

High-Level Working Group on
Climate Change in the Caribbean

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Safeguarding Caribbean Biodiversity





HIGH-LEVEL WORKING GROUP ON CLIMATE CHANGE IN THE CARIBBEAN

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EXECUTIVE SUMMARY

With abundant and rich coral reefs, seagrass beds, mangrove swamps, and tropical rainforests, the Caribbean is a critical biodiversity hotspot. However, a cascade of interconnected crises is accelerating biodiversity loss at an alarming rate. As population and economic activities have increased in recent decades, the region's biodiversity has been under significant stress. In addition, with projections showing a 2.7 degrees Celsius increase by 2100 in the global temperature—well above the 2015 Paris Agreement goal to hold the rise in temperatures by 1.5 degrees—scientists expect that climate change will likely become the main driver of biodiversity loss, posing long-lasting and irreversible changes to the ecosystem.

The situation in the Caribbean is already extremely alarming. Projections show that Caribbean coral reefs and their associated resources will essentially disappear within just a few decades. Likewise, all the other major marine ecosystems are degrading rapidly. The scientific community has already made its point clear: without drastic international, regional, and national efforts, entire ecosystems will collapse, posing a significant risk to the Caribbean region's economy, security, and bio-natural heritage. The following report finds particular vulnerabilities, challenges, and opportunities for the Caribbean. These include:

- Caribbean islands possess unique ecosystems with high levels of endemic and diverse species. Coral reefs, mangrove swamps, seagrass beds, as well as beaches are the habitat of over 12,000 marine species, including mollusks, crustaceans, and fish. Terrestrial habitats contain 12,847 native and introduced flora species—including approximately 8,000 vascular species—as well as 1,342 terrestrial vertebrates.
- The Guiana Shield remains one of the best-preserved reservoirs of biodiversity, carbon, and freshwater in the world. Considered among the greenest of countries, its forests cover more than 85 percent of Guyana's territory and more than 95 percent of Suriname's and French Guiana's territory.
- Caribbean coastal and marine ecosystems are valued at USD 54.55 billion. The Caribbean receives an estimated USD 15 billion annually from fisheries, tourism, and carbon sequestration provided by mangroves and coral reefs. The region plays an important role in mitigating global climate change. It is estimated that the Guiana Shield sequesters approximately 500 million tons of carbon dioxide per year.
- Local factors such as tourism, pollution, coastal developments, overfishing, deforestation, mining, as well as agriculture are suffocating entire marine, coastal, and terrestrial ecosystems.
- Climate change is already heavily impacting the Caribbean's biodiversity. Rising sea surface temperatures, changing rain patterns, ocean acidification, sea level rise, and

intensity of extreme weather events such as hurricanes and droughts are some of the main climate change parameters affecting biodiversity in the region.

- Marine ecosystems are among the most vulnerable to climate change. Coral bleaching is one the most notable and well-documented effects of climate change has upon marine ecosystems and poses a significant threat to Caribbean reefs. Caribbean reefs have been experiencing bleaching events for the most part of the past three decades.
- At the local, national, and regional levels, countries and territories have long integrated policies aimed towards protecting biodiversity into their national and local development and poverty reduction strategies and have established comprehensive National Biodiversity Strategies and Action Plans to implement the Convention on Biological Diversity. However, structural problems—such as governance challenges and limited financial resources—often hinder important conservation efforts.

It is imperative to acknowledge that the Caribbean stands out as particularly vulnerable to the catastrophic and compounding effects of climate change, as well as considering the pressing need to strengthen national and regional mechanisms to protect and restore biodiversity while enhancing sustained, inclusive, and sustainable economic growth. Accordingly, the following report provides a series of actionable policy recommendations.

INTRODUCTION

Complex marine, coastal, and terrestrial ecosystems make the Caribbean one of the world's premier biodiversity hotspots. Indeed, coral reefs, seagrass beds, mangrove swamps, and tropical rainforests play a crucial role in the region's cultural, economic, and ecological fabric.¹ Not only do these ecosystems protect Caribbean coastlines from storms and erosion and provide an important source of food and jobs for local communities, but they also help mitigate climate change by sequestering large amounts of carbon dioxide—thereby benefitting a much broader scope of ecosystems and countries.² Unfortunately, today in the Caribbean like in much of the world, these precious ecosystems are under immediate threat. A cascade of interconnected crises is accelerating biodiversity loss at an alarming rate.³

On the one hand, the rapid increase of economic activities, such as fishing, tourism, agriculture, and mining, is contributing to the region's environmental degradation, inflicting long-term costs. On the other hand, as human induced-climate change exacerbates, its multiple impacts—such as rising sea temperatures, changing rain patterns, ocean acidification, and sea level rise—pose an everlasting threat.

The destruction of these ecosystems bears unique social, economic, and environmental consequences for the region, including the extinction of endemic species, food insecurity, the loss of the region's intangible bio-cultural heritage, and more exposure to extreme weather events. By acknowledging that protecting biodiversity not only complements economic growth but also bolsters climate resilience, and considering the multiplicity of threats that may stem from inaction, regional governments, civil society, and private sector actors are increasingly leading important efforts to safeguard these vital ecosystems. Nonetheless, measures are slow and uneven. The prevalence of some structural problems—such as governance challenges and limited financial resources—often hinder important conservation efforts.

This report aims to provide actionable policy recommendations on how to foster conservation efforts to protect and restore biodiversity in the region while enhancing sustained, inclusive, and sustainable economic growth.⁴ The report is divided into three sections. The first section looks at the current state of biodiversity in the Caribbean, analyzing its economic and social importance in the region as well as the regional drivers of its decline, including the expansion of economic activities and climate change. The second section provides an overview of the international legislation on biodiversity with a focus on key International Environmental Agreements (IEAs) as well as an analysis of different regional and national frameworks in place to protect biodiversity. Finally, the third section identifies and discusses actionable policy recommendations.

¹ William A Gould, Jessica Castro-Prieto, and Nora L. Álvarez-Berrios, “Climate Change and Biodiversity Conservation in the Caribbean Islands”, USDA Forest Service International Institute of Tropical Forestry, 2020. https://data.fs.usda.gov/research/pubs/iitf/bc_iitf_2020_gould001.pdf

² Resilience Islands, “Valuating Benefits of mangroves and Coral Reefs in the Caribbean”, 2019. https://media.coastalresilience.org/Resilient_Islands/BenefitsOfMangrovesAndCorals_TechReport.pdf

³ World Wildlife Fund (WWF), “Living Planet Report 2022 – Building a Nature-Positive Society”, 2022. https://wwfint.awsassets.panda.org/downloads/embargo_13_10_2022_lpr_2022_full_report_single_page_1.pdf

⁴ Vinod Thomas, “The truth about climate action versus economic growth”, Brookings, 2023. <https://www.brookings.edu/articles/the-truth-about-climate-action-versus-economic-growth/>

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1. The State of Biodiversity in the Caribbean

As population and economic activities have increased in recent decades, the region's biodiversity has been under significant stress.⁵ Tourism, pollution, coastal developments, overfishing, deforestation, mining, as well as agriculture are suffocating entire coastal marine, coastal, and terrestrial ecosystems.⁶ Additionally, climate change is increasingly becoming a major driver of biodiversity loss.⁷ Without significant measures to restore and protect the environment, the current pace of biodiversity loss poses a significant risk to the Caribbean region's economy, security, and bio-natural heritage.

1.1. The Importance of Biodiversity in the Caribbean

The Caribbean islands possess unique ecosystems with high levels of endemic and diverse species due to their insularity.⁸ From the Greater and the Lesser Antilles to the Lucayan Archipelago and the Cayman Islands, coral reefs, mangrove swamps,

seagrass beds, as well as beaches habitat of over 12,000 marine species, including mollusks, crustaceans, and fish.⁹ In addition, terrestrial habitats contain 12,847 native and introduced flora species—including approximately 8,000 vascular species—as well as 1,342 terrestrial vertebrates.¹⁰

Likewise, Belize, Suriname, Guyana, and French Guiana are also gifted with highly biodiverse landscapes. Despite a territory of only 8,867 square miles, Belize maintains rich broadleaf and pine forests. The Mesoamerican Barrier Reef System (MBRS), found off the nation's coast, is the largest unbroken barrier reef in the Western Hemisphere and the world's second largest following the Great Barrier Reef of Australia.¹¹ It is estimated that 500 fish species, 60 coral species, 350 mollusk and marine mammals, algae, and seagrasses live in the MBRS.¹²

Guyana and Suriname, located in what is known as the Guiana Shield—a vast ecoregion that lies in the northern part of the Amazon—have abundant rainforest, mountain forests, and mangrove swamps.¹³

⁵ Caribbean Community (CARICOM), *"The State of Biodiversity in the Caribbean Community: A Review of the Progress Towards the Aichi Biodiversity Targets"*, 2018.

https://caricom.org/documents/16630-un_environment_the_state_of_biodiversity_in_the_caribbean_community_b5...pdf

⁶ United Nations Environmental Programme (UNEP), *"Sedimentation and Erosion"*.

