Review of Current and Planned Adaptation Action: The Caribbean

Antigua and Barbuda, Barbados, Cuba, Dominica, Dominican Republic, Grenada, Haiti, Jamaica, Saint Kitts & Nevis, Saint Lucia, Saint Vincent & the Grenadines, and Trinidad & Tobago

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Review of Current and Planned Adaptation Action: The Caribbean

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About the Adaptation Partnership

The Adaptation Partnership was formed in May 2010 in response to a recognized need for development practitioners to share information and lessons on adaptation efforts. Chaired by Costa Rica, Spain and the United States, the goal of the partnership is to encourage effective adaptation by serving as an interim platform to catalyze action and foster communication among the various institutions and actors engaged in the effort to scale up adaptation and resilience around the world, particularly in the context of fast start finance. The Partnership is synthesizes lessons learned and good practices, highlighting needs and priorities, and identifying opportunities for cooperation and alignment of support to build resilience to the adverse effects of climate change. It is also enhancing communities of practice engaged in the adaptation effort.

Adaptation Partnership
Website: http://www.adaptationpartnership.org/
Foreword

In response to a growing awareness of the potential adverse effects of climate change and the particular vulnerability of developing countries to this process, a significant increase in adaptation action has been witnessed in recent years in Africa, Asia-Pacific, and Latin America and the Caribbean. These actions are providing opportunities to: increase understanding of the implications of climate change for the achievement of development objectives in the near and long terms; identify strategies and measures that can be taken to reduce climate vulnerability; communicate and build awareness of climate risks, opportunities and potential solutions; and begin implementing actions on the ground that build capacity to adapt to a changing climate.

Although the recent global upsurge in adaptation action is a welcome development, the emergence of a diverse array of efforts initiated by multiple actors within numerous jurisdictions has the potential to create confusion, lead to duplication of effort and limit the potential for sharing good practice guidance based on past efforts. Enhanced coordination among expanding networks of adaptation actors is needed to ensure resources are deployed quickly and effectively. To this end, the Adaptation Partnership was formed in 2010. Chaired by Costa Rica, Spain and the United States, the goal of the Adaptation Partnership is to encourage effective adaptation by serving as an interim platform to catalyze action and foster communication among the various institutions and actors engaged in the effort to scale up adaptation and resilience around the world.

Toward this goal, the Adaptation Partnership initiated a Review of Current and Planned Adaptation Action in the fall of 2010. Its purpose is to provide a baseline understanding of who is doing what on adaptation in three developing regions—Africa, Asia-Pacific, and Latin America and the Caribbean—and in priority adaptation sectors. Based on available resources, it seeks to provide a rapid assessment of: priority interests and adaptation needs; efforts by governments to support adaptation though policy and planning; the scope of international support for adaptation efforts in different countries and sectors; and potential gaps in adaptation efforts at the country and regional levels.

This document is one of 12 regional profiles completed as a contribution to the Review of Current and Planned Adaptation Action in Africa, Asia-Pacific and Latin America and the Caribbean. It presents a review of current and planned adaptation action in the Caribbean, covering the countries of Antigua and Barbuda, Barbados, Cuba, Dominica, Dominican Republic, Grenada, Haiti, Jamaica, Saint Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines, and Trinidad and Tobago. The review first provides an overview of adaptation action at a regional level, highlighting commonalities and differences between these countries. The appendices that follow discuss adaptation action taking place in each country.
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<th>Full Form</th>
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<tbody>
<tr>
<td>ACCC</td>
<td>Adaptation to Climate Change in the Caribbean Project</td>
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<td>AusAID</td>
<td>Australian Agency for International Development</td>
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<td>CARICOM</td>
<td>Caribbean Community</td>
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<tr>
<td>CATIE</td>
<td>Centro Agronómico Tropical de Investigación y Enseñanza (Tropical Agriculture Research and Higher Education Centre) (Spain)</td>
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<td>CCCCC</td>
<td>Caribbean Community Climate Change Centre</td>
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<td>CCRIF</td>
<td>Caribbean Catastrophe Risk Insurance Facility</td>
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<td>CDKN</td>
<td>Climate and Development Knowledge Network</td>
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<td>CDPMN</td>
<td>Caribbean Drought and Precipitation Monitoring Network</td>
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<td>CIDA</td>
<td>Canadian International Development Agency</td>
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<tr>
<td>CIFOR</td>
<td>Center for International Forestry Research</td>
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<td>CIMH</td>
<td>Caribbean Institute for Meteorology and Hydrology</td>
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<td>CNRE</td>
<td>Consejo Nacional de Reforma del Estado (Dominican Republic)</td>
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<tr>
<td>CPACC</td>
<td>Caribbean Planning for Adaptation to Climate Change</td>
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<tr>
<td>DFID</td>
<td>Department for International Development (U.K.)</td>
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<td>DRR</td>
<td>Disaster Risk Reduction</td>
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<td>ENSO</td>
<td>El Niño Southern Oscillation</td>
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<td>ECLAC</td>
<td>Economic Commission for Latin America and the Caribbean</td>
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<td>EMA</td>
<td>Environmental Management Authority (Trinidad and Tobago)</td>
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<td>FAO</td>
<td>Food and Agriculture Organization</td>
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<td>GCSI</td>
<td>Global Change Strategies International</td>
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<td>GDP</td>
<td>Gross domestic product</td>
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<td>GEF</td>
<td>Global Environment Facility</td>
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<td>IADB</td>
<td>Inter-American Development Bank</td>
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<td>INIA</td>
<td>National Institute for Research and Technology in Agriculture and Food</td>
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<td>INSMET</td>
<td>Instituto de Meteorología de la República de Cuba (Meteorological Institute of the Republic of Cuba)</td>
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<tr>
<td>IPCC</td>
<td>Intergovernmental Panel on Climate Change</td>
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<td>IUCN</td>
<td>International Union for the Conservation of Nature</td>
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<td>LAC</td>
<td>Latin America &amp; the Caribbean</td>
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<td>MACC</td>
<td>Mainstreaming Adaptation to Climate Change</td>
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<td>MDE</td>
<td>Ministère de l’Environnement (Haiti)</td>
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<tr>
<td>MEPD</td>
<td>Ministerio de Economía, Planificación, y Desarrollo (Dominican Republic)</td>
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<td>MHE</td>
<td>Ministry of Health and Environment (Saint Vincent and the Grenadines)</td>
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<td>MPDEH</td>
<td>Ministry of Physical Development, Environment and Housing (Saint Lucia)</td>
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<td>MWH</td>
<td>Ministry of Water and Housing (Jamaica)</td>
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<td>NAPA</td>
<td>National Adaptation Programme of Action</td>
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<td>NEAB</td>
<td>National Environmental Advisory Board (Saint Vincent and the Grenadines)</td>
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<td>NOAA</td>
<td>National Oceanic and Atmospheric Administration</td>
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<td>NMS</td>
<td>National Meteorological Service (Jamaica)</td>
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<td>NWP</td>
<td>Nairobi Work Programme</td>
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<td>Acronym</td>
<td>Full Name</td>
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<td>OECS</td>
<td>Organization of Eastern Caribbean States</td>
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<td>PIACC</td>
<td>Ibero-American Programme on Adaptation to Climate Change</td>
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<td>PPCR</td>
<td>Pilot Program for Climate Resilience</td>
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<td>RIOCC</td>
<td>Ibero-American Network of Climate Change Offices</td>
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<td>SIDS</td>
<td>Small Island Developing States</td>
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<tr>
<td>SPACC</td>
<td>Special Program on Adaptation to Climate Change</td>
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<tr>
<td>TNC</td>
<td>The Nature Conservancy</td>
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<tr>
<td>UNEP</td>
<td>United Nations Environmental Programme</td>
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<tr>
<td>UNFCCC</td>
<td>United Nations Framework Convention on Climate Change</td>
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<tr>
<td>USAID</td>
<td>United States Agency for International Development</td>
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<tr>
<td>USDS</td>
<td>United States Department of State</td>
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Executive Summary

Growing understanding of the need to adapt to the impacts of climate change has led to a significant rise in ongoing and planned adaptation action in the developing regions of the world, including the Caribbean. This upsurge in climate change adaptation action is a welcome occurrence, but enhanced coordination among expanding networks of adaptation actors is needed to ensure resources are deployed quickly and effectively. Responding to this concern, a review of current and planned adaptation action in the Caribbean was undertaken by the Adaptation Partnership between October 2010 and April 2011. Covering the countries of Antigua and Barbuda, Barbados, Cuba, Dominica, Dominican Republic, Grenada, Haiti, Jamaica, Saint Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines, and Trinidad and Tobago, the rapid review examined: priority adaptation needs; efforts by governments to support adaptation though policy and planning; the scope of international support for adaptation efforts in different countries and sectors; and potential gaps in adaptation efforts at the country and regional level. This review of adaptation action in the Caribbean is one of 12 profiles covering regions in Africa, Asia-Pacific, and Latin America and the Caribbean completed by the Adaptation Partnership.

The countries of the Caribbean region examined through this review are diverse, ranging from small island tropical countries with economies that depend mainly on tourism and agriculture, to larger and more populous countries that generally are less economically developed. This includes the countries of Haiti and the Dominican Republic, which are among the poorest countries in the Western Hemisphere. Climate change poses a significant threat to these countries due to their economic dependence on climate sensitive sectors, levels of poverty and under-development, and the historical exposure of the region to extreme weather events such as hurricanes.

To assess the level of adaptation action in the Caribbean, a desk-based review of internet sources and relevant documentation was undertaken. The content of these sources was assessed in relation to a set of parameters established to focus the review’s scope and ensure consistency across regions. Notably, it examines discrete adaptation actions, or “policies, programs and projects designed and implemented specifically to address the current and projected impacts of climate change.” The review therefore presents only a portion of the breadth of efforts underway to reduce the vulnerability of developing countries to the impacts of climate. In particular, it does not capture the broad array of development activities that are increasing the adaptive capacity of communities and countries. As well, within the review, adaptation actions have been deemed to be “current” if they were ongoing or completed in 2009 or later. As such, the review does not include projects completed prior to 2009 that may have contributed to building local and national adaptive capacity. The review identifies only those actions currently underway; it does not offer judgment of the effectiveness of actions taking place. In addition, reflecting the desk-based nature of the review, it is

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1 Formed in 2010, the Adaptation Partnership is chaired by Costa Rica, Spain and the United States. Its goal is to encourage effective adaptation by serving as an interim platform to catalyze action and foster communication among the various institutions and actors engaged in the effort to scale up adaptation and resilience around the world.
acknowledged that the content is biased toward identification of large-scale projects funded by international development assistance organizations, and those projects about which information is available online. As such, small-scale projects that meet the review’s definition of adaptation action, particularly those occurring at the community level, are not fully represented within the review.

Climate Vulnerability

Similar to other parts of the world, the Caribbean has experienced climatic changes over the past few decades, and recent studies project that these changes will continue in the future (Centella, 2010; Christensen et al., 2007; Meehl et al., 2007; Mimura et al., 2007). Centella (2010) estimates that mean annual temperatures in the Caribbean will increase by between 1° and 5°C by the 2080s. Warming is projected to be greater in the northwest Caribbean territories (Cuba, Dominican Republic, Haiti and Jamaica) than in the eastern Caribbean island chain (Taylor et al., 2007, cited in Centella, 2010). Temperature increases are expected to be much larger over land areas then over the sea (Mimura et al., 2007). In regards to precipitation, climate change projections generally predict that various regions of the Caribbean will become drier (Mimura et al., 2007; Centella, 2010). Most models indicate the greatest decrease in rainfall will occur in the summer, particularly around the Greater Antilles (Mimura et al., 2007). Sea levels are also anticipated to rise due to global warming. Determining the degree to which this increase will occur in the Caribbean is challenging, however, as it is highly influenced by the El Niño Southern Oscillation (ENSO) and volcanic and tectonic crustal motions. When combined with model limitations, the resulting large deviations between simulations make estimating the rate of sea level rise across the entire Caribbean region uncertain (Mimura et al., 2007). Uncertainty also remains regarding potential changes in the frequency and/or intensity of extreme weather events, with few models having been developed that simulate hurricanes in the context of climate change.

These changes in the region’s climatic conditions are anticipated to adversely affect a number of its key resources and economic sectors. Of particular concern to countries in the region are the projected impacts of climate change on coastal zones, the quantity and quality of freshwater resources, and agricultural systems. These concerns include:

- **Coastal Zone Management:** Most of the population of the Caribbean lives within the coastal zone, which is also the location of most of the region’s tourism infrastructure—a main source of employment and foreign exchange earnings. Climate change is projected to lead to: coastal erosion; risk of displacement for coastal communities; loss in touristic attractions; eutrophication and sedimentation of coastal waters; and coral bleaching.

- **Freshwater resources:** Water resources are already stressed in many states as a result of forest and wetland depletion and degradation (which also compromises water quality), coupled with high water consumption to meet tourist needs. Climate change is anticipated to lead to: contamination of water supplies through salt water intrusion; further forest and wetland depletion and degradation; and decrease in water quality.

- **Agriculture:** Generally, the second most important source of employment and foreign exchange earnings in the Caribbean, agricultural production is also critical to meeting
subsistence needs and ensuring the food security of island nation. Climate change could lead to a reduction on agricultural productivity, resulting in: a loss of employment and foreign exchange earnings; loss in local food production; and increased risk of food insecurity.

**Identified adaptation needs and priorities**

Through their National Communications to the United Nations Framework Convention on Climate Change, Haiti’s National Adaptation Programme of Action (NAPA) and other national reports and strategies, Caribbean countries have identified priority sectors for adaptation as being coastal zones, freshwater resources and agriculture. Other important overlapping sectors that are vulnerable to the impacts of climate change are tourism, human health, biodiversity and fisheries. A wide range of measures to reduce the vulnerability of Caribbean countries to the impacts of climate change have been identified, including the following:

- **Coastal Zone Management:** Restoration and conservation of coastal ecosystems (mangroves and coral reefs); investments in infrastructure development (i.e., artificial breakwaters, erosion control) and coastal zone planning.
- **Freshwater Resources:** Integrated watershed management; revision of water pricing; water harvesting and storage infrastructure; use of advanced technology to increase water supply in response to climate induced drought; energy-intensive technologies for water purification (such as reverse osmosis); and water production (such as desalinization).
- **Agriculture:** Research into the impacts on key export crops; cultivation of drought-, heat- and salt-resistant cultivars; agricultural diversification; planting of short-cycle crop varieties; recuperating degraded lands; wider application of integrated pest management; ensuring greater efficiency in water use for crops; and installing water storage facilities.

**Policy level actions**

Caribbean countries have recognized the need for regional cooperation to enhance their capacity to adapt to the projected, multifaceted impacts of climate change. Numerous regional initiatives have therefore emerged in the Caribbean to support research, capacity building and policy integration in the area of adaptation. Much of this work has occurred through the Caribbean Community (CARICOM). In particular, a series of projects implemented by CARICOM have helped to understand the region’s vulnerabilities to climate change, build capacities, engage in adaptation planning, support mainstreaming of adaptation into policy processes, and begin implementation of adaptation measures. These projects are: “Caribbean Planning for Adaptation to Climate Change” (1997–2001); “Adaptation to Climate Change in the Caribbean” (2001–2004); “Mainstreaming Adaptation to Climate Change” (MACC) (2004–2009); and the “Special Program on Adaptation to Climate Change: Implementation of adaptation measures in coastal zones” (2007–2011).

Out of these regional initiatives emerged the Caribbean Community Climate Change Centre, which serves as the official repository and clearing house for regional climate change data and provides climate change-related policy advice and guidelines to CARICOM Member States. As well, building upon the MACC project, a roadmap for adaptation action in the Caribbean was created, *Climate
Change and the Caribbean: A Regional Framework for Achieving Development Resilient to Climate Change (2009-2015). The Regional Framework identifies a number of strategic goals for the region, including: mainstreaming climate change into Caribbean countries’ sustainable development agendas; addressing the impact of climate change on freshwater supply, human health and coastal and marine ecosystems; and moving forward on low-carbon development within the region. An implementation plan for this Framework has recently been developed.

The Caribbean Catastrophe Risk Insurance Facility (CCRIF) also provides support to Caribbean countries by enhancing their capacity to respond to extreme weather events. It allows states to purchase insurance against hurricanes and natural disasters, and thereby provides immediate liquidity to Caribbean governments after these catastrophic events. It is the first multi-country risk pool in the world.

In addition to their involvement in the CARICOM, Cuba and the Dominican Republic are also members of the Ibero-American Network of Climate Change Offices (RIOCC), an intergovernmental initiative involving Spanish- and Portuguese-speaking countries from the Latin America and Caribbean region. This intergovernmental program provides a platform for knowledge exchange, capacity building and the promotion of regional adaptation projects. Spain has been coordinating the network and funds most of its activities.

At the national level, Caribbean countries have recognized the need to integrate adaptation into development policies and plans, and are beginning to act upon this understanding. For example, the Dominican Republic has prepared a National Adaptation Plan of Action and made some progress with the integration of adaptation into national policy, such as the inclusion of climate change adaptation in its National Development Strategy (MEPD and CNRE, 2010). The Dominica, Saint Lucia, and Saint Vincent and the Grenadines have also mainstreamed adaptation measures into their development policies and are currently piloting adaptation measures to improve existing strategies.

Projects and Programs that Support Adaptation
Caribbean countries are also engaged in a number of adaptation projects and programs. The greatest number of adaptation projects are taking place in Barbados, the Dominican Republic, Grenada, Jamaica and Saint Lucia. Participation in a range of multi-country projects appears to be the only basis for adaptation programming in the majority of Caribbean countries. This includes participation in a number of Caribbean regional projects, including the CARICOM projects previously described. These projects are mainly focused on governance capacity, coastal zone management and disaster risk management, with a much smaller number addressing adaptation in the agriculture and freshwater sectors, as well as tourism, marine resources, gender, the private sector, trade and biodiversity.

Caribbean countries are also participating in a multi-country projects that link them to adaptation in Latin America, as well as Africa, Asia and the Pacific. For example, several are involved in the
Caribbean regional component of the global “Pilot Program for Climate Resilience.” A number of Caribbean countries also benefited from participation on the “Capacity Development for Policy Makers to Address Climate Change” project.

Fewer than half of the Caribbean countries examined—Barbados, Cuba, the Dominican Republic, Haiti and Jamaica—appear to be engaged in implementation of projects designed specifically to meet their national needs. These projects primarily focus on agriculture, coastal zone management and disaster risk management.

The national, regional and global adaptation projects being implemented in the Caribbean region have received funded by a range of donors. The most common of these are the Global Environment Facility, Inter-American Development Bank, the United Nations Development Programme and the governments of Spain, the United Kingdom and United States.

It should be kept in mind that this review only captures those projects that explicitly aim to support adaptation to climate change. As such, initiatives in which climate change adaptation is integrated into the design of a project or that serendipitously help build adaptive capacity are not reflected in this review. Additional efforts that facilitate vulnerability reduction in the Caribbean therefore are likely underway.

Adaptation communities of practice
Within the Caribbean, a small number of communities of practice working in the area of adaptation have been identified that are facilitating the sharing of knowledge between policy-makers, researchers and the non-governmental community. These include the Caribbean Drought and Precipitation Monitoring Network and the Regional Policy Dialogue: Water and Climate Change Adaptation.

Needs and gaps
Countries of the Caribbean region have been actively engaged in adaptation action at the policy and program level since the late 1990s. Through these initiatives, Caribbean countries have built their capacity to analysis climate change vulnerabilities, mainstream adaptation action into development agendas, and are now beginning to implement actions on the ground to further improve adaptation mainstreaming outcomes. Many of these actions emphasize the need for an ecosystem-based approach to adaptation, such as through integrated coastal zone management and integrated watershed management. There is national and regional recognition that ecosystem services can greatly reduce adaptation costs while providing numerous co-benefits (i.e., mangroves and reefs protect shorelines from erosion and supply fisheries; forests mitigate landslides, flooding and drought).

Although considerable progress has been made in the Caribbean region in relation to preparing for the impacts of climate change, some gaps in programming may be identified:
• Although a number of adaptation projects and programs are being implemented, few are taking place at the national level. It appears that the majority of Caribbean countries are building their adaptation capacity solely through participation in regional and global initiatives. More targeted, discrete adaptation projects at the national level may be appropriate to more appropriately respond to country’s individual needs.

• Relatively few adaptation projects underway at present emphasize the implementation of adaptation actions on the ground. As capacity to assess vulnerabilities and plan adaptation measures is enhanced, greater implementation of field level actions across the diverse needs of the islands of the Caribbean may be appropriate.

• Adaptation action is taking place in a range of sectors, particularly related to the capacity of government to facilitate adaptation actions, disaster risk management, coastal zone management and agriculture. While some current projects address needs related to the region’s important tourism sector and to forestry, biodiversity and the gender dimensions of climate change, expansion of action in these areas may be appropriate.

• As well, relatively few projects appear to address the region’s particular needs with respect to the provision of freshwater resources, and even fewer marine resources (including fisheries) and concerns related to human health. Needs in these areas may be addressed through future adaptation programming.
1.0 Introduction

The arc of islands found largely within the Caribbean Sea that comprise the Caribbean region are home to a diverse array of peoples, geographies and histories. The islands are generally classified into three groups:

- the northern Lucayan Archipelago consisting of the Bahamas and the Turks and Caicos Islands;
- the western Greater Antilles, including the Cayman Islands, Cuba, the Dominican Republic, Haiti, Jamaica and Puerto Rico; and
- the Lesser Antilles, divided into the Leeward Islands (Anguilla, Antigua and Barbuda, Aruba, Curaçao, Dominica, the British Virgin Islands, Caribbean Netherlands, Guadeloupe, Montserrat, Saba, Saint Barthélemy, Saint Kitts and Nevis, Saint Martin, Sint Maarten and the Virgin Islands of the United States) and the Windward Islands (Barbados, Grenada, Martinique, Saint Lucia, Saint Vincent and the Grenadines, and Trinidad and Tobago).

Of these countries, Antigua and Barbuda, Barbados, Cuba, Dominica, the Dominican Republic, Grenada, Haiti, Jamaica, Saint Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines, and Trinidad and Tobago are included within this review.²

The Caribbean region encompasses a diverse array of countries in terms of size of population, development challenges, economic  

²The following territories with the Caribbean region are not examined within this review either due to their high level of economic development and/or their status as a Non-Self-Governing Territory: the independent state of the Bahamas; the islands of the French Antilles—Guadeloupe, Martinique, Saint Barthélemy and Saint Martin; the constituency countries of the Netherlands: Aruba, Caribbean Netherlands (Bonaire, Saba and Saint Eustatius), Curaçao and Sint Maarten; the constituency countries of the United Kingdom: Anguilla, the British Virgin Islands, the Cayman Islands, Montserrat and the Turks and Caicos Islands; and the constituency countries of the United States: Puerto Rico and the Virgin Islands of the United States.
characteristics and ecosystems. Many of these countries are small tropical islands with small populations and economies that depend mainly on tourism, agriculture and, in certain cases, the financial services sector. These small islands include Antigua and Barbuda, Barbados, Dominica, Grenada, Saint Kitts and Nevis, Saint Lucia, and Saint Vincent and the Grenadines. Generally each of these countries has a relatively higher per capita Gross Domestic Product (GDP) than the larger, more populous Caribbean countries of Cuba, the Dominican Republic, Haiti, Jamaica and Trinidad and Tobago. Although some of these countries have more diversified economies—particularly in the case of Trinidad and Tobago, with its substantial oil and gas and manufacturing sectors—others face considerable development challenges. Haiti and the Dominican Republic, for example, are the poorest countries in the Caribbean, with Haiti being the only least developed country in the Americas. As well, 20 per cent of Jamaica’s GDP is comprised of remittances from overseas. These development challenges, as well as their island geographies, contribute to the vulnerability of the countries of the Caribbean to climate change.

Throughout the region, countries have been collaborating in efforts to prepare for and respond to the potential impacts of climate change. To better understand these efforts, this report provides a rapid review of current and planned adaptation action within the region. Based on available resources, it examines: identified priority adaptation needs; efforts by governments to support adaptation through policy and planning; the scope of international support for adaptation efforts in different countries and sectors; and potential gaps in adaptation efforts at the country and regional levels. The main body of the report provides an overview of adaptation actions at the regional level, highlighting commonalities and differences between Antigua and Barbuda, Barbados, Cuba, Dominica, the Dominican Republic, Grenada, Haiti, Jamaica, Saint Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines, and Trinidad and Tobago. In the appendices that follow, adaptation efforts in each of these countries is discussed.

2.0 Methodology

A rapid review of current and planned adaptation action in the Caribbean—one that gives attention to policies, programs and projects at the national and regional levels—presents a considerable task given the breadth of actions that can and are being taken to reduce vulnerability to the short-, medium- and long-term impacts of climate change. Prior to undertaking this review, it therefore was necessary to clarify the terms that would be used within it and to establish a set of parameters to limit its scope. This section provides an understanding of the research parameters established for this rapid review and the process by which the information it contains was gathered. These guidelines are presented to help clarify what the study does and does not aim to achieve.

Definition of “Adaptation Action”

Adaptation is generally defined as being an “adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial
opportunities.” Given the breadth of actions that may be taken which are in keeping with this definition, a critical first step in initiating the rapid review was determining the definition of “adaptation action” to be used within it.

This process was influenced by the outcomes of a review of 135 “adaptation” activities undertaken by McGray et al (2007) that led to identification of three different models of adaptation activity:

- **Serendipitous adaptation**—“activities undertaken to achieve development objectives [that] have outcomes that incidentally may also support adaptation” (McGray et al, 2007, p. 13). This type of adaptation reflects the widely acknowledged intimate linkage between sustainable development and building capacity to adapt to the impacts of climate change. Specifically, sustainable development can enhance adaptive capacity by strengthening institutions, promoting sound management of natural resources, improving health and education systems, promoting gender equity and fostering economic growth.

- **Climate-proofing of development efforts**—where activities are “added to an ongoing development initiative to ensure its success under a changing climate. In these cases, adaptation is seen as a means to a development end” (McGray et al, 2007, p. 13); and

- **Discrete adaptation**—where “adaptation to climate change is the primary objective of a project or initiative. From the beginning, implementers and funders of these efforts have climate change in mind” (McGray et al, 2007, p. 13).

While recognizing the critical role of serendipitous adaptation and climate-proofing of development efforts in fostering adaptation to climate change in developing countries, a review of all three types of adaptation activities would be unmanageable. This study therefore focuses on an examination of discrete adaptation activities. Therefore, adaptation action within the review is defined as *policies, programs and projects designed and implemented specifically to address the current and projected impacts of climate change*. As such, specific reference has been made to supporting adaptation to climate change, and/or climate risk reduction in the objectives and/or rationale of each policy, program or project included in the study.

Due to the selection of this definition, the review automatically presents a narrow snapshot of the wide breadth of activity (often funded though official development assistance4) that is helping developing countries build adaptive capacity and reduce their vulnerability to the impacts of climate change. Therefore, the review should not be viewed as fully representative of the entirety of adaptation action occurring in developing countries—nor of the degree to which vulnerability reduction is occurring in the countries and regions profiled. Rather, the review aims to contribute to understanding of the identified adaptation needs and priorities of different countries and regions and the degree to which discrete adaptation activities are contributing to meeting these needs.

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4 In 2010, official development assistance totaled US$128.7 billion (OECD, 2011)—a level of funding that significantly outstrips that which is currently provided in support of adaptation to climate change. See, for example, SEI and UNEP (2010).
Definition of “Current” Action

To further focus the study, adaptation action have been deemed to be “current” if they were ongoing or completed in 2009 or later. As such, the review does not include a range of projects completed prior to 2009 that may have significantly contributed to building local and national adaptive capacity. This observation is particularly true of adaptation action in the Caribbean and Pacific; reflecting the early interest and commitment of small island developing states (SIDS) to understanding and reducing their vulnerability to the impacts of climate change, countries in these regions began to explore adaptation concerns as early as the late 1990s.

While the review’s definition of “current” adaptation action limits the scope of the study, the volume of discrete adaptation initiatives has accelerated in recent years, as reflected in the following trends:

- Financing for approved projects through the Least Developed Countries Fund has risen from nearly US$24 million in 2008 to US$177 million as of mid-2011;\(^5\)
- Adaptation financing through the Special Climate Change Fund has increased from 22 projects worth nearly US$90.73 million in 2009 (GEF, 2009) to 31 projects approved for financing in the amount of US$128 million as of mid-2011;\(^6\) and
- Financing for adaptation by four Bilateral Financial Institutes increased by 31 per cent from US$3,029 million in 2008 to US$3,963 million in 2009 (SEI and UNEP, 2010).

Therefore, the review reflects the growing number of adaptation efforts initiated in recent years.

Identification of Projects and Programs

A wide range of climate adaptation related initiatives are underway throughout the world—covering the gamut from original scientific research that informs our understanding of current and future climate patterns, to capacity building and knowledge sharing, to the adoption of new planting practices by farmers, to the building of infrastructure that anticipates future climatic extremes. While acknowledging this diversity, to better achieve the specific objectives of the review, it has focused on time-bounded projects that support preparation for and/or implementation of practical adaptation action. As such, the review does not include projects and programs that focus on:

- conducting original scientific research that enhances knowledge of climate change impacts and development of the tools and techniques for reducing vulnerability;
- ongoing, long-term monitoring efforts (whether climatic or socio-economic) that are needed to inform decision-making;
- stand-alone capacity building and knowledge sharing workshops, conferences and training programs; and
- activities solely related to participation in the ongoing international climate change negotiations.

As well, the review only captures adaptation action financed through international development assistance; it does not capture adaptation efforts financed solely by national governments. This focus reflects the original impetus for conducting the review—the current scaling up of adaptation action and the potential for duplication of effort and limited sharing of good practice—and the challenge of rapidly identifying nationally funded adaptation projects. This parameter is particularly important for countries such as Brazil and China, whose governments are engaged in self-driven and self-funded adaptation efforts that are not included within this review.

Data collection
Projects and programs were primarily identified through a desk-based review of the websites of UN agencies, bilateral development agencies, multilateral financial institutions, international research organizations and non-governmental organizations. Reflecting the desire for a rapid review, a comprehensive examination of all of these organizations was not undertaken; rather an emphasis was placed on capturing initiatives involving organizations generally recognized as being actively engaged in fostering climate change adaptation. Additional information regarding current and planned adaptation action was gathered through an examination of relevant reports.

The process by which data were gathered for inclusion in the review has biased its content. Notably, it is highly likely that a number of small-scale projects meeting the review’s definition of adaptation action, particularly those occurring at the community level, have not been captured. As well, the accuracy of the data captured in the review significantly depends upon the accuracy and completeness of the internet resources used.

Classification of projects
To support analysis of the degree to which ongoing projects are addressing the priority adaptation needs of developing countries, identified initiatives have been classified in relation to two general characterizations—their sector or areas of focus and the types of activities being implemented. For the sectors or areas in which projects are supporting adaptation action, a classification system comprised of the following 14 macro project categories was developed: food, fiber and forests; ecosystems; freshwater resources; oceans and coastal areas; disaster risk management; migration and security; gender; business; infrastructure; human settlements; human health; climate information services; governance; and multi-sectoral. These macro project categories were then divided further to provide a more detailed picture of the types of projects identified through the review. For example, the macro project category of “food, fiber and forests” was sub-divided into agriculture, pastoralism, forestry and fire management. Current adaptation projects were then labeled in relation to one or more of these sub-categories.

For the types of projects being implemented, a shorter list of categories was developed. Current adaptation projects have been assessed in relation to the degree they support research, assessment, capacity building, knowledge communication, policy formation and integration, field implementation
and community-based adaptation. A fuller discussion of the project classification system used during this review is provided at the beginning of the appendices.

**Gender analysis**

Within the review, assessments of the degree to which gender-sensitive adaptation action are underway in different countries and regions has focused solely upon the extent to which addressing gender inequalities is a specified objective of projects and programs. The review did not assess the degree to which individual projects and programs may or may not have integrated gender issues into their detailed design. Therefore, the gender analysis provided in the review should not be viewed as fully representative of the degree to which current adaptation action is gender-sensitive.

**Assessment of the effectiveness of adaptation action**

It should also be noted that this rapid review does not assess the quality or effectiveness of the project and programs it includes. Therefore, the review does not provide a basis upon which to judge the degree to which completed and ongoing projects have either achieved their stated objectives and/or made a positive contribution to increasing the ability of a country or region to adapt to the impacts of climate change. It only provides an indication of the intended outcomes of the identified initiatives, the type of action being taken (e.g., capacity building, policy integration and implementation of practical actions) and their area of focus (e.g., agriculture, water and health).

**Scientific Information**

Synopsis of projected changes in climate in different countries and regions included in the review are based primarily on the content of the Fourth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC) and national assessment reports (e.g., National Communications). New scientific analysis published since the completion of these reports may have both refined and presented revised understandings of the projected consequences of climate change in different regions of the world. Therefore, the climate projection sections of the review should be viewed as indicative of anticipated trends in climatic change at the time of publication of the cited reports.

**Qualification of Degree of Adaptation Action**

To evaluate and consistently describe the relative level of adaptation activity occurring by country in each region, a simple benchmarking process has been applied across the review. Using a scale from zero to “X”, where “X” is equivalent to the number of current adaptation projects underway in the country in a particular region with the largest number of current projects, the scale was divided into five equivalent quintiles. Each quintile was then assigned a descriptor as follows:

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7 For example, a project may have as its objective building resilience in the agriculture sector and target farmers in general. As no reference to gender is made in the project’s objectives, it would not be considered a gender-focused adaptation action within the review. This finding would stand even if the detailed design of the project includes having set targets to ensure the involvement of female farmers.

8 In other words, the country in the region with the highest total number of current adaptation projects was identified and used as a benchmark against which to assess performance in all other countries.
“Very Low” level of adaptation action = 0 to 20 per cent of “X;”
“Low” level of adaptation action = 21 to 40 per cent of “X;”
“Moderate” level of adaptation action = 41 to 60 per cent of “X;”
“High” level of adaptation action = 61 to 80 per cent of “X;” and
“Very High” level of adaptation action = 81 to 100 per cent of “X”.

All countries in the region were allocated to one of these quintiles based on the total number of current adaptation projects and programs identified through the review.

This benchmark approach enabled a standard methodology to be applied across all 12 regions examined in the Review of Current and Planned Adaptation Action while also recognizing their individual differences. (For example, the smaller geographies and populations of SIDS suggest that hosting, for instance, 15 projects might reflect a higher level of activity than what might be possible for larger and more populated countries.) However, this methodology does not assess the financial size of individual projects; small projects are given equal weight in comparison to large projects. This approach also does not account for a country’s comparative geographic size, population, level of development and other factors that may affect its level of adaptation activity. Therefore, these contextual influences are discussed within individual country profiles and regional comparisons.

Countries and Regions Incorporated in the Review

The following criteria were considered to identify countries to be included in the Review of Current and Planned Adaptation Action in Africa, Asia-Pacific and Latin America and the Caribbean, and determine their regional allocations:

- Inclusion only of non-Annex I Parties to UNFCCC;
- Allocation by region in accordance with the classification system used by the United Nations Statistics Division (UNSD, 2010); and
- The Organisation for Economic Co-operation and Development (OECD) Development Assistance Committee’s list of countries eligible to receive official development assistance in 2009 and 2010 (OECD, 2009).

Definition of “Communities of Practice”

Communities of practice traditionally have been defined as “groups of people who share a concern or a passion for something they do and learn how to do it better as they interact regularly” (Wenger, 2006). These groups are usually defined by a shared domain of interest and relationships than enable mutual learning. Broadly speaking, two different types of communities of practice with an interest in adaptation to climate change may be identified as:

- Established communities of practice, usually defined by a sector or issue, which have begun to integrate consideration of adaptation needs and priorities into their existing knowledge sharing efforts (e.g., a community of foresters discussing methods of integrating projected climate risk into their management planning); and
Review of Current and Planned Adaptation Action: The Caribbean

- New communities of practice established specifically due to a shared interest in adaptation to climate change (e.g., community-based adaptation experts).

Of these two broad groupings, the review gives attention only to communities of practice, which originated due to their shared interest in adaptation to climate change. This includes networks of non-governmental organizations actively engaged in sharing information regarding climate change. This focus reflects the greater challenge of identifying and assessing the degree to which the vast array of traditional associations and networks have begun to integrate adaptation concerns into their discussions.

**Anticipated Reader**

Finally, it should be noted that the review has been written in a manner that assumes that its readers will have a basic understanding of adaptation to climate change. As such it does not provide definitions of terms such as “National Communication” or “National Adaptation Programmes of Action.” Nor are explanations of key concepts included, such as “adaptive capacity,” “mainstreaming,” the relationship between climate change and development, or the challenges associated with the implementation of adaptation actions at the policy and program levels.

