Development Bank entitled "Natural Disasters in Latin America and Caribbean: An Overview of Risk" http://www.iadb.org/res/publications/pubfiles/pubWP-434.pdf

Figure 1: Number of Hurricanes by year in the North Atlantic, 1950-2006[13]



due to varying global climate change scenarios, limited geographical projections for the region, and an inadequate inventory of vulnerable assets and resources in these economies, a recent study suggests that in a "no-adaptation" scenario, such losses could be on the order of 5 to over 30 percent of GDP on average (annualized values), with an even broader range for some specific countries.

The Caribbean region as a whole, especially its rural areas, is highly vulnerable to exogenous factors. Some events have been truly devastating, affecting the population of an entire country and causing damage in excess of 100 percent of annual GDP. Economic growth in the Caribbean countries was undermined by the natural disasters that struck in the second half of 2004. Their impact, measured in terms of GDP, was quite severe in most cases, with the only major exception being the Dominican Republic, where damage and losses accounted for less than 2 percent of that country's current GDP. In Grenada, it amounted to 212 percent of GDP, and in the Cayman Islands it totaled 138 percent. Although the figures for Jamaica (8 percent) and the Bahamas (7 percent) were lower, they nonetheless represent a significant economic burden.[14] Assessments and analyses conducted by the Economic Commission for Latin America and the Caribbean (ECLAC) and the Organisation of Eastern Caribbean States (OECS) estimate the related amount of damage and losses at more than US$5 billion. As shown in Table 1, hurricanes and tropical

[13] Data obtained from the U.S. National Oceanic and Atmospheric Administration: www.nhc.noaa.gov
[14] ECLAC, 2005. "The 2004 Caribbean Hurricane Season: Facts, Figures, Preliminary Conclusions and Lessons Learned": http://www.eclac.cl/publicaciones/DesarrolloEconomico/5/LCG2265PI/Chapter_4.pdf

storms caused approximately US$4.3 billion in economic damages in the Bahamas,[15] Cayman Islands,[16] Dominican Republic,[17] Grenada,[18] Haiti,[19] and Jamaica.[20]

Table 1: Economic Impact of the 2004 Hurricane Season in the Caribbean

Country	Natural Event	Economic Impact (in US$ millions/billions)
Bahamas	Hurricanes Frances and Jeanne	551
Cayman Islands	Hurricane Ivan	1.62 billion
Dominican Republic	Tropical storm Jeanne	296
Grenada	Hurricane Ivan	889
Haiti	Hurricane Jeanne	296
Jamaica	Hurricane Ivan	595
Total		**4.247 billion**

The impact of Hurricane Ivan on Grenada was particularly severe and typifies the type of challenges posed by weather- and climate-related disasters. Hurricane Ivan made landfall on Grenada on 7 September 2004, as a category 3 storm, with sustained winds of a 120 mph and gusts reaching a maximum speed of 135 mph.[21] Prior to Hurricane Ivan, Grenada's economy was projected to grow by 5.7 percent; after Ivan, a negative forecast of -1.4 percent was predicted. Overall, Hurricane Ivan caused an estimated €2.2 billion in damage, which was twice Grenada's GDP at the time.[22]

The region's vulnerability to extreme weather events was further demonstrated by floods in Guyana and Suriname during 2005 and 2006. The flooding in Guyana affected 463,300 persons, or 62 percent of the population, and inflicted damage estimated at G$93 billion or 59.49 percent

[15] See, Economic Commission for Latin America and the Caribbean, Inter-American Development Bank (2004) *Hurricanes Frances and Jeanne, Their Impact in the Commonwealth of the Bahamas.*

[16] See Economic Commission for Latin America and the Caribbean, United Nations Development Programme, Cayman Islands Government (2004) *The Impact of Hurricane Ivan in the Caymans.*

[17] See Economic Commission for Latin America and the Caribbean, United Nations Development Programme (2004) *Los Efectos Socioeconómicos del Huracán Jeanne en la República Dominicana.*

[18] See Organisation of the Eastern Caribbean States (2004), *Grenada: Macro Socio-economic Assessment of the Damages Caused by Hurricane Ivan.*

[19] See Economic Commission for Latin America and the Caribbean, United Nations Development Programme (2004). "Le Cyclone Jeanne en Haïti: degats et effets sur les departements du nord-ouest et de l'artibonite : approfondissement de la vulnerabilite."

[20] Economic Commission for Latin America and the Caribbean, United Nations Development Programme, Planning Institute of Jamaica, Assessment of the socioeconomic and environmental impact of Hurricane Ivan on Jamaica.

[21] Hurricane Ivan damaged 90% of the housing stock in Grenada totaling €1.4 billion or 38% of GDP. Ninety percent of hotel rooms were damaged or destroyed, worth EC$288 million or 29% of GDP. Damage to education facilities and schools was estimated at 20% of GDP, while damage to telecommunications and electrical installations was estimated at 13% and 9% of GDP, respectively.

[22] Ibid 5.

of current GDP for 2004.[23] Hurricane Dean, which hit Mexico and the Caribbean in August 2007, caused insured damage of over US$1 billion.

