

**POSITION PAPER**

**RESPONDING TO CLIMATE CHANGE IN THE CARIBBEAN DEVELOPMENT BANK  
AND ITS BORROWING MEMBER COUNTRIES**



## **CURRENCY EQUIVALENT**

[Dollars (\$) throughout refer to United States Dollars]

## **ABBREVIATIONS**

|         |   |                                                                      |
|---------|---|----------------------------------------------------------------------|
| ACCC    | - | Adaptation to Climate Change in the Caribbean Project                |
| AfDB    | - | African Development Bank                                             |
| ADB     | - | Asian Development Bank                                               |
| AOSIS   | - | Alliance of Small Island Developing States                           |
| BMCs    | - | Borrowing Member Countries                                           |
| BNTF    | - | Basic Needs Trust Fund                                               |
| BAR     | - | Barbados                                                             |
| BZE     | - | Belize                                                               |
| CCCCC   | - | Caribbean Community Climate Change Centre                            |
| CCRIF   | - | Caribbean Catastrophe Risk Insurance Facility                        |
| CDB     | - | Caribbean Development Bank                                           |
| CIDA    | - | Canadian International Development Agency                            |
| CPACC   | - | Caribbean Planning for Adaptation to Climate Change Project          |
| CREDP   | - | Caribbean Renewable Energy Development Programme                     |
| CTCS    | - | Caribbean Technological Consultancy Services                         |
| DFID    | - | Department for International Development of the United Kingdom       |
| DOM     | - | Dominica                                                             |
| EU      | - | European Union                                                       |
| GDP     | - | Gross Domestic Product                                               |
| GEF     | - | Global Environment Facility                                          |
| GSEII   | - | Global Sustainable Energy Islands Initiative                         |
| GTZ     | - | Gesellschaft für Technische Zusammenarbeit                           |
| GUY     | - | Guyana                                                               |
| IDB     | - | Inter-American Development Bank                                      |
| IFRC/RC | - | International Federation of the Red Cross and Red Crescent Societies |
| IPCC    | - | Intergovernmental Panel on Climate Change                            |
| JAM     | - | Jamaica                                                              |
| MACC    | - | Mainstreaming Adaptation to Climate Change Project                   |
| MDB     | - | Multilateral Development Bank                                        |
| MDG     | - | Millennium Development Goal                                          |
| NGO     | - | Non-Governmental Organization                                        |
| OAS     | - | Organization of American States                                      |
| OECS    | - | Organisation of Eastern Caribbean States                             |
| ppm     | - | parts per million                                                    |
| SIDS    | - | Small Island Developing States                                       |
| SPACC   | - | Implementation of Adaptation Measures in Coastal Zones Project       |
| STL     | - | St. Lucia                                                            |
| SVG     | - | St. Vincent and the Grenadines                                       |
| TRI     | - | Trinidad and Tobago                                                  |
| UK      | - | United Kingdom                                                       |
| UN      | - | United Nations                                                       |
| UNDP    | - | United Nations Development Programme                                 |
| UNEP    | - | United Nations Environmental Programme                               |
| UNESCO  | - | United Nations Educational, Scientific and Cultural Organization     |
| UNFCCC  | - | United Nations Framework Convention on Climate Change                |

|       |   |                                                    |
|-------|---|----------------------------------------------------|
| USA   | - | United States of America                           |
| USAID | - | United States Agency for International Development |
| USD   | - | United States Dollars                              |
| UWI   | - | University of the West Indies                      |
| WB    | - | World Bank                                         |

### **MEASURES AND EQUIVALENTS**

|                     |   |              |
|---------------------|---|--------------|
| One millimetre (mm) | - | 0.039 inches |
| One centimetre (cm) | - | 0.394 inches |
| One metre (m)       | - | 1.094 yards  |
| One kilometre (km)  | - | 0.621 miles  |
| One hectare (ha)    | - | 2.471 acres  |

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## **1. EXECUTIVE SUMMARY**

1.01 Climate change is defined as a change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and is observed over long time periods (multi-decadal). There is now unequivocal evidence that the earth's climate is changing as a result of human activities, principally increased carbon dioxide emissions since the Industrial Revolution in the 1700s. Climate change is distinct from climate variability which is attributable to natural causes such as the El Niño/La Niña oscillation.

1.02 In the Caribbean, predicted changes in climate by 2099 include the following: rising temperatures (+1.4° to 3.2°C); rising sea levels (+0.18 to 0.59 m); increased ocean acidity (+0.14 to 0.35 pH units); likely (>66% certainty) increase in hurricane intensity; decrease in summer rainfall in the Greater Antilles; and increase in flood events.

1.03 Climate change is already ongoing – it is not something that will start at some time in the future. Several examples and signals of ongoing climate change in the Caribbean region are described and include increased coral bleaching since the 1980s resulting from higher sea surface temperatures, and the increased incidence of dengue fever in the Caribbean since 1991 due to increases in minimum temperatures.

1.04 Climate change adds a further stressor to the achievement of the objectives that define sustainable development, namely economic and social development and environmental protection, and may reduce the likelihood of the Caribbean region reaching several of the targets set in the Millennium Development Goals (MDGs). Activities that provide for sustainable development and climate change responses can be mutually reinforcing.

1.05 Almost every sector is likely to be adversely impacted by climate change including, agriculture, forestry, fisheries, tourism, construction (particularly in coastal areas), energy and insurance.

1.06 The poorest people will likely suffer the most from climate change since they are already living in marginal locations and have insufficient income to make the necessary adaptations. This has particular impacts for regional poverty reduction efforts since climate change will directly impact the livelihood assets of the poor: health, access to water and natural resources, homes and infrastructure.

1.07 The evidence clearly shows that ignoring climate change will eventually damage economic growth. Failing to reduce greenhouse gas emissions (mitigation measures) could result in major disruption to economic and social activity later this century. Tackling climate change now is a pro-growth strategy for the longer term and the earlier effective action is taken, the less costly it will be. At the same time and given that climate change is already happening, adaptation measures that help people live with the degree of global warming that cannot be stopped, are essential.

1.08 Since the United Nations Framework Convention on Climate Change (UNFCCC) was ratified in 1994, responses to climate change by the Borrowing Member Countries (BMCs) have been varied, largely led by regional programmes. The establishment of the Caribbean Community Climate Change Centre (CCCCC) in Belize (BZE) in 2005 is an important initiative. There are also several significant examples of national initiatives that include policies and plans for climate change responses, energy efficiency and increased use of renewable energy sources; carbon sequestration projects; and specific national adaptation measures.

1.09 The Multilateral Development Banks (MDBs) have to date largely focused on mitigation measures such as clean energy and energy efficiency, and several new funding mechanisms have been established, but with limited uptake by the BMCs. The African Development Bank (AfDB) is a significant exception to this general trend as it has selected to focus on climate change adaptation and integrating climate risk management into its investment portfolio.

1.10 The Caribbean Development Bank's (CDB) ongoing efforts to strengthen environmental sustainability, promote sound development practices, and mainstream disaster risk management in its internal operations, as well as within the BMCs already contribute to climate change adaptation.

1.11 This paper discusses several potential areas where CDB could focus its climate change response efforts. Two main areas are discussed: (a) due diligence in internal operations, and (b) support for climate risk management in the BMCs.

1.12 The overall goal of due diligence is to climate-proof the regular operations of the Bank. Climate-proofing, sometimes referred to as climate risk management, requires reducing to an acceptable level, the risks due to (a) current climate variability and extreme events, and (b) climate change. Several climate risk management tools have been developed by international development organisations.

1.13 Broad areas discussed under due diligence relate to:

- (a) board oversight and executive level management providing a holistic approach, combining considerations of internal energy use and emissions with broader implications of the impact of climate change on investment and lending operations;
- (b) incorporating climate risk management into the existing loan and investment portfolio; a first step would be to conduct an assessment of climate risk in current lending operations with a view to identifying opportunities for add-on activities;
- (c) ensuring procedures for new projects include climate risk management; this might require expanding existing guidelines or designing new ones;
- (d) including climate risk management in CDB's analytical frameworks for Strategic Planning, Poverty Reduction Strategies, Country Strategy Papers and Sector Policies;
- (e) developing internal capacity within CDB to take on board climate risk management, prepare and use climate risk tools, and develop external partnerships and networks.

1.14 Four areas are discussed under support for climate risk management in the BMCs: (a) renewable energy and energy efficiency; (b) building community resilience to climate change; (c) financial support for adaptation; and (d) research and partnerships.

1.15 Some BMCs have taken significant strides in developing renewable energy and energy efficiency, and the opportunity exists to build on these efforts and facilitate their regional uptake. Strategies such as small scale renewable energy initiatives that particularly serve small rural communities could support the Bank's poverty reduction strategy. Partnerships with the private sector and the MDBs are another important area that could provide for technological innovation and transfer.

1.16 Adaptation to climate change requires mainstreaming climate risk in all sectors. One niche area for the CDB could be to focus on building community resilience to climate change. Existing frameworks such as the Basic Needs Trust Fund (BNTF) and the Caribbean Technological Consultancy Services (CTCS) Network could be expanded and enhanced to provide for specific climate-proofing activities and training at the community level.

1.17 Financial support for adaptation is a third area discussed. Opportunities discussed include the Trust Fund being set up at the CCCCC, the Caribbean Catastrophe Risk Insurance Facility (CCRIF), sector-specific climate-related insurance, mainstreaming climate risk management in national budgetary and fiscal planning.

1.18 Supporting climate change research and partnerships is the fourth area proposed and includes economic analyses of the costs and benefits of climate risk management, continued support to the CCCCC, and supporting partnership with regional institutions and the private sector.

1.19 Whilst any attempt at prioritisation is premature, some first steps might include:

- (a) developing a climate risk management strategy that will guide the climate-proofing of CDB's regular operations over the next two to five years;
- (b) assessment of climate risk in CDB's current lending operations (projects already under implementation as well as those in the preparation process) with the goal of identifying opportunities where climate risk management can be included, perhaps as add-on activities; and
- (c) building CDB's professional capacity to deal with climate risk management, through a series of presentations within the President's Discussion Series.

## **2. INTRODUCTION**

2.01 The earth's climate is changing mainly as a result of greenhouse gases caused by human activities. With the publication in 2007 of the Fourth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC) the evidence is now overwhelming. Since the Industrial Revolution in the 1700s, the burning of fossil fuels, destruction of forests and other human activities have added a significant amount of greenhouse gases (principally carbon dioxide, methane and nitrous oxide) to the atmosphere. These gases trap heat in the atmosphere, much like a greenhouse, and cause air and sea temperatures to increase. Carbon dioxide concentrations have increased from about 280 parts per million (ppm) in pre-industrial times to 379 ppm in 2005, a 35% increase.



Almost all of the increase is due to human activities and present concentrations are higher than at any time in the last 650,000 years<sup>1</sup>.

2.02 The increased greenhouse gases have led to the phenomenon known as global warming whereby the average temperature of the earth's atmosphere has increased. Over the 100 year period 1906-2005, the average global warming was 0.74°C. Perhaps even more striking evidence of global warming is provided by the fact that eleven of the twelve years between 1995 and 2006 ranked as the warmest years on record (since records began being kept in 1850)<sup>2</sup>.

2.03 Other observed changes associated with global warming include rising sea levels, decreases in snow and ice extent and changes in precipitation patterns. Observational evidence points to an increase in intense tropical cyclones in the North Atlantic Basin. These changes, together with those described in Paragraphs 2.01 and 2.02, are commonly referred to as climate change.

2.04 Some aspects of climate change, such as rising sea levels, will continue for centuries even if greenhouse gas concentrations were to be stabilised now, because of the inertia in the climate system<sup>3</sup>. Section 4 of this paper discusses various aspects of climate change and in particular the future scenario for the Caribbean region.

2.05 The impacts of climate change will be widespread and will vary from country to country, affecting water supplies, ecosystems, food and forest products, health, industries, settlements and society. Almost every sector is likely to be adversely impacted by climate change including, agriculture, forestry, fisheries, tourism, construction (particularly in coastal areas), energy and insurance.

2.06 In the Caribbean extended periods of drought and more intense rainfall events will negatively impact agricultural production and food security, the availability of freshwater, and the prevalence of vector borne disease. More than half the population in the Caribbean live within 1.5 km of the shoreline. The resulting concentration of settlement, transportation and tourism infrastructure at or near the coast is especially vulnerable to more frequent flooding, rising sea levels and possible increase in the magnitude and frequency of tropical storms and hurricanes, all consequences of climate change. Rising temperature and resultant coral bleaching will impact marine biodiversity, fisheries, coastal protection and ecotourism. From these few examples, it is clear that climate change represents a major obstacle to sustainable development in the Caribbean region.

