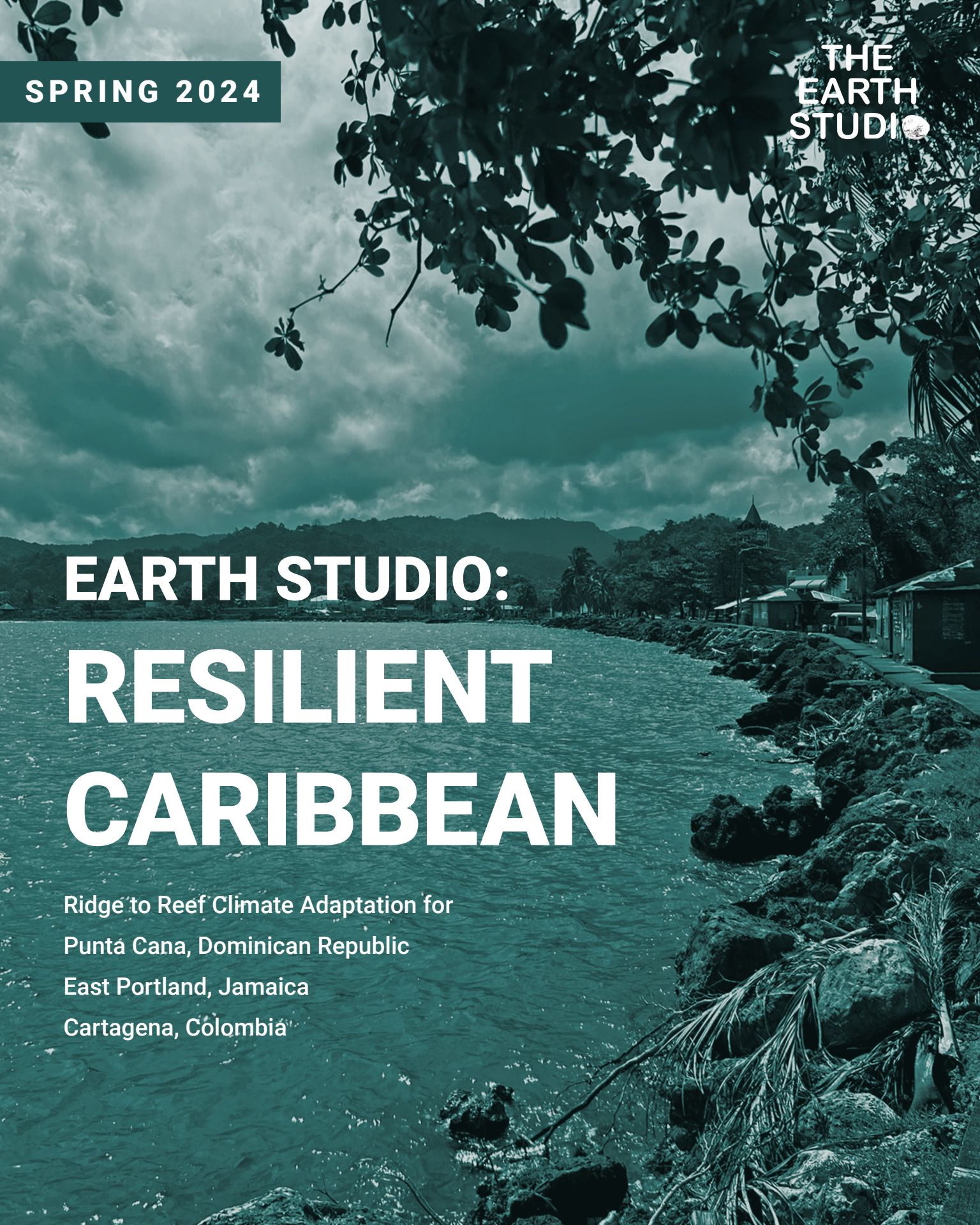

SPRING 2024

THE EARTH STUDIO

EARTH STUDIO:

RESILIENT CARIBBEAN

Ridge to Reef Climate Adaptation for

Punta Cana, Dominican Republic

East Portland, Jamaica

Cartagena, Colombia

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URBAN DESIGN STUDIO X CLIMATE AND SOCIETY PRACTICUM

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All drawings and photographs were created by contributing students and faculty, unless otherwise credited.

Production Editors:
Kate Orff
Thad Pawlowski,
Johanna Lovecchio
Adriana Chavez

Designer: Sara Susan Paul

Copy editor: Rebecca Fowler

ISBN:

CONTRIBUTORS

MS Architecture and Urban Design
Columbia Graduate School
of Architecture, Planning and
Preservation

COLUMBIA GSAPP URBAN DESIGN

Center for Resilient Cities and Landscapes
Columbia University

COLUMBIA CRCL

MA in Climate and Society
Columbia Climate School

COLUMBIA CLIMATE SCHOOL
MA in Climate and Society

RESILIENT CARIBBEAN STORYMAP

"The Caribbean is ground zero for the global climate emergency... We need to gather around bold solutions."

—António Gutterres, United Nations Secretary General

"Vision without action is merely a dream. Action without vision is merely passing time. But vision with action can change the world."

—Nelson Mandela

"We need a better coordinated approach…"

—Mia Mottley, Prime Minister of Barbados and Lead Head of Government within Caribbean Community (CARICOM)

"We were the ones whose blood, sweat, and tears financed the industrial revolution…are we now to face double jeopardy by having to pay the cost as a result of those greenhouse gases from the industrial revolution? That is fundamentally unfair."

—Mia Mottley, Prime Minister of Barbados and Lead Head of Government within Caribbean Community (CARICOM)

INTRODUCTION

EARTH STUDIO OBJECTIVE

This studio explored future regenerative urban design and policy scenarios for Caribbean coastal communities that weaves together social, ecological and government imperatives in East Portland, Cartagena, and Punta Cana.

We asked: What does resilience mean on a hotter and globalized context where those most vulnerable to earth systems collapse are the least to blame? How can we approach the concept of resilience critically and in light of centuries of extraction, but also offer bold ideas for the future? How does the right to housing and the prerogative to invest in next century urban infrastructure intersect with the need to rebuild ecosystems, fisheries, forests? How has a legacy of colonization and extraction led to climate risk? What is the role of urban design and policy to catalyze resilient pathways forward in short term and long-term scenarios 2100?