The aggregate economic losses incurred by the small island and low-lying states of the Caribbean Basin as a result of storms over the period 1979–2005 are estimated at US$613 million annually.[24] The region's tourism, agriculture, forestry, and fisheries sectors; water resources; achievement of the Millennium Development Goals (MDGs); and human rights are considered to be most vulnerable to damage from climate change. Poor levels of preparedness and/or the adoption of a reactive adaptation strategy will cause Caribbean countries to divert scarce resources away from development projects for relief and reconstruction projects caused by global climate change-related events. Against this backdrop, investing in a proactive comprehensive strategy and plan is an indispensable element of the region's economic, social, and environmental resilience-building effort.

Climate Change and Health: a Neglected Area

The Report of the Lancet Commission (2008) identifies climate change as the biggest global health threat of the 21st century. Yet there is a massive information gap and lack of knowledge as to how we should respond to the negative health impacts of the climate change threat. This issue must be accorded high priority within the Caribbean's climate change framework, as the poorest segments of our populations stand to suffer the most if we fail to do so. This possible outcome requires us to focus our efforts and energies on addressing the shortcomings of health systems so as to protect people in the countries and communities most at risk. Equally essential in the view of the Lancet Commission is the need for new public health advocacy targeting the interconnections among varied social spheres, such as disease, food, water and sanitation, shelter and settlements. In this regard, the Lancet Commission believes that health professionals are critical to the movement, and must be incorporated as proponents of the Caribbean climate change regional framework.

A parallel track which needs to be promoted to complement this framework is research that would support policies that increasingly recognize climate change as a public health priority. Among these, the links between health and global warming or pollution or smoking have already begun to attract empirical work. However, much more will be needed.

The Lancet Commission recommended some key areas which could in turn provide useful guidelines for studies on climate change and public health in the Caribbean. Improving global health and health equity, risk assessment of population displacement, degradation of water supplies, the effects of multiple environmental hazards on vulnerable populations, taking action against climate sensitive risks and appropriate interventions to reduce current and future health burdens.

[23] Economic Commission for Latin America and the Caribbean (2005): "Socio-Economic Assessment of the Damages and Losses caused by the January-February 2005 Flooding in Guyana."
[24] World Bank, Latin America and Caribbean Region (2008), "Operational Innovation in Latin America and the Caribbean, The Caribbean Catastrophe Risk Insurance Facility, Providing Immediate Funding After Natural Disasters", Volume 2 Number 1, March 2008:
http://siteresources.worldbank.org/INTENBREVE/Newsletters/21829873/ONS4-CCRIFComplete.pdf

Table 2: Annual Economic Impacts of Climate Change on CARICOM Countries circa 2080 (in constant 2007 US$ millions)			
	Pre-subtotal	Subtotal	Total
Total GDP loss due to climate change-related disasters:			**4,936.9**
Tourist expenditure		447.0	
Employment loss		58.1	
Government loss due to hurricane		81.3	
Flood damage		363.2	
flood-related agricultural damage	1.7		
Drought damage		3.8	
drought-related agricultural damage	0.5		
Wind storm damage		2,612.2	
wind-related agricultural damage	1.9		
Loss of labour productivity (GDP/capita) due to increased hurricane-related disasters (e.g., wind storms, floods, and landslides)		0.1	
Flood disability-adjusted life year "DALY" (GDP/capita)		0.8	
Rise in sea level			
Loss of land			20.2
Hotel room replacement costs			46.1
Housing replacement costs			567.0
Electricity infrastructure loss			33.1
Telephone line infrastructure loss investment needs			3.9
Water connection infrastructure loss investment needs			6.7
Sanitation connection infrastructure loss investment needs			9.0
Road infrastructure loss investment needs			76.1
Rail infrastructure loss investment needs			2.7

1.3 Regional Vision: Building Regional Resilience to a Changing Climate

The strategic vision that drives this regional framework is the achievement of a "regional society and economy that is resilient to a changing climate." The seriousness of the challenge global climate change (GCC) poses to the development prospects of small island and low-lying costal states is addressed in the Barbados Plan of Action (BPoA), as the first of 14 priority areas for achieving sustainable development.

1.4 Strategy Objectives

This document provides a roadmap for action over the period 2009-2015, and builds on the groundwork laid by the Mainstreaming Adaptation to Climate Change (MACC) project. The

objectives of this document are to establish direction for the continued building of resilience to the impacts of GCC on the part of the CARICOM countries. The strategy focuses on the identification and consolidation of a set of complementary activities that utilise the CCCCC's current capacity and experience in managing adaptation to climate change, while taking its limitations into consideration. The strategy includes a number of programmes with complementary components to support mitigation and adaptation projects across the region. Identified are 5 key strategies and associated goals that would lead to the establishment of a successful and sustainable resilience-building programme:

1. Promoting actions to reduce greenhouse gas emissions through energy reduction and conservation, and switching to renewable and cleaner sources of energy;

2. Promoting actions to minimize the effects of greenhouse gas emissions through initiatives and measures designed to reduce the vulnerability of natural and human systems to the effects of climate change (e.g., flood defences, and changing land use patterns);

3. Promoting the development and implementation of educational and public awareness programmes as well as public access to information and citizen participation across the Caribbean region[25]; and

4. Building the Caribbean Community Climate Change Centre's organisational capacity to manage adaptation to climate change, through training of scientific, technical, and managerial personnel; institutional strengthening; providing systematic long-term technical assistance; and strengthening information support capacity that allows the CCCCC to effectively support the Member States.

5. Promoting the dissemination of successful adaptation experiences to address the impacts of climate change on: (a) water supply; (b) coastal and marine ecosystems; (c) tourism; (d) coastal infrastructure; and (e) health, which combined represent the largest threats to the well-being of the CARICOM countries.

