Demonstrating the Value of the Environment in Achieving Colombia’s Development Goals

SUMMARY

Colombia holds within it a wide variety of critical ecosystems that support the well-being of its citizens and sustain its economy. From the high-elevation páramos—known for being the headwaters of rivers that provide freshwater to the Colombian people—to the mangroves and coral reefs that support fisheries and tourism activities, the country is rich in natural resources.

This policy brief summarizes an analysis of the importance of Colombia’s natural capital—the ecosystems that provide crucial benefits to people—as a component of the government’s development goals.

Using the Gulf of Morrosquillo as a pilot area, this research demonstrates where key ecosystems, such as mangroves and forest, play the most important roles in reducing coastal vulnerability to flooding and erosion, storing carbon in the soils of coastal ecosystems (also known as blue carbon), and providing water security. This brief provides recommendations for where safeguarding natural capital could contribute most to securing nature’s benefits into the future for the Gulf of Morrosquillo’s citizens and visitors. There is significant opportunity for these results to be scaled and expanded across the country to help inform spatial and land-use planning in other regions.

WHAT’S AT STAKE?

As areas develop, strategic ecosystems such as forests, coral reefs, and mangroves are put at increasing risk, which in turn imperils the people and infrastructure who depend on them. The Gulf of Morrosquillo encompasses eight municipalities located in two departments. The region is home to nearly 350,000 people and is the ancestral territory of Afrocolombians and Indigenous groups. It is also home to several species of corals and endangered wildlife, such as the Atlantic goliath grouper, which is an important species for fishers. Ensuring a sustainable development path is a key priority for the government and the citizens of the Gulf. Moreover, to achieve lasting development visions such as enhancing tourism and providing water for the planned regional aqueduct, it is critically important to safeguard the natural capital assets that underpin the region’s economy, culture, and wellbeing.

BACKGROUND

The Government of Colombia’s National Development Plan for 2018-2022 states that the vision for regional development should be outlined at the regional and subregional levels by a coordinated approach of municipalities. Based on such a process, the Government of Colombia, in conjunction with municipal and departmental leaders, signed the Territorial Pact of the Gulf of Morrosquillo for 2020-2025 to strengthen the economic, social, and environmental development of the region and to consolidate the Gulf of Morrosquillo as a primary tourist destination in the country.

Individual municipalities have different visions for development, including establishing ports, developing as agro-industrial areas, or enhancing their energy and mining sectors. A common thread throughout the region is a shared vision for becoming a main tourist destination in the country for local and international tourists while preserving cultural heritage. Eleven strategic lines for development have been established by the Department of National Planning. These include building a regional aqueduct for more effective water transport, mitigating coastal erosion, and building a regional hospital, among others.

This region is home to multiple ecosystems that provide many benefits to people. For example, mangroves, seagrasses, and corals, provide critical habitat and nursery areas for the fish and shrimp that are fundamental for local fishers, fishing tourism, and recreational snorkeling and scuba diving in the reef. Moreover, forests of the Sinú river basin provide many benefits, including water retention and provision to the downstream areas of the Gulf, carbon sequestration, and many cultural benefits such as identity and spiritual values for people, as well as being the ancestral territory of the Emberá-Katío people in the upper basin. The upland forests in Paramillo National Park are very diverse, as they have more than 350 species of birds, 96 species of reptiles, and 65 mammals, including endangered species such as jaguars, tapirs, and spectacled bears.

QUESTIONS ASKED BY LOCAL GOVERNMENT AND ADDRESSED BY THIS RESEARCH

What are the strategic ecosystems in the Gulf of Morrosquillo and where are they located? The Gulf of Morrosquillo encompasses five strategic ecosystems: mangroves, coral reefs, and sea grasses on the coast, and tropical dry and wet forests towards the interior, with the most forested areas occurring in Paramillo National Park. The national park is not part of the Gulf but is home to the headwaters of the Sinú River that provides key freshwater services to the region.

Where are strategic ecosystems most important to mitigating exposure to coastal storms? Coastal ecosystems in the areas of San Bernardo del Viento and near Rincón protect the coast from erosion and flooding. Mangroves and sea grasses in this region reduce the risk of these hazards for the region’s people by

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reducing wave energy during storms and trapping sediments to reduce beach and other shoreline losses from erosion. Offshore coral reefs also can dampen wave energy and thus reduce risk. Together, the offshore-to-onshore combination of coral reefs, seagrasses, and mangroves can be a very effective bulwark against coastal damages from sea-level rise and storms.

What areas are most exposed to coastal erosion and flooding? We found that 190 km of the coastline were categorized as having high exposure to coastal erosion and flooding, which represents 37% of the total coastline (521.5 km). The municipalities of Moñitos, Coveñas, and Santiago de Tolú are the most exposed, while also having the greatest number of people living within 1 km of the shoreline. In total, more than 27,000 people are highly exposed to coastal erosion and flooding, and over 25,500 are moderately exposed.

