

High-Level Working Group on
Climate Change in the Caribbean

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Extreme Weather Events and Resilience





HIGH-LEVEL WORKING GROUP ON CLIMATE CHANGE IN THE CARIBBEAN

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and Tobago) Non-resident Senior
Associate, CSIS

Dr. Samantha Chaitram (Trinidad
and Tobago) Lecturer, Trinidad and
Tobago Police Training Academy

Amb. Anton Edmunds (St. Lucia)
Senior Advisor on Caribbean
Affairs, Inter-American
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Lucia Ambassador to the United
States

Guy Edwards (United Kingdom)
PhD Candidate, University of
Sussex; Former Senior Consultant,
Inter-American Development Bank

Dr. Georges Fauriol (United
States) Fellow, Global Americans;
Co-chair, Caribbean Policy
Consortium

Allison Fedirka (United States)
Director of Analysis, Geopolitical
Futures

Dr. Richard Feinberg (United
States) Member, Global Americans
International Advisory Council;
Professor Emeritus, University of
California, San Diego

Shiloh Fetzek (United States)
Senior Fellow, Center for Climate
and Security

Amb. Carlos C. Fuller (Belize)
Belize Permanent Representative to
the United Nations

Ama Francis (Dominica) Climate
Displacement Project Strategist,
International Refugee Assistance
Project

Carlos Gentile (Argentina) Former
State Secretary of Climate Change
and Sustainable Development;
Founding Partner, CICLA
Desarrollo Sustentable

John Goedschalk (Suriname)
Executive Director, Conservation
International-Suriname

Dr. Ivelaw Griffith (Guyana)
Fellow, Global Americans; Former
Vice-Chancellor, University of
Guyana

Rasheed Griffith (Barbados) Non-
resident Senior Fellow, Inter-
American Dialogue

Dr. Legena Henry (Trinidad and
Tobago) Lecturer, University of the
West Indies, Cavehill

Camila Idrovo (Colombia/United
States) Practice Area Lead,
Migration Pan-American
Development Foundation



Amb. Riyad Insanally (Guyana)
Former Guyana Ambassador to the
United States and the OAS

Dr. Scott B. MacDonald (United
States) Fellow, Global Americans;
Chief Economist, Smith's Research
& Gradings

Anaitée Mills (Jamaica) Chair,
Jamaica Energy Resilience Alliance

Dr. Claire Nelson (Jamaica)
Founder and Director, Institute of
Caribbean Studies

Heiny Palacios (Colombia) Youth
Environment Network Chocó, Lead
Organizer

Dr. Justin Ram (Barbados) Former
Director of Economics, Caribbean
Development Bank

Ivan Rebolledo (United States)
Chair, Global Americans Board of
Directors; Managing Partner,
TerraNova Strategic Partners LLC

Dr. Kevin Reed (United States)
Associate Dean and Professor,
School of Marine and Atmospheric
Sciences, Stony Brook University

Alex Rosaria (Curaçao) Former
Member, Parliament of Curaçao

Sir Ronald Sanders (Antigua and
Barbuda) Antigua and Barbuda
Ambassador to the United States
and the OAS

Dr. Kalim Shah (Trinidad and
Tobago) Assistant Professor,
University of Delaware

Dr. Lorraine Sobers (Trinidad and
Tobago) Lecturer, University of the
West Indies, St. Augustine

Antonia Stolper (United States)
Member, Global Americans Board
of Directors; Of Counsel, Shearman
& Sterling LLP

Tulio Vera (Chile) Chair, Global
Americans International Advisory
Council; Former Managing
Director, J.P. Morgan Latin
America Private Bank

Lisa Viscidi (United States) Senior
Manager, Deloitte Consulting

Bruce Zagaris (United States)
Partner, Berliner Corcoran & Rowe
LLP

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EXECUTIVE SUMMARY

Every year, extreme weather events like tropical cyclones, droughts, heat waves, and heavy rains expose Caribbeans to potentially life-threatening situations. As climate change worsens, the region's countries and territories must grapple with these increasingly devastating and other natural phenomena. Since reconstruction and recovery efforts will become more costly and difficult, the region has no option but to take effective measures to tackle the extreme impacts of climate change. Acknowledging that current mitigation strategies are not adequate to deal with the current crisis, the international community has steadily moved toward developing climate-resilience-building mechanisms aimed at anticipating, absorbing, accommodating, and recovering from the natural disasters associated with climate change in a timely manner.

Nonetheless, despite various multilateral agreements urging developed countries to cut global greenhouse emissions and provide financial and logistical assistance to developing countries, progress remains slow. As one of the most impacted regions by climate change and natural disasters, the Caribbean has taken significant steps to develop a network of regional institutions that increase climate resilience. Yet, a combination of structural challenges associated with long-standing economic and financial constraints, lack of human and technical capacity, as well as weak governance are limiting countries and territories from implementing national and local climate resilience strategies to their fullest potential. With these caveats in mind, this report finds particular vulnerabilities, challenges, and opportunities for the Caribbean. These include:

- Since 1950, meteorological, hydrological, and climatological disasters—including tropical cyclones, droughts, floods, and landslides—have caused 24,206 recorded deaths and affected nearly 54 million people in the Caribbean. Of these, data shows that tropical cyclones have historically represented the most frequent and disruptive extreme weather event in the region—causing approximately USD \$163 billion in damages. This figure represents a striking 91 percent of the total economic losses from all natural disasters in the region.
- Caribbean countries face a series of unique economic, social, and environmental challenges that hamper their ability to absorb the impacts of extreme weather events and adapt to the overarching effects of climate change.
- Three decades since signing the United Nations Framework Convention on Climate Change (UNFCCC) and despite early setbacks, in recent years, countries have renewed their commitments to reduce greenhouse gasses and established new mechanisms to help the most vulnerable regions—including the Paris Agreement, the Cancun Adaptation Framework, the Sendai Framework for Disaster Risk Reduction (2015-2030), and the recently announced Agreement on New “Loss and Damage” Fund for Vulnerable Countries.
- Investing in climate-resilience-building mechanisms remains a key strategic policy for countries exposed to extreme weather events. However, the initial costs associated with

executing these mechanisms represent a major burden for most developing states. As a result, current debates have centered around the need for developed countries to fulfill commitments to mobilize climate action resources.

- The Caribbean region has built an important network of mechanisms and institutions that not only deal with climate change, but also anticipate, absorb, and recover from the impacts of extreme weather events. These include the Caribbean Community Climate Change Center (CCCCC), the Caribbean Disaster Emergency Management Agency (CDEMA), the Caribbean Institute for Meteorology and Hydrology (CIMH), which have become leading organizations in enhancing regional resilience. In addition, the Caribbean Catastrophe Risk Insurance Facility (CCRIF), as well as the Central America and Dominican Republic Center for Coordination and Disaster Prevention (CEPRENAC, per its Spanish acronym), are further advancing climate resilience throughout the Caribbean basin.
- Implementing comprehensive climate resilience mechanisms has proven extremely challenging for certain Caribbean countries and territories. Despite long-standing structural economic, social, and environmental challenges, some have made significant progress in building climate resilience, while others remain unable to establish even basic climate resilience mechanisms.

Acknowledging that the Caribbean stands out as particularly vulnerable to the catastrophic, compounding effects of climate change in the form of extreme weather events as well as taking into consideration the pressing need to strengthen national and regional mechanisms to bolster climate resilience, this report provides a series of actionable policy recommendations.

INTRODUCTION

In July 2022, United Nations Secretary General Antonio Guterres warned the world about the growing set of challenges climate change poses to the Caribbean—describing the region as “ground zero” for the climate emergency.¹ Indeed, despite having a small carbon footprint compared to large industrialized nations, Caribbean countries—like most small islands developing states (SIDS)—are being disproportionately impacted by climate change.² Among these, the increasing intensity and frequency of extreme weather events represent a major humanitarian and economic challenge for the Caribbean. In particular, hurricanes—historically the most devastating extreme weather event in the region—have become more powerful and destructive than in previous decades. In 2017, the losses and damages associated with Category 5 Hurricane Maria cost the island nation of Dominica approximately 226 percent of the country’s 2016 GDP.

Unfortunately, as the impacts of climate change worsen, what happened to Dominica is likely to happen again, with scientists suggesting the percentage of storms that reach Categories 4 or 5 will continue to increase. By 2050 annual losses related to extreme weather events will cost the region \$22 billion—a figure representing 10 percent of the current regional economy.³ Thus, Caribbean countries have no option but to take effective resilience-building action. In recent years governments have intensified their efforts to anticipate, absorb, and recover from the effects of extreme weather events. To date, most Caribbean countries have designed national strategies to bolster resilience. International and regional organizations and partners have also increased their cooperation to improve emergency preparedness and response.

However—as in much of the developing world—these efforts are insufficient and highly unequal. Despite various multilateral agreements urging developed countries to cut global greenhouse emissions and provide financial and logistical assistance, progress remains slow. In addition, the lack of a supranational institution in charge of implementing climate regulation has left nation-states as the main actors responsible for taking climate action. Studies show that in addition to demographic, geographic, and economic factors, countries better positioned in terms of state capacity, good governance indicators, societal trust, and high-quality political leadership, tend to be better prepared to build resilience than those that lack these governance-related characteristics.⁴ That said, Caribbean countries and territories face a unique set of structural social, economic, and environmental constraints that directly impacts on their ability to build resilience.⁵ Hence, by

¹ United Nations, “*The Caribbean is ‘ground zero’ for the global climate emergency*” Guterres”, July 2022. <https://news.un.org/en/story/2022/07/1121902>

² United Nations Framework Climate Change Convention (UNFCCC), “*Climate Change: Small Island Developing States*”, 2005. https://unfccc.int/resource/docs/publications/cc_sids.pdf

³ <https://www.iadb.org/en/ove/climate-change-caribbean-small-island-states>; Paul Akiwumi, “*Climate finance for SIDS is shockingly low: Why this needs to change*”, UNCTAD, May 2022. <https://unctad.org/news/climate-finance-sids-shockingly-low-why-needs-change#:~:text=SIDS%20are%20increasingly%20vulnerable%20to,at%20%2412.6%20billion%20per%20year>.

⁴ Frances Z. Brown, “*Governance for Resilience: How Can States Prepare for the Next Crisis?*”, Carnegie Endowment for International Peace, 2022. https://carnegieendowment.org/files/Brown_Governance_for_Resilience_final.pdf

⁵ United Nations Framework Climate Change Convention (UNFCCC), “*Climate Change: Small Island Developing States*”.

identifying the individual and shared challenges Caribbean countries and territories face in building effective resilience this report aims to provide concrete policy recommendations on how best to advance resilience building for the region.

The paper is divided into four sections. The first section introduces the unique nature and threat of extreme weather events in the Caribbean, explains how climate change exacerbates the intensity of tropical cyclones, and describes the increasing humanitarian and economic toll of extreme weather events in recent decades. Section two highlights existing international and regional mechanisms in place to enhance resilience and emphasizes the importance of building further climate resilience. Section three analyzes the impact of extreme weather events and the implementation of resilience-building efforts at the national level in Puerto Rico, Haiti, the Bahamas, and Dominica—the four most impacted countries and territories by extreme weather events in the last two decades in the Caribbean—as well as Barbados—the least impacted in the region.⁶ Finally, section four offers actionable recommendations for regional and partner policymakers looking to build resilience.