LETTER FROM THE COORDINATORS

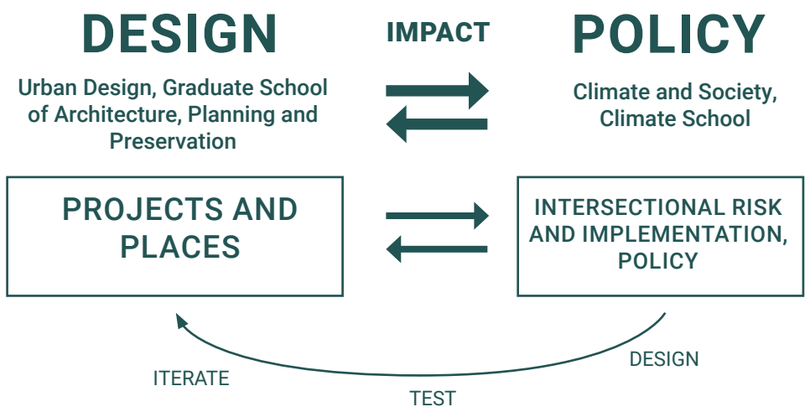
Kate Orff, Director M.S. Architecture and Urban Design, Columbia GSAPP and Faculty of Climate, Columbia Climate School
Johanna Lovecchio, Director of Impact Programs, Columbia Climate School and Adjunct Faculty of Climate

EARTH STUDIO- A PEDAGOGICAL APPROACH TO ACTION

Uniting the disciplines of urban design and climate science can powerfully support and harmonize the living planet's massive critical ecosystems with people and power. With an increasing proportion of the world's population living in cities, and the pressure of urbanization impacting urban and non-urban places alike, the built environment is central to both emission reductions and adaptation. These challenges demand new and intersectional pedagogies to train the next generation of designers, policymakers, and change-agents while also meaningfully supporting municipal, civil-society, academic, and community-based partners on the ground.

Earth Studio is an inter-school and application-based course taught jointly between GSAPP MS AUD and Climate School Masters of Climate and Society. Over the Spring semester, the cohort of urban design students and climate school students work together to create urban design and spatial analysis and visions for an adapted and new energy future that respond to local challenges and planning efforts. Students accepted into the program travel to global cities each spring, and working in collaboration with local governments, community organizations, and local academic partners, explore the entanglements of urbanization, design decisions in the built environment, climate policy, and social justice at global and local scales.

Students practice workshop and facilitation skills in community planning workshops on the ground and produce a comprehensive publication of policy, programmatic, finance, and design solutions that represents their research and responds to local needs. Throughout the semester, students work alongside local academic partners, community organizations and others and participate in design critiques, guest lecture series and present their work in global fora. The course is anchored in multidisciplinary, international, and multiscalar learning, partnership, and activism as a Columbia Climate School community.



RESILIENT CARIBBEAN

Caribbean leaders like Mia Mottley are voicing major concerns on the global stage and can help redefine the priorities and approaches to the global climate crisis and notions of adaptation. And with failures to set international policy to significantly curb greenhouse gas emissions, and global landscapes in varying states of collapse, it is clear that urban design strategies need to scale to the living planet's massive critical landscapes and the cities that are sustained by them. Political systems are similarly strained, with Caribbean islands facing more extreme Atlantic hurricanes and climate-induced migration. The Caribbean Sea boasts a rich mosaic of mangroves, coral reefs, beaches, lagoons, coastal wetlands, mountain streams and is an intensively productive ecosystem that has sustained human settlements over deep time. It is home to 10% of the world's remaining coral reefs and home to over 1,000 species of fish that people depend upon for food and tourism. Water quality and temperature changes in the Caribbean threaten tourism, fisheries, and livelihoods across the region.

Throughout the course, we explored positive, regenerative "ridge to roof to reef" visions for sites, integrating ecological imperatives and the built, economic, and social environments. This involved encounters with a reimagination of urban/ riverine and coastal development practices, and foregrounding the notion of a blue decarbonized economy, our collaborations will also aim to expand the concept of working landscapes and emergent urban ecology that advances decarbonization of the Global North, and financial reparations and regenerative urban design for countries of the Caribbean.

We asked: How might ecological restoration, climate adaptation and mitigation, livelihoods, and culture combine across different sites and scales and in the context of the pressures of urbanization.

While the class explored broad investigations of the Caribbean and cities, we also zoomed into three specific sites - the Dominican Republic, Jamaica, and Cartagena - to explore the drivers of vulnerability expressed in the built environment. The sites share many challenges, but the specific research and project frames have been developed in collaboration and consultation with local partners.

TOWARDS PRACTICING A PROCESS

This applied course is conceived of as one larger initiative, one that imagines next century urbanism that co-exists with ecosystem revitalization and justice. Our class worked with colleagues to whom we owe our gratitude. Each was invaluable and generous with their time, knowledge, and insight and helped us to pull the classroom and the walls outside the University a step closer together. As colleagues and peers, we explored the successes and failings of case studies globally, workshopped and tested policies and practices to support implementation, and activated a set of design scenarios and policy principles that test a climate just future in Punta Cana, East Portland, and Cartagena.

Columbia University and our class does not exist outside of or independent from the systems of power that perpetuate climate change and its risks. So, along the way we inquired into our own roles and identities as it relates to the work of climate justice and engagement with impacted communities.

And while these may never disentangle fully in our lifetimes, we practiced the process and ethic of multidisciplinary, international, and multiscalar learning, partnership, and activism as a Columbia and Climate School community and future collaborators. We entrust our recommendations and learnings to the administration, faculty, and future students as we urgently work together to create a non-extractive and connected community of learning and partnership. The Caribbean is a major voice on the global stage and can help redefine the priorities and approaches to the global climate crisis and notions of adaptation.

Earth Studio is an offering of partnership and allyship.

BLUE LAGOON
PHOTO CREDITS: JOHANNA LOVECCHIO

FOREWORD FROM THE CLIMATE SCHOOL STUDENTS

The Columbia Climate School student cohort is a diverse group of scientists, artists, writers, journalists, designers, and more! Our community is filled with a wide range of interdisciplinary, cross-cultural, and intergenerational points of view—all of which inform a truly unique approach to participation, collaboration, and climate justice.

There are few better examples of climate justice than the Caribbean, where most of the planet's biodiversity is located and where climate impacts are felt the hardest. As Climate School students, we acknowledge the impact of the Caribbean: it provides one of the biggest forest areas and generates oxygen. We want to give back to the Caribbean by doing research. The world is better and safer with a strong, resilient, and prosperous Caribbean region.

Like New York City and the Caribbean, with their melting pots of culture and ethnicities, the Climate School brings a diversity of backgrounds, experiences, and perspectives that makes our work on climate action even more impactful. We're all connected in the same way water and air travel; our diversity of strengths, weaknesses, and vulnerabilities transcends boundaries as we work together and share the commons of the earth.

Many of us are from the Caribbean or islands and share experiences and knowledge that challenge our understanding of issues in the region towards meaningful solutions.

We bring the spirit of New York City to our interactions with each other and our stakeholders to share perspectives and life's learnings. We are honored to share what we learned together in an offering of hope and imagination.

