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REGIONAL FLYWAY INITIATIVE TRAINING SERIES

ការវាយតម្លៃសេវាកម្មអេកូឡូស៊ីតំបន់ជីសើមនៅកម្ពុជា  
**Wetland Ecosystem Services  
Cambodia**

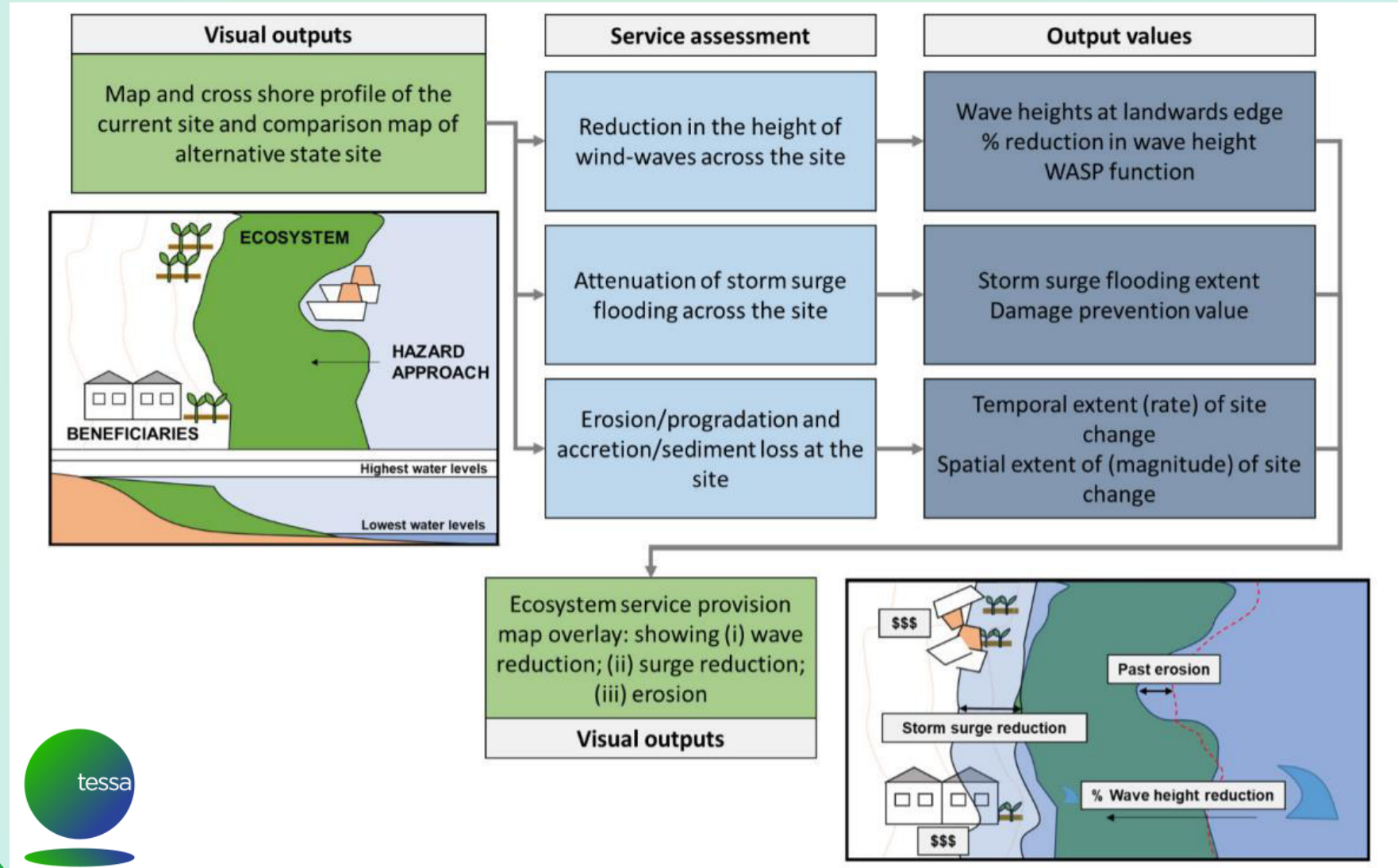
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13-14 September 2023



**Coastal protection and water-related services:  
preliminary results**

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## Site-based assessment: Coastal protection in TESSA



## Site-based assessment: Coastal protection in TESSA

### Datasets required:

- Topographic information
- Details of the surrounding area
- Any existing data on wave and tidal heights
- Any existing data on wind records
- Information about how the site has changed over time

Coastal Hazard 	Coastal Ecosystem 	Beneficiaries (people/assets affected by hazard) 
<ul style="list-style-type: none"> <li>• Type of hazard (waves, storm surge, erosion)</li> <li>• Magnitude (e.g. wave height, peak water level)</li> <li>• Frequency of the hazard</li> <li>• Direction of approach of hazard</li> </ul>	<ul style="list-style-type: none"> <li>• Type (mangrove, salt marsh, tidal flat)</li> <li>• Location relative to hazards and beneficiaries</li> <li>• Area (width and length)</li> <li>• Characteristics of the ecosystem (e.g. elevation, vegetation cover)</li> <li>• Likely alternative state if ecosystem not present</li> </ul>	<ul style="list-style-type: none"> <li>• Types of land use/assets (e.g. buildings, roads, agriculture, aquaculture)</li> <li>• Number of people within the zone likely to be affected</li> <li>• Location and elevation of people and assets</li> <li>• Loss of value that would occur if hazard affects beneficiaries</li> </ul>

