



FACTSHEET

OCEANS • FEBRUARY 2023

© Hannah Morrisette / Smithsonian Institution

Mangroves, such as those pictured above, provide both mitigation and adaptation benefits to addressing climate change. Belize in its most recent nationally determined contribution committed to a set of ambitious targets that would protect and restore this important ecosystem and now has the science to further move implementation forward.

A COMPREHENSIVE CARBON ASSESSMENT OF BELIZE'S MANGROVE ECOSYSTEMS

Coastal wetlands, including mangroves, seagrasses, and salt marshes, are among the most productive places on the planet. These environments provide a suite of important ecosystem services, such as habitat for aquatic and terrestrial species including turtles, manatees, birds, crabs, and various species of fish from sharks to groupers that use these areas for food, shelter, and reproduction grounds. In Belize, mangroves and seagrasses are critical to the economy. It is estimated that mangroves alone contribute up to US\$4 million in fisheries value per year. These ecosystems also support up to \$78 million per year in tourism and recreational activities.

The benefit of these ecosystems extends well beyond their value for biodiversity. Coastal wetlands can help communities mitigate against and adapt to climate change. Mangroves and seagrasses are natural carbon sinks, taking in carbon dioxide – a greenhouse gas that is rapidly increasing due to human activities – and locking it away. In healthy mangroves, it is common to find carbon buried in soils for hundreds of years. Additionally, these ecosystems protect coastlines, homes, and infrastructure during storms by decreasing wave and wind energy, minimizing erosion, and reducing flood extent. These adaptation benefits have been and will continue to be important as the intensity and frequency of storms are expected to increase with climate change.





© Hannah Morrissette / Smithsonian Institution

FACTSHEET

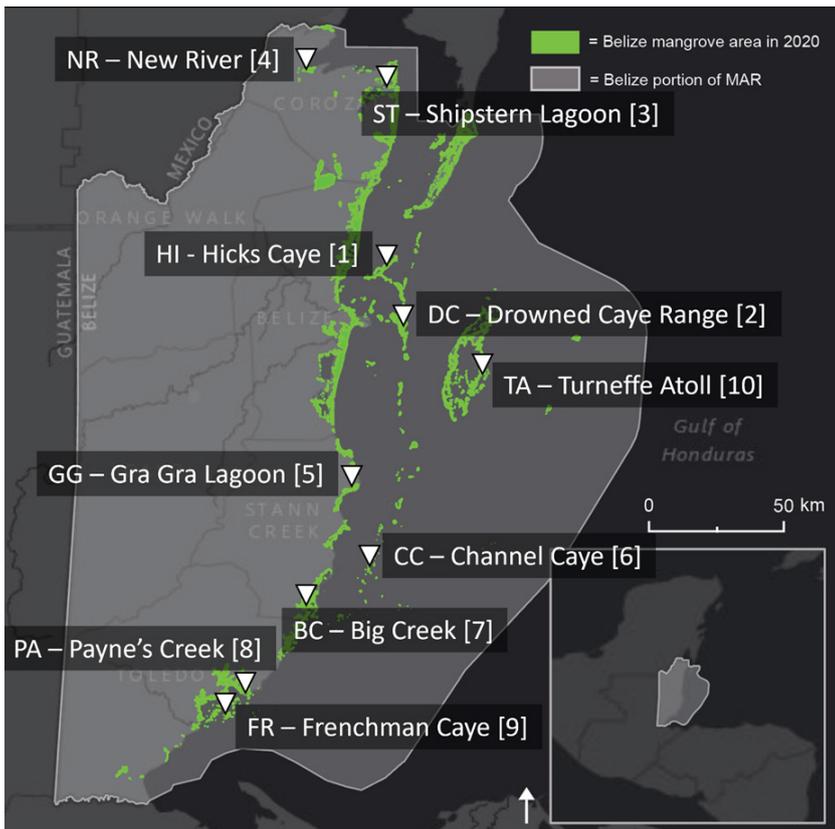
OCEANS • FEBRUARY 2023

By removing carbon from the atmosphere and providing climate adaptation benefits, coastal wetland ecosystems play a role in global efforts to lessen the impacts of climate change. For example, countries can commit to protecting and restoring mangrove and seagrass ecosystems in their nationally determined contributions (NDCs) to the Paris Agreement as a nature-based solution. Currently, approximately 14,000 hectares of mangroves are under protection in Belize.

To identify key mangrove areas and aid in the implementation of Belize’s NDC, it is helpful to understand the associated carbon stores within the coastal ecosystems. A recently completed research project in Belize helps to answer this question for their extensive mangrove environments. The project was a collaborative undertaking among NGOs, academia, and government; led by Smithsonian Institution in partnership with the University of Belize Environmental Research Institute, World Wildlife Fund, Silvestrum Climate Associates, Coastal Zone Management Authority and Institute, National Climate Change Office, Belize Forest and Fisheries Departments, and several local NGOs. Local NGOs included the Toledo Institute for Development and the Environment, Corozal Sustainable Future Initiative, Turneffe Atoll Sustainability Association, and Sarteneja Alliance for Conservation and Development. The Pew Charitable Trusts provided technical research and policy support, as well as funding for this work.

WITHIN THE 2020 UPDATE OF BELIZE’S NDC, THE COUNTRY MADE AMBITIOUS COMMITMENTS TO PROTECT AND RESTORE COASTAL WETLANDS, INCLUDING

- Protecting a minimum of 6,000 additional hectares of mangroves by 2025, and at least 6,000 more hectares more by 2030.
- Restoring at least 2,000 hectares of mangroves by 2025, and at least a 2,000 more hectares by 2030.
- Halting net loss of coastal wetland habitat by 2025.
- Developing a National Seagrass Policy, including identifying a portfolio of priority areas for protection.



Map of the ten sites sampled for the Belize Blue Carbon field assessment, numbers indicated sampling order. Source: Morrissette et al., in review, adapted from Cissel et al., 2021.

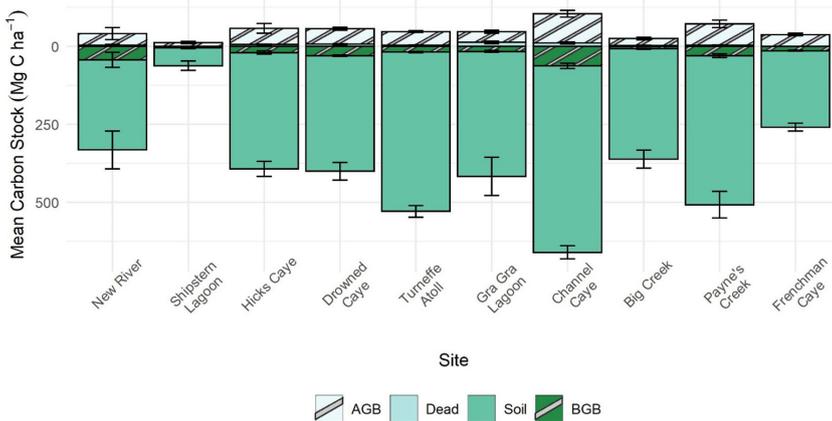


© Hannah Morrisette / Smithsonian Institution

FACTSHEET

OCEANS • FEBRUARY 2023

This project provides the first comprehensive assessment of the carbon stored within mangroves across the country from a range of different ecotypes (mainland lagoon, riverine/coastal, and offshore cayes). Researchers sampled soil and took measurements of mangrove trees to determine the amount of organic carbon found above and below ground.



Average carbon stock pool (Aboveground biomass (AGB), Belowground biomass (BGB), Dead biomass, Soil) per sampling site within Belize. Striped bars are live biomass pools. Source: Morrisette et al., in review.

These data are valuable in providing a more precise and quantitative valuation of the carbon storage benefits of mangroves, aiding the implementation of Belize's updated NDC and helping the country account for the mitigation value of this ecosystem in the national greenhouse gas inventory. Beyond the science and policy components, this project strengthened local research capacity by carrying out in-person trainings. Over 30 individuals from 10 Belizean institutions now have the resources and skills to complete future field assessments for mangrove ecosystem carbon.

- With almost **58,000 ha of mangroves** in Belize, the country has an estimated **25.7 ± 1.2 Tg of mangrove carbon**, equivalent to burying almost 13 million cars.
- **The mean total ecosystem carbon stock for the nation was 444.1 ± 21.0 Mg C ha⁻¹**, with 74.4 ± 6.2 Mg C ha⁻¹ in biomass stocks, and 369.7 ± 17.7 Mg C ha⁻¹ in sediment stocks.
- While all mangroves are important for the ecosystem services they provide, the project showed hotspots for carbon, with taller mangroves found in riverine/coastal ecosystems and offshore cayes having significantly higher average carbon stocks than lagoonal systems and dwarf locations.

For more information

Nadia Bood

Senior Program Officer,
WWF Mesoamerica
Belize Office
nbood@wwfca.org

Hannah Morrisette, Ph.D.

Coastal Wetland Biogeochemist,
Smithsonian Environmental
Research Center
MorrisetteH@si.edu

Stacy K. Baez, Ph.D.

Senior Officer, Coastal Wetlands
and Coral Reefs
The Pew Charitable Trusts
sbaez@pewtrusts.org

María del Rosario Calderón

Communications Senior Officer,
WWF Mesoamérica
rcalderon@wwfca.org



Working to sustain the natural world for the benefit of people and wildlife.

together possible. panda.org

WWF® and ©1986 Panda Symbol are owned by WWF. All rights reserved.

WWF, 28 rue Mauverney, 1196 Gland, Switzerland. Tel. +41 22 364 9111

CH-550.0.128.920-7