<https://www.unep.org/cep/sedimentation-and-erosion>

⁷ National Oceanic and Atmospheric Administration (NOAA), *"What is coral bleaching?"*.

https://oceanservice.noaa.gov/facts/coral_bleach.html#:~:text=When%20water%20is%20too%20warm,and%20are%20subject%20to%20mortality.

⁸ Critical Ecosystems Partnership Fund, *"The Caribbean Islands Biodiversity Hotspot"*, 2019.

<https://canari.org/wp-content/uploads/2017/08/cepf-caribbean-technical-summary-2019.pdf>

⁹ William A Gould, Jessica Castro-Prieto, and Nora L. Álvarez-Berrios, *"Climate Change and Biodiversity Conservation in the Caribbean Islands"*,

¹⁰ Ibid.

¹¹ Convention on Biological Diversity, *"Belize – Biodiversity Facts"*.

<https://www.cbd.int/countries/profile/?country=bz>

¹² The Nature Conservancy, *"Mesoamerican Reef"*.
<https://www.nature.org/en-us/get-involved/how-to-help/places-we-protect/mesoamerican-reef/>

¹³ Convention on Biological Diversity, *"Suriname – Biodiversity Facts"*.

<https://www.cbd.int/countries/profile/?country=sr;>

According to the World Wildlife Fund (WWF), the Guiana Shield remains one of the best-preserved reservoirs of biodiversity, carbon, and freshwater in the world. Considered to be among the greenest countries, forest covers more than 85 percent of Guyana's territory and more than 95 percent of Suriname's territory.¹⁴ Guyana itself provides a habitat for over 8,000 native flora species, of which approximately 1,500 remain unidentified.¹⁵

From agriculture to fisheries, and tourism, nature is fundamental to the region's economy as well as to mitigate climate change.¹⁶ A 2016 World Bank study estimated that Caribbean coastal and marine ecosystems are valued USD 54.55 billion.¹⁷ In terms of revenue, according to the Resilient Islands Initiative, it is estimated that mangroves and coral reefs provide the Caribbean with USD 15 billion annually in fisheries, tourism, and carbon sequestration.¹⁸ Indeed, similar studies have shown that coral reef-related tourism alone provide the Caribbean with an estimated annual revenue of USD 7.9 billion—a figure

equivalent to more than 10 percent of the region's gross domestic product.¹⁹

In terms of carbon sequestration, the region plays an important role in mitigating climate change. It is estimated that the Guiana Shield sequesters approximately 500 million tons of carbon dioxide per year—equivalent to the carbon emissions of nearly 89 million households in one year.²⁰ Likewise, Trinidad and Tobago's Main Ridge Forest Reserve—one of the oldest tropical reserves in the world—is home to coral reefs and mangrove swamps that capture large amounts of carbon from the atmosphere. According to Trinidad and Tobago's Institute of Marine Affairs the country's mangrove forests have stored approximately 810,000 tons of carbon—equivalent to the greenhouse gasses emissions of 163,520 gasoline-powered passenger vehicles driven for one year.²¹ Studies have shown that mangrove swamps are among the most carbon-rich forest in the tropics, sequestering four times more carbon than the same amount of space in a rainforest.²²

Convention on Biological Diversity, “*Guyana – Biodiversity Facts*”.

<https://www.cbd.int/countries/profile/?country=guy>

¹⁴ Ibid.

¹⁵ Ibid.

¹⁶ Caribbean Community (CARICOM), “*The State of Biodiversity in the Caribbean Community: A Review of the Progress Towards the Aichi Biodiversity Targets*”.

¹⁷ Pawan G. Patil, et al., “*Towards a Blue Economy: A Promise for Sustainable Growth in the Caribbean*”, World Bank Group, 2016.

<https://openknowledge.worldbank.org/server/api/core/bitstreams/b09882b6-c506-55af-b11c-cc617a49fc4d/content>

¹⁸ Resilience Islands, “*Valuating Benefits of Mangroves and Coral Reefs in the Caribbean*”.

¹⁹ JetBlue and The Ocean Foundation, “*EcoEarnings: A Shore Thing*”,

https://www.jetblue.com/magnoliapublic/dam/ui-assets/p/ecearnings_report.pdf

²⁰ UN Development Programme, “*Guiana Shield Facility Mobilisation Strategy*”, 2010.

https://www.undp.org/sites/g/files/zskgke326/files/migration/gv/GSF_Resource_Mobilisation_Strategy.pdf; EPA, “*Greenhouse Gas Equivalencies Calculator*”.

<https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator#results>

²¹ Institute of Marine Affairs -Trinidad and Tobago, “*Taking time to appreciate our mangrove forests*”, 2022. <https://www.ima.gov.tt/2022/07/26/taking-time-to-appreciate-our-mangrove-forests/>; EPA, “*Greenhouse Gas Equivalencies Calculator*”.

²² Daniel C. Donato, J. Boone Kauffman, Daniel Murdiyarsa, Sofyan Kurnianto, Melanie Stidham, and Markku Kanninen, “*Mangroves among the most carbon-rich forest in the tropics*”, Nature

Country-specific studies point to similar figures. A 2007 World Resource Institute study revealed that Belize's coral reefs and mangroves-associated tourism contributed to the economy between USD 150 million and USD 190 million. Moreover, reefs and mangroves-dependent fisheries contributed an additionally USD 14 million to USD 16 million. In addition, the same study estimated that both reefs and mangroves protect coastal properties from erosion and waves, avoiding in between USD 231 million and USD 347 million annually in damage.²³

Moreover, the Caribbean's endemic species are also vital for novel drug treatment developments, including drugs for cancer, cardiovascular diseases, immunological and central nervous system disorders, and diabetes as well as bacterial, viral, and parasitic infections.²⁴ Trabectedin—an alkylating agent used as chemotherapy drug—was first isolated from a colonial tunicate found in Caribbean mangroves and seagrass blades called *Esteinascidia turbinata*. It became the first anticancer marine natural product approved for clinical use to treat soft tissue sarcoma and ovarian cancer.²⁵

Likewise, Curcuphenol, a sesquiterpene with anticancer and antimicrobial activity, was isolated for the first time from a marine sponge, located in Long Island, the Bahamas. Other marine derived natural

products to treat diseases ranging from colon adenocarcinoma, ovarian carcinoma, leukemia, lung adenocarcinoma, malaria to protzonal include Salinosporamide A, Discodermolide, Ammosamides A and B, Neopeltolide, as well as a Carmaphycins A and B, were also first isolated in the Caribbean.²⁶

Flora and fauna are also deeply rooted in the region's social fabric. For Caribbean Indigenous and Tribal Peoples, nature represents a means of livelihood and is essential element of their belief systems. The traditional knowledge they acquired over centuries through direct contact with the environment is not only fundamental for their survival, but it is also an important tool for mitigating and adapting to climate change.²⁷

For example, Jamaica's Blue and John Crow Mountains—designated a World Heritage Site by UNESCO in 2015—are not only the ancestral home of the Windward Maroon communities but also remain one of the region's most pristine rain forests. In addition to having large proportions of endemic plants and globally endangered species, the Blue and John Crow Mountains, have served as refuge for maroon communities fleeing from slavery in the eighteenth century. Today, they are a place of worship and are considered part of their intangible cultural heritage.²⁸

Geoscience, 2011.

<https://www.nature.com/articles/ngeo1123>

²³ World Resources Institute (WRI), "Belize's Coastal Capital", 2008.

<https://www.wri.org/research/belizes-coastal-capital>

²⁴ Adrian Demeritte and William M. Wuest, "A look around the West Indies: The spices of life are secondary metabolites", *Bioorganic and Medicinal Chemistry*, 2020.