### 3.0 Climate Projections

According to the multi-model dataset used by the Intergovernmental Panel on Climate Change (IPCC), simulations of future climate in the Caribbean suggest that temperatures will increase by 1.4° to 3.2°C, with a median of 2°C, by the period of 2080 to 2099 (Christensen et al., 2007). Similarly, the Regional Climate Model, PRECIS, projects that mean annual temperatures in the Caribbean will increase by between 1° and 5°C by the 2080s. Warming is projected to be greater in the northwest Caribbean territories (Cuba, Dominican Republic, Haiti and Jamaica) than in the eastern Caribbean island chain (Taylor et al., 2007, cited in Centella, 2010).

While the IPCC’s 2007 report suggests that warming will occur evenly across all seasons (Christensen et al., 2007), other studies project that greater warming will occur in the summer months (June, July and August) in comparison to the cooler and traditionally drier early months of the year (Taylor et al., 2007, cited in Centella, 2010). Moreover, temperature increases over land areas are expected to be much larger than over the sea. This pattern will be the result of less evaporative heat loss over the land than the sea, as well as the greater thermal inertia of the oceans.

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9 From Table 11.1 of Christensen et al. (2007) in which average projections are based on a set of 21 global models in the multi-model data set for the A1B (medium-high) emissions scenario and assessed in comparison to a base time period of 1980 to 1999.

10 PRECIS (“Providing Regional Climates for Impacts Studies”) is a regional climate modelling system developed by the Hadley Centre within the United Kingdom’s Met Office. For more information, see: http://precis.metoffice.com/
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Increased temperatures could directly impact ecosystems (i.e., coral reefs), agriculture and human health through heat stress.

In regards to precipitation, overall climate change projections predict that various regions of the Caribbean will become drier (Mimura et al., 2007; Centella, 2010). Most models indicate the greatest decrease in rainfall will occur in the summer, particularly around the Greater Antilles (Mimura et al., 2007). Decreased rainfall would compromise water availability, food security (by reducing agricultural productivity), and alter ecosystems. This change may be particularly significant for countries that lack surface water rivers and streams and rely primarily on groundwater, such as Jamaica, Saint Kitts and Nevis and the Grenadines.

Climate change will also very likely to contribute to sea level rise within the Caribbean (Mimura et al., 2007). While sea levels are projected rise by 0.19 meters to 0.58 meters globally over the course of this century (2080 to 2099; Meehl et al., 2007), models indicate that sea level rise will not be geographically uniform. In the Caribbean, sea levels are affected by factors such as the El Niño Southern Oscillation (ENSO) and volcanic and tectonic crustal motions, leading to considerable variation in observed levels. When combined with model limitations, the resulting large deviations between simulations make estimating the rate of sea level rise across the entire Caribbean region uncertain (Mimura et al., 2007). Rising sea levels are expected to result in coastal flooding, salt water intrusion and erosion (particularly during storm surges) and thus could compromise infrastructure, agricultural productivity, and coastal ecosystems. Coastline impacts are particularly significant considering that more than half of Caribbean populations live within 1.5 kilometers of the sea and also most all capital cities and transportation infrastructure—and 95 per cent of the tourism infrastructure—of most Caribbean countries is located within 10 kilometers of the coast (Mimura et al., 2007; UNEP 2008).

Conversely, heavy rainfall from extreme weather events such as hurricanes has the potential to produce floods and landslides. Yet fewer models have been developed that simulate hurricanes in the context of climate change compared to those simulating temperature and precipitation changes and sea level rise. Simulating extreme climate change events is more challenging since it requires modeling high resolution information to capture characteristics of tropical cyclones (Centella, 2010). Consequently, projections for the frequency and intensity of tropical cyclones on a regional basis are less certain than projections for temperature and precipitation changes (Centella 2010).

11 Most coral species cannot survive temperatures above 30°C. Sea temperatures surpassing this threshold are thought to be the main factor causing widespread coral bleaching. Climate change may also impact coral reefs with sea level rise and the potential increase in tropical storm intensity and frequency.

12 These global projections are based upon use of six IPCC emissions scenarios and in comparison to a base period of 1980 to 1999. The IPCC emission scenarios present a range of sea level rise predictions, based on various emissions scenarios and resulting from thermal expansion of the oceans and land ice changes. On one end of the spectrum, under the B1 emissions scenario of the Special Report on Emissions Scenarios (2001), global sea levels are expected to rise from between 0.18 meters to 0.38 meters over the course of the century. On the opposite end of the spectrum, emissions scenario A1F1 predicts a global sea level rise of between 0.25 and 0.6 meters over the same time period. There is still a significant amount of uncertainty in these projections, as records on sea level rise remain relatively short and there are uncertainties relating to the loss of land ice (Meehl et al., 2007).
It should be kept in mind that several factors make gaining a clear understanding of future climate change impacts in the Caribbean challenging (Mimura et al., 2007). First, Atmosphere-Ocean General Circulation Models do not have sufficiently fine resolution to include the smaller islands and so projections are made assuming the surface is ocean instead of the actual island. Consequently, down-scaling climate projection information to individual islands is challenging and subsequently lacking in most regions of the Caribbean. Second, the midsummer drought in the Caribbean is a climate process that is poorly understood. Third, there is insufficient consensus on the link between sea surface temperature changes and the frequency and intensity of hurricanes (see, for example, Knutson et al., 2008). Finally, the uncertainty of sea level rise and limited number of models that address storm surges further obscure assessments of climate change impacts in the Caribbean (Mimura et al., 2007). These existing uncertainties may be attenuated as rapidly evolving research and development enhances the measurement and analysis of climate change data.

4.0 Needs and Priorities within the Caribbean

The projected consequences of climate change for the Caribbean—higher temperatures, declining precipitation, rising sea levels and potentially adverse changes in the patterns of extreme weather events—have strong implications for long-term development in the region. The economic consequences could be significant. Damage from wind, storm surges and inland flooding already amounts to up to 6 per cent of GDP in some countries; climate change is expected to exacerbate these losses by an additional cost equivalent to 1 to 3 per cent of GDP by 2030 (CCRIF, 2010).

As elsewhere, climate change is expected to affect a diversity of sectors. Within the Caribbean, the most vulnerable sectors include tourism, freshwater, agriculture, human settlements and economic infrastructure (UNEP, 2008). Through National Communications, the National Adaptation Programme of Action (NAPA) prepared by Haiti, the Dominican Republic’s National Adaptation Plan of Action, Trinidad and Tobago’s draft climate change policy, and other documents, Caribbean countries have reported their adaptation needs and priorities in these areas. As reflected in Table 1, priority sectors identified by Caribbean governments include coastal zone management, freshwater and agriculture (food security), with tourism as a key cross-cutting priority. Other important overlapping sectors include human health, biodiversity and fisheries.

A review of national adaptation actions in the Caribbean countries reveals recognition of the need for integrated, multi-sectoral approaches along with regional cooperation to help enhance the capacity of each relatively small state to adapt to the projected, multifaceted impacts of climate change. They recognize the overarching need to integrate adaptation into development policies, plans and projects that are consistent with national social, economic and environmental goals. There is also a need to foster awareness and provide information about climate change impacts and adaptation options to decision-makers at all levels and to island inhabitants. It is also recognized that
Review of Current and Planned Adaptation Action: The Caribbean

Table 1: Comparison of priority sectors for adaptation as identified by Caribbean countries through their National Communications and other strategic documents.*

<table>
<thead>
<tr>
<th></th>
<th>Agriculture &amp; Food Security</th>
<th>Water Resources</th>
<th>Biodiversity &amp; Forestry</th>
<th>Coastal zones</th>
<th>Human health</th>
<th>Tourism</th>
<th>Other Priorities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Antigua &amp; Barbuda</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>Human settlements/infrastructure</td>
</tr>
<tr>
<td>Barbados</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cuba</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td>✓</td>
<td></td>
<td>✓</td>
<td>Human settlements/infrastructure; marine fisheries</td>
</tr>
<tr>
<td>Dominican Republic</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td>Human settlements/infrastructure</td>
</tr>
<tr>
<td>Grenada</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td>✓</td>
<td></td>
<td>✓</td>
<td>Marine fisheries</td>
</tr>
<tr>
<td>Haiti</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
<td>Watershed management and soil conservation; infrastructure construction and rehabilitation; education and outreach.</td>
</tr>
<tr>
<td>Jamaica</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Saint Kitts &amp; Nevis</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td>Human settlements/infrastructure</td>
</tr>
<tr>
<td>St. Lucia</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>St. Vincent &amp; the Grenadines</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>Human settlements/infrastructure</td>
</tr>
<tr>
<td>Trinidad &amp; Tobago</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>Marine fisheries; wetlands; Caroni Basin</td>
</tr>
</tbody>
</table>

*Sources include the following: Bellot and Parry (2001); Centella and Paz (2001); Challenger (2001); EMA (2001); GoG (2002); Mancebo and Matos (2003); MHE (2000); MPDEH (2003); MoE (2000); MWH & NMS (2000); MDEo (2002); and Wellington and Moore (2001).

access to financial assistance will also be necessary to assist vulnerable groups with insufficient resources to implement climate change adaptation actions.

Coastal Zone Management

Although most Caribbean countries are quite mountainous,13 possessing peaks well above 500 meters, they are still quite vulnerable to sea level rise—particularly when coupled with storm surges from hurricanes. First, most of the population lives within the coastal zone; for instance, 60 per cent of the population of Antigua and Barbuda lives along the coast (Challenger, 2001). Most tourism facilities—a main source of employment and foreign exchange earnings across the Caribbean—are also located along the coast. Coastal erosion is further exacerbated by destruction of mangrove forests for coastal development and fuelwood needs;14 and by coral reef degradation due to eutrophication and sedimentation of coastal waters; physical disturbance by careless tourism and destructive fisheries practices; and increased temperatures (leading to coral bleaching). The

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13 The exceptions include the low-lying Grenadines and hilly Barbados.
14 For example, fuel wood is used to meet 71 per cent of Haiti’s energy requirements (BME 1999, cited in MDE, 2002)
restoration and conservation of coastal ecosystems (mangroves and coral reefs) coupled with infrastructure development (i.e., artificial breakwaters, erosion control) are viewed as important components of coastal zone planning and management to mitigate climate change impacts.

**Freshwater Resources**
With climate change predicted to decrease precipitation over extended periods of time and for sea level rise potentially to lead to the contamination of fresh water supplies through salt water intrusion, all countries have made ensuring continual access to clean water a priority. Water resources are already stressed across many states as a result of forest and wetland depletion and degradation (which also compromises water quality), coupled with high water consumption to meet tourist needs.

Most Caribbean nations see integrated watershed management (i.e., reforestation of watersheds to slow runoff, increase groundwater recharge, and maintain the water cycle) as an important water scarcity adaptation priority, which also has a co-benefit of mitigating flooding and landslide events during extreme precipitation events. The revision of water pricing was also identified as an adaptive measure, namely in Dominica (John et al., 2001). Water harvesting and storage infrastructure has also been identified as an adaptation priority, particularly in poorer nations such as Haiti. Some countries, primarily wealthier states such as Barbados, Saint Kitts and the Grenades, have considered the use of advanced technology to increase water supply in response to climate-induced drought. Energy-intensive technologies for water purification (such as reverse osmosis) and production (such as desalinization) are currently being used to meet existing needs in some states.

**Agriculture (Food Security)**
After tourism, agriculture is generally the second most important source of employment and foreign exchange earnings in the Caribbean. Local food production is also critical to ensuring the food security of island nations, particularly for their poorest, most vulnerable citizens. Climate change is very likely to adversely affect subsistence and commercial agricultural production within the Caribbean—by raising temperatures, decreasing water availability, encouraging sea water intrusion, and potentially causing an increase in extreme events (like droughts and hurricanes; Mimura et al., 2007). Across the Caribbean region, agriculture is closely tied to integrated watershed management and water availability. Diverse climate adaptation needs related to agriculture have been identified. These needs include: undertaking research into the impacts of climate change on key export crops; cultivating drought, heat- and salt-resistant cultivars; agricultural diversification (i.e., agroforestry); planting of short-cycle crop varieties; recuperating degraded lands; developing food security

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15 By placing a levy on water consumption, excessive use of water can be deterred and conservation of an increasingly scarce resource promoted.
16 In Saint Vincent and the Grenadines, for example, approximately 60 per cent of the workforce is employed in the production and export of bananas, and the industry accounts for 50 per cent of national exports (USDS, 2010).
17 For example, Grenada experienced a 10 per cent decline in its GDP in 2004 due to agricultural losses caused by Hurricane Ivan. Moreover, as the country’s main export crops, nutmeg and cocoa, require time to re-establish themselves, it was anticipated that it would be 10 years before they would again be able to be a source of foreign exchange (Mimura et al., 2007).
strategies; wider application of integrated pest management; ensuring greater efficiency in water use for crops through improved irrigation technology, training, and capacity building; installing water storage facilities; and reducing the number of livestock per acre and developing high-protein fodder.

5.0 Assessment of Adaptation Action within the Caribbean

Reflecting their shared vulnerability to similar climate change impacts, the majority of adaptation action in the Caribbean is taking place at the regional level. A number of countries also are pursuing adaptation measures at the national level to address particular concerns and build required capacity.

5.1 Regional Level Action

Numerous regional initiatives have emerged to assist Caribbean countries prepare for the expected impacts of climate change. Most prominently, through the Caribbean Community (CARICOM), the Caribbean Community Climate Change Centre, Caribbean Catastrophe Risk Insurance Facility, and other regional bodies, Caribbean countries are collaborating to address climate change adaptation at both the policy and project level. This considerable regional collaboration is likely a reflection of the practicality and usefulness of combining efforts given the small relative size of many Caribbean islands as well as the presence of prominent regional institutions.

Intergovernmental Actions

This regional response to climate change was initiated in 1994 when Barbados hosted the Global Conference on the Sustainable Development of Small Island States. This meeting eventually led to a partnership between the CARICOM Secretariat\(^\text{18}\) and the Organization of American States to develop regional capacity for climate change adaptation via a series of national and regional workshops. These workshops led to the development of the “Caribbean Planning for Adaptation to Climate Change” (CPACC) project, which executed vulnerability assessments, adaptation planning, and capacity building activities from 1997 to 2001.

The CPACC was the first stage of a comprehensive, long-term program of multi-sectoral adaptation to climate change in the Caribbean, as summarized in Table 2. It served as the foundation for further capacity building, preparation of national climate change adaptation policies and implementation plans, and the formulation of technical assistance and investment projects (GCSI and de Romilly & de Romilly, 2005). The CPACC was succeeded by the “Adaptation to Climate Change in the Caribbean” (ACCC) project, which further enhanced capacity to obtain regional

\(^{18}\) CARICOM Member States include: Antigua and Barbuda, The Bahamas, Barbados, Belize, Dominica, Grenada, Guyana, Haiti, Jamaica, Montserrat, Saint Lucia, St. Kitts and Nevis, St. Vincent and the Grenadines, Suriname, Trinidad and Tobago; along with the following CARICOM Associate Members: Anguilla, Bermuda, British Virgin Islands, Cayman Islands, Turks & Caicos Islands. Of the countries included in the review, only Cuba and the Dominican Republic are not official members of CARICOM, although Cuba has taken part in joint policy statements and conferences.
climate information and assess climate change impacts. One key outcome of the ACCC project was the development of the Caribbean Community Climate Change Centre (CCCCC), which serves as the official repository and clearing house for regional climate change data and provides climate change-related policy advice and guidelines to CARICOM Member States.

Table 2: Evolution of key regional, multi-sectoral adaptation programs in the Caribbean*

<table>
<thead>
<tr>
<th>Assessment</th>
<th>Caribbean Planning for Adaptation to Climate Change (CPACC)</th>
<th>Outcomes:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Timeline:</td>
<td>1997–2001</td>
<td>Establishment of 18 sea level and climate monitoring systems in 12 countries;</td>
</tr>
<tr>
<td>Funder:</td>
<td>GEF</td>
<td>Improved access and availability of data via inventory of coastal resources and development of coral reef monitoring system;</td>
</tr>
<tr>
<td>Budget:</td>
<td>US$6.5 million</td>
<td>Improved understanding of climate change issues by policy-makers;</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Assisted countries with national vulnerability assessments;</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Establishment of coral reef monitoring protocols; and</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Created a network of organizations, universities, banks, associations and government agencies to promote regional harmonization.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Refined Assessment</th>
<th>Adaptation to Climate Change in the Caribbean (ACCC) Project</th>
<th>Outcomes:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Funder:</td>
<td>CIDA</td>
<td>Endorsement of CCCCCC business plan by CARICOM;</td>
</tr>
<tr>
<td>Budget:</td>
<td>US$3.5 million</td>
<td>Draft regional public education &amp; outreach strategy;</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Development of a guide to integrate climate change into environmental impact assessments;</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Statistically downscaled climate scenarios development for Barbados, Jamaica and Trinidad and Tobago;</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Staff training and development at the Caribbean Institute for Meteorology and Hydrology in climate trend analysis in order to strengthen climate change capacity; and</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Implementation of pilot projects on adaptation studies in the water health and agricultural sectors.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Planning</th>
<th>Mainstreaming Adaptation to Climate Change (MACC) Project</th>
<th>Outcomes:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Timeline:</td>
<td>2004–2009</td>
<td>Mainstreaming of adaptation to climate change into national and sectoral planning and policies through the use of climate models developed and customized through the project;</td>
</tr>
<tr>
<td>Funder:</td>
<td>GEF</td>
<td>A strong public education and outreach program and a comprehensive communications strategy including all stakeholders in the Caribbean mass media; and</td>
</tr>
<tr>
<td>Budget:</td>
<td>US$5 million</td>
<td>The creation of an environment conducive to the implementation of measures for adaptation to climate change.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Implementation / Evaluation</th>
<th>Special Program on Adaptation to Climate Change: Implementation of Adaptation Measures in Coastal Zones (SPACC)</th>
<th>Complements the goals of MACC and applies the lessons and information gathered through the CPACC project by piloting the implementation of adaptation measures in countries that have already taken mainstreaming decisions and seek to execute specific measures to address the impacts of climate change on biodiversity and land degradation. (For more information, see Table 3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Timeline:</td>
<td>2007–2011</td>
<td></td>
</tr>
<tr>
<td>Funder:</td>
<td>GEF</td>
<td></td>
</tr>
<tr>
<td>Budget:</td>
<td>US$2.1 million</td>
<td></td>
</tr>
</tbody>
</table>

*Derived from the CCCCC website: [http://caribbeanclimate.bz/projects/projects.html](http://caribbeanclimate.bz/projects/projects.html)
The results and lessons of the ACCC led to the development of the “Mainstreaming Adaptation to Climate Change” (MACC) project (2004–2009), which mainstreamed climate change adaptation into national and sectoral planning. It also included a broad public education and outreach component.

Building upon the MACC project, the United Kingdom’s Department for International Development (DFID) and the Global Environment Facility (GEF) supported a two-year project that created a roadmap for adaptation action in the Caribbean: *Climate Change and the Caribbean: A Regional Framework for Achieving Development Resilient to Climate Change (2009–2015)*. The Regional Framework identifies a number of strategic goals for the region, including: mainstreaming climate change into Caribbean countries’ sustainable development agendas; addressing the impact of climate change on water supply, health and coastal and marine ecosystems; and moving forward on low-carbon development within the region. The CCCCC has the primary responsibility for coordinating implementation of the Regional Framework, including responsibility for liaising with national governments and relevant regional organizations. These organizations include the Caribbean Meteorological Organization, the Caribbean Tourism Organization, the Caribbean Development Bank, the Caribbean Institute for Meteorology and Hydrology, and the Organization for Eastern Caribbean States. An Implementation Plan has recently been developed for the Framework in partnership with the Climate and Development Knowledge network and supported by DFID. It outlines priority actions for local, national and regional adaptation identified during extensive national and regional consultations with stakeholders.

The successor to the MACC project (2007–2011) is the “Special Program on Adaptation to Climate Change: Implementation of adaptation measures in coastal zones” (SPACC). SPACC is piloting adaptation measures in countries that have already mainstreamed adaptation across sectors to better address the impacts of climate change on biodiversity and land degradation in coastal zones.

As presented in Table 2, the evolution of these Caribbean adaptation projects implemented through the CCCCC may be seen as reflecting advances from climate change assessments (CPACC, ACCC), to policy integration (MACC), and implementation/evaluation (SPACC). The selection of coastal zone management as the focus of the SPACC project, after such extensive previous research, verifies the vulnerability of coastal zones in the Caribbean to climate change impacts.

In addition to the CCCCC, a regional organization of import at the policy level is the Caribbean Catastrophe Risk Insurance Facility (CCRIF). It was launched in 2007 on behalf of CARICOM heads of government with funding from the World Bank, Caribbean Development Bank, and Governments of Bermuda, Canada, France, Ireland, Japan and the United Kingdom. CCRIF allows states to purchase insurance for hurricanes and natural disasters, and thereby provides immediate

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20 CCRIF, [http://www.ccrif.org/content/about-us](http://www.ccrif.org/content/about-us)
liquidity to Caribbean governments after these catastrophic events. As the first multi-country\textsuperscript{21} risk pool in the world utilizing parametric insurance to provide coverage at the lowest possible rates, the CCRIF represents a “paradigm shift” in the way countries treat risk.\textsuperscript{22}

As well, two Caribbean countries—Cuba and the Dominican Republic—are members of the Ibero-American Network of Climate Change Offices (RIOCC), an intergovernmental initiative involving Spanish- and Portuguese-speaking countries from the Latin America and Caribbean region.\textsuperscript{23}

RIOCC provides a regional platform for knowledge exchange, capacity building and the promotion of regional adaptation projects. It supports participating countries in areas such as communication, education and awareness raising, capacity building, funding, and developing pilot projects—particularly trans-national and trans-sectoral projects. Spain has been coordinating the network and funds most of its activities. RIOCC is recognized by the Nairobi Work Programme on Impacts, Vulnerability and Adaptation to Climate Change (NWP) as an official partner organization (RIOCC, 2008).

To help participating countries improve their understanding and assessment of impacts, vulnerability and adaptation, and to make informed decisions on practical adaptation actions, the Ibero-American Programme on Adaptation to Climate Change (PIACC) was developed through RIOCC. PIACC specifically aims to: improve institutional frameworks; synergize with regional adaptation initiatives and agencies; support climate research and systematic observation; promote the exchange of knowledge, experiences, tools and methods for evaluating impacts, vulnerability and adaptation; promote the development of adaptation projects in key sectors, with an emphasis on transborder and multi-sectoral activities; inform and communicate PIACC’s work; and elaborate assessment reports on impacts, vulnerability and adaptation. PIACC’s activities are aligned with the NWP (RIOCC, 2008).

Through the framework of PIACC, Spain and other donors support a number of regional activities such as capacity building workshops on climate scenarios as well as on the integration of adaptation into development policies and projects, and research programs on coastal zones and forestry (see Table 3). In addition, a cooperation agreement was signed with the United Nations’ International Strategy for Disaster Reduction in 2008 to: promote the exchange of know-how and experiences between disaster risk reduction and adaptation to climate change; and integrate both issues within regional and UNFCCC processes. Under this agreement, capacity building, institutional strengthening, coordination and communication activities have been pursued in various RIOCC countries.

\textsuperscript{21} The 16 CCRIF participating governments are: Anguilla, Antigua & Barbuda, Bahamas, Barbados, Belize, Bermuda, Cayman Islands, Dominica, Grenada, Haiti, Jamaica, Saint Kitts & Nevis, Saint Lucia, Saint Vincent & the Grenadines, Trinidad & Tobago, Turks and Caicos Islands.

\textsuperscript{22} CCRIF, \url{http://www.ccrif.org/content/about-us}

\textsuperscript{23} Other participating countries are: the South American countries of Argentina, Bolivia, Brazil, Chile, Colombia, Ecuador, Paraguay, Peru, Uruguay and Venezuela; the Central American states of Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua and Panama; Mexico; and the two donor countries—Spain and Portugal.
Regional Projects and Programs

In addition to the MACC, SPACC and PIACC projects previously described, a considerable number of regional projects are taking place within the Caribbean region, as presented in Table 3. These Caribbean region projects and programs are funded by a range of donors including CCRIF, the Food and Agriculture Organisation (FAO), the GEF, the United Nations Development Programme (UNDP), and the governments of Australia, Switzerland, United Kingdom and United States. These projects are mainly focused on the areas of governance capacity, coastal zone management and disaster risk management, with a much smaller number of projects addressing adaptation in the agriculture and freshwater sectors, as well as tourism, marine resources, gender, the private sector, trade and biodiversity. Most projects contain activities that support capacity building, assessment, research, knowledge communication and policy formation and integration; fewer projects emphasize field implementation and community-based adaptation.

Of note are the following initiatives:

- **“Pilot Project for Climate Resilience:”** This global project is aimed at reducing countries’ vulnerability to climate change, and has two components in the Caribbean. The Caribbean Regional Program involves work across the Caribbean in the following areas: (a) region-wide data management and monitoring activities in order to improve understanding of climate risks and potential impacts; (b) the implementation of activities to tackle risks and vulnerabilities common to all Caribbean countries; and (c) working with key entities in the Caribbean to provide scientific analyses so that countries can incorporate climate resilience into national climate change strategies. The project also involves pilot initiatives in the Dominica, Grenada, Haiti, Jamaica, Saint Lucia, and Saint Vincent and the Grenadines.

- **“Climate Change in the Organization of Eastern Caribbean States:”** Funded by the United States Agency for International Development (USAID) in 2011, this project will address adaptation within the areas of coastal zone and freshwater resources management, as well as through the support of improved regulatory frameworks in these areas.

- **“Assistance to Improve Local Agricultural Emergency Preparedness:”** This FAO-funded project seeks to improve the resilience and preparedness of Caribbean countries prone to hurricanes, with a particular focus on the agricultural sector. The countries of focus within this project are Cuba, Grenada, Haiti and Jamaica.

In addition, DFID is funding a considerable number of adaptation projects within the region, the majority of which are focused on policy integration and risk reduction. For example, DFID has partnered with the Australian Agency for International Development (AusAID) on the project “CARIBSAVE Climate Change Risk Atlas: Phase 1.” The project is looking at how key sectors, including agriculture and gender, are affected by climate change within the context for their relationship to tourism and livelihoods.
As described in Table 3, multiple Caribbean countries are also involved in a range of projects that bring together countries from Latin America, and well as from Africa, Asia and the Pacific. Examples of these projects include:

- **Cuba** and the **Dominican Republic** are participating in the following projects involving RIOCC-member countries: “Climate Change Vulnerability Evaluation of Coastal and Marine Areas,” “Mitigation and Adaptation to Climate Change in Sustainable Forest Management in Ibero-America,” and “Integrating Climate Change Adaptation into National Development Processes in Latin America and the Caribbean.” They are both also involved in the project “Climate Policy 2012,” an extension of the global project “Capacity Development for Policy Makers to Address Climate Change.”

- **“Preparedness for Climate Change.”** Participating Caribbean countries: Antigua and Barbuda, Grenada, Saint Kitts and Nevis, and Trinidad and Tobago.

- **“Capacity Development for Policy Makers: Addressing climate change in key sectors.”** Participating Caribbean countries: Dominican Republic and Saint Lucia.

As well, three countries—Barbados, the Dominican Republic and Jamaica—are also the sole Caribbean participants in six projects involving countries either exclusively from the Americas or that are global in scale:

- **Barbados** is participating in the project “Piloting Climate Change Adaptation to Protect Human Health” led by the World Health Organisation. Working in seven countries around the world, the goal of the project is to increase the capacity of national health system institutions to respond to climate sensitive health risks in a rapidly changing climate.

- **The Dominican Republic** is the only Caribbean country participating in UNDP’s “Climate Risk Management Technical Assistance Support Project: Phase II.” The project is building capacity for risk management at the national level. The Dominican Republic has chosen to focus its component of this global project on agriculture in drought-prone areas. The “Peace Corps Renewable Energy and Climate Change Initiative” is also being implemented in the Dominican Republic. Part of this project aims to increase awareness and knowledge of climate change adaptation within municipalities, schools and communities. It is being implemented as part of the Energy and Climate Partnership of the Americas.

- **Jamaica** is also the sole Caribbean participant in two global projects. It is one of 10 countries in which local level adaptation action is being supported through the “Community-based Adaptation to Climate Change Program” financed by the GEF through UNDP. It is also part of the European Commission’s “Global Climate Change Alliance,” which is financing priority adaptation measures in 18 vulnerable countries around the world.

Funders of Caribbean countries’ participation in Latin American and global adaptation projects include the Economic Commission for Latin America and the Caribbean (ECLAC), European

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Commission, GEF, Inter-American Development Bank (IADB), Red Cross/Red Crescent Society, UNDP, United Nations Foundation, World Bank, WHO and the governments of Finland, Norway, Spain, Sweden, Switzerland and the United States.

Table 3: Current regional and interregional adaptation programs in which Caribbean countries are participating

<table>
<thead>
<tr>
<th>Name</th>
<th>Objectives</th>
<th>Participating Countries</th>
<th>Project Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Caribbean Regional Programs</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>1. Mainstreaming Adaptation to Climate Change: Caribbean Community (MACC)(^6)</td>
<td>The objective of the MACC project is to facilitate an enabling environment for climate change adaptation in the Caribbean Community small islands and coastal developing states participating in this effort. Project components aimed to: (1) build regional capacity to collect and analyze data, thus expand the knowledge base on climate change impacts in order to assess the associated physical and socioeconomic vulnerabilities; (2) build in-country capacity to formulate and analyze adaptation policy options and finalize sectoral adaptation strategies for participating countries; (3) build capacity in preparation for a regional position for the United Nations Framework Convention on Climate Change; and (4) support public education and outreach programs by strengthening information access and data resources, and foster public awareness through technical assistance and capacity building.</td>
<td>Antigua &amp; Barbuda, Bahamas, Barbados, Belize, Dominica, Grenada, Guyana, Jamaica, Saint Kitts &amp; Nevis, Saint Lucia, Saint Vincent &amp; the Grenadines, Trinidad and Tobago</td>
<td>Funder(s) GEF Trust Fund; co-financing</td>
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<tr>
<td></td>
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<td></td>
<td>Total Budget US$16-million</td>
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<td></td>
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<td></td>
<td>Implementing Agency(s) CARICOM, CCCCCC, World Bank, Governments of Canada and the United States</td>
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<td></td>
<td></td>
<td></td>
<td>Duration 2003–2009 (closed)</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Project Type Capacity building; Policy formation and integration; Knowledge communication</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Focus Area(s) Government</td>
</tr>
<tr>
<td>2. Assistance to Improve Local Agricultural Emergency Preparedness in Caribbean countries</td>
<td>Natural hazards have severely destabilized the socioeconomic fabric of the Caribbean region in the last two decades, with the most devastating impacts</td>
<td>Cuba, Grenada, Haiti, Jamaica</td>
<td>Funder(s) FAO</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Total Budget</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Implementing Agency(s) FAO</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Duration 2006–2009</td>
</tr>
</tbody>
</table>

| 3. | Special Program on Adaptation to Climate Change: Implementation of adaptation measures in coastal zones (SPACC) | The project aims to support efforts by Dominica, Saint Lucia and Saint Vincent and the Grenadines to implement specific (integrated) pilot adaptation measures addressing primarily, the impacts of climate change on their natural resource base, focused on biodiversity and land degradation along coastal and near-coastal areas. The project also seeks to produce knowledge of global value on how to implement adaptation measures in small island states that can be applied in other countries in the region, not participating in the project and even for islands in other regions of the world. | Dominica, Saint Lucia, Saint Vincent & the Grenadines | Policy formation and integration; Capacity building | Agriculture; Disaster risk management |
| | | | | Funder(s) | GEF; co-financing |
| | | | | Total Budget | US$5.77 million |
| | | | | Implementing Agency(s) | World Bank, CCCCC |
| | | | | Duration | 2007–2011 |
| | | | | Project Type | Field implementation; Community-based adaptation |
| | | | | Focus Area(s) | Coastal zones management; Biodiversity |
| 4. | DRR and Climate Change Adaptation Support Fund | The purpose of this fund is to support the region’s disaster risk reduction (DRR) efforts and responses to effects of climate change which is recognized as a key risk to growth and poverty reduction in the Caribbean. | Caribbean region (countries not specified) | DFID |
| | | | | Total Budget | £942,616 |
| | | | | Implementing Agency(s) | DFID |
| | | | | Duration | 2008–2010 |
| | | | | Project Type | Capacity building; Knowledge communication; Policy formation and integration |
| | | | | Focus Area(s) | Disaster risk management |
| 5. | Caribbean Comprehensive Disaster Management Harmonized Implementation | The purpose of this project is to enhance institutional support and community resilience to mitigate and respond to and recover from the adverse effects of climate | Caribbean region (countries not specified) | DFID |
| | | | | Total Budget | £2,386,713 |
| | | | | Implementing Agency(s) | DFID |
| | | | | Duration | 2008–2013 |

<table>
<thead>
<tr>
<th>Program</th>
<th>Focus Area(s)</th>
<th>Project Type</th>
<th>Implementing Agency(s)</th>
<th>Total Budget</th>
<th>Duration</th>
<th>Funder(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Review of the Economics of Climate Change in the Caribbean</td>
<td>Disaster risk management</td>
<td>Capacity building</td>
<td>ECLAC in cooperation with CCCCC</td>
<td>£750,000</td>
<td>In execution</td>
<td>DFID</td>
</tr>
<tr>
<td>The Economics of Climate Adaptation Initiative</td>
<td>Government; Trade; Private sector</td>
<td>Assessment</td>
<td>CCRIF, CCCCC, ECLAC, McKinsey and Company, Swiss Re</td>
<td></td>
<td>2009–2011</td>
<td>CCRIF Technical Assistance Programme</td>
</tr>
<tr>
<td>Modeling the Transformative Impacts and Costs of Sea Level Rise in the Caribbean</td>
<td>Disaster risk management</td>
<td>Research</td>
<td>UNDP, University of the West Indies, CCCCC and the Institute of Meteorology of the Republic of Cuba</td>
<td></td>
<td>2010</td>
<td>UNDP; DFID</td>
</tr>
</tbody>
</table>

9. **CARIBSAVE Climate Change Risk Atlas: Phase 1**

To provide practical assistance to the governments, communities and the tourism sector at the local and national levels to assess climate change impacts and manage risks. The project focuses on key sectors as they relate to tourism and livelihoods, including agriculture and gender, and “is using climate models, examining sectoral vulnerabilities, assessing adaptive capacity and developing practical response strategies with the countries across the region.”

- **Antigua & Barbuda, Barbados, Belize, The Bahamas, Dominica, Dominican Republic, Grenada, Jamaica, Saint Kitts & Nevis, Saint Lucia, Saint Vincent & the Grenadines, Suriname, Turks & Caicos**
- **Funder(s):** DFID, AusAID
- **Total Budget:** £750,000 + AU$1,000,000
- **Implementing Agency(s):** CARIBSAVE
- **Duration:** 2010–2011
- **Project Type:** Research; Capacity building
- **Focus Area(s):** Tourism; Agriculture; Gender; Government

10. **Implementation Plan for the Caribbean Regional Framework for Achieving Development Resilient to Climate Change**

Develop an implementation and action plan for the Caribbean Regional Framework for Achieving Development Resilient to Climate Change (2009–2015). The action plan will identify and prioritize activities under each strategic element and goal area of the framework, allocate responsibilities and outline functional co-operation between regional and national agencies, develop an investment program and monitoring and evaluation system.

- **Caribbean (CARICOM)**
- **Funder(s):** DFID, CDKN
- **Total Budget:** £450,000
- **Implementing Agency(s):** CCCCC
- **Duration:** 2010–2011
- **Project Type:** Policy formation and integration
- **Focus Area(s):** Government

11. **Climate Change in the Organization of Eastern Caribbean States**

The project will focus on adaptation measures in the areas of coastal/marine zone management and freshwater resources management, and will seek to build an enabling environment for reducing vulnerability to climate change by improving the regulatory framework in support of national adaptation strategies. The program will also provide direct support at the country level for initiatives focusing on adaptation measures in areas of coastal zone management.

