

Mangroves:

Unlocking natural solutions to climate change in Guyana



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Defending our coastal home and its rich heritage depend on how quickly we act and design with nature in mind.

Protecting and restoring mangroves is a key strategy to harness nature-based solutions to climate change while benefiting biodiversity and improving local livelihoods.

As global sea level rise continues to affect the North Brazil Shelf (NBS), Guyana needs to urgently adopt nature-based solutions to secure human well-being. Natural ecosystems, like mangroves, can provide coastal flood protection from damaging storm surge and wave hazards while also sequestering and storing large quantities of carbon in both the biomass of the plants themselves, as well as in the sediments they secure below.

Local communities living near the coast of Guyana benefit from mangroves because of their ability to prevent coastal erosion, improve water quality, and reduce flood damage. Indigenous and local communities also derive significant and *irreplaceable* cultural, social, and subsistence values from mangrove ecosystem.



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COASTAL DEFENCE IN GUYANA

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In July 2019, extreme spring tides and storm surges, likely driven by climate change, caused severe erosion and breach to the earthen embankment at Prospect, Mahaicony. Following this in August 2019, **Guyana spent GY\$460 million (US\$2.3 million) for emergency repairs to this breach.** This is not likely included in the country's almost GY\$4 billion (US\$20 million) 2019 budget for sea defence maintenance, which represents 1.3% of Guyana's 2019 annual budget.

By 2050, shorelines are expected to retreat by almost 50 meters in some parts of Guyana and Suriname, putting homes, roads, farmlands and vulnerable communities at risk.

Mangrove forests have long shielded our coast from ocean forces, and their protection offers us an affordable, lasting solution to this growing threat. But they need our help. For centuries grey, concrete seawalls and other man-made defenses have replaced the green belt of mangroves that once protected our coast. These structures are starting to fail, have high initial costs to build, and may not withstand the coming storm, at least not on their own. Science has shown that combining mangroves and man-made defenses, known as green-grey infrastructure, is much a more effective flood protection solution.

Preservation success of mangroves will depend on room for landward migration.



\$1.5-\$3.6 Billion USD

Potential cost savings by replacing aging seawalls with mangroves belts or a combination of mangrove belts with sea defenses

\$2.3 million USD

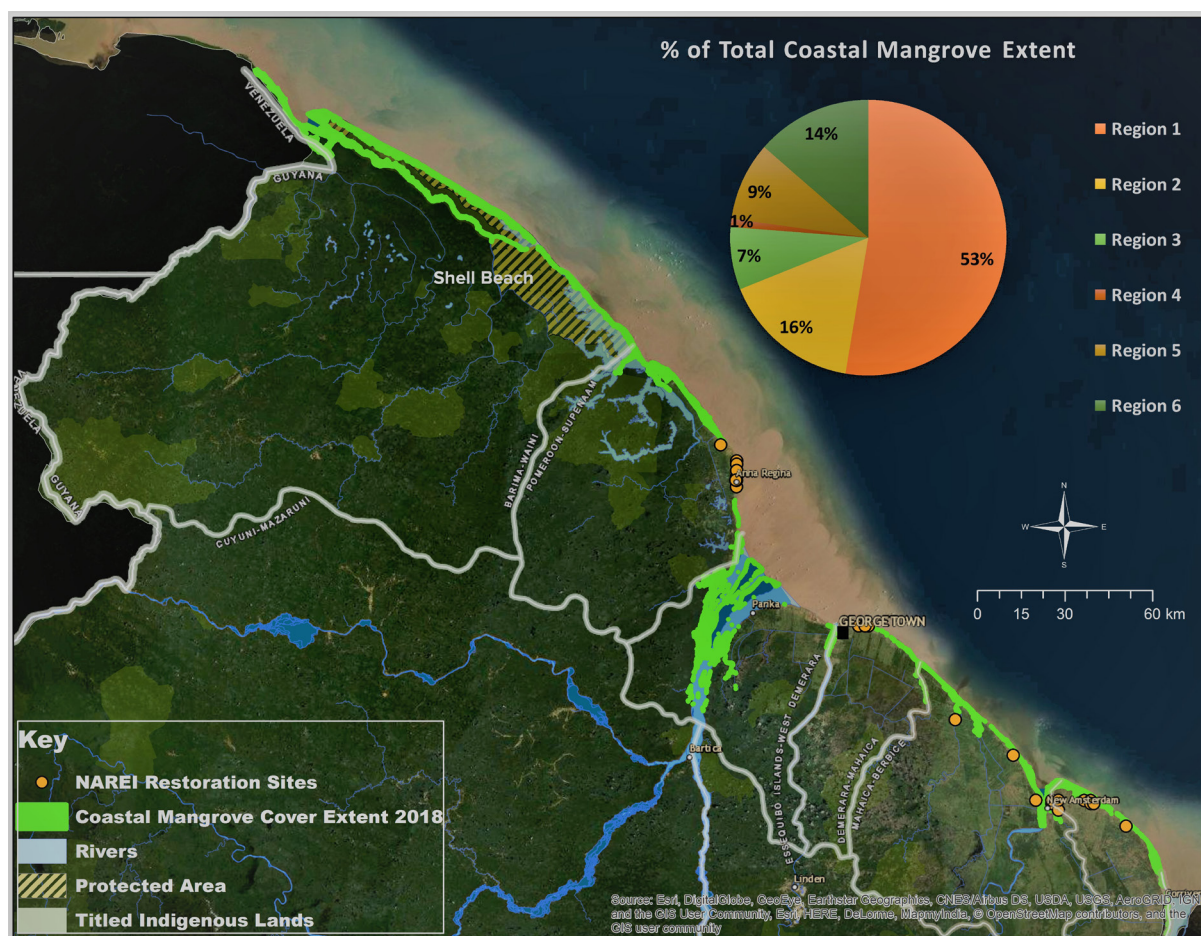
Cost to repair one sea defence failure, at Prospect, Mahaicony, in August 2019