EAST PORTLAND WORKSHOP
PHOTO CREDITS: JOHANNA LOVECCHIO

GUIDE TO THIS BOOK

This document is more than a synthesis of student work. It represents the ideas of many individuals and offers a template for action and practice. Here are some examples of how others might take these learnings forward:

- **Local community partners and policymakers** in the Caribbean who are advancing resilience, adaptation, and mitigation policy and design on the ground. This document is a synthesis and interpretation of much of what we heard from them.
- **Faculty and students in any university** looking for a template for applied, partnered, immersive, interdisciplinary, and impactful coursework.
- **The next cohort of Urban Design and Climate School students** who seek to deepen research and application themes.
- **The Climate School and Columbia University** as each looks to practice climate justice learning and outcome-driven education and research.
- **Non-governmental organizations (NGOs), the private sector, and civil society communities** seeking case studies, policy ideas, and amplification opportunities for local partners and the next generation of leaders.

BLUE LAGOON PHOTO CREDITS: YICHEN XU

Why Climate?

Social, cultural, and environmental collapse: The Caribbean is particularly vulnerable to the effects of climate change (e.g., sea level rise, flooding, freshwater scarcity, increased frequency and intensity of extreme weather events, and heat waves) while having little responsibility for it. The consequences are dire for all living things and impact livelihoods and people's ability to live in their environment.

Why Now?

Scientific data and natural phenomena show that the Earth is reaching ecological thresholds for sustaining life. Our positionality as climate students at an Ivy League school and access to resources enable us to creatively problem-solve and seek solutions to climate change.

Responding to Societal and Justice Imperatives

We want to stress the right of every human being to proper housing, access to water, a fair share of the commons, and a decent wage.[1] We also aim to utilize new opportunities in the funding climate, focusing on the social justice area with the update of the Loss and Damage Fund in COP28.[2]

We acknowledge and study the new Colombian government's ambitious climate and environmental justice agenda, which promises to end the destructive model of resource extraction that's driving climate devastation and build a new relationship with nature. Colombian President Gustavo Petro has vowed to end fossil-fuel dependence—gradually but definitively—starting with a ban on fracking, offshore drilling, and coal mining and prohibiting new exploration licenses for oil projects.

As Climate School students, it is our imperative to facilitate the transition to a just future for everyone on earth. We acknowledge society's misplaced benefits and vow to apply our understanding and learnings toward creating an equitable future.[3]

PRINCIPLES FOR CLIMATE AND JUSTICE

Climate is Dynamic

Empirical science and analysis is just one of the important tools in our conservation strategies. We welcome and need a variety of place-based and local knowledge systems. We consider multiple time scales and perspectives—historical and future.

Pauses before Choices are Wise

Pausing enables you to think through options and their implications, allowing you to tackle bigger decisions more easily. It does not undermine the urgency of the challenge.

Joy is a form of Resistance and Resilience

Joy enhances engagement, stimulates new thinking and creativity, and increases human connection, trust, and emotion. Creating joyful climate capacity and resilient approaches can disrupt conventional thinking patterns and invite new and innovative solutions.

The Effect of People Mobilizing is Policy Pressure

When people are mobilized, connected, and in community, and when the lines between people and the environment are blurred, people and policy can reflect both.

Nature is Regenerative

Nature is one of the Caribbean region's main forces and unique assets. It is the source of life and all livelihoods.

Islands are Mountaintops

A more holistic understanding of our shared world and geography can better aid us in our mitigation and adaptive strategies.

The sites of Trauma are also the sites of Healing

A country's vulnerabilities to climate change are rooted in a long legacy that includes violence and harm. While not all people share this experience, the capacity for empathy helps us alchemize hurt into healing in ways small and big. United during climate negotiations, Caribbean countries can advocate for meaningful change in this context. They represent frontline communities, the most impacted, where solutions are most impactful.

Complete Solutions require Spiritual and Emotional Dimensions

Unified and ethical approaches are essential in navigating a problem that is not only ecologically sensitive, but culturally sensitive. Authentic change will not happen unless respect for spiritual beliefs is at the forefront of the conversation.

Time is Layered, not Linear

Sometimes, progress can feel like taking 10 steps back and a few steps forward. Climate and projections of change also operate on multiple time frames and scales. We acknowledge that time is a layered, multidimensional, self-reflective, and non-linear reality. Accepting and respecting that some priorities and needs will shift over time builds adaptive capacity.

Catastrophe is not Inevitable

Climate disasters are now inevitable, but their disparate impacts and our disparate responses are not. Although climate change is a generation-defining issue, the real disasters are social inequalities, apathy, and lack of political will. These are not inevitable but require a tremendous paradigm shift to achieve meaningful change.

CARIBBEAN ATLAS

CARIBBEAN SEA AT NIGHT
MAP CREDITS: NASA SATELLITE IMAGE

EAST PORTLAND

PUNTA CANA

CARTAGENA

This section is focused on creating a spatial atlas for the Caribbean, integrating historical, ecological, social, and governance information. The goal was to synthesize a variety of readings, reports, and research data to develop a comprehensive visual library of base maps, diagrams, and other spatial information. The atlas covered past and present aspects of the Caribbean region, focusing on three study areas: Punta Cana, East Portland, and Cartagena.

In teams, students researched larger trends, issues, and opportunities within the Caribbean by exploring diverse topics through spatial data and archival research. They produced maps at two key scales: the broader Caribbean and a more detailed site scale for the study areas. This work aimed to foster a deeper understanding of the region's cultural, social, and economic dynamics, as well as its natural processes. The maps supported future projects, reviews, and presentations throughout the semester, with an emphasis on ecological and urban transformations.

Each team also contributed additional readings to further inform the discussion of conceptual directions and case studies relevant to the region. This preliminary research initiated a dialogue between the three study areas, exploring potential future urbanism and development in these locations.

CARIBBEAN GEOLOGY

Bathymmetry

0FT. 25000FT.