## Site-based assessment: Coastal protection in TESSA

Coastal M1	Coastal M2	Coastal M3	Coastal M4
Obtaining information on hazards, ecosystems and beneficiaries/assets affected through stakeholder meetings	Creating maps of your sites	Drawing a cross-sectional profile of your site	Estimating the tidal limits and % inundation frequency
Coastal M5	Coastal M6	Coastal M7	Coastal M8
Estimating water depth	Estimating incident wave conditions	Estimating topographic variability and percentage reduction of waves through saltmarshes and mudflats during inundations with onshore directed waves	Estimating percentage reduction of waves through mangroves
Coastal M9	Coastal M10	Coastal M11	Coastal M12
Calculating the wave attenuation service provision by your site	Working out whether storm surges occur at the site	Estimating storm surge reduction with distance through wetlands using average rates of reduction from the literature	Using numerical storm surge models to estimate surge reduction through wetlands
Coastal M13	Coastal M14	Coastal M15	Coastal M16
Estimating the value of storm surge reduction benefits	Conducting a visual inspection to assess if the site is changing	Estimating the rate of lateral erosion/progradation	Estimating the extent to which sediment is being conserved within the site/system or is entering the sit

## The two-pronged approach of the Regional Flyway Initiative



Source: East Asian-Australasian Flyway Partnership & Asian Development Bank

High-level, modelling-based assessment



Site-level, participatory assessment



# Modelling-based assessments of the Regional Flyway Initiative

## InVEST models



Carbon | [Read more »](#)

Crop Pollination | [Read more »](#)

Habitat Risk Assessment | [Read more »](#)

Reservoir Hydropower Production (Water Yield) | [Read more »](#)

Sediment Retention | [Read more »](#)

Urban Stormwater Retention | [Read more »](#)

[Coastal Blue Carbon | Read more »](#)

Crop Production | [Read more »](#)

Offshore Wind Energy | [Read more »](#)

Scenic Quality | [Read more »](#)

Urban Cooling | [Read more »](#)

[Water Purification | Read more »](#)

[Coastal Vulnerability | Read more »](#)

Habitat Quality | [Read more »](#)

Recreation | [Read more »](#)

Seasonal Water Yield | [Read more »](#)

[Urban Flood Risk Mitigation | Read more »](#)

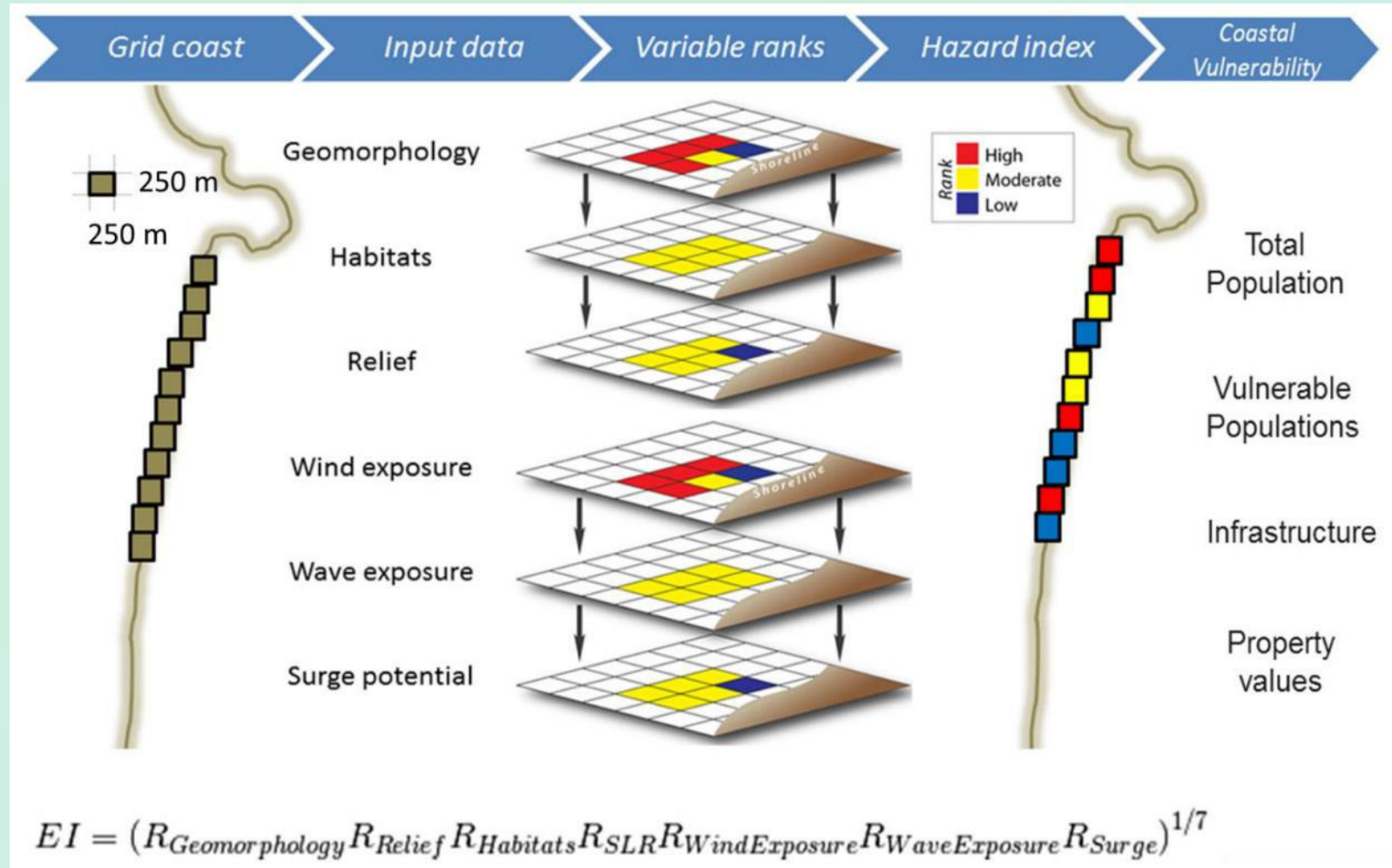
Wave Energy | [Read more »](#)