Georgetown, Guyana flooding, January 2005.

[25] UNFCCC Article 6: Education, Training and Public Awareness, http://unfccc.int/essential_background/convention/background/items/1366.php

2.0 Vulnerability of the Caribbean Region to Climate Change

Environmental globalisation takes the form of global climate change caused predominantly by the growing greenhouse gas emissions of the global energy sector, particularly by the countries of the Organisation for Economic Co-operation and Development (OECD); a situation beyond the region's control and which leaves it extremely vulnerable. According to the Inter-Governmental Panel on Climate Change (IPCC), the countries of the Caribbean are among the most susceptible to the likely impacts of climate change.[26]

Effects of black sigatoka disease on banana crops

CARICOM Member States are vulnerable to the impacts of global climate change, the projected manifestations of which include an increased frequency and ferocity of extreme weather events, especially hurricanes, tropical storms, and rising sea levels. Given the poor condition of the marine environment, most coastal areas have little defence against the raging surfs of hurricanes and tropical storms, and the likely consequences would be significant coastal damage including beach erosion and infrastructure damage (e.g., roads, bridges, utility lines, and buildings). Additionally, the poor condition of upland watersheds and the felling of mangrove forests, particularly in larger countries such as Belize, Guyana, and Suriname, make inland areas very susceptible to property and infrastructure damage from flooding.

Secondly, the productive sectors, especially agriculture and tourism, are likely to be adversely affected by climate change. Coastal erosion, partly the result of anthropogenic factors such as sand mining, is already a problem on many islands and evidently may be exacerbated by rising sea levels. Average annual beach erosion rates of approximately 2 to 4 meters have been reported for several beaches in Trinidad and Tobago, where two gauges have recorded a mean relative sea-level rise of 8-10 mm per year over the last 15 years. While beach erosion is the product of a variety forces, rising sea levels are considered a contributing factor. [27]

In the case of Antigua and Barbuda, more than 60 percent of the population lives in coastal areas. A growing population and tourism-based developments are already putting pressure on coastal resources. In addition, reclamation of lands, sand mining, and the lack of a comprehensive system to control flooding and sedimentation have increased the county's vulnerability to erosion, coastal flooding, and storm damage. Some of Antigua and Barbuda's most important resources, especially in terms of tourism, are its extensive beaches. Sandy beaches form the dominant coastal landscape of Antigua and Barbuda.

[26] For purposes of this strategy, the Caribbean countries comprise the small island developing states (SIDS), such as Antigua and Barbuda, and the low-lying states, which include Belize, Guyana, and Suriname.
[27] UNEP.

The major uses of beaches on these islands include recreation, fish landing sites, a source of fine aggregates used in building construction, as well as habitats for nesting turtles and other animals and plants. The expansion of tourism and increased construction activity have led to more intensive land use and pollution, which in turn have affected watersheds, largely through increased erosion and siltation. Antigua and Barbuda are small islands where pressure to subdivide land for housing, tourism development, agriculture, and quarrying, is mounting exponentially with that country's growing population and economic activity. [28]

Meanwhile, the region's agriculture sector, already besieged by economic forces both local and international, will find it very difficult adapting to the impacts of climate change. The vast majority of agricultural production across the region is rain-fed. The projected reduction in precipitation would have a serious impact on food security and exports. The impact of climate change on agriculture is linked to its effects on water resources. In addition, changes in rainfall patterns will increase crop vulnerability to certain diseases. In the case of the highly water-dependant banana crop, requiring between 1,300 and 1,800 mm of rainfall per year, an adequate water supply is required to produce larger fruit size, and the lack of water is associated with the onset of black sigatoka disease.[29] In the case of sugar cane, an increase in atmospheric carbon dioxide concentrations could cause a reduction in sugar cane yields.

"Indeed, under the Clean Development Mechanism there is what might be perceived as a 'perverse incentive' for countries to do otherwise, that is, to destroy their forests and derive benefit under the CDM for reforestation and afforestation."

Ultimately, climate change will increase the pressure on the region's fragile natural resource base, which is already under stress and is bound to collapse sooner or later should the trend continue.

Several countries in the region have substantive stocks of pristine tropical forests. Development imperatives are putting pressure on governments in these countries to allocate forestland for, *inter alia*, mining, agriculture, timber extraction and infrastructure development, thus further contributing to global deforestation and forest and land degradation. Under the Clean Development Mechanism (CDM) of the Kyoto Protocol there are no provisions to support countries to maintain their forest cover. Indeed, under the Clean Development Mechanism there is what might be perceived as a "perverse incentive" for countries to do otherwise, that is, to destroy their forests and derive benefit under the CDM for reforestation and afforestation.[30] With the realization that deforestation and forest degradation account for at least 20 percent of global green house gas emissions and that "avoided deforestation" is a cost effective mitigative action, there is a distinct possibility that resources to prevent deforestation will be available under the 2012-Post Kyoto negotiations currently under way.

[28] UNEP.
[29] UNEP.
[30] The establishment of a forest by artificial methods, such as planting or seeding on land where trees have never grown.