Subduction

Convergent

Transform

North- American plate

North- American plate

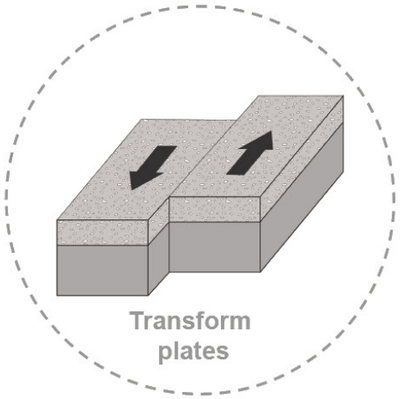
Caribbean plate

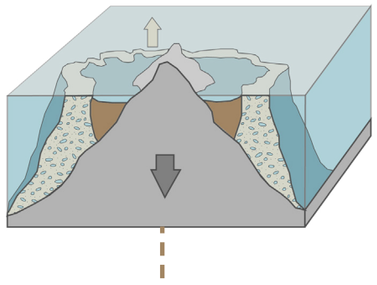
South- American plate

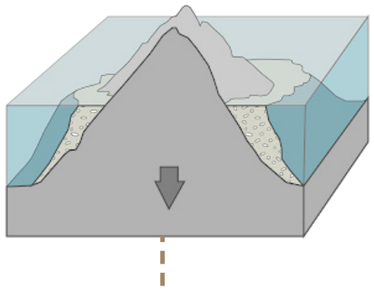
Cocos plate

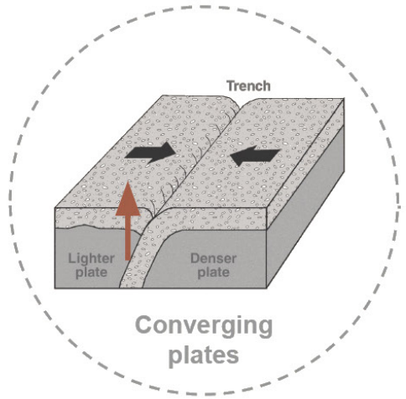
CARIBBEAN GEOLOGY

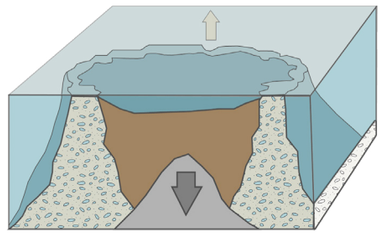
The Caribbean islands were formed through the interaction of three major tectonic plates: the North American, Caribbean, and South American plates. These interactions caused volcanic activity, which shaped the region's landforms. The Caribbean spans from the depths of the Cayman Trough to the Northern Andes. Coral reefs have developed as a result of the geology, on limestone deposits along the coasts, creating a vibrant and thriving ecosystem.