⁶ Germanwatch, “*Global Climate Risk Index 2021*”, 2021.
https://www.germanwatch.org/sites/default/files/Global%20Climate%20Risk%20Index%202021_2.pdf



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1. Extreme Weather Events in the Caribbean

The Caribbean is familiar with the impact of extreme weather events. Each year, between June and November, tropical cyclones sweep across the Caribbean, often triggering large-scale humanitarian crises and inflicting enormous economic losses.⁷ At the same time as the Atlantic hurricane season, heat waves also represent a recurring threat to the region with sustained high temperatures disrupting not only labor productivity and livestock production, but also endangering the marine ecosystem and human health.⁸ In addition to these seasonal threats, droughts, and heavy rains perpetually threaten countries across the Caribbean. While droughts severely impact the region's food security and compromise freshwater resources, heavy rains can occur at any time or place—sometimes resulting

in deadly landslides and expensive property damage.⁹

Climate change exacerbates these threats and poses an unprecedented humanitarian and economic challenge for the Caribbean. The Sixth Assessment Report from the Intergovernmental Panel on Climate Change (IPCC) warned that global warming is altering the intensity and frequency of extreme weather events.¹⁰ According to the World Meteorological Organization's "2021 State of the Climate in Latin America and the Caribbean" report, extreme weather and climate change are already responsible for mega-droughts, extreme rainfall, and land and marine heat waves across the region.¹¹ For the Caribbean region, tropical cyclones represent the most severe threat—with increasing devastation as a result of climate change making reconstruction and recovery efforts significantly more costly and difficult.

Box 1. Climate Change in the Caribbean: Hurricanes

By: Kevin A. Reed, Ph.D. Associate Dean for Research and Associate Professor at the School of Marine and Atmospheric Sciences, Stony Brook University

Hurricanes, or tropical cyclones as they are more commonly known, are among the most societally impactful weather extremes on Earth. Hurricanes are extreme atmospheric vortices, with low atmospheric pressure at their center, that often form over the warm tropical waters of the Caribbean Sea

⁷ National Oceanic and Atmospheric Administration (NOAA) - National Hurricane Center and Central Pacific Hurricane Center, "Tropical Cyclone Climatology".

<https://www.nhc.noaa.gov/climo/#:~:text=The%20official%20hurricane%20season%20for,%2DAugust%20and%20mid%2DOctober>.

⁸ Claudia Di Napoli, Theodore Allen, Pablo A. Méndez-Lázaro, and Florian Pappenberger, "Heat stress in the Caribbean Climatology, drivers, and trends of human biometeorology indices", International Journal of Climatology, June 2022. <https://rmets.onlinelibrary.wiley.com/doi/full/10.1002/joc.7774>

⁹ Caribbean Regional Climate Center, "Physical and Dynamic Drivers of Seasonality of Caribbean Climate". <https://rcc.cimh.edu.bb/caribbean-climatology/>

¹⁰ Sonia I. Seneviratne and Xuebin Zhang, "Weather and Climate Extreme Events in Changing Climate", IPCC, 2021. https://www.ipcc.ch/report/ar6/wg1/downloads/report/IPCC_AR6_WGI_Chapter11.pdf

¹¹ World Meteorological Organization, "State of the Climate in Latin America and the Caribbean". <https://public.wmo.int/en/our-mandate/climate/wmo-statement-state-of-global-climate/LAC>

and North Atlantic Ocean (as well as other ocean basins). Given that warm ocean water fuel these storms, hurricanes typically occur from June through November when surface temperatures are their warmest. Hurricanes also require a moist, unstable atmosphere for which convection, that is, the mixing of air that leads to clouds and precipitation, can occur. Given its tropical environment, hurricanes are a common occurrence throughout the Caribbean. Hurricanes bring a damaging combination of hazards to island and coastal communities—including high winds, torrential rainfall, destructive storm surge, and crashing waves. No hurricane is the same, and each hurricane brings its own unique set of hazards.

Human-induced climate change is becoming more evident throughout the world. Driven by increases in greenhouse gasses—like carbon dioxide, which trap heat near Earth's surface—temperatures across the globe have increased. As of 2020, the global average surface temperature has increased by over 1 degree Celsius (over 1.8 degrees Fahrenheit) due to over 100 years of human greenhouse gas emissions. This means that much of the Caribbean Sea is warmer today than it would have been without human-induced climate change. These waters will continue to warm in the coming decades as greenhouse gas emissions continue to increase. One of the impacts of these warming temperatures will be changes in extreme weather events across the Caribbean region.

The impacts of warming temperatures on hurricanes are one of the direct ways in which the Caribbean has and will continue to experience climate change. One clear way that climate change is impacting hurricanes is that it is making them wetter. As temperatures warm due to the warmer ocean temperatures, they fuel storms with more moisture, resulting in greater rainfall. Evidence suggests that storms have already produced and will continue to produce rain at faster rates, resulting in more accumulated rainfall as they make landfall. Furthermore, also due to rising surface temperatures, hurricane intensity—as measured by wind speeds—is projected to increase in the coming decades. As a result, scientists expect that the percentage of storms that reach Category 4 or 5 on the Saffir–Simpson scale, the most intense and damaging storms, will increase. This increase in intensity can further increase rainfall and storm surge height in future hurricanes. Human-induced climate change also increases sea levels across the globe, including throughout the Caribbean, which results in higher inundation levels during hurricanes. This can result in even further flooding hazards.

When it comes to the frequency of hurricanes, both globally and in the Caribbean, the future impact is a little less clear. There is some evidence that global tropical cyclones numbers may actually decrease in the coming century because of human-induced climate change. This decrease may be driven by a weakening in large-scale tropical circulation and increases in atmospheric stability, which results in less convection. However, what this means for the Caribbean, specifically, is not known. The lack of clarity is partly because hurricane frequency in the North Atlantic Ocean is modulated by large-scale circulations and variability, such as El Niño, and the impact of climate change on El Niño frequency remains unclear. El Niño conditions directly impact hurricanes in the North Atlantic and Caribbean by altering tropical circulation in the North Atlantic, making the region less conducive to hurricane genesis. The opposite is true during La Niña years when the region can become more active. Despite the unknowns about the number of storms in the future in the Caribbean, it is becoming more and more evident that the storms that do occur—and the ones that impact the coast—will likely be stronger, rain more, and have higher storm surges.

Indeed, recent studies are already showing that human-induced climate change is

directly impacting rainfall patterns in the region. According to Dr. Reed, Dr. Wehner,

and Dr. Zarzycki, human-induced climate change increased the extreme three-hourly storm rainfall rates and extreme three-day accumulated rainfall amounts during the full 2020 hurricane season.¹² Moreover, the 2017 Atlantic hurricane season—considered the ninth most active and third most destructive on record—was responsible for 17 named storms, 10 hurricanes, and 6 major hurricanes. This placed it well above the 1981 to 2010 average of 12.1 named storms, 6.4 hurricanes, and 2.7 major hurricanes per year.¹³ During that year, Hurricanes Maria and Irma reached Category 5 intensity, with Irma reaching a record of 60 hours as a sustained Category 5 as it moved across the Caribbean islands of Barbuda, Saint Martin/Sint Maarten, the British Virgin Islands, and the Bahamas before making landfall in southeast Florida as a Category 4 hurricane.¹⁴

During the past decade alone, the Caribbean region also registered record-breaking heat waves and droughts. The so-called Pan-Caribbean drought—lasting from 2013 to 2016—is considered the most intense and widespread multi-year drought on record.¹⁵

According to recent studies, human-induced global warming was responsible for 15 to 17 percent of the drought's severity and 7 percent responsible for its regional extent.¹⁶ In 2020, the Caribbean Institute for Meteorology and Hydrology (CIMH) reported that September was the warmest month ever recorded. In Canfield, Dominica, temperatures rose to an all-time high of 35.7 degrees Celsius (92.26 degrees Fahrenheit). Similarly, Grenada and Puerto Rico registered record-breaking temperatures.¹⁷

1.1. The Impact of Extreme Weather Events in the Caribbean

Caribbean countries face a series of unique economic, social, and environmental challenges that severely underscore not only their ability to absorb the impacts of extreme weather events, but also to adapt to the overall effects of climate change. In addition to being seasonally exposed to multiple natural hazards, most of the Caribbean population lives in areas highly prone to suffer the impact of devastating storm surges and flash floods. It is estimated that approximately 84 percent of the Caribbean

¹² Kevin A. Reed, Michael F. Wehner, and Colin M. Zarzycki, “Attribution of 2020 hurricane season extreme rainfall to human-induced climate change”, Nature Communications, April 2022.

<https://www.nature.com/articles/s41467-022-29379-1>

¹³ NOAA - National Centers for Environmental Information, “Annual 2017 Tropical Cyclones Report - Atlantic Basin 2017 Season Summary”.

<https://www.ncdc.noaa.gov/sotc/tropical-cyclones/201713>; United Nations Office for the Coordination of Humanitarian Affairs (OCHA),

“Natural Disasters in Latin America and the Caribbean, 2000-2019”, January 2020.

<https://reliefweb.int/report/world/natural-disasters-latin-america-and-caribbean-2000-2019>

¹⁴ World Meteorological Organization, “Caribbean 2017 Hurricane Season An Evidence-Based

Assessment of the Early Warning System”, 2018.

https://library.wmo.int/doc_num.php?explnum_id=5459

¹⁵ Dimitris A. Herrera, Toby R. Ault, John T. Fasullo, Sloan J. Coats, Carlos M. Carillo, Benjamin I. Cook, and A. Park Williams, “Exacerbating of the 2013-2016 Pan-Caribbean Drought by Anthropogenic Warming”, Geophysical Research Letter, September 2018.

<https://agupubs.onlinelibrary.wiley.com/doi/full/10.1029/2018GL079408>

¹⁶ Ibid.

¹⁷ World Meteorological Organization, “Caribbean has record-breaking heat season”, November 2020.

<https://public.wmo.int/en/media/news/caribbean-has-record-breaking-heat-season>

population lives and works within the range of 25 km of low-elevation coastal zones.¹⁸

Similar to most small island developing states (SIDS), their small domestic markets, scarce natural resources, high public debts, and strong economic dependence on climate-sensitive sectors such as agriculture, fisheries, and tourism have limited their economic development.¹⁹ Exogenous factors such as financial crises, commodity price volatility, and COVID-19 have also negatively impacted their economic growth. In addition, infrastructure costs represent another major developmental obstacle. For Caribbean countries, investing in large-scale renewable energy and climate-resilient infrastructure projects is financially unfeasible.²⁰ Without the ability to invest in infrastructure, the periodicity of extreme weather events—such as tropical cyclones—pose an existential threat to the Caribbean. As a backdrop, regional countries and territories increasingly struggle to fully recover from the aftermath of a hurricane before the next one hits.

The humanitarian and economic toll of extreme weather events in the Caribbean has been catastrophic—making it one of the most impacted regions in the world. According to the Global Climate Risk Index, between 2000 and 2019, 11 countries and

territories in the Caribbean ranked among the 60 most affected by extreme weather events in the world, Puerto Rico (1), Haiti (3), and the Bahamas (6), Dominica (11), Grenada (24), Belize (33), Saint Vincent and the Grenadines (48), Saint Lucia (51), Dominican Republic (50), Jamaica (54), and Antigua and Barbuda (56).²¹ Indeed, data from the International Disaster Database (EM-DAT) reveals that since 1950, natural disasters in the Caribbean were responsible for the deaths of approximately 257,000 people and for leaving an estimated \$179 billion in economic damages. It is important to note that although hurricanes have been historically the most destructive natural disaster in the Caribbean region, the deadliest natural disaster on record was attributed to Haiti's 2010 earthquake, leaving a tragic loss of 222,570 lives.²²

Since 1950, meteorological, hydrological, and climatological disasters—including tropical cyclones, droughts, floods, and landslides—have caused 24,206 deaths and affected nearly 54 million people. Of these, data shows that tropical cyclones have historically represented the most frequent and disruptive extreme weather event in the Caribbean. During this period, an estimated number of 345 tropical cyclones have hit the region—resulting in close to 18,000 deaths

¹⁸ Michelle Mycoo, “Building Urban Resilience in the Caribbean: Policies, Practices and Prospects”, International Institute for Sustainable Development (IISD), June 2022. <https://sdg.iisd.org/commentary/guest-articles/building-urban-resilience-in-the-caribbean-policies-practices-and-prospects/>; D. Guha-Sapir, R. Below, and Ph. Hoyois, “EM-DAT: The CRED/OFDA International Disaster Database”, Université Catholique de Louvain. <https://public.emdat.be>

¹⁹ UNFCCC, “Climate Change: Small Island Developing States”.