<https://www.sciencedirect.com/science/article/pii/S0968089620306222?via%3Dihub>

²⁵ Ibid.

²⁶ Ibid.

²⁷ United States Fish and Wildlife Service, "Traditional Ecological Knowledge for Application by Service Scientists".

https://www.fws.gov/sites/default/files/documents/T_EK-Fact-Sheet.pdf

²⁸ Ibid.

In Dominica, the Kalinago people—the last Indigenous Peoples in the Eastern Caribbean—not only rely heavily on forests for subsistence agriculture, yet maintain a belief system is also deeply connected to nature.²⁹ The Kalinago people's traditional ecological knowledge plays a fundamental role in the Dominican government's current efforts toward becoming the first climate resilient country in the world. As illustrated by the 2022 National Forest Policy, Dominica's government is committed to investing in nature-based tourism opportunities, serving to revive Kalinago's traditional knowledge, tools, and practices in designing economic development and biodiversity protection projects.³⁰

In some parts of the Caribbean, local species have become modern symbols of national identity and an essential part of bio-cultural heritage. For example, in Barbados, the flying fish—a tropical and temperate marine species often found in coral reefs in the Atlantic, Pacific, and Indian Oceans—is not only the national dish, but it is also considered a symbol of identity and pride.³¹ The flying fish can be seen on Barbados'

currency, passports, and even as the logo of the national Tourism Authority.³²

1.2. Biodiversity Loss in the Caribbean

The WWF's 2022 Living in the Planet Index (LPI)—a measure of the state of the world's biological diversity based upon population trends of vertebrate species from terrestrial, freshwater, and marine habitats—shows that Latin America and the Caribbean experienced the largest regional decline in average population abundance (94 percent) in the world since 1970.³³

The situation in the Caribbean is extremely alarming. Data from across the region points to the same situation: Biodiversity is declining at a fast rate. According to the latest report from the Global Coral Reef Monitoring Network on the status and trends of Caribbean coral reefs “Caribbean coral reefs and their associated resources will virtually disappear within just a few decades.”³⁴ Related studies show that Caribbean mangrove forests have declined 24 percent in the past quarter-century, tropical rainforests are degrading, and seagrass bed ecosystems are collapsing.³⁵

²⁹ World Bank, “*The importance of Dominica's Indigenous Kalinago community in the protection and sustainable management of the fragile tropical rainforest ecosystems*”, 2022.

<https://www.worldbank.org/en/news/feature/2022/08/05/the-importance-of-dominica-s-indigenous-kalinago-community-in-the-protection-and-sustainable-management-of-the-fragile-t>

³⁰ Ibid.

³¹ Go Barbados, “*Island Heritage – Flying Fish*”.

<https://www.gobarbados.org/flying-fish/>

³² Janice Cumberbatch & Catrina Hinds, “*Barbadian Bio-cultural Heritage: an Analysis of the Flying Fish*”, International Journal of Intangible Heritage, 2013.

<https://www.ijih.org/volumes/article/432>

³³ World Wildlife Fund (WWF), “*Living Planet Report 2022 – Building a Nature-Positive Society*”.

³⁴ Jeremy Jackson, Mary Donovan, Katie Cramer, and Vivian Lam, “*Status and Trends of Caribbean Coral Reefs 1970-2012*”, Global Coral Reef Monitoring Network (GCRMN), 2014.

<https://portals.iucn.org/library/efiles/documents/2014-019.pdf>

³⁵ Ibid; Organization of American States (OAS), “*On the Trail of Illicit Gold Proceeds: Strengthening the Fight Against Illegal Mining Finances – Suriname*”, 2023.

<https://www.oas.org/en/sms/dtoc/docs/suriname-eng-digital.pdf>; Beth A. Polidoro, et al., “*The Loss of Species: Mangrove Extinction Risk and Geographic Areas of Global Concern*”, PLOS, 2010.

<https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0010095>

According to the WWF's 2022 Living in the Planet Report, climate change, pollution, and invasive alien species, and the overexploitation of plants and animals are major driving forces of environmental degradation. Though land and sea use change³⁶ currently remains the dominant cause of biodiversity loss, data shows that climate change is becoming the major driver.³⁷ The United Nations' Millennium Ecosystem Assessment estimates that "climate change is projected to exacerbate the loss of biodiversity; increase the risk of extinction for many species, especially those that are already at risk due to factors such as low population numbers, restricted or patchy habitats, and limited climatic ranges; change the structure and functioning of ecosystems; and adversely impact ecosystem services essential for sustainable development."³⁸

A 2018 Caribbean Community (CARICOM) report on the state of biodiversity in the region highlighted that in connection to the rapid growth of populations and economic activities, the Caribbean's main threats to its biodiversity include "increasing urbanisation, conversion of lands for tourism and commercial development, and the expansion of agriculture. Invasive species, pollution, and overexploitation of living resources."³⁹ The report also notes that "the challenges to biodiversity in the Small Island

Developing States (SIDS) and low-lying coastal countries of CARICOM continue to be exacerbated by the effects—such as ocean warming and acidification, increased severity of drought, and increased frequency and intensity of hurricanes—of climate change."⁴⁰

1.2.1. Economic Activities Associated to Biodiversity Loss

Tourism is among the main economic activities associated with biodiversity loss in the Caribbean—an economic activity considered to be the backbone of the region's economy. According to the International Monetary Fund (IMF), the role of tourism has increased steadily: While approximately 4 million people visited the Caribbean in 1970, it now receives 26 million visitors a year. On average, tourism accounts for 32 percent of the region's economy, ranging from 7 percent to 90 percent of the GDP in some countries.⁴¹ Furthermore, estimates from the Economic Commission for Latin America and the Caribbean (ECLAC) notes that tourism accounts for 35 percent of the regional employment.⁴²

Although tourism is vital for the region's development, its rapid expansion is applying harmful pressure to vital marine and coastal ecosystems. Unregulated coastal

³⁶ Land and sea use change refer to any way in which humans modify the natural landscape.

³⁷ Ibid.

³⁸ Richard Howarth and Richard J. T. Klein, "Chapter 13: Climate Change – Millennium Assessment Ecosystem", 2005. <https://www.millenniumassessment.org/documents/document.318.aspx.pdf>

³⁹ Caribbean Community (CARICOM), "The State of Biodiversity in the Caribbean Community: A Review of the Progress Towards the Aichi Biodiversity Targets".

⁴⁰ Ibid.

⁴¹ Krishna Srinivasan, Inci Ötoker, Uma Ramakrishnan, and Trevor Serge Coleridge Alleyne, "Unleashing Growth and Strengthening Resilience in the Caribbean", International Monetary Fund, 2017.

<https://www.elibrary.imf.org/display/book/9781484315194/9781484315194.xml>

⁴² ECLAC, "Recovery measures for the tourism sector in Latin America and the Caribbean present an opportunity to promote sustainability and resilience", July 2020.

https://repositorio.cepal.org/bitstream/handle/11362/45767/4/S2000440_en.pdf

development, including roads and hotels, harbors dredging for yachts and cruise liners, nutrient pollution from golf courses, and untreated sewage from hotels, cruise liners, and cesspits, are contributing to the formation of highly hazardous sediments. Sediment runoff is the most damaging pollutant on coral reefs. Whether it is suspended in the water or deposited on the reefs, sediment can contain toxicants,

pathogens, and nutrients that severely impact the coral's health.⁴³ A recent study from the University of Miami (UM) found that seafloor sediments have played a major role in the persistence of the Stony Coral Tissue Loss Disease (SCTLD) outbreak, a highly lethal coral disease first detected in the coast of Florida in 2014 and now spread across 18 Caribbean countries and territories.⁴⁴

Table 1. Tourism Dependency Index (2014-2018)⁴⁵

	Tourism Dependency Index (2018)
Aruba	84.7
Antigua and Barbuda	61.4
Bahamas	59.4
Barbados	39.4
Belize	38.4
Dominica	48.3
Dominican Republic	22.9
Grenada	42.4
Haiti	17.0
Jamaica	38.4
Saint Kitts and Nevis	38.8
Saint Lucia	56.4
Trinidad and Tobago	8.1

⁴³ Lillian J. Tuttle and Megan J. Donahue, “Effects of sediment exposure on corals: a systematic review of experimental studies”, Environmental Evidence, 2022.