Caribbean countries with significant amounts of standing forests need to ensure that they are prepared to participate in any global scheme to provide resources in order prevent deforestation. These resources can be utilized to support and maintain national stewardship of these valuable resources and at the same time contribute to national development and GHG mitigation. In this respect it is note worthy that the Government of Guyana has taken some important initiatives to promote global agreement on, and inclusion of, the United Nations Collaborative Programme on Reducing Emissions from Deforestation and Forest Degradation in Developing Countries (UN-REDD Programme) in the 2012-Post Agreement to be negotiated in Copenhagen. The government

Tropical Forests and Climate Change

Tropical forests are shrinking at a rate of 5 percent per decade, owing to current forest use patterns. It has also been underscored in a number of scientific reports that tropical deforestation is responsible for atmospheric emissions of approximately 3 billion tons of carbon dioxide (CO2) each year. Upon factoring in methane (CH4) and nitrous oxide (N20) emissions associated either directly or indirectly with deforestation, tropical forest land-use change contributes roughly 25 percent of global greenhouse gas (GHG) emissions. One of the major shortcomings of the Kyoto Protocol was its failure to include avoided deforestation. Including forest preservation as a central plank of the new climate change agreement is urgently needed.

In the Caribbean Community, the three countries with the largest tracts of forest are Belize (more than 70 percent remains under its natural vegetation cover), Guyana (approximately 76 percent forest cover), and Suriname (more than 80 percent forest cover).

The Government of Guyana has developed a strategy to preserve its standing forests as part of the global approach to mitigating the impacts of climate change. The key focus areas of the Guyana strategy include investments in low-carbon economic infrastructure and high-potential, low-carbon sectors; expanding access to services and new economic opportunities for indigenous and forest communities; transforming the village economy and improving social services; expanding economic opportunities for the wider population; and investing in climate change adaptation infrastructure. The Guyana strategy could be used as a model for other developing countries to formulate a low carbon development strategy.

recently unveiled a futuristic proposal for the promotion of economic development in the environmentally sustainable way. A key part of the proposal involves the deployment of Guyana's rainforest towards addressing global climate change. The success of this innovation will depend on a positive outcome of the REDD negotiations in Copenhagen. All Caribbean countries with forestry resources should start laying the groundwork for participation in an approved global REDD mechanism.

3.0 Strategies and Programmes

Responding to worldwide environmental problems such as global climate change (GCC) within the context of an increasingly globalised world economy is a particularly difficult challenge for the fragile economies of small Caribbean states, which are among the most susceptible to

the likely impacts of climate change.[31] To reduce their vulnerability and build their resilience to GCC, it is imperative that CARICOM member governments treat GCC as a development issue and formulate and implement cost-effective policies and "no regrets" measures to ensure that the risks posed by a changing climate to the development prospects of the region are significantly reduced. In particular, Caribbean countries need to incorporate climate change as part of their national development planning processes while building a sound understanding of climate change science, and strengthening their participation in international environmental negotiations on climate change and related subjects.

3.1 Strategic Element 1: Mainstream climate change adaptation strategies into the sustainable development agendas of the CARICOM Member States. The CCCCC will adopt a learning-by-doing approach to capacity building and build on the progress achieved in past projects (CPACC, ACCC, MACC and SPACC) by furthering institutional capacity, strengthening the knowledge base, and deepening awareness and participation.

Goal 1: **Assess the vulnerability and risks associated with a changing climate.**

To identify and quantify climate change vulnerability and risk by building regional capacity to collect and analyse data, and expand the overall knowledge base on climate change impacts and associated physical and economic vulnerabilities. There are five subcomponents, the first four of which will operate at the regional level, but focus on strengthening and expanding the knowledge base as a sound platform for analysis and decision-making at the national and local levels. The fifth subcomponent will support the preparation of vulnerability and risk assessments for selected countries or groups of countries using a harmonised approach.

Goal 2: **Reduce vulnerability to a changing climate.**

To build in-country capacity to formulate and analyse adaptation policy options, and develop and implement multisectoral adaptation strategies. CARICOM Member States will prepare these sectoral adaptation strategies. Components related to this goal will provide inputs to develop the adaptation strategies and vulnerability and risk assessment studies.

Goal 3: **Effectively access and utilise resources to reduce vulnerability to a changing climate.**

There will be two subcomponents: the first will further strengthen regional capacity to prepare regional positions for the UNFCCC and other international forums to enhance the region's visibility and influence on relevant negotiations and policy decisions, whereas the second subcomponent will assist with the development of a strategy to improve regional

[31] Inter-Governmental Panel on Climate Change (IPCC) Third Assessment Report (TAR).

policy coordination and harmonisation on climate change adaptation and mitigation, while strengthening the region's ability to effectively mobilise and utilise financial resources provided through international financial mechanisms.

Goal 4: Build a society that is more informed about and resilient to a changing climate.[32]

To support a public education and outreach program geared towards improving decision-making, encouraging policy changes where required, strengthening information access and data resources for key stakeholders, disseminating project-generated data and information, and fostering public awareness about the potential impacts of climate change.

In keeping with their commitments under Article 6 of the UNFCCC, CARICOM Member States must promote the development and implementation of educational and public awareness programmes, as well as public access to information and citizen participation. Such activities are intended to promote appropriate action and discourage maladaptive practices; for example, reconstruction of buildings in areas that are known to be extremely susceptible to extreme events.

Goal 5: Build the Caribbean Community Climate Change Centre's capacity to support the implementation of the strategy.

To establish a management system that is efficient, flexible, and transparent so as to facilitate the implementation of the strategic objectives and outputs in the time available, using the financial resources allocated according to the technical specifications and quality standards articulated by the project documents. This component will provide support to other regional institutions for the efficient planning, monitoring, and evaluation of the strategy.