- **OECS countries: Antigua & Barbuda, Dominica, Grenada, Saint Kitts & Nevis, Saint Lucia, Saint Vincent & the Grenadines**
- **Funder(s):** USAID
- **Total Budget:** US$2.5 million
- **Implementing Agency(s):** OECS
- **Duration:** Signed in 2011
- **Project Type:** Policy formation and integration; Field implementation
- **Focus Area(s):** Coastal zone management; Freshwater supply

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<table>
<thead>
<tr>
<th>Project Title</th>
<th>Description</th>
<th>Funder(s)</th>
<th>Total Budget</th>
<th>Implementing Agency(s)</th>
<th>Duration</th>
<th>Project Type</th>
<th>Focus Area(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Caribbean Water Monitor: Small island states, water resources and climate change[^37]</td>
<td>The project builds on the existing Caribbean Drought and Precipitation Monitoring Network launched under the Caribbean Water Initiative[^38] to monitor &amp; forecast rainfall for extremes (drought and excessive precipitation) with the goal of supporting water management.</td>
<td>Barbados, Trinidad and Tobago</td>
<td>Government of Switzerland</td>
<td>Earth Sciences-University of Applied Sciences of Southern Switzerland and CIMH</td>
<td>Ongoing</td>
<td>Research; Assessment</td>
<td>Freshwater supply; Climate information services</td>
</tr>
<tr>
<td>At the Water’s Edge: Coastal resilience in Saint Vincent and the Grenadines and Grenada</td>
<td>Demonstrate that governments and communities of small island states can enhance their resilience to climate change by protecting, restoring and effectively managing their marine and coastal ecosystems and strengthening local capacity for adaptation</td>
<td>Grenada, St. Vincent &amp; the Grenadines</td>
<td>Anne Ray Charitable Trust, TNC</td>
<td>TNC</td>
<td>2011–2012</td>
<td>Assessment; Capacity building; Community-based adaptation; Knowledge communication</td>
<td>Coastal zone management; Marine management</td>
</tr>
<tr>
<td>Climate Change Vulnerability Evaluation of Coastal and Marine Areas[^39]</td>
<td>This project is part of the Ibero-American Programme on the Evaluation of Impacts, Vulnerability and Adaptation to Climate Change (PIACC) and aims to determine the impacts of climate change on the coasts of any Spanish or Portuguese speaking countries in the LAC region. It has a particular focus on the dynamics of beaches, estuaries, lagoons, deltas, cliffs and dunes, coastal erosion, flood</td>
<td>RIOCC countries, including Cuba and the Dominican Republic</td>
<td>Spain</td>
<td>ECLAC, University of Cantabria, national counterparts</td>
<td>2009–2011</td>
<td>Capacity building; Assessment; Knowledge communication</td>
<td>Coastal zone management</td>
</tr>
</tbody>
</table>

[^39]: RIOCC, [http://www.lariocc.net/riocc_principal/es/proyectos_iniciativas/proy_marc_piacc.htm](http://www.lariocc.net/riocc_principal/es/proyectos_iniciativas/proy_marc_piacc.htm)
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<tbody>
<tr>
<td>15.</td>
<td>Mitigation and Adaptation to Climate Change in Sustainable Forest Management in Ibero-America $^{10}$</td>
<td>This project is part of the Ibero-American Programme on the Evaluation of Impacts, Vulnerability and Adaptation to Climate Change (PIACC) and aims to generate new information and knowledge and strengthen the capacity of research institutions in the forestry sector on linking sustainable forest management with adaptation and mitigation to climate change. This includes strengthening specific research activities, developing and disseminating methodologies and case studies, strengthening human resources and fostering the representation of the forest sector in the regional and international dialogue.</td>
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<tr>
<td></td>
<td>RIOCC countries, including Cuba and the Dominican Republic</td>
<td>Funder(s): Spain</td>
</tr>
<tr>
<td></td>
<td>Total Budget</td>
<td>Implementing Agency(s): INIA, CIFOR, CATIE, Polytechnical University of Madrid</td>
</tr>
<tr>
<td></td>
<td>Duration</td>
<td>2009–2011</td>
</tr>
<tr>
<td></td>
<td>Project Type</td>
<td>Capacity building; Research; Knowledge communication</td>
</tr>
<tr>
<td></td>
<td>Focus Area(s)</td>
<td>Forestry</td>
</tr>
<tr>
<td>16.</td>
<td>Climate Policy 2012: extension of the global project “Capacity Development for Policy Makers to Address Climate Change” $^{41}$</td>
<td>The UNDP Regional Bureau for Latin America and the Caribbean has expanded on the global project, “Capacity Development for Policy Makers to Address Climate Change” in the LAC region to provide technical support to national policy makers and its Country Offices and strengthen capacity on budgetary issues related to the post-2012 climate regime. Activities include technical backstopping for countries that begin to consider adaptation to climate change in their National Development Plans.</td>
</tr>
<tr>
<td></td>
<td>Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Cuba, Dominican Republic, Ecuador, El Salvador, Guatemala, Honduras, Mexico, Nicaragua, Panama, Paraguay, Peru, Uruguay, and Venezuela</td>
<td>Funder(s): Spain, UNDP</td>
</tr>
<tr>
<td></td>
<td>Total Budget</td>
<td>US$3.6 million</td>
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<tr>
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<td>Implementing Agency(s): UNDP</td>
<td>Duration</td>
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<tr>
<td></td>
<td>Project Type</td>
<td>Capacity building</td>
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<tr>
<td></td>
<td>Focus Area(s)</td>
<td>Government</td>
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<tr>
<td>17.</td>
<td>Understanding Potential Impacts of Climate Change in Latin America</td>
<td>The overall objective of this project is to improve the ability of Latin American and Caribbean</td>
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<td></td>
<td>and the Caribbean</td>
<td>Total Budget</td>
</tr>
<tr>
<td></td>
<td>Implementing</td>
<td>ECLAC</td>
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<thead>
<tr>
<th>Project Title</th>
<th>Description</th>
<th>Agency(s)</th>
<th>Duration</th>
<th>Project Type</th>
<th>Focus Area(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Integrating Climate Change Adaptation into National Development Processes in Latin America and the Caribbean</td>
<td>The project seeks to build the climate resilience of vulnerable human and ecological systems in the region by integrating adaptation options into national planning processes and building the associated capacity of key regional and national institutions. The project will: undertake impact and vulnerability assessments; identify good practices and gaps in integrating adaptation into policy and plans; and support adaptation planning and its integration into national development processes. It will focus on the most vulnerable sectors and ecosystems, especially water and agriculture.</td>
<td>Ministry of Environment and Natural Parks of Spain</td>
<td>In execution</td>
<td>Capacity building</td>
<td>Disaster risk management</td>
</tr>
<tr>
<td>Potential Impact of Climate Change in Latin America and the Caribbean Mountain Forest Ecosystems</td>
<td>The objective of the project is to generate knowledge and tools for sustainable management of Ibero-American mountain forests to the potential impacts of climate change, and it will create international institutional networks that will promote the use and the continuing improvement of those tools. This will include the cooperation to assure the regional capacity growth in this topic.</td>
<td>International Development Bank of the Americas (IADB)</td>
<td>2010–2013</td>
<td>Assessment; Knowledge communication; Policy formation and integration</td>
<td>Government; Agriculture; Freshwater supply</td>
</tr>
</tbody>
</table>

### Participation in Global Projects

<table>
<thead>
<tr>
<th>Project Title</th>
<th>Description</th>
<th>Funder(s)</th>
<th>Total Budget</th>
<th>Implementing Agency(s)</th>
<th>Focus Area(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preparedness for Climate Change</td>
<td>The aim of this program was for the Red Cross and Red Crescent National Societies in countries</td>
<td>Red Cross/Red Crescent Climate Centre</td>
<td>US$738,770</td>
<td>CATIE</td>
<td>Ecosystem conservation</td>
</tr>
</tbody>
</table>
### Review of Current and Planned Adaptation Action: The Caribbean

particularly vulnerable to climate change to gain a better understanding of climate change and its impacts to identify country-specific adaptation measures in line with risks. Activities could include organizing a workshop on risks, assessment of risks through preparation of a background document, capacity building programs, and developing climate change resilient plans.

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<thead>
<tr>
<th>21. Pilot Program for Climate Resilience–Caribbean Regional Program</th>
<th>The Pilot Program for Climate Resilience is a targeted program under the Strategic Climate Fund which aims to provide incentives for scaled-up action and transformational change in integrating climate resilience into national development planning. Activities in the Caribbean include country-based investments in Haiti, Jamaica, Dominica, Saint Lucia, Saint Vincent and the Grenadines, and Grenada; as well as region-wide activities focused on climate monitoring, institutional strengthening, capacity building and knowledge sharing.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Global project with specific Caribbean regional component that includes pilot actions in Dominica, Grenada, Haiti, Jamaica, Saint Lucia, and Saint Vincent &amp; the Grenadines</td>
<td>Funder(s)</td>
</tr>
<tr>
<td>Implementing Agency(s)</td>
<td>National governments</td>
</tr>
<tr>
<td>Duration</td>
<td>2008–present</td>
</tr>
<tr>
<td>Project Type</td>
<td>Capacity building; Knowledge communication; Policy formation and integration</td>
</tr>
<tr>
<td>Focus Area</td>
<td>Government</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>22. Capacity Development for Policy Makers: Addressing climate change in key sectors</th>
<th>The project is a targeted capacity development initiative that supports two goals: 1. To increase national capacity to co-ordinate Ministerial views for more effective participation in the UNFCCC process; and 2. To assess investment and financial flows to address climate change for selected key sectors. As a result of this project, both the technical understanding of key climate change issues and their economic and policy implications within the context of the Convention will be enhanced.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Algeria, Bangladesh, Colombia, Costa Rica, Dominican Republic, Ecuador, Gambia, Honduras, Liberia, Namibia, Nepal, Nicaragua, Niger, Paraguay, Peru, Saint Lucia, Togo, Turkmenistan, Uruguay</td>
<td>Funder(s)</td>
</tr>
<tr>
<td>Implementing Agency(s)</td>
<td>UNDP</td>
</tr>
<tr>
<td>Total Budget</td>
<td>US$7 million</td>
</tr>
<tr>
<td>Duration</td>
<td>2009–2011</td>
</tr>
<tr>
<td>Project Type</td>
<td>Capacity building; Knowledge communication</td>
</tr>
<tr>
<td>Focus Area</td>
<td>Multi-sectoral</td>
</tr>
</tbody>
</table>

| 23. South-South | The project seems to strengthen | Funder(s) | UNDP’s Special Unit for |

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Cooperation between Pacific and Caribbean SIDS on Climate Change Adaptation and Disaster Risk Management\(^7\)  
the safety and resilience of Pacific and Caribbean SIDS communities to a range of natural hazards by facilitating and supporting a South-South cooperation program targeted at strengthening climate change adaptation and disaster risk reduction capacity in SIDS, based on the transfer of appropriate "southern" expertise and technologies.

<table>
<thead>
<tr>
<th>Caribbean SIDS (not specified)</th>
<th>South-South Cooperation and the UNDP-Japan Partnership Fund</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Budget</td>
<td>US$809,978</td>
</tr>
<tr>
<td>Implementing Agency(s)</td>
<td>UNDP Pacific Centre(^8)</td>
</tr>
<tr>
<td>Duration</td>
<td>2009–2011</td>
</tr>
<tr>
<td>Project Type</td>
<td>Capacity building; Knowledge communication</td>
</tr>
<tr>
<td>Focus Area(s)</td>
<td>Disaster risk management</td>
</tr>
</tbody>
</table>

## 5.2 National Level Action

At the national level, Caribbean countries have outlined adaptation needs and measures in their National Communications\(^9\) and, in the case of Haiti, a NAPA (reflecting its status as a least developed country). Independently, the Dominican Republic has prepared a National Adaptation Plan of Action. The progress of these countries with respect to national policy development and degree of project activity is presented in Table 4.

As the poorest country in the Western Hemisphere, Haiti is considered to be the Caribbean country with the least capacity to implement adaptation actions. Haiti’s NAPA outlines 15 adaptation projects, focused primarily on integrated watershed management and coastal zone management (MDE 2006). The NAPA also identifies opportunities to integrate adaptation goals with other national level policies such as Haiti’s Poverty Reduction Strategy Paper, the Interim Cooperation Framework, National Risk and Disaster Management Plan, National Environmental Action Plan, and Coastal Management Plan (MDE, 2006). However, it remains to be seen how and when these adaptation projects will be integrated and implemented on the ground, especially in light of the continuing aftereffects of the January 2010 earthquake. Moreover, the extent to which the more than US$3.5 billion mobilized for earthquake rehabilitation and restoration initiatives (Relief Web, 2011) are integrating climate change adaptation is unknown.


\(^8\) Partners in the Caribbean include Caribbean Disaster and Emergency Management Agency, the National Cuban Meteorological Institute (INSMET), CCCCC and University of the West Indies. Key partners from the Pacific region include the Pacific Islands Applied Geo-Science Commission, South Pacific Regional Environmental Programme, Secretariat of the Pacific Community and University of the South Pacific.

\(^9\) Antigua & Barbuda (Challenger, 2001); Barbados (Wellington and Moore, 2001); Cuba (Centella, 2001); Dominica (John et al., 2001); Dominican Republic (Mancebo and Matos, 2003); Grenada (Charles, 2000); Haiti (MDE, 2001); Jamaica (MWH and NMS 2000); Saint Lucia (Tulsie et al., 2001); Saint Kitts & Nevis (Ministry of the Environment, 2001); and Saint Vincent & the Grenadines (NEAB & MHE, 2000).
Haiti’s neighboring nation, the Dominican Republic, is the second poorest country in the Caribbean. It has seen some progress with the integration of adaptation into national policy, such as the inclusion of climate change adaptation in its National Development Strategy (MEPD & CNRE, 2010). However, the Dominican Republic’s recently established National Climate Change Council appears to be more focused on mitigation than adaptation. The limited number of adaptation projects in the Dominican Republic appears to be insufficient to address the needs and priorities identified in its First National Communication (Mancebo and Matos, 2003) and National Adaptation Plan of Action (Rathe, 2008).

With greater relative capacity compared to Haiti and the Dominican Republic, the remaining Caribbean countries covered in this review appear to have primarily focused their adaptation efforts through their involvement with CARICOM. The most advanced nations appear to be Dominica, Saint Lucia, and Saint Vincent and the Grenadines since they have already mainstreamed adaptation measures into their core development policy and, through the SPACC project, are currently piloting adaptation measures to improve existing policy.

| Table 4: Comparison of adaptation action at the policy and program level in the Caribbean (as of May 2011) |
|---|---|---|---|---|---|---|
| **Policy Action** | **Participation in Projects/Programs** |
| | | | | | National | Multi- | Total |
| | | | | | | country |
| **1st National Communication** | **2nd National Communication** | NAPA | National Strategy/Plan | | | |
| Antigua & Barbuda | 2001 | Expected in 2011 | n/a | | 0 | 5 | 5 |
| Barbados | 2001 | In development | n/a | | 2 | 5 | 7 |
| Cuba | 2001 | 2001 | n/a | 2007 | 1 | 5 | 6 |
| Dominica | 2001 | Expected in 2011 | n/a | | 0 | 6 | 6 |
| Dominican Republic | 2003 | 2009 | n/a | National Adaptation Plan of Action (2008) | 1 | 8 | 9 |
| Grenada | 2000 | Expected in 2011 | n/a | National Climate Change Policy and Action Plan 2007-2011 | 0 | 7 | 7 |
| Haiti | 2002 | 2002 | 2006 | | 3 | 2 | 5 |
| Jamaica | 2000 | Expected in 2011 | n/a | In development | 2 | 7 | 9 |
| Saint Kitts & Nevis | 2001 | 2000 | n/a | | 0 | 4 | 4 |
| Saint Lucia | 2001 | Expected in 2011 | n/a | Climate Change Adaptation Policy and Strategy (2003) | 0 | 7 | 7 |
| St. Vincent & the Grenadines | 2000 | Expected in 2011 | n/a | Prepared; date unknown | 0 | 6 | 6 |
| Trinidad & Tobago | 2001 | n/a | Draft Climate Change Policy (2010) | | 0 | 3 | 3 |

*Note: Information contained in this table is based upon research completed as of May 2011. Additional project and programs, for example, may be underway in each country. Full information regarding adaptation action in each country as of May 2011 is available in the Appendix of this report.*
It must be kept in mind that many countries—including Antigua and Barbuda, Barbados, Dominica, Grenada, Jamaica, Saint Kitts and Nevis, and Saint Vincent and the Grenadines—have participated in the recently completed MACC project, which aimed to help Caribbean countries develop their own national adaptation plans. As these plans appear to have not yet been released publicly, it is possible that many Caribbean islands are more advanced in the area of policy integration than what may be observed at present.

Most of the current and planned adaptation actions in the wealthier Caribbean countries focus on multi-sectoral policy integration, reflecting previous significant investments to (1) better assess the impacts of climate change in the region, (2) communicate the need for an integrated approach for climate change adaptation in SIDS to local policy makers and the public, and (3) capacity building of Caribbean governments to adopt a multi-sectoral approach. As island states, there is particular focus on coastal zone management (including adaptation to hurricanes), freshwater supplies and agriculture.

As Table 4 demonstrates, a greater number of adaptation projects are taking place in Barbados, the Dominican Republic, Grenada, Jamaica and Saint Lucia. Participation in regional projects appears to be the only basis for adaptation programming in the majority of Caribbean countries. The exceptions are Barbados, Cuba, the Dominican Republic, Haiti and Jamaica. These projects primarily focus on agriculture, coastal zone management and disaster risk management. One of the projects being implemented in Haiti, “Strengthening Adaptive Capacities to Address Climate Change Threats on Sustainable Development Strategies for Coastal Communities in Haiti,” has received funding from the Least Developed Countries Fund to support actions identified in its NAPA.

It should be kept in mind that the number of projects quantified in Table 4 does not account for those occurring at the regional level that have not explicitly identified the countries in which they are focused; these projects are identified in Table 3. As well, this review captures only those projects that explicitly aim to support adaptation to climate change. As such, initiatives in which climate change adaptation is integrated into the design of a project or that serendipitously help build adaptive capacity are not reflected in this review. Additional efforts that facilitate vulnerability reduction in the Caribbean therefore are likely underway.

### 5.3 Communities of Practice

Two knowledge networks that bring together policy-makers, researchers and non-governmental organizations from different Caribbean countries to build knowledge related to climate change adaptation are the “Caribbean Drought and Precipitation Monitoring Network” and “the Regional Policy Dialogue: Water and Climate Change Adaptation.” Both of these networks are described in Table 5. Other formal communities of practice active in the region have not been identified.
Table 5: Identified communities of practice focused on adaptation that are active in the Caribbean

<table>
<thead>
<tr>
<th>Organization</th>
<th>Geographic scope</th>
<th>Type of Action</th>
<th>Sector / area of work</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Caribbean Drought and Precipitation Monitoring Network (CDPMN)⁵⁰</td>
<td>Jamaica, Grenada and Guyana</td>
<td>Research; Knowledge communication</td>
<td>Started under the CARIWIN project, the CDPMN seeks to produce a number of precipitation indices to assist in monitoring drought and wet seasons in the Caribbean. The CDPMN bring together the Caribbean Institute for Meteorology and Hydrology (CIMH), national and local governments and pilot communities to share knowledge on adaptation strategies.</td>
</tr>
<tr>
<td>2. Regional Policy Dialogue: Water and Climate Change Adaptation</td>
<td>Latin America and the Caribbean</td>
<td>Knowledge communication; Advocacy</td>
<td>The network is a regional effort where civil society, multilateral partners, the private sector and governments collaborate in dialogue to share knowledge and lessons learned on climate change and water.⁵¹ With a clear focus on water issues related to climate change, it aims to raise awareness among the public and decision-makers, promote a united voice in global discussions, and exchange experiences.</td>
</tr>
</tbody>
</table>

6.0 Conclusions

Adaptation to the uncertain yet foreseeable impacts of climate change is well beyond the sole capacity of any one Caribbean nation. However, regional initiatives, along with newly forged regional institutions with an adaptation focus (i.e., CCCCC and CCRIF), are enabling countries to provide/share resources, tools and guidance for adaptation actions. The regional initiatives provide multi-sectoral support to gather information on climate change, mainstream adaptation actions into sustainable development agendas, and implement and refine policy to better account for climate change impacts. However, it is up to individual national and local governments to effectively implement adaptation measures. The wide gap in wealth and capacity between nations in the Caribbean (e.g., Bahamas and Haiti) can be challenging due to a mismatch of capacity to undertake adaptation measures. However, this challenge also presents an opportunity for Haiti and other nations with limited capacity to build upon the successes of their wealthier neighbors.

A common theme (or priority) identified in both regional and national adaptation actions is the need for an ecosystem approach for integrated coastal zone management and/or integrated watershed management. There is national and regional recognition that ecosystem services can greatly reduce adaptation costs whilst providing numerous co-benefits (i.e., mangroves and reefs protect shorelines from erosion and supply fisheries; forests mitigate landslides, flooding and drought). The need for integrated watershed management is particularly vital in Haiti due to its extensive deforestation and

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⁵¹ Dialogue partners include: Inter-American Development Bank, World Bank, Agencia Nacional de Aguas, Red Centroamericana de Acción del Agua, Consejo Consultivo de Agua, The Nature Conservancy, UN-Habitat, Gobierno de Sao Paulo, Comisión Nacional del Agua, the Global Water Partnership and Tecnológico de Monterrey,
high degree of vulnerability to flooding and landslides along its steep slopes. Yet implementing adaptation actions will be challenging, as Haiti struggles to recover from the crippling 2010 earthquake. Nevertheless, where possible, restoration efforts could be evaluated and executed to ensure climate change adaptation, or at least minimize vulnerability to future climate change impacts.

An issue that seems to have been overlooked by Caribbean governments is ocean acidification.\textsuperscript{52} Nearly all nations recognized the threat that climate change poses to coral reefs in their national communications and expressed protection of coral reefs as a key concern, especially considering the important role they play for maintaining fisheries, tourism, and biodiversity conservation. However, the threat of ocean acidification was not acknowledged (see for example, Albright et al., 2010), and adaptation to ocean acidification is currently poorly understood.

There appears to be an evolution of adaptation projects in the Caribbean. Initially focused primarily on capacity building for analysis of climate change vulnerability, projects then progressed to capacity building for mainstreaming adaptation action into development agendas. Currently, projects have started to implement actions on the ground to further improve adaptation mainstreaming outcomes. Although considerable progress has been made, some gaps in programming may be identified:

- Although a number of adaptation projects and programs are being implemented, few are taking place at the national level. It appears that the majority of Caribbean countries are building their adaptation capacity solely through participation in regional and global initiatives. More targeted, discrete adaptation projects at the national level may be appropriate to better respond to countries’ individual needs.

- Although appearing to be a more common component of newer adaptation projects in the region, relatively little implementation of adaptation actions on the ground is underway at present. As capacity is to assess vulnerabilities and plan adaptation measures is enhanced, greater implementation of field level actions across the diverse needs of the islands of the Caribbean may be appropriate.

- Adaptation action is taking place in a range of sectors, particularly related to the capacity of government to facilitate adaptation actions, disaster risk management, coastal zone management and agriculture. While some current projects address needs related to the region’s important tourism sector and to forestry, biodiversity and the gender dimensions of climate change, expansion of action in these areas may be appropriate.

- As well, relatively few projects appear to address the regions particular needs with respect to the provision of freshwater resources, and even fewer target marine resources (including fisheries) and concerns related to human health. Needs in these areas may be addressed through future adaptation programming.

\textsuperscript{52} Ocean acidification is the decreasing pH (increasing acidity) of the ocean resulting from increasing concentrations of carbon dioxide in the atmosphere.
References


Review of Current and Planned Adaptation Action: The Caribbean


United Nation Environment Programme [UNEP] (2008). Climate Change in the Caribbean and the Challenge of Adaptation. Panama City, Panama: UNEP Regional Office for Latin America and the Caribbean.


Appendices: Country Profiles

Within this review of current and planned adaptation action, the Caribbean is defined as the following: Antigua and Barbuda, Barbados, Cuba, Dominica, Dominican Republic, Grenada, Haiti, Jamaica, Saint Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines, and Trinidad and Tobago.

To assess the level of adaptation action occurring in each of these countries, a desk-based review of internet sources and relevant documentation was undertaken. The content of these sources was assessed in relation to a set of parameters established to focus the review’s scope and ensure consistency across regions. Notably, it examines *discrete* adaptation actions, or *policies, programs and projects designed and implemented specifically to address the current and projected impacts of climate change*. Therefore, the review presents only a portion of the breadth of the efforts underway to reduce the vulnerability of developing countries to the impacts of climate change. In particular, it does not capture the broad array of development activities that are increasing the adaptive capacity of communities and countries. As well, within the review, adaptation efforts have been deemed to be “current” if they were ongoing or completed in 2009 or later. Therefore, the review does not include projects completed prior to 2009 that may have contributed to building local and national capacity to adapt. The review also only identifies those actions currently underway; it does not offer judgment of the effectiveness of actions taking place. In addition, reflecting the desk-based nature of the review, it is acknowledged that the content is biased toward identification of large-scale projects funded by international development assistance organizations and those projects about which information is available online. Therefore, small-scale projects that meet the review’s definition of adaptation action, particularly those occurring at the community level, are not fully represented within the review. A fuller explanation of the methodology used to develop the country profiles that follow is provided in the methodology section of this report.

To facilitate analysis of the degree to which current adaptation projects and programs identified through the review are helping to meet the adaptation needs and priorities of developing countries, a common classification system was developed. This system examined identified projects and programs from two perspectives—their sector or areas of focus and the types of activities they are supporting. A fuller description of these two types of classifications is provided below.

**Sector or Area of Focus**
To support development of a general classification system for adaptation projects on the basis of their sector or area of focus, a review of the categories used by the Adaptation Learning Mechanism, Intergovernmental Panel on Climate Change (IPCC), United Nations...
Environment Programme (UNEP) and the Nairobi Work Programme was completed and used to guide development of a series of categories for characterizing activities included in this review. Based on this review and expert judgment, a set of 14 macro project categories were identified: food, fiber and forests; ecosystems; freshwater resources; oceans and coastal areas; disaster risk management; migration and security; gender; business; infrastructure and transportation; human settlements; human health; climate information services; governance; and multi-sectoral. Where appropriate, these macro project categories were further refined through the identification of various sub-categories. These sub-categories were then used to label the discrete adaptation projects included in the review.

Definitions of the macro project categories used in the review along with descriptions of the types of projects included within their individual sub-categories are presented below.

1. **Food, Fiber and Forests** – Defined as the management and use of terrestrial natural resources to directly improve human well-being. Its sub-categories are:
   - *Agriculture* – Encompassing subsistence agriculture, commercial agriculture and the rearing of confined domestic animals.
   - *Pastoralism* – Encompassing the use of domestic animals as a primary means for obtaining resources from habitats (UNEP, 2007), particularly in nomadic and semi-nomadic communities.
   - *Forestry* – Encompassing afforestation, reforestation, agroforestry, commercial forestry, community-based forest management and woodland management.
   - *Fire management* – encompassing monitoring, planning and management to address the impact of fires on settlements and ecosystems, including forested and grassland ecosystems.

2. **Ecosystems** – Defined as a system of living organisms interacting together and with their physical environment, the boundaries of which may range from very small spatial scales to, ultimately, the entire Earth (IPCC, 2007). Its sub-categories are:
   - *Biodiversity* – Encompassing activities related to the maintenance of living organisms at various spatial scales, including the establishment and protection of parks and bio-reserves.
   - *Ecosystem conservation* – Encompassing efforts to maintain the health of particular ecosystems, such as wetlands, grasslands, forests, mangroves and coral reefs.
   - *Ecosystem restoration* – Encompassing efforts to restore the health of particular ecosystems, such as wetlands, grasslands, forests, mangroves and coral reefs.
3. **Freshwater Resources** – Defined as the management and use of freshwater contained in terrestrial ponds, lakes, rivers, watersheds, among others. Its sub-categories are:
   - *Freshwater fisheries* – Encompasses the catching, packing and selling of fish and shellfish derived from lakes, rivers and ponds, as well as through freshwater aquaculture.
   - *Watershed management* – Encompassing management of the basins that supply water to different streams, rivers, lakes and reservoirs, including integrated watershed management.
   - *Freshwater supply* – Encompassing efforts to access and preserve freshwater for human consumption and use including drinking water sources, groundwater resources, rainwater harvesting and water infrastructure such as wells, dams and dikes.

4. **Oceans and Coastal Areas** – Defined as the management and use of coastal areas and oceans. Its sub-categories are:
   - *Coastal zone management* – Encompassing the management of land and water resources in coastal areas, including through integrated coastal zone management and the establishment and maintenance of coastal infrastructure.
   - *Marine management* – Encompassing the management and use of off-shore ocean and sea resources.
   - *Marine fisheries* – Encompassing the catching, packing and selling of fish, shellfish and other aquatic resources found in the oceans and seas, including through marine and coastal aquaculture.

5. **Disaster Risk Management** – Defined as the “systematic process of using administrative directives, organizations, and operational skills and capacities to implement strategies, policies and improved coping capacities in order to lessen the adverse impacts of hazards and the possibility of disaster” (UNISDR, 2009, pp. 10). It includes emergency response measures, preparation for extreme events and early warning systems. No sub-categories were established in relation to this macro project category.

6. **Migration and Security** – Defined as efforts to support the movement of people and maintain their personal security in the face of incremental climate changes or climate shocks.
   - *Migration* – Encompassing preparations for and responses to the potential movement of people from one location to another due to climate change impacts.
   - *Security* – Relates to personal security and freedom from violence, crime and war due to natural and human-induced disasters (UNEP, 2007) and encompasses peace building, conflict reduction and conflict avoidance activities.
7. **Gender** – Defined as the social attributes and opportunities associated with being male and female and the relationships between women and men, and girls and boys, as well as the relations between women and those between men. These attributes, opportunities and relationships are socially constructed and are learned through socialization processes (UN Women, undated). It includes efforts to understand the vulnerability of women to the impacts of climate change, gender-sensitive adaptation strategies, and measures to improve the situation of women at the local and policy level, including through gender mainstreaming. No sub-categories were established in relation to this macro project category.

8. **Business** – Defined as the purchase and sale of goods and services with the objective of earning a profit. Its sub-categories are:
   - *Tourism* – Encompassing the adjustment and development of tourist facilities and operations to account for current and future vulnerabilities, including these actions in relation to ecotourism.
   - *Private sector* – Encompassing potential impact of climate change and potential adaptation strategies on the diverse activities underway in the portion of the economy in which goods and services are produced by individuals and companies including industry, mining and other economic sectors.
   - *Trade* – Encompassing the exchange of goods and services within and between countries.
   - *Insurance* – Encompassing the development, testing and adjusting of insurance and risk-management schemes, including weather-based index systems.

9. **Infrastructure** – Defined as the basic equipment, utilities, productive enterprises, installations, institutions and services essential for the development, operation and growth of an organization, city or nation (IPCC, 2001). Its sub-categories are:
   - *Energy* – Encompassing energy-related systems and infrastructure, including small-scale and large-scale energy generation through hydroelectric power generation, wind, solar and other forms of traditional and new energy sources, as well as transmission networks.
   - *Transportation* – Encompassing the components of the system required to move people and goods, including roads, bridges, railway lines, shipping corridors and ports.
   - *Waste management* – Encompassing sanitation, sewage systems, drainage systems and landfills.
   - *Buildings* – Encompassing actions related to built structures such as houses, schools and offices, including changes to building codes, building practices and green ways of construction.
10. **Human Settlements** – Defined as a place or area occupied by settlers (IPCC, 2001). Its sub-categories are:
   - *Peri-urban areas* – Encompassing the outskirts of urban centers, and the transition zone between rural and urban areas.
   - *Urban areas* – Encompassing municipalities, towns and cities, as well as areas in these centers (such as slums).
   - *Rural areas* – Encompassing villages and other small settlements, as well as rural landscapes and integrated rural development.

11. **Human Health** – Defined as a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity (WHO, undated). It includes efforts to assess vulnerabilities to and the impacts of climate change on human health directly and indirectly, and the development and implementation of appropriate adaptation strategies at the local, regional and national levels. No sub-categories were established in relation to this macro project category.

12. **Climate Information Services** – Defined as the production and delivery of authoritative, timely and usable information about climate change, climate variability, climate trends and impacts to different users at the local, sub-national, national, regional and global levels. It includes efforts to develop, adjust and provide short- and long-term climate forecasts, including climate change projections, to different audiences. No sub-categories were established in relation to this macro project category.

13. **Governance** – Defined as the institutions (laws, property rights systems and forms of social organization) through which societies define and exercise control over resources. Its sub-categories are:
   - *Government* – Encompassing efforts to build the capacity of government officials, either at the national or sub-national level, to prepare for and facilitate adaptation to climate change, including through the development of policies, plans, frameworks and strategies, as well as the establishment and operation of climate change trust funds.
   - *Civil society* – Encompassing efforts to build the capacity of the public including non-governmental organizations, to understand, prepare for and respond to climate change.

14. **Multi-sectoral** – Defined as actions that simultaneously address more than one sector in one and/or multiple locations. It includes efforts that address more than one sector, which are challenging to tease apart, and in the context of this review includes large, multi-country projects in which the specific sector of focus is nationally determined and, therefore, varies from country to country. No sub-categories were established in relation to this macro project category.

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54 Derived from UNEP, 2007.
Types of Activities
The following categories were used to organize the types of activities being completed as part of current adaptation projects and programs identified through the review:

- **Research** – Encompassing efforts to develop new knowledge and/or organize existing information so as to increase understanding of the links between climate change, human society and ecosystems and inform adaptation decision-making.
- **Assessment** – Encompassing risk, impact and vulnerability assessments, as well as monitoring of ecological and societal trends.
- **Capacity building** – Encompassing the provision of technical training, technical assistance, institutional strengthening and education.
- **Knowledge communication** – Encompassing efforts to share information, knowledge and practices related to climate change adaptation, including awareness raising and engagement of media.
- **Policy formation and integration** – Encompassing efforts to inform, develop and implement climate change adaptation plans, strategies, frameworks and policies at the local, sub-national, national and international levels.
- **Field implementation** – Encompassing physical measures to reduce vulnerability to the impacts of climate change, including the implementation of pilot projects, construction of infrastructure, development and modification of technologies and the management of physical resources.
- **Community-based adaptation** – Encompassing actions that directly engage community members in efforts to understand, plan for and respond to the impacts of climate change.

References:


Antigua and Barbuda is an archipelago nation located between the Caribbean Sea and the Atlantic Ocean with approximately 84,000 inhabitants. It consists of two principle islands, Antigua and Barbuda, as well as a number of smaller islands. Tourism is a major sector in the country, comprising more than half of annual Gross Domestic Product (GDP), with other major sectors including construction, transport, communications, and banking and financial services (ALM, 2009; USDS, 2011). The agriculture sector is also an important part of the country’s economy, with major crops including fish, cotton, livestock, vegetables and pineapples (USDS, 2011). The country’s terrain is characterized as low-lying, with its highest elevation reaching 405 meters. It experiences a tropical maritime climate with high and uniform yearlong temperatures and easterly trade winds (Challenger, 2001; USDS, 2011). Antigua and Barbuda’s marine and coastal environments are characterized by mangroves, coral reefs and sea-grass beds; these ecosystems sustain the country’s sandy beaches and fishery resources, while also serving as protective barriers during tropical storms (Challenger, 2001).

