adrc 23 Australian Disaster Resilience Conference

Australian Government
National Emergency Management Agency

Australian Institute for Disaster Resilience

NRMA INSURANCE

Insuring Nature Based Defences

The Role of the Insurance Sector in Promoting Nature-Based Solutions Involving Coastal Wetlands in Australia

Dr Justine Bell-James

The University of Queensland

Ondrej Bures

Finity Consulting

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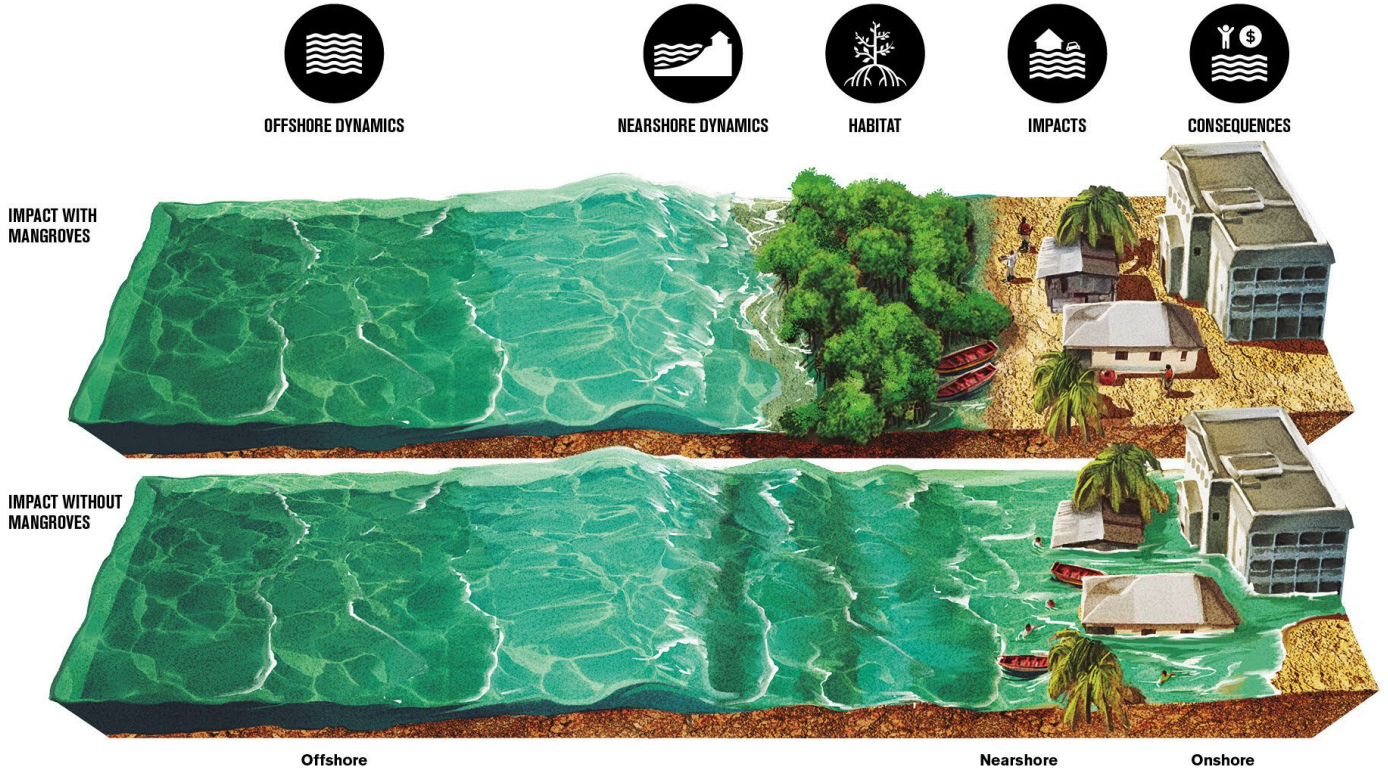
Coastal wetlands and resilience

