



UWI

Policy Brief

The University of the West Indies

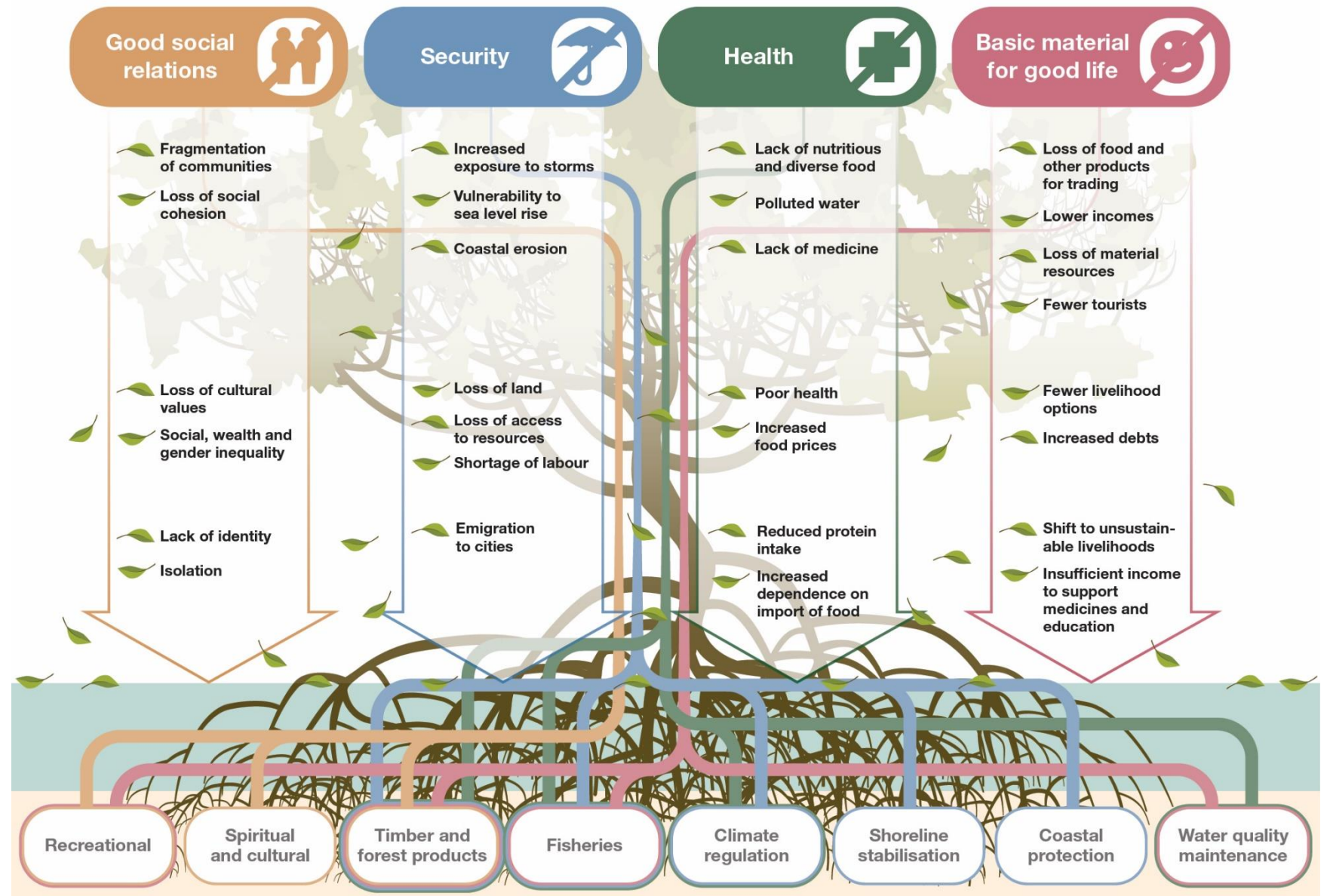




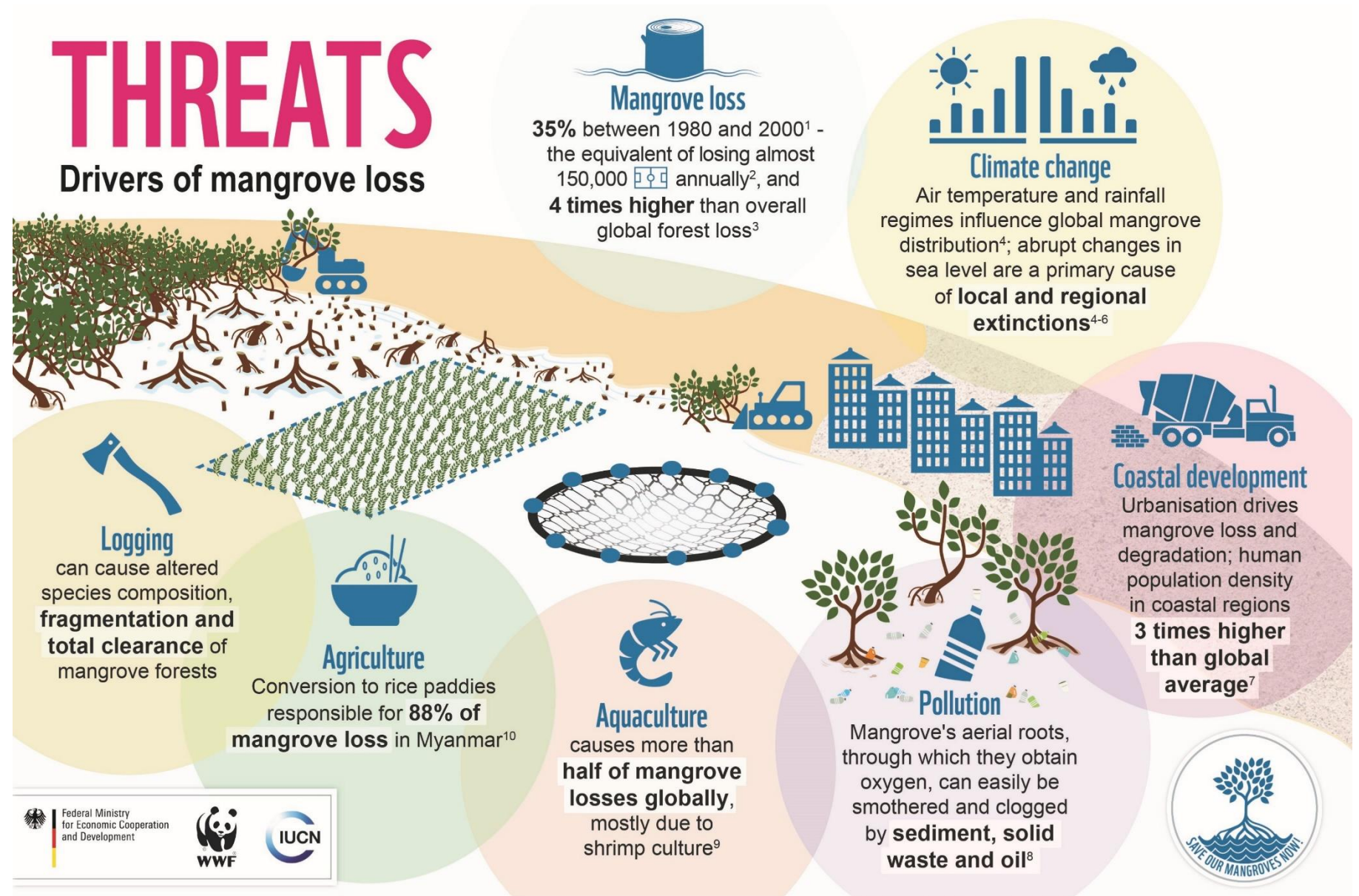
Content

- Introduction
- Summary of findings
- Policy Implications
- Concluding Remarks

The importance of mangroves



Threats to Mangrove Ecosystems



Sources: ¹ Millennium Ecosystem Assessment, 2005 • ² 0.66% or 102,000 hectares annually (2000-2005): FAO, 2007 • ³ Spalding et al., 2010 • ⁴ Alongi, 2015 • ⁵ Duke et al., 2017 • ⁶ Lovelock et al., 2017 • ⁷ Small et al., 2003
⁸ UNEP, 2014 • ⁹ Valiela et al., 2001 • ¹⁰ Over 2000-2012: Richards & Friess, 2016