> "CARICOM countries have abundant renewable energy sources that are under-utilised such as solar, wind, hydro, geothermal, biomass, and ocean."

Goal 6: Reduce the region's carbon footprint through the promotion of energy efficiency measures.

The CARICOM countries are very inefficient energy users. On average, the Caribbean uses at a minimum 200 percent more energy per unit of GDP compared to best practices. Consequently, there are numerous investment opportunities in energy efficiency, particularly in the areas of lighting, cooling, transportation, and industrial production.

[32] UNFCCC Article 6: Education, Training and Public Awareness, http://unfccc.int/essential_background/convention/background/items/1366.php

3.2 Strategic Element 2: Promote the implementation of specific adaptation measures to address key vulnerabilities in the region.

This element of the strategy seeks to strengthen the climate resilience of the most vulnerable sectors by supporting the dissemination of successful adaptation measures, some of which are already being implemented in the region. Specifically, the strategy seeks to address the impacts of climate change on: (a) water supply; (b) coastal and marine ecosystems; (c) tourism; (d) coastal infrastructure; and (e) health, which combined represent the largest threats to the well-being of the CARICOM countries.

Goal 1: Promote the adoption of measures and disseminate information that would make water supply systems resilient to climate-induced damage.

"Solar water heating systems are usually more cost-effective than photovoltaic applications as a greenhouse gas reduction measure, and can be comparable to wind farms and hydroelectric facilities.".

This would focus on coastal aquifers and water systems that may be particularly vulnerable to the impacts of salinization caused by rising sea levels and subject to extreme weather events. The strategy would promote the adoption of systems and designs to address these impacts, for example through the wider use of reverse osmosis water desalination systems using wind energy as power source.

Goal 2: Promote the implementation of measures to reduce climate impacts on coastal and marine infrastructure

The strategy would promote the adoption of building codes and land use plans that would incorporate the anticipated effects of increased intensity and strength of weather events and rising sea levels in the planning and implementation of coastal infrastructure, as well as in the retrofitting of existing infrastructure.

Goal 3: Promote the adoption of measures and dissemination of information that would adapt tourism activities to climate impacts.

The strategy would promote the adoption of measures that would result in better planning of tourism infrastructure and access to tourism facilities, incorporating consideration of the impacts of climate change. This strategy also seeks to promote the adoption of sound water use practices by the tourism facilities that would result in a sustainable use of the resource under scenarios that include climate impacts.

Goal 4: **Promote sound conservation practices in coastal and marine ecosystems to shelter these resources from climate-induced damage.**

The strategy would promote the adoption of measures and the dissemination of information required to strengthen the resilience of coastal and marine ecosystems to climate-induced damage. Specifically, the strategy seeks to disseminate information on measures to protect the coral biome, coastal mangroves and wetlands, other ecosystems, and the economic and environmental services these provide.

Goal 5: **Promote the adoption of sound practices and measures to prevent and/or reduce climate-induced health impacts in the community.**

The strategy seeks to disseminate information and promote the adoption of practices to prevent and/or reduce the exposure to vector-borne diseases resulting from increased temperatures and extreme rainfall and flooding events.

3.3 Strategic Element 3: Promote actions to reduce greenhouse gas emissions through fossil fuel reduction and conservation, and switching to renewable and cleaner energy sources.

This element of the strategy seeks to improve the living standards and the resilience of the CARICOM region and its people through expanded opportunities for economic development by encouraging the use of cleaner and renewable energy technologies. Sustainable social and economic development is critical to the region's ability to adapt to a changing climate. CARICOM countries have abundant renewable energy sources that are under-utilised such as solar, wind, hydro, geothermal, biomass, and ocean. The strategy will focus on promoting the use of cleaner and more efficient energy technologies and alternative energy sources in the industrial, agriculture, transport and building sectors, as well as in households. At the national level, fiscal policies will be used to encourage investment in and the use of new and cleaner energy technologies.

Goal 1: **Promote the use of renewable energy resources.**

Preliminary studies show that most CARICOM Member States can produce biofuels. The sugarcane growing countries have the best potential to establish viable liquid biofuel industries within the next three to five years. Additionally, this resource can provide an estimated 16,000 MW of geothermal energy potential.

Goal 2: **Support the assessment of wind potential to supply electric power in CARICOM countries.**

In 2001, one study indicated that the Caribbean has significant capacity for the production of wind-generated electricity. The study estimates that wind can satisfy in excess of 10 percent

of the electricity needs in many CARICOM countries by the year 2020. A number of wind farm projects have been implemented including in Curaçao, Guadeloupe, and Jamaica, making wind one of the fastest growing renewable energy technologies in the region over the next two decades.

Goal 3: Support the Development of Innovative Financing Mechanisms for the Deployment of Solar Water Heaters (SWHs).

There are many lessons to be learned from the implementation of the Barbados solar water heater programme which was launched in 1974. Solar water heating systems are usually more cost-effective than photovoltaic applications as a greenhouse gas reduction measure, and can be comparable to wind farms and hydroelectric facilities. High initial costs have acted as a barrier to their widespread use. However, such costs can be reduced through the application of appropriate fiscal measures.

Goal 4: Assess the Feasibility of Converting Waste to Energy in CARICOM Countries.