²⁰ OECD, “Small island developing states (SIDS) and post-2015 development finance agenda”, 2015. https://www.oecd.org/dac/financing-sustainable-development/Addis%20Flyer%20SIDS%20FINAL_.pdf

²¹ David Eckstein, Vera Künzel, and Laura Schäfer, “Briefing Paper: Global Climate Risk Index 2021”, Germanwatch, https://www.germanwatch.org/sites/default/files/Glob%20Climate%20Risk%20Index%202021_2.pdf

²² Centre for Research on the Epidemiology of Disasters (CRED), “EM-DAT The International Disaster Database”.

and impacting nearly 38 million people.²³ In terms of economic losses, tropical cyclones are by far the most devastating natural disaster as well, with estimates indicating that since 1950 close to \$163 billion was lost in damages.²⁴ This represents a striking 91 percent of the total economic losses from all natural disasters in the region.²⁵ Moreover, vulnerable population such as migrants, women, girls, and sexual and gender minorities are particularly vulnerable to hurricanes. A recent study conducted by the University of Cambridge researchers and published in *The Lancet Planetary Health* has found evidence suggesting a positive correlation between gender-based violence (GBV) and extreme weather events. According to the study, factors such as economic malaise, social instability, enabling environments, and stress further contribute to this relationship.²⁶ For example, according to the United Nations Women, amidst the chaos following Hurricane Maria in 2017, at least 46 women and girls suffered GVB. In addition, other reports suggest that young and teenage girls experienced sexual harassment, grooming, and voyeurism.²⁷

Recent studies also show that, between 1980

to 2009, the economic and social impacts of tropical cyclones in the Caribbean have been gradually increasing and that since 2010 they have drastically increased. In particular, the agricultural, housing, transport, and utility sectors have been the most impacted.²⁸ Without significant measures to curb global warming and increase resilience-building efforts, projections predict a dire future for the Caribbean. According to a study conducted by the Stockholm Environmental Institute and the Global Development and Environmental Institute, the annual cost of inaction for the Caribbean in hurricane damages, tourism losses, and infrastructure damages could reach up to \$22 billion by 2050 and \$46 billion by 2100.²⁹ The Inter-American Development Bank (IDB) estimated that to meet the 2030 sustainable goals, including bolstering climate action, will require \$19 billion in infrastructure.³⁰ Moreover, as climate change worsens and extreme weather events patterns change, Caribbean countries below the “hurricane belt”—outside the normal path of hurricanes—have also started to fear for their future. For example, Trinidad and Tobago's strategic yacht industry—considered one of the world's main centers

²³ Ibid.

²⁴ Ibid.

²⁵ Ibid.

²⁶ Van Daalen, KR, “*Extreme events and gender-based violence: a mixed-methods systematic review*”, *Lancet Planetary Health*, 2022. <https://www.cam.ac.uk/research/news/extreme-weather-and-climate-events-likely-to-drive-increase-in-gender-based-violence>

²⁷ United Nations Women, “*The gender and age dimensions of hurricane in Dominica*”, December 2019. <https://wrd.unwomen.org/node/134>

²⁸ United Nations Framework Climate Change Convention (UNFCCC), “*Climate Change: Small Island Developing States*”.

²⁹ Ramón Bueno, Cornelia Herzfeld, Elizabeth A. Stanton, and Frank Ackerman, “*The Caribbean and Climate Change: The Costs of Inaction*”, Tufts University, 2008. <https://research.fit.edu/media/site-specific/researchfit.edu/coast-climate-adaptation-library/latin-america-and-caribbean/regional---caribbean/Bueno-et-al.--2008.--CC--Costs-of-Inaction-Ex.-Summary..pdf>

³⁰ Juan Pablo Brichetti, Leonardo Rivas, María Eugenia Rivas, Tomás Serebrisky, Ben Solís, “*The Infrastructure Gap in Latin America and the Caribbean: Investment Needed Through 2030 to Meet the Sustainable Development Goals*”, December 2021.

<https://publications.iadb.org/en/infrastructure-gap-latin-america-and-caribbean-investment-needed-through-2030-meet-sustainable>

for repairment, maintenance services, and storage of yachts—is increasingly facing pressure from extreme weather events.³¹

2. International Mechanisms and Regional Responses

As climate change worsens and hurricanes, droughts, floods, and heat waves become more devastating in the Caribbean region, and elsewhere, the international community's ability to reduce global greenhouse emissions and mobilize resources to assist the most vulnerable regions remains indispensable.

Despite advances, the current pace is insufficient to deal with the growing crisis. According to Climate Tracker, an independent international research group, the existing policies in place around the world are projected to result in an increase in

the global temperature of 2.7 degrees Celsius above pre-industrial levels by 2100—well above the 1.5-degree-Celsius increase considered by scientists as the threshold to avoid long-lasting and irreversible changes to the ecosystem.³²

Acknowledging that mitigation strategies would not be adequate to deal with the current crisis, the international community has increased the development of climate resilience-building mechanisms and tools to cope with climate change impacts. At the regional level, the Caribbean region has created an impressive network of institutions aimed at bolstering climate resilience and tackling the multiple impacts associated with extreme weather events, including disaster risk management response agencies as well as finance mechanisms to cope with the initial response in the aftermath of hurricanes.

Box 2. What does “climate resilience” mean?

The term “resilience” implies the action of “bouncing back” to an initial equilibrium point after suffering the impact of an external shock.³³ In the context of the current climate emergency, the Intergovernmental Panel on Climate Change (IPCC) has defined resilience as:

“The ability of a system and its component parts to anticipate, absorb, accommodate, or recover from the effects of a hazardous event in a timely manner, including through ensuring the preservation, restoration, or improvement of its essential basic structures and functions.”³⁴

It is important to note that climate change resilience is not synonymous with climate change adaptation. While climate resilience specifically refers to the capacity to anticipate and cope with hazardous events and to recover from their impacts, climate change adaptation implies changing ecological, social, or

³¹ Ivor Jackson, “*Potential Impact of Climate Change on Tourism*”, Prepared for the OAS – Mainstreaming Adaptation to Climate Change (MACC) Project.

³² Alan Buis, “*A Degree of Concern: Why Global Temperature Matters*”, NASA – Global Climate Change, June 2019.
<https://climate.nasa.gov/news/2878/a-degree-of-concern-why-global-temperatures-matter/>

³³ Giliberto Capano and Jun Jie Woo, “*Resilience and robustness in policy design*” a critical appraisal”, Springer Policy Sciences, January 2017.
https://ash.harvard.edu/files/ash/files/resilience_and_robustness.pdf

³⁴ IPCC, “*Glossary of terms*”, In: Managing the Risks of Extreme Events and Disaster to Advance Climate Change Adaptation, 2012.
https://archive.ipcc.ch/pdf/special-reports/srex/SREX-Annex_Glossary.pdf

economic systems in response to a climatic stimulus to moderate the damage and make them more capable of surviving in a new environment.³⁵ The IPCC defines adaptation as:

“The process of adjustment to actual or expected climate and its effects, in order to moderate harm or exploit beneficial opportunities. In natural systems, the process of adjustment to actual climate and its effects; human intervention may facilitate adjustment to expected climate.”³⁶

What does climate resilience look like?

According to Global Climate Action and the Marrakech Partnership, building climate resilience requires at least nine climate risk management interventions:

- 1) Climate risk and vulnerability assessments, disclosure, and monitoring actions
- 2) Access to early warning systems and development of early actions;
- 3) Preparedness with contingency plans and emergency response;
- 4) Establishment of effective governance to manage climate risks accompanied by human and institutional capacity-building;
- 5) Natural-based solutions used to reduce risks;
- 6) Climate-proofing of infrastructure and services;
- 7) Risk transfer: insurance and social protection instruments;
- 8) Sharing of knowledge and best practices on climate risk management;
- 9) Increase in the access and quality of public and private finance to invest in resilience.³⁷

Although building climate resilience mechanisms remains a key strategic policy for countries exposed to extreme weather events, the initial cost associated with developing these mechanisms represents a major burden.³⁸ In particular, the lack of available financial mechanisms is significantly harming Caribbean countries' capacity to tackle climate change. According to the Organisation for Economic Co-operation and Development (OECD), SIDS'

lack of absorptive and repayment capacity to develop and implement climate projects has impacted their ability to address the climate crisis. As a result, the need to mobilize financial resources for climate action resources is at the center stage of current debates.

2.1. International Mechanisms

Three decades since the signing of the United Nations Framework Convention on

³⁵ Sarah Mehryar, “What is the difference between climate change adaptation and resilience?”, Grantham Research Institute on Climate Change and the Environment – The London School of Economics and Political Science, September 2022. <https://www.lse.ac.uk/granthaminstitute/explainers/what-is-the-difference-between-climate-change-adaptation-and-resilience/>; UNFCCC, “Adaptation and resilience”. <https://unfccc.int/topics/adaptation-and-resilience/the-big-picture/introduction>

³⁶ IPCC, “Glossary of terms”, Managing the Risks of Extreme Events and Disaster to Advance Climate Change Adaptation.

³⁷ UNFCCC, “Climate Action Pathway – Climate Resilience Action Table”, 2021.

https://unfccc.int/sites/default/files/resource/Resilience_ActionTable_unedited_for_publication.pdf

³⁸ Livia Minoja, Carlos Henriquez Cortez, and Christian Gischler, “Building resilience comes at a higher initial cost. How can we better finance it?”, Inter-American Development Bank, April 2022.

<https://blogs.iadb.org/sostenibilidad/en/building-resilience-comes-at-a-higher-initial-cost-how-can-we-better-finance-it/>

Climate Change (UNFCCC)—a non-binding international treaty that established a legal framework to stabilize atmospheric concentrations of greenhouse gases—countries have slowly moved toward finding a common approach to combat climate change. To date, the Conference of Parties (COP)—the supreme decision body represented by all states that are parties to the convention—have celebrated 27 COPs. Despite early setbacks, in recent years, amidst the growing crisis, countries have increasingly renewed their commitments to reduce greenhouse gasses and established new mechanisms to help the most vulnerable regions.

In 2009, at COP15, countries pledged to mobilize \$100 billion per year by 2020 for climate action in developing countries. Parties not only agreed that funding would come from both bilateral and international aid as well as from domestic public and private sources, but also called for governance mechanisms to ensure that these were allocated in an effective, efficient, and transparent manner.³⁹ At COP16, with the objective of providing technical assistance and access to resources to strengthen medium and long-term climate adaptation policies countries established the Cancun Adaption Framework. The Cancun Framework introduced the national adaptation plans (NAP) process—a mechanism that enables each party member to identify its own climate change

vulnerabilities and design policy interventions to build adaptive capacity and enhance climate resilience. At COP16, countries also formalized the \$100 billion pledge and established the Green Climate Fund—an operating entity to channel investment in mitigation and climate-resilience development with a particular focus on the least developed countries (LDCs), SIDS, and African States.⁴⁰

In 2013, at COP19, countries made an important step by establishing the Warsaw International Mechanism for Loss and Damages associated with Climate Change Impacts. Among its primary tasks, this mechanism was established to increase knowledge and understanding of comprehensive risk management approaches, strengthen dialogue, coordination, coherence, and synergies among relevant stakeholders, as well as enhance action and support, including finance, technology, and capacity-building.⁴¹ In 2015—a significant year for international cooperation on climate action—countries signed the Paris Agreement, launched the 2030 Agenda for Sustainable Development, and established the Sendai Framework for Disaster Risk Reduction (2015-2030). These mechanisms established important policy objectives geared toward countries exposed to extreme weather events.