Bogue Lagoon







0 0.5 1 2 Kilometers



0 15 30 60 90 Kilometers

 Study Area

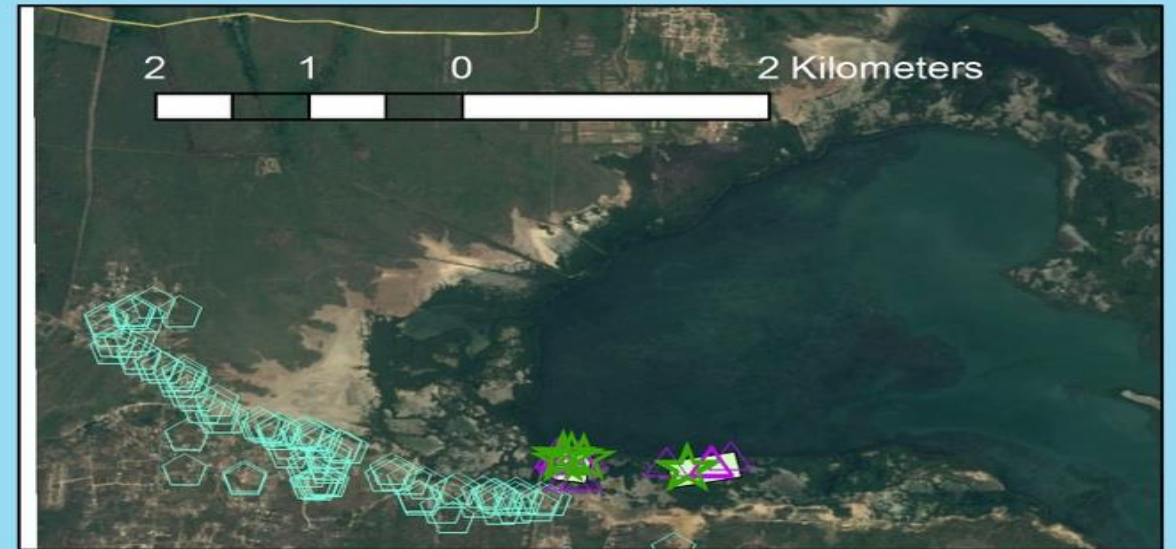
-  Ecological
-  Physical
-  Socio-Economic
-  Site Plots

Salt Marsh



0 0.5 1 2 Kilometers

Portland Cottage



2 1 0 2 Kilometers



SOCIO-ECONOMIC CHARACTERISTICS



Key Findings

- **High level of exposure and sensitivity** to natural hazards. Generally highest in Portland cottage
- **Several ecosystem services** were shown to be very important to the communities: fish habitat, shoreline protection services, a support for near or off shore fishing and a wild life habitat and medicinal value.
- **Several issues affecting mangrove** many of which are common among the three communities: pollution, overfishing or illegal fishing and illegal logging or clearing of forest for residential or commercial use
- **Limited involvement of locals** in all three communities in restoration activities BUT **relatively strong degree of willingness** to participate in mangrove restoration activities
- **Opportunities for private/public partnership**



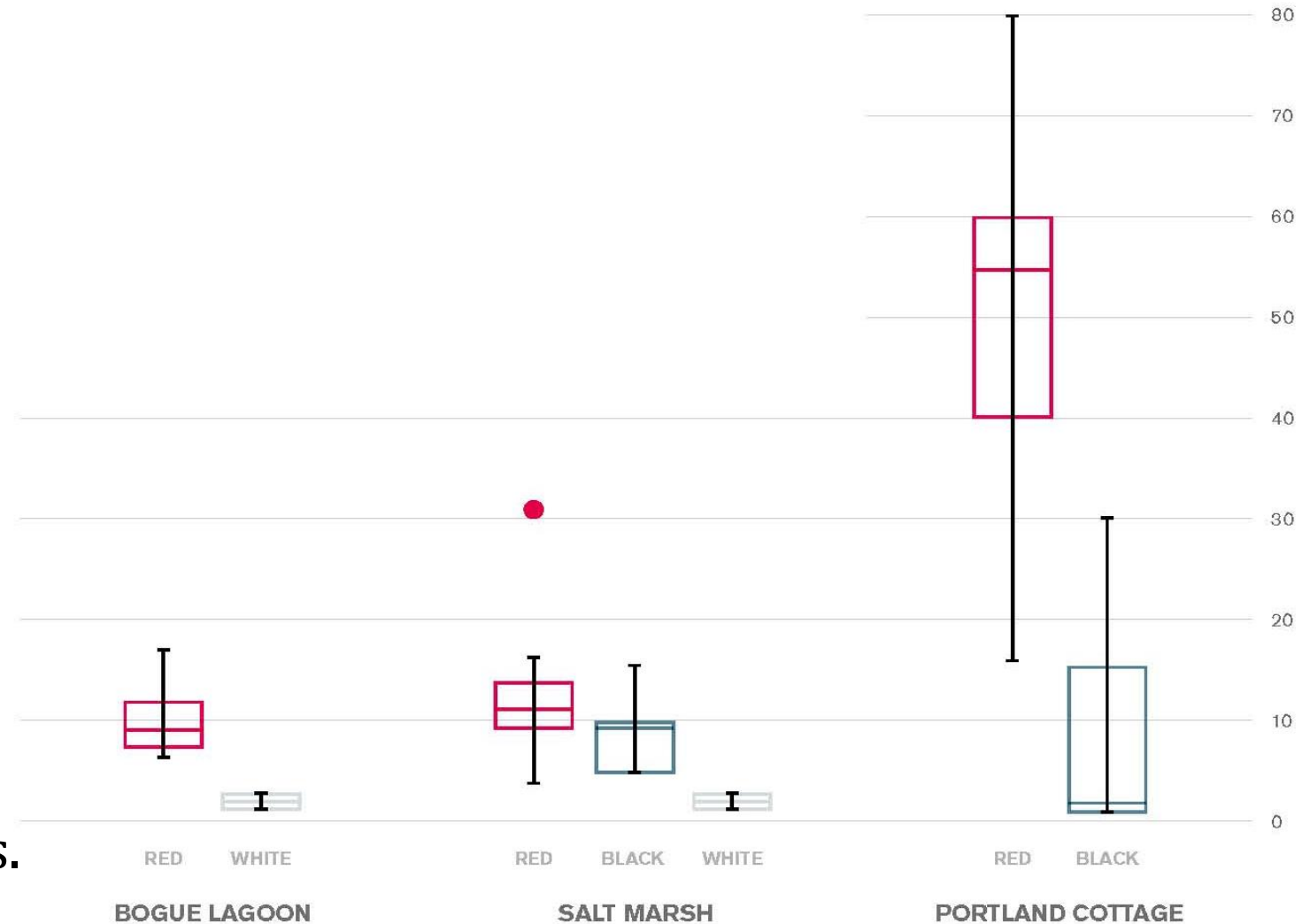
ECOLOGY



❑ *R. mangle* (red): dominant species at all locations.

❑ Low species diversities (expected).