<https://naturalcapitalproject.stanford.edu/software/invest>



## Modelling-based assessment: Coastal protection (biophysical)

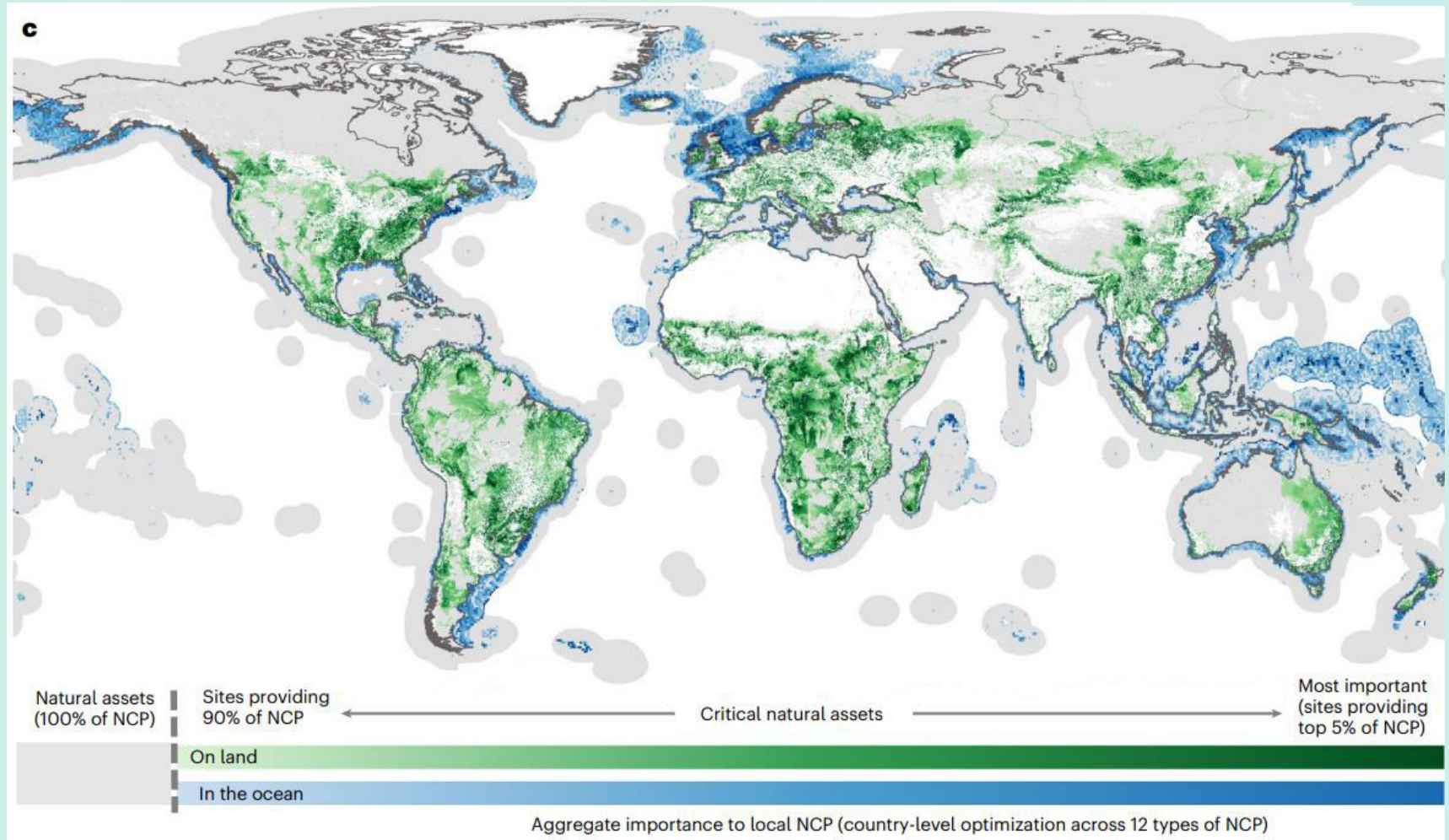


Silver et al., 2019: A National Coastal Hazard and Social Vulnerability Analysis for The Bahamas