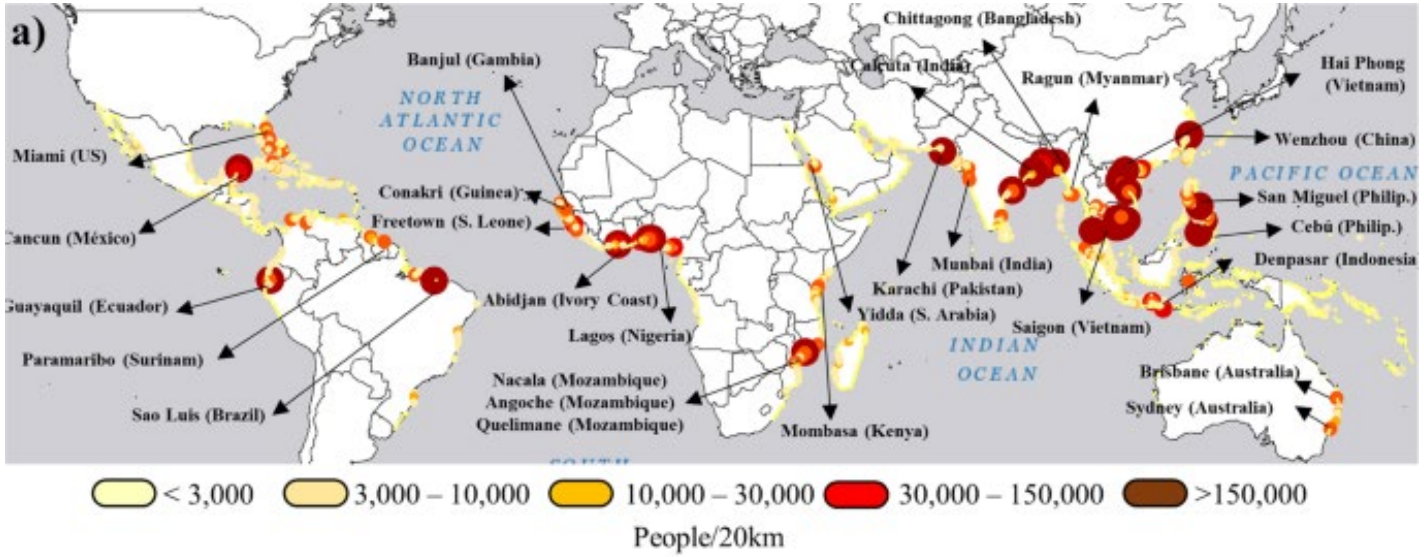
Coastal wetlands protect coasts by

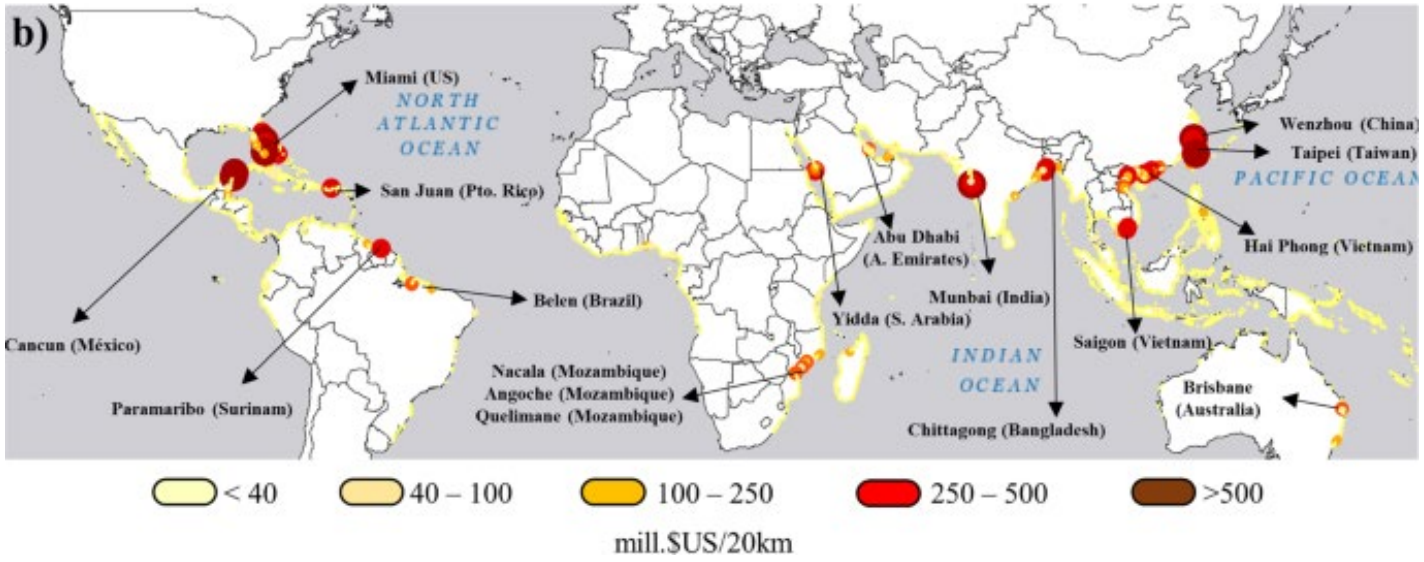
- Reflecting energy
- Slowing water flow
- Reducing wave height
- Recharging water supplies
- Reducing flood risk