<https://environmentalevidencejournal.biomedcentral.com/articles/10.1186/s13750-022-00256-0>

⁴⁴ Diana Udel, “Sediments a likely culprit in spread of deadly disease on Florida coral reefs, study finds”, University of Miami (UM) Rosenstiel School of Marine and Atmospheric Science, 2022.

<https://news.miami.edu/rosenstiel/stories/2022/01/sediments-a-likely-culprit-in-spread-of-deadly->

[disease-on-florida-coral-reefs-study-finds.html](https://www.cdhc.noaa.gov/coral-disease/characterized-diseases/stony-coral-tissue-loss-disease-sctld/);

Coral Disease and Health Consortium, “Stony Coral Tissue Loss Disease (SCTLD)”.

<https://cdhc.noaa.gov/coral-disease/characterized-diseases/stony-coral-tissue-loss-disease-sctld/>

⁴⁵ **Tourism Dependency Index** calculates a country's economy dependency on tourism. The range is from zero to 100, with 100 representing total dependence on the sector.

<https://www.iadb.org/en/news/idb-report-envisions-devastating-tourism-shocks-latin-america-and-caribbean>

Moreover, ballast water from cruise ships and cargo vessels also contributes to seawater pollution and the training of invasive alien species. Ballast water—fresh or salt water retained in the ballast tanks of a ship to provide stability and maneuverability—has resulted in the introduction of invasive species into the Caribbean.⁴⁶ A 2014 study conducted by Wageningen University documented the presence of 211 exotic alien species in the Dutch Caribbean, including 27 marine species as a result of ballast water.⁴⁷

In addition, the fishing and agricultural sectors—economic activities deeply entrenched in regional development—are also associated with biodiversity loss. On the one hand, fisheries have long played a strategic role in the Caribbean, providing a source of income and food security to highly vulnerable coastal communities.⁴⁸ Data from the Development Bank of Latin America and the Caribbean (CAF) shows that in 2019, fisheries provided stable jobs to approximated 350,000 people, leading to a

production valued of more than USD 500 million.⁴⁹ On the other hand, despite the sharp regional decline in its productivity and competitiveness, agriculture remains an important source of income and employment, encompassing between 7 and 17 percent of the regional GDP and accounting for approximately 16 percent of the regional employment.

Poor environmental regulations, lack of government capacity, and heavy reliance on these economic sectors have contributed to environmental degradation in the region. As a country largely driven by agriculture, Haiti remains the most paradigmatic cases of biodiversity loss in the Caribbean and the world. With almost half of its work force employed in the agricultural sector, it is the most dependent country on agriculture, forestry, and fisheries in the region, accounting for 20.3 percent of its GDP and is among the world's most deforested and overfished countries.⁵⁰ As a result of uncontrolled deforestation—driven by agriculture and consumption of charcoal for

⁴⁶ USDA - National Invasive Species Information Center, "Ballast Water". <https://www.invasivespeciesinfo.gov/subject/ballast-water>

⁴⁷ S.R. Smith, et al., "Key Elements Towards a Joint Invasive Alien Species Strategy for the Dutch Caribbean", Wageningen University – Institute for Marine Resources & Ecosystems Studies. <https://www.dcbd.nl/sites/default/files/documents/C020-14%20Smith%202014%20Invasive%20Species%20Strategy.pdf>

⁴⁸ Caribbean Natural Resources Institute, "Lessons learned from fisheries-related livelihoods and socio-economic initiatives in the Caribbean", 2020. https://canari.org/wp-content/uploads/2019/10/Report_Lessons-from-Carib-fisheries-livelihood-initiativesFinalJul2021.pdf

⁴⁹ Development Bank of Latin America and the Caribbean (CAF), "Blue Economy Opportunities for Revival in the Caribbean", 2021.

<https://www.caf.com/en/knowledge/views/2021/10/blue-economy-opportunities-for-revival-in-the-caribbean/#:~:text=In%202019%2C%20the%20fishi ng%20sector,more%20than%20USD%20500%20million>

⁵⁰ Nidhi Tandon and Anabella Palacios, "Strengthening Sustainable Agriculture in the Caribbean", Multilateral Investment Bank, 2014. https://caricom.org/wp-content/uploads/Strengthening_Sustainable_Agriculture_in-the-Caribbean_web.pdf; Pablo Silveri and Isabel De la Peña, "Haiti", International Fund for Agricultural Development <https://www.ifad.org/en/web/operations/w/country/haiti>

cooking, scientists expect that Haiti will lose all its primary forest.

A 2018 study conducted by Temple University, Oregon State University, the U.S. Forest Service, and Société Audubon Haiti notes that with less than 1 percent of its original primary forests, Haiti will lose all of its primary forest by late 2030s, leading to a mass extinction of its rich and unique biodiversity, including endemic amphibians and reptiles species.⁵¹ Besides impacting biodiversity, deforestation is also causing life-threatening floods and landslides, including the 2004 flood following Hurricane Jeanne, resulting in the death of 2,665 persons.⁵²

Overfishing is also contributing to the degradation of Haiti's coastal and marine ecosystems, severely impacting the livelihood and food security of vulnerable local coastal communities. According to the NGO Reef Check, Haiti's coral reefs are the world's most overfished.⁵³ Indeed, overfishing, including recreational, commercial, as well as illegal, unreported, and unregulated (IUU) fishing for both local and overseas fisheries is threatening species such as the flying fish and disrupting the feeding ecology of coral ecosystems.⁵⁴ A

2022 report published by American University found that poor regulations and sparse data collection represent a major problem for Caribbean countries. Additionally, IUU fishing is often associated to other crimes, such as smuggling and homicides.⁵⁵

Moreover, throughout the Caribbean, in addition to overfishing, the use of agricultural pesticides and fertilizers also represents a major threat to coral reefs, seagrass beds, and mangrove swamps. According to the National Oceanic and Atmospheric Administration (NOAA), significant changes in Caribbean drainage basins are attributed to agriculture among other factors such as deforestation, and grazing of feral animals, leading to increase in the volume of land-based pollution.⁵⁶

Moreover, a 2021 study conducted by Florida Atlantic University found that the increase in the use of fertilizers is contributing to the formation of toxic sargassum, a floating brown seaweed often present in the Caribbean Sea. Though sargassum itself is an important nursery habitat that helps mitigate climate change, the increase in nitrogen present in the Atlantic Basin contributes to turning

⁵¹ Blair Hedges, Warren B. Cohen, Joel Timyan, and Zhiqiang Yang, "Haiti's biodiversity threatened by nearly complete loss of primary forest", Proceedings of the National Academy of Sciences, 2018.

<https://www.pnas.org/doi/epdf/10.1073/pnas.1809753115>

⁵² Université Catholique de Louvain, "EM-DAT: The CRED/OFDA International Disaster Database", <https://public.emdat.be/data>

⁵³ Reef Check, "Haiti's Reefs Most Overfished in the World", 2011. <https://www.reefcheck.org/haitis-reefs-most-overfished-in-the-world/>

⁵⁴ Caribbean Reef Institute, "Overfishing", <https://www.uprm.edu/ccri/classroom/overfishing/>

⁵⁵ American University – Center for Latin America & Latino Studies, "IUU Fishing Crimes in Latin America and the Caribbean", 2022.