## Modelling-based assessment: Coastal protection (biophysical)

**a**

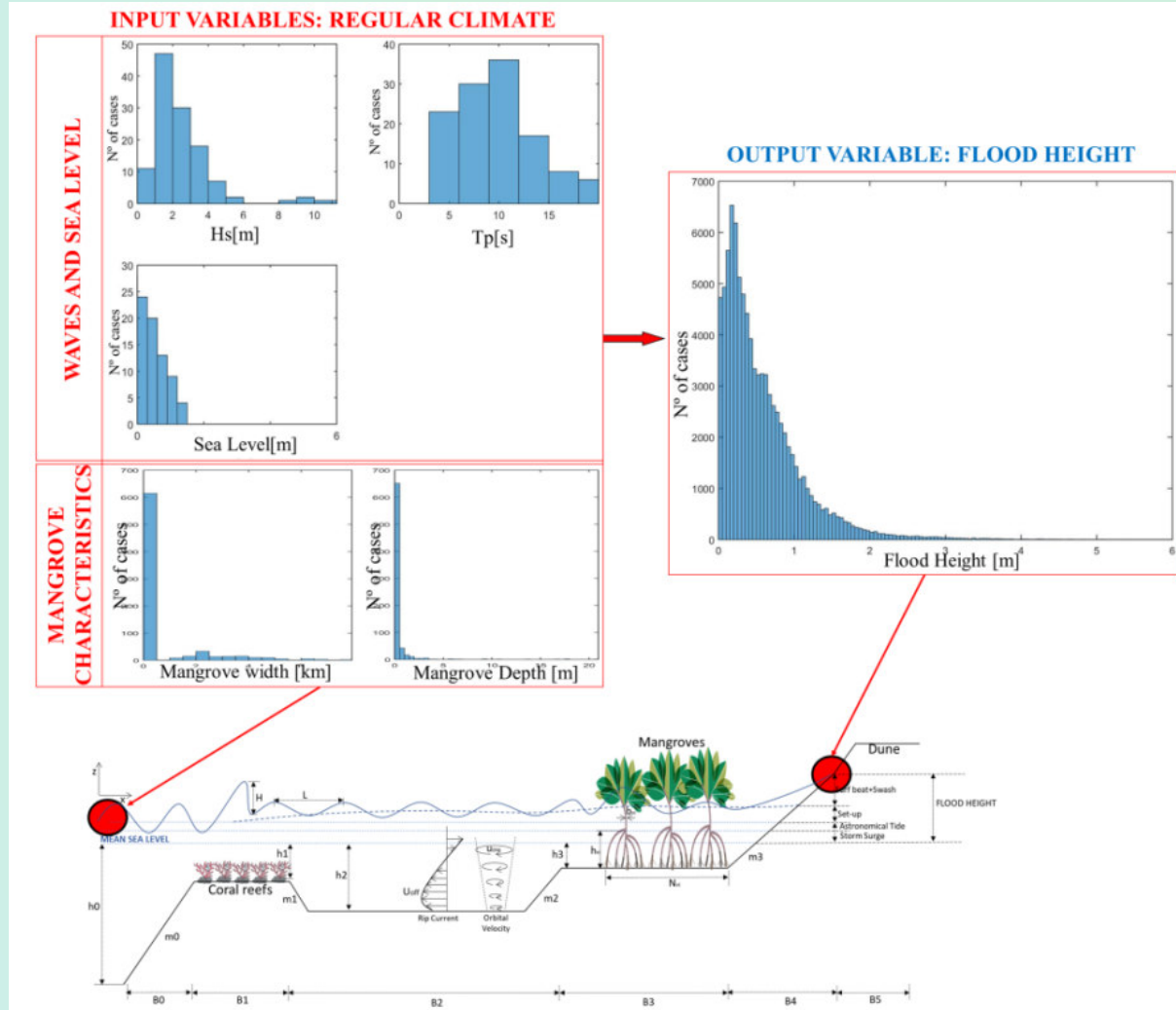
List of local NCP modelled
Nitrogen retention for water quality regulation
Sediment retention for water quality regulation
Pollinator habitat sufficiency for pollination-dependent crops
Fodder for livestock
Timber production
Fuelwood production
Flood regulation
Riverine fish harvest
Access to terrestrial nature (for local recreation and gathering)
Coastal risk reduction (terrestrial and marine)
Marine fish harvest
Marine recreation (coral-reef tourism and associated livelihoods)