2.07 Climate change is a global issue affecting all countries. The atmosphere is a shared resource, part of the "global commons". However, it has long been accepted that the older industrialized nations bear more responsibility for human-induced climate change and thus

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<sup>1</sup> Intergovernmental Panel on Climate Change. 2007. The Physical Science Basis: Summary for Policymakers. Contribution of Working Group I to the Fourth Assessment Report.

<sup>2</sup> Intergovernmental Panel on Climate Change, 2007, The Physical Science Basis: Summary for Policymakers. Contribution of Working Group I to the Fourth Assessment Report.

<sup>3</sup> Intergovernmental Panel on Climate Change, 2007, The Physical Science Basis: Summary for Policymakers. Contribution of Working Group I to the Fourth Assessment Report.

climate justice, equity and sustainable development are important issues. The UNFCCC, formulated and signed in 1992 by most of the world's countries, recognized that countries have common but differentiated responsibilities in causing the problem and their respective capacities to take action to address it.

2.08 There are three overarching challenges to addressing climate change; the first is how to stop and reverse further global warming, also referred to as mitigation. Mitigation efforts will involve taking firm action now to reduce greenhouse gas emissions. Such efforts must be viewed as investments, or as costs incurred now and in the coming few decades to avoid the risks of very severe consequences in the more distant future. If these investments are made wisely, the costs will be manageable, and there will be a wide range of opportunities for growth and development<sup>4</sup>.

2.09 The second challenge, usually referred to as adaptation, relates to how to live with the degree of global warming that cannot be stopped. Adaptation policy will reduce the impact of climate change and in many cases will provide short term local benefits, without the long lead in times required for mitigation responses. Some adaptation measures will simply be an extension of good development practices such as those currently being utilized in disaster risk reduction, however, others such as major infrastructure planning will require new foresight and planning.

2.10 The third challenge is how to design a new model for human progress and development that is climate proof and climate friendly and gives everyone a fair share of the natural resources on which we all depend. This might include rethinking the model of international aid and ethical commitments<sup>5</sup>.

2.11 There are many ongoing initiatives, at the national, regional and international levels, that address climate change issues in one way or another. Caribbean responses are described and reviewed in Section 5 of this paper.

2.12 Given the geographical location of the BMCs they will likely feel few, if any, benefits from climate change. They already experience high temperatures, high rainfall variability and are vulnerable to extreme weather conditions, e.g. floods, droughts, tropical storms and hurricanes. Ongoing research indicates that the frequency and/or intensity of some of these extreme weather events will likely increase bringing with them substantial economic losses particularly in the tourism and agriculture sectors. In the face of accelerated sea level rise some BMCs may face significant losses of their territory.

2.13 Climate change is a major obstacle to continued poverty reduction efforts. The poorest people will likely suffer the most from climate change since they are already living in marginal locations and have insufficient income to make the necessary adaptations. In particular, the poor will be vulnerable to increased prevalence of pests and diseases, degradation of natural resources, increased food prices, changes in water availability, shifting patterns of employment, geographical displacement, more frequent extreme weather events, and increasing psychological stress due to uncertainty about livelihoods and lifestyles.

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<sup>4</sup> Stern Review on the Economics of Climate Change, 2006, HM Treasury, UK.

<sup>5</sup> Working Group on Climate Change and Development, 2006, *Up in Smoke? Latin America and the Caribbean. The threat from climate change to the environment and human development.*

2.14 The evidence clearly shows that ignoring climate change will eventually damage economic growth<sup>6</sup>. Tackling climate change now is a pro-growth strategy for the longer term. Furthermore, the 2007 IPCC report identified human activities as the cause of global warming.

No longer is it possible to delay action by calling for more research. Recent observations, such as the two category five hurricanes forming in the Caribbean Sea over a three-week period in 2007, and the unprecedented shrinking of Arctic Sea ice opening the Northwest Passage as a navigable route between Europe and Asia for the first time in 2007, cannot be ignored.

2.15 Based on the contextual background (Section 3), the emerging threat from climate change in the Caribbean region (Section 4), and regional responses (Section 5), this paper sets out to develop and discuss several areas where CDB could develop climate change responses (Section 6).

### **3. CONTEXTUAL BACKGROUND**

#### **Sustainable Development**

3.01 The Bruntland Commission<sup>7</sup> defined sustainable development in 1987 as “development that meets the needs of the present without compromising the ability of future generations to meet their own needs”. This is one of several definitions for sustainable development, all of which include the concept of meeting fundamental human needs in ways that preserve the life support systems of the planet. The challenge of sustainable development lies in reconciling real and perceived conflicts between environment and development and between the present and the future<sup>8</sup>.

3.02 The three interdependent and mutually reinforcing pillars of sustainable development are economic development, social development, and environmental protection. It has been proposed by the United Nations Educational, Scientific and Cultural Organization (UNESCO)<sup>9</sup> that cultural diversity is as necessary for humankind as biodiversity is for nature, since it is a means to achieve a more satisfactory intellectual, emotional, moral and spiritual existence. In this vision, cultural diversity is proposed as the fourth policy area of sustainable development.

3.03 Climate change adds to the list of stressors that challenge our ability to achieve the economic, ecological and social objectives that define sustainable development. This has particular impacts for poverty reduction since climate change will directly impact the livelihood assets of the poor: health, access to water and natural resources, homes and infrastructure.

3.04 Sustainable development measures and climate change responses, including mitigation and adaptation, can reinforce each other. For example, reducing dependence on fossil fuels for electricity generation and making up the energy shortfall with wind and solar power will reduce

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<sup>6</sup> Stern Review on the Economics of Climate Change, 2006, HM Treasury, UK.

<sup>7</sup> World Commission on Environment and Development, 1987, Our Common Future.

<sup>8</sup> National Research Council, 1999, Our Common Journey: Transition towards Sustainability.

<sup>9</sup> UNESCO Universal Declaration on Cultural Diversity, 2002, UNESCO, Paris, France.

greenhouse gas emissions (climate change mitigation policy goal) and will also provide long term economic and energy security benefits to the country (sustainable development goal).

3.05 Integration of climate change responses into national development planning is critical. However, this is a complex process. For example, incentives for carbon sequestration could promote expanded palm oil plantations that may also pose a threat to biodiversity and ecosystem health. There is no one-size-fits-all model and it is likely that the Caribbean will see many climate change responses, some of which may work well, while others will likely be less successful.

3.06 Over the past three decades, BMCs have developed policies and created and strengthened institutions to monitor, plan and manage environmental resources, and to try and balance the conflicting needs of expanded physical development and natural resource protection. Significant successes have been achieved but still environmental degradation continues, and now there is a new consideration in the form of climate change, to add to the stressors. Climate change may provide an opportunity to review existing sustainable development policies and ask what needs to be continued and what needs to be changed.

3.07 It is useful to compare the agendas for climate change and disaster risk management. It has been widely publicised in the media that climate change will impact the magnitude and frequency of some natural hazards, e.g. floods and droughts. However, there are some fundamental differences between the two agendas. For example, climate change deals only with climate-related hazards and their impacts; furthermore, the time frames are distinct - disaster impacts are relatively immediate and concentrated while the consequences of climate change may evolve over a longer time scale.

3.08 Two broad disaster risk management response approaches have emerged. One approach is policy driven and based on institutional responses, allocation of funding and agreed procedures and practices, while the second enhances the capacity of local communities to adapt and prepare for disaster. Activities of the latter approach include sharing technical knowledge and training, awareness raising, accessing local knowledge and resources, and mobilising local communities. The magnitude and impact of climate change issues are such that both approaches are needed; in addition, new ones, possibly led by the private sector, will likely emerge.

### **Emergence of Climate Change as a Global Issue**

3.09 Appendix 3.1 discusses in detail the major milestones in global climate change since the 1970s and Appendix 3.2 provides a timeline; some highlights are presented here.

3.10 Starting with the World Climate Conference<sup>10</sup> in 1979 and continuing through the 1980s scientists expressed their concern about the mounting evidence showing the impact of man's activities on the global climate.

3.11 At the decision-making level, concern among small island leaders about climate change and especially rising sea levels also began to gain momentum and the Alliance of Small Island States (AOSIS) was formed in 1990.

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<sup>10</sup> Intergovernmental Panel on Climate Change Brochure, 2004, World Meteorological Organization and United Nations Environment Programme.

3.12 The IPCC was established in 1988 to provide decision-makers and others with an objective source of information about climate change. Its role is to assess the latest scientific, technical and socio-economic literature produced worldwide relevant to climate change. The IPCC regularly prepares assessment reports; the 2007 report was heralded as a landmark in that it placed the reality of human-induced climate change beyond any doubt.

3.13 In 1992 the UNFCCC was opened for signature at the Earth Summit in Rio de Janeiro. This Convention has been ratified by 192 countries and entered into force in 1994. The UNFCCC aims to stabilize greenhouse gas concentrations in the atmosphere at a level that will prevent dangerous anthropogenic interference with the climate system. However, the Convention contains no provisions that compel action to accomplish this, rather it lays out a process through which various protocols containing more specific commitments might be negotiated. Provisions under the Convention commit countries to: (a) share information on greenhouse gas emissions, national policies and best practices; (b) launch national strategies for mitigation and adaptation, including the provision of financial and technological support to developing countries; and (c) cooperate in preparing for adaptation to the impacts of climate change. No specific emission targets were established under the Convention.

3.14 Following several years of intense negotiations about emission controls, the Kyoto Protocol was prepared in 1997. This Protocol establishes binding caps on emissions for developed nation parties and parties with economies in transition under the principle of “common but differentiated responsibilities” (Paragraph 2.07). The Kyoto Protocol entered into force in 2005 and has not been ratified by the USA. Under the Protocol, developed countries are required to reduce their greenhouse gas emissions to specific levels that add up to a total cut in emissions of at least 5% against the baseline of 1990. The first commitment period for these targets is 2008-12. The Protocol places a heavier burden on developed nations.

3.15 The Protocol developed three market-based mechanisms:

- (a) Clean Development Mechanism, is the most relevant to Caribbean countries, and is an arrangement allowing industrialized countries with a greenhouse gas reduction commitment to invest in projects that reduce emissions in developing countries as an alternative to more expensive emission reductions in their own countries;
- (b) Joint Implementation is a similar arrangement, allowing emission-reducing projects in another industrialized country (expected to be the economies in transition in Eastern Europe and the former Soviet Union);
- (c) Emissions Trading is an administrative approach that allows the government to set a limit on the total amount of a specific pollutant that can be emitted. Companies are then issued emission permits for a specific amount of the pollutant and they can trade these permits amongst themselves so that those who exceed their permits must buy credits from those that pollute less.

3.16 Besides the global policy framework defined in the Kyoto Protocol, national, state, municipal and corporate initiatives are underway, e.g. in 2007 the European Union (EU) set a firm independent commitment to reduce greenhouse gas emissions by 20% (relative to the 1990 baseline) by 2020.

3.17 The UN Climate Change Conference in Bali in December 2007 brought together 180 countries, whose deliberations culminated in the Bali Action Plan. This Plan provides a roadmap for negotiating an expanded and strengthened international emissions reduction agreement by the end of 2009. Agreement was also reached in Bali on (a) establishing an Adaptation Fund to assist developing countries, and (b) approaches to reduce emissions from deforestation in developing countries.

3.18 As discussed earlier (Paragraphs 3.01-3.06), the climate change and sustainable development agendas are mutually supportive, and this clearly emerged during several UN global conferences since 1992, see Appendices 3.1 and 3.2 for details. In particular, climate change, sea level rise and natural disasters were high on the list of priorities at the Earth Summit in 1992, the Global Conference on the Sustainable Development of Small Island Developing States (SIDS) in 1994, the United Nations Millennium Summit in 2002, and the Global Conference for the Further Implementation of the Programme of Action for the Sustainable Development of SIDS in 2005.

