



CANARI POLICY BRIEF No.10

Climate change in the Caribbean: the case for greater investment in research and adaptive policies

An issue the Caribbean cannot afford to ignore

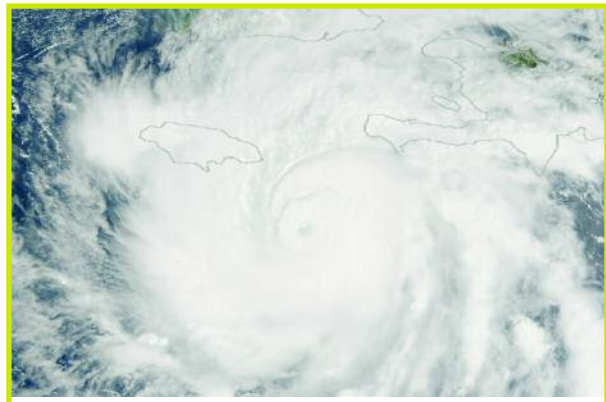
Climate change is one of the most critical issues facing the world today with the potential to cause massive and possibly irreversible damage to the global environment and human society. Small island regions are among those considered to be most vulnerable to climate change, so it is an issue the Caribbean cannot afford to ignore.

Despite this knowledge, the threat of climate change, or global warming as it is often called, is often not treated with the urgency it requires. For many people, the gradual rise in the earth's temperature, barely noticeable to the man on the street, still seems rather harmless, abstract or irrelevant - "something for the scientists". In reality this could not be further from the truth. The impacts of climate change can be abrupt and dangerous, and certainly will have serious implications for people's lives and livelihoods.

The increasing frequency of extreme weather events in the Caribbean in recent years, and in particular the devastating hurricanes and flash floods in Guyana, Haiti and Cuba in 2008, is clear evidence of the region's present vulnerability. Climate change presents many other threats that are less dramatic than hurricanes, but potentially more dangerous. Water shortages, crop failures and epidemics associated with climate change have been witnessed worldwide and are already affecting parts of the Caribbean. The scientific consensus is that these trends are set to continue in the coming decades, with a high probability that the rate of change will accelerate. The stakes are high and so is the need for urgent adaptive action.

Some global facts

There is no longer any doubt that human activities have accelerated global warming by increasing levels of carbon dioxide and other greenhouse gases in the atmosphere. It is happening now and at a faster rate than originally expected. The average global surface



Hurricane Ivan over the Caribbean, 2004 (Courtesy NASA)

temperature in the 21st century will likely increase by between 2.4 to 6.4 degrees Celsius (high emissions scenario).

- The five warmest years since the late 1880s in descending order were 2005, 1998, 2002, 2003 and 2006
- The northern polar ice cap has decreased in thickness by 40% and in extent by 6% over the past 40 years. It is expected to completely melt within 50 years
- Coastal glaciers in Greenland are undergoing rapid thinning by as much as 1 metre per year. Recent modeling indicates that 50 more years of unabated greenhouse gas buildup will irreversibly commit the Greenland ice cap to melt in its entirety adding 7 metres to the global average sea level.

For the Caribbean region in the 21st century, the following are the projected trends (and estimated degree of probability):

- Temperature: greater than 90% probability that Caribbean temperatures will increase but the extent will depend on actual green house gas emissions.
- Precipitation: greater than 66% probability that precipitation will decrease in the Greater Antilles in June, July and August, potentially causing water shortages.
- Sea level rise: greater than 66% probability that sea level will continue to rise on average around the small islands of the Caribbean, close to the global mean of 0.2 to 0.5 metre up to 2090s.
- Hurricanes: globally, greater than 66% probability that intense tropical cyclone activity will increase in some regions but there is not yet enough information to make a specific statement about the Caribbean.

A highly complex issue

One of the most challenging aspects of climate change, both for scientists and policy-makers, is its complexity. To help address this challenge, the Intergovernmental Panel on Climate Change (IPCC) was established in 1988 as a global assessment team of over two thousand climate scientists. Every few years the IPCC produces reports that summarise the status of the research and the scientific consensus on the projections for the coming century. These projections are largely based on a suite of Global Climate Models that are constantly being refined with new data.