<https://insightcrime.org/wp-content/uploads/2022/09/SSRN-IUU-Fishing-Crimes-in-Latin-America-and-the-Caribbean-American-university-InSight-Crime-2022.pdf>

⁵⁶ NOAA, "How does land-based pollution threaten coral reefs?", National Ocean Service <https://oceanservice.noaa.gov/facts/coral-pollution.html>

sargassum into “harmful algal blooms with catastrophic impacts on coastal ecosystems, economies, and human health.”⁵⁷

Other economic sectors such as artisan and small-scale mining (ASM), is also contributing to biodiversity loss in the Caribbean. With gold representing 75 percent of Suriname’s total exports and approximately half of its public sector revenues, the mining sector is the leading polluter of the country’s crucial tropical forest and freshwater ecosystems. Despite ratifying the Minamata Convention on Mercury—a international legally binding mechanism to phase out the usage of mercury for extracting gold—and having imports restrictions in place, mercury is smuggled from the Guyanese border. A 2019 report from Social Solution, noted that “virtually all ASM miners use mercury to extract gold” in Suriname. It also indicated that elevated levels of mercury have been found in the hair, urine, and blood of rural fish-consuming populations, including vulnerable Indigenous communities. Although the effects of mercury on human health are not fully understood, it has been

associated to neurological and development disorders.⁵⁸

Offshore oil and gas drilling also represent a considerable threat to the region’s biodiversity. In 2013, Petrotrin—Trinidad and Tobago’s state-owned oil company—was responsible for a series of oil spills in the Gulf of Paria due to mismanagement and lack maintenance. The result was a sever environmental crisis—reports indicated that beaches and mangrove forests were significantly hit, impacting endemic spices and the local fisheries.⁵⁹

1.2.2. Climate Change and Biodiversity Loss

With projections showing an increase in the global temperature by 2.7 degrees Celsius in 2100—well above the 2015 Paris Agreement goal to hold the increase of temperatures below 1.5 degree—scientists expect that climate change will likely become the main driver of biodiversity loss, posing long-lasting and irreversible changes to the ecosystem.⁶⁰ In 2019, the landmark report from the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services already listed climate change as the third greatest threat associated

⁵⁷ B. E. Lapointe, R. A. Brewton, L. W. Herren, M. Wang, C. Hu, D. J. McGillicuddy Jr., S. Lindell, F. J. Hernandez, and P. L. Morton, “Nutrient content and stoichiometry of pelagic Sargassum reflects increasing nitrogen availability in the Atlantic Basin”, Nature Communications, 2021. <https://www.nature.com/articles/s41467-021-23135-7>

⁵⁸ Social Solution, “The political ecology of mercury within the small-scale gold sector – Suriname”, 2019. <https://www.iucn.nl/app/uploads/2021/03/regional-mercury-report-suriname.pdf>

⁵⁹ Jeremy Hance, “A series of oil spills sully Caribbean paradise, coating mangroves and wildlife”, 2014. <https://news.mongabay.com/2014/01/a-series-of-oil-spills-sully-caribbean-paradise-coating-mangroves-and-wildlife-photos/>

⁶⁰ Climate Action Tracker, “Addressing global warming”, 2022. <https://climateactiontracker.org/global/temperatures/>; 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/>

to the likely extinction within decades of around one million animal and plant species worldwide, just behind changes in land and sea use and the direct exploitation of organisms.⁶¹ While 2100 may seem like a long way off, the only change of getting climate goals back on track requires action/changes to be taken now.

According to a 2020 report from the U.S. Department of Agriculture's International Institute of Tropical Forestry climate change is already heavily impacting Caribbean's biodiversity.⁶² Rising sea surface temperatures and sea levels, changing rain patterns, acidifying oceans, and intensifying extreme weather events such as hurricanes and droughts are among the main climate change parameters affecting biodiversity in the region.⁶³

Although climate change impacts all ecosystems, marine ecosystems are among the most vulnerable to its effects. While some species in terrestrial ecosystems have a greater capacity to survive in the sudden changes of temperature by migrating to higher altitudes, species living in coral reefs, seabed grass, and mangrove forests do not have this option.⁶⁴ The Sixth Assessment Report from the Intergovernmental Panel on Climate Change (IPCC) estimates with high

confidence that “at warming levels beyond 2 degree Celsius by 2100, risks of extirpation, extinction and ecosystem collapse escalate rapidly,” adding that “impacts on ocean and coastal ecosystems will be exacerbated by increases in intensity, reoccurrence and duration of marine heatwaves [...], in some cases leading to species extinction, habitat collapse or surpassing ecological tipping points.”⁶⁵

Coral bleaching—the process in which corals, driven by changes in conditions such as temperature or nutrients expel the symbiotic algae living in their tissues, turning them completely white and leaving them subject to mortality—is among the most notable and well-documented effects climate change has on marine ecosystems and poses significant threat to Caribbean reefs.⁶⁶ Indeed, studies indicates that Caribbean reefs have been experiencing bleaching for the most part of the past three decades. In 2005, Caribbean corals experienced a massive bleaching event, affecting 50 to 95 percent of the coral colonies present in Jamaica, Dominican Republic, Barbados, Trinidad and Tobago, Cuba, Puerto Rico, the Cayman Islands, St. Maarten, Saba, St. Eustatius, Guadeloupe, Martinique, and St. Barthelemy.⁶⁷

⁶¹ United Nations, “UN Report: Nature’s Dangerous Decline ‘Unprecedented’; Species Extinction Rates ‘Accelerating’”. <https://www.un.org/sustainabledevelopment/blog/2019/05/nature-decline-unprecedented-report/#:~:text=The%20Report%20finds%20that%20around,20%25%2C%20mostly%20since%201900.>

⁶² William A Gould, Jessica Castro-Prieto, and Nora L. Álvarez-Berrios, “Climate Change and Biodiversity Conservation in the Caribbean Islands”.

⁶³ Ibid.

⁶⁴ Holly Chetan-Welsh and Lisa Hendry, “How are climate change and biodiversity loss linked?”, Natural History.

<https://www.nhm.ac.uk/discover/how-are-climate-change-and-biodiversity-loss-linked.html>

⁶⁵ IPCC, “Fact sheet – Biodiversity”, Sixth Assessment Report.

https://www.ipcc.ch/report/ar6/wg2/downloads/outreach/IPCC_AR6_WGII_FactSheet_Biodiversity.pdf

⁶⁶ Ibid.

⁶⁷ Clive Wilkinson and David Souter, “Status of Caribbean Coral Reefs after Bleaching and

Box 1. Caribbean Coral Reefs and Climate Change - Dr. David E. Guggenheim

Since 1970, the Caribbean—and much of the rest of the world—has tragically lost half its coral reefs. It is estimated that the world will lose between 70 and 90 percent of its reefs by the end of the century. Coral reefs are essential to countless marine species that depend upon them – perhaps up to 9 million different species. Humans also depend greatly upon coral reefs which represent billions of dollars to the global economy from fishing, tourism, and coastal protection. Indeed, coral reefs can absorb an astonishing 97 percent of wave energy. More than half of new cancer drug research is focused on marine life, and much of that on coral reef ecosystems.

Climate change is a significant player in the demise of coral reefs, which are being pushed beyond their thermal tolerance, resulting in the all-too-familiar images of bleached corals, a weakened state of corals that often leads to their death. Increased carbon dioxide in the atmosphere dissolves in seawater, causing ocean waters to become more acidic, threatening to dissolve organisms with a calcium carbonate shell or skeleton, including corals.

As dismal and hopeless as this may seem, there are compelling reasons to have hope. When it comes to ensuring the health of coral reefs, there are many other factors at work besides the global problems of climate change and acidification. There are *local* factors that we can control immediately. Recent studies demonstrate that local factors are as important, and perhaps *more* important than global factors, in ensuring the health of coral reefs. Despite the ravages of climate change, there are examples of remarkably healthy corals in parts of Cuba, the Bahamas, the Dominican Republic, and Brazil.

Nutrient pollution, primarily from fertilizers used for agriculture and our lawns, fuels the rampant growth of algae in the ocean, which can smother and kill coral reefs. Meanwhile, reef fish—many of which graze upon algae and keep coral reefs “clean”—are overfished, allowing algae to grow unchecked. A growing number of devastating diseases threaten coral reefs, some originating from human waste leaking from septic tanks and ships. Sedimentation from deforestation and coastal development can also be fatal to coral reefs. The good news is that we can control these factors in the short term.

Cuba has developed differently from any other in the Caribbean. Consequently, coral reefs in Cuban waters represent 10 percent of the planet’s reefs most likely to survive to the end

of the century. Owing to its unique history and robust environmental laws, Cuban agriculture is largely organic. Additionally, the country has not overfished many of its coral reefs and has established large marine protected areas. The island is an example of how, if we can manage the local factors that impact coral reefs, we can build their resilience—and hope for the future of coral reefs—in the face of formidable global threats.