3.19 The MDGs concentrate attention on sectoral outputs and thus risk missing cross cutting measures like climate change and disaster risk management, both of which affect the chances of meeting the MDGs<sup>11</sup>. Whilst climate change is included in Goal 7: Ensure Environmental Sustainability, its consequences have the potential to impact the achievement of several other MDGs; some examples are given below:

- (a) Goal 1 Eradicate Extreme Poverty and Hunger: climate change will reduce income opportunities for the poor – a 1 m rise in sea level would displace 600,000 people in Guyana and cost USD4 billion (1000% of the Gross National Product)<sup>12</sup>;
- (b) Goal 4 Reduce Child Mortality; Goal 5 Improve Maternal Health: women and children are particularly vulnerable to extreme weather events as was seen during the floods from Tropical Storms Noel and Olga in Hispaniola in 2007;
- (c) Goal 6 Combat HIV/AIDS, Malaria and other Diseases: the increase in the incidence of dengue fever in the Caribbean since 1991 is being linked to climate change (Paragraph 4.21).

3.20 The award of the Nobel Peace Prize to the IPCC and Albert Arnold (Al) Gore in 2007 for their efforts to build up and disseminate greater knowledge about man-made climate change and to lay the foundations for measures that are needed to counteract such changes has helped ensure that climate change remains prominent in the public agenda.

### **Summary and Overview**

3.21 Among the key points emerging from this discussion are the following:

- (a) climate change adds a further stressor to the achievement of the objectives that define sustainable development, and will adversely impact on poverty reduction;

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<sup>11</sup> Pelling, M, 2003, Disaster Risk and Development Planning: The Case for Integration, International Development Planning Review, 25 (4).

<sup>12</sup> Reid, H., Alam, M, 2005, Millennium Development Goals, Tiempo, Issue 54.

- (b) climate change has implications that may reduce the likelihood of reaching several of the targets set in the MDGs;
- (c) sustainable development measures and climate change policies can be mutually reinforcing;
- (d) lessons learnt from disaster risk management that combine policy driven approaches and community resilience building measures may be useful in building climate change responses;
- (e) scientific knowledge about man-made climate change has been emerging since the 1970s;
- (f) the first official commitment period for emission cuts under the Kyoto Protocol is 2008-12; additional efforts to cut emissions at national, state, municipal and corporate levels are underway;
- (g) ongoing negotiations (Bali Road Map) for a follow-up agreement to the Kyoto Protocol are critical;
- (i) the Clean Development Mechanism established under the Kyoto Protocol, and the Adaptation Fund, being launched as part of the Bali Action Plan, offer opportunities for funding climate change responses in BMCs.

#### **4. EMERGING THREATS OF CLIMATE CHANGE**

##### **Weather, Climate Change and Climate Variability**

4.01 Climate is generally defined as average weather, and as such, climate change and weather are intertwined. Weather is the current atmospheric conditions at a given place. Climate is the general weather conditions over a period of 30 years, and is the sum of all statistical weather information (temperature highs and lows, precipitation rates, wind patterns, humidity) that helps describe a place or region. While weather changes from day to day, subtle climate changes are not easily detectable and require long periods of careful measurement. It is virtually impossible to look at short-term weather trends for any given area and make valid statements about long-term climate change.

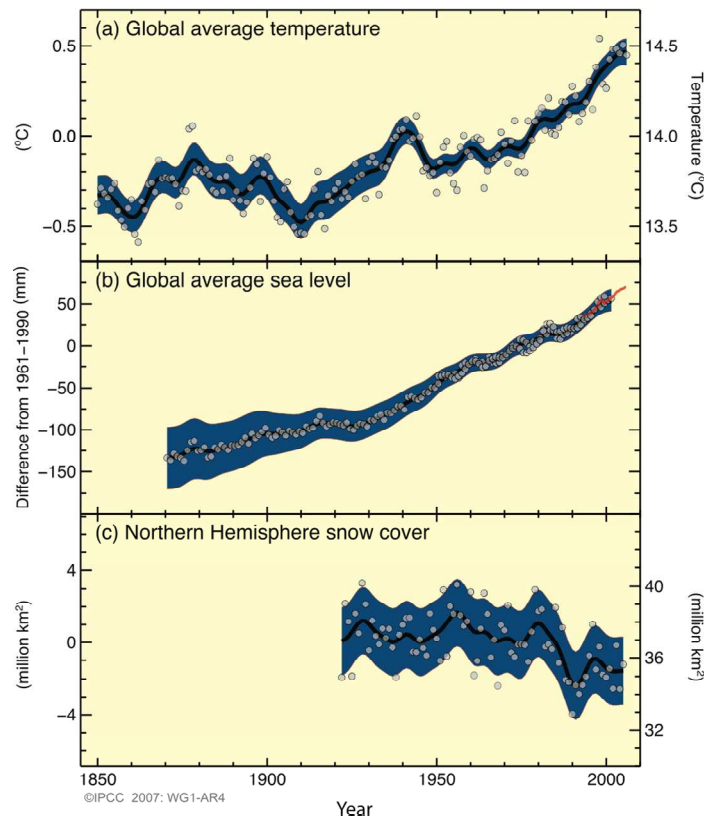
4.02 Climate change can be seen as a trend in one or more climatic variables characterized by a fairly smooth continuous increase or decrease of the average value during the period of record, and this is what is observable from the global temperature record and sea level rise (Figure 4.1). The UNFCCC makes a distinction between climate change attributable to human activities altering the atmospheric composition, and climate variability attributable to natural causes. The El Niño/La Niña variation is an example of climate variability due to natural causes.

##### **Global Climate Change Predictions**

4.03 Based on the Fourth Assessment Report of the IPCC (2007), carbon dioxide is the most important anthropogenic greenhouse gas. Its annual emissions grew by about 80% between 1970 and 2004. The increase is due primarily to fossil fuel use although other causes such as deforestation have also contributed to the increase in the concentration of carbon dioxide in the atmosphere. Emissions of other greenhouse gases, such as methane and nitrous oxide, have also increased over the same period.

4.04 There is a 90% certainty that the increase in greenhouse gases has caused the observed increase in globally averaged temperatures since the mid-twentieth century.

**FIGURE 4.1: GLOBAL CHANGES IN GLOBAL AVERAGE TEMPERATURE AND SEA LEVEL, AND NORTHERN HEMISPHERE SNOW COVER (IPCC, 2007)**



**Figure SPM.3**

4.05 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.

4.06 Table 4.1 shows the global scenarios for temperature and sea level rise by 2099 using the best case and worst case presented by the IPCC 2007 Assessment Report.



**TABLE 4.1: PROJECTED AVERAGE SURFACE WARMING AND SEA LEVEL RISE BY 2099 (IPCC, 2007)**

| Scenario                                                                                                                                             | Temperature Change (°C) | Range (°C) | Sea Level Rise metres (m) |
|------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|------------|---------------------------|
| A1 FI Scenario:<br>(Rapid economic growth, Population increase with peak in 2050, Intensive use of fossil fuels)                                     | 4.0                     | 2.4 – 6.4  | 0.26 – 0.59*              |
| B1 Scenario:<br>(Convergent world, Population increase with peak in 2050, Rapid changes in economic structures to a service and information economy) | 1.8                     | 1.1 -2.9   | 0.18 – 0.38*              |

### Caribbean Climate Change Predictions

4.07 Table 4.2 shows the predicted climate scenarios for the Caribbean region for 2099, based on IPCC estimates.

**TABLE 4.2: PREDICTED CLIMATE SCENARIOS FOR THE CARIBBEAN REGION BY 2099 (IPCC, 2007)**

| Parameter                                                                                                                                             | Predicted Change                                                                                                                                  |
|-------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------|
| Air and sea surface temperature                                                                                                                       | Rise of 1.4 to 3.2°C                                                                                                                              |
| Sea level rise                                                                                                                                        | Rise of 0.18 to 0.59* m                                                                                                                           |
| Ocean acidity                                                                                                                                         | Reduction in pH of 0.14 – 0.35 units making the oceans more acid                                                                                  |
| Tropical storms and hurricanes                                                                                                                        | Likely (>66% certainty) increase in hurricane intensity with larger peak wind speeds and heavier precipitation                                    |
| Precipitation                                                                                                                                         | No clear predictions for the region, although most models predict a decrease in summer (June, July, August) precipitation in the Greater Antilles |
| Extreme weather events (floods and droughts)                                                                                                          | Number of flood events expected to increase<br>Picture for droughts is unclear regionally                                                         |
| *The prediction does not include the full effect of changes in the ice sheets in Antarctica and Greenland, therefore the upper values could increase. |                                                                                                                                                   |

4.08 The predicted temperature change for the Caribbean is slightly less than the global average. On the other hand, the predicted rates for regional sea level rise are the same as the global predictions (around 1.8 mm/yr). However, there is likely to be significant local variation due to tectonic changes in the Caribbean rim which affect the land levels on which tide gauges are placed. (For example, the west coast of Trinidad is experiencing a 1 mm/yr relative sea level rise, while the south coast has a 4 mm/yr relative sea level rise<sup>13</sup>; the difference is due to variation in vertical land movements). Since 1993 the rate of sea level rise has increased globally to 3.1

<sup>13</sup> Miller, K, 2005, Variations in Sea Level on the West Trinidad Coast, Marine Geodesy 28.

mm/yr, and this increase is also reflected in the Caribbean, e.g. tide gauges in Puerto Rico have shown a sea level rise of 7 mm/yr over the past eight years<sup>14</sup>. However, it is as yet unknown whether this recent acceleration is a natural variation or the beginning of a long term trend.

4.09 While annual rates for sea level rise of 1-3 mm may sound insignificant, they have a significant effect on beaches. Models<sup>15</sup> and records show that as sea level rises, beaches retreat inland; the general rule shows that as sea level rises 1 mm the beach retreats inland 0.1 m. Box 4.1 illustrates how this has been taking place in Nevis since 1988. Measurements in six of the smaller BMCs over the period 1985-2000 showed the beaches retreated inland at an average rate of 0.5 m yr and that those islands impacted by hurricanes had much higher rates.<sup>16</sup>

4.10 Ultimately some BMCs may have to consider abandoning homes and infrastructure in low-lying coastal areas, since it may no longer be economic to defend the coastline, a scenario called “holding the line”. This scenario is one faced by all countries with populated low-lying coastal areas. Plans currently being discussed to discontinue defending parts of the low-lying Norfolk coast in the UK after 2060 have met considerable opposition and a decrease in property value in the affected areas<sup>17</sup>.

4.11 Higher carbon dioxide concentrations in seawater have led to the oceans becoming more acidic. The progressive acidification of the oceans is expected to have negative impacts on marine shell-forming organisms such as corals and their dependent species, which use forms of calcium carbonate for their shells or skeletons. The entire reef ecosystem will be affected with impacts on fisheries, tourism and beach stability.

4.12 Observations indicate an increase in intense hurricane activity in the North Atlantic Basin since the 1970s. This correlates with increases in sea-surface temperatures. However, the quality of records prior to the start of routine satellite observations in 1970 complicates the detection of long-term trends in hurricane activity. Furthermore there may be cycles of hurricane activity (climate variability) spanning two or three decades. However, **the bottom line for the BMCs is that it is likely (>66% certainty) that for the next one to two decades, the pattern seen since 1995 with increased annual numbers of hurricanes and increased numbers of intense hurricanes will continue**, whether caused by anthropogenic climate change or natural climate variability.

4.13 More intense and longer droughts together with an increased frequency of heavy rainfall events have been observed globally since the 1970s. However, in the Caribbean the picture is different in that the data show the maximum number of consecutive dry days is decreasing<sup>18</sup>.

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<sup>14</sup> Personal Communication, 2008, Dr. A. Mercado, Director Coastal Hazards Centre, University of Puerto Rico, Mayaguez.