The Caribbean Community Climate Change Centre (CCCCC) in Belize is the official repository and clearing house for regional climate change data, providing climate change-related policy advice and guidelines to the Caribbean Community (CARICOM) Member States. It also provides capacity building for climate change mitigation and adaptation throughout the region, including the UK Overseas Territories. It is responsible for coordinating research within the Caribbean region with other agencies¹. Recent collaborations between these agencies and global centres of research on climate change, such as the Hadley Centre in the United Kingdom, have generated much



Coral bleaching in Tobago. Source Buccoo Reef Trust

more detailed projections by using downscaled Regional Climate Models that have a much finer resolution. These models are a significant improvement on what was available just a few years ago, but still not adequate for reliable projections to be made at the national level. Better regional climate models will be important in supporting more effective policy-making and planning at the country level.

Far-reaching impacts of climate change

The Caribbean is considered to be one of the most vulnerable regions in the world to the impacts of climate change. The projected changes in temperature, rainfall, sea level and hurricane intensity will have direct and indirect impacts on countless aspects of human well-being in the Caribbean. The projections for sea level rise will mean flooding, coastal erosion, contamination of groundwater with saltwater and the destruction of wetlands and coastal ecosystems in many areas. In addition, these impacts will be compounded by the effects of intensifying hurricanes and their associated storm surges and swells. The social, economic and ecological impacts of these changes to the coastal zone will need careful consideration by planners, coastal zone managers, engineers and developers from now on.

Coral reefs, already weakened by coastal pollution and sedimentation, are likely to be one of the first victims of climate change. The mass coral bleaching events of 1998 and 2005 caused by elevated seawater temperatures (unprecedented in living memory) have already caused massive coral mortality throughout the region. The loss of these reefs means the loss of hundreds of species that live in these highly biodiverse ecosystems.

¹ Agencies include Caribbean Institute for Meteorology and Hydrology based in Barbados (CIMH), the Instituto de Meteorología in Cuba (INSMET) and the University of the West Indies.



Englishman's Bay and Ridge Forest Reserve, Tobago.

Source Buccoo Reef Trust

It also means that coastal communities will suffer from the negative impacts on tourism, fisheries and coastal protection. The economic value of the ecosystem services provided by coral reefs in the Caribbean is estimated to be between US\$ 1.5 and 3 billion per year. If nothing is done, Caribbean coral reefs may disappear altogether within the next few decades. Coral scientists are calling for urgent action to avert this catastrophe by increasing the resilience of coral reefs. This can be done through a watershed management approach to reduce land-based pollution and sedimentation and by creating a network of effective marine protected areas.

Fisheries are likely to be affected not only by the loss of coral reefs, but also by changes to the distribution of commercially important species of fish. As seawater temperatures increase, many species will migrate to cooler waters outside of the region. Coastal communities may have to find alternative employment or focus their effort on a narrower range of fish species, potentially increasing the pressure on already stretched resources.

Food security is perhaps one of the most worrying issues for policy-makers. Climate change and increased climate variability will cause crop failures worldwide due to droughts, higher temperatures or changes in humidity levels. The Caribbean's heavy reliance on imported food is a concern, as countries that currently export food into the region may soon stop doing so. Domestic agricultural production will need to be strengthened to meet both the projected shortfall in imports and in domestic production of rice, corn and beans associated with increases in temperature. Farmers will therefore need crops that are more resistant to droughts and warmer conditions. Consequently, many countries are recognising the need for increased research and institutional capacity for agro-biodiversity as a key adaptation strategy to climate change. Traditional knowledge of the many pre-

industrial crops will also be an important component to regional food security.

The region's forests and terrestrial biodiversity are also threatened by climate change. While hurricanes are part of the Caribbean's "normal" environment and ecosystems have adapted to them, the repeated and compounding impacts of frequent extreme weather events has been shown to reduce their ability for recovery. The increased threat of bush-fires is also a major vulnerability that is poorly understood. As with marine biodiversity, the ecosystem services performed by forests, such as maintaining the function of water catchments areas, regulating local microclimate and preventing soil erosion are critical to human wellbeing. The flash floods and mudslides that caused the many fatalities during the devastating 2008 hurricane season in Haiti, would probably not have been so severe had the mountains not been deforested. Protecting forests and improving their resilience will be an important adaptation strategy both for the conservation of biodiversity and for the future wellbeing of Caribbean communities.

The Caribbean's rich biodiversity means that it is rated among the top eight of the world's 25 biodiversity "hotspots". The Caribbean occupies only 0.15% of the Earth's surface, but hosts 2.3% of the global original primary vegetation and 2.9% of the world's endemic vertebrates. Its rich flora comprises 7000 endemic species. However, some species are critically endangered and therefore need special consideration.

More investment needed in multi-disciplinary research and adaptation

While climate change is a global issue that requires coordinated action by all nations, the bulk of the responsibility for mitigation rests in the hands of the more developed countries whose carbon emissions make up the large majority of the global output. For small developing countries, such as those of the Caribbean, the main priority is to develop appropriate adaptation strategies to ensure that the projected impacts of climate change cause minimal disturbances to society and the environment.

In a few Caribbean countries, such as Belize, Jamaica and Trinidad and Tobago, adaptation activities such as reforestation or forest conservation, which promote carbon capture and storage in trees, may qualify for financial assistance through various formal or informal carbon trading mechanisms.

Perhaps more than any other area of research, climate change requires a holistic multi-disciplinary approach. Climate scientists, ecologists, social scientists and economists are all required for the development of effective adaptation policies and a more pragmatic approach to implementation. The planning of protected areas is an example where this multidisciplinary approach is critical to obtain community support for the successful enforcement of laws and the achievement of conservation and livelihoods objectives.

Adaptation (research and implementation) is not only cheaper than remediation, but many of the solutions are win-win opportunities that would benefit the region with or without climate change. In most cases, addressing the existing problems to the region's environment and biodiversity will not only improve the resilience of the ecosystems and well-being of communities today, but will also place them in a better position to "weather the storm" of climate change.

Investing in research is a prerequisite for effective decision-making and for determining optimum trade-offs. Improved communication between policy-makers and scientists will be essential for this process to work effectively and will provide mutual benefits.

The need for more effective communication also exists between scientists, policy-makers and communities. Without greater public awareness and understanding, adaptation policies to climate change will fail and the full impacts of climate change will fall on unprepared and exposed communities.

The value of mainstreaming climate change adaptation in national and regional policy

There is a strong case for the Caribbean to bring adaptation into the mainstream of national and regional policymaking, planning and development.

Adaptation is the only way to deal with the inescapable impacts of climate change. Development cannot be sustainable unless it factors in climate impacts and natural hazards, and finds ways of reducing risk and minimising the vulnerability of natural, human and built systems.

Mainstreaming climate change issues into national and regional policy and planning processes provides an

opportunity to improve natural resource management and physical planning. It does not require a dramatic departure from all that has gone on before but can be done in incremental ways that build on existing policies and programmes. What is required is a commitment to deal efficiently and effectively with current climate, environmental, social and economic needs and vulnerabilities in an integrated and holistic manner.

By addressing the development challenges that have led to the accumulation of hazard and human vulnerability throughout the region, decision makers and planners will reduce the negative effects of climate change while bringing immediate benefits to communities and the environment. Adopting a regional approach, when possible, will also maximise the use of the limited resources available and foster greater collaboration in other areas of development and research. Mainstreaming adaptation to climate change, at both the regional and national levels, is therefore a win-win proposition.

Caribbean Natural Resources Institute

The Caribbean Natural Resources Institute (CANARI) is a regional technical non-profit organisation which has been working in the islands of the Caribbean for over 20 years.

Our mission is to promote equitable participation and effective collaboration in managing the natural resources critical to development.

Our programmes focus on research, sharing and dissemination of lessons learned, capacity building and fostering regional partnerships.

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See www.canari.org for the other outputs of the "Climate change and biodiversity in the insular Caribbean" project, from which the data in this brief are drawn