Chaplin-Kramer et al., 2022: Mapping the planet's critical natural assets

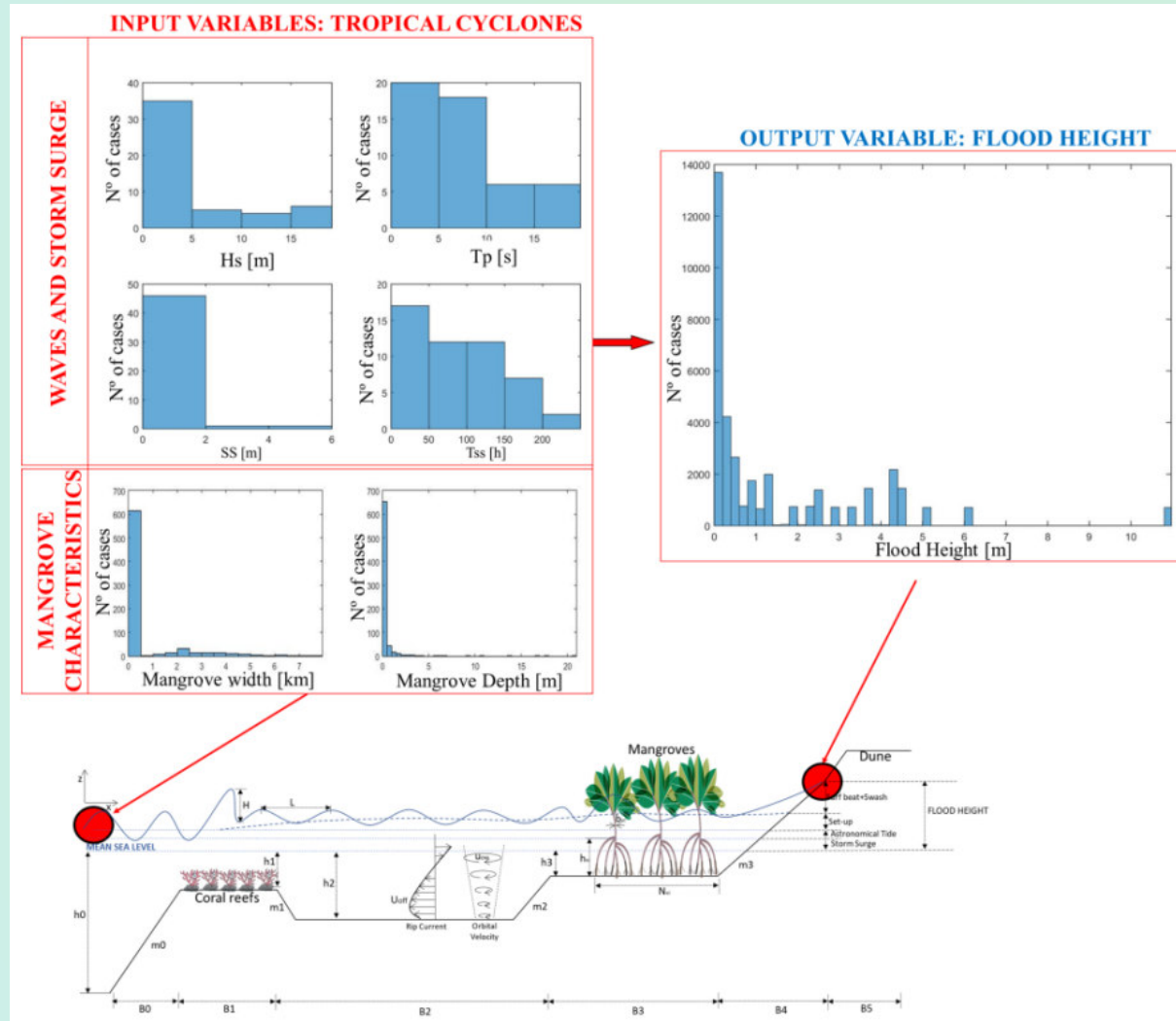


# Modelling-based assessment: Coastal protection (economic)



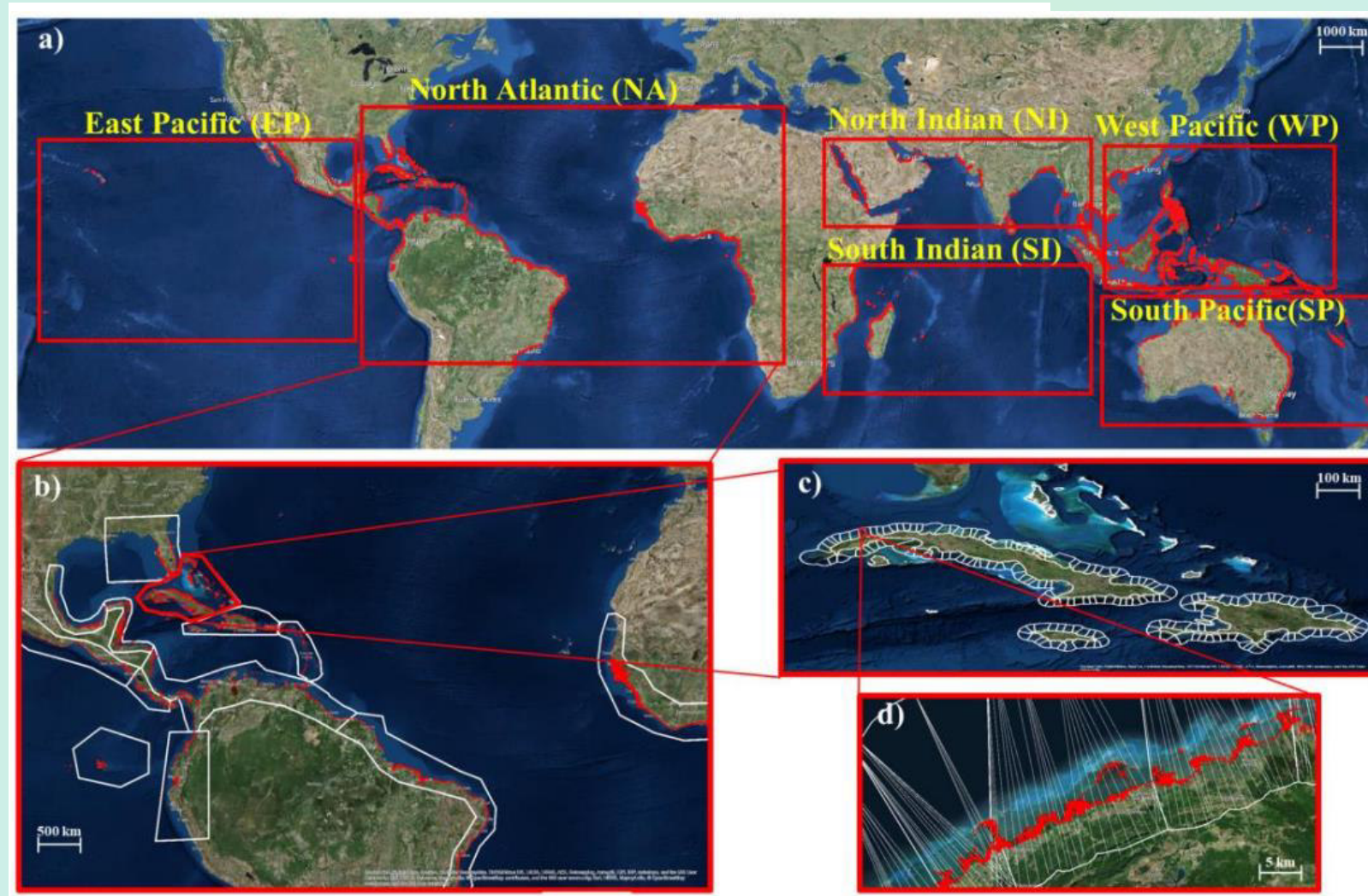