COP21's Paris Agreement represents the most significant step ever taken by the

³⁹ United Nations, “Background note on the USD 100 billion goal in the context of the UNFCCC process, in relation to advancing on SDG indicator 13.a.1”. https://unstats.un.org/sdgs/tierIII-indicators/files/13.a.1_Background.pdf

⁴⁰ United Nations Environmental Programme, “Green Climate Fund”. [https://www.unep.org/about-un-environment/funding-and-partnerships/green-](https://www.unep.org/about-un-environment/funding-and-partnerships/green-climate-fund)

[climate-fund#:~:text=The%20Green%20Climate%20Fund%20was,in%20the%20Republic%20of%20Korea.](#)

⁴¹ UNFCCC, “Warsaw International Mechanism for Loss and Damage associated with Climate Change Impacts (WIM)”. <https://unfccc.int/topics/adaptation-and-resilience/workstreams/loss-and-damage/warsaw-international-mechanism>

international community to tackle global warming—setting important targets and laying the foundations of modern climate governance.⁴² Among these targets, two stand out in particular: 1) reduce global greenhouse gas emissions to limit the global temperature increase to 2 degrees Celsius while pursuing efforts to limit the temperature to 1.5 degrees Celsius, and 2) review nationally determined contributions (known as NDCs or countries' specific commitments to reduce emissions) every five years became two important goals to reduce global warming. Acknowledging the multiples impacts of climate change, parties not only recognized the importance of averting, minimizing, and addressing the “loss and damage associated with (...) extreme weather events and slow onset events, and the role of sustainable development in reducing the risk of loss and damage,” but also called on developed states to provide financial resources to assist developing states in mitigating, adapting, and enhancing climate resilience, as well as establishing mechanisms for loss and damages.⁴³

The 2030 Agenda for Sustainable Development—a shared plan of action with specific goals and targets guided by the purposes and principles of the Charter of the United Nations for people, planet, and prosperity—incorporated the goal of

bolstering global climate action by 2030, including the need to “strengthen resilience and adaptive capacity to climate-related hazards and natural disasters in all countries”⁴⁴ and “promote mechanism for rising capacity for effective climate change-related planning and management in least developed countries and small island developing States.”⁴⁵ To measure this goal, the United Nations uses eight indicators including the number of deaths, missing persons and directly affected persons attributed to disasters; the number of countries that adopt and implement national disaster risk reduction strategies; as well as the number of LDCs and SIDS that are receiving specialized support, and amount of support, including finance, technology and capacity-building, for mechanisms for raising capacities for effective climate change-related planning and management.⁴⁶

The Sendai Framework—the successor of the Hyogo Framework for Action (2005-2015)—is an intergovernmental process designed to build resilience as well as to reduce the losses of lives and livelihoods in the context of climate change. It particularly focuses on the adoption of measures to address three key dimensions of disaster risk (exposure to hazards, vulnerability and capacity, and hazard's characteristics).⁴⁷ The framework outlined a series of targets, including the need to lower the global

⁴² European Commission, “Paris Agreement”. https://climate.ec.europa.eu/eu-action/international-action-climate-change/climate-negotiations/paris-agreement_en

⁴³ United Nations, “The Paris Agreement”. <https://www.un.org/en/climatechange/paris-agreement>

⁴⁴ United Nations, “Goal 13: Take urgent action to combat climate change and its impacts”. <https://sdgs.un.org/goals/goal13>

⁴⁵ Ibid

⁴⁶ SDG Tracker, “Take urgent action to combat climate change and its impacts”. <https://sdg-tracker.org/climate-change#targets>

⁴⁷ United Nations Office for Disaster Risk Reduction, “What is the Sendai Framework for Disaster Risk Reduction?”. <https://www.undrr.org/implementing-sendai-framework/what-sendai-framework#:~:text=The%20Sendai%20Framework%20focuses%20on,existing%20risk%20and%20increase%20resilience>

average of disaster mortality, as well as the number of people affected, the economic losses, the damages to critical infrastructure, and increase the number of countries with national and local disaster risk reduction strategies.⁴⁸ To achieve these targets it has set four properties:

- 1) Understanding disaster risk—establishing policies and practices based on the identification of the disaster risk in all its dimensions (vulnerability, capacity, exposure to persons and assets, hazard characteristics, and the environment).
- 2) Strengthening disaster risk governance to manage disaster risk—enhancing disaster risk governance for prevention, mitigation, preparedness, response, recovery, and rehabilitation at the national, regional, and global levels.
- 3) Investing in disaster risk reduction for resilience—allocating necessary public and private resources to develop and implement disaster risk reduction strategies, policies, plans, laws, and regulations, including disaster risk transfer and insurance, risk-sharing, and financial protection.
- 4) Enhancing disaster preparedness for effective response and to “Build Back Better” in recovery, rehabilitation, and reconstruction—preparing and reviewing disaster preparedness and contingency plans, strengthening multisectoral forecasting and early warning mechanism,

as well as to build and resilience infrastructure to secure critical services such as water supply, transportation, telecommunication, education, and medical care.⁴⁹

In 2016, at COP22, parties launched the Marrakech Partnership for Global Climate Action—an initiative established under the United Nations to implement the Paris Agreement—marked an important step forward to help countries reduce greenhouse gases emissions and boost climate resilience to cope with the multiple natural hazards associated with climate change. With the goal of ensuring that all countries have integrated climate resilience mechanisms developed by 2050 to thrive in a world in which temperatures have increased by 1.5 degrees Celsius since pre-industrial levels, the Marrakech Partnership aimed to enhance the capacity of vulnerable communities and people to adapt and be resilient to current and future climate shocks and stress as well as to build resilient environments, economies, and investments.⁵⁰ Moreover, the Marrakech Partnership also acknowledged that “mitigation-only strategy on climate action will not be effective to address the current and future impacts of climate change. It is essential we have pathways that build resilience and adapt to climate change and reduce greenhouse gas emissions.”⁵¹

⁴⁸ United Nations Office for Disaster Risk Reduction, “Sendai Framework Indicators”. <https://www.preventionweb.net/sendai-framework/sendai-framework-indicators>

⁴⁹ Ibid.

⁵⁰ UNFCCC, “Resilience – Climate Action Pathway: Managing Climate Risks so Everyone is Thriving”. <https://unfccc.int/climate-action/marrakech-partnership/reporting-tracking/pathways/resilience-climate-action->

[pathway#Climate-Action-Pathway-2021](#); UNFCCC, “Climate Action Pathway – Climate Resilience – Executive Summary”. https://unfccc.int/sites/default/files/resource/ExecSummary_Resilience_0.pdf

⁵¹ UNFCCC, “Climate Action Pathway – Resilience and Adaptation – Executive Summary”, November 2019. https://unfccc.int/sites/default/files/resource/CAP_Resilience_and_Adaptation_ES.pdf

2.2. Climate Finance Challenges

Despite signing multiple frameworks to strengthen climate resilience and pledges to channel financial resources to developing countries, developed countries have fallen short of the goal of raising \$100 billion by 2020. In fact, they fell short by \$16.7 billion.⁵² In 2020, public finance (bilateral and multilateral) accounted for \$68.3 billion (82 percent), private finance \$13.1 billion (16 percent), and climate-related export credits \$1.9 billion (2 percent).⁵³ Between 2016 and 2020, multilateral and bilateral loans (both concessional and non-concessional) represented the main instrument to channel climate finance to developing countries.

The lack of financial resources available to developing countries has disproportionately impacted SIDS. Due to their structural financial constraints to repay, develop, and implement climate projects, these countries have mainly received climate finance through grants. Unlike loans that are used to fund large profitable infrastructure projects, grants tend to support capacity building, feasibility studies, and technical assistance.⁵⁴ Moreover, it is important to note that many Caribbean SIDS are not eligible for concessional financing due to

their classification as middle or high-income countries. Despite graduating from LDC status, these countries continue to experience natural disasters and the multiple impacts associated with climate change, remaining heavily dependent on development finance to boost climate resilience.

According to a 2022 United Nations report, the current climate and development system is unable to “accommodate SIDS’ unique needs, realities, and vulnerabilities, resulting in fewer funding opportunities.”⁵⁵ The lack of human and technical capacity to implement climate projects, as well as the data limitations for adaptation, high transaction costs, and small project sizes significantly harms SIDS’ ability to attract climate financing.⁵⁶

Understanding the need to expand loss and damages mechanisms and boost resilience, as well as acknowledging that mitigation efforts are not sufficient, at COP27 in 2022, countries announced the ground-breaking Agreement on the New “Loss and Damage” Fund for Vulnerable Countries. It includes new funding arrangements to respond to the negative impacts of climate change, including both slow-onset events and sudden-onset disasters.⁵⁷ This revelation

⁵² OCDE, “*Climate Finance Provided and Mobilised by Developed Countries in 2016-2020*”, September 2022. <https://www.oecd-ilibrary.org/sites/286dae5d-en/1/2/2/index.html?itemId=/content/publication/286dae5d-en&csp=46b868d4f630525e4ccc5f67e501847f&itemIGO=oecd&itemContentType=book>

⁵³ Ibid.

⁵⁴ Ibid.

⁵⁵ United Nations, “*Accessing Climate Finance: Challenges and opportunities for Small Island Developing States*”. https://www.un.org/ohrrls/sites/www.un.org.ohrrls/files/accessing_climate_finance_challenges_sids_report.pdf

[les/accessing_climate_finance_challenges_sids_report.pdf](https://www.un.org/ohrrls/sites/www.un.org.ohrrls/files/accessing_climate_finance_challenges_sids_report.pdf)

⁵⁶ Ibid.

⁵⁷ UNFCCC, “*COP27 Reached Breakthrough Agreement on New “Loss and Damage” Fund for Vulnerable Countries*”, November 2022. https://unfccc.int/news/cop27-reaches-breakthrough-agreement-on-new-loss-and-damage-fund-for-vulnerable-countries?gclid=Cj0KCQiAn4SeBhCwARIsANeF9DJE6x-DHF2wAvUz-WThSZ4PiASevwYkW9MduCIiqz1x6rJGCVrAD18aAnrPEALw_wcB

comes after three decades since the Alliance of Small Islands States (AOSIS) first call for the creation of an international mechanism to compensate the most vulnerable small islands and low-lying coastal developing states for loss and damage arising from sea level rise.⁵⁸ Though the establishment of the fund represents a historic achievement in multilateralism, Avinash Persaud, special envoy to the Prime Minister of Barbados, highlighted the need to pair the fund with complementary action at the closing speech of the COP: “We have a historic decision to establish a Loss and Damage fund for countries acutely impacted by the warming climate. It was the result of the strong leadership by the small island states with an amazing degree of solidarity shown by the rest of the world, from the major industrialising developing countries and the developed ones. It is a small victory for humankind. Now we need to redouble efforts behind an energy, transport and agriculture transition that will limit these climate losses and damages in the future.”⁵⁹

2.3. Regional Response

The Caribbean region has built an important network of institutions to implement international mechanisms and set a common regional policy that serves countries and territories to respond to the multiple impacts of climate change. With this objective, Caribbean Community (CARICOM) member states established the Caribbean Community Climate Change Center (CCCCC), the Caribbean Disaster

Emergency Management Agency (CDEMA), and the Caribbean Institute for Meteorology and Hydrology (CIMH). To date, these institutions have become crucial to help member states anticipate, absorb, and recover from the impact of extreme weather events. In addition, the Caribbean Catastrophe Risk Insurance Facility (CCRIF) and the Central America and Dominican Republic Center for Coordination and Disaster Prevention (CEPREDENAC, per its Spanish acronym) are further advancing climate resilience throughout the Caribbean basin. International organizations, such as the United Nations as well as international partners such as the United States and the European Union, are playing an important role in helping these organizations by providing resources to fund several projects aimed at enhancing climate resilience across the region.

- **Caribbean Community Climate Change Centre (CCCCC)**

In 2005 in Belmopan, Belize, the Caribbean Community (CARICOM) established the Caribbean Community Climate Change Centre to coordinate the region’s response to climate change. The CCCCC offers policy recommendations, manages programs to boost climate resilience, and provides information and technical assistance to address the multiple impacts associated with climate change.⁶⁰ The Centre has developed a series of mechanisms to improve climate risk planning, management, and action,

⁵⁸ Chatham House, “*The Historic loss and damage fund*”, February 2023.

<https://www.chathamhouse.org/2023/02/historic-loss-and-damage-fund>

⁵⁹ Dizzanne Billy, “*A Caribbean debrief of COP27 that goes beyond the historic loss and damage fund*”, Global Voices, December 2022.

<https://globalvoices.org/2022/12/11/a-caribbean-debrief-of-cop27-that-goes-beyond-the-historic-loss-and-damage-fund/>

⁶⁰ Caribbean Community Climate Change in the Caribbean, “*About us*”.

<https://www.caribbeanclimate.bz/about-us/>

including the Clearinghouse Search Tool, the Tourism Sector Emission Calculator, the Coral Reef Early Warning System, as well as the Caribbean Assessment of Regional Drought.⁶¹

- **Caribbean Institute for Meteorology and Hydrology (CIMH)**

Created in 1999 following the fusion of the Caribbean Meteorological Institute and the Caribbean Operational Hydrological Institute, the current institute, administrated by sixteen Commonwealth Governments members, serves as regional meteorological and hydrological training and research organization. The CIMH's—headquartered in Bridgetown, Barbados—main goal is to advance meteorological and hydrological services and promote awareness about the importance of these services for the economic well-being of the region.⁶² In 2007, in collaboration with the World Meteorological Organization established the Caribbean Regional Climate Centre (RCC)—a leading regional organization in drought and precipitation monitoring and forecast, climate data production, as well as agro-meteorological and applied meteorology knowledge.⁶³ Both the CIHM and the RCC have developed extensive partnerships with the U.S. National Oceanic and Atmospheric Agency (NOAA), the European Union, USAID, as well as other regional and international organizations that have enabled them to develop infrastructure, increase range of products and services, as

well as enhance human and technical capabilities.

- **Caribbean Disaster Emergency Management Agency (CDEMA)**

Established in 1999 as the Caribbean Disaster Emergency Response Agency, the current Caribbean Disaster Emergency Management Agency, also located in Bridgetown, Barbados, is a regional inter-governmental agency for disaster management serving primarily CARICOM member states. Since implementing the Comprehensive Disaster Management (CDM) approach in 2009, CDEMA's goal has been to enhance resilience by addressing all hazards through all phases of the disaster management cycle, including prevention and mitigation, preparedness, response, recovery, as well as rehabilitation.⁶⁴ Under the CDM, CDEMA has established six strategic objectives: 1) mobilize and coordinate disaster relief; 2) mitigate or eliminate, the immediate consequences of disasters; 3) provide immediate and coordinated responses; 4) secure, coordinate, and provide information on disasters affecting the region; 5) Encourage the adoption of disaster loss reduction and mitigation policies and the national and regional level; and 6) coordinate the establishment, enhancement, and maintenance of adequate emergency disasters response capabilities.⁶⁵ In 2018, following the devastating 2017 Atlantic hurricane season, CEDEMA outlined the

⁶¹ Ibid

⁶² Caribbean Institute for Meteorology and Hydrology, "About". <https://cimh.edu.bb/?p=about>

⁶³ Caribbean Regional Climate Centre, "About the Caribbean Regional Climate Centre". <https://rcc.cimh.edu.bb/about/about-the-rcc/>

⁶⁴ Caribbean Disaster Emergency Management Agency, "What is CDEMA?".

<https://www.cdema.org/about-us/what-is-cdema#which-states-are-members-of-cdema;> Caribbean Disaster Emergency Management Agency, "What is Comprehensive Disaster Management (CDM)".

https://www.cdema.org/what_is_CDM.pdf

⁶⁵ Caribbean Disaster Emergency Management Agency, "What is CDEMA?".

“Caribbean Pathway for Building Resilience.” The framework calls for increasing social protection for the marginal and most vulnerable, safeguarding infrastructure, enhancing economic opportunity, boosting environmental protection, and improving operational readiness and recovery to further strengthen regional resilience. In 2021, CDEMA launched the Caribbean Resilient Recovery Facility, a mechanism that aims to allow actors across the region to coordinate ex-ante and ex-post resilient recovery supported by the Caribbean Pathway for Building Resilience. Furthermore, in 2022, CDEMA in partnership with the United Nations World Food Programme (WFP) and the Government of Barbados announced the establishment of a logistics hub in Barbados that would seek to strengthen the emergency preparedness and response capabilities of Caribbean islands.⁶⁶

- **The Caribbean Catastrophe Risk Insurance Facility (CCRIF SPC)**

Created in 2007, the Caribbean Catastrophe Risk Insurance Facility is a segregated portfolio company that aims to limit the financial impact of natural disasters, including hurricanes, earthquakes, and excessive rains that impact Caribbean and Central American countries and territories. By using parametric insurance, the CCRIF SPC became the first regional fund to provide governments the opportunity to purchase special coverage for hurricanes, earthquakes, and excessive rains at a low

price.⁶⁷ Since 2007, it has made 54 payouts to 16 member governments, totaling approximately \$244.8 million. In addition, in 2019 in partnership with the World Bank and the U.S. Department of State, the CCRIF SPC introduced coverage for the fisheries sector of Saint Lucia and Grenada.⁶⁸

In addition to these regional resilience institutions, the United States and Canada, among other partners from beyond the Caribbean have developed mechanisms to work with the Caribbean on these issues. From the United States, examples include the U.S.-Caribbean Partnership launched in 2019 and the U.S.-Caribbean Partnership to Address Climate Change 2030 (PACC 2030) launched in 2022. From Canada, the Canada-Caribbean Resilience Facility aims at achieving more effective and coordinated gender-informed climate resilient preparedness, recovery, and public financial management.⁶⁹ Similarly, the European Union established the Caribbean-European Union Partnership (2021-2027) to bolster the region's climate resilience efforts by improving access to development financing, enhancing local capacity building, and facilitating clean energy projects. The International Organization for Migration (IOM), launched the Caribbean Environmental Resilience and Disaster Response Plan 2023-2025—a regional plan aiming to provide support to communities at risk of displacement before, during, and after

⁶⁶ WFP, “Upcoming logistic hub in Barbados to enhance emergency response across the Caribbean”, August 2022. <https://www.wfp.org/news/upcoming-logistics-hub-barbados-enhance-emergency-response-across-caribbean>

⁶⁷ Caribbean Catastrophe Risk Insurance Facility, “Company Overview”. <https://www.ccrif.org/about-us>

⁶⁸ Ibid.

⁶⁹ Global Facility for Disaster Reduction and Recovery (GFDRR), “Canada-Caribbean Resilience Facility”. <https://www.gfdrr.org/en/crf>

a disaster and enhance their resilience against multiple risks.⁷⁰

Despite multiple international cooperation initiatives and the significant progress made at the regional level, there are still multiple challenges to be addressed. According to the 2023 Punta del Este ministerial declaration—signed at the VIII Regional Platform for Disaster Risk Reduction in the Americas and the Caribbean (RP23)—current investments in disaster risk reduction are insufficient to address the existing needs. The declaration also warned of significant challenges associated with the implantation, monitoring, and reporting of the targets set by the Sendai Framework. In addition, it calls countries to “ensure that resilience building, and disaster risk reduction measures are mainstreamed as a core component informing the decision-making process in the planning, implementation, operation and maintenance of infrastructure projects, and consider nature-based solutions.”⁷¹

3. Building Resilience at the National and Local Level: Implementation Challenges

Despite the efforts of an important network of regional resilience institutions, implementing resilience mechanisms at the national has proven to be extremely challenging for many Caribbean countries and territories. Although some have made significant progress, others remain unable to establish basic climate resilience mechanisms. For example, Grenada, Saint Lucia, Saint Vincent and the Grenadines, and Suriname are the only Caribbean countries to submit their NAPs to the UNFCCC.⁷² Moreover, only 30 percent of the 19 participating states and territories in CDEMA are covered by vital early warning mechanisms.⁷³ Likewise, though some countries have moved towards integrating gender equality in disaster preparedness and recovery, there are still considerable disparities among countries.

According to the World Bank, one of the key enablers of resilience is a country's ability to improve governance, including investing in stronger infrastructure systems, managing public budgets, and delivering services more

⁷⁰ IOM, “*Caribbean Environmental Resilience and Disaster Displacement Response Plan 2022-2024*”. <https://crisisresponse.iom.int/response/caribbean-environmental-resilience-and-disaster-displacement-response-plan-2022-2024>

⁷¹ Americas + Caribbean VIII Platform for Disaster Risk Reduction, “*VII Regional Platform for Disaster Risk Reduction in the Americas and the Caribbean (RP23) – Punta del Este Declaracion*”, 2023. <https://rp-americas.undrr.org/sites/default/files/2023-03/Ministerial%20Declaration.pdf>

⁷² UNFCCC, “National Adaptation Plans 2021”, 2021. <https://unfccc.int/sites/default/files/resource/UNFCCC-NAP2021-Progress-report.pdf>

⁷³ World Meteorological Organization, “*Barbados hosts regional launch of Early Warnings for All Initiatives*”, February 2023. <https://public.wmo.int/en/media/press-release/barbados-hosts-regional-launch-of-early-warnings-all-initiative#:~:text=Bridgetown%2C%20Barbados%2C%20hosts%20on%206.leading%20partners%20in%20the%20initiative>

efficiently and transparently.⁷⁴ Furthermore, the bank has also pointed out that it is essential to have a stable economic system capable of channeling the resources needed to absorb the short-term impacts of a shock.⁷⁵ Similarly, Frances Z. Brown from the Carnegie Endowment for International Peace has identified three governance-related characteristics essential to building resilience, these include: high levels of public trust, low corruption levels, and high-quality political leadership.⁷⁶

Given the diverse political, economic, and social realities within the Caribbean region, understanding the challenges the governments of Haiti, Puerto Rico, the Bahamas, Dominica, and Barbados face in building climate resilience allows for tailored policy recommendations as well as identifiable regional trends. These countries and territories are not only among the most impacted by climate change in the world but also have different levels of economic development, corruption, government effectiveness, as well as political leadership.

3.1. Puerto Rico

Puerto Rico is the easternmost island of the Greater Antilles, with a population of 3.2 million and a gross national income (GNI) per capita of \$22,580. According to the Global Climate Index, for the past two decades has been the most affected country or territory by extreme weather events in the world.⁷⁷ Data from the EM-DAT shows that since 2000, 10 hurricanes and two tropical storms impacted it—of these Category 5 Hurricane Irma on September 7, 2017, and Category 4 Hurricane Maria on September 20, 2017, left the island in ruins.⁷⁸

Hurricane Maria—which made landfall on the southeast coast near Yabucoa and moved northward across the island—was particularly devastating, with the island yet to fully recover. Immediately following the disaster, debris, and damages left 97 percent of the roads inoperable, and 95 percent of the population did not have access to safe drinking water.⁷⁹ Post-disaster assessments showed approximately 3,000 people died, and economic damages amounted to roughly \$20 billion.⁸⁰ Similar to what happened in

⁷⁴ Julie Rozenberg, Nyanya Browne, Sophie De Vries Robbé, Melanie Kappes, Woori Lee, Abha Prasad, “360° Resilience: A Guide to Prepare the Caribbean for a New Generation of Shocks”, World Bank, October 2021.

<https://openknowledge.worldbank.org/handle/10986/36405?locale-attribute=en>

⁷⁵ Ibid.

⁷⁶ Frances Z. Brown, “Governance for Resilience: How Can States Prepare for the Next Crisis?”.

⁷⁷ World Bank, “GNI per capita, Atlas method (current US\$) – Haiti, Bahamas, The, Puerto Rico, Dominica, Barbados”.

<https://data.worldbank.org/indicator/NY.GNP.MKT.P.CD?locations=HT-PR-BS-DM-BB>; World Bank, “Population, total – Haiti, Bahamas, The, Puerto Rico, Dominica, Barbados”.

<https://data.worldbank.org/indicator/SP.POP.TOTL?locations=HT-BS-PR-DM-BB>

David Eckstein, Vera Künzel, and Laura Schäfer, “Briefing Paper: Global Climate Risk Index 2021”.

⁷⁸ Centre for Research on the Epidemiology of Disasters (CRED), “EM-DAT The International Disaster Database”.

⁷⁹ RAND Corporation. “Hurricane Irma and Maria: Impact and Aftermath”.

<https://www.rand.org/hsrd/hsoac/projects/puerto-rico-recovery/hurricanes-irma-and-maria.html>

⁸⁰ U.S. Economic Development Administration, “EDA Continues to Support the Caribbean Following the Devastating 2017 Hurricane Season”, September 2021.