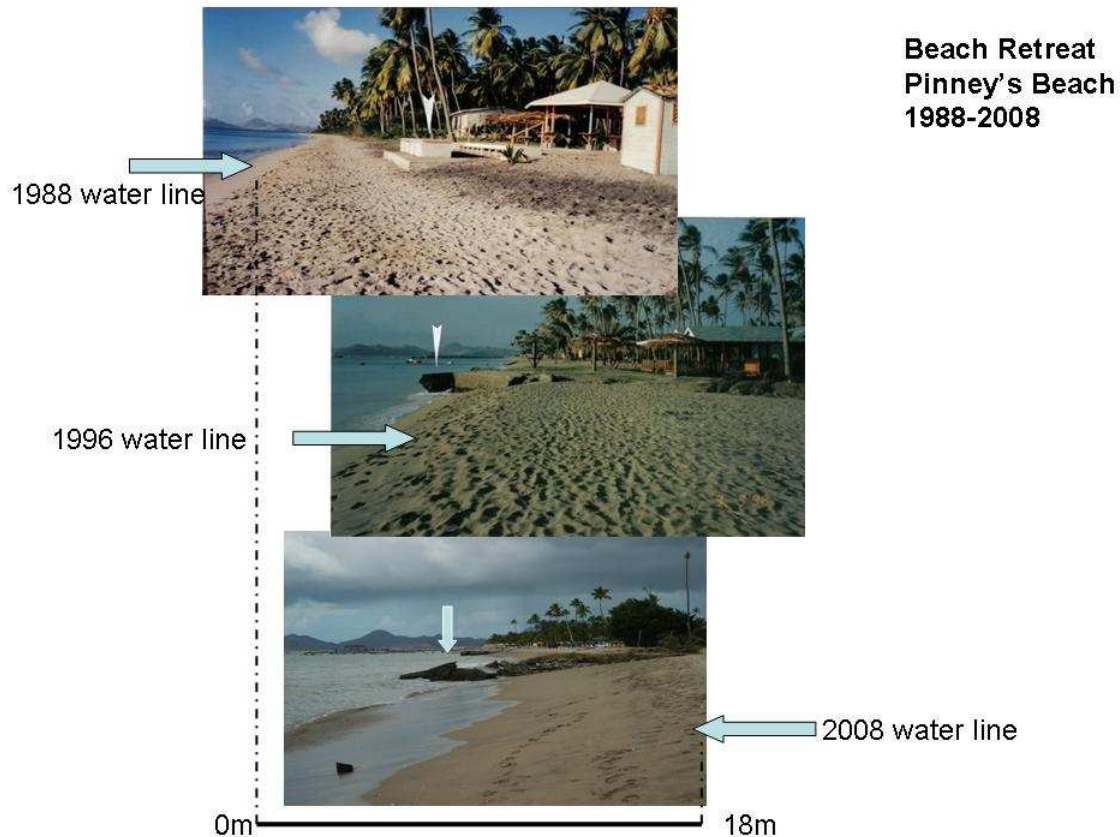
<sup>15</sup> Bruun, P, 1962, Sea Level Rise as a Cause of Shore Erosion, Journal of Waterways and Harbours Division, American Society of Civil Engineers 88.

<sup>16</sup> Cambers, G, 2008, Communities coping with climate change: a perspective from the Caribbean, Aquatic Ecosystem Health & Management Society, in press.

<sup>17</sup> Barkham, P, 2008, Waves of Destruction, Guardian Newspaper, April 17, 2008.

<sup>18</sup> IPCC, 2007, Assessment Report 4, Working Group II Report, Chapter 16.

### **BOX 4.1: EFFECTS OF SEA LEVEL RISE ON BEACHES**



Over the 20-year period, 1988-2008, the water line has retreated inland 18 m (59 ft) at Pinney's Beach in Nevis. This erosion is due to a combination of (a) sea level rise; (b) several hurricanes (Hurricane Hugo, 1989, Hurricane Luis, 1995, Hurricane Lenny, 1999); and (c) anthropogenic factors, including building too close to the beach, poorly planned sea defence structures, sand mining and offshore dredging. Such coastline retreat has serious impacts for existing coastal infrastructure and especially beachfront tourism properties in the BMCs.

### **Signals of Ongoing Climate Change in the Caribbean**

4.14 The foregoing discussion has shown that climate change as a result of human activities is already taking place; it is not something that will start in the middle of the century or at some future date.

4.15 One of the most obvious signals for the Caribbean is the increase in the number of extreme weather-related events – floods, droughts and hurricanes. The Guyana floods of 2005 and 2006, and the Barbados drought of 1994-95 are examples of extreme weather-related events that caused those countries severe environmental damage, as well as economic and social losses;

such events are expected to increase in frequency as a result of climate change and climate variability.

4.16 In 2005 and 2006 floods in Guyana affected thousands of people, causing severe social and economic losses. The floods of January 2005, affected 20% of the population with damage and losses estimated to be around 60% of GDP<sup>19</sup>. Similar devastating floods were experienced in 2006.<sup>20</sup>

4.17 Barbados, classified by the UN Commission on Water as a “water scarce” country, and heavily dependent on the tourism industry, experienced a severe drought (variously classified from 1 in 50 years to 1 in 150 years) in 1994-95. As a result, the water supply was cut off to many households, and part of the capital including the main hospital, for prolonged periods of time. Several tourism projects had to be put on hold. Following the drought various measures were implemented including desalination plants, recycling waste water, update of the water rate structure and water conservation measures<sup>21</sup>.

4.18 As noted in Paragraph 4.12, changes in hurricane activity may be related to climate variability and/or climate change. In the BMCs, the cost in terms of human lives lost, infrastructure and livelihoods destroyed, economic losses (especially in agriculture and tourism), ecosystems damaged, and lives disrupted is well known and has been documented.

4.19 There are other signals, besides extreme weather-related events, that should not be ignored. Coral reefs are extremely diverse, marine ecosystems that underpin economic functions such as local shore protection, fisheries and tourism. Coral bleaching has been widely reported in the Caribbean and other regions of the world since the early 1980s. Coral bleaching is a phenomenon that happens when corals expel their microscopic symbiotic algal cells as a result of environmental stress, such as high sea surface temperatures. This condition makes coral colonies turn brilliant white. Corals may recover when more normal conditions return, but they may be permanently weakened with lower growth rates and reduced reproductive ability. If bleaching is prolonged, or if sea surface temperature exceeds 2°C above average seasonal maxima, corals die<sup>22</sup>. Box 4.2 describes a coral bleaching incident in Tobago in 2005.

4.20 Another signal comes from the pine forests of Belize. Since the end of the 1990s, pine beetles have destroyed up to 80%, or close to 70,000 acres (28,300 hectares), of the Mountain Pine Ridge Forest near Belize's border with Guatemala where trees stressed by higher temperatures and years of water shortages could not defend themselves. The death of the trees caused soil erosion, desertification, and increased siltation. These factors resulted in significant economic and social problems in the tourism, recreation, and forestry industries, and threatened Belize's primary potable water source reservoir and hydroelectric power infrastructure. Reforestation is underway as a carbon sequestration project, see Box 4.3.

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<sup>19</sup> UNDP Country Programme Document for Guyana, 2006-2010.

<sup>20</sup> CDERA Situation Report: Guyana, Feb 7, 2006.

<sup>21</sup> Drosdoff, D., 2004, Barbados Acts to Prevent Water Crisis, IDB America, Magazine of the Inter-American Development Bank.

<sup>22</sup> IPCC, 2007, Assessment Report 4, Working Group II Report, Chapter 4.

**BOX 4.2: THE 2005 CORAL BLEACHING EVENT IN TOBAGO**



Coral bleaching in Tobago, 2005 (photo credits [www.buccooreef.org](http://www.buccooreef.org))

According to some dive operators, working in Tobago for more than 18 years, the 2005 coral bleaching event in Tobago was the worst in living memory. Triggered by high sea surface temperatures (30-31°C) that started in July 2005, coral bleaching was reported throughout the Caribbean including, Antigua and Barbuda, Barbados, Cuba, Panama and Puerto Rico. In Tobago the event was severe and widespread; the worst hit areas were those affected by land pollution e.g. inadequately treated sewage and sediment<sup>23</sup>. Stressors such as pollution permanently weaken ecosystems making them even more vulnerable to additional stressors such as climate change.

4.21 Climate change adds further stresses to ongoing efforts to improve the quality of life for the poor. Research shows that the sharp increase in the incidence of dengue fever in the Caribbean since 1991 may be related to increases in minimum temperatures; and that the projected 2°C increase of temperature by 2099 is expected to increase the transmission of dengue fever three-fold. The poor are most at risk, especially those living in informal settlements, where conditions are conducive to the proliferation of the vector and the virus<sup>24</sup>.

**Summary and Overview**

4.22 Among the key points emerging from this discussion are the following:

- (a) climate change due to human activities altering the atmospheric composition needs to be distinguished from climate variability due to natural causes;

<sup>23</sup> Out of the Blue, Issue 5, March-October 2005, Caribbean Corals in Crisis.

<sup>24</sup> Chen, A., Chadee, D., Rawlins, S., 2006, Climate Change Impact on Dengue: the Caribbean Experience, Climate Studies Group – Mona, UWI.

**BOX 4.3: MOUNTAIN PINE RIDGE CARBON SEQUESTRATION PROJECT, BELIZE**



Forest devastation



Planting

(Photo credits [www.reforestbelize.com/](http://www.reforestbelize.com/))

With the support of the government, many professionals and an international Forestry Investment Management Corporation a massive four-year reforestation project is underway. Funding for the re-establishment of the Mountain Pine Ridge Forest Reserve will be achieved through the sale of the climate change benefits created through implementing the reforestation and managing the resource as a carbon sequestration storage project. A Carbon Budget Analysis has been conducted and verified that benefits are an eligible and saleable commodity that is now being offered for investment.<sup>25</sup>

- (b) warming of the climate system is unequivocal, and 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;
- (c) the predicted climate scenario for the Caribbean by 2099 shows:
  - (i) rise in temperature of 1.4 - 3.2°C;
  - (ii) rise in sea level of 0.18 – 0.59 m;
  - (iii) increase in ocean acidity by 0.14 – 0.35 pH units;
  - (iv) likely (>66% certainty) increase in hurricane intensity;
  - (v) decrease in summer rainfall in the Greater Antilles;
  - (v) flood events likely to increase;

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<sup>25</sup> Forest Securities Inc. <http://www.reforestbelize.com/>

- (d) while sea level rise figures may sound small, they have a significant impact on beach erosion rates and beachfront infrastructure;
- (e) climate change is already taking place;
- (f) signals of ongoing climate change and/or climate variability include the Guyana floods of 2005 and 2006, the Barbados drought of 1994-5, and the increased numbers and intensities of hurricane since 1995, all of which caused social and economic losses, and significant environmental damage;
- (g) besides the extreme weather-related events, other signals of ongoing climate change include increased coral reef bleaching events throughout the Caribbean since the early 1980s (a result of increased sea surface temperatures); pine forest destruction in Belize as a result of the proliferation of the pine beetle (related to higher temperatures and water shortages); and increased incidence of dengue fever in the Caribbean since the early 1990s (related to increase in minimum temperatures).

## **5. REGIONAL RESPONSES**

5.01 Responses to climate change must be global, regional, national and local, deal with long term and short term horizons, include the economics of risk and uncertainty, and take into account the possibility of major changes.

5.02 Responses to climate change include (a) reducing greenhouse gas emissions (mitigation) and (b) protecting societies and economies, and the planet, from the expected impacts of climate change that cannot be stopped over the next few decades (adaptation). Mitigation will likely be achieved through a mix of regulatory approaches, incentives, compensation, market-based instruments and public information strategies; while adaptation will involve building social, economic and ecosystem resilience.

### **National Responses**

5.03 Appendix 5.1 contains a summary and overview of the main initiatives undertaken by each BMC; this is preliminary and is based on a web and literature search and should not be interpreted as a comprehensive listing.

5.04 All the BMCs have ratified the UNFCCC and the Kyoto Protocol, and have submitted their first National Communication to the UNFCCC. The National Communications are comprehensive documents that include information on emissions and removals of greenhouse gases, and details of the activities a country has undertaken to implement the Convention, e.g. national circumstances, vulnerability assessment, financial resources, transfer of technology, education, training and awareness-raising. Training and support was provided to BMCs by international organizations for the preparation of their National Communications.

5.05 As part of the process of preparing their National Communications, all the BMCs established formal or semi-formal climate change committees.

5.06 Education and awareness-raising about climate change is ongoing in all the BMCs to varying degrees, sometimes as national initiatives and sometimes prompted by regional climate change projects, e.g. those supported by the CCCCC.

5.07 Work on climate change policies, strategies and action plans is ongoing in seven of the BMCs; some countries are more advanced, e.g. Guyana (GUY), which recently experienced severe flooding events and is especially vulnerable to sea level rise, has established a Climate Change Unit in the Ministry of Agriculture.

5.08 Two countries, Barbados (BAR) and BZE, are providing specific support for the CCCCC in BZE, and one of the countries belonging to the Organisation of Eastern Caribbean States (OECS) has put forward proposals for a sub-regional climate change centre.

5.09 Carbon sequestration projects focusing on reducing deforestation are being promoted by two of the BMCs: BZE and GUY.

5.10 Two BMCs (Anguilla and St. Kitts and Nevis) have moved ahead to incorporate planning for climate change into their coastal planning guidelines; and one BMC has established a government managed climate change website, St. Lucia (STL).

5.11 Policies and plans that incorporate renewable and alternative energies are being developed in at least half of the BMCs. Renewable energy initiatives are being explored and/or implemented in eight countries; Jamaica (JAM) is particularly advanced in wind energy and several of the OECS countries have made significant progress in the exploration of geothermal energy alternatives. Energy efficiency incentives exist in two countries.

5.12 Joint government/private sector initiatives present opportunities for climate change responses, particularly in the area of renewable and alternative energy. The introduction of solar water heaters in BAR (Box 5.1) is one example where fiscal incentives introduced after the oil crisis of the 1970s were particularly successful in promoting the use of renewable energy to satisfy one particular household need. (The reduced use of fossil fuels for energy supply is also a climate change mitigation measure). Fiscal incentives are also being used in JAM and The Bahamas to promote energy efficiency. The development of geothermal energy in Nevis since 2007 (Box 5.2) is an example of a climate change mitigation measure that will also reduce the island's need for costly fossil fuel importation.

### **Overview of Regional Responses**

5.13 The Caribbean Planning for Adaptation to Climate Change (CPACC) Project was funded by the Global Environment Facility from 1996-2001 and included 12 CARICOM countries. Principal components of this project were to establish networks for monitoring sea level rise and coral reefs; prepare an inventory, assessment, economic evaluation, and policy framework for marine and coastal resources. The project laid an important foundation but failed to establish a sustainable sea level rise monitoring network.

5.14 This was followed by the Adaptation to Climate Change in the Caribbean Project (ACCC) funded by the Canadian International Development Agency (CIDA) and operational from 2001-04. This focused on adaptation strategies in particular sectors e.g. water, health and food production; established a Masters programme in climate change at the University of the West Indies (UWI), and developed the foundation for a regional climate change entity.



### **BOX 5.1: SOLAR WATER HEATERS IN BARBADOS: A PRIVATE SECTOR- GOVERNMENT SUCCESS STORY**



The promotion of solar water heating systems in BAR since the early 1980s resulted from concessions granted by the Ministry of Finance, which enabled manufacturers to import materials duty-free, and provide consumers with partial or full tax deductions for the cost of the heaters. The initiative was partly as a response to the oil crisis of the 1970s. The industry minimizes the loss of foreign reserves while encouraging entrepreneurship, which in turn creates employment opportunities. There are three solar water heating companies in BAR and plans to

expand to other Caribbean islands. A simple family-sized solar heater costs about USD2,000. Currently, about 32,000 solar water heaters are installed in homes, commercial businesses and hotels in BAR and save the country about USD6.5 million per year in imported fuel, and consumers about USD16 million a year<sup>26</sup>. The changeover from heating water with imported fossil fuels to using renewable energy reduces emissions of greenhouse gases.

### **BOX 5.2: GEOTHERMAL ENERGY IN NEVIS**

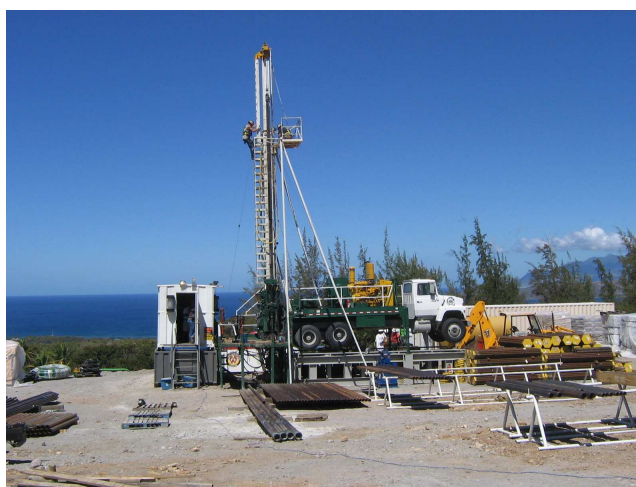


photo credit: P. Diamond

A Caribbean based independent power producer, owned by Caribbean and European shareholders, specializing in the development and operation of geothermal power plants and their offshoots, started drilling in Nevis in 2008<sup>27</sup>. As a result, the Nevis Island Administration anticipates that they will be able to offer power to domestic and commercial consumers at a reduced cost by 2009, and be in a position to export to neighbouring islands shortly thereafter. This measure will also reduce greenhouse gas emissions by decreasing the island's dependence on fossil fuels.

<sup>26</sup> UNDESA, Promotion of Solar Water Heating Systems, SIDS Network.

5.15 The Mainstreaming Adaptation to Climate Change (MACC) Project is still ongoing (2004-08) and is supported by the Global Environment Facility (GEF) and the World Bank. This focuses on generating climate change scenarios for the region, capacity building, and public education and outreach. Installation of eleven sea level monitoring gauges is planned as part of the MACC project; by the end of 2007 one had been installed in BZE.

5.16 The MACC project is being followed by the Implementation of Adaptation Measures in Coastal Zones (SPACC) project in Dominica (DOM), St. Lucia (STL), and St. Vincent and the Grenadines (SVG), financed by GEF and the World Bank, which focuses on specific pilot adaptation measures addressing the impacts of climate change on biodiversity and land degradation.

5.17 The establishment of the CCCCC in BZE in 2005 represented an important step towards developing a regional response to climate change. It is the official repository and clearing house for regional climate change data, providing climate change-related policy advice and guidelines to the Caribbean Community Member States through the CARICOM Secretariat.

5.18 A three-year project, Enhancing the Capacity for Adaptation to Climate Change in the Caribbean United Kingdom (UK) Overseas Territories, started in 2007. Funded by UK-DFID and implemented by the CCCCC, this will allow the five UK Caribbean Overseas Territories to benefit from the activities of the MACC project.

5.19 The Caribbean Renewable Energy Development Programme (CREDP), an ongoing CARICOM programme supported by UNDP, Gesellschaft für Technische Zusammenarbeit (GTZ) and others, is working with governments to reform the regional policy environment to support initiatives such as power purchase agreements, redesign electricity supply legislation, promote renewable energy and provide advice on carbon trade and financing. Eleven BMCs are participating in this programme, which also has provision for start up of renewable energy projects.

5.20 The Global Sustainable Energy Islands Initiative (GSEII) has been working since 2000 to transform fossil fuel-based, small island energy systems into sustainable energy systems. GSEII consists of a consortium of non-governmental organizations (NGOs) that are working with AOSIS and are supported by the Organization of American States (OAS), United States Agency for International Development (USAID), Rockefeller Brothers Fund and others. Within this initiative, DOM, Grenada, St. Kitts and Nevis, and STL are preparing sustainable energy plans that include the use of biomass, wind, solar, biofuels and geothermal energy sources. The plans involve changes in the regulatory framework, tax concessions, energy efficiency measures and public education. In DOM, it is planned to commission a geothermal plant in 2008 that will also have the capacity for energy export to Guadeloupe and Martinique.

5.21 The Caribbean tourism industry is concerned that the industry may be jeopardized by emerging carbon emissions trading schemes, particularly in the important European market. They are advocating differential treatment for developed and developing countries within carbon trading schemes such that European travellers to the Caribbean could offset the emissions

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<sup>27</sup> West Indies Power Company <http://www.westindiespower.com/geoterm.asp>

generated by their air travel through regional initiatives involving renewable energy, energy efficiency and forest restoration programmes<sup>28</sup>.

5.22 Funding organizations, such as CIDA, EU, OAS, UK-DFID, UNDP, United Nations Environmental Programme (UNEP), USAID and others, have provided financial support for the initiatives described above (Paragraphs 5.13 – 5.19) and assistance to the BMCs in fulfilling their commitments to the UNFCCC. These organizations also have their own international climate change programmes that include combinations of mitigation and adaptation responses.

5.23 There are several ongoing regional initiatives designed to assist Caribbean countries including the BMCs respond to climate change, e.g. a project to develop a research agenda on the impacts of climate change on the biodiversity of the insular Caribbean started in 2007 with the support of the John D and Catherine T MacArthur Foundation; an initiative supported by UK-DFID and the International Development and Research Council (IDRC) of Canada is developing a five-year programme on climate change and poverty reduction in Latin America and the Caribbean; the International Federation of the Red Cross and Red Crescent Societies (IFRC/RC) has an international climate change awareness programme that includes several of the BMCs.

5.24 The CDB has focused its efforts to date on support for the CCCCC and representation on its Board; loans for energy co-generation projects in BZE and GUY that utilize bagasse from the sugar factory for electricity generation for operating the factory and sale to the national grid; assistance to BMCs with national energy plans; contribution to the Trust Fund to establish the CCRIF and representation on its Board (see also Paragraph 5.31); and mainstreaming environmental sustainability; sound development practices and disaster risk management within its internal operations and activities in the BMCs.

### **Multilateral Development Bank Responses**

5.25 The AfDB has developed a Climate Risk Management Policy; this has three main components: (a) due diligence in Bank operations, (b) capacity building for adaptation measures in the Bank and at the country level, and (c) specific projects in climate change adaptation.

5.26 The Asian Development Bank (ADB) has focused on clean energy and low carbon alternatives. It has official observer status at the UNFCCC and in 2006 it established a Centre for Excellence in Climate Change Knowledge at Beijing's Tsinghua University. The ADB also supports mainstreaming adaptation measures in its member countries.

5.27 The Inter-American Development Bank (IDB) established in 2007 a Sustainable Energy and Climate Change Initiative (SECCI) to support the Latin American and Caribbean region in its urgent challenge to find economically and environmentally sound energy options.

5.28 The World Bank Group has also focused its climate change efforts on the supply of clean energy through the Clean Development Mechanism and the carbon market. However, in 2006, a pledge was given to provide appropriate weighting to managing climate risk for the poor<sup>29</sup>.

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<sup>28</sup> Caribbean Hotel Association –Caribbean Tourism Organization, 2007, Position Paper on Global Climate Change and the Caribbean Tourism Industry

<sup>29</sup> World Bank, 2006, World Bank Statement to the Ministerial Segment, COP11, Montreal

### **Regional and International Funding Mechanisms for Climate Change Responses**

5.29 Existing climate change funding mechanisms have been utilized by the BMCs to some extent. The UNFCCC established a financial mechanism, the Global Environment Facility (GEF), to provide funds for adaptation to developing countries. Since 1991 the Caribbean has benefitted from five regional projects under the GEF climate change portfolio: three climate change adaptation projects and two renewable energy projects. National projects can also be submitted to the UNFCCC and as of their September 2005 listing, 20 projects from five of the BMCs had been submitted (but not funded).

5.30 Only two of the global SIDS have benefitted from the Clean Development Mechanism: JAM and Fiji. This is in contrast to countries such as China, India, Brazil and South Korea where many projects have been supported under this mechanism. Transaction costs associated with registration and production of Certified Emission Reductions (commonly known as carbon credits) are high and as a result the uptake of the Clean Development Mechanism has been dominated by large scale projects that focus on the capture of industrial gases such as hydrofluorocarbons and nitrous oxide and to a lesser extent methane. Renewable energy projects involving the use of hydro, wind and biomass energy sources are generally smaller in scale and have accounted for only 18% of the Certified Emission Reductions<sup>30</sup>.

5.31 Procedures for the new Adaptation Fund being established under the Kyoto Protocol and its follow-on protocol will likely be an opportunity for future funding of large scale adaptation projects (expected to be in the order of USD2+ million).

5.32 The CCRIF, the world's first regional insurance fund, is a parametric insurance facility, owned, operated and registered in the Caribbean for the region's governments. It insures government risk and is designed to limit the financial impact of catastrophic hurricanes and earthquakes to Caribbean governments by quickly providing short term liquidity when a policy is triggered. The CCRIF allows CARICOM governments to purchase coverage akin to business interruption insurance that provides them with a rapid cash payment after the occurrence of a catastrophic earthquake or hurricane of sufficient magnitude to impact the entire national economy. Two earthquake claims were paid out to DOM and STL during 2007, the first year of operation for CCRIF. Following requests from member countries a feasibility study into flood coverage will be conducted in 2008 by the World Bank in partnership with CCRIF. The CCRIF Board is also looking into ways to support the insurance of Caribbean agricultural interests<sup>31</sup>.

5.33 The Petroleum Fund, established by the Government of Trinidad and Tobago (TRI), undertook to provide USD1 million to the CCCCC in 2007 to create and establish a Trust Fund. It is anticipated that this will provide administrative support for the Centre's operations and seed money for projects. (CDB is planning to provide technical assistance to establish the legal framework for this Trust Fund).