(plus other ecosystem services – storing carbon, fish habitat, etc)



University of California (2020) *Research shows mangrove conservation can pay for itself in flood protection. Phys.org.* https://phys.org/news/2020-03-mangrove.html





Mangroves provide flood protection benefits exceeding **$US 65 billion per year**

If mangroves were lost, **15 million more people** would be flooded annually across the world

*Menéndez, P., Losada, I.J., Torres-Ortega, S. et al. The Global Flood Protection Benefits of Mangroves. Sci Rep **10**, 4404 (2020)*

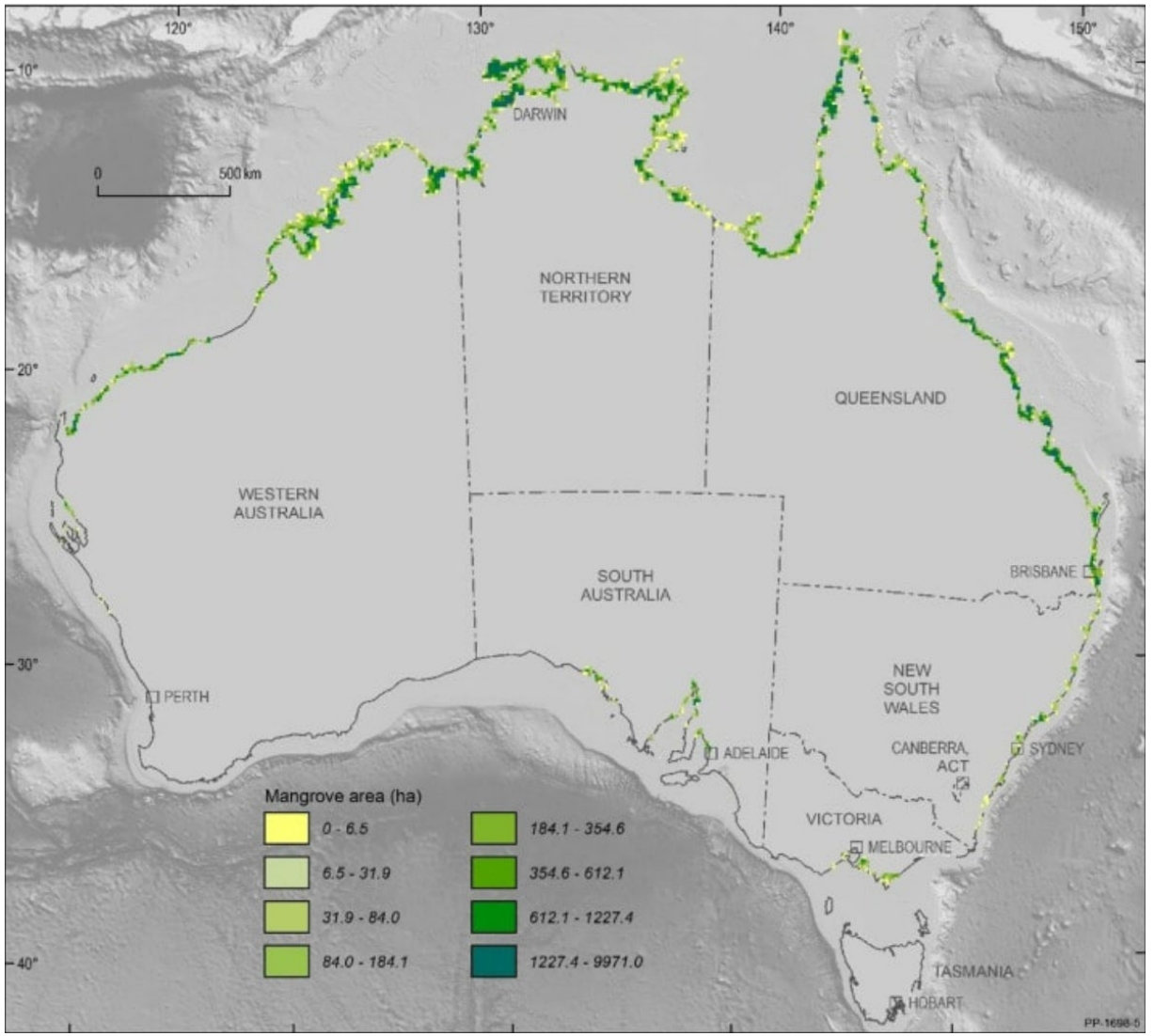
Areas with higher-than-average mangrove extent recover faster from cyclones

GRID Arendal on Flickr

*Hochard, J. P., et al. (2019). "Mangroves shelter coastal economic activity from cyclones." Proceedings of the National Academy of Sciences **116**(25): 12232-12237.*

Opportunity in Australia

- Australia has one of the largest areas of mangroves in the world
- Australia is home to around 7% of the world's mangroves
- We have a significant opportunity to use these natural barriers for risk reduction and protection of assets



The extent of mangroves in Australia in 2017.

Lymburner, L., Bunting, P., Lucas, R., Scarth, P., Alam, I., Phillips, C., Ticehurst, C., & Held, A. (2019). Mapping the multi-decadal mangrove dynamics of the Australian coastline. Remote Sensing of Environment, 111185. https://doi.org/10.1016/j.rse.2019.05.004)

- Estimated $29.6 billion of cyclone damage averted in Australia (from 1967-2016) due to wetlands
- $236 million per storm
- $4203 per hectare of wetland

*Mulder, O. J., et al. (2020). "The value of coastal wetlands for storm protection in Australia." Ecosystem Services **46**: 101205.*

https://wallpaperaccess.com/mangrove

Mangroves are threatened by climate change

Dead mangroves in St. Kilda - An adjacent salt mining company reinstated a pump against the terms of its tenancy in 2020 and hypersaline water leaked from gypsum ponds into the wetlands

https://www.abc.net.au/news/2021-08-13/blue-carbon-creating-value-from-magnificent-mud/100371238

Australia is losing the equivalent of 700 soccer pitches in blue carbon wetlands annually

- Climate change is a threat to mangroves as rising sea levels and more extreme weather events can damage or destroy mangrove forests
- Rate of loss in Australia estimated to be between 2 and 5% per year or 200,000 and 500,000 hectares of wetlands each year
- Affected also by urbanization, agriculture, mining

Climate change is increasing cyclone risk

IPCC AR6 outlined with very high confidence that "ongoing climate trends have exacerbated many extreme events", including tropical cyclones.

- **Decrease in frequency**, but highly variable year to year
- **Increase in intensity** with stronger winds and greater rainfall, which will lead to greater coastal impacts when combined with the projected sea level rise and other factors.
- Rising sea levels together with warming of oceans will amplify the impacts
- Low level of confidence that tropical cyclones will occur **further south**
- **Rapid intensification** more often
- Difficult to predict **storm surge**
- Number of cyclones with **higher wind speeds** projected to increase

The restoration imperative

1. *Decides* to proclaim 2021–2030 the United Nations Decade on Ecosystem Restoration, within existing structures and available resources, with the aim of supporting and scaling up efforts to prevent, halt and reverse the degradation of ecosystems worldwide and raise awareness of the importance of successful ecosystem restoration;

UN General Assembly Resolution 73/284

UNITED NATIONS DECADE ON
ECOSYSTEM
RESTORATION
2021-2030

TARGET 2

Ensure that by 2030 at least 30 per cent of areas of degraded terrestrial, inland water, and coastal and marine ecosystems are under effective restoration, in order to enhance biodiversity and ecosystem functions and services, ecological integrity and connectivity.

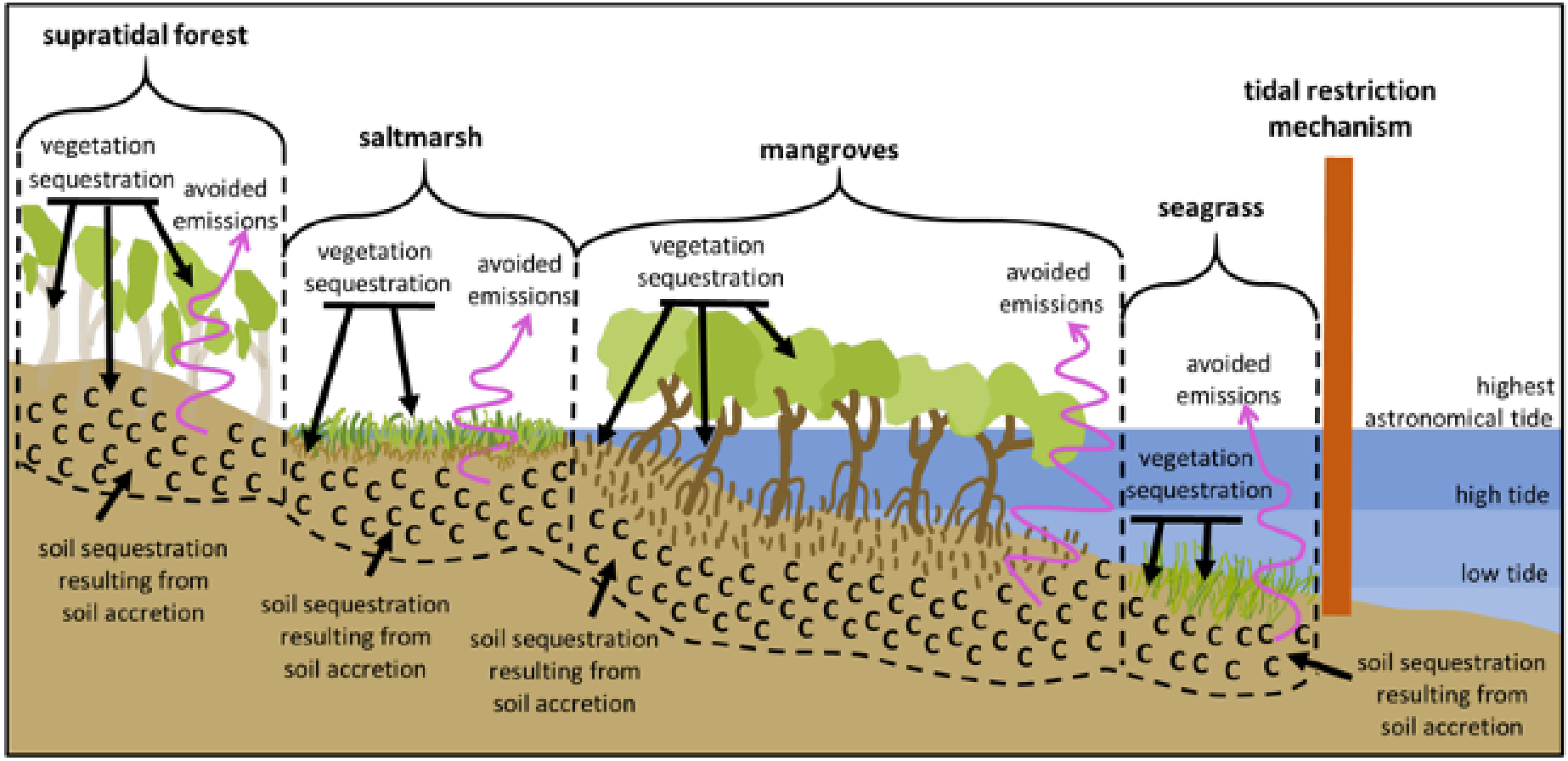
Kunming-Montreal Global Biodiversity Framework

Legislative barriers

- Permitting
- Tenure
- Liability

Kiran Bahra on Flickr

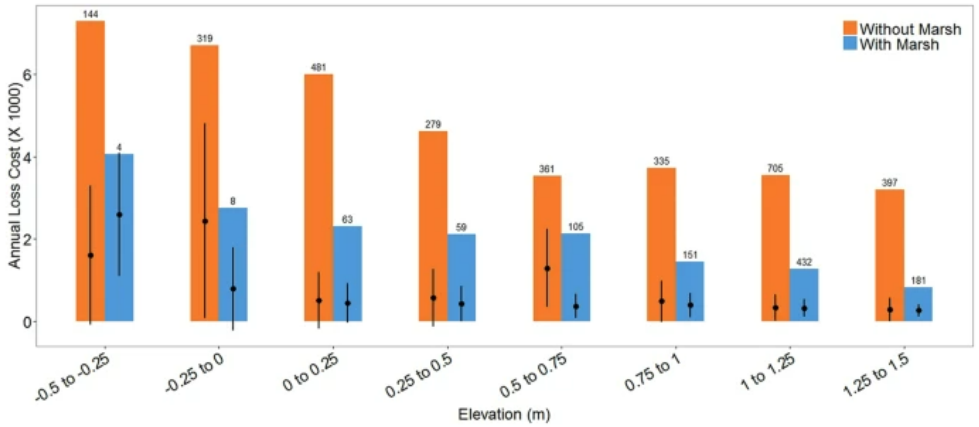
Significant funding is needed



Source – CER, Blue Carbon Method Guide, 2022

Wetlands and risk reduction measures

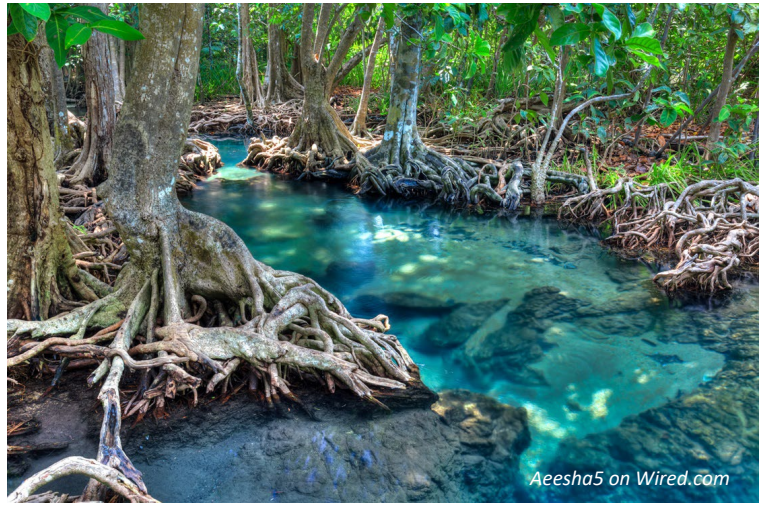
Figure 3



Annual loss costs from flooding for properties with and without marshes, by elevation class. Annual loss costs are shown for properties with marshes and without marshes, from −0.5 to +1.5 m above the NAVD88 sea-level datum. Coloured bars show the range of loss costs for each class. Black dots represent the mean loss costs and black bars represent one standard deviation from the mean. Numbers on top of each bar give the number of properties assessed. For full range of elevations see Fig. SI 3. Annual loss costs represent the losses to a property normalised by the insurable value of the property and expressed per US $1,000 (for the year 2012). Here all properties are assumed to have an insurable value of US $1,000,000. We do not show loss cost values less than 0.1 (i.e. annual losses less than $100 per $1,000,000 property).

*Narayan, S., Beck, M.W., Wilson, P. et al. The Value of Coastal Wetlands for Flood Damage Reduction in the Northeastern USA. Sci Rep **7**, 9463 (2017). https://doi.org/10.1038/s41598-017-09269-z*

- Where we build and how we build matters
- Adopting zoning and building codes that consider wetland areas is crucial
- Restriction of development in fringe zones may help prevent further encroachment on wetlands

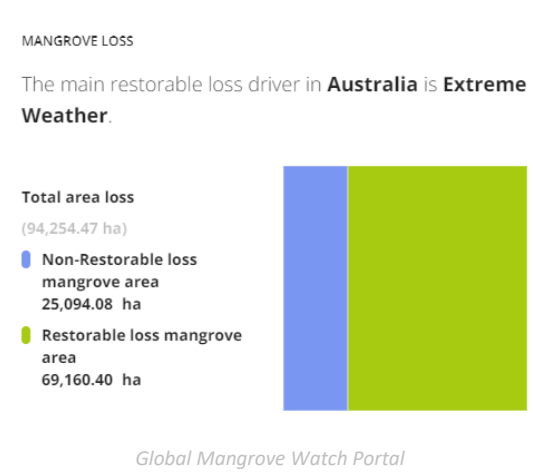


Risk reduction potential

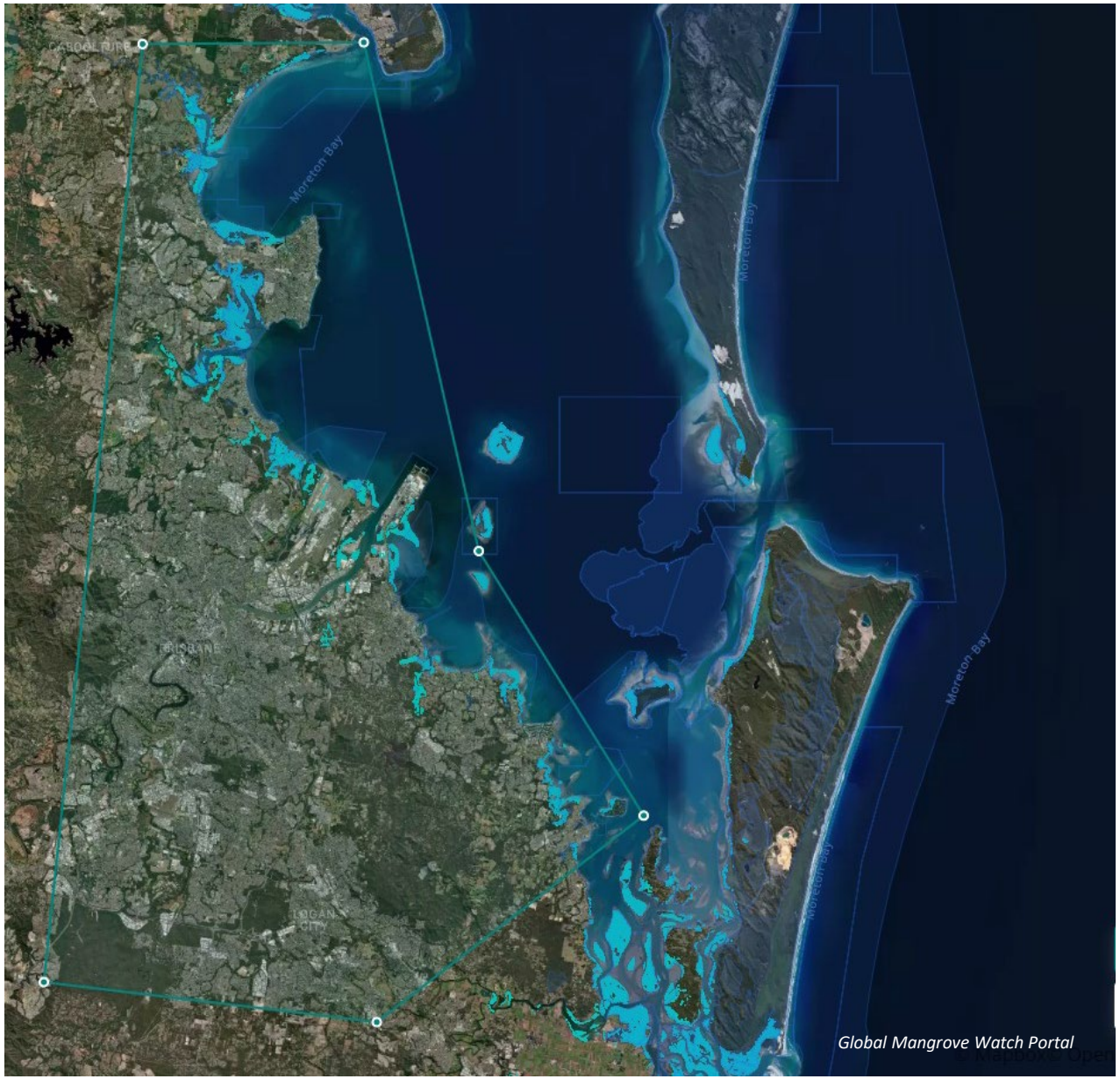
- In the selected area, there is roughly 35 km^2 mangrove habitat (as of 2020),
- The extent of mangroves in the area decreased by about 2 km^2 between 1996 and 2020
- Total organic carbon stored in the area is estimated at 8 Mt CO2e