A. Adaptation Needs and Priorities
Antigua and Barbuda’s most vulnerable sectors are coastal zones, tourism, water, agriculture and human health (Challenger, 2001). The country’s National Communication, prepared in 2001, identifies the country’s adaptation needs and priorities as summarized in Table 1.
<table>
<thead>
<tr>
<th>Key vulnerable sectors</th>
<th>Risks due to climate change</th>
<th>Adaptation activities and needs</th>
</tr>
</thead>
</table>
| Human settlements and tourism | - Heavy rains and storm surges  
- Flooding and landslides  
- Damage to hotels and tourist properties | - Hazard mapping to identify areas most vulnerable to climate change  
- Flood control, including the cleaning of watercourses and drains  
- Land use controls and enforcement, including zoning regulations, building codes, and planning infrastructure standards  
- Retrofitting existing structures to strengthen resilience against the hazards of climate change and hurricanes  
- Capacity building, particularly the strengthening of institutions  
- Improved forecasting and early warning systems  
- Public education and information to raise public awareness  
- Insurance initiatives to reduce the vulnerability of properties |
| Coastal zones | - Erosion, coastal flooding, storm damage  
- Damage to mangroves  
- Detrimental impacts to coral reefs  
- Salinization of coastal aquifers | - Protective measures to restore beach and/or protect property, including beach nourishing and dune restoration  
- Exploration of retreat and accommodation options |
| Fisheries | - Damage to habitat  
- Changes to fish stock availability  
- Damage to fishing traps and other fishing infrastructure | - Development of pelagic freshwater fisheries  
- Aquaculture  
- Investment in more sophisticated fishing vessels |
| Agriculture | - Higher evapotranspiration rates and higher temperatures  
- Shortage in forage and feed availability for livestock  
- Drought, floods and extreme weather events | - Need for a cross-sectoral water policy  
- Introduction of drought-tolerant crop varieties  
- For livestock, a reduction in the number of animals per acre and development of high protein fodder |
| Freshwater | - Saline intrusion into aquifers  
- Reduction in surface water availability  
- Increased occurrence of droughts and floods | - More efficient management of existing supplies and infrastructure  
- Institutional arrangements to limit future demands  
- Promotion of conservation  
- Monitoring and forecasting systems for droughts and floods  
- Rehabilitation of watersheds |
| Human health | - Impacts on food security and water supply  
- Possibility of dengue fever outbreaks, as well as cholera, typhoid and bacterial dysentery | - Programs for improved health data management and monitoring  
- Public awareness activities  
- Technological interventions, including solid and liquid waste management |

Source: Challenger (2001)
B. National Level Policies and Strategic Documents
In 2001, Antigua and Barbuda submitted an Initial National Communication to the United Nations Framework Convention on Climate Change; it is presently in the process of completing its Second National Communication.35 Additional policy related initiatives at the national level may be occurring as part of Antigua and Barbuda's participation in regional initiatives. For example, through the Caribbean Community Climate Change Centre (CCCCC) and other regional forums, Antigua and Barbuda is collaborating with other Caribbean Community (CARICOM) on adaptation policy at the regional level, including through the recently released Regional Framework for Achieving Development Resilient to Climate Change. In addition, Antigua and Barbuda recently participated in the regional project “Mainstreaming Adaptation to Climate Change,” which sought to integrate climate change considerations into the national development policies and planning of Caribbean countries. This project is the most recent of a succession of regional projects dating back to 1997 that have addressed climate change adaptation in the region.

Table 2: Key Government Policies and Reports reflecting Adaptation Needs, Priorities and Planned Actions

<table>
<thead>
<tr>
<th>Name of Policy Action</th>
<th>Government Division Responsible</th>
<th>Status</th>
<th>Sector(s) of Focus</th>
<th>Summary description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Initial National Communication on Climate Change36</td>
<td>Office of the Prime Minister</td>
<td>Submitted in 2001</td>
<td>Coastal zone management; Biodiversity</td>
<td>This document reviews the country’s national circumstances, greenhouse gas mitigation profile, key vulnerabilities, as well as mitigation and adaptation policy options.</td>
</tr>
</tbody>
</table>

C. Current Adaptation Action
There do not appear to be any nationally focused adaptation projects currently taking place within Antigua and Barbuda. However, a moderate number of multi-country projects are ongoing and recently were completed in the country. For example, as indicated in Table 3, working with the Organization for Eastern Caribbean States (OECs), the United States Agency for International Development (USAID) is funding a pan- Caribbean project focused on reducing vulnerability in coastal zones and the water sector by building regulatory frameworks for adaptation, as well as through capacity building and awareness raising efforts. In addition, the recently completed “Mainstreaming Adaptation to Climate Change” (MACC) project worked with Caribbean countries to mainstream adaptation into policy frameworks. The Climate Change Risk Insurance Facility is cooperating with a number of organizations to assess the economic vulnerability of Caribbean countries to the effects of climate change in order to better prepare for its impacts. It is likely that projects listed

in Table 3 under-represents the number of adaptation activities currently taking place within Antigua and Barbuda as several donors that are funding projects in the Caribbean do not specify which particular countries are benefitting from their projects.

Adaptation programming in Antigua and Barbuda is largely focused on building capacity within the governance sector, and predominately involves capacity building, research, policy building, and knowledge communication. Additional sectors in which adaptation action is currently occurring are coastal zone management, disaster risk management, tourism, agriculture, freshwater resources and gender.

Table 3: Current Adaptation Projects and Programs active in Antigua and Barbuda

<table>
<thead>
<tr>
<th>Name</th>
<th>Objectives</th>
<th>Funder(s)</th>
<th>Implementing Agency(s)</th>
<th>Type of project</th>
<th>Duration</th>
<th>Priority Sector(s)</th>
<th>Geographic focus (if any)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Mainstreaming Adaptation to Climate Change: Caribbean Community (MACC) 57</td>
<td>The objective of the MACC project is to facilitate an enabling environment for climate change adaptation in the Caribbean Community small islands and coastal developing states participating in this effort. Project components aimed to: (1) build regional capacity to collect and analyze data, thus expand the knowledge base on climate change impacts in order to assess the associated physical and socioeconomic vulnerabilities; (2) build in-country capacity to formulate and analyze adaptation policy options and finalize sectoral adaptation strategies for participating countries; (3) build capacity in preparation for a regional position for the United Nations Framework Convention on Climate Change; and (4) support public education and outreach programs by strengthening information access and data resources, and foster public awareness through technical assistance and (4) support public education and outreach programs by strengthening information access and data resources, and foster public awareness through technical assistance and</td>
<td>GEF Trust Fund; co-financing</td>
<td>CCCC, CARICOM, World Bank, Government of Canada, GEF, Government of US</td>
<td>Capacity building; Knowledge communicatio; Policy formation and integration</td>
<td>2003–2009 (closed)</td>
<td>Government</td>
<td>Regional: Antigua and Barbuda, Bahamas, Barbados, Belize, Dominica, Grenada, Guyana, Jamaica, Saint Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines, Trinidad and Tobago</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Name</th>
<th>Objectives</th>
<th>Funder(s)</th>
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<th>Duration</th>
<th>Priority Sector(s)</th>
<th>Geographic focus (if any)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2. Preparedness for Climate Change</td>
<td>The aim of this program was for the Red Cross and Red Crescent National Societies in countries particularly vulnerable to climate change to gain a better understanding of climate change and its impacts to identify country-specific adaptation measures in line with risks. Activities could include organizing a workshop on risks, assessment of risks through preparation of a background document, capacity building programs, and developing climate change resilient plans.</td>
<td>Red Cross/Red Crescent Climate Centre</td>
<td>National Red Cross/Red Crescent Societies</td>
<td>Capacity building; Policy formation and integration</td>
<td>Phase 1: 2006–2009 Phase 2: ongoing</td>
<td>Disaster risk management</td>
<td>39 countries Caribbean countries Phase 1: Antigua &amp; Barbuda, Grenada, Saint Kitts &amp; Nevis, Trinidad &amp; Tobago</td>
</tr>
<tr>
<td>3. The Economics of Climate Adaptation Initiative</td>
<td>Recognizing that decision makers need a quantitative fact base to inform the design of sound adaptation strategies, the Caribbean Catastrophe Risk Insurance Facility launched a study for the Caribbean region in February 2010. Based on the Economics of Climate Adaptation (ECA) methodology developed by the ECA Working Group, the study provides the facts and tools required to develop quantitative adaptation strategies that can be incorporated into national development plans. An initial study has been produced. The next phase of the project will include further engagement with countries via individual workshops to obtain feedback on</td>
<td>CCRIF Technical Assistance Programme</td>
<td>CCRIF, CCCCC, ECLAC, McKinsey and Company, and Swiss Re.</td>
<td>Research; Knowledge communication</td>
<td>2009–2011</td>
<td>Government</td>
<td>Regional: Anguilla, Antigua &amp; Barbuda, Barbados, Bermuda, Cayman Islands, Dominica, Jamaica, and Saint Lucia</td>
</tr>
</tbody>
</table>

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58 IFRC, [http://www.climatecentre.org/site/preparedness-for-climate-change-programme](http://www.climatecentre.org/site/preparedness-for-climate-change-programme)
60 CCRIF, [http://www.ccrif.org/sites/default/files/publications/ECABrochureFinalAugust182010.pdf](http://www.ccrif.org/sites/default/files/publications/ECABrochureFinalAugust182010.pdf)
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<tr>
<th>Name</th>
<th>Objectives</th>
<th>Funder(s)</th>
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<th>Duration</th>
<th>Priority Sector(s)</th>
<th>Geographic focus (if any)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>results, engage in verification and enhancement of input data and areas for more details work, etc. Phase 3 will involve working closely with interested countries and other partners to enable the application of this methodology in all Caribbean countries.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>CARIBSAVE Climate Change Risk Atlas: Phase 1</td>
<td>To provide practical assistance to the governments, communities and the tourism sector at the local and national levels to assess climate change impacts and manage risks. The project focuses on key sectors as they relate to tourism and livelihoods, including agriculture and gender, and “is using climate models, examining sectoral vulnerabilities, assessing adaptive capacity and developing practical response strategies with the countries across the region.”</td>
<td>DFID; AusAID</td>
<td>CARIBSAVE</td>
<td>Research; Capacity building</td>
<td>2010–2011</td>
<td>Tourism; Agriculture; Gender; Government</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Budget: £750,000 + AUS$ 1,000,000</td>
<td></td>
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</tr>
<tr>
<td>In Antigua and Barbuda: Workshops were held in Antigua and Barbuda in July 2011 with USAID and OECS staff to prepare the country for this project. Tentative activities were identified by the climate change committees and proposals for funding are now being developed.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>Climate Change in the Organization of Eastern</td>
<td>The project will focus on adaptation measures in the areas of coastal/marine zone</td>
<td>USAID</td>
<td>OECS</td>
<td>Policy formation and</td>
<td>2011–?</td>
<td>Coastal zone management</td>
</tr>
</tbody>
</table>

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Review of Current and Planned Adaptation Action: The Caribbean
D. Proposed Adaptation Action
Antigua and Barbuda’s Initial National Communication summarizes potential climate change adaptation actions that the country may take to address climate change in key areas, as presented in Table 1. This list may be further refined and expanded through the country’s forthcoming Second National Communication.

E. Assessment
The majority of adaptation action in Antigua and Barbuda appears to be occurring at the regional level. At present, the known adaptation projects occurring within the country are addressing its priorities in the areas of water, agriculture, tourism and coastal zones. Through the “CARIBSAVE Climate Change Risk Atlas” project, the country is also taking a gender-based perspective on the implications of climate change for tourism and livelihoods. A gap in implementation appears to exist within the priority sector of human health. The country’s forthcoming Second National Communication may offer a more complete picture of current adaptation action within the country and priority needs going forward.

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References:


2.0 Barbados

Barbados is the most easterly island of the Antilles, bordered by the Caribbean Sea to the west and the Atlantic Ocean to the east, with a population of approximately 282,000 people (USDS, 2011). Its terrain is mostly flat but with a hilly interior. The island’s climate is tropical, with annual average temperatures of around 27°C (USDS, 2011). The country’s wet season lasts from June to November, while the dry season lasts from December to May (Wellington and Moore, 2001). In recent years there has been a change in the frequency of rainfall, with an increase in the length of dry spells; this change has impacted agricultural production and water supplies (Wellington and Moore, 2001). As the island has no major rivers or surface streams, underground streams are the nation’s main source of water (Wellington and Moore, 2001).

The tourism, sugar, manufacturing, and finance and business sectors are Barbados’ main sources of foreign exchange (Wellington and Moore, 2001). Although sugar production was formerly a considerable contributor to the country’s Gross Domestic Product, economic diversification along with dramatic declines in soil fertility and drought in recent decades have diminished this crop’s importance to the national economy (Wellington and Moore, 2001). The majority of the workforce is employed by the following activities: tourism,
government, manufacturing, construction, mining, agriculture and fishing (USDS, 2011). Barbados’ unemployment rate is 10 per cent, per capita income is approximately US$19,000 per year, and the island has a very high adult literacy rate at 99 per cent (USDS, 2011).

A. Adaptation Needs and Priorities

The anticipated impacts of climate change in the country include coastal inundation and sea level rise, an increase in tidal and storm surge levels, coastal erosion, rising temperatures, changes in rainfall patterns, and more frequent and severe weather events including drought and tropical storms (Wellington and Moore, 2001). These impacts would have a largely negative impact on the country’s tourism sector, freshwater supply, coastal infrastructure, coral reefs and fisheries. These projected impacts are summarized in Table 1, along with possible adaptation options.

Table 1: Climate change vulnerabilities and proposed responses in Barbados’ National Communication

<table>
<thead>
<tr>
<th>Priority Sector</th>
<th>Vulnerabilities</th>
<th>Proposed Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agriculture</td>
<td>• Less rain and more drought causing low crop yields, reduction in genetic diversity, reduced feed for livestock, and an increase in the numbers and generation of pest</td>
<td>• Development of a food security strategy</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Research into more drought resistant crops and crops with shorter growing seasons</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Inventory and monitoring of resources</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Wider application of Integrated Pest Management</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Integrated water resource management</td>
</tr>
<tr>
<td>Coral reefs and fisheries</td>
<td>• Less rain may cause reduced influx of nutrients into the near-shore</td>
<td>• Engage in coastal zone management</td>
</tr>
<tr>
<td></td>
<td>• Increased flooding may increase near-shore salinity and sediment load</td>
<td>• Conduct monitoring and research activities</td>
</tr>
<tr>
<td></td>
<td>• Increased temperature may cause heat-induced mortality of fish</td>
<td>• Enhance the resilience of natural systems through improved pollution control</td>
</tr>
<tr>
<td></td>
<td>• Sea level rise</td>
<td>• Implementation of comprehensive watershed management systems</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Implementation of setbacks and zones for coastal buildings; establish a building code for coastal buildings</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Beach nourishment</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Construction of groynes, revetments and breakwaters</td>
</tr>
<tr>
<td>Freshwater resources</td>
<td>• Less rain and more drought may reduce water availability and encourage saline intrusion along the coast</td>
<td>• Integrated water resource management</td>
</tr>
<tr>
<td></td>
<td>• Increases in temperature may cause increased evapotranspiration</td>
<td>• Control leakage from water mains</td>
</tr>
<tr>
<td></td>
<td>• Sea level rise</td>
<td>• Desalinization and other augmentation techniques</td>
</tr>
<tr>
<td>Human settlement/ infrastructure</td>
<td>• Less rain and more drought may increase demand for water, have an adverse effect on food supply, and cause structural damage</td>
<td>• Relocation and redesign of wells</td>
</tr>
<tr>
<td></td>
<td>• Increased flooding may impact insurance costs</td>
<td>• Integrated water resource management</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Public awareness campaigns</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Incorporation of climate change considerations into building codes and coastal</td>
</tr>
</tbody>
</table>

Review of Current and Planned Adaptation Action: The Caribbean
Review of Current and Planned Adaptation Action: The Caribbean

B. National Level Policies and Strategic Documents
The island of Barbados submitted its First National Communication to the United Nations Framework Convention on Climate Change (UNFCCC), and participates in regional intergovernmental collaboration to address climate change. The government was also the first Caribbean country to create a special body charged with coastal zone management, the Coastal Zone Management Unit. In addition, a National Adaptation Strategy to Address Climate Change in the Tourism Sector in Barbados was developed by the Barbados Centre for Resource Management and Environmental Studies in 2009, and published by the Caribbean Community Climate Change Centre (CCCC). The degree to which this policy has been by the government of Barbados is unclear.

Table 2: Key Government Policies and Reports reflecting Adaptation Needs, Priorities and Planned Actions

<table>
<thead>
<tr>
<th>Name of Policy Action</th>
<th>Government Division Responsible</th>
<th>Status</th>
<th>Sector(s) of Focus</th>
<th>Summary description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. First National Communication to the UNFCCC</td>
<td>Ministry of Physical Development and Environment</td>
<td>Submitted in 2001</td>
<td>Multi-sectoral</td>
<td>This document provides an overview of Barbados’ national circumstances, greenhouse gas emissions profile, key vulnerabilities to climate change, as well as mitigation and adaptation policies.</td>
</tr>
</tbody>
</table>

C. Current Adaptation Action
Barbados is currently participating in a high number of adaptation actions. In addition to its involvement in a number of regional projects, Barbados is one of a few Caribbean countries that also is benefitting from nationally-focused adaptation activities. Nationally-focused projects are being funded by the Inter-American Development Bank (IADB) and are focused on coastal zone management, disaster risk management and institutional strengthening.

Download available here: [http://200.32.211.67/M-Files/openfile.aspx?objtype=0&docid=2730](http://200.32.211.67/M-Files/openfile.aspx?objtype=0&docid=2730)
Further information available here: [http://www.dfid.gov.uk/where-we-work/caribbean/barbados/](http://www.dfid.gov.uk/where-we-work/caribbean/barbados/)
Regional project activities in Barbados include an United States Agency for International Development (USAID) funded project that focuses on vulnerability assessment and capacity building to address climate change in coastal zones and the water sector; the Caribbean Catastrophe Risk Insurance Facility (CCRIF) funded “Economics of Climate Adaptation Initiative;” and the recently completed Global Environment Facility (GEF)-funded project focused on mainstreaming climate considerations into development planning and programming. The government of Switzerland is also funding a project in Barbados and Trinidad and Tobago that focuses on research, vulnerability assessment, and policy formation in the freshwater sector. The inter-regional World Health Organization (WHO)-funded “Piloting Climate Change Adaptation to Protect Human Health” project also includes a component in Barbados.

Collectively, the current adaptation projects in Barbados address a number of vulnerable sectors, with a stronger focus on disaster risk management and governance capacity. Most projects involve capacity building, assessment and research activities; few expect to implement adaptation actions on the ground. The projects listed in Table 3 are likely to underrepresent the scope of adaptation work in Barbados. It is possible that the government is engaged in efforts not captured in the table, as some donor funded regional project activities are ongoing that do not specify in which Caribbean countries they are working.

<p>| Table 3: Current Adaptation Projects and Programs active in Barbados |</p>
<table>
<thead>
<tr>
<th>Name</th>
<th>Objectives</th>
<th>Funder(s)</th>
<th>Implementing Agency(s)</th>
<th>Type of project</th>
<th>Duration</th>
<th>Priority Sector(s)</th>
<th>Geographic focus (if any)</th>
</tr>
</thead>
<tbody>
<tr>
<td>National Action</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>1. Coastal Risk Management Program⁶⁷</td>
<td>Expected components of the program are: 1) coastal risk assessment and monitoring, including strengthening and expansion of monitoring networks (slope stability, water quality, natural hazards), oceanographic studies and risk assessments; 2) coastal infrastructure including construction and pre-investment studies for beach stabilization works; and 3) institutional strengthening for coastal risk management and climate change adaptation.</td>
<td>IADB</td>
<td>Government of Barbados</td>
<td>Assessment; Capacity building; Field implementation</td>
<td>2011–?</td>
<td>Coastal zone management; Government; Disaster risk management</td>
<td>Barbados</td>
</tr>
<tr>
<td>2. Preparation of the Coastal</td>
<td>The project will finance activities regrouped in</td>
<td>IADB</td>
<td>Government of Barbados</td>
<td>Assessment; In execution</td>
<td>Coastal zone</td>
<td>Barbados</td>
<td></td>
</tr>
</tbody>
</table>

### Risk Assessment and Management Program

**Objectives:**

- three components: (1) Coastal Risk Assessment, Monitoring and Planning, including a prioritization of risk information needs, preparation of terms of reference for baseline studies, vulnerability and risk assessment and design of an integrated coastal risk information platform; (2) Design of Investment Program for Coastal Infrastructure, including prioritization of works, update and or preparation of designs incorporating climate change adaptation and disaster risk management; and (3) Institutional Strengthening Needs Assessment.

**Funder(s):** US$450,000

**Implementing Agency(s):** Barbados

**Type of project:** Policy formation and integration; Capacity building

**Duration:** 2003–2009 (closed)

**Priority Sector(s):** Government

**Geographic focus:** Antigua and Barbuda, Bahamas, Barbados, Belize, Dominica, Grenada, Guyana, Jamaica, Saint Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines,

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### Mainstreaming Adaptation to Climate Change: Caribbean Community (MACC)

**The objective of the MACC project is to facilitate an enabling environment for climate change adaptation in the Caribbean Community small islands and coastal developing states participating in this effort. Project components aimed to:**

1. Build regional capacity to collect and analyze data, thus expand the knowledge base on climate change impacts in order to assess the associated physical and socioeconomic vulnerabilities;
2. Build in-country capacity to formulate and analyze adaptation policy options and finalize sectoral adaptation strategies for participating countries;
3. Build capacity in preparation for a regional position for the United Nations Framework

**Funder(s):** GEF Trust Fund; co-financing

**Implementing Agency(s):** CCCCC, CARICOM, World Bank, Government of Canada, GEF, Government of US

**Type of project:** Capacity building; Knowledge communicatio; Policy formation and integration

**Duration:** 2003–2009 (closed)

**Priority Sector(s):** Government

**Geographic focus:** Regional: Antigua and Barbuda, Bahamas, Barbados, Belize, Dominica, Grenada, Guyana, Jamaica, Saint Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines,
<table>
<thead>
<tr>
<th>Name</th>
<th>Objectives</th>
<th>Funder(s)</th>
<th>Implementing Agency(s)</th>
<th>Type of project</th>
<th>Duration</th>
<th>Priority Sector(s)</th>
<th>Geographic focus (if any)</th>
</tr>
</thead>
<tbody>
<tr>
<td>4. The Economics of Climate Adaptation Initiative&lt;sup&gt;70&lt;/sup&gt;</td>
<td>Recognizing that decision makers need a quantitative fact base to inform the design of sound adaptation strategies, the Caribbean Catastrophe Risk Insurance Facility launched a study for the Caribbean region in February 2010. Based on the Economics of Climate Adaptation (ECA) methodology developed by the ECA Working Group, the study provides the facts and tools required to develop quantitative adaptation strategies that can be incorporated into national development plans. An initial study has been produced.&lt;sup&gt;71&lt;/sup&gt; The next phase of the project will include further engagement with countries via individual workshops to obtain feedback on results, engage in verification and enhancement of input data and areas for more details work, etc. Phase 3 will involve working closely with interested countries and other partners to enable the application of this methodology in all Caribbean countries.</td>
<td>CCRIF, CCCCC, ECLAC, McKinsey and Company, and Swiss Re.</td>
<td>Research; Knowledge communication</td>
<td>2009–2011</td>
<td>Government</td>
<td>Regional: Anguilla, Antigua &amp; Barbuda, Barbados, Bermuda, Cayman Islands, Dominica, Jamaica, and Saint Lucia</td>
<td></td>
</tr>
<tr>
<td>5. Piloting Climate Change Adaptation to Protect Human Health&lt;sup&gt;72&lt;/sup&gt;</td>
<td>To increase adaptive capacity of national health system institutions, including field practitioners, to respond to climate change-</td>
<td>SCCF; co-financing</td>
<td>UNDP, WHO</td>
<td>Capacity building; Field</td>
<td>2009–2014</td>
<td>Human health; Disaster risk management</td>
<td>Global: Barbados, Bhutan,</td>
</tr>
</tbody>
</table>

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<sup>71</sup> CCRIF, [http://www.ccrif.org/sites/default/files/publications/ECABrochureFinalAugust182010.pdf](http://www.ccrif.org/sites/default/files/publications/ECABrochureFinalAugust182010.pdf)

### CARIBSAVE Climate Change Risk Atlas: Phase 1

**Objectives:**
- To provide practical assistance to the governments, communities and the tourism sector at the local and national levels to assess climate change impacts and manage risks. The project focuses on key sectors as they relate to tourism and livelihoods, including agriculture and gender, and “is using climate models, examining sectoral vulnerabilities, assessing adaptive capacity and developing practical response strategies with the countries across the region.”

**Funder(s):** DFID; AusAID

**Agency(s):** CARIBSAVE

**Type of project:** Research; Capacity building

**Duration:** 2010–2011

**Priority Sector(s):** Tourism; Agriculture; Gender; Government

**Geographic focus:** LAC Region: Antigua & Barbuda, Barbados, Belize, The Bahamas, Dominica, Dominican Republic, Grenada, Jamaica, Saint Kitts & Nevis, Saint Lucia, Saint Vincent & the Grenadines, Suriname, Turks & Caicos

**Budget:**
- DFID: £750,000 + AUS$1,000,000

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<table>
<thead>
<tr>
<th>Name</th>
<th>Objectives</th>
<th>Funder(s)</th>
<th>Type of project</th>
<th>Duration</th>
<th>Priority Sector(s)</th>
<th>Geographic focus (if any)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>In Barbados: Workshops were held in July 2011 with USAID and OECS staff to prepare the country for this project. Tentative activities were identified by the climate change committees and proposals for funding are being developed.</td>
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<tr>
<td>7.</td>
<td>Caribbean Water Monitor: Small island states, water resources and climate change</td>
<td>The Caribbean Water Monitor is expected to be an essential tool in water resources management, and to assist in decision support for planning and managing water resources. The project builds on the existing Caribbean Drought and Precipitation Monitoring Network launched under the Caribbean Water Initiative, to monitor &amp; forecast rainfall for extremes (drought and excessive precipitation) with the goal of supporting water management.</td>
<td>Government of Switzerland</td>
<td>Research; Assessment</td>
<td>ongoing</td>
<td>Freshwater supply; Climate information services</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Earth Sciences-University of Applied Sciences of Southern Switzerland and CIMH</td>
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<tr>
<td></td>
<td></td>
<td>In Barbados: Further information required</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

D. Proposed Adaptation Action

In addition to possible actions proposed by the Government of Barbados through its forthcoming Second National Communication, Barbados is a possible recipient of funding through an inter-regional project proposed to the Special Climate Change Fund, as described below.

Table 4: Proposed Adaptation Projects and Programs in Barbados

<table>
<thead>
<tr>
<th>Name</th>
<th>Objectives</th>
<th>Type of project</th>
<th>Priority Sector(s)</th>
<th>Geographic focus (if any)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Up-scaling and Replicating Successful Approaches to Adaptation at the Local Level</td>
<td>The objectives of this project are not available.</td>
<td>Community-based adaptation</td>
<td>Unknown</td>
<td>Global: Indicative 10 countries – Barbados, China, Indonesia, Mali, Nicaragua, Peru, Sri Lanka, Tajikistan, Tanzania, Tunisia</td>
</tr>
</tbody>
</table>

Notes: This project has been proposed to the Special Climate change Fund.

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74 [http://www.cimh.edu.bb/projects.html](http://www.cimh.edu.bb/projects.html)
75 [http://www.mcgill.ca/cariwin](http://www.mcgill.ca/cariwin)
E. Assessment

Compared to other Caribbean states, there is a considerable amount of ongoing adaptation action in Barbados at the national, regional, and international levels. A number of adaptation projects are occurring in Barbados, and the country appears to be addressing its priority climate change areas of concern. In addition to preparing a National Communication to the UNFCCC, the country has established a Coastal Zone Unit within the government to engage in coastal zone management activities that may assist in reducing its vulnerability to climate change impacts, including changes to infrastructure. The country is also collaborating in intergovernmental initiatives on adaptation to climate change.

Current adaptation projects appear to be addressing the country’s main adaptation priorities, including improving governance capacity, the freshwater sector, agriculture, coastal zone management, and disaster risk reduction. Other areas in which adaptation action is occurring include human health, gender, tourism and strengthening climate information services. Future efforts may address other vulnerabilities, including impacts on fisheries and the built environment, including changes to the building code.

References:


3.0 Cuba

Cuba is a large island located at the border of the Caribbean Sea and the North Atlantic Ocean. The island’s terrain is generally flat, but mountains that reach up to 2,000 meters in height can be found in the southeast. The country’s climate is tropical and it experiences a dry season from November to April and a rainy season from May to October (USDS, 2010). The population of Cuba is 11.2 million, with 75 per cent of the population residing in urban areas (USDS, 2010). The average monthly salary of workers is US$18, and the workforce is primarily employed within the following sectors: 42 per cent in services (including education, health and social services); 19 per cent in agriculture; 12 per cent in commerce and tourism; 6 per cent in transport, storage and communication; 5 per cent in construction; and 2 per cent in mining, electricity, gas and water (USDS, 2010). As the majority of the country’s means of production are owned and run by the government, approximately 83 per cent of the population of Cuba is employed by the state (USDS, 2010).

A. Adaptation Needs and Priorities

As a result of its location in the western Caribbean Sea, Cuba is affected by extreme hydro-meteorological events on an annual basis, including hurricanes (UNDP, 2010). Between 1998 and 2008, Cuba was affected by over 20 tropical storms that caused widespread damage to infrastructure; however, in testament to the country’s risk reduction measures, only 35 lives were lost during these events (UNDP, 2010).
Cuba’s water sector is very vulnerable to climate variability; rainwater is its only water resource, the country experienced a decline in precipitation of 10 to per cent between 1960 and 2000 (Oxfam, 2011). Coastal floods and sea water inundations are also leading to saline intrusion of the country’s groundwater aquifers. The country’s agriculture sector is also vulnerable to reduced water availability, droughts, and extreme weather events such as hurricanes. These current concerns may become more acute as in the future as the climate changes and temperatures rise. Warmer temperatures associated with climate change may also affect the health of Cuba’s population, including a possible increase in cardiovascular and respiratory diseases, and a rise in dengue fever, diarrhea, chicken pox and other viral illnesses (Oxfam, 2011).

Cuba’s First National Communication to the United Nations Framework Convention on Climate Change (submitted in 2001) identifies the sectors of water, agriculture and forestry as the most vulnerable to the effects of climate change, and proposes a number of actions to address these impacts, including the following:

- **Freshwater sector**: Improved maintenance of national water infrastructure; greater efficiency in water used for irrigation; reducing the contaminant load in bodies of water; construction of dikes against the intrusion of sea water; relocation of wells; and water conservation promotion programs.
- **Agriculture sector**: Ensure greater efficiency in water use for crops through improved irrigation technology, training, and capacity building; introduction of crops that are more resistant to droughts and pests; development of agriculture and livestock production in higher elevation areas; and planting of short-cycle crop varieties.
- **Forestry sector**: Reforestation and management of forests to increase coverage; replacement of firewood cooking methods with electric methods; strengthened control of poaching and extraction to discourage degradation; creation of forest plots for forest recovery; and growing involvement of the population in reforestation.

**B. National Level Policies and Strategic Documents**
Cuba has a long history of policy initiatives to address climate change. For example, in 1991, the country created a National Commission on Climate Change with a mandate to study the impacts of the phenomenon on its population, food production, water supplies and health (Oxfam, 2011). In the process of developing its First National Communication to the UNFCCC, Cuba established a number of institutional and legal frameworks for climate change, including the National Climate Change Group that brings together all relevant governmental and non-governmental institutions. In 2007, the country also launched the Cuban Society Program to Face Climate Change,
which analyzes all sectors of the Cuba economy in terms of vulnerability to climate change and required adaptation measures. As part of this process, the National Water Resources Institute developed an Action Plan for Water Resources Adaptation to Climate Change (Oxfam, 2011). Cuba is currently in the process of developing its Second National Communication under the UNFCCC. It also cooperates with the Caribbean Community (CARICOM) members on climate change initiatives, including a 2008 statement calling for increased financing to address climate change adaptation.

In addition to these efforts, Cuba has established a sophisticated national disaster risk reduction framework through the creation of a comprehensive Civil Defense System that protects lives in the case of extreme climatic events and acts as an early warning system. This system involves a series of preparatory actions, annual large-scale simulations, and a broad network of logistical support centers across the country (Oxfam, 2011; UNDP, 2010).

<table>
<thead>
<tr>
<th>Table 1: Key Government Policies and Reports reflecting Adaptation Needs, Priorities and Planned Actions</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Name of Policy Action</strong></td>
</tr>
<tr>
<td>2. First National Communication to the UNFCCC</td>
</tr>
</tbody>
</table>

C. Current Adaptation Action

There appear to be a moderate number of adaptation actions occurring within Cuba, as compared to other countries in the region. These initiatives include:

- CARE is currently funding an adaptation project focused on the livestock sector, which aims to build capacity, improve policy formation, and reduce risk in this area.
- A recently completed regional project funded by the Food and Agriculture Organization (FAO) aimed to improve emergency preparedness in the agriculture sectors of Cuba, Grenada, Haiti and Jamaica.

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79 CARICOM, [http://www.caricom.org/isp/pressreleases/press384_08.jsp](http://www.caricom.org/isp/pressreleases/press384_08.jsp)
It is likely that Cuba is addressing adaptation needs through more initiatives than those represented in Table 2, given the long engagement of the government on this issue.

Table 2: Current Adaptation Projects and Programs active in Cuba

<table>
<thead>
<tr>
<th>Name</th>
<th>Objectives</th>
<th>Funder(s)</th>
<th>Implementing Agency(s)</th>
<th>Type of project</th>
<th>Duration</th>
<th>Priority</th>
<th>Sector(s)</th>
<th>Geographic focus (if any)</th>
</tr>
</thead>
<tbody>
<tr>
<td>National Action</td>
<td></td>
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</tr>
<tr>
<td>1. Livestock Adaptation: Proposal for extreme drought areas in the province of Camaguey, Cuba</td>
<td>Through this project, cooperatives will increase their human and technological capacities on climate risks and adaptation practices and will implement disasters risks reduction strategies based on a climate forecast system. Actors and population linked to the livestock will have information available to help them integrate vulnerability and adaptive capacity into development policies.</td>
<td>CARE</td>
<td>Cuban Association of Animal Production and the Meteorological Society of Cuba</td>
<td>Capacity building; Policy formation and integration</td>
<td>Unknown</td>
<td>Disaster risk management; Agriculture</td>
<td>Camaguey province</td>
<td></td>
</tr>
<tr>
<td>Participation in Regional and Global Actions</td>
<td></td>
<td></td>
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<tr>
<td>2. Assistance to Improve Local Agricultural Emergency Preparedness in Caribbean countries highly prone to hurricane related disasters</td>
<td>Natural hazards have severely destabilized the socio-economic fabric of the Caribbean region in the last two decades, with the most devastating impacts experienced in 2004. Such events have exposed the socio-cultural and environmental vulnerabilities of the Caribbean basin, and the urgent need to rethink disaster management options.</td>
<td>FAO</td>
<td>FAO</td>
<td>Policy formation and integration; Capacity building</td>
<td>2006–2009</td>
<td>Agriculture, Disaster risk management</td>
<td>Regional: Cuba; Grenada; Haiti; Jamaica</td>
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<tr>
<td>3. Climate Policy 2012: Extension of the global project “Capacity Development for Policy</td>
<td>The UNDP Regional Bureau for Latin America and the Caribbean has expanded on the global project, “Capacity Development for Policy Makers to Address Climate Change” in</td>
<td>Spain, UNDP</td>
<td>UNDP</td>
<td>Capacity building</td>
<td>2009–2011</td>
<td>Government</td>
<td>LAC Region: Argentina, Bolivia, Brazil, Chile,</td>
<td></td>
</tr>
</tbody>
</table>

81 CARE, [http://www.careclimatechange.org/adaptation-initiatives/cuba](http://www.careclimatechange.org/adaptation-initiatives/cuba)
### Makers to Address Climate Change

**Name:** Makers to Address Climate Change

**Objectives:**
- To address climate change and provide technical support to national policy makers and its Country Offices and strengthen capacity on budgetary issues related to the post-2012 climate regime. Activities include technical backstopping for countries that begin to consider adaptation to climate change in their National Development Plans.

**Funder(s):** Colombia, Costa Rica, Cuba, Dominican Republic, Ecuador, El Salvador, Guatemala, Honduras, Mexico, Nicaragua, Panama, Paraguay, Peru, Uruguay, and Venezuela


**Type of project:** Capacity building; Assessment; Knowledge communication

**Duration:** 2009–2011

**Priority Sector(s):** Coastal zone management

**Geographic focus (if any):** LAC Region: RIOCC countries, including Cuba and the Dominican Republic

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### Climate Change Vulnerability Evaluation of Coastal and Marine Areas

**Name:** Climate Change Vulnerability Evaluation of Coastal and Marine Areas

**Objective:**
- This project is part of the Ibero-American Programme on the Evaluation of Impacts, Vulnerability and Adaptation to Climate Change (PIACC) and aims to determine the impacts of climate change on the coasts of any country in Spanish and Portuguese speaking countries of Latin America and the Caribbean. It has a particular focus on the dynamics of beaches, estuaries, lagoons, deltas, cliffs and dunes, coastal erosion, flood risks and coastal infrastructure.