5.34 In 1996 the Iwokrama International Centre for Rain Forest Conservation and Development, an autonomous non-profit institution was established in GUY. The Centre manages the nearly one million acre (371,000 hectares) Iwokrama Forest in central GUY to show how

<sup>30</sup> Wara, M., 2006, Measuring the Clean Development Mechanism's Performance and Potential, Working Paper 56, Program on Energy and Sustainable Development, Stanford University, USA.

<sup>31</sup> CCRIF announces changes for 2008 renewal. News Release, February 21, 2008.  
<http://ccrif.org/main.php?main=16&id=9>

tropical forests can be conserved and sustainably used to provide ecological, social and economic benefits to local, national and international communities. CDB has received a request from the Centre for a grant to improve its capacity for generating revenue through the construction of dedicated training facilities and the installation of a solar power system to reduce the Centre's use of non-renewable energy. Facing dwindling international support, in 2007 the President of GUY offered to place the country's entire standing forest under the control of a British-led, international body in return for a bilateral deal with the UK that would secure development aid and the technical assistance needed to make the change to a green economy. Mechanisms to stimulate action on reducing emissions from deforestation in developing countries are presently (in 2008) being discussed for inclusion in the post-Kyoto agreement.

5.35 Other measures such as debt swaps for nature (purchasing foreign debt at a discount, converting the debt into local currency, and using the proceeds to finance local conservation activities) have been used in the BMCs, principally BZE and JAM.

### **Summary and Overview**

5.36 Among the key points emerging from this discussion are the following:

- (a) country-led responses in the 16 years since the UNFCCC was opened for signature have been varied:
  - (i) all the BMCs have ratified the UNFCCC and the Kyoto Protocol and submitted their first National Communications;
  - (ii) climate change committees have been established and awareness raising activities are ongoing, in varying degrees, in all the BMCs;
  - (iii) climate change policies and strategies are being established in about half the BMCs; specific climate change response initiatives are limited;
  - (iv) less than half the BMCs have implemented specific energy efficiency and/or renewable energy initiatives;
- (b) the region has benefited from five projects funded by the GEF climate change portfolio, three in climate change adaptation and two in renewable energy;
- (c) the CCCCC was established in BZE in 2005; it is mandated to be the official centre for regional climate change data, advice and guidelines; the Petroleum Fund of TRI is providing some support (USD1 million) to establish a Trust Fund that will finance administrative costs for the CCCCC and seed money for projects;
- (d) several other regional initiatives are ongoing or starting in the areas of tourism, biodiversity and poverty reduction supported by different international organizations;
- (e) MDBs have focused mainly on clean energy initiatives with the exception of the AfDB's focus on climate change adaptation;
- (f) only one BMC has benefited from the Clean Development Mechanism;

- (g) there is interest and some limited uptake among the BMCs for carbon sequestration projects and related mechanisms such as debt-swaps-for-nature.

## **6. FUTURE DIRECTIONS FOR THE CARIBBEAN DEVELOPMENT BANK**

6.01 Climate change represents an opportunity for the Caribbean region, not only as further justification for measures that promote environmental sustainability, but also to (a) implement climate change mitigation measures; (b) test, select and implement new climate change adaptation approaches; and (c) explore new ideas for regional growth.

6.02 The world is recognizing that the Earth's climate is no longer a static boundary condition for conducting their affairs. Strategic investment decisions have a direct bearing on climate and the natural environment both of which underpin economic growth. New governance principles may need to emerge to take this into account.

6.03 Climate change issues have the daily attention of the media. Weather affects everyone's lives, rich and poor alike, and reports and forecasts are a standard component of every news programme. Climate change is a news story that has everyday relevance, endless variety and is fast changing with the ever present chance of a news scoop such as a super storm or a section of the Antarctic ice sheet becoming detached. This media interest is a catalyst for region-wide and worldwide action.

6.04 BMCs are particularly vulnerable to climate change and climate variability. The risks from the changing climate threaten CDB's mission of achieving sustainable poverty alleviation and economic development in the Caribbean in two ways: (a) through impacts on BMCs' economic performance and (b) as a direct threat to the Bank's own loan investment portfolio.

6.05 Climate change directly and indirectly impacts the three pillars of sustainable development, presenting an opportunity for CDB to infuse climate change responses into its economic, social and environmental agendas; alternatively one of these areas could be singled out to take a lead role.

6.06 This section discusses several potential areas where CDB could focus climate change response efforts. Recognizing that the size of the institution and available resources are constraints, and the need to avoid duplication of effort, these areas are presented here as a starting point for discussion, selection and further in-depth analysis.

### **Due Diligence in the Caribbean Development Bank's Internal Operations**

6.07 The overall goal is to climate-proof CDB's regular operations. (Climate-proofing, sometimes referred to as climate risk management, requires reducing to an acceptable level, the risks due to current climate variability and extreme events, and climate change). A climate risk management strategy to guide these efforts should be prepared to cover the next two to five years, and incorporated into CDB's next Strategic Plan. The development of a climate risk management strategy will likely require a specific consultancy, although some of the elements of the strategy could likely be undertaken in-house. Paragraphs 6.08 - 6.14 outline elements of such a strategy.

6.08 Board oversight and executive level management of climate risk is an emerging trend especially among the private banks<sup>32</sup>, which are increasingly adopting a holistic approach, combining practical considerations of their own energy use and greenhouse gas emissions, with broader implications of how climate change affects their lending and investment operations, reputations and financial bottom lines.

6.09 Climate risk management needs to be incorporated into CDB's loan and investment portfolio. A first step might be to conduct an assessment of climate risk in the Bank's current lending operations (projects under implementation as well as those in the process of preparation) with the goal of identifying opportunities where climate risk management might be included, perhaps as add-on activities in the form of additional loans or grants, or some combination of the two. Tools have been developed by development agencies, e.g. UK-DFID's Climate and Disasters Screening Tool (ORCHID)<sup>33</sup>, the Dutch Development Agency's expert judgement approach. Such an assessment/audit would also provide a benchmark against which future policy measures and climate risk management actions could be measured.

6.10 Systematically integrate climate risk into new project identification, design, preparation, appraisal and supervision stages of both loans and technical assistance initiatives. Options include: (a) separate climate risk operational guidelines, (b) climate risk integrated into recently prepared Environmental and Social Review Procedures, and (c) climate risk incorporated into existing Operational Policies and Procedures Manuals. Examination of climate risk methods and tools being used by other development banks, e.g. World Bank's Climate Risk Screening Tool (ADAPT)<sup>34</sup>, could be undertaken in-house in order to provide a starting point.

6.11 Integration of climate risk management into CDB's existing analytical frameworks is another important area. These include Strategic Planning, Poverty Reduction Strategies, Country Strategy Papers, and Sector Policies, e.g. energy.

6.12 CDB is not itself a large emitter of greenhouse gases, however, it can set an important example for clients in the BMCs and for other partners by adopting formal emissions accounting, setting goals for the achievement of carbon neutrality in its operations including carbon offsets for air travel, promotion of energy efficiency, and the use of renewable energy wherever possible in its internal operations.

6.13 In 2007 the MDBs established a cooperative framework for their climate change activities, including annual meetings and continuous update of templates summarizing their activities<sup>35</sup>. This framework presents a potential opportunity for the CDB to share and maximise its own climate risk responses.

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<sup>32</sup> Cogan, D.G., 2008, Corporate Governance and Climate Change: The Banking Sector, Ceres Report.

<sup>33</sup> Institute of Development Studies, ORCHID Opportunities and Risks from Climate Change and Disasters, UK-DFID.

<sup>34</sup> World Bank, ADAPT Model, A Tool to Screen for Climate Change.

<sup>35</sup> ADB, AfDB, EU-RD, EIB, IADB, WB, 2007, The Multilateral Development Banks and the Climate Change Agenda: A Joint Report.

6.14 These measures will require expansion of CDB's internal capacity to deal with climate risk, the preparation and use of climate risk tools, and the development of partnerships and networks to draw on external expertise and experience at the country, regional and global level. In the first instance staff training will be required, although ultimately additional staff will likely be necessary.

### **Support for Climate Risk Management in Borrowing Member Countries**

6.15 Several different climate change adaptation and mitigation activities are already ongoing in the region. The challenge is to identify those niche areas where CDB can fill specific gaps, achieve maximum impact and build on other initiatives.

6.16 Since the UNFCCC came into force the MDBs have focused on mitigation efforts. These have included energy efficiency, promotion of renewable energy, reduction of greenhouse emissions from thermal energy sources, energy efficient transport systems, and reduction of deforestation. However, following the Gleneagles communiqué they have embarked on several new initiatives that include climate change adaptation, although to date their financial commitment to adaptation activities remains modest<sup>36</sup>.

6.17 The AfDB, in contrast to the other MDBs, is developing a strategy that addresses underinvestment in climate change adaptation in Africa<sup>37</sup>. The Caribbean region and Africa share certain similarities. Climate variability and extreme weather events, such as floods, droughts, tropical storms and hurricanes, already severely affect economic performance. Added to which, both regions are very vulnerable to climate change, such that agriculture and food security, water resources, public health, coastal infrastructure and natural resources are under increasing threat. The AfDB's climate risk management strategy focuses (a) on integrating climate change into its present investment portfolio and (b) on addressing current underinvestment in climate risk management and climate adaptation in its member countries.

### **Renewable Energy and Energy Efficiency Opportunities**

6.18 There have been several attempts to promote renewable energy initiatives in the Caribbean, but while oil prices remained relatively stable there was little interest in alternative energy sources or energy security. Added to this, most energy providers are monopolies, and in the absence of competition, there was little incentive to make investments in new plant and equipment. During 2007, this picture began to change dramatically and even more so in 2008 when oil prices moved above USD100 per barrel.

6.19 There now exists a strong economic incentive to promote energy conservation and efficiency, energy diversification, and renewable energy development. Besides economic savings, these measures will reduce greenhouse gas emissions, and provide for greater energy security in the BMCs.

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<sup>36</sup> ADB, AfDB, EU-RD, EIB, IADB, WB. 2007. The Multilateral Development Banks and the Climate Change Agenda: A Joint Report.

<sup>37</sup> African Development Bank, 2007, Come Rain or Shine Integrating Climate Risk Management into African Development Bank Operations. Working Paper No. 89



6.20 Some BMCs are already moving ahead with different energy-related initiatives. One example is JAM where initiatives include the Wigton Wind Farm, solar applications (water heating, electricity generation, crop drying), hydropower, and bagasse for electricity cogeneration. In 2006, renewable energy provided 5.6% of the country's energy, which is still only a small percentage of the country's needs<sup>38</sup>. Among the BMCs, DOM, SVG, Haiti, BZE, JAM and GUY were the main producers of renewable energy<sup>39</sup>.

6.21 Regional initiatives, such as the Caribbean Renewable Energy Development Programme, are working to provide the policy environment for renewable energy; while the Global Sustainable Energy Islands Initiative is helping some of the smaller BMCs develop appropriate combinations of renewable energy sources (wind, solar, biofuels and geothermal).

6.22 CDB has some past experience in renewable energy, having provided financial assistance for co-generation electricity plants in BZE and GUY that utilize bagasse to generate electricity to operate the sugar factory and sell excess electricity to the national grid.

6.23 To date only one BMC, JAM, has had a project supported as part of the Clean Development Mechanism (Paragraph 3.15); this project was a wind power plant. Other developing countries, particularly China, India, Brazil and South Korea have had significant numbers of large-scale projects supported through this mechanism. The limited uptake of the Clean Development Mechanism in the region may be related to the fact that to date it has focused on large scale projects that capture industrial gases such as hydrofluorocarbons and nitrous oxide and to a lesser extent methane, rather than on smaller scale renewable energy projects.

6.24 The present high cost of oil may serve to reinvigorate interest in small scale renewable energy initiatives that particularly serve small rural communities, e.g. the use of biodigestors to produce cooking gas.

6.25 The area of renewable energy and energy efficiency is a potential investment area for CDB, possibly in partnership with other MDBs.

6.26 Partnership with the private sector is another important area that could provide for technological innovation and transfer.

#### Building Community Resilience to Climate Change

6.27 CDB is working with the BMCs in many areas of environmental sustainability, including but not limited to land use planning, environmental impact assessment, environmental and disaster risk management, protected area management and eco-tourism. Climate variability and natural disasters are being integrated into these efforts. The new challenge will be to add the climate change dimension.

6.28 The underlying principle behind climate change adaptation is that healthy systems are more resilient to existing climate variability and extreme events, as well as climate change. For

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<sup>38</sup> Tiempo Climate Newswatch, 2006, Jamaica's Energy Potential.

<sup>39</sup> Development Statistics: Latin America and the Caribbean, 2008, USAID.

example, a wide beach backed by a coastal forest and protected by a healthy coral reef can better withstand this year's hurricane and future sea level rise than a narrow beach confined by a sea wall on the landward side and a degraded, dying coral reef on the seaward side.

6.29 The BMCs will require extensive assistance to integrate climate risk management into all the key sectors, including education, human health, freshwater supply, food security, sustainable urban development, biodiversity conservation, tourism, manufacturing, mining, banking and insurance.

6.30 The challenge is to find suitable entry points for CDB, bearing in mind its strengths and constraints, and in particular its focus on poverty reduction. Existing structures such as the BNTF, which responds to the needs of low income communities, and the CTCS, which supports small businesses, present a framework on which to base building community resilience to climate change and creating a community-based climate change constituency.

6.31 Natural disasters and climate variability already affect the poor the most; this trend will be exacerbated by climate change. Some suggestions for building community resilience to climate change include:

- (a) enhancing community capacity in climate change adaptation through the BNTF framework;
- (b) climate-proofing all ongoing and future BNTF projects;
- (c) executing specific climate-related projects, e.g. prediction of climate extremes (floods and droughts) and information transfer directly to communities likely to be affected;
- (d) provision of knowledge, information and training relating to climate change adaptation;
- (e) expanding the scope and reach of the CTCS to provide technical and professional advice in areas such as renewable energy, climate-proofing buildings and projects, climate change predictions, climate adaptation measures.

#### Financial Support for Climate Change Adaptation

6.32 There are several international funding mechanisms for climate change adaptation (already discussed in Paragraphs 5.29 – 5.31). These include the UNFCCC through the GEF, the Clean Development Mechanism, the new Adaptation Fund (being established following the 2007 Bali Road Map), and (indirectly) Debt for Nature Swaps. CDB could assist BMCs to better leverage these sources of funding and support, since so far they have only benefitted to a limited extent. One approach could be to provide information and training to finance managers and economic planners in the BMCs on ways to access these opportunities.

6.33 A Trust Fund is being established for the CCCCC with the help of TRI's Petroleum Fund. This could also represent an opportunity for CDB to invest in regional climate change responses.

6.34 The CCRIF is in its second year of operation and has announced that it is lowering premiums charged to government policyholders and broadening its hurricane coverage<sup>40</sup>. Following requests from member countries a feasibility study into flood coverage will be conducted in 2008 by the World Bank in partnership with CCRIF. The CCRIF Board is also looking into ways to support the insurance of Caribbean agricultural interests. This and other sector-specific climate-related insurance represent areas of potential support by the CDB.

6.35 Micro-insurance schemes for low-income groups are being piloted in Africa to reduce farmer's vulnerabilities to climate shocks such as droughts<sup>41</sup>; these have potential application for the BMCs especially in light of food security concerns.

6.36 Small project funding is needed to support community resilience efforts. However, the administration of small project funds is very time consuming. CDB has existing structures such as BNTF and CTCS that have scope for expansion to include small scale climate change response projects (Paragraphs 6.30 - 6.31).

6.37 The ongoing initiative by CDB to mainstream disaster risk management in budgetary and fiscal planning in the BMCs has the potential to include climate risk management. This would include the further development of models and tools that illustrate the tradeoffs and choices national authorities may confront in increasing their resilience to the risks of catastrophic disasters and climate change.

#### Supporting Climate Change Research and Partnerships

6.38 In the past, planning decisions have been based on the assumption that future climate will not be significantly different from the past climate. There is some evidence that climate risk management pays off; the US Federal Emergency Management Agency has estimated that every USD1 spent on hazard mitigation generates an average USD4 in future benefits<sup>42</sup>. A study of the damage to the Roseau Port, DOM, after Hurricane David in 1979, showed that inclusion of appropriate risk management in the original investment would have added 12% to the investment cost, which compares favourably with post-hurricane reconstruction costs of over 40%<sup>43</sup>. However, such economic analyses of the costs and benefits of climate risk management in the Caribbean are limited in number. This is an area where CDB has expertise and could contribute to the research.

6.39 CDB is represented on the Board of Directors of the CCCCC and has provided support and technical assistance to the Centre since its start-up in 2005. Given the Centre's goal to become the key node for information on climate change issues and the region's response to managing and adapting to climate change, it is important to maintain support to the Centre, especially in the

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<sup>40</sup> Business Insurance, 2008, CCRIF Lowers Premiums and Broadens Coverage for Governments.

<sup>41</sup> African Development Bank, 2007, Come Rain or Shine Integrating Climate Risk Management into African Development Bank Operations, Working Paper No. 89.

<sup>42</sup> Multihazard Mitigation Council of the National Institute of Building Sciences, 2005, Natural Hazard Mitigation Saves: An Independent Study to Assess the Future Savings from Mitigation Activities.

<sup>43</sup> Organization of American States, 1998, Costs and Benefits of Hazard Mitigation for Building and Infrastructure Development: A Case Study in Small Island Developing States.

areas of climate monitoring, modelling and forecasting; assessment of climate change impacts; training; education and outreach.

6.40 Building partnerships with other regional organizations and the private sector is of vital importance. However, there are myriad climate change initiatives ongoing or about to start in the region and it will be necessary to be selective.

### **Next Steps**

6.41 All the proposals set out in this section require further discussion and selection, thus any attempt at prioritisation and scheduling would be premature.

6.42 Notwithstanding the above, there are three steps that could be initiated while this discussion process is ongoing:

- (a) develop a climate risk management strategy that will guide the climate-proofing of the Bank's regular operations over the next two to five years (Paragraph 6.07);
- (b) conduct an assessment of climate risk in the Bank's current lending operations (projects under implementation as well as those in the process of preparation) with the goal of identifying opportunities where climate risk management can be included, perhaps as add-on activities (Paragraph 6.09);
- (c) commence the building of CDB's internal professional capacity to deal with climate risk management, through a series of presentations within the President's Discussion Series (Paragraph 6.14).

**EMERGENCE OF CLIMATE CHANGE AS A GLOBAL ISSUE**

1.01 The timeline in Appendix 3.2 summarizes the major global climate change events in chronological order. Starting with the World Climate Conference organized by the World Meteorological Organization in 1979 and continuing through the 1980s scientists expressed their concern about the mounting evidence showing the impact of man's activities on the global climate.

1.02 At the decision-making level, concern among small island leaders about climate change and especially rising sea levels also began to gain momentum. In 1990 AOSIS was formed. This alliance of small islands and low-lying coastal countries comprises 39 countries, 13 of which are BMCs. They share similar development challenges and concerns about the environment, especially their vulnerability to the adverse effects of global climate change. AOSIS functions primarily as an *ad hoc* lobby and negotiating voice for SIDS within the UN system, and played an important role in the preparation of the UNFCCC.

1.03 Meanwhile, in 1988 the IPCC was established to provide decision-makers and others interested in climate change with an objective source of information. The IPCC does not conduct any research nor does it monitor climate related data or parameters. Its role is to assess on a comprehensive, objective, open and transparent basis the latest scientific, technical and socio-economic literature produced worldwide relevant to (a) the understanding of the risk of human-induced climate change, (b) its observed and projected impacts and (c) options for adaptation and mitigation. The IPCC regularly prepares assessment reports (1990, 1995, 2001 and 2007) which become standard works of reference relating to climate change. In particular the 2007 report was heralded as a landmark in that it placed the reality of human-induced climate change beyond any doubt. At present there are about 5,000 scientists from around the world who contribute to the IPCC Assessment Reports.

1.04 These events laid the groundwork for the UNFCCC which was opened for signature at the Earth Summit in Rio de Janeiro in 1992. This convention has been ratified by 192 countries and entered into force in 1994. Under the Convention, countries: (a) share information on greenhouse gas emissions, national policies and best practices; (b) launch national strategies for mitigation and adaptation, including the provision of financial and technological support to developing countries; and (c) cooperate in preparing for adaptation to the impacts of climate change. No specific emission targets were established under the Convention.

1.05 There then followed several years of intense negotiations about emission controls, leading up to the Kyoto Protocol in 1997. Even after this Protocol was agreed, several more years elapsed as countries dealt with its political ramifications, and as a result it did not enter into force until 2005. The Protocol has not been ratified by the USA. The Protocol requires developed countries to reduce their greenhouse gas emissions to specific levels that add up to a total cut in emissions of at least 5% against the baseline of 1990. The first commitment period for these targets is 2008-2012. Review and enforcement of these commitments are carried out by UN-based bodies. The Protocol places a heavier burden on developed nations under the principle of "common but differentiated responsibilities". The Protocol developed three market-based mechanisms allowing developed Parties to earn and trade emissions credits through projects

1.06 implemented either in other developed countries or in developing countries, which they can use towards meeting their commitments.

1.06 The Clean Development Mechanism is an arrangement allowing industrialized countries with a greenhouse gas reduction commitment to invest in projects that reduce emissions in developing countries as an alternative to more expensive emission reductions in their own countries. Joint Implementation is a similar arrangement, allowing emission reducing projects in another industrialized country (expected to be the economies in transition in Eastern Europe and the former Soviet Union). Emissions Trading is an administrative approach that allows the government to set a limit on the total amount of a specific pollutant that can be emitted. Companies are then issued emission permits for a specific amount of the pollutant and they can trade these permits amongst themselves so that those who exceed their permits must buy credits from those that pollute less.

1.07 Besides the global policy framework, national, state, municipal and corporate initiatives are underway, e.g. in 2007 the European Union set a firm independent commitment to reduce greenhouse gas emissions by 20% from a 1990 baseline by 2020; in 2006 the state of California, USA, passed a law requiring a 25% cut in carbon dioxide pollution produced within the state's borders by 2020; Mexico City is replacing 80,000 of the city's taxis with lower emission vehicles; Barclays Bank is resourcing renewable energy for its operations, and developing further environmental products for personal customers<sup>1</sup>.

1.08 The UN Climate Change Conference in Bali in December 2007 brought together 180 countries and culminated in the Bali Action Plan. This provides a roadmap for negotiating an expanded and strengthened international emissions reduction agreement by the end of 2009. The Action Plan does not itself lay out any explicit emissions reduction targets, rather a process for negotiating such targets. Agreement was also reached in Bali on (a) establishing an Adaptation Fund to assist developing countries in meeting the cost of adaptation, and (b) approaches to stimulate action to reduce emissions from deforestation in developing countries. (Work in ongoing in 2008 to develop procedures for the Adaptation Fund and the Deforestation initiative).

1.09 The climate change and sustainable development agendas are mutually supportive, and this clearly emerged during several UN global conferences since 1992. In particular, climate change, sea level rise and natural disasters were high on the list of priorities at the Earth Summit in 1992, the Global Conference on the Sustainable Development of SIDS in 1994, the United Nations Millennium Summit in 2002, and the Global Conference for the Further Implementation of the Programme of Action for the Sustainable Development of SIDS in 2005.

1.10 The MDGs concentrate attention on sectoral outputs and thus risk missing cross cutting measures like climate change and disaster risk management which affect the chances of meeting the MDGs.

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<sup>1</sup> The Climate Group [http://theclimategroup.org/index.php/reducing\\_emissions/case\\_studies/](http://theclimategroup.org/index.php/reducing_emissions/case_studies/)

Whilst climate change is included in Goal 7: Ensure Environmental Sustainability of the MDGs, it has the potential to impact the achievement of several other MDGs:

- (a) Goal 1 Eradicate Extreme Poverty and Hunger;
- (b) Goal 4 Reduce Child Mortality;
- (c) Goal 5 Improve Maternal Health;
- (d) Goal 6 Combat HIV/AIDS, Malaria and Other Diseases;
- (e) Goal 8 Promote Global Partnerships for Development.

1.11 The Hyogo Framework for Action 2005-15: Building the Resilience of Nations and Communities to Disasters provides some useful directions for the climate change agenda. While disasters are often rapid time events and climate change a slow onset event, many of the actions incorporated in the Hyogo Framework are also relevant to climate change. These include placing people at the centre of the agenda, reducing the underlying risk factors, maintaining a joint focus on (a) the policy, legislative and institutional frameworks and (b) community response mechanisms.

1.12 The award of the Nobel Peace Prize to the IPCC and Albert Arnold (Al) Gore in 2007 for their efforts to build up and disseminate greater knowledge about man-made climate change and to lay the foundations for measures that are needed to counteract such changes has helped ensure that climate change remains prominent in the public agenda.