Menendez et al., 2020: The Global Benefits of Mangroves

# Modelling-based assessment: Coastal protection (economic)



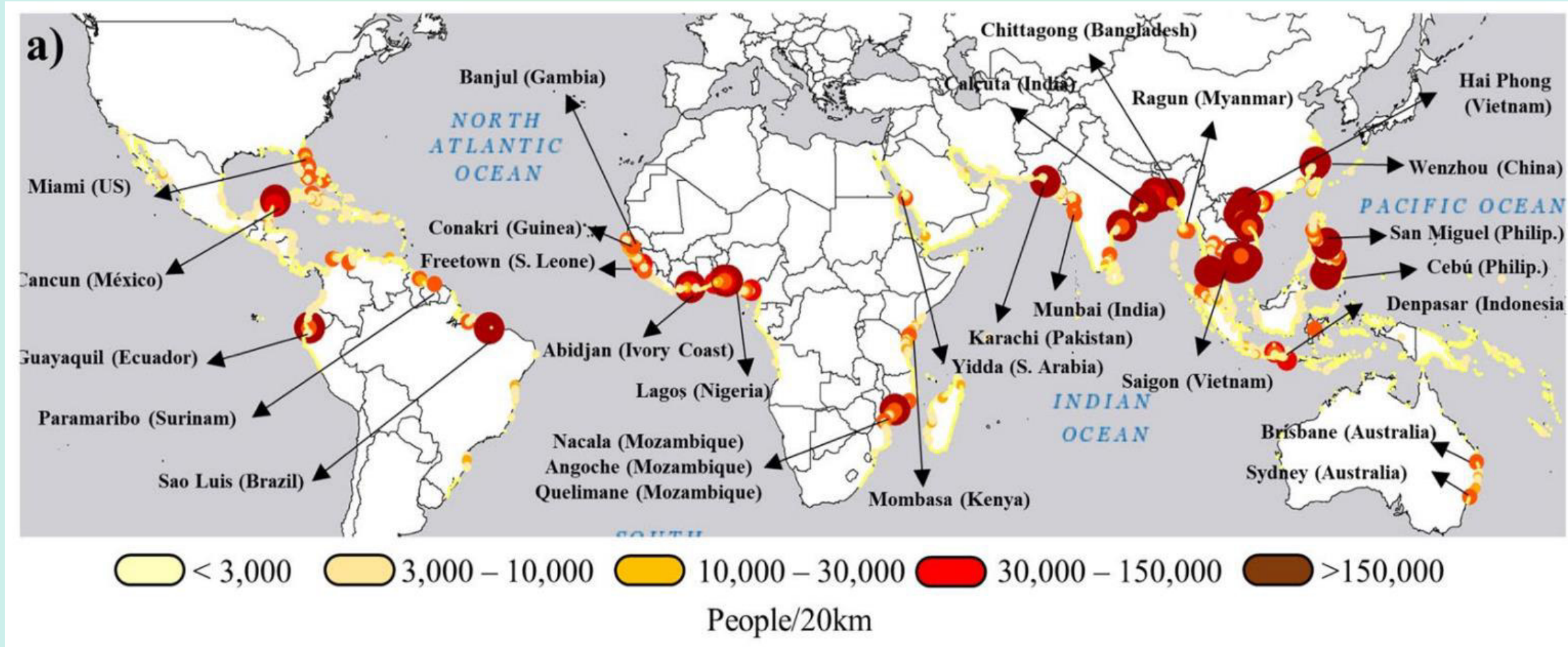
Menendez et al., 2020: The Global Benefits of Mangroves