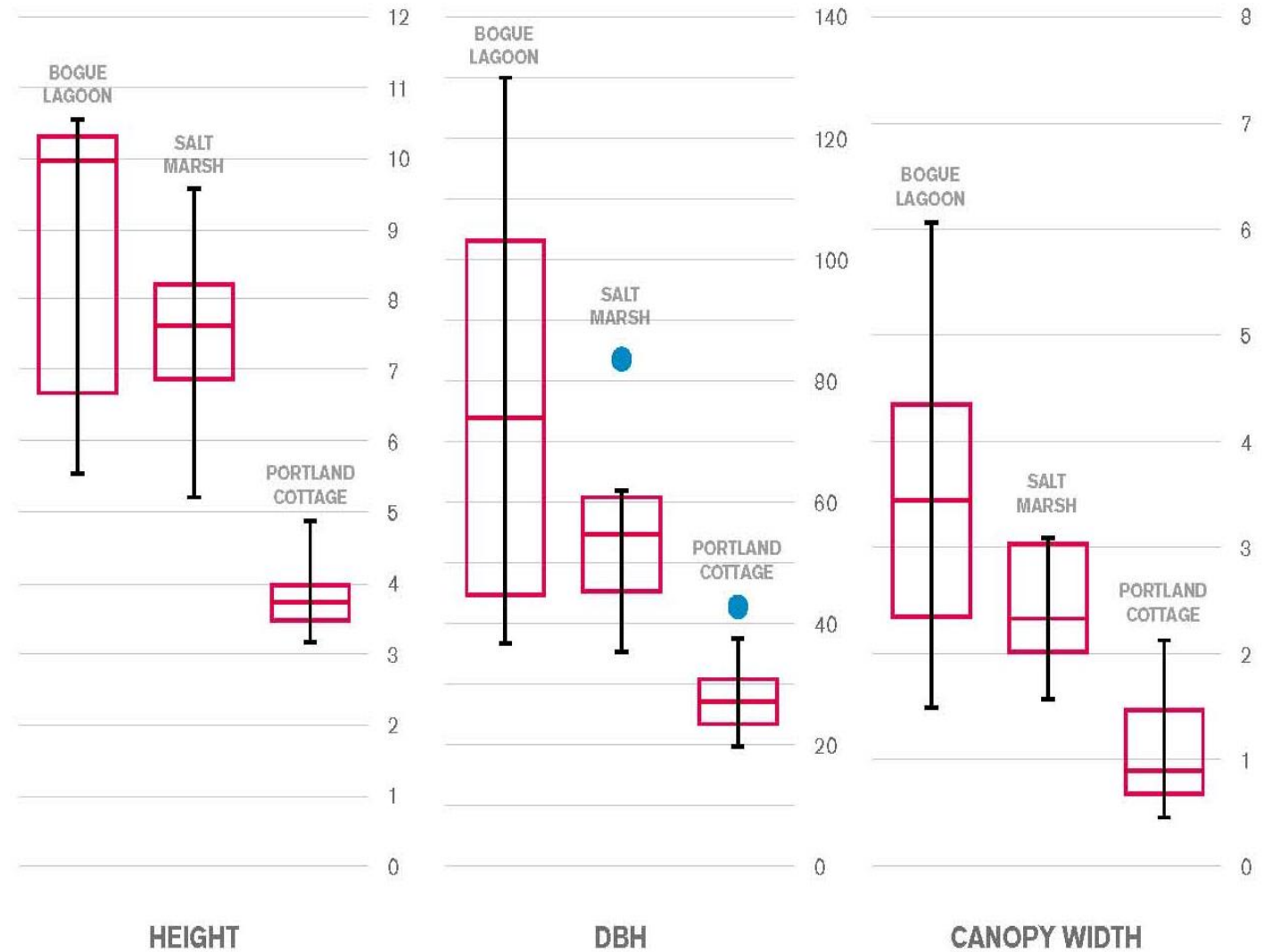
❑ Portland cottage - greatest abundance of red mangrove trees.



Ecological

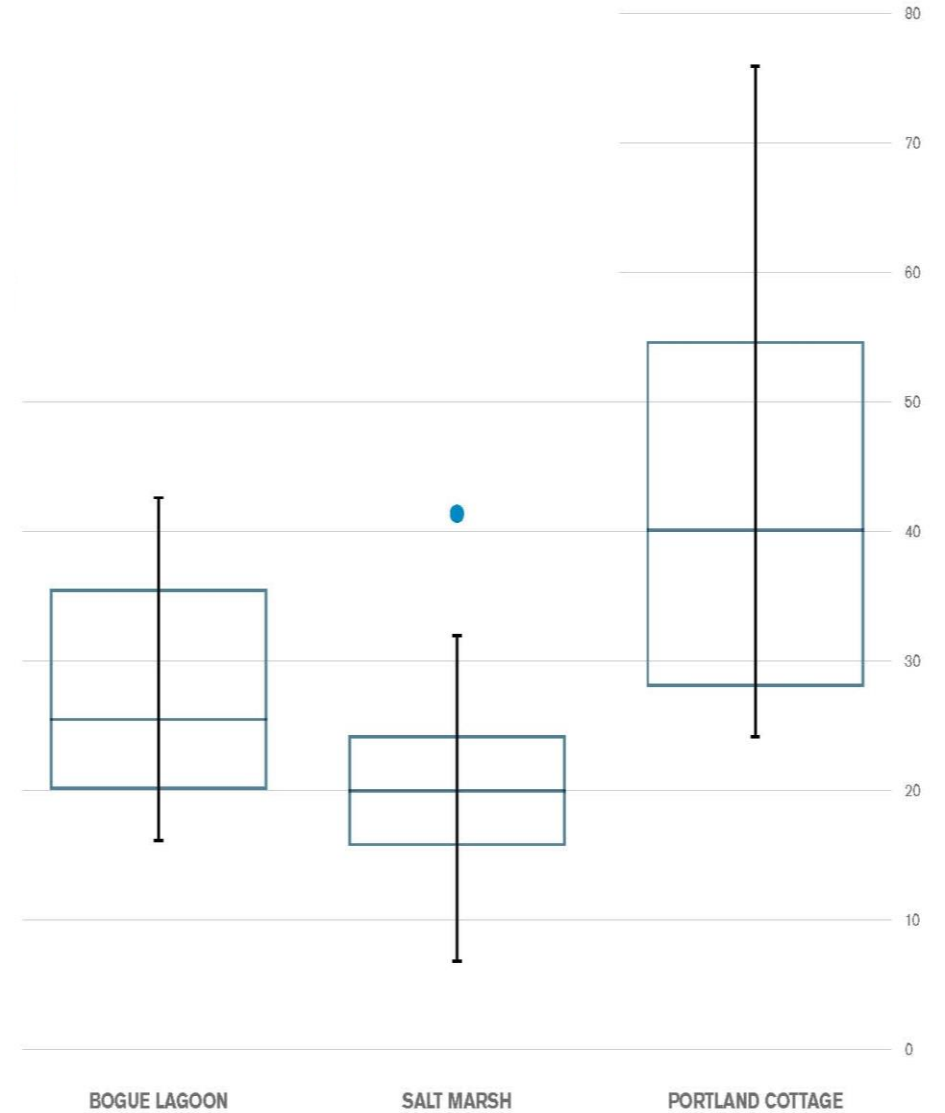
❑ Bogue had greatest DBH, canopy width and tree height.

❑ Portland cottage - shortest trees with smallest DBH (highly disturbed and recovering forest)

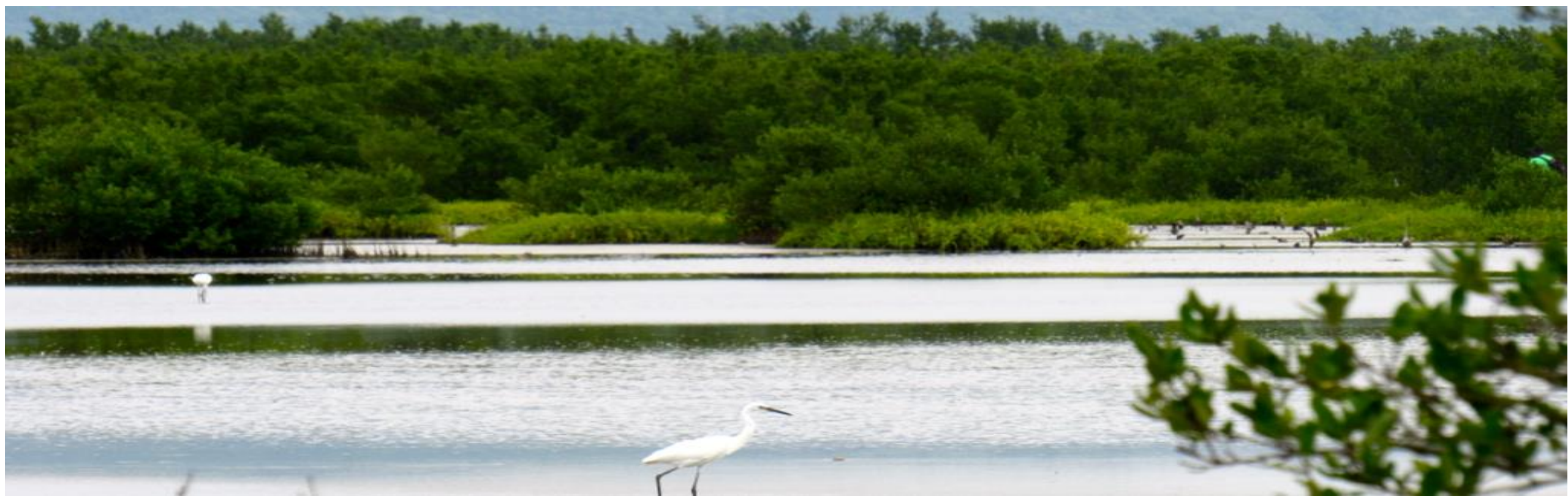


Aerial root structure:

- ❑ Red mangrove prop root densities decreased with increasing distance from sea
- ❑ Black/ White mangrove pneumatophore densities generally increased in the same direction.
- ❑ North coast forest (Bogue & Salt Marsh): Intermediate structural development
- ❑ South coast forest (Portland Cottage): Low structural development



WAVE PROPERTIES, GEOLOGY AND BIOGEOCHEMISTRY

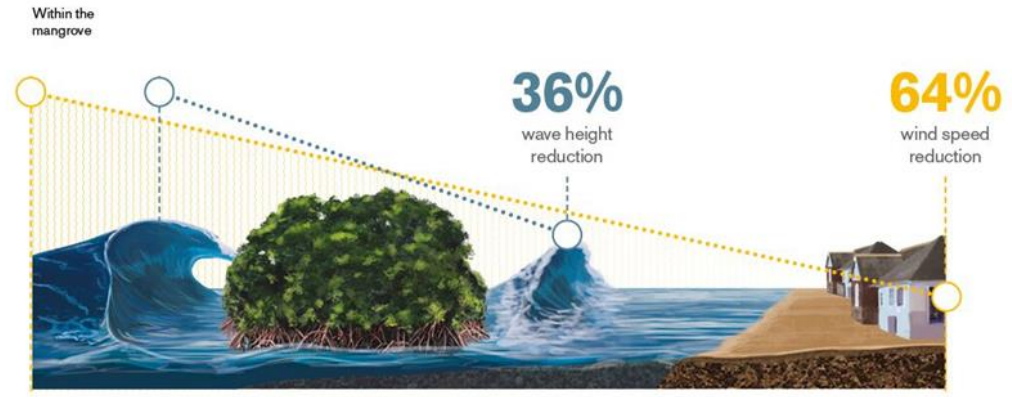
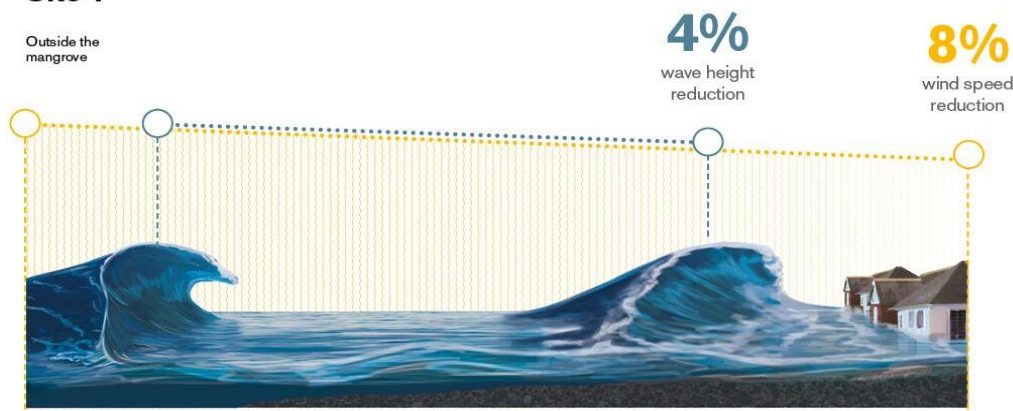


Wind & Wave Attenuation:

BOGUE LAGOON

Site 1

Outside the mangrove



	Reduction of Wave Height Outside Mangroves	Reduction of Wave Height Within Mangroves	Reduction of Wind Speed Outside Mangroves	Reduction of Wind Speed Within Mangroves
Bogue Lagoon Site 1	4	36	8	64
Bogue Lagoon Site 2	7	46	33	75
Portland Cottage Site 1	-	-	2	58
Portland Cottage Site 2	2	58	11	58
Salt Marsh Site 1	9	55	34	66
Salt Marsh Site 2	12	41	29	80

Whole Ecosystem Carbon Stock?



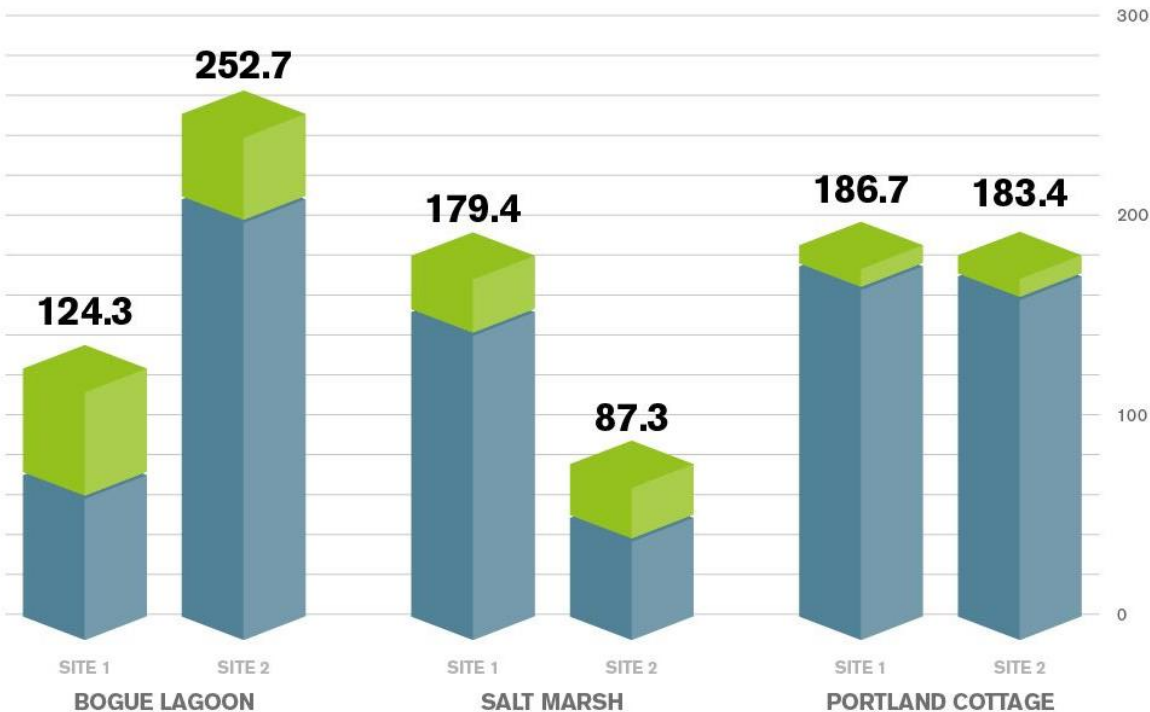
Blue Carbon

Whole Ecosystem Carbon (Mg C ha⁻¹)

Whole ecosystem carbon stocks.

Vegetation Carbon

SOC stock

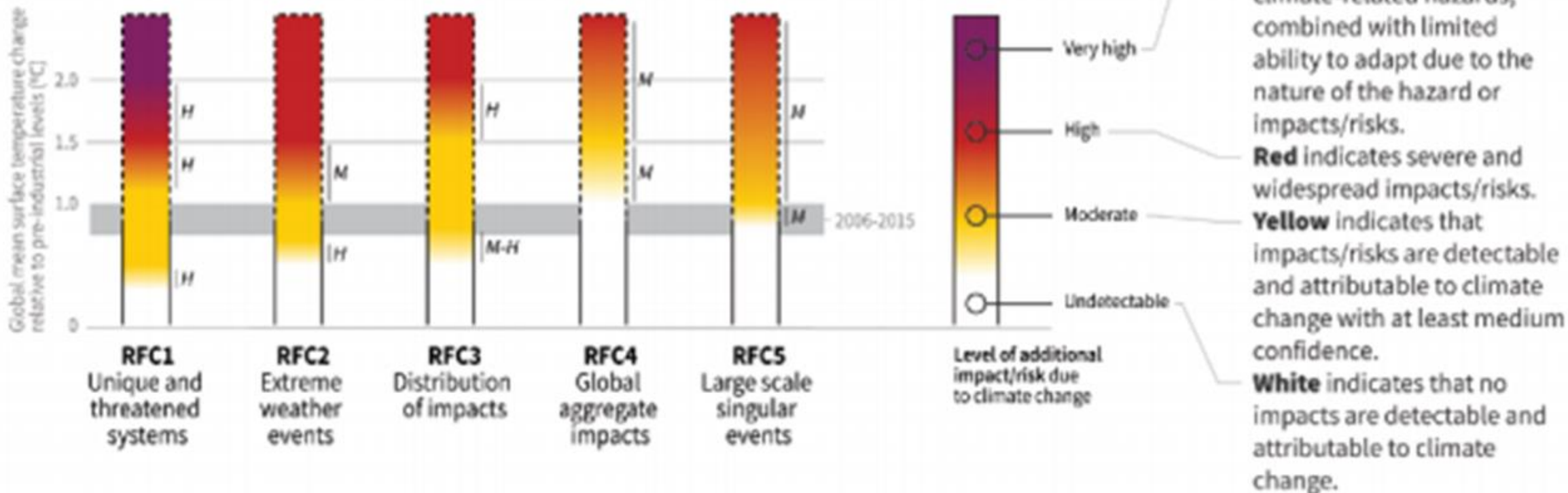


Mean ecosystem carbon stock

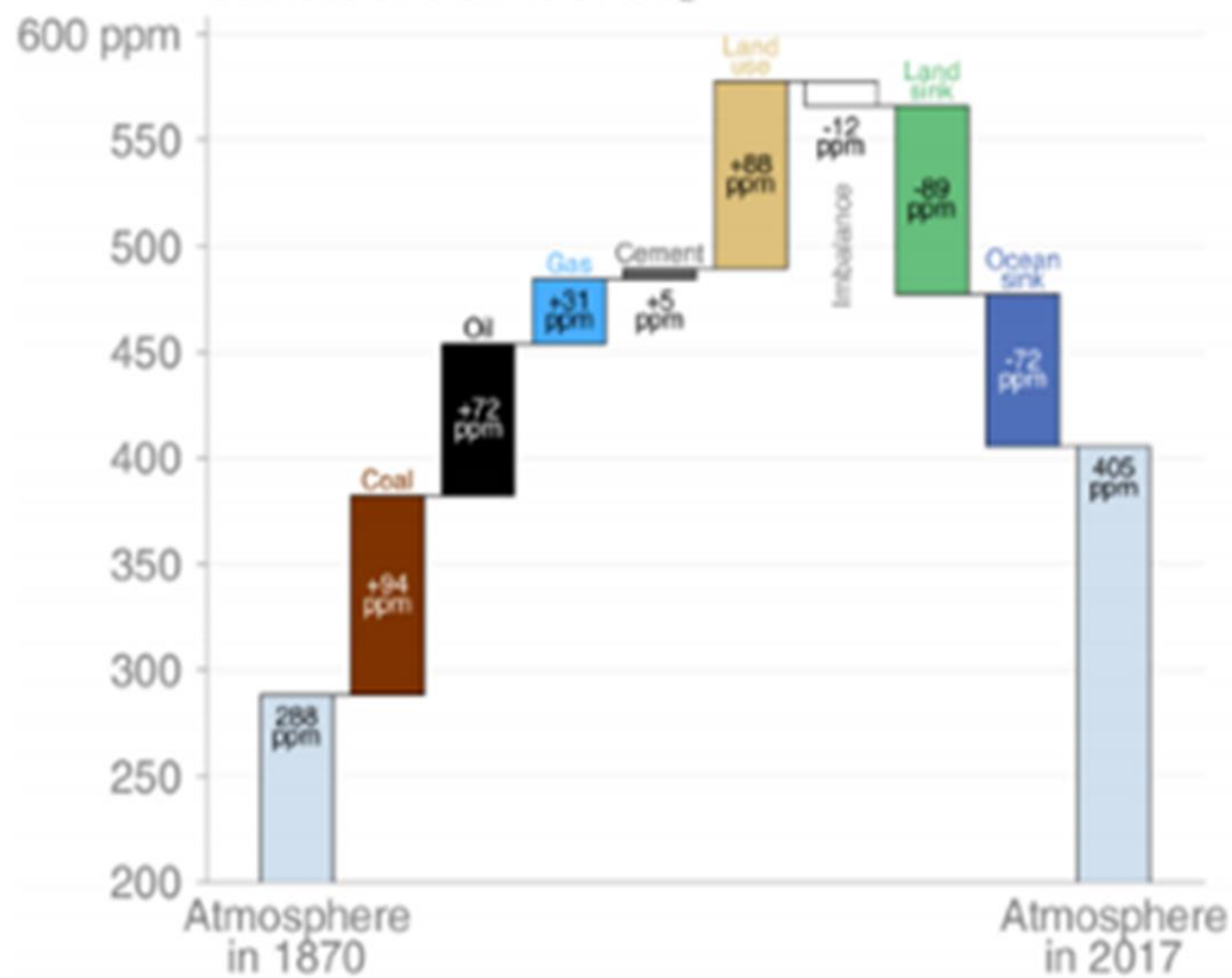
Sites	SOC stock (Mg C ha ⁻¹)	Vegetation Carbon (Mg ha ⁻¹)	Carbon Stored (Mg C ha ⁻¹)
Bogue Lagoon	158.3 ± 22.4	93.7 ± 11.6	252.0 ± 34.0
Portland Cottage	178.1 ± 5.6	14.0 ± 11.4	192.1 ± 17.0
Salt Marsh	96.5 ± 23.0	61.6 ± 5.3	158.1 ± 28.3

Five Reasons For Concern (RFCs) illustrate the impacts and risks of different levels of global warming for people, economies and ecosystems across sectors and regions.

Impacts and risks associated with the Reasons for Concern (RFCs)

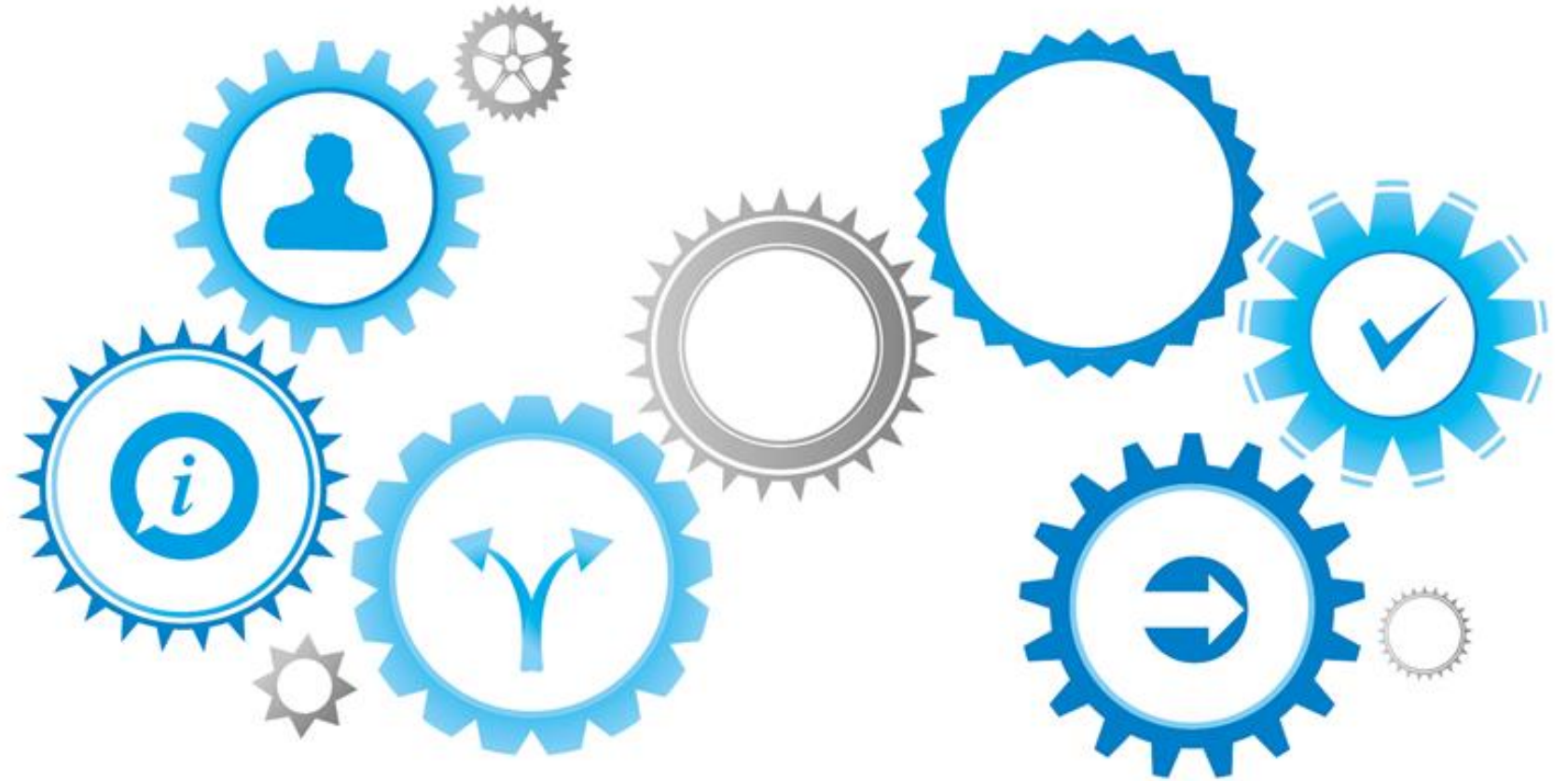


Sources and Sinks of CO₂



©© Global Carbon Project • Data: CDIAC/GCP/NOAA-ESRL/UNFCCC/BP/USGS

POLICY IMPLICATIONS



Data Governance

Collection Processing Dissemination

Although this study was conducted with the best data available, it is clear that some of glaring gaps exist in a few areas.

- Valuation
- Fisheries Data
- Elevation and bathymetry
- Methane gas from soils
- BOD of water
- Emerging contaminants
- Longer substrate depth studies

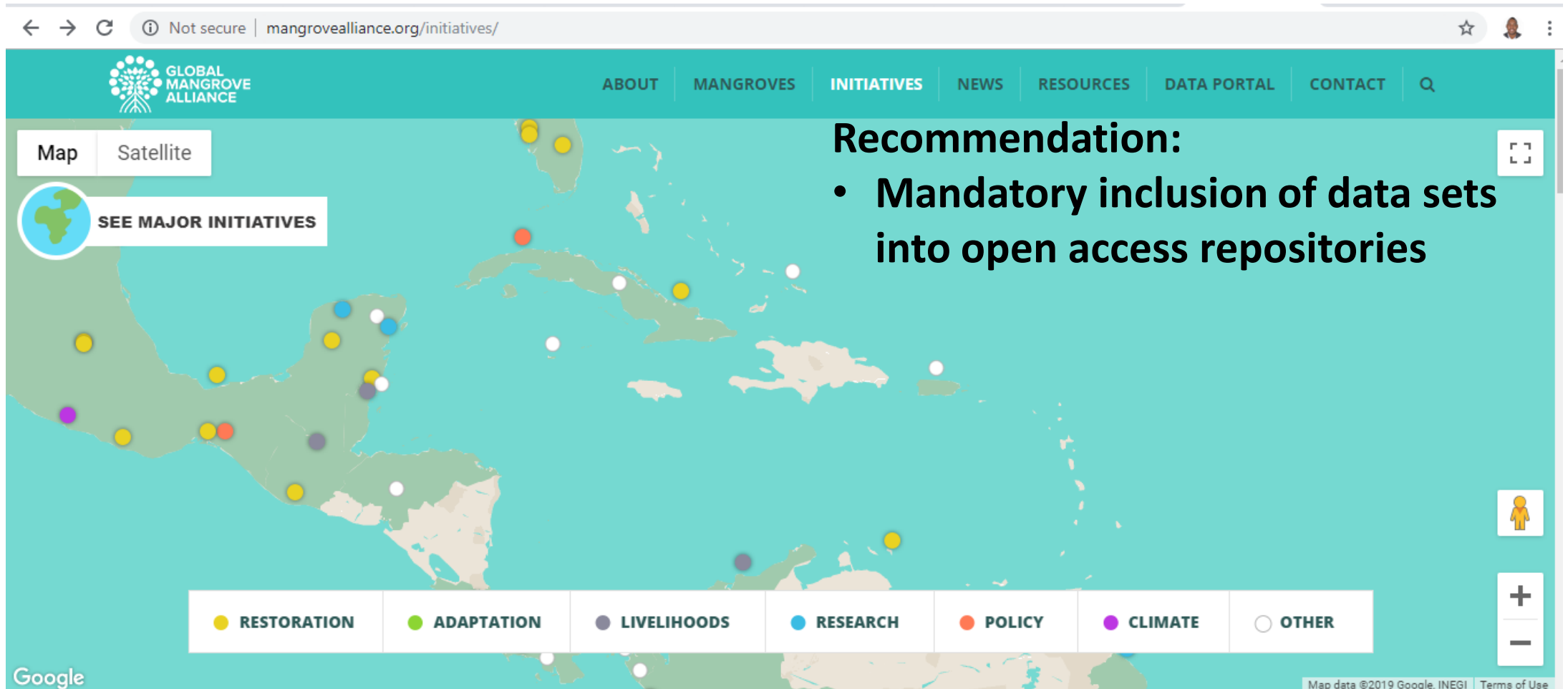
Recommendation:

- **Prioritisation of initiatives to acquire higher resolution data for greater modelling precision.**



Data Governance

- There is also a need for greater integration of mangrove data into global data repositories



Inclusion and Capacity Building

Fishers continue to use mangrove forests for their livelihoods

Recommendation:

Create enabling conditions for effective mangrove management

- Consider the current use of the mangrove forest by locals and integrate locals into decision making concerning its use, benefits and issues relating to its destruction
- Enacting laws **(esp. declaring mangroves as protected species)**, but, even more importantly, **ENFORCING** existing laws and policies



Inclusion and Capacity Building

- In all communities, there is little knowledge and involvement in mangrove restoration activities YET there is significant interest to become involved

Recommendation:

Secure the long term future of mangroves through restoration activities

- Recognise and accept the opportunities for private/public partnership by involving community members and businesses in restoration activities such as the replanting of mangroves and also the monitoring of the forest
- Share existing knowledge on ecosystem functions and services provided by the mangrove, how they are managed and by whom whether through the media, churches, schools which may help to increase support and involvement in mangrove restoration efforts
- Consider implementing or strengthening community-based approaches to the management of mangrove forest



Inclusion and Capacity Building



Community Involvement & encouragement has intrinsic values



0.25 acres under restoration, of **25 acres** of mangroves on white sand beach, **private owner!!**

Lilliput-St. James



Restoring mangroves by “hydrology”,
with community involvement

Recommendation:

stakeholders should be sensitized on
ecological mangrove rehabilitation
approaches....not “RePLANTING”



Example: Palisadoes, Kingston



- ✓ 70% survival over **12 months**
- ✓ Flowering *Avicennia*
- ✓ Increase in height, # leaves)
- ✓ More animals

- Govt. agency paused payments (no cleaning, fence breached)
- No new seedlings can live(despite falling from parents)
- **40% overall survival(18 months survey)**

Inclusion and Capacity Building

The data revealed that there is a link between mangrove degradation and poverty as revealed by activities such as illegal deforestation for housing development, the continued use of the protected areas for fishing. Mangrove support fish for local consumption and even commercial use

Recommendation:

- Mangrove management must be integrated in poverty reduction strategies, food security planning, tourism planning and waste management
 - A cost effective contribution to food security in local coastal communities



Environmental Restoration, Risk and Resilience

- Waste Removal from Mangroves recognized as a critical threat

Environmental challenges are compounded by poverty and, in turn, intensify marginalization and vulnerability



Recommendation:

- A specialised and coordinated national clean-up initiative
- Intensification of community sensitisation programmes to encourage proper garbage disposal

Environmental Restoration, Risk and Resilience

Coastal communities are vulnerable to storm surges. The impact of hurricanes on Portland Cottage, for example, has resulted in the relocation of some community members to higher elevation areas in the community referred to as Shearer heights.

Recommendations:

- Integrate the role of mangroves in climate change adaptation and disaster risk reduction into local and national adaptation plans
- Developing and extending mangrove forests to support climate change mitigation and adaptation as they are able to store carbon, reduce erosion and protect the shoreline
- More nuanced planning which displays greater sensitivity to livelihood dependencies and the impacts of displacement

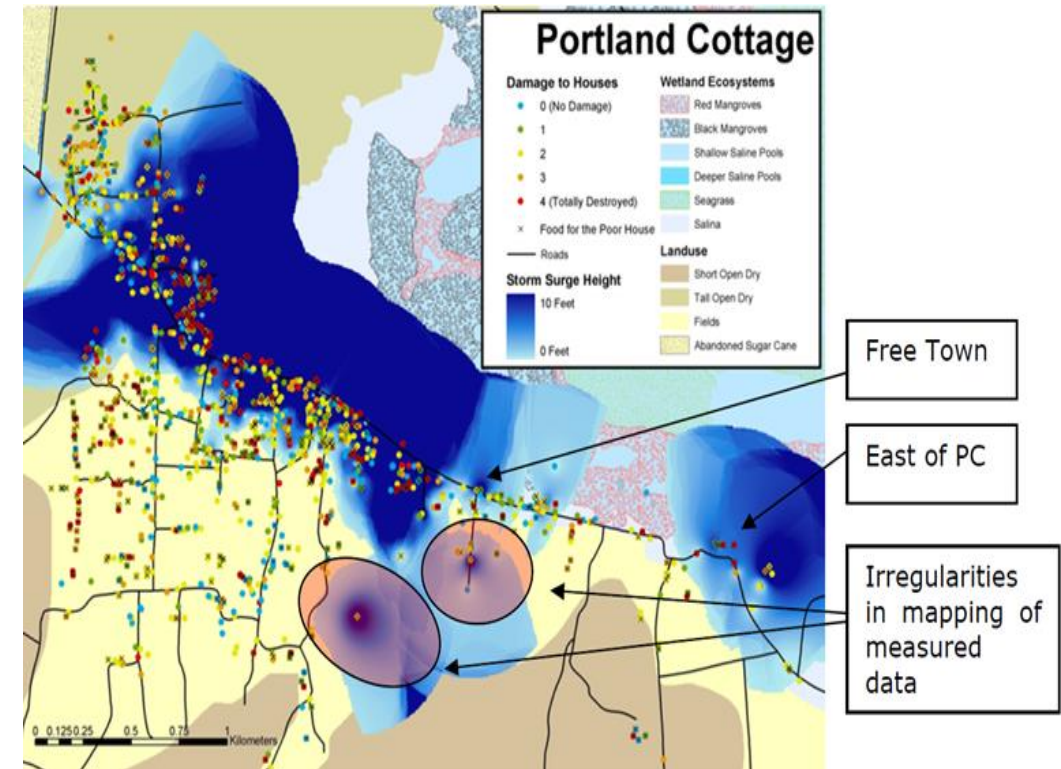


Spatial Planning

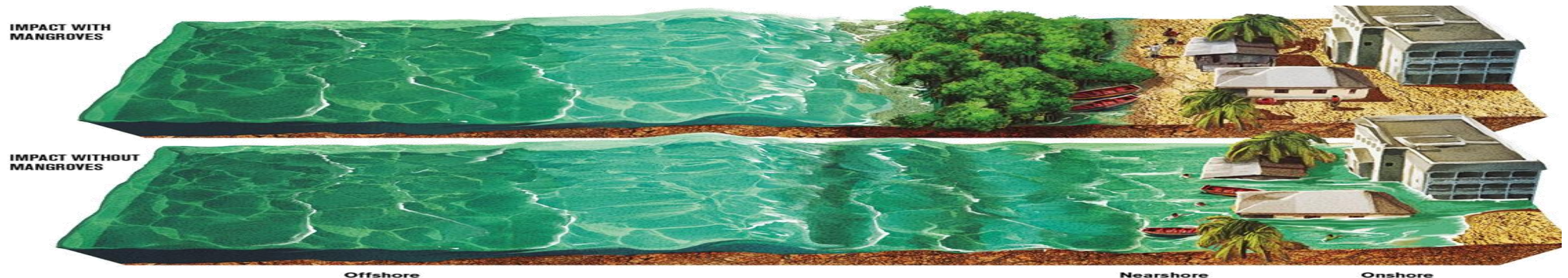
- The expansion of formal and informal structures has contributed significantly to the loss of mangrove forests
- Preserving mangrove width will aid the reduction of impact

Recommendations:

- Stronger enforcement of zoning regulations
- Buffer zones for enforcement based on previous events and risk projections



Post Ivan Damage assessments in Portland Cottage (ODPEM 2004)