**Funder(s):** Spain

**Implementing Agency(s):** ECLAC, University of Cantabria, national counterparts

**Type of project:** Capacity building; Assessment; Knowledge communication

**Duration:** 2009–2011

**Priority Sector(s):** Coastal zone management

**Geographic focus (if any):** LAC Region: RIOCC countries, including Cuba and the Dominican Republic

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### Mitigation and Adaptation

**Name:** Mitigation and Adaptation to Climate Change

**Objective:**
- This project is part of the Ibero-American Programme on the Evaluation of Impacts, Vulnerability and Adaptation to Climate Change (PIACC) and aims to determine the impacts of climate change on the coasts of any country in Spanish and Portuguese speaking countries of Latin America and the Caribbean. It has a particular focus on the dynamics of beaches, estuaries, lagoons, deltas, cliffs and dunes, coastal erosion, flood risks and coastal infrastructure.

**Funder(s):** Spain

**Implementing Agency(s):** INIA, CIFOR, National counterparts

**Type of project:** Capacity building; Assessment; Knowledge communication

**Duration:** 2009–2011

**Priority Sector(s):** Forestry

**Geographic focus (if any):** RIOCC countries

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84 RIOCC, [http://www.lariocc.net/riocc_principal/es/proyectos_iniciativas/proy_marc_piacc.htm](http://www.lariocc.net/riocc_principal/es/proyectos_iniciativas/proy_marc_piacc.htm)

85 The 21 member countries of RIOCC are Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Cuba, Dominican Republic, Ecuador, El Salvador, Guatemala, Honduras, Mexico, Nicaragua, Panama, Paraguay, Peru, Portugal, Spain, Uruguay and Venezuela.

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Review of Current and Planned Adaptation Action: The Caribbean
### Name

Climate Change in Sustainable Forest Management in Ibero-America

#### Objectives

Programme on the Evaluation of Impacts, Vulnerability and Adaptation to Climate Change (PIACC) and aims to generate new information and knowledge and strengthen the capacity of research institutions in the forestry sector on linking sustainable forest management with adaptation and mitigation to climate change. This includes strengthening specific research activities, developing and disseminating methodologies and case studies, strengthening human resources and fostering the representation of the forest sector in the regional and international dialogue.

#### Funder(s)

CATIE, Polytechnical University of Madrid (UPM)

#### Implementing Agency(s)

Building; Research; Knowledge communication

#### Type of project

Research

#### Duration

2010–2013

#### Priority Sector(s)

Government; Agriculture; Freshwater supply

#### Geographic focus (if any)

Countries including Cuba and the Dominican Republic

In Cuba: Further information required.

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### Name

Integrating Climate Change Adaptation into National Development Processes in Latin America and the Caribbean

#### Objectives

Build climate resilience of vulnerable human and ecological systems in the region by integrating adaptation options into national planning processes and building the associated capacity of key regional and national institutions. The project will: undertake impact and vulnerability assessments; identify good practices and gaps in integrating adaptation into policy and plans; and support adaptation planning and its integration into national development processes. It will focus on the most vulnerable sectors and ecosystems, especially water and agriculture.

#### Funder(s)

Spain

#### Implementing Agency(s)

UNEP

#### Type of project

Assessment; Knowledge communication; Policy formation and integration

#### Duration

2010–2013

#### Priority Sector(s)

Government; Agriculture; Freshwater supply

#### Geographic focus (if any)

LAC Region: Phase 1: 19 RIOCC countries

Phase 2: 3-5 countries (Dominican Republic 1st country selected)

In Cuba: Further information required.

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87 The 19 RIOCC countries are: Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Cuba, Dominican Republic, Ecuador, El Salvador, Guatemala, Honduras, Mexico, Nicaragua, Panama, Paraguay, Peru, Uruguay and Venezuela.
D. Proposed Adaptation Action
No proposed adaptation actions in Cuba have been identified to date.

E. Assessment
At the policy level, Cuba appears to have made considerable progress in addressing the impacts of climate change on its key sectors, as well as in establishing a sophisticated disaster risk reduction system. Through its relatively moderate number of current discrete adaptation projects, it is addressing needs related to each of its identified priority sectors of agriculture and, to a lesser extent, freshwater resources and forestry. Future initiatives could expand upon its current adaptation efforts related to agriculture, disaster risk management, government, coastal zone management, forestry and water. They could also close observed gaps related to human health, the differential impacts of climate change by gender, and build capacity in the urban areas where three-quarters of Cuba’s population resides. It is likely that Cuba’s forthcoming Second National Communication will provide a review of the country’s recent adaptation actions and clarify areas where enhanced action is required.

References:


4.0 Dominica

AusAID Australian Agency for International Development
CCCCC Caribbean Community Climate Change Centre
CCRIF Caribbean Community Risk Insurance Facility
CIF Climate Investment Funds
ECLAC Economic Commission for Latin America and the Caribbean
GEF Global Environment Facility
IUCN International Union for the Conservation of Nature
MACC Mainstreaming Adaptation to Climate Change
NOAA National Oceanic and Atmospheric Administration
UNFCCC United Nations Framework Convention on Climate Change
UNDP United Nations Development Program
UNFCCC United Nations Framework Convention on Climate Change
USAID United States Agency for International Development
USDS United States Department of State

The Commonwealth of Dominica is located in the Caribbean Sea, and was the last of the Caribbean islands to be colonized by Europe. Dominica is a mountainous volcanic island, with very rugged and steep terrain (John, Bellot and Parry, 2001). The island has rich biodiversity, a perennial river system, and extensive rainforests. Sixty per cent of the land area of the country is covered by vegetation, including scrub woodlands and lush tropical forest (John, Bellot and Parry, 2001). Dominica's tropical maritime climate is influenced by the North East Trade Winds and its rugged topography results in micro-climate variability over small distances (John, Bellot and Parry, 2001). The country is located along the tropical Atlantic hurricane belt and has experienced approximately 15 extreme weather events since 1979.

Dominica’s population is approximately 72,000 people, 90 per cent of whom live in coastal villages (John, Bellot and Parry, 2001; USDS, 2010). The country’s main economic sectors are rain-fed agriculture (with major crops including bananas, citrus and coconuts), government services, banks and insurance, wholesale and retail trade, and transport (John, Bellot and Parry, 2001).
A. Adaptation Needs and Priorities

The country experiences one of the highest levels of rainfall in the Caribbean, distributed among a drier season from December to April and a wetter season from June to November (John, Bellot and Parry, 2010). The country’s First National Communication to the United Nations Framework Convention on Climate Change (UNFCCC) identifies the following sectors as being vulnerable in Dominica:

- **Forestry and terrestrial resources**: Possible impacts of climate change on the country’s forest ecosystems include: an alteration in the range of species; reduced water flow; an increase in forest pests and disease; and reduced food availability for wildlife.

- **Coastal ecosystems**: A rise in mean sea level could cause a loss of beach area; rising temperatures may damage coral reefs along with the island’s tourism sector and fishery; and increased mortality of mangrove forests.

- **Water resources**: Depending on future changes in precipitation on the island, climate change could result in flooding, landslides, reduced water for domestic use, and saline invasion of drinking water.

- **Human settlements and infrastructure**: Given that most of Dominica’s infrastructure is located in coastal areas, more frequent extreme weather events and sea level rise could adversely impact these human settlements.

- **Agriculture**: Impacts could include: declines in the country’s main crop, bananas, which are very sensitive to changes in precipitation; losses due to extreme weather events such as cyclones; and changes in yield due to rising temperatures and variable precipitation.

- **Fisheries**: The fisheries sector is vulnerable to the impacts of climate change as a result of the expected consequences of rising sea temperatures on coral reefs.

- **Tourism**: The impact of climate change on coastal zones, fisheries, and coral reefs could adversely affect this burgeoning industry.

B. National Level Policies and Strategic Documents

In 2001, Dominica submitted its First National Communication to the UNFCCC, and is expected to complete its Second National Communication prior to the end of 2011 (CIF, 2009). Following its participation in the “Mainstreaming Adaptation to Climate Change” (MACC) project (see Table 2), Dominica also recently approved a national policy on climate change, although details regarding it are not immediately available (CIF, 2009). In addition to these measures, Dominica has established an Office of Disaster Management within the Ministry of Public Utilities that is responsible for overseeing the country’s risk reduction measures (UNDP, 2009).
Table 1: Key Government Policies and Reports reflecting Adaptation Needs, Priorities and Planned Actions

<table>
<thead>
<tr>
<th>Name of Policy Action</th>
<th>Government Division Responsible</th>
<th>Status</th>
<th>Sector(s) of Focus</th>
<th>Summary description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Initial National Communication under the UNFCCC\textsuperscript{88}</td>
<td>Ministry of Agriculture and Environment</td>
<td>Submitted in 2001</td>
<td>Multi-sectoral</td>
<td>This document provides a review of Dominica’s national circumstances and characteristics, identifies the country’s main sources of greenhouse gas emissions and vulnerabilities to climate change, and discusses ways that climate change may be addressed through mitigation and adaptation policies.</td>
</tr>
</tbody>
</table>

C. Current Adaptation Action

In comparison to other Caribbean countries, Dominica is currently participating in a moderate number of regional and global adaptation projects. Dominica is one of six countries benefitting from pilot activities through the “Pilot Program for Climate Resilience,” a global initiative funded by the World Bank’s Strategic Climate Fund that aims to reduce countries’ vulnerability to climate change in key areas. In addition to its participation in the recently completed MACC project, Dominica is also a participant in the “Special Program on Adaptation to Climate Change: Implementation of adaptation measures in coastal zones,” financed by the Global Environment Facility (GEF) that addresses the impacts of climate change on natural resources in four Caribbean countries. As well it is one of the countries being studied through the Caribbean Catastrophe Risk Insurance Facility’s “Economics of Climate Adaptation Initiative,” a research program that aims to estimate the economic impacts of climate change and the costs of adaptation in the Caribbean.

While current adaptation programming in Dominica focuses on a number of different sectors (e.g., tourism, agriculture, gender), it most frequently addresses needs in the areas of coastal zone management and improving the capacity of government to create an enabling environment for adaptation. The majority of projects emphasize capacity building, research and knowledge sharing; about a third plan to implement adaptation measures on the ground.

Table 2: Current Adaptation Projects and Programs active in Dominica

<table>
<thead>
<tr>
<th>Name</th>
<th>Objectives</th>
<th>Funder(s)</th>
<th>Implementing Agency(s)</th>
<th>Type of project</th>
<th>Duration</th>
<th>Priority Sector(s)</th>
<th>Geographic focus (if any)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Mainstreaming Adaptation to Climate Change:</td>
<td>The objective of the MACC project is to facilitate an enabling environment for climate</td>
<td>GEF Trust Fund; co-</td>
<td>CCCCC, CARICOM,</td>
<td>Capacity building;</td>
<td>2003–2009 (closed)</td>
<td>Government</td>
<td>Regional: Antigua and Barbuda</td>
</tr>
</tbody>
</table>

\textsuperscript{88} UNFCCC, \url{http://unfccc.int/essential_background/library/items/3599.php?rec=1&prref=3348#beg}

Review of Current and Planned Adaptation Action: The Caribbean
<table>
<thead>
<tr>
<th>Name</th>
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<th>Implementing Agency(s)</th>
<th>Type of project</th>
<th>Duration</th>
<th>Priority Sector(s)</th>
<th>Geographic focus (if any)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Caribbean Community (MACC)²⁹</td>
<td>change adaptation in the Caribbean Community small islands and coastal developing states participating in this effort. Project components aimed to: (1) build regional capacity to collect and analyze data, thus expand the knowledge base on climate change impacts in order to assess the associated physical and socioeconomic vulnerabilities; (2) build in-country capacity to formulate and analyze adaptation policy options and finalize sectoral adaptation strategies for participating countries; (3) build capacity in preparation for a regional position for the United Nations Framework Convention on Climate Change; and (4) support public education and outreach programs by strengthening information access and data resources, and foster public awareness through technical assistance and capacity building.</td>
<td>financing</td>
<td>World Bank, Government of Canada, GEF, Government of US</td>
<td>Knowledge communication; Policy formation and integration</td>
<td>2006–2011</td>
<td>Coastal zones management; Biodiversity</td>
<td>Barbuda, Bahamas, Barbados, Belize, Dominica, Grenada, Guyana, Jamaica, Saint Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines, Trinidad and Tobago</td>
</tr>
<tr>
<td>2. Special Program on Adaptation to Climate Change: Implementation of adaptation measures in coastal zones (SPACC)³⁰</td>
<td>The Implementation of Adaptation Measures in Coastal Zones Project aims to support efforts by Dominica, Saint Lucia and Saint Vincent and the Grenadines to implement specific (integrated) pilot adaptation measures addressing primarily, the impacts of climate change on their natural resource base, focused on biodiversity and land degradation along coastal and near-coastal areas. The project also seeks to produce knowledge of global value on how to</td>
<td>GEF; co-financing</td>
<td>World Bank, CCCCC</td>
<td>Field implementation; Community-based adaptation</td>
<td>2006–2011</td>
<td>Coastal zones management; Biodiversity</td>
<td>Regional: Dominica, Saint Lucia, Saint Vincent &amp; the Grenadines</td>
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<td>In Dominica: A report on a SPACC technical forum held in Dominica in 2009 prioritized the following interventions: (1) creation of national park management plans, including sustainable land management provisions; (2) data collection and monitoring, including an assessment of data needs and the installation of meteorological stations in national parks; (3) installation of a storage and distribution system for irrigation water; and (4) the</td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Name</th>
<th>Objectives</th>
<th>Funder(s)</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>implement adaptation measures in small island states that can be applied in other countries in the region, not participating in the project and even for islands in other regions of the world.</td>
<td>World Bank's Strategic Climate Fund</td>
<td>National governments</td>
<td>Capacity building; Knowledge communication; Policy formation and integration</td>
<td>2008–present</td>
<td>Government</td>
<td>Global project with specific Caribbean component: Dominica, Grenada, Haiti, Jamaica, Saint Lucia, and Saint Vincent &amp; the Grenadines</td>
</tr>
<tr>
<td>3.</td>
<td>Pilot Program for Climate Resilience–Caribbean Regional Program</td>
<td>The Pilot Program for Climate Resilience is a targeted program under the Strategic Climate Fund which aims to provide incentives for scaled-up action and transformational change in integrating climate resilience into national development planning. Activities in the Caribbean include country-based investments in Haiti, Jamaica, Dominica, Saint Lucia, Saint Vincent and the Grenadines, and Grenada; as well as region-wide activities focused on climate monitoring, institutional strengthening, capacity building and knowledge sharing.</td>
<td>National governments</td>
<td>Capacity building; Knowledge communication; Policy formation and integration</td>
<td>2008–present</td>
<td>Government</td>
<td>in Dominica: Activities in Dominica may address the following priority areas: water availability, storage and distribution; natural disaster prevention and management; sustainable management of national parks; sustainable tourism; coastal protection; agricultural production and food security.</td>
</tr>
<tr>
<td>4.</td>
<td>The Economics of Climate Adaptation Initiative91</td>
<td>Recognizing that decision makers need a quantitative fact base to inform the design of sound adaptation strategies, the Caribbean Catastrophe Risk Insurance Facility launched a study for the Caribbean region in February 2010. Based on the Economics of Climate Adaptation (ECA) methodology developed by the ECA Working Group, the study provides the facts and tools required to develop quantitative adaptation strategies that can</td>
<td>CCRIF Technical Assistance Programme</td>
<td>CCRIF, CCCCC, ECLAC, McKinsey and Company, and Swiss Re.</td>
<td>Research; Knowledge communication</td>
<td>2009–2011</td>
<td>Government</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Name</th>
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<th>Priority Sector(s)</th>
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</tr>
</thead>
<tbody>
<tr>
<td>5. CARIBSAVE Climate Change Risk Atlas: Phase 1</td>
<td>To provide practical assistance to the governments, communities and the tourism sector at the local and national levels to assess climate change impacts and manage risks. The project focuses on key sectors as they relate to tourism and livelihoods, including agriculture and gender, and “is using climate models, examining sectoral vulnerabilities, assessing adaptive capacity and developing practical response strategies with the countries across the region.”</td>
<td>DFID; AusAID</td>
<td>CARIBSAVE</td>
<td>Research; Capacity building</td>
<td>2010–2011</td>
<td>Tourism; Agriculture; Gender; Government</td>
<td>LAC Region: Antigua &amp; Barbuda, Barbados, Belize, The Bahamas, Dominica, Dominican Republic, Grenada, Jamaica, Saint Kitts &amp; Nevis, Saint Lucia, Saint Vincent &amp; the Grenadines, Suriname, Turks &amp; Caicos</td>
</tr>
</tbody>
</table>

In Dominica: Further information required

In Dominica: Further information required

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### Name
Climate Change in the Organization of Eastern Caribbean States

#### Objectives
The project will focus on adaptation measures in the areas of coastal/marine zone management and freshwater resources management, and will seek to build an enabling environment for reducing vulnerability to climate change by improving the regulatory framework in support of national adaptation strategies. The program will also provide direct support at the country level for initiatives focusing on adaptation measures in areas of coastal zone management and freshwater resource management. It will be supported by appropriate public awareness and education program to raise the level of awareness on climate change and steps being taken to address or reduce impacts across the region.

#### Funder(s)
USAID

#### Implementing Agency(s)
OECS

#### Type of project
Policy formation and integration; Field implementation

#### Duration
2011–?

#### Priority Sector(s)
Coastal zone management; Freshwater supply

#### Geographic focus (if any)
OECS countries: Antigua and Barbuda, Dominica, Grenada, Saint Kitts & Nevis, Saint Lucia, Saint Vincent & the Grenadines

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### D. Proposed Adaptation Action
Adaptation projects and program presently proposed for implementation in Dominica were not identified through this review.

### E. Assessment
Dominica has addressed adaptation at the policy level through the preparation of a national climate change adaptation strategy (CIF, 2009), and through the “Economics of Climate Adaptation Initiative,” the MACC project, and the “Pilot Program for Climate Resilience,” appears to be engaged in further policy formation and integration efforts to address the impacts of climate change. The country is also benefitting from participation in several adaptation projects that address the priority adaptation needs outlined in its National Communication. These needs include those related to coastal zones, agriculture, tourism, and risk reduction efforts. Gaps in current adaptation action appear to include a lack of activity within the socioeconomic sectors of human settlements and infrastructure, forestry

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and fisheries. However, it is possible that needs in these areas are being addressed through Dominica’s more development focused programming.

References:


5.0 Dominican Republic

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>AusAID</td>
<td>Australian Agency for International Development</td>
</tr>
<tr>
<td>CATIE</td>
<td>Centro Agronómico Tropical de Investigación y Enseñanza (Tropical Agriculture Research and Higher Education Centre) (Spain)</td>
</tr>
<tr>
<td>CIFOR</td>
<td>Center for International Forestry Research</td>
</tr>
<tr>
<td>DFID</td>
<td>Department for International Development (U.K.)</td>
</tr>
<tr>
<td>ECLAC</td>
<td>Economic Commission for Latin America and the Caribbean</td>
</tr>
<tr>
<td>FONTAGRO</td>
<td>El Fondo Regional de Tecnología Agropecuaria (Regional Fund for Agricultural Technology)</td>
</tr>
<tr>
<td>GDP</td>
<td>Gross Domestic Product</td>
</tr>
<tr>
<td>INIA</td>
<td>Instituto Nacional de Investigación y Tecnología Agraria y Alimentaria (National Institute for Research and Technology in Agriculture and Food) (Spain)</td>
</tr>
<tr>
<td>NAPIA</td>
<td>National Adaptation Plan of Action</td>
</tr>
<tr>
<td>NGOs</td>
<td>non-governmental organizations</td>
</tr>
<tr>
<td>SIDA</td>
<td>Swedish International Development Agency</td>
</tr>
<tr>
<td>UNDP</td>
<td>United Nations Development Programme</td>
</tr>
<tr>
<td>UNEP</td>
<td>United Nations Environment Programme</td>
</tr>
<tr>
<td>UNFCCC</td>
<td>United Nations Framework Convention on Climate Change</td>
</tr>
<tr>
<td>USDS</td>
<td>United States Department of State</td>
</tr>
</tbody>
</table>

The Dominican Republic is a mountainous tropical country located on the border of the North Atlantic Ocean and the Caribbean Sea that shares the island of Hispaniola with its neighbor to the west, Haiti. The country’s land area is approximately 48,442 square kilometers with 9.65 million inhabitants (USDS, 2010). The country’s workforce is highly dependent on the services sector, being comprised of the tourism, transportation, communications and finances industries (USDS, 2010). A further 11.5 per cent are employed in construction, 11.3 per cent in agriculture, and 1.5 per cent in mining. The country’s per capita Gross Domestic Product (GDP) is approximately US$4,815 (USDS, 2011), contributing to the Dominican Republic’s status as the second poorest nation in the Caribbean.
A. Adaptation Needs and Priorities
As a Small Island Developing State, the Dominican Republic is vulnerable to climatic hazards and changes. To date, its main climatic risks have been associated with extreme events, especially hurricanes and tropical storms. Next to these threats, incremental changes have been viewed as being of lesser importance. Temperature averages have increased slightly over the last 50 years, and rainfall has decreased mainly in the wet season. These trends are likely to persist, although current projections have high uncertainty ranges. Temperatures are projected to increase by around 1 to 5°C by 2100. Rainfall is expected to decrease further, although some scenarios also show increases. Sea level rise is a serious threat, as it could inundate low-lying areas and worsen the impacts of future storms and hurricanes (Herrera-Moreno and Ocampo, 2011).

The Dominican Republic’s main climate change concern is the potential impacts caused by more frequent or intense extreme weather events. Reflecting this concern, a number of studies have been undertaken and several workshops have been held in recent years to identify and prioritize adaptation measures in various sectors. A detailed account of these recommended adaptation measures can be found in the two National Communications the country has submitted so far to the United Nations Framework Convention on Climate Change (UNFCCC) and in the National Adaptation Plan of Action (NAPIA) the Dominican Republic has elaborated despite not being a least developed country (Dominican Republic, 2008). The NAPIA identifies freshwater, tourism, agriculture and food security, human health, biodiversity, forests, coastal and marine resources, infrastructure, human settlements and energy as being vulnerable sectors. Climate risk management and capacity building are identified as cross-cutting themes. The sectors of freshwater, agriculture and food security, and coastal and marine systems were prioritized due their high vulnerability and importance in human and economic development. About one-third of the Dominican Republic’s freshwater, for example, comes from groundwater sources that are already under threat due to over-exploitation, saltwater intrusion (due to excessive abstraction) and/or pollution (Karanjac, 2003). Climate change could put these resources at greater risk as sea level rise leads to greater intrusion of saltwater into freshwater sources. A total of 136 adaptation measures listed by sector are identified in the NAPIA.

B. National Level Policies and Strategic Documents
The rising attention that climate change has received in the Dominican Republic in recent years is reflected in new policies and institutional arrangements. The National Development Strategy of the Dominican Republic 2010-2030 identifies “sustainable environmental management and adequate adaptation to climate change” as one of four strategic areas. Among the 29 actions mentioned under this strategic area, the freshwater sector receives particular attention. Impact studies, prevention systems and technology transfer are further key elements (Dominican Republic, 2010). The only quantified goal related to adaptation is a commitment to reversing deforestation trends in the coming years.
Responsibility for implementing adaptation measures lies, according to the NAPIA, with the respective ministries. The “Council for Climate Change and the Clean Development Mechanism” is coordinating this work and assisting other actors. The Council was created in 2008 and is under the direct supervision of the President of the Republic. The Ministry for Environment, which was the main focal point for climate change before the Council existed, seems now to perform a more technical role.

Table 1: Key National Level Policies and Reports reflecting Adaptation Needs, Priorities and Planned Actions in the Dominican Republic

<table>
<thead>
<tr>
<th>Name of Policy Action</th>
<th>Government Division Responsible</th>
<th>Status</th>
<th>Sector(s) of Focus</th>
<th>Summary description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. First National Communication to the United Framework Convention on Climate Change(^95)</td>
<td>Ministry of Environment</td>
<td>Submitted in 2003</td>
<td>Multi-sectoral</td>
<td>First report to UNFCCC. On adaptation, it presents available results of vulnerability studies as well as detailed lists of adaptation actions for freshwater, coastal zones, forests, agriculture and human health.</td>
</tr>
<tr>
<td>2. National Adaptation Plan of Action (Plan de Acción Nacional de Adaptación al Cambio Climático en la República Dominicana)</td>
<td>Ministry of Environment</td>
<td>Released in 2008</td>
<td>Multi-sectoral</td>
<td>The NAPIA aims at increasing the systemic capacity of the Dominican Republic to face the effects of climate change through adaptation measures in prioritized vulnerable systems. It proposes 136 measures in nine sectors. Three sectors, water, agriculture and coast zones, are prioritized.</td>
</tr>
<tr>
<td>3. Second National Communication to the United Framework Convention on Climate Change(^96)</td>
<td>Ministry of Environment</td>
<td>Submitted in 2009</td>
<td>Multi-sectoral</td>
<td>Second report to UNFCCC. On adaptation, it presents results of vulnerability studies related to human health, tourism, freshwater, agriculture and biodiversity, as well as related adaptation actions.</td>
</tr>
</tbody>
</table>

C. Current Adaptation Action

Although the Dominican Republic is not part of CARICOM and is not participating in the variety of ongoing regional actions focused on the Caribbean region, the country nevertheless is benefitting from participation in a very high number of adaptation projects at the national, regional and global levels. These projects address a range of sectors, with particular attention begin given to agriculture and

\(^{95}\) UNFCCC, [http://unfccc.int/essential_background/library/items/3599.php?such=j&symbol=DOM/COM/1%20E#beg](http://unfccc.int/essential_background/library/items/3599.php?such=j&symbol=DOM/COM/1%20E#beg)

enabling the government to facilitate adaptation to climate change. Other sectors being addressed through current adaptation programming in the Dominican Republic include freshwater resources, tourism, energy, forestry, coastal zone management and the impacts of climate change by gender. Most project activities focus on capacity building, knowledge communication and research.

Reflecting the relative importance of extreme weather events in comparison to incremental changes among past and current climatic risks, the Dominican Republic hosts a wide range of disaster risk management projects, ranging from preventive measures to post-disaster management. These initiatives are being implemented by the government, non-governmental organizations, the Red Cross, the United Nations Development Programme (UNDP), and other actors. Disaster prevention projects often have adaptation co-benefits. However, so far few projects have explicitly focused on climate change.

Most research has taken place in conjunction with development of the Dominican Republic’s National Communications. UNDP has been the key driver of adaptation activities in the country, both as the main partner in the elaboration of the National Communications and as an implementer and funder of several discrete adaptation projects.

<table>
<thead>
<tr>
<th>Name</th>
<th>Objectives</th>
<th>Funder(s)</th>
<th>Implementing Agency(s)</th>
<th>Type of Project</th>
<th>Duration</th>
<th>Priority Sector(s)</th>
<th>Geographic focus (if any)</th>
</tr>
</thead>
<tbody>
<tr>
<td>National Action</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.</td>
<td>Poverty-Environment and Climate Change Adaptation</td>
<td>To mainstream poverty-environment linkages arising from vulnerabilities to environmental shocks (i.e., droughts, floods, deforestation, land degradation, and storms) into poverty reduction strategies and national development processes.</td>
<td>UNEP</td>
<td>UNDP</td>
<td>Capacity building</td>
<td>2009–ongoing</td>
<td>Multi-sectoral</td>
</tr>
<tr>
<td>Participation in Regional and Global Projects</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>2.</td>
<td>Capacity Development for Policy Makers: Addressing climate change in key sectors</td>
<td>The project is a targeted capacity development initiative that supports two goals: 1. To increase national capacity to coordinate Ministerial views for more effective policy making; 2. To develop capacity in key decision makers in key sectors.</td>
<td>United Nations Foundation, Finland,</td>
<td>UNDP</td>
<td>Capacity building; Knowledge communication</td>
<td>2008–2010</td>
<td>Multi-sectoral</td>
</tr>
</tbody>
</table>

### Name: 21 Participation in the UNFCCC Process
- **Objectives**: Participation in the UNFCCC process; and 2. To assess investment and financial flows to address climate change for selected key sectors. As a result of this project, both the technical understanding of key climate change issues and their economic and policy implications within the context of the Convention will be enhanced.
- **Funder(s)**: Switzerland, Norway, UNDP
- **Implementing Agency(s)**: 
- **Type of project**: In
- **Duration**: 
- **Priority Sector(s)**: 
- **Geographic focus (if any)**: Dominican Republic and Saint Lucia

### Name: 3 Climate Change Vulnerability Evaluation of Coastal and Marine Areas
- **Objectives**: This project is part of the Ibero-American Programme on the Evaluation of Impacts, Vulnerability and Adaptation to Climate Change (PIACC) and aims to determine the impacts of climate change on the coasts of any country in Spanish and Portuguese speaking countries of Latin America and the Caribbean. It has a particular focus on the dynamics of beaches, estuaries, lagoons, deltas, cliffs and dunes, coastal erosion, flood risks and coastal infrastructure.
- **Funder(s)**: Spain, ECLAC, University of Cantabria, national counterparts
- **Implementing Agency(s)**: Capacity building; Assessment; Knowledge communication
- **Type of project**: 2009–2011 Coastal zone management
- **Duration**: 2009–2011
- **Priority Sector(s)**: Coastal zone management
- **Geographic focus (if any)**: LAC Region: RIOCC countries including Cuba and the Dominican Republic

### Name: 4 Mitigation and Adaptation to Climate Change in Sustainable Forest
- **Objectives**: This project is part of the Ibero-American Programme on the Evaluation of Impacts, Vulnerability and Adaptation to Climate
- **Funder(s)**: Spain, INIA, CIFOR, CATIE, Polytechnical
- **Implementing Agency(s)**: Capacity building; Research
- **Type of project**: 2009–2011 Forestry
- **Duration**: 2009–2011
- **Priority Sector(s)**: Forestry
- **Geographic focus (if any)**: RIOCC countries including

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98 These countries are: Algeria, Bangladesh, Colombia, Costa Rica, Dominican Republic, Ecuador, Gambia, Honduras, Liberia, Namibia, Nepal, Nicaragua, Niger, Paraguay, Peru, Saint Lucia, Togo, Turkmenistan and Uruguay.
99 UNDP, [http://www.undpcc.org/content/dominican_republic-en.aspx](http://www.undpcc.org/content/dominican_republic-en.aspx)
100 RIOCC, [http://www.lariocc.net/riocc_principal/es/proyectos_iniciativas/prov_marc_piacc.htm](http://www.lariocc.net/riocc_principal/es/proyectos_iniciativas/prov_marc_piacc.htm)
101 The 21 member countries of RIOCC are Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Cuba, Dominican Republic, Ecuador, El Salvador, Guatemala, Honduras, Mexico, Nicaragua, Panama, Paraguay, Peru, Portugal, Spain, Uruguay and Venezuela.
<table>
<thead>
<tr>
<th>Name</th>
<th>Objectives</th>
<th>Funder(s)</th>
<th>Implementing Agency(s)</th>
<th>Type of project</th>
<th>Duration</th>
<th>Priority Sector(s)</th>
<th>Geographic focus (if any)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Management in Ibero-America&lt;sup&gt;102&lt;/sup&gt;</td>
<td>Change (PIACC) and aims to generate new information and knowledge and strengthen the capacity of research institutions in the forestry sector on linking sustainable forest management with adaptation and mitigation to climate change. This includes strengthening specific research activities, developing and disseminating methodologies and case studies, strengthening human resources and fostering the representation of the forest sector in the regional and international dialogue.</td>
<td>University of Madrid (UPM)</td>
<td>Knowledge communication</td>
<td></td>
<td></td>
<td>Cuba and the Dominican Republic</td>
<td></td>
</tr>
<tr>
<td>Climate Policy 2012: Extension of the global project “Capacity Development for Policy Makers to Address Climate Change”&lt;sup&gt;103&lt;/sup&gt;</td>
<td>The UNDP Regional Bureau for Latin America and the Caribbean has expanded on the global project, “Capacity Development for Policy Makers to Address Climate Change” in the LAC region to provide technical support to national policy makers and its Country Offices and strengthen capacity on budgetary issues related to the post-2012 climate regime. Activities include technical backstopping for countries that begin to consider adaptation to climate change in their National Development Plans.</td>
<td>Spain, UNDP</td>
<td>UNDP</td>
<td>Capacity building</td>
<td>2009–2011</td>
<td>Government</td>
<td>LAC Region: Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Cuba, Dominican Republic, Ecuador, El Salvador, Guatemala, Honduras, Mexico, Nicaragua, Panama, Paraguay, Peru, Uruguay, and...</td>
</tr>
</tbody>
</table>

<sup>102</sup> Proyecto MIA, [http://www.proyectomia.com/](http://www.proyectomia.com/)
<sup>103</sup> UNDP, [http://www.undpcc.org/content/act_latin-en.aspx](http://www.undpcc.org/content/act_latin-en.aspx)
<table>
<thead>
<tr>
<th>Name</th>
<th>Objectives</th>
<th>Funder(s)</th>
<th>Implementing Agency(s)</th>
<th>Type of project</th>
<th>Duration</th>
<th>Priority Sector(s)</th>
<th>Geographic focus (if any)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>In Dominican Republic: The focus of the CRM project is gaining a better understanding of climate risk in the Dominican Republic’s agriculture sector, with a focus on the country’s drought-prone areas.</td>
<td>Implementing Agency: International Institute for Sustainable Development.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Peace Corps Renewable Energy and Climate Change Initiative[105]</td>
<td>Across the Americas the Peace Corps will, among other things, increase municipal, school and communities’ awareness and knowledge of climate change (including adaptation) and support community-led projects, including on adaptation. This</td>
<td>United States Department of State, U.S. Peace Corps, USDS</td>
<td>Community-based adaptation; Knowledge communication</td>
<td></td>
<td></td>
<td>Energy</td>
<td>LAC Region: Costa Rica, Dominican Republic, El Salvador, Guatemala,</td>
</tr>
</tbody>
</table>

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104 UNDP, [http://www.undpcc.org/content/dominican_republic-en.aspx](http://www.undpcc.org/content/dominican_republic-en.aspx)  
<table>
<thead>
<tr>
<th>Name</th>
<th>Objectives</th>
<th>Funder(s)</th>
<th>Implementing Agency(s)</th>
<th>Type of project</th>
<th>Duration</th>
<th>Priority Sector(s)</th>
<th>Geographic focus (if any)</th>
</tr>
</thead>
<tbody>
<tr>
<td>8. Integrating Climate Change Adaptation into National Development Processes in Latin America and the Caribbean</td>
<td>Build climate resilience of vulnerable human and ecological systems in the region by integrating adaptation options into national planning processes and building the associated capacity of key regional and national institutions. The project will: undertake impact and vulnerability assessments; identify good practices and gaps in integrating adaptation into policy and plans; and support adaptation planning and its integration into national development processes. It will focus on the most vulnerable sectors and ecosystems, especially water and agriculture.</td>
<td>Spain</td>
<td>UNEP</td>
<td>Assessment; Knowledge communication; Policy formation and integration</td>
<td>2010–2013</td>
<td>Agriculture; Freshwater supply</td>
<td>LAC Region: Phase 1: 19 RIOCC countries; Phase 2: 3-5 countries (Dominican Republic 1st country selected)</td>
</tr>
<tr>
<td>9. CARIBSAVE Climate Change Risk Atlas: Phase 1</td>
<td>To provide practical assistance to the governments, communities and the tourism sector at the local and national levels to assess climate change impacts and manage risks. The project focuses on key sectors as they relate to tourism and livelihoods, including agriculture and gender, and “is DFID; AusAID</td>
<td>CARIBSAVE</td>
<td>Research; Capacity building</td>
<td>2010–2011</td>
<td>Tourism; Agriculture; Gender; Government</td>
<td>LAC Region: Antigua &amp; Barbuda, Barbados, Belize, The Bahamas, Dominica,</td>
<td></td>
</tr>
</tbody>
</table>

106 The 19 RIOCC countries are: Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Cuba, Dominican Republic, Ecuador, El Salvador, Guatemala, Honduras, Mexico, Nicaragua, Panama, Paraguay, Peru, Uruguay and Venezuela.

**D. Proposed Adaptation Action**

The number of planned adaptation actions in the Dominican Republic appears to be limited and therefore there is no indication that adaptation activity will increase substantially in the near future. The country is anticipated to be part of the planned shared project “Impacts of Climate Change in Agricultural Zones and Relevant Sectors in Chile Argentina and Dominican Republic: Economy, production, water requirements, adaptation and policy orientation.”