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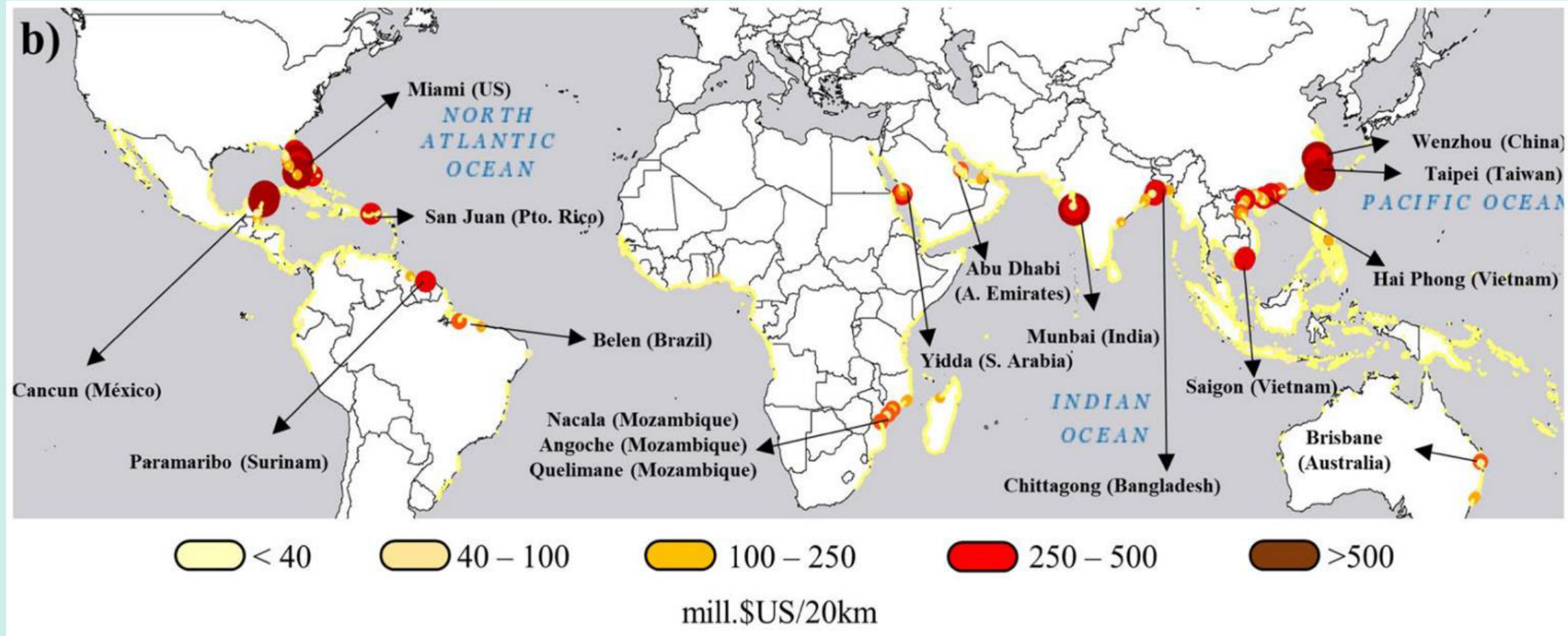