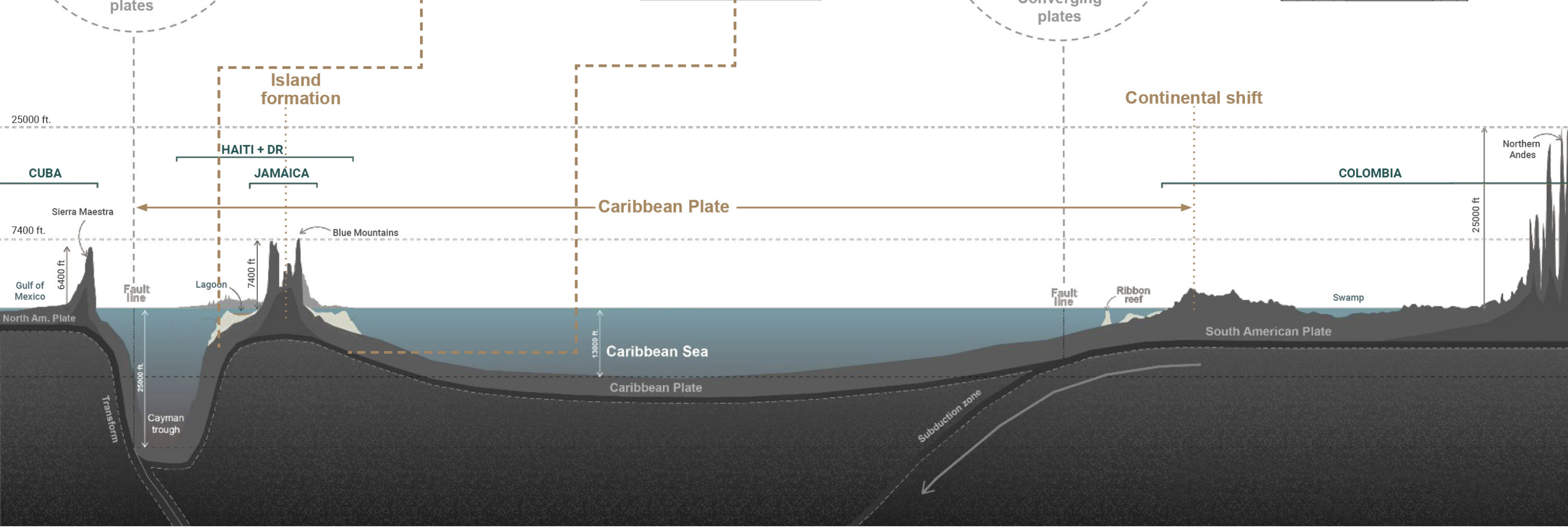




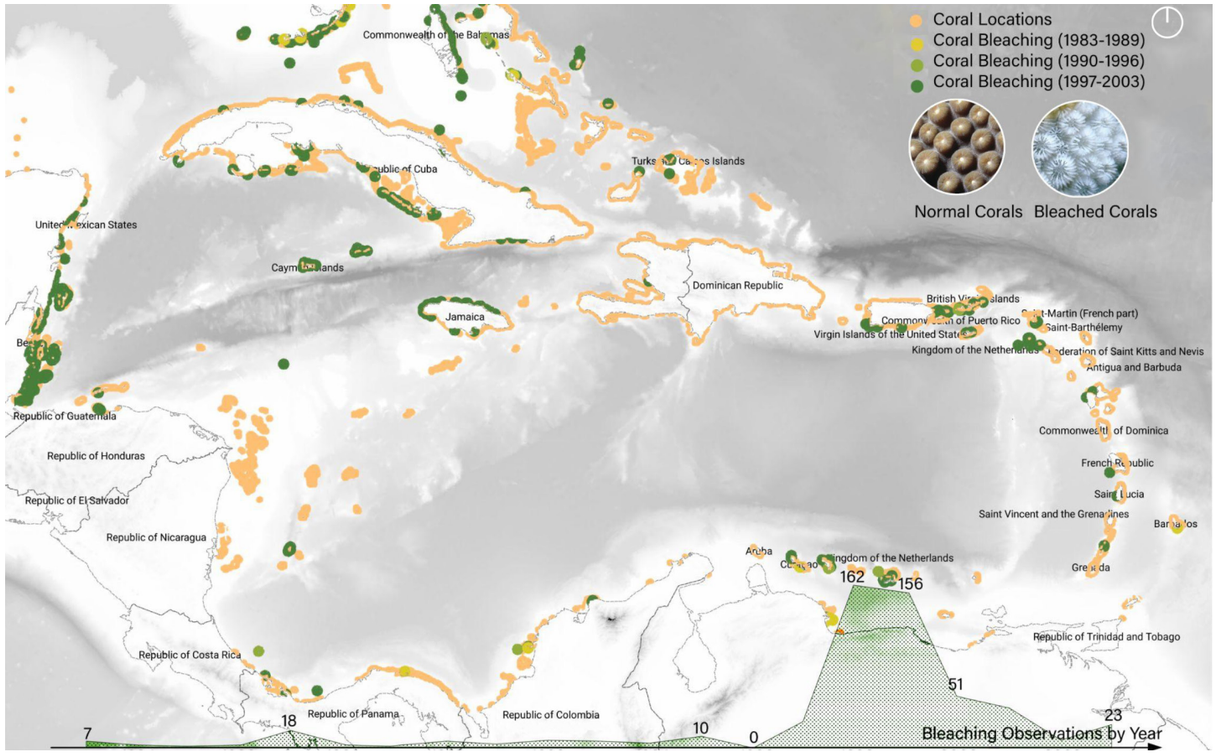




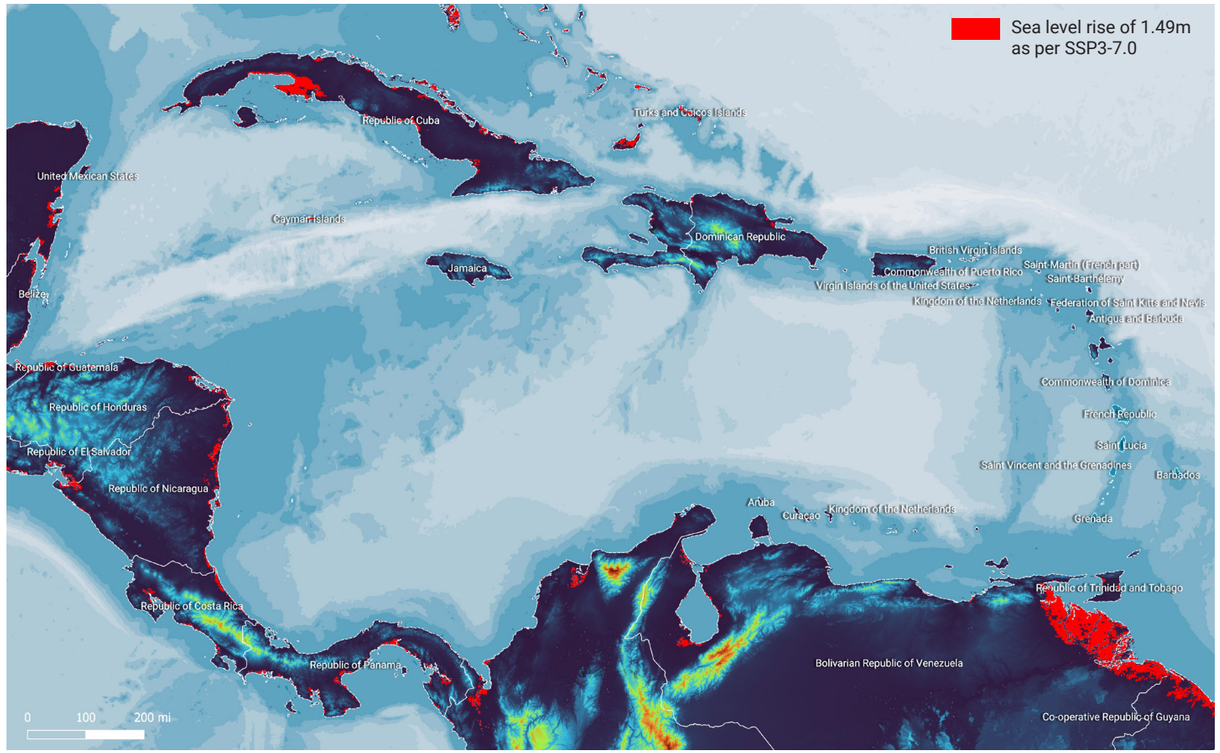




CARIBBEAN REEFS



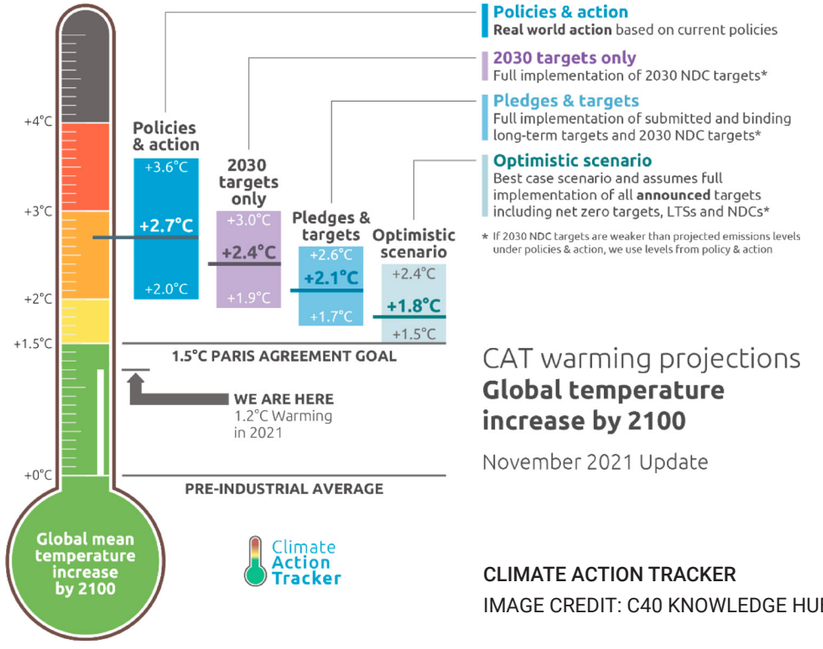
CLIMATE DYNAMICS



CLIMATE RISK IN THE CARIBBEAN

EXTREME HEAT | SEA LEVEL RISE | HURRICANES | FLOODING | CORAL BLEACHING

The Caribbean faces severe climate risks, including extreme heat, rising sea levels, hurricanes, flooding, and coral reef bleaching, threatening ecosystems and livelihoods. Islands with vital ecosystems, such as coral reefs and mangroves, are vulnerable to rising temperatures, stronger storms, and declining water quality. These impacts harm communities and industries like tourism and fisheries, while climate-induced migration increases as global carbon emissions persist. Leaders like Barbados President Mia Mottley advocate for reparations for loss and damage. At COP28, the Inter-American Development Bank launched the “One Caribbean” initiative to enhance regional resilience through financial innovation.