**TIME LINE SHOWING THE EMERGENCE OF CLIMATE CHANGE AS A  
GLOBAL ISSUE**

| <b>Year</b> | <b>Event</b>                                                                                                                                                                                                                                                                                                                                                                                     |
|-------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1979        | First World Climate Conference<br>Concern expressed that expansion of man's activities may cause global changes of climate                                                                                                                                                                                                                                                                       |
| 1988        | IPCC established with the goal to provide decision-makers and others with an objective source of information about climate change                                                                                                                                                                                                                                                                |
| 1990        | AOSIS formed, an alliance of small islands and low lying coastal countries with similar development challenges and environmental concerns, especially their vulnerability to global climate change. Function: <i>ad hoc</i> lobby and negotiating voice for SIDS within the UN system; 13 BMCs are members of AOSIS                                                                              |
| 1990        | IPCC First Assessment Report                                                                                                                                                                                                                                                                                                                                                                     |
| 1992        | UN Earth Summit, Rio de Janeiro<br>Agenda 21, a comprehensive plan of action covering every area where human beings impact the environment, adopted<br>UNFCCC was opened for signature.<br>Convention ratified by 192 countries, and entered into force in 1994. Convention provides a framework for responding to climate change<br>No specific emission targets were set under the convention. |
| 1994        | UN Global Conference on the Sustainable Development of SIDS<br>SIDS Programme of Action adopted (climate change and sea level rise, and natural disasters identified as priority areas)                                                                                                                                                                                                          |
| 1995        | IPCC Second Assessment Report                                                                                                                                                                                                                                                                                                                                                                    |
| 1997        | Kyoto Protocol to the UNFCCC adopted<br>Protocol entered into force in 2005, after ratification by Russia; expires in 2012<br>Protocol requires developed countries to limit their greenhouse gas emissions below specific targets                                                                                                                                                               |
| 2001        | IPCC Third Assessment Report                                                                                                                                                                                                                                                                                                                                                                     |
| 2002        | UN Millennium Summit<br>Millennium Development Goals agreed                                                                                                                                                                                                                                                                                                                                      |
| 2005        | Hyogo Framework for Action: 2005-15 Building the Resilience of Nations and Communities to Disasters                                                                                                                                                                                                                                                                                              |
| 2005        | UN Global Conference for the Further Implementation of the Programme of Action for the Sustainable Development of SIDS<br>Mauritius Strategy adopted (climate change and sea level rise, and natural disasters, identified as priority areas)                                                                                                                                                    |
| 2006        | An Inconvenient Truth by Al Gore (book and film) published                                                                                                                                                                                                                                                                                                                                       |
| 2007        | IPCC Fourth Assessment Report<br>Landmark report that placed the reality of human-induced climate change beyond any doubt                                                                                                                                                                                                                                                                        |
| 2007        | Nobel Peace Prize awarded to the IPCC and Albert Arnold (Al) Gore Jr. for their efforts to build up and disseminate greater knowledge about man-made climate change, and to lay the foundations for the measures that are needed to counteract such change                                                                                                                                       |
| 2007        | Bali Road Map and Action Plan prepared that provide a negotiating process for a successor to the Kyoto Protocol                                                                                                                                                                                                                                                                                  |



**NATIONAL CLIMATE CHANGE INITIATIVES**

**Summary of Climate Change-Related Activities in all the BMCs**

- UNFCCC ratified (100%)
- First National Communication to UNFCCC completed (100%)
- Kyoto Protocol ratified (100%)
- National Climate Change Committees established, formal and/or informal (100%)
- Climate Change awareness raising ongoing, though varying in extent (100%)
- Climate Change policies, strategies and action plans developed/being developed in seven countries (39%)
- Support for regional and sub-regional climate change centres being provided by three countries (17%)
- Climate Change issues being included in physical planning guidelines in two countries (11%)
- Carbon sequestration initiatives underway in two countries (11%)
- National Climate Change website in one country (6%)
- Energy policies and plans with focus on renewable and alternative energies being developed/developed in half of the countries (50%)
- Renewable energy initiatives explored/implemented in eight countries (45%)
- Energy efficiency incentives implemented in two countries (11%)

**National Climate Change-Related Activities**

**Anguilla**

- 1992 UK Signed UNFCCC, 1993 UK ratified Convention
- Included in UK National Communications to IPCC (4<sup>th</sup> National Communication submitted in 2006)
- 1998 UK signed Kyoto Protocol, UK 2002 ratified Protocol
- 1996 Physical Planning Department designed and began to use new guidelines for coastal development setbacks that incorporate climate change and climate variability; 2008 new coastal development policy under consideration that includes climate change

**Antigua and Barbuda**

- 1992 Signed UNFCCC, 1993 ratified Convention
- 2001 First National Communication to IPCC
- 1998 Signed Kyoto Protocol, 1998 ratified Protocol
- 1997/8 Country Study on Climate Change Impacts and Adaptation Assessments (supported by UNEP)
- 2006 Climate change awareness raising project (supported by IFRC/RC)

**The Bahamas**

- 1992 Signed UNFCCC, 1994 ratified Convention
- 1999 Signed Kyoto Protocol, 1999 ratified Protocol
- 2001 First National Communication to IPCC
  
- 1995-6 Bahamas Ozone Country Study.
- 1996 National Climate Change Committee established.
- 1999 Government commissioned study on the Effects of Climate Change on the Bahamas.
- National Action Plan on Climate Change under development
- Climate Change Policy under development
- Energy efficiency measures include a punitive tax structure in place to encourage the purchase of more energy efficient vehicles (engine size <2.5 litres)

**Barbados**

- 1992 Signed UNFCCC, 1994 ratified Convention
- 2001 First National Communication to IPCC
- 2000 Signed Kyoto Protocol, 2000 ratified Protocol
  
- Renewable energy measures include tax incentives to install solar water heaters (used by 20% of the population)
- Support to CCCCC in Belize

**Belize**

- 1992 Signed UNFCCC, 1994 ratified Convention
- 2002 First National Communication to IPCC
- 2003 Ratified Kyoto Protocol
  
- Host and provide support to the CCCCC
- 2002 Carbon sequestration project: Reforestation of Mountain Ridge Pine Forest
- Rio Bravo Forest Climate Action Project (forest conservation, Joint Implementation mechanism with The Nature Conservancy)
- National Energy Plan that includes development of power purchase agreements with facilities having renewable or alternative energy sources

**British Virgin Islands**

- 1992 UK Signed UNFCCC, 1993 UK ratified Convention
- Included in UK National Communications to IPCC (4<sup>th</sup> National Communication submitted in 2006)
- 1998 UK signed Kyoto Protocol, UK 2002 ratified Protocol

**Cayman Islands**

- 1992 UK Signed UNFCCC, 1993 UK ratified Convention
- Included in UK National Communications to IPCC (4<sup>th</sup> National Communication submitted in 2006)
- 1998 UK signed Kyoto Protocol, UK 2002 ratified Protocol
- 
- 2007 National Climate Change Adaptation Working Group, a multi-sectoral working group, established to drive efforts to adapt to climate change
- 2007 Waste to energy project (part of a solid waste management planning project)

**Dominica**

- 1993 Signed UNFCCC, 1994 ratified Convention
- 2001 First National Communication to IPCC
- 2005 Signed Kyoto Protocol, 2005 ratified Protocol
- 
- Climate Change Action Plan
- 2002 Draft Sustainable Energy Plan developed (under the auspices of the Global Sustainable Energy Islands Initiative)
- 2008 Funding secured from European Commission for geothermal initiatives

**Grenada**

- 1992 Signed UNFCCC, 1994 ratified Convention
- 2000 First National Communication to IPCC
- 2002 Signed Kyoto Protocol, 2002 ratified Protocol
- 
- The National Climate Change Committee established
- 2006 National Climate Change Policy and Action Plan under development
- Significant climate change awareness raising efforts underway
- Draft energy policy prepared

**Guyana**

- 1992 Signed UNFCCC, 1994 ratified Convention
- 2002 First National Communication to IPCC
- 2005 Work started on preparation of Second National Communication
- 2003 Signed Kyoto Protocol, 2003 ratified Protocol
- 
- National Climate Change Committee developed.
- National Climate Change Strategy and Action Plan
- National Climate Change Adaptation Policy and Implementation Plan
- 2005-2006 work started on establishment of a Climate Change Unit in the Hydrometeorological Service of the Ministry of Agriculture, which could act as a precursor to the development of a Climate Change Centre

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|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"><li>- 2007 President Jagdeo's call for incentives aimed at reducing deforestation to be part of international agreements on climate change</li><li>- National Energy Policy</li><li>- Renewable energy projects implemented (solar, wind, hydropower and biomass)</li></ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <p style="text-align: center;"><b>Haiti</b></p> <ul style="list-style-type: none"><li>- 1992 Signed UNFCCC, 1996 ratified Convention</li><li>- 2002 First National Communication to IPCC</li><li>- 2005 Signed Kyoto Protocol, 2005 ratified Protocol</li></ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <p style="text-align: center;"><b>Jamaica</b></p> <ul style="list-style-type: none"><li>- 1992 Signed UNFCCC, 1995 ratified Convention</li><li>- 2000 First National Communication to IPCC</li><li>- 1999 Signed Kyoto Protocol, 1999 ratified Protocol</li><li>- Climate change awareness raising (with support from IFRC/RC)</li><li>- Energy Fund and tax incentives for energy efficiency and use of renewable energy</li><li>- DATE Establishment of the Wigton Wind Farm (Clean Development Mechanism)</li><li>- Specific targets for renewable energy</li></ul>                                                                                                                                                                                         |
| <p style="text-align: center;"><b>Montserrat</b></p> <ul style="list-style-type: none"><li>- 1992 UK Signed UNFCCC, 1993 UK ratified Convention</li><li>- Included in UK National Communications to IPCC (4<sup>th</sup> National Communication submitted in 2006)</li><li>- 1998 UK signed Kyoto Protocol, UK 2002 ratified Protocol</li><li>- 2008 Proposal for an OECS Climate Change Centre to be established in Montserrat</li></ul>                                                                                                                                                                                                                                                                                                                      |
| <p style="text-align: center;"><b>St. Kitts and Nevis</b></p> <ul style="list-style-type: none"><li>- 1992 Signed UNFCCC, 1993 ratified Convention</li><li>- 2001 First National Communication to IPCC</li><li>- 2008 Ratified Kyoto Protocol</li><li>- Steering Committee, hosted by the Department of Environment, has been established to oversee and guide UNFCCC activities</li><li>- 1998 Nevis Planning Department designed and began to use new guidelines for coastal development setbacks that incorporate climate change and climate variability; 2008 these guidelines being incorporated in building regulations</li><li>- 2008 Drilling for geothermal energy underway in Nevis with geothermal power expected to be available by 2009</li></ul> |

**St. Lucia**

- 1993 Signed UNFCCC, 1993 ratified Convention
- 2001 First National Communication to IPCC
- 1998 Signed Kyoto Protocol, 2003 ratified Protocol
- Significant climate change awareness raising activities
- 2000 Official St Lucia climate change web site ([www.climatechange.gov.lc](http://www.climatechange.gov.lc)).
- Draft policy on climate change under development
- National Sustainable Energy Plan was adopted, establishing aggressive targets for renewable energy and energy efficiency, and setting the stage for significant changes in the energy sector

**St. Vincent and the Grenadines**

- 1992 Signed UNFCCC, 1996 ratified Convention
- 2000 First National Communication to IPCC
- 1998 Signed Kyoto Protocol, 2004 ratified Protocol
- Significant climate change awareness raising activities
- National Climate Change Committee established
- Draft policy on climate change
- Promotion and investment in renewable energy
- Phase out of leaded gasoline

**Trinidad and Tobago**

- 1992 Signed UNFCCC, 1994 ratified Convention
- 2001 First National Communication to IPCC
- 1999 Signed Kyoto Protocol, 1999 ratified Protocol
- Climate Change Committee established
- 2007 Petroleum Company of Trinidad and Tobago (Petrotrin) incorporated climate change considerations into its Environmental Impact Assessment (EIA) process.
- Significant climate change awareness raising
- Promotion of compressed natural gas and decreasing wastage in transportation and handling of petroleum products

**Turks and Caicos Islands**

- 1992 UK Signed UNFCCC, 1993 UK ratified Convention
- Included in UK National Communications to IPCC (4<sup>th</sup> National Communication submitted in 2006)
- 1998 UK signed Kyoto Protocol, UK 2002 ratified Protocol