For Australia as a whole

- Area decreased by 483.9 km^2 between 1996 and 2020
- Around 50% are in protected areas
- Mangroves are expected to protect 176.45 km^2 during a 100-year storm
- protect 59,832 individuals during an average annual storm
- Expected to protect $792M annually



Global Mangrove Watch Portal



Global Mangrove Watch Portal

Grey infrastructure vs mangroves

Table 3-3. NBS cost components

CAPEX	OPEX	Transaction costs	Opportunity costs [a]	Disservices
- Design and planning - Securing permits - Land acquisition - Community resettlement - Site preparation - Construction - Tree planting	- Monitoring labor and technology - Tree and vegetation maintenance - Invasive species removal - Land use (for example, rent or other payments to landowners) - Land protection, including managing and controlling access	- Scoping studies and other technical assistance - Community engagement / stakeholder outreach - Goal setting and prioritization	- Value of using land for other purposes such as agriculture or residential/ commercial development - Opportunity cost of local labor and materials used for implementing the NBS project	- Negative impacts from NBS (for example, mosquitoes, pests)

Source: Original table for this publication.
Note: CAPEX = capital expenditures; NBS = nature-based solutions; OPEX = operating expenses.
a. Avoid double counting between opportunity cost and CAPEX/OPEX cost components. For example, do not include land acquisition costs in CAPEX and the opportunity cost of land.

From World Bank

- Costs vary depending on a project
- World bank study from 2017 found that the yearly costs of mangrove forests in Bangladesh were $1/10^{th}$ of yearly cost of levees per hectare
- Grey infrastructure commonly build but expensive to build, maintain and can harm ecosystems and is harder to adapt to changes
- Green infrastructure – cheaper, provide other benefits, but can be damaged by storms – that is where insurance comes in

Hybrid protection?


https://www.dezeen.com/2016/10/24/tetrapot-coastal-defence-design-plant-pot-sheng-hung-lee-china/

Based on data for 112 countries and regions where mangrove forests are present along the coastline, the global benefit/cost ratio for the

combination of dikes and mangrove is approximately 1.5 times higher than the ratio for dike-only protection

Protection tools

Coastal ecosystems can be protected by many tools

Buyout schemes

Discounted flood insurance schemes

Tenders to carry out conservation

Blue carbon financing

Extension of Indigenous land rights

Mitigation and adaptation strategies to increased climate change risk

CSR Tools

Establishing sustainable financing mechanisms – investigating insuring nature against catastrophic events (limiting damage+ preventing releasing carbon)

Damsea on Shutterstock

Insurance sector as an enabler

- In promoting nature-based solutions
- Reducing vulnerability of coastal communities
- Demonstrating and understanding the value of wetlands in disaster mitigation and damage mitigation play a role in protecting them
- Carbon sequestration


Vijesh Datt on Unsplash

Key questions to resolve

- Are they included in flood models ? Providing frictional resistance to flooding, isolating impact is not common practice.
- Collaboration of ecological modelers and risk modelers
- Lack of high-resolution large-scale assessments of the value of coastal wetlands for reducing property damages
- Are decision makers aware about the benefits and consider mangroves as viable option in disaster mitigation?

Boondall Wetlands (Shutterstock)

Thank you

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