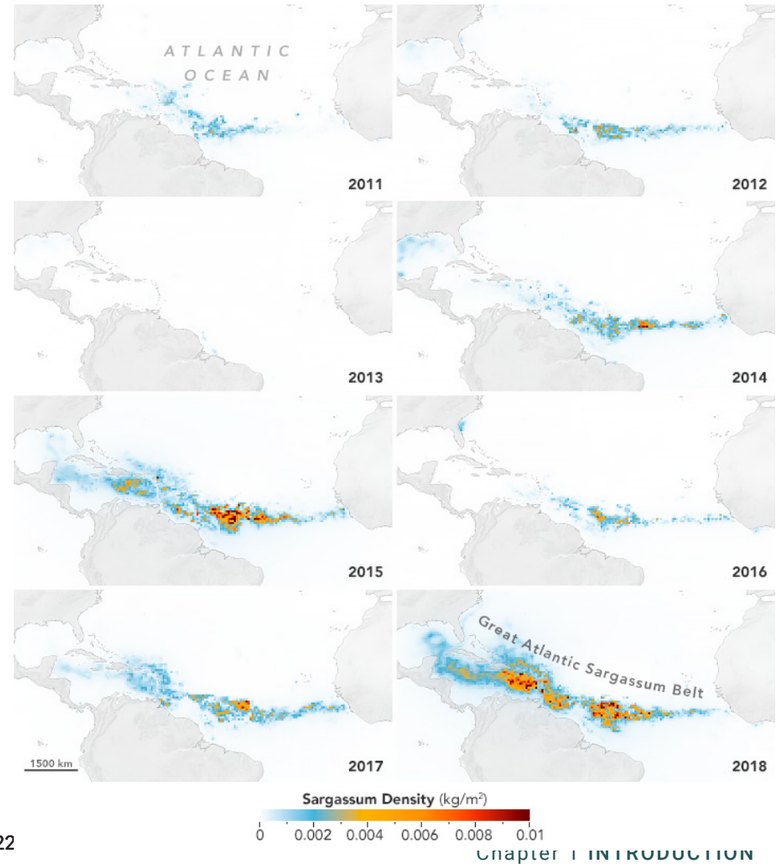
Under the SSP3-7.0 scenario, scientists expect global emissions to double by the end of the 21st century, in line with current climate policies. This scenario would lead to a temperature increase of about 3.6°C (6.5°F) above pre-industrial levels by 2100 and a sea level rise of 0.49 meters (49 cm). These changes would significantly impact ecosystems, weather patterns, and human communities worldwide.

CLIMATE ACTION TRACKER

IMAGE CREDIT: C40 KNOWLEDGE HUB

SARGASSUM

Sargassum, a type of floating seaweed, mainly originates in the Sargasso Sea in the Atlantic Ocean. It is carried by ocean currents to the Caribbean, where it can accumulate on shores. Rising sea temperatures and nutrient pollution contribute to its increased presence, impacting ecosystems, tourism, and coastal communities.



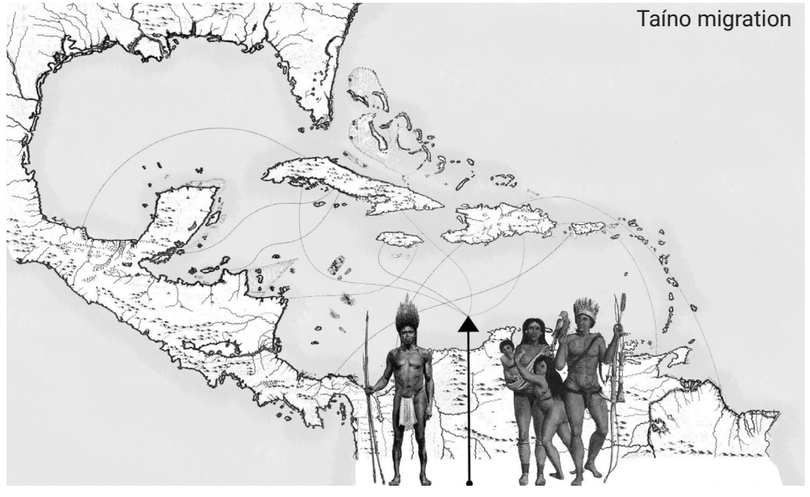
SARGASSUM DENSITY MAP
Map Credit: NASA Earth Observatory

TAÍNO CULTURE

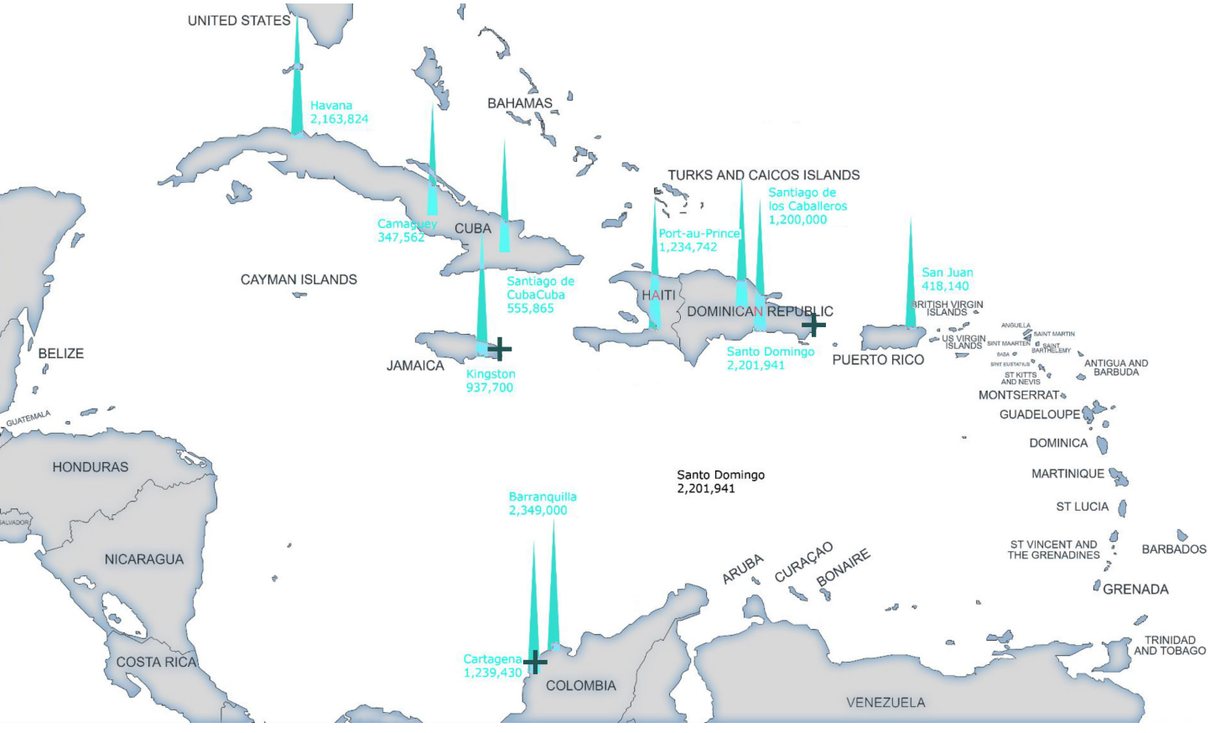
The Taíno people originated in northeastern South America in areas now part of modern-day Venezuela and migrated northward to the Caribbean. They were part of the Arawakan language family and became the dominant indigenous group in the region. The Taíno lived in villages and were skilled in farming, growing crops like cassava, maize, and sweet potatoes. They also excelled in pottery, weaving, and crafting tools from wood, shells, and stone.

Despite the devastating impact of European colonization, which led to a significant loss of life and culture, many aspects of Taíno heritage have endured. Elements of their language remain in the Caribbean vocabulary, with many words of Taíno origin still used today. Additionally, certain traditions, foods, and spiritual practices continue to reflect their influence, preserving the cultural legacy of the Taíno people in modern Caribbean societies.

Images:
Zemí Cohoba Stand. Photo Credit: The Metropolitan Museum of Art
Steel engraving of Christoper Columbus landing on the Bahamas in 1492. Photo Credit: Getty Images

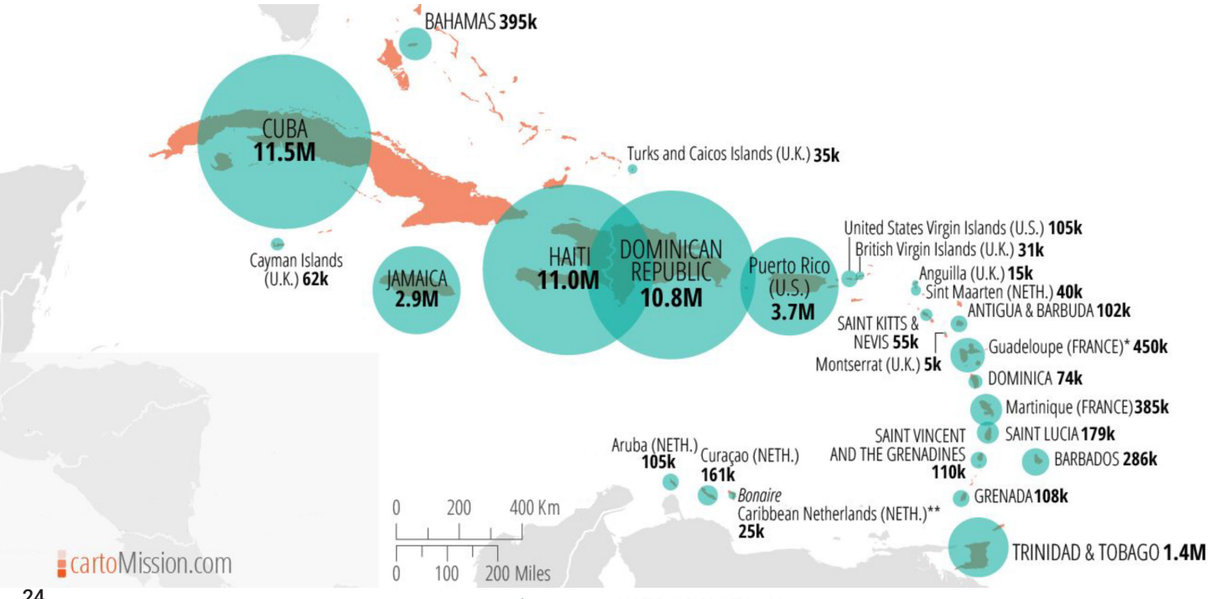


POPULATION CHANGE

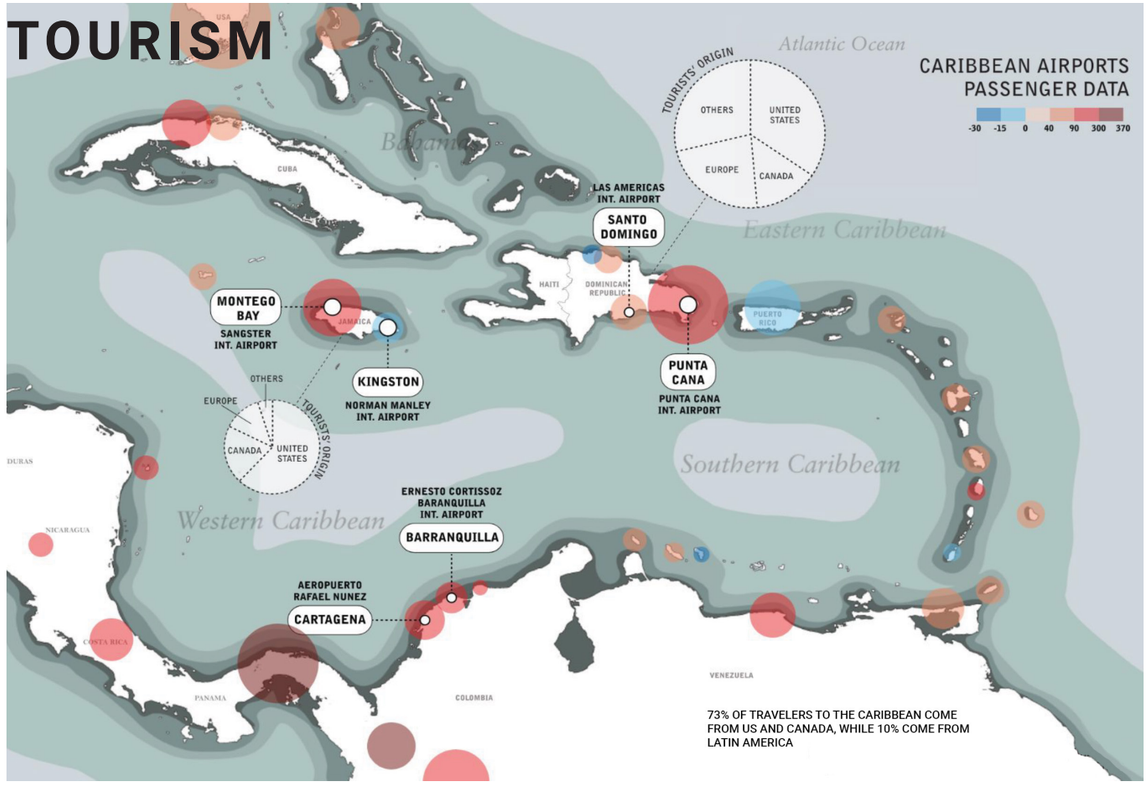


The Caribbean comprises 26 countries and territories, with a combined population of approximately 44 million. The map below, prepared using data from the United Nations, illustrates population distribution across the region, using circle sizes to represent the population concentration in each country or territory.