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Similar studies indicate that seagrass beds as well as mangrove forests are also under threat due to climate change. On the one hand, a 2015 study from the Caribbean Coastal Marine Productivity (CARICOMP) monitoring network found that tropical storms and hurricanes, in addition to seagrass beds along the Caribbean basin, including in Barbados and Belize have collapsed.⁶⁸ On the other hand, a 2016 cross regional study assessed that high incidences of tropical storms, sea level rise, changing rain patterns, and increasing temperatures, are significantly stressing mangrove forests across the Caribbean.⁶⁹

Besides driving biodiversity loss, climate change is contributing to the disruption migratory patterns and the creation of international disputes. Indeed, linked to the rising sea surface temperatures, the changing migratory patterns of the flying fish sparked an international dispute between Barbados and Trinidad and Tobago, resulting in the intervention of the Permanent Court of Arbitration in the Hague, to resolve the conflict over fishing territories.⁷⁰

⁶⁸ Brigitta I. van Tussenbroek, et al., “Caribbean-Wide, Long-Term Study of Seagrass Beds Reveals Local Variations, Shifts in Community Structure and Occasional Collapse”, PLOS ONE, 2014. <https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0090600>

⁶⁹ Raymond D. Ward et al., “Impacts of climate change on mangrove ecosystems: a region by region overview”, Ecosystems Health and Sustainability,

2016. <https://esajournals.onlinelibrary.wiley.com/doi/10.1002/ehs2.1211#pane-pcw-references>

⁷⁰ British Sea Fishing, “The Flying Fish Dispute”, <https://britishseafishing.co.uk/the-flying-fish-dispute/#:~:text=The%20Flying%20Fish%20Dispute%20was,waters%20of%20Trinidad%20and%20Tobago.>

2. International Environmental Agreements and Regional and National Frameworks on Biodiversity

Inspired by the growing commitment to sustainable development, the Convention on Biological Diversity (CBD) is the world's most comprehensive international agreement on biodiversity. It entered into force in 1993 and has been ratified by 196 countries, including all 33 countries in Latin America and the Caribbean. Among its objectives the Convention seeks to promote “the conservation of biological diversity, the sustainable use of its components and the fair and equitable sharing of the benefits arising out of the utilization of genetic resources, including by appropriate access to genetic resources and by appropriate transfer of relevant technologies, taking into account all rights over those resources and to technologies, and by appropriate funding.”⁷¹

Two supplementary protocols, the Cartagena Protocol on Biosafety in 2000 and the Nagoya Protocol on Access and Benefit-sharing in 2014, have been added to the convention since 1993. The Cartagena Protocol seeks ensuring the safe handling,

transport, and use of living modified organisms, resulting from modern biotechnology that may have adverse effects on biodiversity and human health.⁷² The Nagoya Protocol ensures that the sharing of benefits arising from the utilization of genetic resources must be carried out in a fair and equitable manner.⁷³

In addition to the CBD and its protocols, other international agreements have focused on biodiversity issues, including the Convention on Conservation of Migratory Species (1979), the Convention on International Trade in Endangered Species of Wild Fauna and Flora (1975), the Ramsar Convention on Wetlands (1971), the World Heritage Convention (1972) and the International Plant Protection Convention (1952).

⁷¹ Convention on Biological Diversity, “Article 1. Objectives”,

<https://www.cbd.int/convention/articles/?a=cbd-01>

⁷² Cartagena Protocol on Biosafety.

https://bch.cbd.int/protocol?_gl=1*oh1o1n*_ga*MT

https://www.cbd.int/abs/Q2NTY5MzYxLjE2ODg5OTkxNDM.*_ga_7S1TPRE7F5*MTY4OTUxMjc0OS4zLjEuMTY4OTUxNjA1Ni41NC4wLjA.

⁷³ Nagoya Protocol on Access and Benefit-sharing.

<https://www.cbd.int/abs/>

Table 2. International Environmental Agreements

	Convention on Biological Diversity (1993)	Convention on Conservation of Migratory Species (1997)	Convention on International Trade in Endangered Species of Wild Fauna and Flora (1975)	Ramsar Convention on Wetlands (1971)	World Heritage Convention (1972)	International Plant Protection Convention (1952)
Antigua and Barbuda	Party (1993)	Party (2007)	Party (1997)	Party (2005)	Party (1986)	Party (2006)
Bahamas	Party (1993)	Non-Party	Party (1979)	Party (1997)	Party (2014)	Party (1997)
Barbados	Party (1994)	Non-Party	Party (1993)	Party (2006)	Party (2002)	Party (1997)
Belize	Party (1994)	Non-Party	Party (1986)	Party (1998)	Party (1990)	Party (1987)
Cuba	Party (1994)	Party (2008)	Party (1990)	Party (2001)	Party (1981)	Party (1974)
Dominica	Party (1994)	Non-Party	Party (1995)	Non-Party	Party (1995)	Party (2006)
Dominican Republic	Party (1997)	Party (2017)	Party (1987)	Party (2002)	Party (1985)	Party (1952)
Grenada	Party (1994)	Non-Party	Party (1999)	Party (2012)	Party (1998)	Party (1985)
Guyana	Party (1994)	Non-Party	Party (1977)	Non-Party	Party (1977)	Party (1970)
Haiti	Party (1996)	Non-Party	Non-Party	Non-Party	Party (1980)	Party (1970)
Jamaica	Party (1995)	Non-Party	Party (1997)	Party (1998)	Party (1983)	Party (1969)
Saint Kitts and Nevis	Party (1993)	Non-Party	Party (1994)	Non-Party	Party (1986)	Party (1990)
Saint Lucia	Party (1993)	Non-Party	Party (1983)	Party (2002)	Party (1991)	Party (2002)
Saint Vincent and the Grenadines	Party (1993)	Non-Party	Party (1989)	Non-Party	Party (2003)	Party (2001)
Suriname	Party (1996)	Non-Party	Party (1981)	Party (1985)	Party (1997)	Party (1997)
Trinidad and Tobago	Party (1996)	Party (2018)	Party (1994)	Party (1993)	Party (2005)	Party (1970)

Unlike the CBD these conventions aim to implement and establish cooperation frameworks at national, regional, and international levels to promote the protection and conservation of specific

species and ecosystems. For example, while the Ramsar Convention provides a framework for the conservation and use of wetlands and their resources, the International Plant Protection Convention

focuses on protecting the world's plant resources from the introduction of pests and on promoting safe trade.⁷⁴

Despite the significant commitment to safeguarding biodiversity, the global community has failed to meet several important targets. For instance, the world did not meet any of the crucial Aichi Targets set during the 2010 CBD summit in Nagoya, Japan by 2020, including to reduce deforestation by 50 percent, curb pollution, and protect and conserve 17 percent of all land and water inland and 10 percent of oceans.⁷⁵ Indeed, historically the lack enforcing mechanisms of international environmental agreements and the absence of a supranational institution in charge of implementing environmental regulation has left nation states with little incentives to take effective conservation efforts.

Nonetheless, the looming threat of climate change and new frameworks and international agreements such as the Kunming-Montreal Global Biodiversity Framework (GBF)—an ambitious pathway to strengthen biodiversity—announced in 2022 and the new High Seas Treaty, provide new opportunities to protect and restore marine biodiversity. In particular, the High Seas Treaty, adopted by 193 countries in June 2023, offers a viable opportunity to

protect 30 percent of the world's oceans by 2030 as well as bolster science research capacity.⁷⁶

2.1. Regional and National Frameworks

At the regional level, Caribbean countries and territories, were long able to find a common approach to deal with biodiversity loss. Indeed, the 1986 Cartagena Convention for the Protection of Marine Environment of the Wider Caribbean Region, stands out as one the most important regional and innovative mechanism to safeguard marine biodiversity.

With support from the European Union and the Caribbean Natural Resources Institute (CANARI), CARICOM released the region's first biodiversity strategy to meet the Aichi Targets and provide a long-term cooperation mechanism in 2018. Countries agreed on four goals long-term goals: 1) conserve biodiversity to protect natural heritage and assets, 2) sustainably use ecosystems goods and services for national and regional development, 3) address biodiversity threats from intra-Caribbean transboundary issues and external sources, and 4) build an enabling regional environment to manage biodiversity.⁷⁷

In 2020, the Organization of the Eastern Caribbean States (OECS), launched in

⁷⁴ Convention on Biological Diversity, "Biodiversity-related Conventions". <https://www.cbd.int/brc/>

⁷⁵ Gloria Dickie, "Explainer: Why did past targets to protect nature fail over the last decades?", Reuters, 2022. <https://www.reuters.com/business/environment/why-did-past-targets-protect-nature-fail-over-last-decade-2022-12-09/#:~:text=THE%20AICHI%20TARGETS%20SUCCEED,the%20world%20ultimately%20failed%20short.>

⁷⁶ Nature, "UN high seas treaty is a landmark—but science needs to fill the gaps", 2023.