There are four existing opportunities to derive energy from waste: (i) the production of biodiesel from waste edible oils and fats; (ii) from the production of biogas and fertilizer; (iii) from agriculture residues and; (iv) from the production of fuels for power generation from solid waste. Waste-to-energy programmes provide major environmental benefits including improved quality of the coastal environment and protection of critical ecosystems on which the tourism industry depends.

"The extensive standing forest resource in CARICOM countries offers the region significant opportunities to derive economic benefits regionally, while providing benefits globally."

Goal 5: Assess the Economic Viability of Environmental Impact of Shore-based Ocean Thermal Energy Conversion (OTEC) Plants.

The Caribbean Sea offers abundant opportunities for the generation of energy utilising OTEC technology. The distinctive feature of OTEC energy systems is that the end products not only provide energy in the form of electricity, but also several other synergistic products, including a less expensive alternative source of desalinated water.

3.4 **Strategic Element 4:** Promote actions to reduce the vulnerability of natural and human systems in CARICOM countries to the impacts of a changing climate.

In order to achieve the objectives of this element of the strategy, CARICOM countries will have to take the following action:

- Revise building codes, to include restricting construction in areas susceptible to coastal flooding, landslides, or tidal surges;
- Develop new standards for road construction to ensure adequate surface drainage;
- Implement integrated land-use planning;
- Enact national standards for sanitation, both to reduce the required volume of water, as well as to ensure safe systems for the treatment of wastewater and other forms of waste so as to reduce public health risks;
- Develop and test crop varieties that are more tolerant to adverse weather conditions such as droughts, high winds, and floods;
- Implement public education and awareness programs; and
- Develop new legal tools that make for a more responsive insurance industry.

3.5 **Strategic Element 5:** Promote actions to derive social, economic, and environmental benefits from the prudent management of standing forests in CARICOM countries.

There is growing recognition of the critical role standing forests play in carbon sequestration and other ecological services. The extensive standing forest resource in CARICOM countries offers the region significant opportunities to derive economic benefits regionally, while providing benefits globally.

Deriving these benefits both regionally and globally requires CARICOM countries to promote sound management practices and support strategies and programmes that generate fair and adequate compensation to the region from international mechanisms.

Goal 1: Promote the adoption of best practices for sustainable forest management.

In promoting sustainable forest management, the aim is to provide opportunities for the utilisation of agro-forestry systems based on combinations of tree species and crops that provide multiple benefits, particularly species for the improved production of goods and services. These can function as biomass stocks and carbon sinks while making more efficient and effective use of available land space and water resources. Additional benefits will include reduction in land and forest degradation, reduced soil erosion and loss, and improved water retention. The potential also exists for reversing vegetation and forest cover loss. Tree species can include those of high commercial value that can be harvested through proper harvesting techniques for the production of added value materials. Other species can be used to rehabilitate already degraded land areas or to enhanced the protection and reduce vulnerability of exposed areas.

Goal 2: **Engage in negotiations with international partners to mobilise resources for the protection of standing forests.**

Local partners and stakeholders should first be provided with social and economic incentives to buy into the concept of forest protection. Such incentives will contribute to their participation and encourage buy-in of local partners and stakeholders into protection strategies. This demonstrated commitment and partnership at the national level could then ease negotiations with international partners to mobilise resources. The scale of initiatives in the Caribbean is small, so regional programmes would be easier to promote with international partners.

Goal 3: **Undertake research aimed at improving current methodologies for estimating carbon sequestration rates in tropical forests.**

To undertake research, including targeted research, to derive regional above- and below-ground biomass values used for calculating carbon stocks. Remote sensing methodologies have limitations due to the scale and resolution of the images (if available). On-the-ground assessments will be more accurate and reliable. A series of "permanent sampling plots" could be periodically measured for data collection; the analysis could be done in the regional institution, e.g., the Centre for Research Management and Environmental Studies (CERMES).

4.0 Strategy Implementation

This strategy is influenced by, and strives to operationalise an approach to vulnerability reduction and resilience-building to a changing climate that emphasises collaboration and cooperation among development partners in hazard risk identification, reduction, and transfer. Thus, effective implementation of the strategy will require that the various actors at the national, regional, and international levels have a clear appreciation of their respective roles and responsibilities.

Mindful that strategies operate in a dynamic environment, government and the development partners agree on the need to strengthen those institutions with key disaster risk management responsibilities to: (i) provide adequate support on adaptive measures to stakeholder actors in the public and private sectors, and at the community level; (ii) monitor the impact of the strategy against the goals and objectives that have been set; and (iii) adjust the policy and strategy in the light of intended or unintended changes in the situation.

4.1 Guiding Principles

A strong and diversified economy is indispensable to building resilience to a changing climate. Resilience building to a changing climate is most effective when: (a) it is approached in an integrated development planning context; (b) it involves at the earliest possible stage, a multi-stakeholder approach based on mutual respect and responsibility; and; (c) it is sustained by public education and awareness programmes.

The actions outlined in this strategy are underpinned by the following additional principles:

- An integrated approach is important in minimizing the use and costs of limited technical, administrative, and financial resources; in reducing any potential conflicts in policy development; and in promoting coordination among all stakeholder groups in hazard risk reduction;
- Effective and sustained involvement of civil society;
- Stakeholder involvement and participation must be effectively coordinated so as to minimize duplication of effort and conflict, and ensure efficient use of resources and the creation of positive synergies;
- An effective institutional, administrative, and legislative environment is a *sine qua non* to effective and timely resilience-building to the hazard risks associated with a changing climate;
- Investing in resilience-building to a changing climate is investing in sustainable development;
- Investing in proactive resilience-building to a changing climate can significantly limit the immediate losses and future cost of recovery from climate events;
- An enabling environment for the adoption of appropriate technologies and practices is necessary to ensure that national, regional, and international commitments with respect to the causes and effects of a changing climate are fulfilled;
- Effective collaboration with other regional and international state actors and organisations must be an integral part of resilience-building to a changing climate;Reducing the singular and cumulative impacts of natural disasters can alleviate development challenges; and
- Access to information and transparency in planning and implementation.

Accordingly, the framework is cast from the perspective of governments and their development partners, including civil society. The roles envisaged by these partners are summarised below.

4.2 Role of Governments

The principal task of governments will be to:

- Provide an appropriate political, legal, and administrative environment, including monitoring and enforcement;
- Assist in the mobilisation of new and additional financial resources;
- Encourage the participation of all government entities in the development of appropriate climate hazard risk mitigation measures; and
- Promote sustained partnerships with non-state actors.

4.3 Role of the Private Sector

The strategy envisages a direct and involved role for the private sector. Private sector involvement will, where necessary and feasible, be promoted through agreements that define clear roles and responsibilities. More specifically, the private sector will be expected to:

- Develop and implement corporate environmental policies that emphasise prospective and compensatory climate hazard risk management principles; and
- Observe the "polluter pays" principle, the "user pays" principle, the precautionary principle, and make informed investments in climate hazard risk management.

4.4 Role of Citizens

Citizens are seen as playing a proactive role in articulating their needs in relation to their respective livelihood priorities. Such action will help to inform decisions regarding hazard management, as well as assist in reducing risks and uncertainties. Citizens are also expected to:

- Take full responsibility for arming themselves with appropriate information to guide decisions, whether at the individual, organisational, or community level regarding climate hazard risk management;
- Take all opportunities to participate in decision making processes;
- Monitor the activities of government and the private sector to ensure that government policies and programmes enhance resilience; and
- Act in an environmentally responsible manner and contribute to the building of resilience in their communities.

4.5 Role of Regional Organisations

This framework recognises that regional organisations will play a pivotal role in supporting climate hazard risk management activities, through the sharing of knowledge among key agencies and individuals, and in supporting the development of national capacities.

Against this backdrop, CARICOM governments recognise the need to sustain the contribution of regional agencies such as the Caribbean Meteorological Organisation (CMO), the Caribbean Tourism Organisation (CTO), the CARICOM Secretariat, the Caribbean Development Bank (CDB), the Caribbean Disaster Emergency Response Agency (CDERA), the Caribbean Environmental Health Institute (CEHI), CCCCC, the Caribbean Institute for Meteorology and Hydrology (CIMH), the Caribbean Agricultural Research and Development Institute (CARDI), the Caribbean Regional Fisheries Mechanism (CRFM), OECS, the University of the West Indies (UWI), and other regional organisations in:

- Strengthening national capacities through training, programme support, technical assistance, and resource mobilisation;
- Information sharing, documentation, and comparative analyses of issues on a regional and subregional basis;
- Coordinating subregional or regional disaster risk reduction projects;
- Developing common regional or subregional policy platforms and advocating regional policy initiatives in global forums; and
- Undertaking comprehensive, post-disaster damage assessments.

CARICOM involvement in the implementation, monitoring, and review of the strategy will be facilitated at the levels and in the manner described below.

Level 1. Establishment of an Oversight Committee of Heads of Government on Climate Change is proposed, to be chaired by the prime minister with responsibility for sustainable development and emergency management (St. Lucia) and include the prime ministers with lead responsibility for tourism (Bahamas), agriculture (Guyana), as well as the prime ministers of the countries holding the chairmanship of COTED and COFCOR, respectively. The intention is that this subcommittee will serve as the bridge between the framework's policy, foreign relations, and scientific dimensions. It is anticipated that the Committee will receive briefings at such intervals as it might establish from the scientific community and communicate the policy imperatives to the CARICOM Heads of Government.

Level 2. Establishment of a climate change Council of Trade and Economic Development (COTED) to oversee implementation of the strategy, for example, conducting periodic reviews of the adequacy of policies designed to address the adverse effects of a changing climate. COTED will oversee implementation of the framework, and specifically:

- Conduct periodic reviews of the adequacy of the provisions of regional policies designed to address the adverse effects of a changing climate;
- Work in collaboration with COFCOR to negotiate the timely transfer of resources and technology from the developed countries to the CARICOM Member States;
- Establish such subsidiary bodies as may be necessary for the performance of its functions;
- Facilitate the mainstreaming of climate change into national and regional development policies; and
- Conduct reviews of measures addressing climate change to ensure that they have minimal impact on international trade.

Level 3. CARICOM Heads of Government will be invited to establish a Regional Commission on Climate Change that includes representatives of specialised agencies with a mandate in areas related to climate change mitigation and adaptation. The primary responsibilities of the Commission will include oversight in the design and establishment of the appropriate decision-support systems that will help to build the region's resilience to a changing climate.

4.6 Role of the CCCCC

The CCCCC will have primary responsibility for coordinating the implementation of the regional framework in collaboration with the relevant regional and national institutions, and provide technical support and guidance as required by the respective implementing agencies and/or countries through their national contact points.

In keeping with its mandate, the Centre will:

- Analyse and disseminate information relevant to climate change;
- Facilitate and coordinate the development of Caribbean positions on global climate change, and serve as the authoritative technical source for Caribbean countries to, inter alia, fulfil their responsibilities under the UNFCCC;
- Assist the Member States in accessing benefits deriving from the implementation of financial mechanisms under the UNFCCC;
- Support public education and awareness programmes on climate change in Member Countries;
- Promote the sharing of resources, technical cooperation, and information exchanges with other global climate change initiatives, particularly in small island developing states and the Americas.

4.7 Role of the International Development Community

Over the years, the international community has demonstrated a growing commitment to assisting the region to improve its disaster risk management capacity. It is envisaged that this strategy will help to facilitate the continuing involvement of the international community in strengthening the capacity of CARICOM states in adapting to a changing climate. The international community will be invited to:

(a) Support training and education for climate hazard risk management;

(b) Share knowledge with the region that can address its hazard management challenges;

(c) Ensure that climate hazard risk management is factored into development aid programmes as well as disaster recovery and reconstruction;

(d) Enhance global indexing of risk and vulnerability;

(e) Strengthen the capacity of planning institutions to incorporate natural hazards into the planning process; and

(f) Support the development of detailed methodologies for identifying, categorizing, and quantifying disaster risk.

5.0 Financing Implementation of the Framework

The implementation of the framework will require that financial resources be made available to support the actions and the responsibilities of implementing organisations.

The partners acknowledge that many of the actions recommended by this framework do not represent an additional burden on their budgets. Many of framework's objectives could be met through better planning, using information gleaned from vulnerability assessments as the basis of decisions regarding mitigation.

The framework envisages that financing of disaster risk reduction initiatives will be treated as a development priority within the budgeting process and that all government entities will advance the goals and objectives of the policy by ensuring that disaster risk reduction is taken into account in designing programmes and projects.

In addition to the current financing arrangements for post-disaster rehabilitation and reconstruction, provided through external loans and from local revenue (Sinking Fund), the governments will explore the feasibility of establishing a Natural Hazard Risk Management Fund to finance prospective disaster risk management initiatives. It is envisaged that such a fund could be patterned on the environmental levy concept and/or could be built around user fees, charges on polluters, special-purpose lotteries, and licenses. It is also envisaged that the creation of such a fund should be linked to a review of the use of available financing mechanisms, such as fiscal incentives for various economic stakeholders. Expenditure from this fund should be based on integrated budgets and programmes submitted by all the major agencies involved in disaster risk management.

The CCCCC will have lead responsibility and work in close collaboration with the CARICOM Secretariat, the CDB, regional private sector entities, and regional governments to access the financial and resources required to implement the framework. There is potential for immediate support from the European Union through the recently announced "Global Climate Change Alliance" (GCCA). Moreover, there will be increased interest and support for adaptation as the UNFCCC Nairobi Work Program develops further, and the CCCCC should endeavour to remain at the cutting edge of these developments to ensure early access to financial and technical support as these initiatives are being developed. Furthermore, the region should explore the development of innovative financing mechanisms for climate change adaptation (e.g., establishing a regional carbon market).

The framework is envisaged as embracing a timeframe over the period 2009-2015, taking into consideration the various regional and international agreements and their associated targets. The CCCCC, in collaboration with regional stakeholders, will develop a detailed implementation plan including timelines for implementation of the different components and a budget for implementation. The budget will be financed from a variety of sources including:

- innovative financing mechanisms, to include a regional adaptation fund, clean development mechanisms (CDMs), carbon levy, etc.;

- multilateral and bilateral donor funds, to include regional and international (multilateral, bilateral, and philanthropic) funds such as the Pilot Program on Climate Resilience (PPCR), the Special Climate Change Fund, the Adaptation Fund, Global Environment Facility (GEF) resources; and
- private and public sector financing, to include contributions from governments, businesses, and philanthropic organisations.

6.0 Conclusion

The Fourth Assessment Report of the IPCC predicts that rising sea levels are likely to cause increased flooding in the form of storm surges and other coastal hazards in small islands and low-lying states. Furthermore, the deterioration of coastal environments through beach erosion, the felling of mangrove forests, and coral bleaching will likely reduce the attractiveness and economic value of Caribbean tourist destinations. Increased sea temperatures are likely to have adverse effects on the Mesoamerican (Belize) and other regional coral reefs, and possible shifts in fish stocks.

The threat posed to the well-being of the region's socioeconomic development and its people due to climate change and its adverse effects demand an urgent response from decision makers at the highest levels in national governments, regional organisations, the region's private sector, and other key stakeholders. The regional adaptation strategy provides the blueprint for adopting rational adaptation policies and measures in response.

The justification for the development and implementation of a regional framework is rooted in the legal mandate provided under the Treaty of Chaguaramas; Article XXIII, "Environmental Rights" of the Charter of Civil Society for the Caribbean Community; and the Caribbean Single Market and Economy, which calls for joint action and accelerated integration of economic and social development.

CARICOM Heads of Government mechanisms demonstrated bold and visionary leadership when they established the CCCCC in 2002, and development partners from within and outside the region have participated in and supported climate change adaptation efforts over the years. However, the recent strong admonitions from the CCCCC, IPCC, and the Stern Review demand that the region mount a strategic and purposeful response to the challenges posed by climate change to the development prospects of the region.

This regional framework has been developed with the participation of governments and stakeholders and will be supported by the regional governments and stakeholders in its implementation.

CCCCC
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