<https://www.eda.gov/news/blog/2021/09/20/eda-continues-support-caribbean-following-devastating-2017-hurricane-season>; GW today, “GW

Researchers: 2,975 Excess Deaths Linked to Hurricane Maria”, August 2018.

<https://gwtoday.gwu.edu/gw-researchers-2975->

Dominica, the island's power grid collapsed—leaving entire parts of the island without electricity for up to 11 months. The effects of the 2017 hurricane season on Puerto Ricans are clear. Though an exact figure remains elusive, studies suggest that because of the hurricane, between 129,000 to 476,000 Puerto Ricans left the island.⁸¹

More than five years following the hurricane, reconstruction efforts continue to face significant challenges. A recent report from the United States Government Accountability Office (GAO) outlined that factors such as the limited institutional knowledge and capacity to manage disaster recovery programs, the existing difficulties between the Federal Emergency Management Agency (FEMA) and grant applicants in reaching agreements on the scope rebuilding projects, increases in cost for projects because of inflation, as well as the difficulties in procuring resources for construction, have contributed to the slow recovery.⁸² The same report found that as of August 2022, most available reconstruction funds were only spent in early response emergency work, leaving permanent repairs and rebuilding of key infrastructure vulnerable to new hurricanes.⁸³ Indeed, as

many feared, in September 2022—the significantly less powerful Category 1—Hurricane Fiona completely knocked down the fragile power grid, leaving the entire island without power again.

Exacerbated by climate change, Puerto Rico's long-standing structural problems, such as recurrent economic and financial crises, shrinking population, corruption, and government mismanagement, have harmed its ability to bounce back from the impact of extreme weather events. Corruption and government mismanagement have proven to be the main reasons behind the slow reconstruction following Hurricane Maria. According to a recent paper published by the Center for Puerto Rican Studies of the City University of New York, clientelism and corruption practices such as electorally motivated disaster resources allocation have slowed recovery efforts and harmed the most vulnerable communities. Puerto Rico's ranking of 40.86/100 places it among the least effective of any territory or country in the Caribbean region.⁸⁴ In addition, surveys have constantly shown that Puerto Ricans distrust local institutions. In 2016, only 19 percent of survey respondents said they trusted the judiciary system, 12 percent in

[excess-deaths-linked-hurricane-maria#:~:text=The%20study%20found%20that%20he,a%20year%20without%20the%20storm](#)

⁸¹ Rolando J. Acosta, et al., *Quantifying the dynamics of migration after Hurricane Maria in Puerto Rico*, Proceedings of the National Academy of Sciences of the United States of America (PNAS), November 2020, <https://doi.org/10.1073/pnas.2001671117>;

Intergovernmental Panel on Climate Change (IPCC), *Sixth Assessment Report Working Group II-Impacts, Adaptation and Vulnerability - Fact Sheet – Small Islands*, 2022, https://www.ipcc.ch/report/ar6/wg2/downloads/outreach/IPCC_AR6_WGII_FactSheet_SmallIslands.pdf

⁸² U.S. Government Accountability Office, *“Hurricane Recovery Can Take Years—But For Puerto Rico, 5 Years Show Its Unique Challenges”*, November 2022.

[https://www.gao.gov/blog/hurricane-recovery-can-take-years-puerto-rico-5-years-show-its-unique-challenges#:~:text=Puerto%20Rico's%20government%20estimated%20it,U.S.%20history%20\(11%20months\)](https://www.gao.gov/blog/hurricane-recovery-can-take-years-puerto-rico-5-years-show-its-unique-challenges#:~:text=Puerto%20Rico's%20government%20estimated%20it,U.S.%20history%20(11%20months))

⁸³ Ibid.

⁸⁴ World Bank, *“Worldwide Governance Indicators”*.

<https://info.worldbank.org/governance/wgi/Home/Reports>

the Senate, and 11 percent in the House of Representatives.⁸⁵ In 2020, a similar poll revealed that 61.1 percent of Puerto Ricans considered the government's response to Hurricane Maria to be poor.⁸⁶

3.2. Haiti

Haiti, located on the island of Hispaniola, with 11,447,569 inhabitants and a GNI per capita in 2021 of \$1,430, is the most populated and poorest country in the Caribbean. Given its complex historical economic and social developmental challenges—exacerbated by international meddling, political instability, and violence—it remains the poorest and most fragile country in Latin America and the Caribbean.⁸⁷ According to the World Bank's governance indicators, Haiti's government effectiveness is practically non-existent, with a score of just 0.96/100 in 2021.⁸⁸ The Global Climate Index shows that between 2000 and 2019, Haiti ranked as the third-most-impacted country or territory by extreme weather events in the world. The International Disaster Database (EM-DAT) estimates that since 2000, Haiti has been impacted by 79 disasters meteorological, hydrological, and climatological disasters, including hurricanes, tropical storms,

droughts, riverine floods, and coastal floods—resulting in approximately \$2.8 billion in damages and 7,543 deaths.⁸⁹

Of the tropical cyclones that have hit the country, Hurricane Jeanne in 2004, Hurricane Sandy in 2012, and Hurricane Matthew in 2016 caused the most damage, accounting for a combined \$2.6 billion in damages and 3,375 deaths.⁹⁰ According to a rapid assessment from the World Bank following Hurricane Matthew landfall, approximately two million people were directly impacted, up to 90 percent of the crops and livestock were lost in the southern region, thousands of roads and bridges were rendered inoperable, an estimated 450,000 children could not attend school, vaccine chains were destroyed, and cholera cases rose sharply.⁹¹ In the aftermath of the hurricane, at the request of the Haitian government, CDEMA participating states in coordination with the United States Southern Command and the United Nations World Food Programme (WFP) assisted Haiti's Civil Protection Agency—the national institution in charge of leading the country's disaster risk management strategy—with key emergency relief supplies and early recovery operations. Post-assessment reports have highlighted that

⁸⁵ Cynthia López Cabán, “Desconfían los boricuas en sus instituciones”, *El Nuevo Día*, May 2016 <https://www.elnuevodia.com/noticias/locales/notas/desconfian-los-boricuas-en-sus-instituciones/>

⁸⁶ Viviana Rivas Burgos, “Encuesta sobre el electorado puertorriqueño”, 9 Millones, December 2020. <https://medium.com/9-millones/encuesta-sobre-el-electorado-puertorrique%C3%B1o-c4a93ace21ae>

⁸⁷ World Bank, “GNI per capita, Atlas method (current US\$) – Haiti, Bahamas, The, Puerto Rico, Dominica, Barbados”; World Bank, “Population, total – Haiti, Bahamas, The, Puerto Rico, Dominica, Barbados”.

⁸⁸ The World Bank, “Worldwide Governance Indicators”. <https://info.worldbank.org/governance/wgi/Home/Reports>

⁸⁹ Centre for Research on the Epidemiology of Disasters (CRED), “EM-DAT The International Disaster Database”; David Eckstein, Vera Künzel, and Laura Schäfer, “Briefing Paper: Global Climate Risk Index 2021”.

⁹⁰ Ibid.

⁹¹ The World Bank, “Rapidly Assessing the Impact of Hurricane Matthew in Haiti”, October 2017. <https://www.worldbank.org/en/results/2017/10/20/rapidly-assessing-the-impact-of-hurricane-matthew-in-haiti>

CDEMA efforts were vital to support the rehabilitation of schools and maintain food programs for students.⁹² Moreover, a multidisciplinary CARICOM contingent, including CARICOM Operational Support Team (COST) and CARICOM Disaster Relief Unit (CDRU), were deployed to Les Cayes and Jeremie—two of the most impacted areas.⁹³

Further deepening Haiti's structural challenges and the decades-long food crisis, droughts have also been devastating. Data from the United Nations Office for the Coordination of Humanitarian Affairs (OCHA) shows that, between 2015 and 2016, agricultural production fell by about 60 percent from pre-drought levels. In March 2016, the OCHA assessed that 3.5 million were food insecure, 1.5 million severely food insecure, 131,000 children with global acute malnutrition, and 600,000 farmers severely impacted by the droughts.⁹⁴ International partners such as the United States and the European Union have long provided vital relief to Haiti's most vulnerable. In February 2022, USAID, in collaboration with Catholic Relief Services,

announced a five-year program called Ayiti Pi Djanm ("a Stronger Haiti"), aimed at building resilience, increasing food security, and bolstering the nutritional status of nearly 90,000 people across Haiti's Sud and Nord-Est departments.⁹⁵ Similarly, in 2022, the EU Civil Protection and Humanitarian Aid Operations allocated €13.5 million to provide nutritional services to rural and urban areas.⁹⁶

Despite the regional and international support, persistent economic malaise and government instability have prevented Haiti from building the capacity to face the current climate crisis and solve decades-long environmental problems. According to the charitable organization Oxfam, disaster risk management plans in hurricane-vulnerable coastal zones are poorly elaborated, early warning flood mechanisms do not provide real-time data, and accessible and adequate shelters are sparse.⁹⁷ Moreover, as Haiti's 50 percent of its budget comes from international donors, funds often do not arrive in time, reducing the effectiveness of measures and amplifying the devastation of hurricanes and droughts.⁹⁸ In addition,

⁹² CDEMA, "CARICOM's Relief and Early Recovery Operations in Haiti, post Hurricane Matthew a Success", November 2016. [https://www.cdema.org/news-centre/press-releases/1640-caricom-s-relief-and-early-recovery-operations-in-haiti-post-hurricane-matthew-a-success#:~:text=Matthew%20provided%20significant%20impact%20to,%2Fh\)%20with%20higher%20gusts](https://www.cdema.org/news-centre/press-releases/1640-caricom-s-relief-and-early-recovery-operations-in-haiti-post-hurricane-matthew-a-success#:~:text=Matthew%20provided%20significant%20impact%20to,%2Fh)%20with%20higher%20gusts)

⁹³ Centre for Research on the Epidemiology of Disasters (CRED), "EM-DAT The International Disaster Database".

⁹⁴ OCHA, "Haiti: Drought Snapshot", July 2016. https://www.humanitarianresponse.info/sites/www.humanitarianresponse.info/files/documents/files/drought_snapshot_july_2016_english2.pdf

⁹⁵ USAID, "USAID Providing Additional Assistance to Strengthen Food Security in Haiti", February 2022. <https://www.usaid.gov/news->

[information/press-releases/feb-16-2022-usaid-providing-additional-assistance-strengthen-food-security-haiti](https://www.usaid.gov/news-information/press-releases/feb-16-2022-usaid-providing-additional-assistance-strengthen-food-security-haiti)

⁹⁶ European Commission – European Civil Protection and Humanitarian Aid Operations, "Haiti Factsheet". https://civil-protection-humanitarian-aid.ec.europa.eu/where/latin-america-and-caribbean/haiti_en

⁹⁷ Bhawan Singh and Marc J. Cohen, "Climate Change Resilience: The case of Haiti", Oxfam Research Reports, March 2014. <https://oxfamlibrary.openrepository.com/bitstream/handle/10546/314540/rr-climate-change-resilience-haiti-260314-en.pdf;jsessionid=8D547F7EBB83E4181082C67DCD31917C?sequence=1>

⁹⁸ Bhawan Singh and Marc J. Cohen, "Climate Change Resilience: The case of Haiti".

following the 2021 assassination of President Jovenel Moïse and the increasing gang-related violence, have prevented NGOs such as Catholic Relief Services to effectively work on the ground to aid the most vulnerable.⁹⁹

3.3. The Bahamas

The Bahamas, located in the Lucayan Archipelago with a population of 407,906 and a GNI per capita of \$26,490, stands out as one of the most prosperous CARICOM member states. Considered a high-income country by the World Bank, its government ranks among the most effective across the Caribbean region (68.27/100).¹⁰⁰ According to Global Climate Index, the Bahamas was the sixth most-affected country or territory by extreme weather events in the world and the third most in the Caribbean.¹⁰¹ The International Disaster Database (EM-DAT) shows that since 2000, the Bahamas was directly impacted by fourteen tropical cyclones, including devastating Category 5 Hurricane Frances in 2004, Matthew in 2016, and Dorian in 2019.

Among these, Hurricane Dorian represented one of the worst natural disasters in the country's history. Indeed, according to the NOAA's National Hurricane Center, Dorian

was the strongest hurricane to hit the Bahamas in modern records.¹⁰² On September 1, after becoming a Category 5 hurricane on the Saffir-Simpson Wind Scale, Dorian made landfall at Elbow Cay and slowly swept across Gran Abaco, before moving to neighboring Grand Bahama Island.¹⁰³ Government figures show that 74 people lost their lives and approximately 245 people were reported missing one year after the hurricane.¹⁰⁴ According to the Inter-American Development Bank damages and losses accounted for \$3.4 billion—over a quarter of the country's GDP.¹⁰⁵ More than half of the damages registered occurred in the housing sector and the tourism sector—with the latter representing Bahamas primary economic driver and accounting for the most losses. In addition, assessments indicate that 29,472 persons were severely impacted by the hurricane, many of whom completely lost their homes and assets.¹⁰⁶ In the immediate aftermath, a CDEMA team was deployed to Nassau to provide coordinator support and advice to Bahamian authorities. In addition, it partnered with the UN WFP to assist in relief management operations and conducted multiple assessments operations with the Pan-

⁹⁹ Dennis Sadowski, "CRS Gradually restores services in Haiti amid series of crises", Catholic Review, July 2016. <https://catholicreview.org/crs-gradually-restores-services-in-haiti-amid-series-of-crises/>

¹⁰⁰ David Eckstein, Vera Künzel, and Laura Schäfer, "Briefing Paper: Global Climate Risk Index 2021"; World Bank, "GNI per capita, Atlas method (current US\$) – Haiti, Bahamas, The, Puerto Rico, Dominica, Barbados"; World Bank, "Population, total – Haiti, Bahamas, The, Puerto Rico, Dominica, Barbados".

¹⁰¹ David Eckstein, Vera Künzel, and Laura Schäfer, "Briefing Paper: Global Climate Risk Index 2021".

¹⁰² Lixion A. Avila, Stacy R. Stewart, Robbie Berg, and Andrew B. Hagen, "Hurricane Dorian", National Hurricane Center Tropical Cyclone Report, April 2020.

https://www.nhc.noaa.gov/data/tcr/AL052019_Dorian.pdf

¹⁰³ Ibid.

¹⁰⁴ Ibid.

¹⁰⁵ IDB, "Damages and other impacts on Bahamas by Hurricane Dorian estimated at \$3.4 billion: report", November 2019.

<https://www.iadb.org/en/news/damages-and-other-impacts-bahamas-hurricane-dorian-estimated-34-billion-report>

¹⁰⁶ Ibid.

American Health Organization (PAHO), as well as UNICEF and the World Bank.¹⁰⁷

The government invested \$82.7 million in Hurricane Dorian aftermath operation programs and enacted a series of tax concessions and exonerations to foster rebuilding efforts. It also established the Bahamas National Recovery and Reconstruction Trust Fund—an “independent and non-political body” designated to provide the most vulnerable up to \$10,000 in grant money per household.¹⁰⁸ Regional financing mechanisms, multilateral institutions, as well as international development agencies also provided emergency funding to the Bahamas government. Among these, the Caribbean Catastrophe Risk Insurance Facility SPC (CCRIF) transferred \$13 million, the IDB provided a contingency loan of \$100 million as well as an emergency donation of \$200,000, and the U.S. government provided \$34 million.¹⁰⁹

Nonetheless, similar to SIDS, financing reconstruction efforts following Hurricane Dorian has represented a major obstacle for the Bahamas. According to the IMF, the government response to Hurricane Dorian and the subsequent COVID-19 response has severely compromised the country’s public financing, pushing the fiscal deficit up to

13.7 percent of GDP in the fiscal year 2020/2021 and the public debt rising to over 100 percent of the GDP.¹¹⁰

Nearly four years since Hurricane Dorian, the Bahamas is still struggling to rebuild areas of Grand Abaco and Grand Bahama Islands. Despite pledges from the private sector to mobilize \$1.5 billion in homebuilding and repair, education assistance, as well as relief aid, most donations never reached the government.¹¹¹ Moreover, many impacted properties were either uninsured or underinsured, resulting in an important obstacle for rebuilding efforts. Acknowledging that “COVID-19 pandemic came on the heels of the devastation caused by Hurricane Dorian,”¹¹² and despite having graduated from the International Bank for Reconstruction and Development (IBRD), in 2021, the World Bank Board of Executive Directors approved an emergency \$100,000 million development policy loan aimed at laying the foundations for a resilient economy recovery amidst the crises.¹¹³

Due to the magnitude of the destruction left by Hurricane Dorian, the Bahamian government decided to launch the Disaster Reconstruction Act in 2019 as well as the Resilient Recovery Policy and the Resilient Recovery Strategy and Implementation in

¹⁰⁷ CDEMA, “Major Hurricane Dorian Situation Report – September 27th, 2019”, September 2019. <https://reliefweb.int/report/bahamas/cdema-situation-report-18-major-hurricane-dorian-500pm-ast-september-27th-2019>

¹⁰⁸ International Federation of Red Cross and Red Crescent Societies, “Disaster Recovery in the Bahamas: A Legal and Policy Survey”, 2022. <https://disasterlaw.ifrc.org/media/4147>

¹⁰⁹ Ibid.

¹¹⁰ International Monetary Fund, “The Bahamas” 2022 Article IV Consultation-Press Release; Staff Report; and Statement by the Executive Director for

the Bahamas”, May 2022.

<https://www.elibrary.imf.org/view/journals/002/2022/131/article-A001-en.xml?rskey=yK1n3U&result=5>

¹¹¹ Ibid.

¹¹² World Bank, “World Bank Approves US\$100 Million for the Bahamas’ COVID-19 Response and Recovery”, May 2021.

<https://www.worldbank.org/en/news/press-release/2021/05/25/world-bank-approves-us-100-million-for-the-bahamas-covid-19-response-and-recovery>

¹¹³ Ibid.

2020. Among its objectives, these policies aimed to strengthen the country's resilience efforts and emphasize the need to prepare for recovery in the face of the current climate crisis. Moreover, in 2022, the government passed the Disaster Risk Management Act—which, according to the International Federation of Red Cross and Red Crescent Societies (IFRC), this piece of legislation represents a major overhaul and improvement to the country's disaster risk policy. Besides addressing all aspects of disaster risk management (prevention, preparedness, mitigation, and response) and including the recovery process, it establishes the Disaster Risk Management Authority (DRMA)—a new government body responsible for national wide disaster risk management operations.¹¹⁴ Acknowledging the challenges the country faced in the aftermath of Hurricane Dorian, the new Disaster Risk Management Act tasked the Ministry of Finance to develop a comprehensive Financial Management Strategy for Disaster Risk Management. In addition, it established a Disaster Emergency Fund—a financial mechanism aimed at funding disaster response, rehabilitation, and recovery, as well as developing financial protection mechanisms.¹¹⁵

3.4. **Dominica**

Dominica, also located in the Eastern Caribbean, with a GNI per capita of \$7,790 in 2021 and a population of approximately 72,742 inhabitants, is considered an upper middle-income country.¹¹⁶ In 2021, the World Bank's good governance indicators placed Dominica's government effectiveness at 49.04/100.¹¹⁷ According to the Global Climate Index, Dominica represented the eleventh most affected country by extreme weather events between 2000 to 2019, including three hurricanes and one tropical storm—Hurricane Dean in 2007, Tropical storm Orphelia in 2011, Hurricane Erika in 2015, and Hurricane Maria in 2017.¹¹⁸

Among these, the unprecedented landfall of Category 5 Hurricane Maria on September 2017 was responsible for the death of 65 persons and losses of \$1.3 billion—226 percent of the island's 2016 GDP.¹¹⁹ With damages amounting to \$354 million, nearly the entire housing infrastructure of Dominica was destroyed. Nor was the damage equitably distributed, with close to 90 percent of Dominica's Kalinago

¹¹⁴ International Federation of Red Cross and Red Crescent Societies, “Disaster Recovery in the Bahamas: A Legal and Policy Survey”; Official Gazette The Bahamas, “Disaster Risk Management Act, 2022”, December 2022.

<https://www.bahamas.gov.bs/wps/wcm/connect/f3da125f-6b52-4a40-b8da-75b6f7029f16/Exo+9+December%2C+2022.pdf?MOD=AJPERES>

¹¹⁵ Ibid.

¹¹⁶ World Bank, “GNI per capita, Atlas method (current US\$) – Haiti, Bahamas, The, Puerto Rico, Dominica, Barbados.”; World Bank, “Population,

total – Haiti, Bahamas, The, Puerto Rico, Dominica, Barbados”.

¹¹⁷ World Bank, “Worldwide Governance Indicators”.

<https://info.worldbank.org/governance/wgi/Home/Reports>

¹¹⁸ <https://public.emdat.be/>

¹¹⁹ Government of the Commonwealth of Dominica, “Post-Disaster Needs Assessment Hurricane Maria September 18, 2017”.

<https://resilientcaribbean.caricom.org/wp-content/uploads/2017/11/DOMINICA-EXECUTIVE-SUMMARY.pdf>

indigenous people losing their homes.¹²⁰ The two hardest hit economic sectors were the agriculture sector and the commerce and micro business sector—which accounted for a total of \$178 million in damages.¹²¹ In the aftermath of the hurricane critical services such as water, electricity, food supply were interrupted—leaving nearly the entire island's population without critical services and supplies.¹²² The United Nations estimated that in the aftermath the hurricane Maria, poverty in Dominica rose from 29 percent to 42.8 percent.¹²³ In the immediate aftermath of the hurricane, CDEMA facilitated the deployment of seven response teams, including an operation support team, disaster relief unit, firefighters, combined police force, as well as a medical team. Moreover, it provided nutritional services to 200 affected families and emergency relief supplies to the Kalinago people.¹²⁴

As a response to the devastation, the Dominican government, building on previous legislation and disaster preparedness plans, announced its intentions to transform Dominica into the “first disaster resilient nation.” In 2018, under the Climate Resilience Act, the government established the Climate Execution Agency of Dominica (CREAD)—a statutory government agency mandated to lead efforts to bolster resilience.¹²⁵ According to the 2021

Dominica Disaster Resilience Strategy—a state-of-the-art document elaborated by the Government of Dominica in consultation with different stakeholders including staff of the IMF and the World Bank—the efforts to transform Dominica would require working around three pillars: structural resilience, financial resilience, and post-disaster resilience. The structural pillar includes upgrading infrastructure, developing irrigation systems, ensuring the resiliency of roads, bridges, buildings, and public service infrastructure, as well as establishing early warning systems, and customizing building codes and zoning rules. The financial pillar comprises using fiscal buffers and pre-arranged fiscal instruments to manage recovery and reconstruction costs in the aftermath of a disaster. Finally, the post-disaster pillar specifies detailed action plans, emergency protocols, and community awareness. The Government of Dominica has estimated that this project would require two decades and a total amount of \$2.8 billion to transform the country into the world's first resilient nation.¹²⁶

Dominica's high public debt stood at an estimated 106 percent of the GDP in 2020 and continues to complicate its resilience-building efforts. According to Dominica's Disaster Resilience Strategy document, the support of the international community

¹²⁰ United Nations Office for the Coordination of Humanitarian Affairs, “*Dominica: Country Profile (as of June 2022)*”.

<https://reliefweb.int/report/dominica/dominica-country-profile-june-2022>

¹²¹ Government of the Commonwealth of Dominica, “*Post-Disaster Needs Assessment Hurricane Maria September 18, 2017*”.

¹²² United Nations Office for the Coordination of Humanitarian Affairs, “*Dominica: Country Profile (as of June 2022)*”.

¹²³ UN Women, “*The gender and age dimensions of hurricane in Dominica*”, December 2019.

<https://wrd.unwomen.org/node/134#:~:text=Poverty,42.8%20percent%20after%20the%20hurricane>

¹²⁴ CDEMA, “*Situation Report – Hurricane Maria 2017*”, October 2017.

<https://reliefweb.int/report/dominica/cdema-situation-report-8-hurricane-maria-october-4-2017>

¹²⁵ Commonwealth of Dominica, “*Climate Resilience Act 16*”, 2018.

<https://static1.squarespace.com/static/5cb79b0f9b8fe873d303393a/t/5d0a8432dd07c100013e7eda/1560970291289/Climate+Resilience+Act+2018+%281%29.pdf>

¹²⁶ Ibid.

remains imperative, stating that “Attaining resilience with fiscal and external sustainability crucially depends on an increase in donor grants of about \$63 million per year, three to four times above recent levels.”¹²⁷ As a result, the European Union allocated €20 million in a five-year plan (2018-2023) to provide help to the most vulnerable communities including the Kalinago people, and build resilient homes and stronger disaster shelters.¹²⁸ The U.S. is also proactively assisting Dominica through multilateral development banks such as the World Bank and the Caribbean Development Bank, as well as through USAID. In addition, under the U.S.-Caribbean Partnership to Address the Climate Crisis (PACC 2030), the U.S. government aims to help Dominica, as well as other countries in the region, to strengthen energy security, climate adaptation, and resilience measures.¹²⁹

3.5. Barbados

Barbados is the Caribbean’s easternmost island, with a population of 281,200 inhabitants and a GNI per capita of \$16,900.¹³⁰ As such, it is the most populated and prosperous country in the Eastern Caribbean. According to the World Bank’s

good governance indicators, Barbados’ people benefit from one of the most effective governments in the region (69.71/100 in 2021).¹³¹ Despite being impacted by several hurricanes, tropical storms, and droughts,¹³² the Global Climate Index indicates that between 2000 to 2019, Barbados was the least-affected country in the region by extreme weather events.

Even so, Barbados has been at the forefront of developing comprehensive legislation on climate resilience. In 2007, the government established the Department of Disaster Management to administer the National Disaster Management Program designed to create mechanisms to advance disaster management activities, including the mitigation of natural hazards, as well as the development and maintenance of effective warning, response, and recovery plans.¹³³ Moreover it also oversees the National Emergency Management System (NEM), an overarching mechanism which facilitates emergency management, including an Emergency Management Advisory Council, Emergency Operations Centre, and a series

¹²⁷ International Monetary Fund (IMF), “*Dominica: Disaster Resilience Strategy*”, August 2021. <https://www.imf.org/en/Publications/CR/Issues/2021/08/11/Dominica-Disaster-Resilience-Strategy-463663>

¹²⁸ European Commission, “*Budget support – helping Dominica get back on its feet*”. https://international-partnerships.ec.europa.eu/news-and-events/stories/budget-support-helping-dominica-get-back-its-feet_en

¹²⁹ Guy Mentel and Jackson Mihm, “*The U.S.-Caribbean Partnership to Address the Climate Crisis 2030: A Timely Initiative Worthy of Serious Investments*”, Global Americans, July 2022. [https://theglobalamericans.org/2022/07/the-u-s-caribbean-partnership-to-address-the-climate-crisis-](https://theglobalamericans.org/2022/07/the-u-s-caribbean-partnership-to-address-the-climate-crisis-2030-a-timely-initiative-worthy-of-serious-investment/)

[2030-a-timely-initiative-worthy-of-serious-investment/](https://theglobalamericans.org/2022/07/the-u-s-caribbean-partnership-to-address-the-climate-crisis-2030-a-timely-initiative-worthy-of-serious-investment/)

¹³⁰ World Bank, “*GNI per capita, Atlas method (current US\$) – Haiti, Bahamas, The, Puerto Rico, Dominica, Barbados*”; World Bank, “*Population, total – Haiti, Bahamas, The, Puerto Rico, Dominica, Barbados*”.

¹³¹ World Bank, “*Worldwide Governance Indicators*”.

¹³² Tropical storm Lili in 2002, Hurricane Ivan in 2004, Hurricane Tomas in 2010, Hurricane Irma in 2017, Hurricane Elsa in 2021, and a severe drought in 2010 that impacted all eleven provinces.

¹³³ Government of Barbados – Department of Emergency Management, “*Our Mission*”. <https://dem.gov.bb/about/mission>

of fifteen emergency committees, and thirty District emergency organizations.¹³⁴

In 2019, the department published the Barbados Comprehensive Disaster Management (CDM) Country Work Programme (CWP) 2019-2030, aimed at enhancing the country's resilience by "strengthening national systems and processes for emergency and disaster risk management."¹³⁵ Among its expected outcomes, the CDM seeks to reduce risk by building more resilient structures and improving maintenance of critical infrastructure, review and improve the national disaster management plan, as well as improve hazard monitoring, forecasting, and mapping.¹³⁶ The government of Barbados has been running a series of programs in partnership with USAID, the IDB, the Caribbean Community Climate Change Center (CCCCC), and the Green Climate Fund aimed at improving water resource management and flood resilience, assessing coastal and island-wide hazards, and enhancing the country's ability to recover from extreme weather events.¹³⁷

Despite this progress, Barbados' high public debt—125 percent of the GDP in 2020, well above the World Bank's 77 percent threshold—has severely impacted its ability

to channel the necessary resources to build resilience.¹³⁸ Indeed, according to a USAID assessment performed in 2021, Barbados financial constraints often results in the lack of effectively funding management and resilience programs.¹³⁹ As a result, amidst the current climate crisis, the current government, under Prime Minister Mia Mottley, has proactively called upon the international community to restructure the international financial architecture. Under the so-called 'Bridgetown Initiative' announced at COP27 in 2022, the government aims to revolutionize climate finance for developing countries amidst the unprecedented and interconnected set of crises SIDs face. The initiative is built around three goals: 1) Urge the International Monetary Fund (IMF) to provide liquidity to stop the debt crisis. The creation of a Debt Service Suspension Initiative, including the suspension of all multilateral loans to the poorest countries and COVID-related loans to middle-income countries, and the normalization of Natural Disaster and Pandemic Clauses in all debt instruments to absorb shocks better; 2) Expand multilateral lending to governments by \$1 trillion; and 3) Activate private sector savings for climate mitigation and fun reconstruction after a climate disaster through new multilateral mechanisms.¹⁴⁰ Taken together, these

¹³⁴ Government of Barbados – Department of Emergency Management, "Structure of National Emergency Management Systems (NEMs)". <https://dem.gov.bb/about/nems>

¹³⁵ Government of Barbados – Department of Emergency Management, "The Barbados Comprehensive Disaster Management (CDM) Country Work Programme (CWP) 2019-2023", December 2019. https://dem.gov.bb/public/downloads/BarbadosCDM-CountryWorkProgramme2019-2023final_2.pdf

¹³⁶ Ibid.

¹³⁷ USAID, "Barbados Resilience Profile", May 2021.

https://pdf.usaid.gov/pdf_docs/PA00XHZD.pdf

¹³⁸ United States Department of the Treasury, "Report to Congress on the International Monetary Fund's Loans to Barbados and Suriname", June 2022.

https://home.treasury.gov/system/files/206/2022ReporttoCongress_Barbados_Suriname.pdf

¹³⁹ USAID, "Barbados Resilience Profile".

¹⁴⁰ Ministry of Foreign Affairs and Foreign Trade of Barbados, "Urgent and Decisive Action Required for an Unprecedented Combination of Crises The 2022 Bridgetown Agenda for the Reform of the

measures aim to provide SIDS and climate-vulnerable countries the breathing room to access needed funds to survive in a warming world. Given Barbados' relatively low susceptibility to extreme weather events, the government's efforts showcase its effectiveness as a forward-thinking entity and the expansive list of challenges all climate-stressed nations must contend with, which extreme weather events further compound.

Global Financial Architecture".
<https://www.foreign.gov.bb/the-2022-barbados-agenda/>

4. RECOMMENDATIONS

With or without climate change, extreme weather events will exist and regrettably affect people in the Caribbean and worldwide. However, as global average temperatures warm, the Caribbean stands out as particularly vulnerable to the catastrophic, compounding effects of climate change in the form of extreme weather events. Contending with tropical cyclones, droughts, heat waves, and heavy rains require practical solutions which will invariably touch upon politically sensitive issues—ranging from questioning the rationale of the current international financial architecture, acknowledging the responsibility of high-emitting countries for warming temperatures, and tackling regional structural problems such as corruption and government mismanagement. These recommendations reflect the pressing need to strengthen international and regional mechanisms, as well as improve national and regional governance to bolster climate resilience.

Prevention and Planning

- Caribbean and SIDS countries must continue using their voices and votes in international forums to pressure the United States, European Union, China, and other large economies to cut greenhouse gas emissions. The Caribbean has the moral authority on this issue as, despite its small contribution to global greenhouse gas emissions, the region still stands as one of the most climate-vulnerable regions in the world.
- Promote resilience building and disaster risk reduction measures as central components in infrastructure-project planning, implementation, operation, and maintenance.
- Conduct country-specific analysis to develop gender-informed climate resilience solutions and disaster recovery activities.
- Apply a multidisciplinary approach to disaster risk governance and management that includes hard and soft sciences. Both perspectives are indispensable to a comprehensive understanding of the needs and concerns of diverse, impacted communities.
- Create robust policies and programs to plan for and address displacements as a result of extreme weather events.
- The United States, Canada, the European Union as well as other international partners, should invest in early warning mechanisms and help Caribbean countries fulfill the pledge signed in February 2023 in Bridgetown, Barbados, to cover the entire Caribbean by 2027.

Governance

- Enhance capacity building through the existing network of regional institutions such as the Caribbean Community Climate Change Center (CCCCC), the Caribbean Disaster Emergency Management Agency (CDEMA), and the Caribbean Institute for Meteorology and Hydrology (CIMH).

- Guide international cooperation subject to the needs as defined by the recipient countries, oriented to strengthen the capacities of the local and national institutions responsible for disaster risk reduction and promote the transfer of information, knowledge, and technology on voluntary and mutually agreed terms.
- Support, strengthen, and expand CDEMA's post-disaster operations. CDEMA's post-disaster early response missions have played an important role in helping member states assist the hardest hit and most vulnerable communities.
- Support and expand regional cooperation and best-practice sharing. The devastation left by Hurricane Maria in Dominica in 2017 and Hurricane Dorian in the Bahamas in 2019 have resulted in decisive measures to bolster resilience-building efforts, and other countries and territories could benefit from the lessons learned by both countries.
- Invest in mechanisms to promote good governance. Strengthening the rule of law, reducing violence, as well as improving government accountability mechanisms to tackle corruption remain vital components to improving recovery and resilience efforts.
- Ensure risk management strategies and communications are based on an understanding of citizen perceptions of risk so that they are more effective in instigating action. Encourage private and public partnerships in developing, planning, and understanding of systemic risk.
- Encourage countries and international organizations to promote cooperation, considering their central role in the implementation of the 2030 Agenda for Sustainable Development and the Sendai Framework for Disaster Risk Reduction 2015-2030. Call on the United Nations, other development partners, and multilateral agencies to continue providing and mobilizing institutional and financial support for risk analyses of the implementation, monitoring, and review of the Sendai Framework for Disaster Risk Reduction in the Americas and the Caribbean, as well as for its Regional Action Plan.

Access to Financial Mechanisms

- Ensure the new Agreement on Loss and Damage Fund includes all Caribbean SIDS regardless of country-specific income classifications.
- Review and revise the current multilateral methodology that depends mainly on measuring Gross National Income per capita as the measure of economic development and focus instead on a multidimensional vulnerability index that calculates vulnerability and resilience.
- Multilateral development banks need to expand concessional loans to upper-middle and high-income SIDS.
- Promote a regulatory environment that incentivizes the insurance sector to reduce the protection gap and increase the accessibility of risk transfer mechanisms.

- Build fiscal resilience, and invest in fiscal buffers and disaster recovery funds aimed at supporting the hardest-hit and most-vulnerable communities.
- The cycle of taking on debt to address recovery must be calibrated carefully to ensure that investment is focused on resilient infrastructure. In addition, Caribbean countries must improve debt management, diversify portfolios, and reduce exposure to external shocks. High public debt has prevented many countries from accessing key financing mechanisms needed to build robust resilience infrastructure.