<https://www.nature.com/articles/d41586-023-00757-z>

⁷⁷ Caribbean Natural Resources Institute, "Caribbean Community (CARICOM) strategy for the implementation of biodiversity cluster of Multilateral Environmental Agreements (MEAS)", 2018. <https://www.canari.org/wp-content/uploads/2018/11/draft-caricom-biodiversity-strategy-15.11.18.pdf>

collaboration with the CANARI, the Biodiversity and Ecosystems Framework and Strategic Action Plans (OECS-BEF). A five-year regional mechanism to address biodiversity and ecosystem issues, including protection, maintaining, and restoring ecosystems; protecting the region against invasive species; climate and disaster resilience; ensuring fair access to and sharing of benefits from biodiversity resources; as well as assessing and integrating biodiversity and ecosystems into national development processes.⁷⁸

At national level, countries and territories have long integrated policies aimed to protect biodiversity into their national and local development and poverty reduction strategies. Also to be included comprehensive national biodiversity strategies and action plans to implement the Convention on Biological Diversity as well as regional frameworks.

For instance, in 2018 the government of Saint Lucia launched its second National Biodiversity Strategy and Action Plan. Among its targets it incorporated the need to “safeguarding critical ecosystems that contribute to water and sanitation; poverty reduction, for improved social welfare.”⁷⁹ Likewise, Dominican Republic, released its first National Biodiversity Strategy and Action Plan in 2011 and included on its National Development Strategy (2010-

2030) the need to strengthen biodiversity. Moreover, countries have also established government agencies ensuring the enforcement of the CBD. In 2020, Belize’s government established the National Biodiversity Office (NBIO) in charge of coordinating the administration and management of protected areas, the conservation of biodiversity resources, and implementing the government’s policies, plans and commitments under the CBD.⁸⁰

⁷⁸ Organisation of Eastern Caribbean States, “*Biodiversity and Ecosystems Management Framework 2020-2035*”, 2020. <https://oecs.org/biospace-ilm/images/OECSBiodiversityandEcosystemsStrategy2022-1.pdf>

⁷⁹ Government of Saint Lucia, “*Revised Second National Biodiversity Strategy and Action Plan*”,

2018. <https://www.cbd.int/doc/world/lc/lc-nbsap-v2-en.pdf>

⁸⁰ Government of Belize, “*National Biodiversity Office*”. <https://sustainabledevelopment.gov.bz/national-biodiversity-office/>

3. RECOMMENDATIONS: SAFEGUARDING BIODIVERSITY IN THE CARIBBEAN

With the alarming increase in the temperature of the Caribbean Sea at a rate of 0.24 degrees Celsius per decade, increasingly frequent marine heat waves, and rising sea levels as a result of climate change in combination with local factors associated with changes in land and sea use, projections show a dire future for strategic Caribbean marine and terrestrial ecosystems.⁸¹ This cascade of interconnected crises poses an unprecedented threat to the region's environment, economy, security, and bio-cultural heritage. Protecting the environment requires a comprehensive strategy that addresses local drivers of biodiversity loss, such as pollution and exploitation caused by the expansion of economic activities in the region, as well as the global threat of climate change.

Addressing the drivers of biodiversity loss requires practical solutions which will invariably touch upon politically and economically sensitive issues. This may include questioning the region's developmental strategy and exploitation of natural resources, acknowledging the responsibility of high-emitting countries for warming temperatures, and tackling regional structural problems such as government inefficiency.

Indeed, as the destruction of natural capital increasingly threatens economic growth prospects, these recommendations reflect the idea that biodiversity protection and the transition to a carbon-neutral economy are both complementary to economic growth and a necessity. Crucial economic regional activities such as tourism, fishing, agriculture, and mining can be done sustainably, benefiting both the livelihoods of the population and the environment. Moreover, these recommendations aim at the pressing need to strengthen international and regional mechanisms, as well as to improve national and regional governance to protect and restore biodiversity.

Supporting Conservation Efforts

- Increase the number of protected areas:

Protected areas—the foundation of modern-day conservation approaches—not only facilitate the safeguarding of biodiversity and supports ecosystem services, but also help mitigate climate change. Caribbean islands have 21.7 percent and 16.1 percent of terrestrial and marine areas protected, respectively.⁸² The designation of protected areas has resulted in tangible results for the region. For instance, the 1993 establishment of the Glover's Reef

⁸¹ Keneshia Hibbert et al., “Changes to Sea Surface Temperatures and Vertical Wind Shear and Their Influence on Tropical Cyclone Activity in the Caribbean and the Main Developing Region”, MDPI, 2023.

<https://www.mdpi.com/2073-4433/14/6/999>

⁸² United States Fish and Wildlife Service, “Traditional Ecological Knowledge for Application by Service Scientists”.

Marine Reserve in Belize led to an increase in the density of conchs and lobsters.⁸³ In Dominican Republic, the Hispaniolan Hawk, one of the most endangered raptors in the world, is reportedly recovering at Los Haitises National Park—a protected area on the country's northeastern coast since 1976.⁸⁴ However, the region has still much work to do; the degree of protection varies significantly from 166 protected areas in the island of La Hispaniola, 139 correspond to the Dominican Republic, to just 27 in Haiti. Barbados has less than 5 percent of its territory designated as a protected area.⁸⁵

- Ensure the proper management and monitoring of protected areas:

Without a comprehensive strategy to manage, monitor, and ensure the health of the ecosystems within protected areas, practices such as illegal fishing and poaching remain a threat. For example, due to the poor planning and management of Bahamas' Andros West Side National Park—one of the largest protected areas in the Caribbean and home of the endangered West Indian flamingo—illegal fishing and hunting continue to be a major threat.⁸⁶

- Foster deeper engagement with civil society organizations:

Engaging with civil society to promote conservation initiatives remains vital. While governments have limited human capacity and economic resources, civil society organizations can provide not only expertise for the development and implementation of important conservation strategies but also raise public awareness of the implication of biodiversity loss and channel critical financial resources. Civil society organizations are conducting important conservation efforts across the region.⁸⁷ In Saint Vincent and the Grenadines, a grass-root effort launched a successful restoration project in 2015 after a failed attempt to build a hotel resort caused damage to Ashton Lagoon's pristine mangroves. Led by a local non-profit, Sustainable Grenadines (SusGren), and in collaboration with the Caribbean Community Climate Change Centre, the German Development Bank, the Philip Stevenson Foundation, and the Ministry of Agriculture,

⁸³ UN Environmental Programme, "Strengthening Protection for Caribbean Marine Protected Areas through SPAW". <https://www.unep.org/cep/fr/node/332?%2Fnews%2Feditorial%2Fstrengthening-protection-caribbean-marine-protected-areas-through-spaw>

⁸⁴ The Peregrine Fund, "Ridgway's Hawk". <https://peregrinefund.org/explore-raptors-species/hawks/ridgways-hawk>; Convention on Biological Diversity, "Dominican Republic – Main Details". <https://www.cbd.int/countries/profile/?country=do>

⁸⁵ Protected Planet, "Latin America and the Caribbean". <https://www.protectedplanet.net/region/SA>

⁸⁶ Biopama, "The Andros West Side National Park, Home of the National Bird of the Bahamas", 2014. <https://biopama.org/the-andros-west-side-national-park-home-of-the-national-bird-of-the-bahamas/>

⁸⁷ Caribbean Natural Resources Institute, "Consolidating the role of civil society in biodiversity conservation in the Caribbean islands". <https://canari.org/civil-society-and-governance/consolidating-the-role-of-civil-society-in-biodiversity-conservation-in-the-caribbean-islands-2/>

among others, the Ashton Lagoon Restoration Project was able to restore the lagoon and have thriving marine life again.⁸⁸

- Seek innovative financing strategies such as issuing Blue Bonds and expanding the Caribbean Biodiversity Fund:

Blue bonds should be issued with greater frequency. These are debt instruments issued by governments, development banks, and others to raise capital from impact investors to finance marine-based projects that have positive environmental and economic benefits. They are becoming an essential financial device for Caribbean countries in funding important conservation projects and refinancing their debts. For example, The Nature Conservancy (TNC), a leading U.S.-based conservation organization, has partnered with the government of Belize and Barbados under its Blue Bond Ocean Conservation strategy to refinance portions of their sovereign debt and secure long-term sustainable financing for large-scale protection of natural resources.⁸⁹ A deal reached between Belize and TNC in 2021 designated 30 percent of its waters as protected areas and spent USD 4.3 million on conservation efforts, allowing the Belizean government to refinance its debt and freeing up more than USD 200 million.⁹⁰ Other initiatives such as the Caribbean Biodiversity Fund—a regional environmental fund that uses its flexible structure to implement innovative solutions and consolidate resource mobilization in the Caribbean—offers opportunities to increase long-term conservation projects.⁹¹

Investing in the Blue Economy and in Nature-Based Solutions

- Promote sustainable tourism practices:

Given the region's dependency on tourism and the significant impact it has on biodiversity, Caribbean countries should move, in line with the United Nations World Tourism Organization (UNWTO) principles, towards optimizing the use of environmental resources, maintaining essential ecological processes, and helping to conserve natural heritage and biodiversity.⁹²

⁸⁸ Birds Caribbean, “Ashton Lagoon: A Joyful Story of Restoration and Rebirth”, 2019.