GUYANA'S MANGROVES: NOW & FUTURE

Mangrove Cover

The total mangrove area on Guyana's coastal plain is 33,360 hectares, which represents a total net gain of mangrove over the last ten years of over 5,000 hectares in Regions 2 thru 6 and a net loss of 1,419 ha in Region 1.

Future fieldwork will be essential to identify mangrove loss and regeneration zones using a repeatable and multi-year approach.



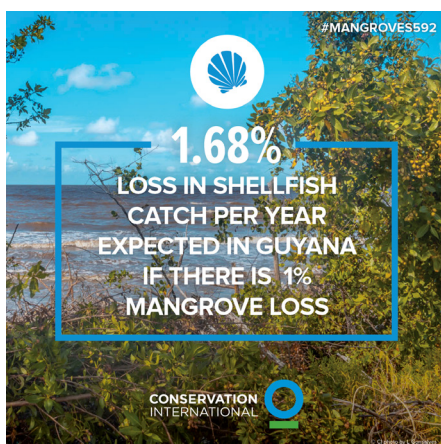
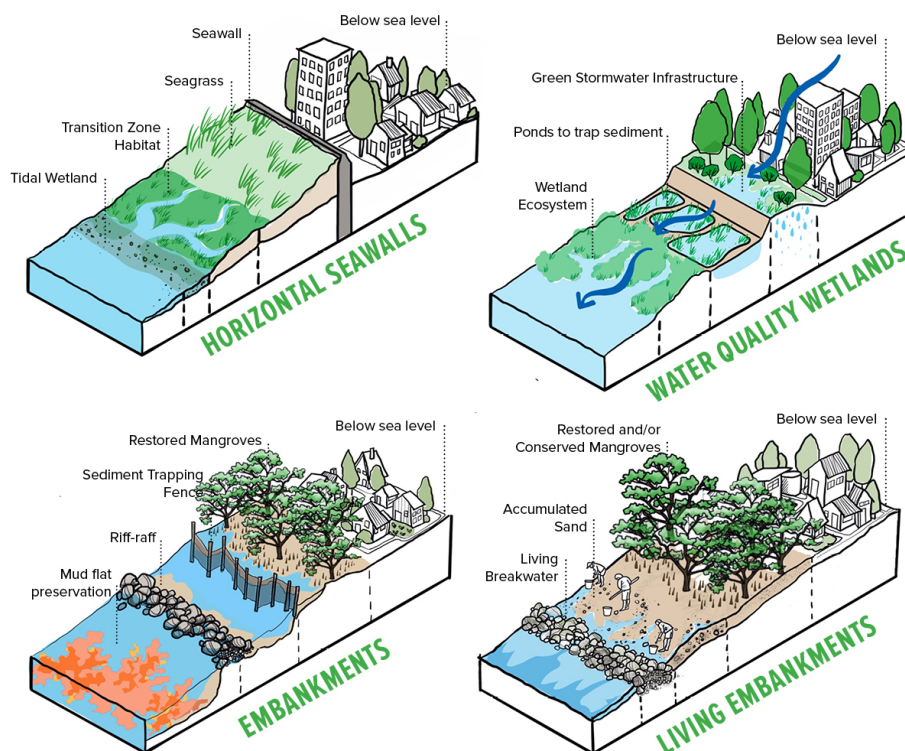
Blue Carbon

“Blue carbon” ecosystems like mangroves, tidal marshes, and seagrasses, sequester and store large quantities of carbon in both the biomass of the plants themselves, as well as in the sediments they secure below – in fact, as much as 10x more carbon can be stored in these systems than in terrestrial forests.

Nature-based Solutions

As global sea level rise continues, Guyana needs to urgently adopt nature-based solutions to secure human well-being. Combining mangrove restoration and/or conservation with conventional engineering solutions in a green-gray approach can reduce coastal hazards while also enhancing habitat health.

Applying green or green-gray hybrid solutions to reduce coastal hazards in Guyana is likely the lowest cost and most flexible option for reducing flood risks. With thoughtful planning, mangrove restoration and enhancement can be an important component of nature-based solutions for climate adaptation, flood risk reduction, and for ecosystem survival.



Ecosystem Valuation

Saving mangroves can increase Guyana's annual fisheries earnings by almost US\$544,320; a significant value for thousands of families who depend on fisheries. **We must protect our mangroves to protect communities and people who depend on fishing to make a living.**

MANGROVE RESTORATION PROJECT REVIEW

From 2010 to 2018, the Guyana Mangrove Restoration Project (GMRP) installed different types of green and green-gray mangrove restoration approaches to reduce wave impacts and collect sediment along the coastline. There was significant mangrove restoration success in three of the four Regions (#2 #4, and #5) with lengths of restored mangroves ranging from 100 to 5000 meters and widths from 60 to 600 meters. To date an estimated 526 hectares of mangroves have been restored (NAREI Mangrove Department, 2018). The total cost of restoration initiatives between 2010 and 2018 for mainly planting mangrove seedlings and *Spartina* grass, construction of engineering structures, and monitoring is GYD\$178, 853,966. Over a period of nine years only 7 out of 17 restoration sites survived (41% success rate).



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The dynamic nature of mud movements along Guyana's coastline, a limited understanding of the role of coastal processes, and a Sargassum invasion, all contributed to the loss of restoration sites. **Many lessons were learned, including the need to:**

- **Use GIS to identify sites suitable for accelerated mangrove restoration;**
- **Use coastal structures to promote accretion; and**
- **Combine *Spartina* grass and *Avicennia* seedling planting to promote sustainable growth and regeneration of mangroves.**

This, along with the participation of the local community in all mangrove restoration and conservation initiatives will be critical to the future restoration designs for long term sustainability.

Biophysical Conditions

Infrastructure built within the coastal mangrove fringe is subject to periodic erosion threats due to offshore mudbank dynamics. The presence of levees further acts to exacerbate erosion by enhancing wave energy and hindering sedimentation on adjacent mudflats. **Preservation success of mangroves will depend on room for landward migration. Where flood coastal protection exist the migration mangroves will be squeezed between rising waters and hard infrastructure.**

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ZERO NET LOSS...IS NOT GOOD ENOUGH

Policy Recommendations

In Guyana, government agencies with administrative capacity need to:

- **Create a legal framework for mangrove management;**
- **Develop a mangrove management policy;**
- **Promote sustainable management; and**
- **Support and manage research in mangroves.**

The existing legislative mechanisms and institutional systems for mangrove conservation and management are unable to address new and emerging issues, such as conflict related to land tenure and the protection of mangroves on private lands. The absence of an overarching Mangrove Strategy or Policy Directive jeopardizes future mangrove efforts. Mangrove policies need to be strengthened and comprehensive - especially in light of coastal climate change, sea level rise and the oil and gas sector development.

Next Steps

Moving forward, it is paramount that civil society, the private sector and governments pull together with the support of donors to stop and reverse mangrove loss and destruction in Guyana.

A coordinated effort will be required, and should include:

1. Development of an Integrated Coastal Zone Mangrove Management Plan;
2. Investigations to improve the understanding of mangrove-mud bank interactions and dynamics;
3. Continued investment in green-gray infrastructure pilot sites; and
4. A cost-benefit analysis that considers short-term and long-term flood protection needs, multi-tiered green-gray strategies, and managed retreat along Guyana's coastline.

Mangroves are an essential component in the journey to secure our global future.

Join us and help value and protect these ecosystems.

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Summarized findings from "Setting the foundations for zero net loss of the mangroves that underpin human wellbeing in the North Brazil Shelf Large Marine Ecosystem (NBS-LME)", a collaborative project of:



**CONSERVATION
INTERNATIONAL**



Conservation International - Guyana | 98 Laluni Street, Queenstown | Georgetown, Guyana | 592-227-8171

www.conservation.org.gy | mangroves@conservation.org