**Table 3: Proposed Adaptation Actions in the Dominican Republic**

<table>
<thead>
<tr>
<th>Name</th>
<th>Objectives</th>
<th>Type of project</th>
<th>Priority Sector(s)</th>
<th>Geographic focus (if any)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Impacts of Climate Change in Agricultural Zones and Relevant Sectors in Chile Argentina and Dominican Republic: Economy, production, water requirements, adaptation and policy orientation (FONTAGRO 2010)</td>
<td>Contribute to the competitiveness and food security of the agricultural sector in Argentina, Chile and Dominican Republic, through new knowledge generated through the simulation and evaluation of economic and productive impacts of climate change, proposition of adaptation measures by sector and resulting policy recommendations and support strategies. Call for bids issued in 2010.</td>
<td>Assessment; Policy formation and integration</td>
<td>Agriculture</td>
</tr>
</tbody>
</table>

*In Dominican Republic: Further information required.*
E. Assessment

Historically, extreme events such as hurricanes and storms have been the main climate risks of concern to the Dominican Republic, and remain so in light of the projected consequences of climate change. This concern is evidenced by significantly more research activity, capacity building and practical projects occurring in this area (although not specifically with the objective of supporting adaptation to climate change).

There has been important progress on both the institutional and policy side (evidenced for instance by the prominent inclusion of adaptation in the national development strategy), and in terms of vulnerability and adaptation analysis regarding climate change. However, even the recently established National Climate Change Council seems to be more focused on mitigation projects than on adaptation. The adaptation agenda seems to have been driven mainly by UNDP, which supported the government in the elaboration of National Communications and has funded and implemented several adaptation projects. Still, these projects fall far short of addressing the many adaptation needs identified in the National Communications and the National Adaptation Plan of Action. Greater effort in the future may need to be directed towards the country’s priority areas of concern—agriculture, freshwater, coastal zones and marine resources—while also building upon current action related to gender, tourism, forestry and energy. As well, it may be appropriate to give greater attention to the implementation of field level activities and community-based adaptation.

References:


6.0 Grenada

AusAID Australian Agency for International Development
CARICOM Caribbean Community
CCCCC Caribbean Community Climate Change Centre
FAO Food and Agriculture Organization
GEF Global Environment Facility
OECS Organization for Eastern Caribbean States
UNFCCC United Nations Framework Convention on Climate Change
USAID United States Agency for International Development
USDS United States Department of State

The state of Grenada consists of the islands of Grenada, Carriacou and Petit Martinique. The country’s 345 square kilometer land base is characterized by mountainous terrain and is ringed by coral reefs. Approximately 104,000 people live in Grenada (Charles, 2000; USDS, 2010). Grenada’s climate is primarily humid and tropical, with the country experiencing a dry season from January to May and a rainy season from June to December. Extreme drought conditions can be experienced during some dry seasons (Charles, 2000). Grenada has a high rate of unemployment, at nearly 25 per cent. Economic activity in the country is dominated primarily by services (tourism and education) and agricultural production (nutmeg and cocoa) (USDS, 2010). Grenada has been adversely affected by extreme weather events over the past several decades; two hurricanes in 2004 caused damage totaling approximately 2.5 times the country’s annual Gross Domestic Product, and damaged or destroyed 90 per cent of the island’s buildings (USDS, 2010).

A. Adaptation Needs and Priorities

Grenada’s First National Communication to the United Nations Framework Convention on Climate Change (UNFCCC) (submitted in 2000) notes the following sectors as being particularly vulnerable to the impacts of climate change (Charles, 2000):

- **Freshwater supply**: Increased temperatures and reduced precipitation could lead to higher evapotranspiration and lessen the island’s water supplies; sea-level rise may also cause saltwater intrusion and reduce available groundwater.

- **Agriculture**: The impacts of climate change on agriculture will depend on its effect on precipitation; given that precipitation is expected to decline in the Caribbean, Grenada’s crop yields may be negatively affected.
Review of Current and Planned Adaptation Action: The Caribbean

- **Fisheries**: The breeding ground of the country’s 17 main fish species (which provide 43 per cent of the total catch) may be negatively affected by damage to mangroves and reefs through warmer temperatures and sea-level rise.
- **Coastal zones**: These areas may be impacted by flooding and sea-level rise, beach erosion, and damage to corals through higher ocean temperatures. These effects would also impact Grenada’s tourism industry through possible loss of and/or deterioration of beaches.
- **Human health**: Climate change is likely to cause an increase in the incidence of vector-borne communicable diseases; respiratory diseases may also become more common should regional dust storms increase during the hurricane season. The National Communication notes that further information is required in this area.

B. National Level Policies and Strategic Documents

Grenada has prepared a National Communication under the UNFCCC, which was submitted in 2000. More recently, the country has recently participated in the regional project “Mainstreaming Adaptation to Climate Change” through which Caribbean countries were encouraged to integrate climate change into national development planning process (see Table 2). It is therefore possible that Grenada is currently taking more significant adaptation action at the policy level than is represented by Table 1.

<table>
<thead>
<tr>
<th>Name of Policy Action</th>
<th>Government Division Responsible</th>
<th>Status</th>
<th>Sector(s) of Focus</th>
<th>Summary description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. First National Communication to the UNFCCC(^{108})</td>
<td>Ministry of Health and the Environment</td>
<td>Submitted in 2000</td>
<td>Multi-sectoral</td>
<td>This document includes a description of national circumstances, greenhouse gas emissions, vulnerability analysis, institutional arrangements, and national response measures.</td>
</tr>
</tbody>
</table>

C. Current Adaptation Action

Grenada is currently participating in a high number of regional projects relative to other Caribbean countries that address climate change adaptation. Projects are being funded by various multilateral and bilateral sources, including the Food and Agriculture Organization (FAO), the Global Environment Facility (GEF), the World Bank, and the United States Agency for International Development (USAID). Of note, Grenada is one of six countries receiving funding for pilot actions under the Red Cross/Red Crescent’s “Pilot Program for Climate Resilience.” Current adaptation projects in Grenada focus on the areas of agriculture, disaster risk management, coastal zone management, freshwater supply, gender and tourism; several are focused on enhancing the capacity of government to create an enabling environment.

environment for adaptation. Most projects support capacity building, knowledge communication and fostering policy formation and implementation.

Table 2: Current Adaptation Projects and Programs active in Grenada

<table>
<thead>
<tr>
<th>Name</th>
<th>Objectives</th>
<th>Funder(s)</th>
<th>Implementing Agency(s)</th>
<th>Type of project</th>
<th>Duration</th>
<th>Priority Sector(s)</th>
<th>Geographic focus (if any)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Participation in Regional and Global Actions</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>1. Mainstreaming Adaptation to Climate Change: Caribbean Community (MACC)¹⁰⁹</td>
<td>The objective of the MACC project is to facilitate an enabling environment for climate change adaptation in the Caribbean Community small islands and coastal developing states participating in this effort. Project components aimed to: (1) build regional capacity to collect and analyze data, thus expand the knowledge base on climate change impacts in order to assess the associated physical and socioeconomic vulnerabilities; (2) build in-country capacity to formulate and analyze adaptation policy options and finalize sectoral adaptation strategies for participating countries; (3) build capacity in preparation for a regional position for the United Nations Framework Convention on Climate Change; and (4) support public education and outreach programs by strengthening information access and data resources, and foster public awareness through technical assistance and capacity building.</td>
<td>GEF Trust Fund; co-financing</td>
<td>CCCCC, CARICOM, World Bank, Government of Canada, GEF, Government of US</td>
<td>Capacity building; Knowledge communication; Policy formation and integration</td>
<td>2003–2009 (closed)</td>
<td>Government</td>
<td>Regional: Antigua and Barbuda, Bahamas, Barbados, Belize, Dominica, Grenada, Guyana, Jamaica, Saint Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines, Trinidad and Tobago</td>
</tr>
<tr>
<td>2. Assistance to Improve Local Agricultural Emergency Preparedness in Caribbean</td>
<td>Natural hazards have severely destabilized the socio-economic fabric of the Caribbean region in the last two decades, with the most</td>
<td>FAO</td>
<td>FAO</td>
<td>Policy formation and integration;</td>
<td>2006–2009</td>
<td>Agriculture, Disaster risk management</td>
<td>Regional: Cuba; Grenada;</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Name</th>
<th>Objectives</th>
<th>Funder(s)</th>
<th>Implementing Agency(s)</th>
<th>Type of project</th>
<th>Duration</th>
<th>Priority Sector(s)</th>
<th>Geographic focus (if any)</th>
</tr>
</thead>
<tbody>
<tr>
<td>countries highly prone to hurricane related disasters</td>
<td>devastating impacts experienced in 2004. Such events have exposed the socio-cultural and environmental vulnerabilities of the Caribbean basin, and the urgent need to rethink disaster management options.</td>
<td></td>
<td></td>
<td>Capacity building</td>
<td></td>
<td>Haiti; Jamaica</td>
<td></td>
</tr>
<tr>
<td><strong>In Grenada:</strong> Further information required.</td>
<td></td>
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<tr>
<td><strong>3.</strong> Preparedness for Climate Change</td>
<td>The aim of this program was for the Red Cross and Red Crescent National Societies in countries particularly vulnerable to climate change to gain a better understanding of climate change and its impacts to identify country-specific adaptation measures in line with risks. Activities could include organizing a workshop on risks, assessment of risks through preparation of a background document, capacity building programs, and developing climate change resilient plans.</td>
<td>Red Cross/Red Crescent Climate Centre</td>
<td>National Red Cross/Red Crescent Societies</td>
<td>Capacity building; Policy formation and integration</td>
<td>Phase 1: 2006–2009 Phase 2: ongoing</td>
<td>Disaster risk management</td>
<td>39 countries Caribbean countries Phase 1: Antigua &amp; Barbuda, Grenada, Saint Kitts &amp; Nevis, Trinidad &amp; Tobago</td>
</tr>
<tr>
<td><strong>In Grenada:</strong> Further information required.</td>
<td></td>
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<td></td>
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<td></td>
</tr>
<tr>
<td><strong>4.</strong> Pilot Program for Climate Resilience–Caribbean Regional Program</td>
<td>The Pilot Program for Climate Resilience is a targeted program under the Strategic Climate Fund which aims to provide incentives for scaled-up action and transformational change in integrating climate resilience into national development planning. Activities in the Caribbean include country-based investments in Haiti, Jamaica, Dominica, Saint Lucia, Saint Vincent and the Grenadines, and Grenada; as well as region-wide activities focused on climate</td>
<td>World Bank’s Strategic Climate Fund</td>
<td>National governments</td>
<td>Capacity building; Knowledge communication; Policy formation and integration</td>
<td>2008–present</td>
<td>Government</td>
<td>Global project with specific Caribbean component: Dominica, Grenada, Haiti, Jamaica, Saint Lucia, and Saint Vincent &amp;the Grenadines</td>
</tr>
</tbody>
</table>

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112 IFRC, [http://www.climatecentre.org/site/preparedness-for-climate-change-programme](http://www.climatecentre.org/site/preparedness-for-climate-change-programme)
<table>
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</tr>
</thead>
<tbody>
<tr>
<td>5. CARIBSAVE Climate Change Risk Atlas: Phase 1&lt;sup&gt;113&lt;/sup&gt;</td>
<td>To provide practical assistance to the governments, communities and the tourism sector at the local and national levels to assess climate change impacts and manage risks. The project focuses on key sectors as they relate to tourism and livelihoods, including agriculture and gender, and “is using climate models, examining sectoral vulnerabilities, assessing adaptive capacity and developing practical response strategies with the countries across the region.”</td>
<td>DFID; AusAID</td>
<td>CARIBSAVE</td>
<td>Research; Capacity building</td>
<td>2010–2011</td>
<td>Tourism; Agriculture; Gender; Government</td>
<td>LAC Region: Antigua &amp; Barbuda, Barbados, Belize, The Bahamas, Dominica, Dominican Republic, Grenada, Jamaica, Saint Kitts &amp; Nevis, Saint Lucia, Saint Vincent &amp; the Grenadines, Suriname, Turks &amp; Caicos</td>
</tr>
<tr>
<td>6. Climate Change in the Organization of Eastern Caribbean States&lt;sup&gt;114&lt;/sup&gt;</td>
<td>The project will focus on adaptation measures in the areas of coastal/marine zone management and freshwater resources management, and will seek to build an enabling environment for reducing vulnerability to climate change by improving the regulatory framework in support of national adaptation strategies. The program</td>
<td>USAID</td>
<td>OCECS</td>
<td>Policy formation and integration; Field implementation</td>
<td>2011–?</td>
<td>Coastal zone management; Freshwater supply</td>
<td>OCECS countries: Antigua and Barbuda, Dominica, Grenada, Saint Kitts &amp; Nevis, Saint Lucia</td>
</tr>
</tbody>
</table>

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### Name: At the Water’s Edge: Coastal Resilience in Saint Vincent and the Grenadines and Grenada

**Objectives:** Demonstrate that governments and communities of small island states can enhance their resilience to climate change by protecting, restoring and effectively managing their marine and coastal ecosystems and strengthening local capacity for adaptation.

**Funder(s):** Anne Ray Charitable Trust, The Nature Conservancy  
**Implementing Agency(s):** The Nature Conservancy  
**Type of project:** Assessment; Capacity building; Community-based adaptation; Knowledge communication  
**Budget:** US$992,650  
**Duration:** 2011–2012  
**Priority Sector(s):** Coastal zone management; Marine management  
**Geographic focus (if any):** Regional: Grenada, Saint Vincent & the Grenadines

**In Grenada:** Further information required.

### D. Proposed Adaptation Action

There is no evidence of proposed adaptation programming in Grenada has been identified.

### E. Assessment

Grenada is currently benefiting from its participation in a number of regional adaptation projects. Of particular note are the FAO-funded “Assistance to Improve Local Agricultural Emergency Preparedness” and the “Pilot Program for Climate Resilience: Caribbean Regional Program.” The fact that Grenada was chosen as one of few Caribbean participants may reflect donors’ recognition of its vulnerability to climate change vis-à-vis its small island status, development challenges, proneness to natural disasters, and reliance on agriculture and tourism.
Current projects are addressing many of the country’s priority areas of concern for adaptation as identified through the National Communication, including coastal zones, agriculture, freshwater, disaster risk management, and forming the policy structure for adaptation. Future activities may be expanded towards other areas of focus, including human health and fisheries. There is likely room for expanded efforts in the areas of coastal zones and agriculture given the country’s economic dependence on these sectors and their vulnerability to the effects of climate change.

References:

7.0 Haiti

Haiti is the poorest country in the Western Hemisphere, with approximately 80 per cent of the population living in poverty (MDE, 2006). Its widespread poverty and ecological degradation make Haiti particularly susceptible to climate change impacts. Rapid deforestation, at a rate of about 1,000 hectares per year between 2005 and 2010 (FAO, 2010),\(^\text{115}\) has left only three per cent of the country with forest cover (Williams, 2011). Consequently, 25 of 30 watersheds in Haiti are completely deforested (PAE, in MDE, 2006). This rate of deforestation

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\(^\text{115}\) In its *Global Forest Resource Assessment*, FAO (2010: 232) indicates that Haiti’s forest cover rested at 116,000 hectares in 1990 and had shrunk to 101,000 hectares by 2010, with an annual deforestation rate of 0.77 per cent or 1,000 hectares per year between 2005 and 2010.
results from the use of fuelwood to supply 71 per cent of Haiti’s energy requirements (BME 1999, cited in MDE, 2002). Vulnerability to climate change was further increased in January 2010, when a crippling magnitude 7.0 earthquake destroyed much of Haiti’s capital city, Port-au-Prince. Approximately two million people lived within the zone of heavy and moderate structural damage (CIA, 2010). Haiti also lies in the middle of a hurricane belt, with the most severe storms occurring from June to October (MDE, 2006). The country also has been plagued by political violence throughout its history (CIA, 2010).

A. Adaptation Needs and Priorities
Based on available projections, major climatic changes expected to occur in Haiti include a reduction in rainfall of 6 to 20 per cent by 2030 and by 11 to 36 per cent by 2060 (MDE, 2006). While annual precipitation is projected to decrease, the more limited rainfall events are expected to become more intense. Temperatures are also expected to increase by 0.8° to 1.0°C by 2030, and by 1.5° to 1.7°C by 2060 (MDE, 2006). Identified climate-related hazards in Haiti include: (flash) flooding, salt water intrusion, drought, intense rainfall, landslides, severe soil erosion, and hurricanes.

According to its First National Communication to the United Nations Framework Convention on Climate Change (UNFCCC), the adaptation needs of Haiti relate primarily to: (1) agriculture/food security; (2) coastal zones and marine ecosystems; and (3) water resources (MDE, 2002). Similarly, the National Adaptation Program of Action (NAPA) identified the following adaptation priorities: (1) watershed management and soil conservation; (2) coastal zone management; (3) evaluation and conservation of natural resources; (4) preservation and enforcement of food security; (5) water protection and conservation; (6) infrastructure construction and rehabilitation; (7) waste management; (8) education and outreach. The NAPA also identified Haiti’s most vulnerable areas to be the Southern, Western and North-Western departments, as well as the department of Artibonite (MDE, 2006).

As noted above, climate change will have repercussions on diverse sectors. These climate change impacts are often interlinked. The decreased annual rainfall and intense storm events projected with climate change would decrease agricultural productivity (namely corn, rice and potatoes) and increase dependence on imported food (MDE, 2006). In addition to compromising food security, decreased precipitation would also likely result in water scarcity. Intense storm events could threaten water security by contributing to increased erosion and the subsequent fouling of water quality. On the other hand, intense rainfall events would also lead to flooding, landslides and significant erosion, especially considering that most of Haiti’s watersheds lack protective forest cover. Erosion from the wind and rain of intense storms, coupled with iterative cycles of drought and chronic anthropogenic degradation, will also amplify desertification in Haiti, thus further compromising agricultural productivity and food security (MDE, 2006).
Coastal communities in Haiti are also particularly vulnerable to climate change impacts. The most intense rainfalls primarily occur and will continue to occur along the coast resulting in significant runoff of water and pollution into densely populated coastal areas. Sediments and pollutants from eroded upstream lands also negatively impact marine ecosystems. In addition to runoff events, sea level rise induced by climate change will also impact Haiti’s coastal population and ecosystems. Sea level rise will increase coastal erosion and salt-water intrusion and thus very likely compromise food and water security (MDE, 2006).

B. National Level Policies and Strategic Documents

With the elaboration of Haiti’s First National Communication (MDE, 2002) and NAPA (MDE, 2006), Haiti’s Ministry of Environment has undertaken steps towards the elaboration of national level adaptation policy. The NAPA recognizes the need to synergize existing national strategies with climate change adaptation. Specific national level policies that will be integrated with the NAPA include the Interim Cooperation Framework (Cadre de Cooperation Interinaire) and Poverty Reduction Strategy Paper (PRSP). These policies share mutual goals, including the sustainable intensification of agriculture production, prevention of land degradation, and increasing access to clean water (MDE, 2006). Haiti’s PSRP and NAPA also share mutual objectives to implement the vulnerability reduction activities as outlined in the National Risk and Disaster Management Plan (Plan National de Gestion des Risques et Desastres) (MDE, 2006). Another plan that will be integrated with the NAPA is the National Environmental Action Plan (Plan d’Action pour l’Environnement) released in 1999, which focuses on sound environmental management and recognizes climate change as a priority. Finally, the Coastal Zone Management Plan will also be integrated into NAPA activities. The integration of these diverse national level policies will help Haiti adapt to the broad spectrum of climate change impacts. However, it remains to be seen how and to what extent these policies will be integrated and successfully applied on the ground to reduce the country’s vulnerability to climate change.

Table 1: Key Government Policies and Reports reflecting Adaptation Needs, Priorities and Planned Actions

<table>
<thead>
<tr>
<th>Name of Policy Action</th>
<th>Government Division Responsible</th>
<th>Status</th>
<th>Sector(s) of Focus</th>
<th>Summary description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. First National Communication to the UNFCCC(^{116})</td>
<td>Ministry of Environment</td>
<td>Submitted August 2001</td>
<td>Agriculture; Freshwater supply; Coastal zone management</td>
<td>On adaptation, this report presents preliminary assessments of the vulnerability of Haiti’s agriculture sector, freshwater resources and coastal zones to climate change.</td>
</tr>
<tr>
<td>2. National Adaptation Programme of Action(^{117})</td>
<td>Ministry of Environment</td>
<td>Released October 2006</td>
<td>Multi-sectoral</td>
<td>The NAPA presents: climate change vulnerability assessments focused on soil erosion/desertification, agriculture, coastal</td>
</tr>
</tbody>
</table>


\(^{117}\) UNFCCC, [http://unfccc.int/resource/docs/napa/hai01f.pdf](http://unfccc.int/resource/docs/napa/hai01f.pdf)
Review of Current and Planned Adaptation Action: The Caribbean

<table>
<thead>
<tr>
<th>Name of Policy Action</th>
<th>Government Division Responsible</th>
<th>Status</th>
<th>Sector(s) of Focus</th>
<th>Summary description</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
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<td></td>
<td>zones and water; a brief overview for the need to integrate the NAPA with other national strategies; and analysis and ranking of adaption needs and priorities.</td>
</tr>
</tbody>
</table>

C. Current Adaptation Action

The review revealed a total of five current adaptation-focused projects in Haiti, an average number of projects for the Caribbean region. Over half of the adaptation actions in Haiti are being implemented solely in Haiti, with the remainder of the projects being part of regional initiatives. Nationally focused projects in Haiti are being funded by the Least Developed Countries Fund (LDCF), the Canadian International Development Agency (CIDA) and the Global Environment Facility (GEF). They focus on capacity building, vulnerability assessment and policy integration in the areas of disaster risk management, coastal zone management and agriculture. Haiti is also participating in regional projects funded by the Food and Agriculture Organization (FAO) and the World Bank in the areas of agriculture, disaster risk management and policy integration. This includes Haiti’s participation in the “Pilot Program for Climate Resilience,” a recognition of the country’s particular vulnerability to climate change.

Table 2: Current Adaptation Projects and Programs in Haiti

<table>
<thead>
<tr>
<th>Name</th>
<th>Objectives</th>
<th>Funder(s)</th>
<th>Implementing Agency(s)</th>
<th>Type of project</th>
<th>Duration</th>
<th>Priority Sector(s)</th>
<th>Geographic focus (if any)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Climate Change Adaptation Initiatives in Haiti(^{118})</td>
<td>Support for climate change adaptation activities in Haiti</td>
<td>CIDA</td>
<td>Budget: CND 5 million</td>
<td>2010–?</td>
<td>Haiti</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Strengthening Adaptive Capacities to Address Climate Change Threats on Sustainable Development Strategies for Coastal Communities in Haiti(^{119})</td>
<td>To strengthen adaptive capacity of populations and productive sectors in coastal areas to address increasing climate change risks.</td>
<td>LDCF</td>
<td>Budget: US$11.06 million</td>
<td>UNDP</td>
<td>Capacity Building</td>
<td>2010–2014 Coastal zone management</td>
<td>Haiti</td>
</tr>
</tbody>
</table>


\(^{119}\) ALM, [http://www.adaptationlearning.net/project/strengthening-adaptive-capacities-address-climate-change-threats-sustainable-development-str](http://www.adaptationlearning.net/project/strengthening-adaptive-capacities-address-climate-change-threats-sustainable-development-str) and [www.gefonline.org/projectDetailsSQL.cfm?projID=3733](http://www.gefonline.org/projectDetailsSQL.cfm?projID=3733)
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<th>Duration</th>
<th>Priority Sector(s)</th>
<th>Geographic focus (if any)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3. Strengthening Climate Resilience and Reducing Disaster Risk in Agriculture to Improve Food Security in Haiti Post Earthquake</td>
<td>The objective of this project is to reduce the impact of climate variability and change on agro-ecosystems, vulnerable farmers and their livelihoods in the post-earthquake crises through the integration of disaster risk management and adaptation in the agricultural sector and replication of resilient crop varieties and cultivation practices.</td>
<td>GEF, FAO</td>
<td>FAO</td>
<td>Policy formation and integration; Capacity building; Field implementation</td>
<td>2010–2014</td>
<td>Agriculture; Disaster risk management</td>
<td>Haiti</td>
</tr>
</tbody>
</table>

**Participation in Regional and Global Projects**

<table>
<thead>
<tr>
<th>Name</th>
<th>Objectives</th>
<th>Funder(s)</th>
<th>Implementing Agency(s)</th>
<th>Type of project</th>
<th>Duration</th>
<th>Priority Sector(s)</th>
<th>Geographic focus (if any)</th>
</tr>
</thead>
<tbody>
<tr>
<td>4. Assistance to Improve Local Agricultural Emergency Preparedness in Caribbean countries highly prone to hurricane related disasters</td>
<td>Natural hazards have severely destabilized the socio-economic fabric of the Caribbean region in the last two decades, with the most devastating impacts experienced in 2004. Such events have exposed the socio-cultural and environmental vulnerabilities of the Caribbean basin, and the urgent need to rethink disaster management options.</td>
<td>FAO</td>
<td>FAO</td>
<td>Policy formation and integration; Capacity building</td>
<td>2006–2009</td>
<td>Agriculture, Disaster risk management</td>
<td>Regional: Cuba; Grenada; Haiti; Jamaica</td>
</tr>
</tbody>
</table>

In Haiti: Further information required.

| 5. Pilot Program for Climate Resilience–Caribbean Regional Program | The Pilot Program for Climate Resilience is a targeted program under the Strategic Climate Fund which aims to provide incentives for scaled-up action and transformational change in integrating climate resilience into national development planning. Activities in the Caribbean include country-based investments in Haiti, Jamaica, Dominica, Saint Lucia, Saint Vincent and the Grenadines, and Grenada; as well as | World Bank’s Strategic Climate Fund | National governments | Capacity building; Knowledge communication; Policy formation and integration | 2008–present | Government | Global project with specific Caribbean component: Dominica, Grenada, Haiti, Jamaica, Saint Lucia, and Saint Vincent &the |

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D. Proposed Adaptation Action

The over-arching benefits that are provided by integrated watershed-based management have been recognized by Haitian communities, governments and international donors. Effective watershed restoration and management would pro-actively mitigate climate change impacts across diverse sectors, including water and agriculture, along with the mitigation of flooding, landslides and droughts. Most of the proposed adaptation projects in Haiti therefore focus on needs in this area. Other proposed adaptation actions include coastal zone management and freshwater infrastructure projects.

Table 3: Proposed Adaptation Projects and Programs in Haiti

<table>
<thead>
<tr>
<th>Name</th>
<th>Objectives</th>
<th>Type of project</th>
<th>Priority Sector(s)</th>
<th>Geographic focus (if any)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Haiti: Sustainable Management of the Domestic Energy Sector</td>
<td>To assist the energy sector of Haiti meet the growing domestic energy demands whilst preventing the continued destruction of forests, biodiversity and carbon sequestration through: a) the strengthening of institutions in the energy sector and promoting the participation of civil society in energy sector management; b) the execution and monitoring of a project for community management of fuelwood supply; c) the promotion of private sector activities and non-governmental initiatives in the substitution of traditional energy sources (fuelwood, charcoal, mineral coal, etc.) by new and renewable energy (i.e., solar and wind, etc.).</td>
<td>Capacity building; Research; Knowledge communication; Field implementation</td>
<td>Forestry; Energy; Private sector</td>
<td>Haiti</td>
</tr>
</tbody>
</table>

Notes: Source: First National Communication

Projects proposed in Haiti’s NAPA

2. Watershed restoration, soil conservation and reforestation in South and Grand-Anse
   - Increase adoption of soil conservation measures
   - RemEDIATE degraded and deforested land within watersheds
   - Train farmers techniques for sustainable land use,

Agriculture; Watershed management

Aquin, Jérémie, Lazile, Maniche, Vieuxbourg d’Aquin
<table>
<thead>
<tr>
<th>Name</th>
<th>Objectives</th>
<th>Type of project</th>
<th>Priority Sector(s)</th>
<th>Geographic focus (if any)</th>
</tr>
</thead>
</table>
| Provinces | agroforestry, pest management and ravine management  
• Significantly increase riparian flow through reforestation | Notes: | | |
| Watershed restoration of River Grise in West Province  3. | • Reduce environmental vulnerability of watersheds  
• Regulate runoff  
• Reduce soil erosion  
• Mitigate flooding impact on human lives and property | Capacity building; Field implementation | Watershed management | Plaine du Cul de Sac  
Notes: An ongoing project funded by the United States Agency for International Development (USAID) may be implementing these activities. |
| Watershed restoration of River La Quinte (Ravine Durée) and Support to the agricultural production in Artibonite Province against the negative effects of extreme climatic conditions  4. | • Restore the watersheds of Ravine Durée  
• Protect the outskirts of the northern area of Gonaïve against floods  
• Restore the existing vegetative cover  
• Repair irrigation infrastructure over 200 hectares of land  
• Manage 3,000 hectares of land with appropriate agriculture techniques | Capacity building; Field implementation | Agriculture; Watershed management | Anse-à-Foleur, Baie de Henne, Bombardopolis, Jean-Rabel  
Notes: An ongoing project funded by USAID may be implementing these activities |
| Flood mitigation and improvement of agricultural production through the rehabilitation of watersheds in Northwest and Northeast Provinces  5. | • Reforestation of watersheds with agroforestry  
• Use anti-erosion structures and riparian forests to protect river banks  
• Educate and motivate rural inhabitants about climate change impacts on the environment and how they may protect themselves | Capacity building; Field implementation; Knowledge communication | Watershed management | Northwest & Northeast Provinces  
Notes: An ongoing project funded by USAID may be implementing these activities |
| Watershed restoration, soil conservation and reforestation in Southeast Province  6. | • Assist with the restoration of watersheds through the implementation of anti-erosive structures  
• Increase forest cover within watersheds/ravines with forest and fruit trees  
• Train farmers on how to implement anti-erosive structures and monitor tree plantations  
• Enhance the productive capacity of farmers in the region  
• Seek the involvement of local actors in the execution of the project | Capacity building; Field implementation; Knowledge communication | Watershed management; Agriculture | Bainet, Belle-Anse, Cayes-Jacmel, Côtes-de-Fer, Grand-Gosier, Jacmel, La Vallée-de-Jacmel, Marigot, Plaine Mapou, Thiotte |
<table>
<thead>
<tr>
<th>Name</th>
<th>Objectives</th>
<th>Type of project</th>
<th>Priority Sector(s)</th>
<th>Geographic focus (if any)</th>
</tr>
</thead>
</table>
|      | diverse projects  
- Educate and empower the entire population concerned about effective environmental management and protection | Field implementation; Knowledge communication | Coastal zone management; Biodiversity; Freshwater supply | Anse-à-Foleur (Nord-Ouest), Fort-Liverté, Caracol, Terrier-Rouge et Ferrier (Nord-Est) |
| 7.   | Restoration and protection of coastal areas in Northwest and Northeast Provinces  
- Sustainable protection of marine and coastal ecosystems with mechanical and biological structures to reduce the damage caused by waves  
- Conserve coastal biodiversity  
- Improve flood, wave and saltwater intrusion protection for coastal communities  
- Ensure a certain level of safety on the coast | Field implementation; Knowledge communication | Coastal zone management; Biodiversity; Freshwater supply | Anse-à-Foleur (Nord-Ouest), Fort-Liverté, Caracol, Terrier-Rouge et Ferrier (Nord-Est) |
| 8.   | Restoration and protection of coastal areas in West Province  
- Sustainable protection of the marine and coastal ecosystems with mechanical and biological structures to reduce the damage caused by waves  
- Conserve coastal biodiversity  
- Improve flood, wave and saltwater intrusion protection for coastal communities  
- Ensure a certain level of safety on the coast | Field implementation; Knowledge communication | Coastal zone management; Biodiversity; Freshwater supply | Port-au-Prince (Ouest), La Gonâve (Ouest) |
| 9.   | Restoration and protection of coastal areas in South and Grand-Anse Provinces  
- Sustainable protection of the marine and coastal ecosystems with mechanical and biological structures to reduce the damage caused by waves  
- Conserve coastal biodiversity  
- Improve flood, wave and saltwater intrusion protection for coastal communities  
- Ensure a certain level of safety on the coast  
- Provide appropriate fishing tools to fishers  
- Educate coastal communities on the necessity of respecting fishing regulations and fishing seasons | Field implementation; Knowledge communication; Capacity building | Coastal zone management; Biodiversity; Marine fisheries | Baradères, Dame-Marie, Anse d’Hainault, Les Irois |
| 10.  | Reforestation, preservation and protection of fruit and  
- Reforestation especially upstream areas of Pédernales River and the towns of Pichon and CorailLamothe | Knowledge communication; Capacity building | Forestry; Watershed management; Biodiversity | Anse-à-Pitres, Belle Anse (Corail) |
<table>
<thead>
<tr>
<th>Name</th>
<th>Objectives</th>
<th>Type of project</th>
<th>Priority Sector(s)</th>
<th>Geographic focus (if any)</th>
</tr>
</thead>
</table>
| forest species in Southeast Province | • Improve the biodiversity of the region  
• Educate and motivate the rural inhabitants to reduce the degradation of forest resources, particularly in the Forêt des Pins Reserve  
• Incorporate community-based management of the Forêt des Pins Reserve and ensure its protection | | | Lamothe et Pichon, Thiotte (Forêt des Pins) |
| 11. Restoration and protection of natural sites in Northeast Province | • Improve regional biodiversity  
• Educate and motivate the rural inhabitants to reduce the degradation of forest resources  
• Develop spaces for tourism and recreation  
• Increase local art production  
• Develop greater value for natural sites in the region | Knowledge communication; Capacity building | Biodiversity; Tourism | Capotille, Ferrier, Mont-Ogranisé, Terrier-Rouge, Trou du Nord, Vallières |
| 12. Improved management of natural resources in Artibonite Province | • Promote better soil and residue management  
• Diversify and improve food production  
• Increase vegetative cover  
• Build local-level response capacity | Capacity Building | Agriculture; Biodiversity | Chenot (Marchand Dessalines) |
| 13. Support to the enhancement of agricultural production capacity in Jean Rabel | • Set-up an agricultural input store to respond to the most urgent agriculture needs  
• Popularize elementary agricultural techniques suitable for local conditions  
• Make agricultural credit available to farmers | Capacity building; Field implementation | Agriculture | Jean-Rabel (Nord-Ouest) |
| 14. Construction of reservoirs at household and community level in Grand-Anse Province | • Permit families from different communities to access water during periods of drought  
• Avoid conflict over water resources  
• Relive women of their chores by providing them with a close source of water | Field implementation | Freshwater supply | Montagnac, Fond-Rouge (Jérémie), Lopineau (Roseau) and Jean-Bellune (Pestel) |
| 15. Rehabilitation of 25 | • Restore the catchments and fountains in 25 sites in the Bas | Community-based | Watershed |
### Name

- Water supply infrastructures in 4 Farwest districts

### Objectives

- Satisfy the water consumption needs of the inhabitants in the target area
- Form local teams to manage catchment areas and water quality

### Type of project

- Adaptation; capacity building

### Priority Sector(s)

- Management; freshwater supply

### Geographic focus (if any)

#### Notes:

**E. Assessment**

Despite the benefits of integrated watershed-based management and other adaptation actions, there are numerous challenges that need to be overcome to effectively implement adaptation actions in Haiti. The NAPA specifically identified the following obstacles:

- Haiti’s political turbulence and instability has generated fear and despair. Consequently, Haitians are wary and resistant to engage in government programs, which may result in weak participation of NAPA initiatives.
- The acute food shortage affecting the majority of the population displaces concerns about environmental protection.
- The persistent insecurity and turbulent politico-socio-economic conditions can interrupt adaptation activities and increase the reluctance of donors to support projects, further impeding implementation of adaptation initiatives.
- Potential conflicts between partner organization and local authorities, or the lack of local government representatives at adaptation project sites.
- The lack of coordination for environmental projects; there are many institutions involved in environmental management but the roles and responsibilities of each institution are unclear.
- The rugged topography of priority areas, which are difficult access, and the potential occurrence of new disasters during implementation may constitute new obstacles to NAPA implementation.

Moreover, the NAPA was written before the crippling January 12, 2010, earthquake that internally displaced an estimated 2 million individuals (Relief Web, 2011) and left the country even more vulnerable to existing hazards (i.e., hurricanes) and epidemics (i.e., cholera). Urgent reconstruction efforts are needed to restore critical infrastructure and services to the country. As mentioned above, Haiti’s history of political instability could also impede adaptation actions. With such urgent needs and near-term uncertainty, it will be difficult for Haiti to adapt to the long-term uncertainty imposed by climate change. The extent to which the US$3.4 billion mobilized for earthquake rehabilitation and restoration initiatives (Relief Web, 2010) are considering climate change impacts is unknown. As aid is funneled into the...
country and applied, over-arching guidelines could be set for funds to be used in a climate-sensitive manner to avoid exacerbating existing vulnerabilities to climate change (i.e., infrastructure development that considers flooding from climate change).