Which ecosystems store the most blue carbon and how much carbon is being stored? Blue carbon is the carbon stored in the vegetation and soils of coastal ecosystems. Tropical mangroves are among the most effective ecosystems in the world at storing and sequestering carbon, doing so at rates two to four times
greater than tropical forests. On average, Colombian Caribbean mangroves store 1,935 tons of carbon per hectare. Therefore, the current stock of carbon in mangroves in the Gulf is expected to be approximately 56 million tons, and by 2030, an additional 6 million tons can be stored, increasing that number to ~62 million tons, assuming no disturbance or loss of habitat. Sea grasses also store carbon at ~633 tons per hectare. The current carbon stocks in sea grasses in the Gulf are expected to total ~10 million tons, and by 2030 that might be ~12 million tons, again assuming no disturbance of these ecosystems. These numbers are estimated from studies by Invemar and Colombian researchers in the Colombian Caribbean.

Where does the water for the Gulf come from, and if tourism expands, which areas are important for ensuring water security? The Sinú River, which feeds the gulf, originates in the Paramillo National Park. From there, the Sinú flows to the Caribbean, eventually emptying into the sea at San Antero. The forest in Paramillo National Park retains excess water runoff in the wet months, helping to mitigate flooding of communities and ecosystems downstream. Then, that retained water is gradually discharged throughout the dry months, supplying water resources to the Gulf when demand is highest. The forests in and around the park act like a sponge releasing water throughout the year, including during the dry season. Intact forest also provides important filtration services, reducing transport of excess sediment downstream.

WHAT ARE THE POLICY AND MANAGEMENT IMPLICATIONS FOR THE REGION THAT EMERGE FROM THIS RESEARCH?

• Safeguarding the mangroves in San Bernardo del Viento and near Rincón, through conservation efforts and environmental management campaigns, is most likely to secure multiple ecosystem benefits. Safeguarding these priority areas can help mitigate coastal erosion and flooding. Moreover, in the Caribbean Pact of the National Development Plan 2018-2022, the government stated a target of six initiatives for blue carbon in the region. Results from the research reported here indicate that significant carbon storage and other ecosystem benefits (e.g., fisheries) would result if one of these initiatives is implemented in these key mangrove locations in the Gulf of Morrosquillo (Figure 2, grey boxes).

• The coastline between Arboletes and Moñitos contains areas where the protective natural habitat has been degraded and is highly exposed to coastal erosion and flooding. If mangroves are prioritized for restoration in this area, such a nature-based solution could contribute to mitigating coastal erosion (Figure 2, black box) and other ecosystem benefits. We recommend further evaluation of a restoration scenario in these areas to determine the feasibility and benefits of such an endeavor.

• To secure water for the Gulf during the dry months, it is important to protect the forests inside Paramillo National Park and its buffer zone. Unfortunately, these forests have experienced increased deforestation rates between 150-200% between 2013 and 2018. Government-led policy instruments or public-private partnerships, such as payment for ecosystem services or accords of conservation and no deforestation (such as the ones being piloted in the Amazon), around Paramillo National Park could help secure freshwater supply for the Gulf and its future tourist development.

Final decisions about where and how much to protect, restore, or improve management of key mangrove, seagrass, coral, and upland forest ecosystems are most appropriately determined through careful consideration of the financial, political, and cultural costs and benefits associated with alternative locations, in addition to the potential biophysical and socioeconomic benefits provided. The results and implications presented here represent a crucial first step in informing such decisions that will help promote a sustainable prosperity for the Gulf of Morrosquillo region.

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colleagues who wanted models to reflect the priorities of the Government of Colombia outlined in the territorial pact of the Gulf of Morrosquillo and the National Development Plan, such as mitigating coastal erosion, and sequestering carbon, as well as informing the aqueduct planning. For that reason, coastal vulnerability and blue carbon models were chosen in coastal areas, and seasonal water yield in coastal and inland areas. The natural habitats considered followed global and local land-use classifications. Analyses were conducted between September and December 2020 using the Natural Capital Project’s InVEST software. InVEST is a suite of free, open-source models for mapping, quantifying and valuing the goods and services from nature that sustain and fulfill human life. While much of the information needed to conduct these analyses was gathered by the DNP from available sources in Colombia, results presented here refer to original research.

THE NATURAL CAPITAL PROJECT AT STANFORD UNIVERSITY

Centered at Stanford University, the Natural Capital Project operates as a partnership between the Chinese Academy of Sciences, the University of Minnesota, the Stockholm Resilience Centre, The Nature Conservancy, and the World Wildlife Fund. We are an interdisciplinary team of academics, software engineers, and real-world professionals all working to make valuing natural capital easier and more accessible to everyone. For more information, visit www.naturalcapitalproject.stanford.edu or contact naturalcapitalproject@stanford.edu.

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PEOPLE INVOLVED IN THIS STUDY

The Natural Capital Project: Mary Ruckelshaus, PhD; Lisa Mandle, PhD; Alejandra Echeverri Ochoa, PhD; Stacie Wolny, Jesse Goldstein, Marcelo Guevara, Sarah Cafasso

Departamento Nacional de Planeación: Santiago Aparicio Velásquez, Diego Alejandro Peña Restrepo, Sioux Fanny Melo Leon, Lina Maria Ibatá Molina, Diana Patricia Mendoza González, Leidy Caterine Riveros Salcedo, Diana Estefania Pulido, Fabian Darío Villalba Pardo, PhD

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