POPULATION CONCENTRATION

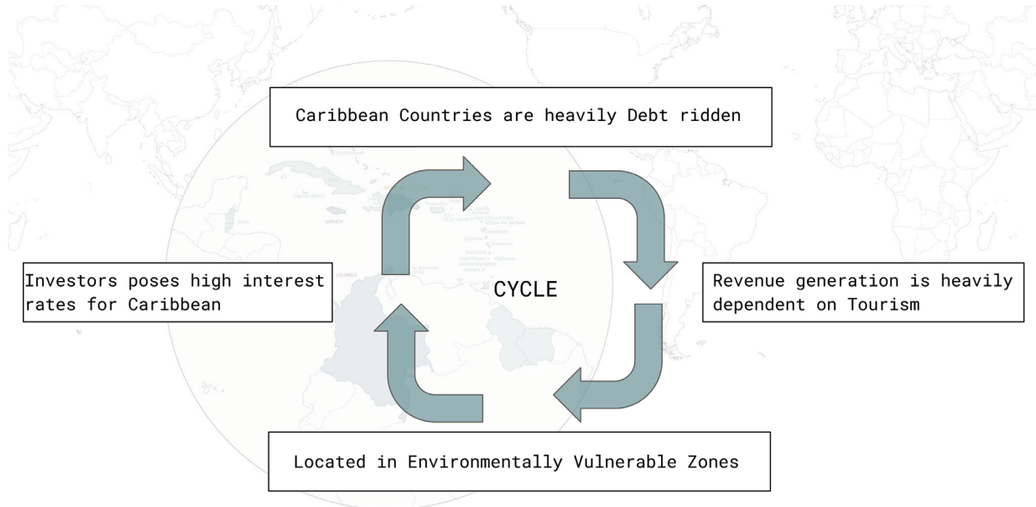


TOURISM



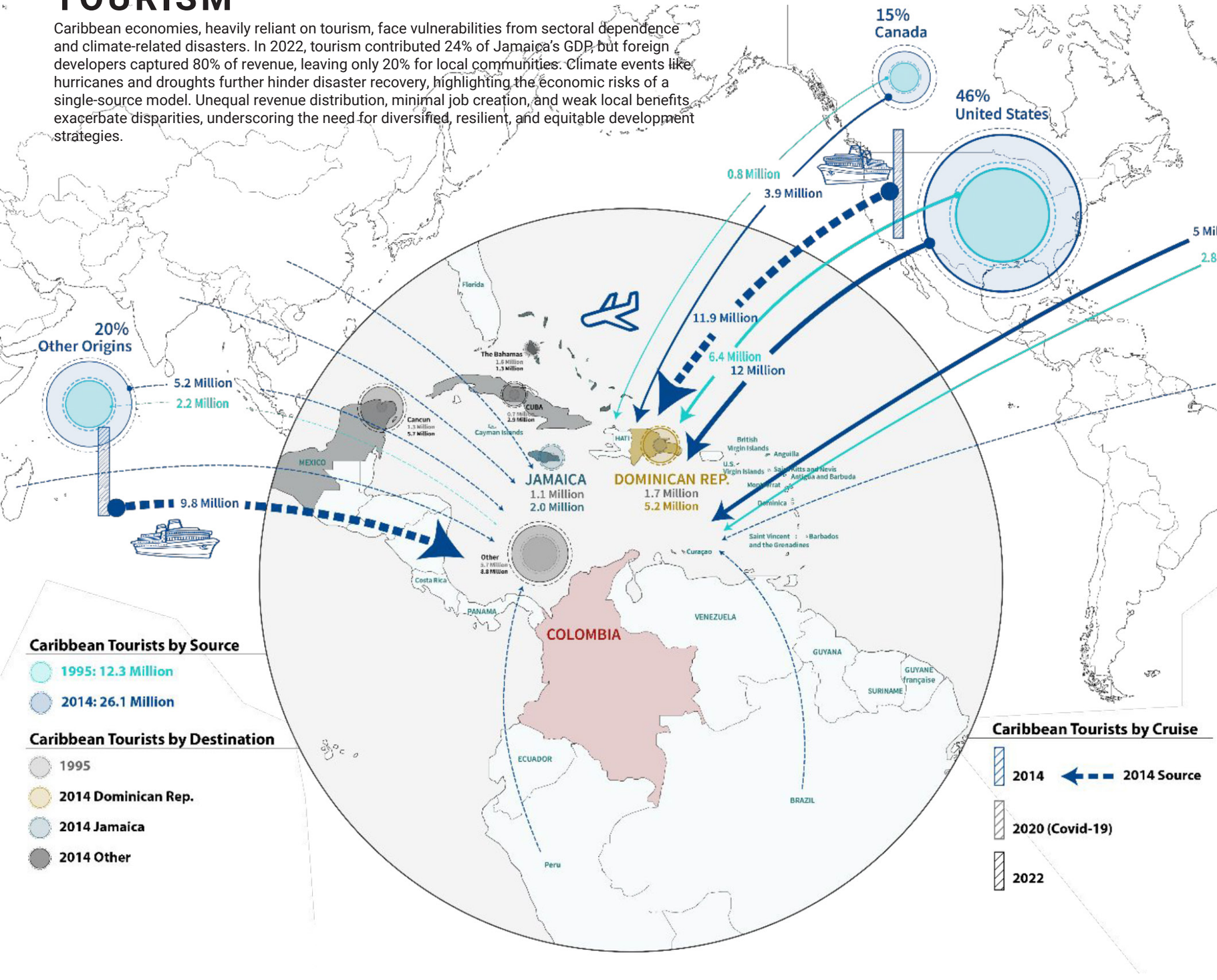
Seventy-two percent of the Caribbean population resides in urban areas, with a significant portion living in substandard, informally-built settlements. These communities are particularly vulnerable to the impacts of climate change, such as rising sea levels, extreme weather events, and other environmental stresses. The inadequate infrastructure and housing conditions heighten their exposure to climate risks.

ECONOMIC VULNERABILITY CYCLE



TOURISM

Caribbean economies, heavily reliant on tourism, face vulnerabilities from sectoral dependence and climate-related disasters. In 2022, tourism contributed 24% of Jamaica's GDP, but foreign developers captured 80% of revenue, leaving only 20% for local communities. Climate events like hurricanes and droughts further hinder disaster recovery, highlighting the economic risks of a single-source model. Unequal revenue distribution, minimal job creation, and weak local benefits exacerbate disparities, underscoring the need for diversified, resilient, and equitable development strategies.



FOREIGN DIRECT INVESTMENT

Foreign direct investment (FDI) in the Caribbean, crucial for addressing debt crises and funding infrastructure, often comes from the United States and the European Union. While FDI helps alleviate financial strain worsened by climate disasters, it also compromises governance and exposes nations to market fluctuations. To counter these challenges, Caribbean countries must collaborate to enhance their negotiating power, secure fair trade terms, and pursue sustainable development, reducing reliance on external actors and fostering long-term self-reliance.