<https://www.birdscaribbean.org/2019/11/ashton-lagoon-a-joyful-story-of-restoration-and-rebirth/>

⁸⁹ The Nature Conservancy, “The Nature Conservancy Announces Its Third Global Debt Conversion in Barbados”, 2022. <https://www.nature.org/en-us/newsroom/tnc-announces-barbados-blue-bonds-debt-conversion/>

⁹⁰ Anatoly Kurmanav, “How Belize Cut Its Debt by Fighting Global Warming”, The New York Times, 2022. <https://www.nytimes.com/2022/11/07/world/americas/belize-coral-reef-preservation.html#:~:text=Under%20the%20blue%20bonds%20deal,than%20half%20a%20billion%20dollars.>

⁹¹ Caribbean Biodiversity Fund, “Conservation Finance Program”. https://caribbeanbiodiversityfund.org/wp-content/uploads/2023/02/CF-Fact-Sheet_JAN2023.pdf

⁹² United Nations World Tourism Organization (UNWTO), “Sustainable Development”. <https://www.unwto.org/sustainable-development>

- Invest in wastewater management:

Waste treatment is a major problem for the Caribbean. This includes solid waste and wastewater, which are often untreated and can help facilitate the spread of infectious diseases. The World Bank estimates that in the Caribbean, 85 percent of wastewater enters the ocean untreated and poses a risk to water usage, fishing, and coral reef health.⁹³

- Deal with marine litter:

The pollution issue also includes marine litter, of which plastic is a major offender. In the northeastern Caribbean alone, as many as 200,000 pieces of plastic have been found per square kilometer. Fourteen Caribbean countries, accounting for one-third of the region's small island states, have banned single-use plastics and Styrofoam. Governments should implement programs more broadly to encourage school presentations and beach clean-ups. The rest of the Caribbean that has not banned single-use plastics should strongly consider such action.

- Improve the health of Caribbean reefs and fisheries:

It is imperative to work toward a better collection, management, and usage of scientific data information. Governments need to adopt improved regulatory frameworks and legislation regarding ocean governance within territorial waters, especially for vulnerable ecosystems like coral reefs. For instance, the Dominican Republic has taken an active role in identifying and protecting its valuable marine ecosystem, closing 18 percent of its territorial waters to non-living and living resource extraction.⁹⁴ The implementation of digital technologies and analytical data methods is also helping fisheries better manage and balance diverse societal and environmental objectives.⁹⁵ For example, the Barbados Environmental Conservation Trust, as part of its DigiFish 2022 initiative, installed 38 vessel monitoring traps to help fisheries make informed decisions to support their management and marine spatial planning.⁹⁶

- Properly deal with Sargassum:

While Sargassum represents a major threat to the Caribbean tourism industry and the region's marine and coastal ecosystems, new companies and initiatives are exploring options to use it for energy and organic fertilizers production, bioplastic alternatives, and cosmetic and medical purposes.⁹⁷ Indeed, by enforcing the circular economy principle of

⁹³ Donna Barne and Florina Pirlea, "Caribbean beaches are littered with single-use plastics", World Bank Blogs, 2019. <https://blogs.worldbank.org/opendata/caribbean-beaches-are-littered-single-use-plastics>

⁹⁴ World Bank, "Marine protected areas (% of territorial waters)". https://data.worldbank.org/indicator/ER.MRN.PTMR.ZS?locations=GY-SR-BZ-DO-BS-AG-BB-TT-JM&name_desc=true

⁹⁵ Shelley-Ann Cox, "DigiFish: Data Driven Solutions to Inform Decision Making", Barbados Fisheries Division. <https://www.fisheries.gov.bb/digifish/>

⁹⁶ Ibid.

⁹⁷ Andres Bisono and Christopher Walker, "Sargassum: A grave Threat and Great Opportunity", Global Americans, 2022. <https://theglobalamericans.org/2022/07/sargassum-a-grave-threat-and-a-great-opportunity/>

reducing waste, Sargassum is increasingly serving as an important input for new materials and new processes.⁹⁸ In Barbados, Red Diamond Compost—a biotech business focused on research, development, and commercialization—is turning Sargassum into organic crop protection solutions meant to reduce the use of fertilizers.⁹⁹ Awganic Inputs, for example, is a Jamaican start-up that is leading the production of organic animal feed.¹⁰⁰

- Consider extending moratoriums on—or possibly even banning—deep-sea mining: Caribbean countries should consider greatly restricting or even prohibiting deep-sea mining because of its dangers to coral reefs and the deterioration of what were once pristine waters. Indeed, with potentially devastating consequences to crucial regional economic activities such as tourism and fishing, deep-sea mining poses a serious threat to highly venerable marine ecosystems.¹⁰¹

Addressing Institutional Constraints and Engaging in International Fora

- Strengthen environmental rule of law and capacity building: Environmental rule of law—a concept promoted by the United Nations Environmental Programme (UNEP)—integrates environmental needs with the essential elements of the rule of law. Indeed, according to UNEP, “without environmental rule of law and the enforcement of legal rights and obligations, environmental governance may be arbitrary, discretionary, subjective, and unpredictable.”¹⁰² In the Caribbean, the prevalence of corruption remains a significant obstacle in upholding the rule of law. According to a 2022 study from the World Justice Project on the Caribbean’s perception of corruption, almost 66 percent of the respondents believed public officials were corrupt and regularly requested bribes.¹⁰³ For instance, media reports point out that the constant smuggling of mercury into Suriname is facilitated by corrupt officers within the customs department.¹⁰⁴

⁹⁸ Gerard Alleng, “World Ocean Day: What’s up with all the Sargassum?”, IDB, 2019.

<https://blogs.iadb.org/sostenibilidad/en/world-oceans-day-whats-up-with-all-the-sargassum/>

⁹⁹ United Nations, “First Person: The Barbadian entrepreneur turning sargassum into money”, 2022.

<https://news.un.org/en/story/2022/06/1121232>

¹⁰⁰ Alison Binger Christie, “Turning trash into treasure: tackling sargassum in Jamaica”, IDB.

<https://www.iadb.org/en/improvinglives/turning-trash-treasure-tackling-sargassum-jamaica>

¹⁰¹ Sophina Marenick and David E. Guggenheim, “The Dangers of Deep-Sea Mining in the Clarion-Clipperton Zone”, Global Americans, 2023. <https://theglobalamericans.org/2023/06/the-dangers-of-deep-sea-mining-in-the-clarion-clipperton-zone/>

¹⁰² UN Environmental Programme, “Environmental Rule of Law”, <https://www.unep.org/explore-topics/environmental-rights-and-governance/what-we-do/promoting-environmental-rule-law-0>

¹⁰³ World Justice Project, “World Justice Project’s Corruption in the Caribbean Reports Shows Majority Believe Public Officials Corrupt”, 2023. <https://worldjusticeproject.org/news/world-justice-project-s-corruption-caribbean-report-shows-majority-believe-public-officials-0>

¹⁰⁴ Social Solution, “The political ecology of mercury within the small-scale gold sector – Suriname”.

- Deepen international engagement:

Caribbean and SIDS countries must continue to use their voices and votes in international forums to pressure the United States, European Union, China, India, and other large economies to cut greenhouse gas emissions. The Caribbean maintains 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. While Caribbean countries can control the local factors driving biodiversity loss in the region, the area cannot directly tackle the overarching impacts of climate change on its ecosystems.