References:


8.0 Jamaica

Jamaica is an island in the Caribbean Sea, located approximately 145 kilometers from Cuba. The island is 230 kilometers long and 80 kilometers wide, with a population of around 2.8 million; approximately 22 per cent of its inhabitants live below the poverty line (MWH and NMS, 2000; USDS, 2010). The country is mainly tropical, with mean average temperatures hovering around 33°C at sea level and 12°C in the islands’ Blue Mountains. The country is impacted by extreme tropical weather events, including tropical waves, storms and hurricanes, particularly during the hurricane season that lasts from June to November (MWH and NMS, 2000). Jamaica’s economy is
dependent on the services sector (including tourism), which constitutes approximately 60 per cent of its Gross Domestic Product (GDP); remittances make up a further 20 per cent of the country’s GDP (USDS, 2010). Jamaica has a high unemployment rate and the fourth highest debt to GDP ratio per capita in the world (USDS, 2010). Approximately 65 per cent of the country’s workforce is employed by the services sector, 17 per cent by industry (bauxite, gypsum, etc.) and 18 per cent in agriculture (USDS, 2010).

**A. Adaptation Needs and Priorities**
Climate change projections predict various regions of the Caribbean will become drier (Mimura et al., 2007; Centella, 2010). Most models indicate the greatest decrease in rainfall will occur in the summer, particularly around Jamaica and the rest of the Greater Antilles (Mimura et al., 2007). Key vulnerable sectors to climate change in Jamaica, as identified in the country’s First National Communication to the United Nations Framework Convention on Climate Change (UNFCCC), include the coastal zone (which produces approximately 90 per cent of the country’s GDP), as well as water and agriculture (MWH and NMS, 2000). A number of adaptation options are presented in the country’s National Communication, as included in Table 1.

**Table 1: Climate change vulnerabilities and proposed responses in Jamaica’s National Communication**

<table>
<thead>
<tr>
<th>Priority Sector</th>
<th>Vulnerabilities</th>
<th>Proposed Responses</th>
</tr>
</thead>
</table>
| **Agriculture** | - Changes to precipitation and water availability may affect agricultural output  
- Potential for increased soil erosion through heavier winds, more extreme rainfall events | - Adjust to the impacts of climate change on water supply in the agriculture sector though improved efficiency of irrigation, installation of water storage facilities, night time irrigation, drip irrigation systems, and better management and control of supply networks  
- Adapt to the impacts of climate change on soil through improved drainage, watershed management, public education and awareness, improved soil management practices, etc.  
- Engage in disaster planning for food security  
- Integrated pest management and altered chemical use  
- Research into the impacts of climate change on key crops, including bananas, sugar and coffee |
| **Coastal zones** | - Risk of extreme weather events  
- Erosion from storm surges, beach loss  
- Sea-level rise  
- Damage to coral reefs and tourist infrastructure | - Assessment of need for modified land use, implementation of land use guidelines, and modification of building styles and codes  
- More structured coral reef management, promotion of research and monitoring of corals, and support for coral reef mapping programs  
- Development of marine fisheries management plan  
- Biological and research programs for marine fisheries  
- Improved integrated water resources management |
| **Freshwater resources** | - Saline intrusion into Jamaica’s groundwater (which constitutes 84 per cent of water supply)  
- Possible decline in water quality and availability with decreased precipitation, adversely effecting food | - Promotion of domestic, industrial and agricultural water conservation  
- Supply-side management measures, including a leak detection/repair program and improved monitoring and metering |
Review of Current and Planned Adaptation Action: The Caribbean

<table>
<thead>
<tr>
<th>Priority Sector</th>
<th>Vulnerabilities</th>
<th>Proposed Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>security</td>
<td>Heavy rainfall events could lead to increased soil erosion and runoff</td>
<td>Development of new infrastructure, including upgrading existing infrastructure, storage facilities, and improved flood control structures</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Improve the availability and interpretation of climate data and services, including further research on climate change and variability</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Addressing gaps in information and research including through improved monitoring of water resources, legislation and environmental plans, and collation and analyses of relevant data</td>
</tr>
</tbody>
</table>

Source: MWH and NMS (2000)

B. National Level Policies and Strategic Documents

In addition to its National Communication, according to a recent document prepared by the government, Jamaica is preparing a national Climate Strategy and Action Plan (CIF, 2009). As well, the government announced plans in 2006 to establish a climate change unit that would act as a clearinghouse for information on climate change in Jamaica and support activities such as development of its National Communications. However, this unit has not yet been established (Williams-Raynor, 2010).

Table 2: Key Government Policies and Reports reflecting Adaptation Needs, Priorities and Planned Actions

<table>
<thead>
<tr>
<th>Name of Policy Action</th>
<th>Government Division Responsible</th>
<th>Status</th>
<th>Sector(s) of Focus</th>
<th>Summary description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. First National Communication to the UNFCCC(^{22})</td>
<td>Ministry of Water &amp; Housing and National Meteorological Service of Jamaica</td>
<td>Released November 2000</td>
<td>Coastal zone management; Freshwater supply; Agriculture</td>
<td>This document describes the steps Jamaica is taking and envisages undertaking to implement the UNFCCC. It underlines key vulnerabilities (coastal zones and marine ecosystems, water resources, and agriculture) as well as potential adaptation measures.</td>
</tr>
<tr>
<td>2. National Climate Strategy and Action Plan</td>
<td></td>
<td>In development</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

C. Current Adaptation Action

Compared to many other Caribbean countries, Jamaica is currently benefitting from a very high number of ongoing adaptation projects and programs. These include a nationally-focused project funded by the United States Agency for International Development (USAID) that addresses adaptation in the agriculture sector. The majority of current projects, however, are regionally and globally focused. These

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regional and global projects are focused on the areas of agriculture, disaster risk management, watershed management, gender, tourism and enabling governments to prepare for and respond to climate change impacts. For example, Jamaica is participating in the “Global Climate Change Alliance,” global project that focuses on policy integration and disaster risk management that is looking at the watershed and forestry sectors in Jamaica; and the “Pilot Project for Climate Resilience,” also focused on policy integration with a sectoral emphasis in Jamaica on freshwater, agriculture, tourism and human health. Funders of multi-country adaptation projects being implemented in Jamaica include the Caribbean Catastrophe Risk Insurance Facility (CCRIF), European Commission, the Food and Agriculture Organization (FAO), the Global Environment Facility (GEF), the World Bank and the governments of Australia and the United Kingdom.

Table 3: Current Adaptation Projects and Programs active in Jamaica

<table>
<thead>
<tr>
<th>Name</th>
<th>Objectives</th>
<th>Funder(s)</th>
<th>Implementing Agency(s)</th>
<th>Type of project</th>
<th>Duration</th>
<th>Priority Sector(s)</th>
<th>Geographic focus (if any)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. The Impact of Climate Change on Tourism and Economic Growth in Jamaica&lt;sup&gt;123&lt;/sup&gt;</td>
<td>The project is examining the impact of climate change on the economics of tourism in Jamaica and also the issues of gender and agriculture in the context of economics and climate change. CARIBSAVE is working in collaboration with agencies in Jamaica and regional experts to assess these impacts using a methodology developed by the International Institute of Environment and Development, enhanced with a Delphi type process.</td>
<td>The International Institute of Environment and Development and Oxfam</td>
<td>CARIBSAVE</td>
<td>Research</td>
<td>2009–2011</td>
<td>Tourism; Agriculture; Gender</td>
<td>Jamaica</td>
</tr>
<tr>
<td>2. Agriculture Climate Change Adaptation&lt;sup&gt;124&lt;/sup&gt;</td>
<td>Support and promote adaptive measures, such as altering planting dates and selecting more resilient crop varieties, increasing rainwater harvesting for irrigation, relocating crops to less vulnerable areas, improving agroforestry techniques, promoting better land management, and improving climate</td>
<td>USAID</td>
<td>USAID</td>
<td>Capacity building</td>
<td>2011–?</td>
<td>Agriculture</td>
<td>Jamaica</td>
</tr>
</tbody>
</table>


<sup>124</sup> USAID, [http://www.state.gov/documents/organization/151898.pdf](http://www.state.gov/documents/organization/151898.pdf)
<table>
<thead>
<tr>
<th>Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Participation in Regional and Global Actions</td>
</tr>
<tr>
<td><strong>3.</strong> Mainstreaming Adaptation to Climate Change: Caribbean Community (MACC)(^{125})</td>
</tr>
<tr>
<td>The objective of the MACC project is to facilitate an enabling environment for climate change adaptation in the Caribbean Community small islands and coastal developing states participating in this effort. Project components aimed to: (1) build regional capacity to collect and analyze data, thus expand the knowledge base on climate change impacts in order to assess the associated physical and socioeconomic vulnerabilities; (2) build in-country capacity to formulate and analyze adaptation policy options and finalize sectoral adaptation strategies for participating countries; (3) build capacity in preparation for a regional position for the United Nations Framework Convention on Climate Change; and (4) support public education and outreach programs by strengthening information access and data resources, and foster public awareness through technical assistance and capacity building.</td>
</tr>
<tr>
<td>Funder(s)</td>
</tr>
</tbody>
</table>

*In Jamaica: Further information required.*

| **4.** Assistance to Improve Local Agricultural Emergency Preparedness in Caribbean countries highly prone to hurricane related disasters\(^{126}\) |
| Natural hazards have severely destabilized the socio-economic fabric of the Caribbean region in the last two decades, with the most devastating impacts experienced in 2004. Such events have exposed the socio-cultural and environmental vulnerabilities of the |
| Funder(s) | Implementing Agency(s) | Type of project | Duration | Priority Sector(s) | Geographic focus (if any) |
| FAO | FAO | Policy formation and integration; Capacity building | 2006–2009 | Agriculture, Disaster risk management | Regional: Cuba; Grenada; Haiti; Jamaica |

*In Jamaica: Further information required.*


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Review of Current and Planned Adaptation Action: The Caribbean
<table>
<thead>
<tr>
<th>Name</th>
<th>Objectives</th>
<th>Funder(s)</th>
<th>Implementing Agency(s)</th>
<th>Type of project</th>
<th>Duration</th>
<th>Priority Sector(s)</th>
<th>Geographic focus (if any)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Caribbean basin, and the urgent need to rethink disaster management options.</td>
<td></td>
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</tr>
<tr>
<td>5. Community-based Adaptation (CBA) Programme¹²⁷</td>
<td>The objective of the program is to enhance the capacity of communities in the pilot countries to adapt to climate change including variability. Planned outcomes are: - Enhanced adaptive capacity allows communities to reduce their vulnerability to adverse impacts of future climate hazards; - National policies and programs include community-based adaptation priorities to promote replication, up-scaling and integration of best practices derived from community-based adaptation projects; and - Cooperation among member countries promotes global innovation in adaptation to climate change including variability.</td>
<td>GEF (Strategic Priority on Adaptation), co-financing</td>
<td>UNDP</td>
<td>Knowledge communication; Capacity Building; Community-based adaptation</td>
<td>2009–2011</td>
<td>Multi-sectoral</td>
<td>Global: Bangladesh, Bolivia, Guatemala, Jamaica, Kazakhstan, Morocco, Namibia, Niger, Samoa, Viet Nam</td>
</tr>
<tr>
<td>In Jamaica: A number of projects are currently being implemented through this program in Jamaica, including the following topics: (a) reducing climate change-driven erosion and landslide risks through sustainable agriculture for safer slopes; (b) land and preservation measures to combat climate change pressures in the Martha Brae watershed; (c) adaptation to climate change vulnerability in Jamaica’s Cockpit Country; and (d) increasing community adaptation and ecosystem resilience to climate change in Portland Bight.</td>
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<tr>
<td>6. Global Climate Change Alliance¹²⁸</td>
<td>The Global Climate Change Alliance seeks to deepen the policy dialogue between the European Union and developing countries on climate change; and to increase support to target countries to implement priority adaptation and mitigation measures, and integration climate change into their development strategies. The program’s five priority areas for funding are: improving the European Commission, Czech Republic, Sweden, 10th European Development Fund</td>
<td>National Governments</td>
<td>European Commission, National Governments</td>
<td>Policy formation and implementation; Knowledge communication</td>
<td>2008–ongoing</td>
<td>Disaster risk management; Government</td>
<td>Global: 17 countries and the Pacific region,¹²⁹ including: Jamaica</td>
</tr>
</tbody>
</table>

¹²⁸ GCCA, [http://www.gcca.eu/pages/1_2-Home.html](http://www.gcca.eu/pages/1_2-Home.html)
¹²⁹ These countries are: Bangladesh, Belize, Cambodia, Ethiopia, Gambia, Guyana, Jamaica, Malawi, Maldives, Mali, Mauritius, Mozambique, Nepal, Pacific region, Rwanda, Senegal, Seychelles, Sierra Leone, Solomon Islands, Tanzania and Vanuatu.
<table>
<thead>
<tr>
<th>Name</th>
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<th>Funder(s)</th>
<th>Implementing Agency(s)</th>
<th>Type of project</th>
<th>Duration</th>
<th>Priority Sector(s)</th>
<th>Geographic focus (if any)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>knowledge base of developing countries to the effects of climate change; promoting disaster risk reduction; mainstreaming climate change into poverty reduction development strategies; reducing emissions from deforestation and degradation; and enhancing participation in the Clean Development Mechanism.</td>
<td>Budget: € 140 million</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>In Jamaica: This project in Jamaica focuses on improving climate change adaptive capacity in selected terrestrial and coastal ecosystems; institutional strengthening; and awareness building, all geared towards helping Jamaica, particularly vulnerable groups, to be better prepared to cope with the potential impacts of climate change which include natural disasters. The objectives include the following: rehabilitate and improve management of selected watersheds to reduce downstream run-off and associated pollution and health risks; restore and protect coastal ecosystems to enhance natural buffers and increase resilience; and integrate climate change mitigation and adaptation into relevant national policies and plans, enhance institutional (human and technical) capacity and facilitate awareness building amongst Jamaica's population to better adapt to climate change.</td>
<td></td>
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</tr>
<tr>
<td>7. Pilot Program for Climate Resilience–Caribbean Regional Program</td>
<td>The Pilot Program for Climate Resilience is a targeted program under the Strategic Climate Fund which aims to provide incentives for scaled-up action and transformational change in integrating climate resilience into national development planning. Activities in the Caribbean include country-based investments in Haiti, Jamaica, Dominica, Saint Lucia, Saint Vincent and the Grenadines, and Grenada; as well as region-wide activities focused on climate monitoring, institutional strengthening, capacity building and knowledge sharing.</td>
<td>World Bank’s Strategic Climate Fund</td>
<td>National governments</td>
<td>Capacity building; Knowledge communication; Policy formation and integration</td>
<td>2008–present</td>
<td>Government</td>
<td>Global project with specific Caribbean component: Dominica, Grenada, Haiti, Jamaica, Saint Lucia, and Saint Vincent &amp; the Grenadines</td>
</tr>
<tr>
<td>In Jamaica: The main activities of this program in Jamaica are the development of a Strategic Program for Climate Resilience in Jamaica covering the period until 2030. Activities will include conducting studies and analyses of Jamaica’s current development programs, collecting relevant data and strengthening data management, developing a climate change communication strategy, institutional strengthening, etc. The main</td>
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</table>

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<thead>
<tr>
<th>Name</th>
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<th>Type of project</th>
<th>Duration</th>
<th>Priority Sector(s)</th>
<th>Geographic focus (if any)</th>
</tr>
</thead>
<tbody>
<tr>
<td>8.</td>
<td>The Economics of Climate Adaptation Initiative(^{132})</td>
<td>Recognizing that decision makers need a quantitative fact base to inform the design of sound adaptation strategies, the Caribbean Catastrophe Risk Insurance Facility launched a study for the Caribbean region in February 2010. Based on the Economics of Climate Adaptation (ECA) methodology developed by the ECA Working Group, the study provides the facts and tools required to develop quantitative adaptation strategies that can be incorporated into national development plans. An initial study has been produced.(^{133}) The next phase of the project will include further engagement with countries via individual workshops to obtain feedback on results, engage in verification and enhancement of input data and areas for more details work, etc. Phase 3 will involve working closely with interested countries and other partners to enable the application of this methodology in all Caribbean countries.</td>
<td>CCRIF Technical Assistance Programme</td>
<td>CCRIF, CCCCC, ECLAC, McKinsey and Company, and Swiss Re.</td>
<td>Research; Knowledge communication</td>
<td>2009–2011</td>
<td>Government</td>
</tr>
<tr>
<td>9.</td>
<td>CARIBSAVE Climate Change Risk Atlas: Phase 1(^{134})</td>
<td>To provide practical assistance to the governments, communities and the tourism sector at the local and national levels to assess climate change impacts and manage risks. The project focuses on key sectors as</td>
<td>DFID; AusAID</td>
<td>CARIBSAVE</td>
<td>Research; Capacity building</td>
<td>2010–2011</td>
<td>Tourism; Agriculture; Gender; Government</td>
</tr>
</tbody>
</table>

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\(^{133}\) CCRIF, [http://www.ccrif.org/sites/default/files/publications/ECABrochureFinalAugust182010.pdf](http://www.ccrif.org/sites/default/files/publications/ECABrochureFinalAugust182010.pdf)
D. Proposed Adaptation Action
Jamaica is currently developing a project for submission to the Adaptation Fund, as described in Table 3. As well, activities through the “Pilot Program for Climate Resilience” may produce a climate risk management plan with a suite of suggested actions.

Table 4: Proposed Adaptation Actions in Jamaica

<table>
<thead>
<tr>
<th>Name</th>
<th>Objectives</th>
<th>Type of project</th>
<th>Priority Sector(s)</th>
<th>Geographic focus (if any)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Enhancing the Resilience of the Agriculture Sector and Coastal Areas to Protect Livelihoods and Improve Food Security(^{135})</td>
<td>To increase sectoral resilience and adaptive capacity to cope with the impacts of climate change by: improving land and water management in the agricultural sector; strengthening coastal protection; and building institutional and local capacity.</td>
<td></td>
<td>Agriculture; Coastal zone management</td>
<td></td>
</tr>
</tbody>
</table>

Notes: Approval of project formulation grant provided June 2011 by the Adaptation Fund. Planned implementing agency: Planning Institute of Jamaica. Proposed budget: US$9,965,000

\(^{135}\) Adaptation Fund, [http://www.adaptation-fund.org/endorsed_concepts](http://www.adaptation-fund.org/endorsed_concepts) and [http://www.adaptation-fund.org/sites/default/files/AF_Request%20for_Programme%20Funding_JAMAICA-Part%20I-II.pdf](http://www.adaptation-fund.org/sites/default/files/AF_Request%20for_Programme%20Funding_JAMAICA-Part%20I-II.pdf)
E. Assessment

Jamaica’s position as a small island developing state has attracted a relatively large number of adaptation projects from an array of donors, much of which is focused on strengthening capacity of the country to address climate change and to integrate adaptation into its national policies. Following participation in the GEF-funded MACC project, for example, Jamaica stated its intention to develop a national adaptation strategy. Progress towards development of this policy or of integrating adaptation into various sectoral strategies is not clear at present.

Current adaptation programming is focused on the country’s most vulnerable sectors as identified through its National Communication—agriculture, coastal zones and water resources. Additional activities address gender, watershed management and disaster risk management. Going forward, there may be room to expand adaptation activities within the country’s most vulnerable sectors, and to ensure that ongoing projects engaged in similar efforts are coordinated and complimentary. As well, given that the majority of current initiatives focus on assessment, research, capacity building, knowledge communication and policy mainstreaming, greater attention to the implementation of field level actions that build resilience to climate change may be appropriate.

References:


9.0 Saint Kitts and Nevis

AusAID Australian Agency for International Development
CARICOM Caribbean Community
CCCCC Caribbean Community Climate Change Centre
GEF Global Environment Facility
MACC Mainstreaming Adaptation to Climate Change
MOE Ministry of the Environment
OECS Organization of Eastern Caribbean States
USAID United States Agency for International Development
USDS United States Department of State

The mountainous tropical islands of Saint Kitts and Nevis are located in the eastern Caribbean, with a total land area of 269 square kilometers and a human population of around 40,000 (MOE, 2000; USDS, 2010). The islands are the summits of a submerged mountain range along the eastern boundary of the Caribbean Tectonic Plate (MOE, 2000). Although once reliant on sugar monoculture, this industry was closed in 2005. The islands still carry on small scale production of crops, including rice, yams, bananas and cotton, but its present economy is based primarily on tourism (USDS, 2010). The majority of the islands’ inhabitants live near the coastline, as the interior tends to be extremely rugged and steep. However, pressure for agricultural land has caused small farmers to clear forested plots along slopes for farming, causing deforestation, soil erosion and water pollution (MOE, 2000). The country has a high literacy rate at 97.8 per cent and a low unemployment rate of 5.1 per cent. Per capita Gross Domestic Product in 2006 was US$8,546 (USDS, 2010).

A. Adaptation Needs and Priorities

As a coastal developing state Saint Kitts and Nevis is considered to be vulnerable to the effects of climate change. Through its National Communication to the United Nations Framework Convention on Climate Change (UNFCCC) submitted in 2000, the country identifies the following sectors as being particularly vulnerable to the effects of climate change:

- **Forestry and terrestrial ecosystems:** Climate projections suggest that the islands may experience declining productivity of terrestrial ecosystems, including a possible decrease in forest productivity.
• **Coastal ecosystems**: The islands’ coasts may be exposed to sea-level rise and other impacts of climate change, including a worsening of present trends of coastal erosion, saline intrusion and sea flooding. These processes could negatively impact natural resources (including coral reefs) and infrastructure.

• **Freshwater supply**: Given the islands’ dependence on groundwater and anticipated decreases in precipitation in the Caribbean region, water availability on the island may become scarcer and prone to saline intrusion. These impacts would spillover to other sectors of the economy and society, including agriculture, health and tourism.

• **Human settlements**: Possible intensification of tropical storms may increase damage to tourism structures, homes and other infrastructure.

• **Agriculture**: Certain climate projections suggest that, with declining precipitation, conditions could become too dry for rain-fed agriculture by the latter half of the twenty-first century. Given that water availability is anticipated to worsen with climate change, this change may impact food security on the islands.

• **Tourism**: This sector contributes significantly to the islands’ economy and is dependent upon a number of natural and historic attractions, including coastal and marine environments. Climate change may adversely impact the tourism sector through possible sea-level rise, more extreme weather events, decreased water availability, and the declining health of terrestrial ecosystems.

• **Human health**: Increasing temperatures, declining water quality and other anticipated impacts of climate change may cause a rise in water-borne diseases, as well as have an adverse impact on the nation’s food security and its population’s nutritional status.

The country’s National Communication provides a number of options to address vulnerabilities in the sectors identified above, including those listed in Table 1.

<table>
<thead>
<tr>
<th>Sector</th>
<th>Proposed responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water</td>
<td>• Rational use of available water enforced by the national water authority</td>
</tr>
<tr>
<td></td>
<td>• Controlled rate of pumping from aquifers;</td>
</tr>
<tr>
<td></td>
<td>• Conservation of protective forests which allow for a high rate of filtration to aquifers</td>
</tr>
<tr>
<td></td>
<td>• Protection of underground water from contamination by key pollution sources, including agricultural, human settlements, and others.</td>
</tr>
<tr>
<td>Agriculture</td>
<td>• Research into the potential for developing and introducing cultivars resistant to the projected climatic conditions</td>
</tr>
<tr>
<td>Tourism</td>
<td>• Developing and enforcing environmental policies and regulations for tourism activities</td>
</tr>
<tr>
<td></td>
<td>• Ensuring that risks associated with seal level rise are taken into consideration in the building and development of tourism resorts</td>
</tr>
<tr>
<td></td>
<td>• Redirecting tourism from activities that adversely impact natural ecosystems</td>
</tr>
<tr>
<td>Health</td>
<td>• Development of a Health Forecast System for acute respiratory, cardiovascular, and other diseases for which climate factors are a trigger</td>
</tr>
<tr>
<td></td>
<td>• Strengthen data collection and reporting systems</td>
</tr>
</tbody>
</table>
- Sustained and improved sanitary conditions in human settlements
- Sustained and improved disease vector control
- Educational and promotional health public campaigns

B. National Level Policies and Strategic Documents
Saint Kitts and Nevis has completed a National Communication to the UNFCC and, through its participation in the “Mainstreaming Adaptation to Climate Change” (MACC) project, worked to prepare a national climate change adaptation strategy.

Table 2: Key Government Policies and Reports reflecting Adaptation Needs, Priorities and Planned Actions

<table>
<thead>
<tr>
<th>Name of Policy Action</th>
<th>Government Division Responsible</th>
<th>Status</th>
<th>Sector(s) of Focus</th>
<th>Summary description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Initial National Communication to the UNFCCC</td>
<td>Ministry of Environment</td>
<td>Submitted in 2001</td>
<td>Multi-sectoral</td>
<td>This document provides an overview of the country’s national circumstances, greenhouse gas emissions profile, and key vulnerabilities to climate change, including proposed policies to address mitigation and adaptation.</td>
</tr>
</tbody>
</table>

C. Current Adaptation Action
Currently a low number of discrete adaptation projects are being implemented in Saint Kitts and Nevis, all of which also involve other developing countries. These projects include the island states’ participation in a project funded by the United States Agency for International Development (USAID) that is focused on vulnerability assessment, capacity building, and public awareness in the areas of coastal zones and water, and the recently completed MACC project funded by the Global Environment Facility (GEF) that sought to mainstream climate change adaptation into the policymaking process. Adaptation needs in a variety of sectors are being addressed through these projects, including water, agriculture, tourism, coastal zone management, disaster risk management and the implications of climate change by gender. Most of these projects support capacity building, research, knowledge communication and policy formation and integration.

### Participation in Regional and Global Actions

<table>
<thead>
<tr>
<th>Name</th>
<th>Objectives</th>
<th>Funder(s)</th>
<th>Implementing Agency(s)</th>
<th>Type of project</th>
<th>Duration</th>
<th>Priority Sector(s)</th>
<th>Geographic focus (if any)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Mainstreaming Adaptation to Climate Change: Caribbean Community (MACC)</td>
<td>The objective of the MACC project is to facilitate an enabling environment for climate change adaptation in the Caribbean Community small islands and coastal developing states participating in this effort. Project components aimed to: (1) build regional capacity to collect and analyze data, thus expand the knowledge base on climate change impacts in order to assess the associated physical and socioeconomic vulnerabilities; (2) build in-country capacity to formulate and analyze adaptation policy options and finalize sectoral adaptation strategies for participating countries; (3) build capacity in preparation for a regional position for the United Nations Framework Convention on Climate Change; and (4) support public education and outreach programs by strengthening information access and data resources, and foster public awareness through technical assistance and capacity building.</td>
<td>GEF Trust Fund; co-financing</td>
<td>CCCCC, CARICOM, World Bank, Government of Canada, GEF, Government of US</td>
<td>Capacity building; Knowledge communication; Policy formation and integration</td>
<td>2003–2009 (closed)</td>
<td>Government</td>
</tr>
</tbody>
</table>

**In Saint Kitts and Nevis: Further information required.**

| 2.   | Preparedness for Climate Change | The aim of this program was for the Red Cross and Red Crescent National Societies in countries particularly vulnerable to climate change to gain a better understanding of climate change and its impacts to identify country-specific adaptation measures in line | Red Cross/Red Crescent Climate Centre | National Red Cross/Red Crescent Societies | Capacity building; Policy formation and integration | Phase 1: 2006–2009 Phase 2: ongoing | Disaster risk management | 39 countries |

**Caribbean countries**

**Phase 1:** Antigua &

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<table>
<thead>
<tr>
<th>Name</th>
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</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>with risks. Activities could include organizing a workshop on risks, assessment of risks through preparation of a background document, capacity building programs, and developing climate change resilient plans.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Barbuda, Grenada, Saint Kitts &amp; Nevis, Trinidad &amp; Tobago</td>
</tr>
<tr>
<td>3.</td>
<td>CARIBSAVE Climate Change Risk Atlas: Phase 1[^139]</td>
<td>To provide practical assistance to the governments, communities and the tourism sector at the local and national levels to assess climate change impacts and manage risks. The project focuses on key sectors as they relate to tourism and livelihoods, including agriculture and gender, and “is using climate models, examining sectoral vulnerabilities, assessing adaptive capacity and developing practical response strategies with the countries across the region.”</td>
<td>DFID; AusAID</td>
<td>CARIBSAVE</td>
<td>Research; Capacity building</td>
<td>2010–2011</td>
<td>Tourism; Agriculture; Gender; Government</td>
</tr>
<tr>
<td></td>
<td>In Saint Kitts and Nevis: Further information required.</td>
<td>Budget: £750,000 + AUS$ 1,000,000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>Climate Change in the Organization of Eastern Caribbean States[^140]</td>
<td>The project will focus on adaptation measures in the areas of coastal/marine zone management and freshwater resources</td>
<td>USAID</td>
<td>OECS</td>
<td>Policy formation and integration;</td>
<td>2011–?</td>
<td>Coastal zone management; Freshwater</td>
</tr>
</tbody>
</table>


The program will also provide direct support at the country level for initiatives focusing on adaptation measures in areas of coastal zone management and freshwater resource management. It will be supported by appropriate public awareness and education program to raise the level of awareness on climate change and steps being taken to address or reduce impacts across the region.

<table>
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<tr>
<th>Name</th>
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<tr>
<td></td>
<td>management, and will seek to build an enabling environment for reducing vulnerability to climate change by improving the regulatory framework in support of national adaptation strategies. The program will also provide direct support at the country level for initiatives focusing on adaptation measures in areas of coastal zone management and freshwater resource management. It will be supported by appropriate public awareness and education program to raise the level of awareness on climate change and steps being taken to address or reduce impacts across the region.</td>
<td>US$2.5 million</td>
<td>Field implementation</td>
<td></td>
<td>supply</td>
<td>Barbuda, Dominica, Grenada, Saint Kitts &amp; Nevis, Saint Lucia, Saint Vincent &amp; the Grenadines</td>
<td></td>
</tr>
</tbody>
</table>

D. Proposed Adaptation Action

Saint Kitts and Nevis’ National Communication lists a number of priority actions that could be undertaken to address climate change in the country, as listed in Table 4. Based on available information, it is not clear to what extent these proposed activities have already been undertaken in the country.

Table 4: Adaptation Projects and Programs proposed in Saint Kitts and Nevis’ National Communication

<table>
<thead>
<tr>
<th>Name</th>
<th>Objectives</th>
<th>Type of project</th>
<th>Priority Sector(s)</th>
<th>Geographic focus (if any)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Strengthened institutional capacity for climate change</td>
<td>Climatological data is dispersed between a number of different agencies, and much of it is non-digitized. The Government of Saint Kitts and Nevis therefore proposes to create a National Meteorological and Climatological Authority that would perform the following tasks: act as a source of certified climatological data, create a National Drought Surveillance System and National Early Warning System, create a National Climate Forecast system, and conduct research.</td>
<td>Research; Capacity building; Research</td>
<td>Climate information services</td>
<td></td>
</tr>
<tr>
<td>Name</td>
<td>Objectives</td>
<td>Type of project</td>
<td>Priority Sector(s)</td>
<td>Geographic focus (if any)</td>
</tr>
<tr>
<td>-------------------------------------</td>
<td>-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>------------------------------------------------------</td>
<td>-------------------</td>
<td>---------------------------</td>
</tr>
<tr>
<td>2. Improved public awareness</td>
<td>In order to achieve greater public awareness concerning the effects of climate change the National Communication proposes education of agencies involved in public outreach and specialized training for decision-makers, among other actions.</td>
<td>Knowledge communication; Capacity building</td>
<td>Civil society</td>
<td></td>
</tr>
<tr>
<td>3. Coastal area management</td>
<td>Pursue retreat, accommodation and protection options as appropriate within the islands’ coastal zones, and create an integrated coastal management framework.</td>
<td>Policy formation and integration; Field implementation</td>
<td>Coastal zone management</td>
<td>Coastal zones of the islands</td>
</tr>
<tr>
<td>4. Improved freshwater resources management</td>
<td>The National Communication proposes a combination of resource enhancement activities (reforestation, agro-forestry) and management measures (water conservation, land use policy, zoning) to improve water availability.</td>
<td>Capacity building</td>
<td>Freshwater supply</td>
<td></td>
</tr>
<tr>
<td>5. Research</td>
<td>The National Communication also calls for more in-depth analysis of the vulnerability of various sectors, and the potential for introducing crop cultivars resistant to projected climatic conditions.</td>
<td>Research; Assessment</td>
<td>Multi-sectoral</td>
<td></td>
</tr>
</tbody>
</table>

Notes:

Source: MOE (2000)

**E. Assessment**

Saint Kitts and Nevis appears to be addressing adaptation to climate change through participation in a relatively low number of regional projects, and may be in the process of developing a national strategy for climate change. Ongoing activities focus on the country’s articulated adaptation priorities of the water, agriculture and tourism sectors and in coastal areas. Additional action in these sectors and others in which current projects are being implemented, such as the gender dimensions of climate change and disaster risk management, will need to be taken in the future. Noticeably absent in the (limited) suite of current adaptation program occurring in Saint Kitts and Nevis are those addressing vulnerabilities in the areas of forestry, human settlements and human health. As well, a greater focus on implementation of “on the ground” adaptation actions, moving beyond research and capacity building, may be appropriate.
References:


10.0 Saint Lucia

Saint Lucia is a small island developing state located in the Eastern Caribbean with a population of approximately 170,000 people (USDS, 2010). The tropical island has a rocky terrain that includes steep mountains and deep valleys (MPDEH, 2003). The country’s climate is characterized by a dry season (January to May) and a wet season (June to December), with a hurricane season lasting from late June until the end of November (MPDEH, 2003). The island is home to an impressive array of biodiversity, and approximately 35 per cent of its land area is covered by natural forest and rainforest (MPDEH, 2003). The island’s reef systems extend along its west and east coasts, with the healthiest and most diverse reefs being found along the central west coast. In general, the island’s reefs are subject to damage from land-based pollutants and sedimentation, which has threatened near-shore fisheries (MPDEH, 2003). The freshwater and mangrove wetlands of Saint Lucia are relatively small, although there are five species of mangrove found on the island (Tulsie, d’Auvergne and Barrow, 2001). The economy of Saint Lucia is dominated by tourism and banana production, with some activity from small-scale manufacturing (USDS, 2010).
A. Adaptation Needs and Priorities
The adaptation needs and priorities of Saint Lucia are discussed in the country’s Climate Change Adaptation Policy and Strategy (2003) as well as its Initial National Communication to the United Nations Framework Convention on Climate Change (UNFCCC). The main sectors identified by these documents as being particularly vulnerable to the impacts of climate change are presented in Table 1, along with proposed responses.