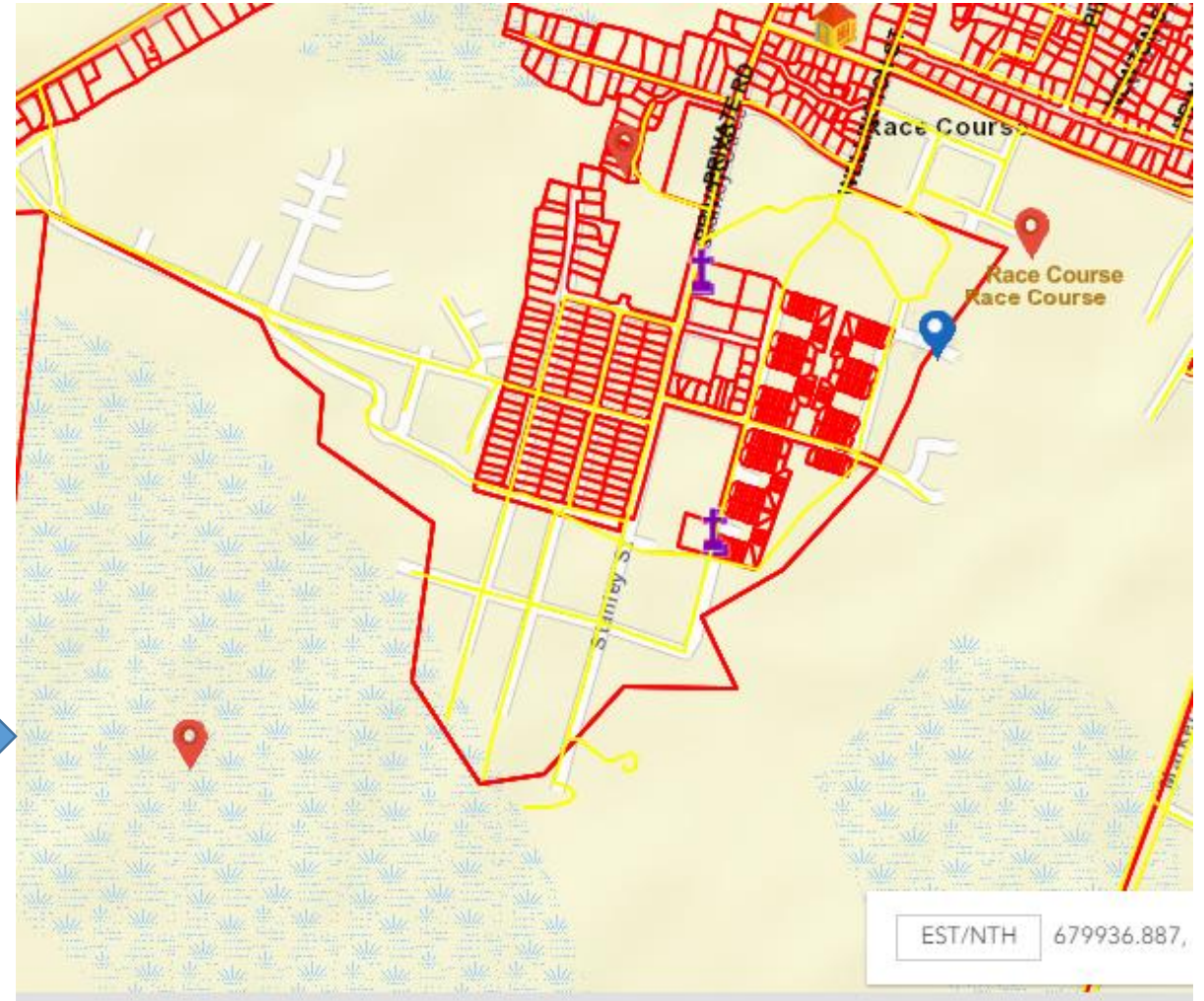
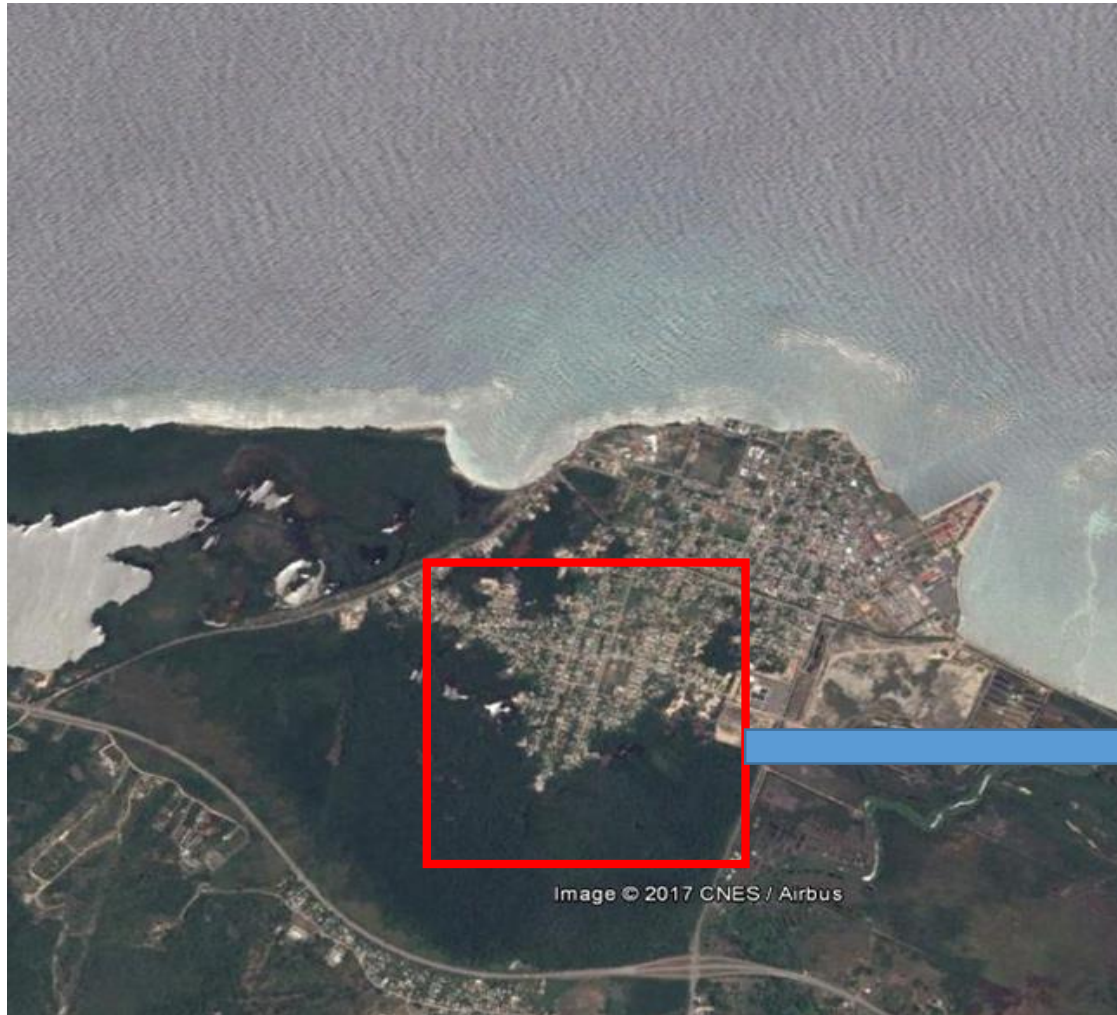


Falmouth- informal community on government lands

Moving south into mangrove forest

-no central sewage, no building codes

No intervention currently!!



Infrastructural Planning

- More viable engineering solutions that can allow the habitat and humans to coexist in a sustainable way. Several homes along the coastline were not build on stilts
- Construction of houses on stilts provide one option of risk reduction and may offset the impacts of coastal flooding



Recommendation:

- Strict enforcement of building codes in high risk zones
- Financing of infrastructural adaptation initiatives

Community based or Gov't
implemented hybrid engineering
solutions as a compromise



Installation of sustainable infrastructure much like
what is modelled at the DBML



Recommendation:

Establish & encourage ways for the communities
who are dependent on the wetland community
for their livelihoods or because of their heritage to
thrive.

Concluding Remarks

- Many useful policies already exist but enforcement is critical
- Finance: a major catalyst
- Poverty reduction and livelihood diversification is key
- More specific focus needed on understanding the role of gender in intervention initiatives
- Greater sensitivity to synergistic effects and associated intervention strategies
- Stronger and more sustainable partnerships
- In the context of scarce resources, intervention initiatives need to specifically target areas in most critical need