Menendez et al., 2020: The Global Benefits of Mangroves

## Modelling-based assessment: Coastal protection (economic)



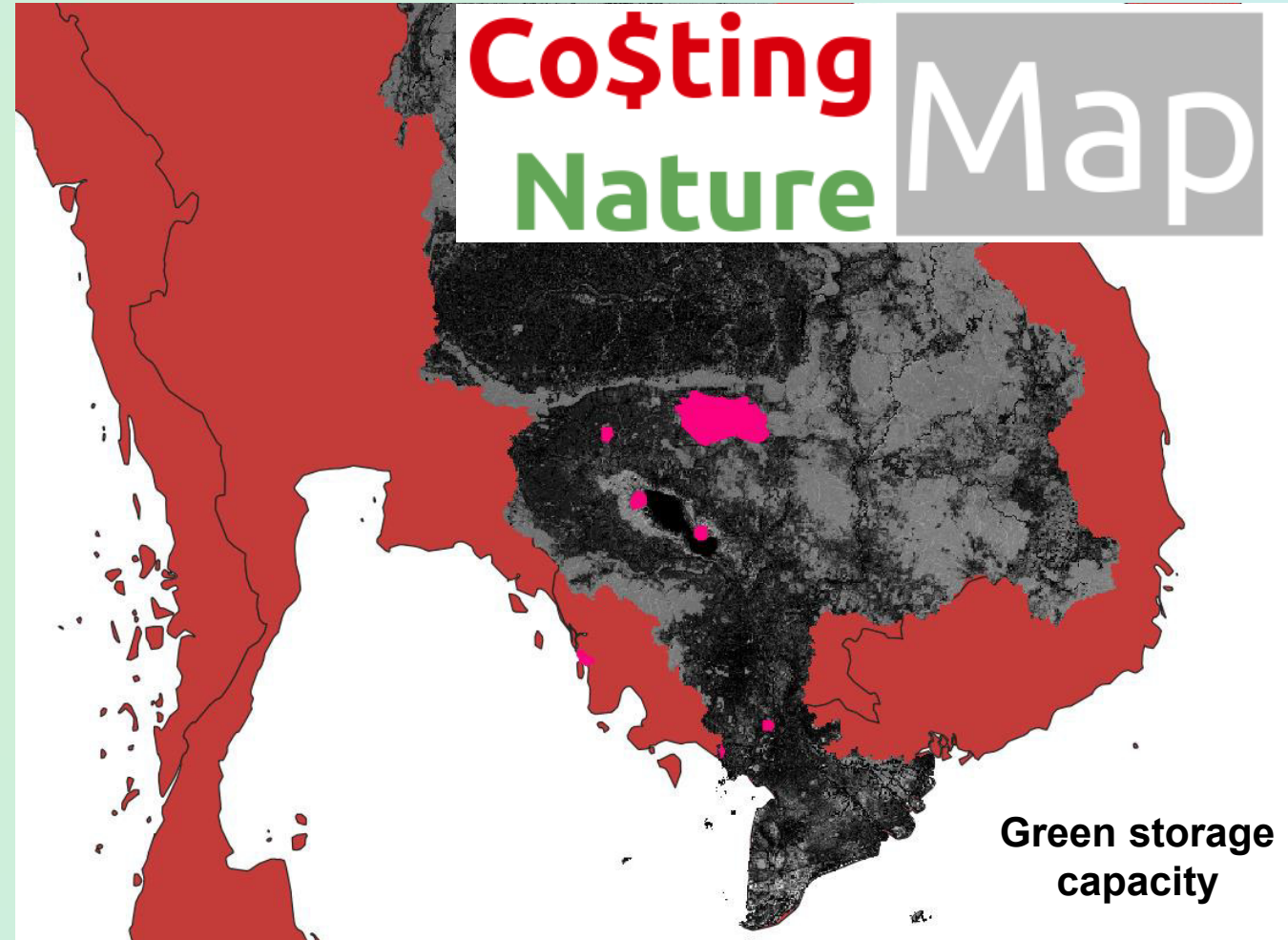
## Modelling-based assessment: Coastal protection (economic)



## Modelling-based assessment: Flood Mitigation (biophysical)



Chaplin-Kramer et al., 2022



Mulligan, M. 2021: Co\$tingNatureMap: a visualisation tool



## Coastal protection service (biophysical value)

ID 016 (KHM)

**Koh Kapik (Peam Krasop WS)**

*Maximum potential exposure (index):*

*Risk reduction (index x population):*

*Risk reduction (% max pot exp):*

## Coastal protection service (economic value)

ID 016 (KHM)

**Koh Kapik (Peam Krasop WS)**

*Total annual benefits (US\$, 2015):*

*Per mangrove area (US\$, 2015/ha):*

*For 100-yr return storms (US\$, 2015):*





**Flood mitigation service  
(biophysical value)**

ID 009 (KHM)

**Prek Toal (Tonle Sap BR)**

*Magnitude of natural storage:*

—

*Downstream population benefitting:*

—

*Downstream infrastructure benefitting:*

—



**Flood mitigation service  
(biophysical value)**

ID 010 (KHM)

**Ang Tropeang Thmor (SCR)**

*Magnitude of natural storage:*

—

*Downstream population benefitting:*

—

*Downstream infrastructure benefitting:*

—

## Flood mitigation service (biophysical value)

ID 011 (KHM)

**Boeung Prek Lapouv (SCR)**

*Magnitude of natural storage:*

—

*Downstream population benefitting:*

—

*Downstream infrastructure benefitting:*

—

## Flood mitigation service (biophysical value)

ID 012 (KHM)

### Anlung Pring (SCR)

*Magnitude of natural storage:*

—

*Downstream population benefitting:*

—

*Downstream infrastructure benefitting:*

—

## Flood mitigation service (biophysical value)

ID 013 (KHM)

### Boeng Chhmar Ramsar Site

*Magnitude of natural storage:*

—

*Downstream population benefitting:*

—

*Downstream infrastructure benefitting:*

—

## Flood mitigation service (biophysical value)

ID 014 (KHM)

**Chi Kreng, Siem Reap**

*Magnitude of natural storage:*

—

*Downstream population benefitting:*

—

*Downstream infrastructure benefitting:*

—

## Flood mitigation service (biophysical value)

ID 015 (KHM)

### **Kulen Promtep WS**

*Magnitude of natural storage:*

—

*Downstream population benefitting:*

—

*Downstream infrastructure benefitting:*

—



## Flood mitigation service (biophysical value)

ID 017 (KHM)

### Stung, Kampong Thom

*Magnitude of natural storage:*

—

*Downstream population benefitting:*

—

*Downstream infrastructure benefitting:*

—





ANY QUESTIONS?

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