Table 1: Climate change vulnerabilities and proposed responses in Saint Lucia

<table>
<thead>
<tr>
<th>Priority Sector</th>
<th>Vulnerabilities</th>
<th>Proposed Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coastal and marine resources</td>
<td>The effects of rising temperatures and sea level rise on coastal zones are expected to cause the following:</td>
<td>• Ensure continued expansion and strengthening of coastal monitoring and data collection activities;</td>
</tr>
<tr>
<td></td>
<td>• Inundation of coral reefs, sea grass beds and other coastal ecosystems;</td>
<td>• Promote and facilitate the undertaking of a national assessment of coastal areas;</td>
</tr>
<tr>
<td></td>
<td>• Erosion of beaches and coastal lands;</td>
<td>• Adopt short, medium and long-term measures to protect coastal lands, including relocation and retreat of structures and activities, restrictions on future development, sea-walls, levees and mangrove habitat protection;</td>
</tr>
<tr>
<td></td>
<td>• Loss of fishery production; and</td>
<td>• Promote and enable the restoration of damaged or destroyed coastal resources and ecosystems; and</td>
</tr>
<tr>
<td></td>
<td>• Fish kills and coral die-off.</td>
<td>• Develop a comprehensive national land use and management plan.</td>
</tr>
<tr>
<td>Terrestrial resources and biodiversity (including forestry)</td>
<td>Climate change is expected to have an impact on terrestrial resources including soils, forests and biodiversity, including:</td>
<td>• Develop or improve the basis for sound decision making by developing the capacity to undertake research into and analysis of recent climate change processes;</td>
</tr>
<tr>
<td></td>
<td>• Changes in the composition of natural vegetation; and</td>
<td>• Undertake measures to increase the resilience of terrestrial resources, including soil conservation, agro-forestry, wetlands protection, urban forestry and conservation/management areas;</td>
</tr>
<tr>
<td></td>
<td>• Increased soil fragility and erosion.</td>
<td>• Develop a comprehensive land use management plan;</td>
</tr>
<tr>
<td>Agriculture</td>
<td>• Increased water demand and reduced water supply due to increased temperatures;</td>
<td>• Ensure the inclusion of climate change considerations into strategies and plans.</td>
</tr>
<tr>
<td></td>
<td>• Increased occurrence of agricultural pests;</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Reduced production due to modified and agro-climatic regimes; and</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Accelerated soil erosion and increased salinization.</td>
<td></td>
</tr>
<tr>
<td>Human settlements</td>
<td>Possible impacts of climate change include:</td>
<td>• Conduct further research on the risks of climate change to the productivity of agricultural crops and food security, water availability for agriculture, and soil productivity and soil management;</td>
</tr>
<tr>
<td></td>
<td>• Damage to coastal property utilities and infrastructure due to storm surges;</td>
<td>• Develop a national adaptation strategy for the agriculture sector;</td>
</tr>
<tr>
<td></td>
<td>and</td>
<td>• Formulate and implement other strategies and measures to ensure food security, sustainable food production, and sustainability of forest resources.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Priority Sector | Vulnerabilities | Proposed Responses
---|---|---
**Damage to houses, businesses and other properties due to increased intensity and frequency of cyclonic events.** | **Develop a national land use and management plan;**<br>**Develop and implement a plan for the relocation or protection of settlement utilities and infrastructure, and consider inland relocation, the upgrading of planning legislation, public awareness programs and hazard mapping;**<br>**Ensure the incorporation of climate change considerations into existing national emergency plans; and**<br>**Promote the development and enforcement of a building code which addresses climate change considerations.**

**Changes in temporal and spatial distribution of water due to increased climate variability and severe events;**<br>**Contamination of groundwater due to saltwater intrusion;**<br>**Sedimentation of dams and reservoirs due to increased soil erosion; and**<br>**Water shortages due to drought.** | **Undertake a comprehensive inventory of water resources, including surface and groundwater;**<br>**Promote the strengthening of national water management agencies;**<br>**Develop a long-term national water management plan that incorporates climate change concerns including water protection and saltwater intrusion;**<br>**Undertake reforestation to increase the resilience of watersheds;**<br>**Accurately reflect the cost of water through pricing schemes and water conservation efforts;**<br>**Improved management of forest resources including private forests; and**<br>**Exploit non-traditional water sources such as rain water.**

**Damage to and destruction of hotels and other tourism infrastructure located in coastal areas prone to storm surges, erosion and sea-level rise;**<br>**Loss of economic returns due to possible changes in or loss of coral reefs, beaches and natural forests; and**<br>**Reduced visitor arrivals.** | **Conduct necessary research and information gathering to strengthen the basis for sound decision-making;**<br>**Ensure that appropriate physical planning such as coastal setbacks are enforced for new tourism developments, including relocation of structures; and**<br>**Work with stakeholders in the tourism sector to develop a strategic plan which incorporates climate change considerations.**

**Possible increase in mosquito and other vector-borne diseases (such as dengue fever);**<br>**A higher occurrence of heat and stress-related illnesses and conditions; and**<br>**An increase in water-related diseases, especially water borne diseases following extreme weather events.** | **Conduct necessary health-related research and information gathering in order to strengthen the basis for sound decision-making;**<br>**Ensure that appropriate measures to address health related climate change issues are incorporated into national health plans; and**<br>**Ensure the preventive and curative measures are available, such as vaccines and medications.**

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Sources: MPDEH (2003); Tulsie, d’Auvergne and Barrow (2001)

### B. National Level Policies and Strategic Documents

St. Lucia has prepared a National Communication to the United Nations Framework Convention on Climate Change (UNFCCC) as well as a Climate Change Adaptation Policy and Strategy (2003). This Adaptation Policy and Strategy is the culmination of an involved process...
undertaken through the Global Environment Facility (GEF) funded and now completed “Caribbean Planning for Adaptation to Climate Change” (CPACC) project. It provides a national framework for addressing climate change within the small island country.

Table 2: Key Government Policies and Reports reflecting Adaptation Needs, Priorities and Planned Actions

<table>
<thead>
<tr>
<th>Name of Policy Action</th>
<th>Government Division Responsible</th>
<th>Status</th>
<th>Sector(s) of Focus</th>
<th>Summary description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. National Communication to the UNFCCC(^{141})</td>
<td>Ministry of Planning, Development, Environment and Housing</td>
<td>Submitted in 2001</td>
<td>Multi-sectoral</td>
<td>This document provides a review of the island’s national circumstances, its greenhouse gas emissions profile, its key areas of vulnerability to climate change, and the ways that the country may move forward in addressing the challenge.</td>
</tr>
<tr>
<td>2. St. Lucia’s Climate Change Adaptation Policy and Strategy</td>
<td>Ministry of Physical Development, Environment and Housing</td>
<td>2003</td>
<td>Multi-sectoral</td>
<td>The objective of the policy is to foster and guide a national process of addressing the short, medium and long term effects of climate change in a coordinated, holistic and participatory manner. The policy includes a number of directives around specific sectors.</td>
</tr>
</tbody>
</table>

C. Current Adaptation Action

St. Lucia is participating in a relatively high number of adaptation projects and programs. While no country-specific projects appear to be underway, Saint Lucia is participating in regional projects such as the GEF-funded “Special Program on Adaptation to Climate Change” that focuses on adaptation in the coastal zones. It is also engaged in the global projects “Pilot Program for Climate Resilience” and “Capacity Development for Policy Makers: Addressing climate change in key sectors.” Collectively, the current adaptation projects in Saint Lucia are focused on needs in the areas of coastal zones, freshwater, biodiversity, agriculture, tourism, and strengthening the capacity of governments to facilitate adaptation. Funders of adaptation projects in Saint Lucia include the Caribbean Catastrophe Risk Insurance Facility (CCRIF), the GEF, the United Nations Development Programme (UNDP), the United Nations Foundation, the World Bank, and the governments of Australia, Finland, Norway; Switzerland, the United Kingdom and the United States.

### Table 3: Current Adaptation Projects and Programs active in Saint Lucia

<table>
<thead>
<tr>
<th>Name</th>
<th>Objectives</th>
<th>Funder(s)</th>
<th>Implementing Agency(s)</th>
<th>Type of project</th>
<th>Duration</th>
<th>Priority Sector(s)</th>
<th>Geographic focus (if any)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Mainstreaming Adaptation to Climate Change: Caribbean Community (MACC)</td>
<td>The objective of the MACC project is to facilitate an enabling environment for climate change adaptation in the Caribbean Community small islands and coastal developing states participating in this effort. Project components aimed to: (1) build regional capacity to collect and analyze data, thus expand the knowledge base on climate change impacts in order to assess the associated physical and socioeconomic vulnerabilities; (2) build in-country capacity to formulate and analyze adaptation policy options and finalize sectoral adaptation strategies for participating countries; (3) build capacity in preparation for a regional position for the United Nations Framework Convention on Climate Change; and (4) support public education and outreach programs by strengthening information access and data resources, and foster public awareness through technical assistance and capacity building.</td>
<td>GEF Trust Fund; co-financing</td>
<td>CCCCC, CARICOM, World Bank, Government of Canada, GEF, Government of US</td>
<td>Capacity building; Knowledge communication; Policy formation and integration</td>
<td>2003–2009 (closed)</td>
<td>Government</td>
<td>Regional: Antigua and Barbuda, Bahamas, Barbados, Belize, Dominica, Grenada, Guyana, Jamaica, Saint Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines, Trinidad and Tobago</td>
</tr>
<tr>
<td>2. Special Program on Adaptation to Climate Change: Implementation of adaptation measures in coastal zones (SPACC)</td>
<td>The Implementation of Adaptation Measures in Coastal Zones Project aims to support efforts by Dominica, Saint Lucia and Saint Vincent and the Grenadines to implement specific (integrated) pilot adaptation measures addressing primarily, the impacts of climate change on coastal ecosystems and communities.</td>
<td>GEF; co-financing</td>
<td>World Bank, CCCCC</td>
<td>Field implementation; Community-based adaptation</td>
<td>2006–2011</td>
<td>Coastal zones management; Biodiversity</td>
<td>Regional: Dominica, Saint Lucia, Saint Vincent &amp; the Grenadines</td>
</tr>
</tbody>
</table>

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Review of Current and Planned Adaptation Action: The Caribbean
### 3. Capacity Development for Policy Makers: Addressing climate change in key sectors

The project is a targeted capacity development initiative that supports two goals: 1. To increase national capacity to coordinate Ministerial views for more effective participation in the UNFCCC process; and 2. To assess investment and financial flows to address climate change for selected key sectors. As a result of this project, both the technical understanding of key climate change issues and their economic and policy implications within the context of the Convention will be enhanced.

- **Funder(s):** United Nations Foundation, Finland, Switzerland, Norway, UNDP
- **Budget:** US$6,953,413
- **Type of project:** Capacity building; Knowledge communication
- **Duration:** 2008–2010
- **Priority Sector(s):** Multi-sectoral
- **Geographic focus:** Global: 20 countries including the Dominican Republic and Saint Lucia

**Saint Lucia:** Further information required.

### 4. Pilot Program for Climate Resilience–Caribbean Regional Program

The Pilot Program for Climate Resilience is a targeted program under the Strategic Climate Fund which aims to provide incentives for scaled-up action and transformational change in integrating climate resilience into national development planning. Activities in the Caribbean include country-based investments in Haiti, Jamaica, Dominica, Saint Lucia, Saint

- **Funder(s):** World Bank’s Strategic Climate Fund
- **Implementing Agency(s):** National governments
- **Type of project:** Capacity building; Knowledge communication; Policy formation and integration
- **Duration:** 2008–present
- **Priority Sector(s):** Government
- **Geographic focus:** Global project with specific Caribbean component: Dominica, Grenada, Haiti, Jamaica, Saint

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144 UNDP, [http://www.undpcc.org/](http://www.undpcc.org/)

145 These countries are: Algeria, Bangladesh, Colombia, Costa Rica, Dominican Republic, Ecuador, Gambia, Honduras, Liberia, Namibia, Nepal, Nicaragua, Niger, Paraguay, Peru, Saint Lucia, Togo, Turkmenistan and Uruguay.
<table>
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<tr>
<td></td>
<td>Vincent and the Grenadines, and Grenada; as well as region-wide activities focused on climate monitoring, institutional strengthening, capacity building and knowledge sharing.</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>Lucia, and Saint Vincent &amp;the Grenadines</td>
</tr>
<tr>
<td>5.</td>
<td>The Economics of Climate Adaptation Initiative(^{147})</td>
<td>Recognizing that decision makers need a quantitative fact base to inform the design of sound adaptation strategies, the Caribbean Catastrophe Risk Insurance Facility launched a study for the Caribbean region in February 2010. Based on the Economics of Climate Adaptation (ECA) methodology developed by the ECA Working Group, the study provides the facts and tools required to develop quantitative adaptation strategies that can be incorporated into national development plans. An initial study has been produced.(^{148}) The next phase of the project will include further engagement with countries via individual workshops to obtain feedback on results, engage in verification and enhancement of input data and areas for more details work, etc. Phase 3 will involve working closely with interested countries and other partners to enable the application of this methodology in all Caribbean countries.</td>
<td>CCRIF Technical Assistance Programme</td>
<td>CCRIF, CCCCC, ECLAC, McKinsey and Company, and Swiss Re.</td>
<td>Research; Knowledge communication</td>
<td>2009–2011</td>
<td>Government</td>
</tr>
</tbody>
</table>


<table>
<thead>
<tr>
<th>Name</th>
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<tbody>
<tr>
<td>6. CARIBSAVE Climate Change Risk Atlas: Phase 1&lt;sup&gt;149&lt;/sup&gt;</td>
<td>To provide practical assistance to the governments, communities and the tourism sector at the local and national levels to assess climate change impacts and manage risks. The project focuses on key sectors as they relate to tourism and livelihoods, including agriculture and gender, and “is using climate models, examining sectoral vulnerabilities, assessing adaptive capacity and developing practical response strategies with the countries across the region.”</td>
<td>DFID; AusAID</td>
<td>CARIBSAVE</td>
<td>Research; Capacity building</td>
<td>2010–2011</td>
<td>Tourism; Agriculture; Gender; Government</td>
<td>LAC Region: Antigua &amp; Barbuda, Barbados, Belize, The Bahamas, Dominican Republic, Grenada, Jamaica, Saint Kitts &amp; Nevis, Saint Lucia, Saint Vincent &amp; the Grenadines</td>
</tr>
<tr>
<td>In Saint Lucia: Further information required</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>7. Climate Change in the Organization of Eastern Caribbean States&lt;sup&gt;150&lt;/sup&gt;</td>
<td>The project will focus on adaptation measures in the areas of coastal/marine zone management and freshwater resources management, and will seek to build an enabling environment for reducing vulnerability to climate change by improving the regulatory framework in support of national adaptation strategies. The program will also provide direct support at the country level for initiatives focusing on adaptation measures in areas of coastal zone.</td>
<td>USAID</td>
<td>OECs</td>
<td>Policy formation and integration; Field implementation</td>
<td>2011–?</td>
<td>Coastal zone management; Freshwater supply</td>
<td>OECs countries: Antigua and Barbuda, Dominica, Grenada, Saint Kitts &amp; Nevis, Saint Lucia, Saint Vincent &amp; the Grenadines</td>
</tr>
</tbody>
</table>


<table>
<thead>
<tr>
<th>Name</th>
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<td>management and freshwater resource management. It will be supported by appropriate public awareness and education program to raise the level of awareness on climate change and steps being taken to address or reduce impacts across the region.</td>
<td>In Saint Lucia: Further information required</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**D. Proposed Adaptation Action**

It does not appear that Saint Lucia has proposed to undertake concrete adaptation projects beyond those activities mentioned in the Climate Change Adaptation Strategy and Policy.

**E. Assessment**

As a small island with a small population, Saint Lucia is benefitting from a considerable number of climate change adaptation projects across an array of its identified adaptation priorities, and has made a concerted effort to address climate change through its Climate Change Adaptation Policy and Strategy. The country’s dependence on tourism and vulnerability of its natural biodiversity and coastal resources may help to explain its ability to attract a considerably amount of adaptation funding, especially from projects with a global focus. In the future, adaptation program may need to build upon current efforts related to coastal zone management, agriculture, freshwater supply, and the gender dimensions of climate change impacts. It may also need to focus on areas in which action does not seem to be on-going, such as the impacts of climate change on marine resources, human settlements and human health. More programming could also be directed towards implementation of concrete adaptation measures in the field.

**References:**


11.0 Saint Vincent and the Grenadines

AusAID Australian Agency for International Development
CARICOM Caribbean Community
CCCCCG Caribbean Community Climate Change Centre
CIF Climate Investment Fund
GEF Global Environment Facility
IUCN International Union for the Conservation of Nature
MACC Mainstreaming Adaptation to Climate Change
MHE Ministry of Health and the Environment
NOAA National Oceanic and Atmospheric Administration
OECS Organization for Eastern Caribbean States
USAID United States Agency for International Development
USDS United States Department of State

Saint Vincent and the Grenadines is an island archipelago located in the Caribbean Sea. With a total land area of 340 square kilometers and 84 kilometers of coastline, the nation consists of over 30 islands, inlets, and cays, some of which are privately owned (MHE, 2000; USDS, 2010). The country’s climate is tropical and the terrain of its islands are volcanic and mountainous (USDS, 2010). The main island of Saint Vincent is characterized by rugged, mountainous terrain with valleys that drain to the narrow coastal area, as well as wet upland forests, numerous rivers, and fertile soils (MHE, 2000). The islets and cays that form the Grenadines are smaller and less rugged than Saint Vincent; these islands are nearly entirely dependent on groundwater for their freshwater supply given a lack of rivers and lakes (MHE, 2000).

The country’s population is approximately 104,500, with adult literacy at 88.1 per cent and per capita Gross Domestic Product approximately US$18,100 (USDS, 2010). The country’s economy is highly dependent on tourism and agricultural production; approximately 60 per cent of the workforce is employed by banana production, and the industry accounts for 50 per cent of the island nation’s exports. Efforts to diversify the economy have been made in recent years (USDS, 2010).
A. Adaptation Needs and Priorities
The island nation is feeling the effects of warming temperatures and more extreme weather; there is evidence that fish are retreating into deeper and cooler waters, and the islands of the Grenadines, which have no surface water, are beginning to experience saltwater intrusion into their groundwater supplies (Gonsalves, 2007). The country’s coastal areas are particularly vulnerable to the effects of sea level rise; 85 per cent of the population and 90 per cent of the country’s infrastructure inhabit a narrow coastal strip that is less than five meters above sea level and under five kilometers from the high-water mark (MHE, 2000). These challenges are particularly significant for the islands of Grenadines, which are dependent upon their natural resources—white beaches, coral reefs and fisheries—to sustain the local economy (MHE, 2000). Given the importance of agriculture to the country’s economy, this sector is also noted in the country’s Initial National Communication to the United Nations Framework Convention on Climate Change (UNFCCC) as being particularly vulnerable to the impacts of climate change, including variable precipitation, extreme weather events and increased evapotranspiration (MHE, 2000). The nation’s water resources are also noted as being particularly vulnerable, along with energy resources (MHE, 2000).

B. National Level Policies and Strategic Documents
Saint Vincent and the Grenadines has prepared an Initial National Communication for the UNFCCC. In addition, as part of the “Mainstreaming and Adaptation to Climate Change” project, Saint Vincent and the Grenadines undertook to develop and mainstream climate change adaptation strategies into its sustainable development agenda.\textsuperscript{151} A National Climate Change Adaptation Strategy, National Disaster Management Plan (2010-2012), and a National Environment Management Strategy also are reported to have been established (CIF, 2011).

\begin{table}[h]
\centering
\begin{tabular}{|l|l|l|l|l|}
\hline
Name of Policy Action & Government Division Responsible & Status & Sector(s) of Focus & Summary description \\
\hline
1. Initial National Communication to the UNFCCC\textsuperscript{152} & Ministry of Health and the Environment & 2000 & Multi-sectoral & This document provides a review of the country’s national circumstances, discusses its energy supply and greenhouse gas emissions profile, reviews the country’s vulnerability to climate change, and discusses some of the mitigation and adaptation measures that may help to address climate change. \\
\hline
\end{tabular}
\caption{Key government policies and reports reflecting adaptation needs, priorities and planned actions}
\end{table}

\textsuperscript{151} MACC, \url{http://www.caribbeanclimate.bz/macc/macc.html}
\textsuperscript{152} UNFCCC, \url{http://unfccc.int/essential_background/library/items/3599.php?rec=j&priref=3439#beg}
C. Current Adaptation Action

There are currently a moderate number of adaptation projects occurring or recently completed within Saint Vincent and the Grenadines. These project activities are all regional or global in nature and most commonly focus on the areas of coastal zones management and building the capacity of government to facilitate adaptation to climate change. Notably, the country was one of three Caribbean countries to receive funding through the “Special Program on Adaptation to Climate Change,” a regional project that aims to reduce vulnerability within the areas of coastal zones, land management, and biodiversity.

Table 2: Current Adaptation Projects and Programs active in Saint Vincent and the Grenadines

<table>
<thead>
<tr>
<th>Name</th>
<th>Objectives</th>
<th>Funder(s)</th>
<th>Implementing Agency(s)</th>
<th>Type of project</th>
<th>Duration</th>
<th>Priority Sector(s)</th>
<th>Geographic focus (if any)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Mainstreaming Adaptation to Climate Change: Caribbean Community (MACC)</td>
<td>The objective of the MACC project is to facilitate an enabling environment for climate change adaptation in the Caribbean Community small islands and coastal developing states participating in this effort. Project components aimed to: (1) build regional capacity to collect and analyze data, thus expand the knowledge base on climate change impacts in order to assess the associated physical and socioeconomic vulnerabilities; (2) build in-country capacity to formulate and analyze adaptation policy options and finalize sectoral adaptation strategies for participating countries; (3) build capacity in preparation for a regional position for the United Nations Framework Convention on Climate Change; and (4) support public education and outreach programs by strengthening information access and data resources, and foster public participation</td>
<td>GEF Trust Fund; co-financing</td>
<td>CCCCC, CARICOM, World Bank, Government of Canada, GEF, Government of US</td>
<td>Capacity building; Knowledge communication; Policy formation and integration</td>
<td>2003–2009 (closed)</td>
<td>Government</td>
<td>Regional: Antigua and Barbuda, Bahamas, Barbados, Belize, Dominica, Grenada, Guyana, Jamaica, Saint Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines, Trinidad and Tobago</td>
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</tbody>
</table>

In Saint Vincent and the Grenadines: Further information required

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<table>
<thead>
<tr>
<th>Name</th>
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<th>Implementing Agency(s)</th>
<th>Type of project</th>
<th>Duration</th>
<th>Priority Sector(s)</th>
<th>Geographic focus (if any)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2. Special Program on Adaptation to Climate Change: Implementation of adaptation measures in coastal zones (SPACC)(^{155})</td>
<td>The Implementation of Adaptation Measures in Coastal Zones Project aims to support efforts by Dominica, Saint Lucia and Saint Vincent and the Grenadines to implement specific (integrated) pilot adaptation measures addressing primarily, the impacts of climate change on their natural resource base, focused on biodiversity and land degradation along coastal and near-coastal areas. The project also seeks to produce knowledge of global value on how to implement adaptation measures in small island states that can be applied in other countries in the region, not participating in the project and even for islands in other regions of the world.</td>
<td>GEF; co-financing</td>
<td>World Bank, CCCCC</td>
<td>Field implementation; Community-based adaptation</td>
<td>2006–2011</td>
<td>Coastal zones management; Biodiversity</td>
<td>Regional: Dominica, Saint Lucia, Saint Vincent &amp; the Grenadines</td>
</tr>
<tr>
<td>3. Pilot Program for Climate Resilience–Caribbean Regional Program</td>
<td>The Pilot Program for Climate Resilience is a targeted program under the Strategic Climate Fund which aims to provide incentives for scaled-up action and transformational change in integrating climate resilience into national development planning. Activities in the Caribbean include country-based investments in Haiti, Jamaica, Dominica, Saint Lucia, Saint Vincent and the Grenadines, and Grenada; as well as region-wide activities focused on climate monitoring, institutional strengthening, capacity building and knowledge sharing.</td>
<td>World Bank’s Strategic Climate Fund</td>
<td>National governments</td>
<td>Capacity building; Knowledge communication; Policy formulation and integration</td>
<td>2008–present</td>
<td>Government</td>
<td>Global project with specific Caribbean component: Dominica, Grenada, Haiti, Jamaica, Saint Lucia, and Saint Vincent &amp; the Grenadines</td>
</tr>
</tbody>
</table>

\(^{155}\) CCCCC, [http://www.caribbeanclimate.bz/spacc/spacc.html](http://www.caribbeanclimate.bz/spacc/spacc.html) and GEF, [http://www.gefonline.org/projectDetailsSQL.cfm?projID=2552](http://www.gefonline.org/projectDetailsSQL.cfm?projID=2552)
<table>
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<tr>
<th>Name</th>
<th>Objectives</th>
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<th>Priority Sector(s)</th>
<th>Geographic focus (if any)</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>to: (a) formulate comprehensive adjustments and mitigation policy for sea level rise; (b) strengthen the information base on climate change; and (c) develop the physical and human capacity in climate change monitoring.</td>
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<tr>
<td>4. CARIBSAVE Climate Change Risk Atlas: Phase 1</td>
<td>To provide practical assistance to the governments, communities and the tourism sector at the local and national levels to assess climate change impacts and manage risks. The project focuses on key sectors as they relate to tourism and livelihoods, including agriculture and gender, and “is using climate models, examining sectoral vulnerabilities, assessing adaptive capacity and developing practical response strategies with the countries across the region.”</td>
<td>DFID; AusAID</td>
<td>CARIBSAVE</td>
<td>Research; Capacity building</td>
<td>2010–2011</td>
<td>Tourism; Agriculture; Gender; Government</td>
<td>LAC Region: Antigua &amp; Barbuda, Barbados, Belize, The Bahamas, Dominica, Dominican Republic, Grenada, Jamaica, Saint Kitts &amp; Nevis, Saint Lucia, Saint Vincent &amp; the Grenadines, Suriname, Turks &amp; Caicos</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Budget: £750,000 + AUS$ 1,000,000</td>
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<td></td>
<td>Saint Vincent and the Grenadines: Further information required</td>
</tr>
<tr>
<td>5. Climate Change in the Organization of Eastern Caribbean States</td>
<td>The project will focus on adaptation measures in the areas of coastal/marine zone management and freshwater resources management, and will seek to build an enabling environment for reducing vulnerability to climate change by improving the regulatory framework in support of</td>
<td>USAID</td>
<td>OECS</td>
<td>Policy formation and integration; Field implementation</td>
<td>2011–?</td>
<td>Coastal zone management ; Freshwater supply</td>
<td>OECS countries: Antigua and Barbuda, Dominica, Grenada, Saint Kitts &amp;</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Budget: US$2.5 million</td>
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Review of Current and Planned Adaptation Action: The Caribbean
<table>
<thead>
<tr>
<th>Name</th>
<th>Objectives</th>
<th>Funder(s)</th>
<th>Implementing Agency(s)</th>
<th>Type of project</th>
<th>Duration</th>
<th>Priority Sector(s)</th>
<th>Geographic focus (if any)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>national adaptation strategies. The program will also provide direct support at the country level for initiatives focusing on adaptation measures in areas of coastal zone management and freshwater resource management. It will be supported by appropriate public awareness and education program to raise the level of awareness on climate change and steps being taken to address or reduce impacts across the region.</td>
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<td></td>
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<td></td>
<td>Nevis, Saint Lucia, Saint Vincent &amp; the Grenadines</td>
</tr>
<tr>
<td>6.</td>
<td>At the Water’s Edge: Coastal resilience in Saint Vincent and the Grenadines and Grenada</td>
<td>Demonstrate that governments and communities of small island states can enhance their resilience to climate change by protecting, restoring and effectively managing their marine and coastal ecosystems and strengthening local capacity for adaptation</td>
<td>Anne Ray Charitable Trust, The Nature Conservancy</td>
<td>Assessment; Capacity building; Community-based adaptation; Knowledge communication</td>
<td>2011–2012</td>
<td>Coastal zone management; Marine management</td>
<td>Regional: Grenada, Saint Vincent &amp; the Grenadines</td>
</tr>
</tbody>
</table>

### D. Proposed Adaptation Action

It does not appear that Saint Vincent and the Grenadines has proposed to undertake concrete climate change adaptation projects.

### E. Assessment

Based on information presented in a recent government document, it appears that Saint Vincent and the Grenadines has made considerable efforts to address adaptation through policy initiatives, including establishment of a National Adaptation Strategy and a National Environmental Management Strategy. The country is also benefiting from participation in a number of the main Caribbean adaptation projects, including the MACC and SPACC projects. Saint Vincent and the Grenadines’ inclusion in the latter project likely reflects its particular vulnerability to climate change given its low-lying coastal areas, the limited water supply of the Grenadines, and the country’s dependence on tourism to support its economic activity. Ongoing projects in the country address priority adaptation needs as
discussed in the National Communication, including freshwater resources, agriculture, tourism and coastal zones. Current initiatives are also addressing the need for policy formation and integration to address climate change, as well as risk reduction measures. Future project initiatives may move from capacity building and vulnerability assessments towards greater implementation of activities at the field level. In the country’s coastal zones, for example, this could involve investments in the integrated planning and physical infrastructure needed to reduce coastal vulnerability to sea level rise, storm surge and other expected impacts of climate change.

References:


12.0 Trinidad and Tobago

CARICOM  Caribbean Community
CCCCC  Caribbean Community Climate Change Centre
CIMH  Caribbean Institute for Meteorology and Hydrology
EMA  Environmental Management Authority
GDP  Gross Domestic Product
GEF  Global Environment Facility
GRTT  Government of the Republic of Trinidad and Tobago
LNG  Liquefied natural gas
MACC  Mainstreaming Adaptation to Climate Change
UNFCCC  United Nations Framework Convention on Climate Change
USDS  United States Department of State

The Republic of Trinidad and Tobago is an archipelagic nation in the southern Caribbean, located northeast of Venezuela and south of Grenada. The country occupies an area of 5,128 square kilometers with a population of 1.3 million people. It consists of two main islands: Trinidad, the larger and more populous island, and Tobago, a smaller island which only comprises six per cent of the nation’s land area and four per cent of the population (GRTT, 2010). The country’s terrain is characterized by plains and low mountain ranges, and experiences a rainy season from June through December (USDS, 2010).

Unlike many other Caribbean nations, the island has a relatively large industrial base. It is the largest producer of oil and gas in the Caribbean and its economy is dependent on its energy supplies; it is also the fifth largest exporter of liquefied natural gas (LNG) in the world and provides two-thirds of LNG imported into the United States (USDS, 2010). The oil and gas sector contributes 46 per cent of the nation’s Gross Domestic Product (GDP), followed by financial services (11 per cent), distribution and restaurants (11 per cent), manufacturing (5 per cent), and other activities (USDS, 2010). Tourism contributes a much smaller portion of GDP to the nation’s economy than other Caribbean nations, at around 1 per cent (EMA, 2001). The per capita income of the country is approximately US$18,864 per year (USDS, 2010).
A. Adaptation Needs and Priorities

Trinidad and Tobago’s climate is tropical and experiences a rainfall of bimodal distribution, with a peak in June or July and a second peak in November (EMA, 2001). Flooding is a perennial problem within the country, with heavy rains causing overflow of the nation’s major river basins (EMA, 2001). However, compared to many other Caribbean nations, the country experiences relatively few extreme weather events, particularly severe storms and hurricanes (EMA, 2001).

Trinidad and Tobago’s Initial National Communication to the United Nations Framework Convention on Climate Change (UNFCCC) lists coastal and marine resources, freshwater resources, forestry and land use, and biodiversity as the most vulnerable areas to the impacts of climate change. The recently prepared draft Climate Change Policy (2010) concurs with the conclusions of the National Communication, though also identifies human health and human settlements as additional vulnerable sectors (GRTT, 2010).

Trinidad and Tobago’s Initial National Communication discusses its vulnerability to climate change in a number of areas:

- **Caroni Basin**: This area is located between the northern mountain range and the central range of Trinidad and is considered to be highly vulnerable to climate change for the following reasons: it is the most densely populated area of the country and has a significant concentration of biodiversity (coastal mangroves, swamp fringes); the area is already under threat from poor land-use practices, including deforestation of the northern range that has caused flooding in the lower areas of the Basin, as well as siltation and a decline in water resources.

- **Coral resources**: Impacts of climate change on the nation’s coastal resources include coral bleaching and subsequent impact on the tourism sector, as well as coastal erosion as a result of sea level rise.

- **Fisheries**: The vulnerability of coral reefs to the impacts of increased sea-surface temperature, as well as increased siltation in Trinidad and Tobago’s rivers and pollution is expected to adversely impact aquatic life.

- **Wetlands**: Trinidad and Tobago’s wetlands form the habitat of a variety of highly vulnerable species of plants and animals; more than 90 per cent of the wetlands are less than five meters in elevation, making these areas vulnerable to the effects of sea level rise.

- **Agriculture sector**: Although agriculture contributes a small amount of the nation’s GDP, it employs approximately 10 per cent of the labor force and is considered particularly vulnerable to the effects of climate change. The sector is vulnerable to changes in precipitation, enhanced evapotranspiration, and the potential impacts of rising temperatures and other factors on crop yields.

- **Freshwater**: The country’s ground and surface water resources may be impacted by changes in precipitation and saltwater intrusion through rising sea levels.
• **Human health:** As temperatures rise and precipitation becomes more erratic, heat stress may increase in prevalence, especially in elderly populations. The effects of climate change may also affect vector-borne diseases.

The country’s Draft Climate Change Policy makes a number of recommendations regarding adaptation, including:

- Strengthening existing institutional arrangements for systematic observation, research and climate change modeling;
- Assess sectoral vulnerability to climate change by conducting vulnerability analyses and formulating adaptation options;
- Revising sectoral policies to include consideration of climate impacts derived from vulnerability analyses;
- Revising national development plans to incorporate climate change vulnerability, impacts, and adaptation options;
- Enhance the resilience of natural biophysical systems so as to maximize ecosystem services, such as the natural coastal defense properties of coral reefs and mangrove systems; and
- Promote community-based adaptation through expanded use of the Green Fund for capacity building and enhancing resilience (GRTT, 2010).

### B. National Level Policies and Strategic Documents

Trinidad and Tobago has prepared a National Communication through the UNFCCC and in 2010 began consultations to formulate a climate change policy. The status of this policy is not yet clear, however is a good indication that the country is beginning to integrate climate change adaptation into its national development planning processes.

**Table 1: Key Government Policies and Reports reflecting Adaptation Needs, Priorities and Planned Actions**

<table>
<thead>
<tr>
<th>Name of Policy Action</th>
<th>Government Division Responsible</th>
<th>Status</th>
<th>Sector(s) of Focus</th>
<th>Summary description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Initial National Communication to the UNFCCC</td>
<td>Environmental Management Authority</td>
<td>Submitted in 2001</td>
<td>Agriculture, forests, Caroni basin, marine fisheries, coastal resources, freshwater, human health</td>
<td>This document provides a review of Trinidad and Tobago’s national circumstances, its greenhouse gas emissions profile, vulnerability to climate change, as well as suggested options to address vulnerability in the country.</td>
</tr>
<tr>
<td>2. Draft Climate Change Policy</td>
<td>Ministry of Planning, Housing, and the Environment</td>
<td>Released in 2010</td>
<td>Multi-sectoral</td>
<td>This draft document aims to provide policy guidance for the development of an appropriate administrative and legislation framework for the pursuit of low-carbon development in Trinidad and Tobago, including adaptation and mitigation measures.</td>
</tr>
</tbody>
</table>
C. Current Adaptation Action
It appears there are three ongoing adaptation activities within Trinidad and Tobago, the lowest level of adaptation programming in the Caribbean region. The Government of Switzerland is funding a project in Trinidad and Tobago (as well as Barbados) that focuses on adaptation in the water sector, aiming to enhance understanding of vulnerabilities and assist in decision making. The Red Cross/Red Crescent’s also implemented the project “Preparedness for Climate Change” in Trinidad and Tobago. It sought to increase the capacity of the national societies to understand and prepare for the impacts of climate change. In addition, Trinidad and Tobago participated in the Global Environment Facility (GEF) funded “Mainstreaming Adaptation to Climate Change” project.

Table 2: Current Adaptation Projects and Programs active in Trinidad and Tobago

<table>
<thead>
<tr>
<th>Name</th>
<th>Objectives</th>
<th>Funder(s)</th>
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<tbody>
<tr>
<td>1. Mainstreaming Adaptation to Climate Change: Caribbean Community (MACC)¹⁵⁸</td>
<td>The objective of the MACC project is to facilitate an enabling environment for climate change adaptation in the Caribbean Community small islands and coastal developing states participating in this effort. Project components aimed to: (1) build regional capacity to collect and analyze data, thus expand the knowledge base on climate change impacts in order to assess the associated physical and socioeconomic vulnerabilities; (2) build in-country capacity to formulate and analyze adaptation policy options and finalize sectoral adaptation strategies for participating countries; (3) build capacity in preparation for a regional position for the United Nations Framework Convention on Climate Change; and (4) support public education and outreach programs by strengthening information access and data resources, and foster public</td>
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</tr>
</tbody>
</table>

D. Proposed Adaptation Action

There is no evidence of planned adaptation activities in Trinidad and Tobago.

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159 IFRC, http://www.climatecentre.org/site/preparedness-for-climate-change-programme
160 http://www.cimh.edu.bb/projects.html
161 http://www.mcgill.ca/cariwin
E. Assessment

Given Trinidad and Tobago’s relatively advanced industrial base and smaller reliance on tourism as a source of revenue, it could be said that the country is better placed to adapt to climate change than many of its Caribbean neighbors. However, as identified through its National Communication, many socioeconomic sectors in the country are vulnerable to the impacts of climate change, including sensitive ecosystems, fisheries, the agriculture sector, and its freshwater resources. The country appears to be addressing this vulnerability through a national adaptation policy planning process, but a smaller number of adaptation projects involve Trinidad and Tobago, some of which are now closed. These projects supported policy formation and integration as well as the water sector, two areas that are important to the country’s ongoing efforts to address climate change.

Going forward there may be a need to diversify adaptation activities towards other vulnerable socioeconomic sectors that were identified through the country’s National Communication, and that may be identified in a forthcoming national adaptation strategy. These include a focus on the country’s vulnerable ecosystems, including the Caroni Basin, coral resources and wetlands, as well as a focus on the agriculture sector, fisheries, human health and looking more closely at how climate change will affect men and women differently.

References:

