

Tulane
University



Data sources for coastal wetland mapping

Training Workshop Module 1: Introduction to National Wetland Inventories

12th Sept 2024, Professor Dan Friess, Tulane University, dfriess@tulane.edu

Introduction

In this session we will:

- Highlight the breadth of data and approaches you can use/create
- Show some examples of data sources
- Introduce some modelling approaches already existing/that you can apply

Things to think about as we go through:

- These slides are a list of potential data sources, designed for you to look back at later
- Think about what is suitable for your national context
- Some of these datasets can be used off the shelf
- Some of these approaches need other data to be applied to different ecosystems
- Some of these approaches could be redone for your national context, but it gives you a framework to use

There are a lot of data out there!*

* For mangroves

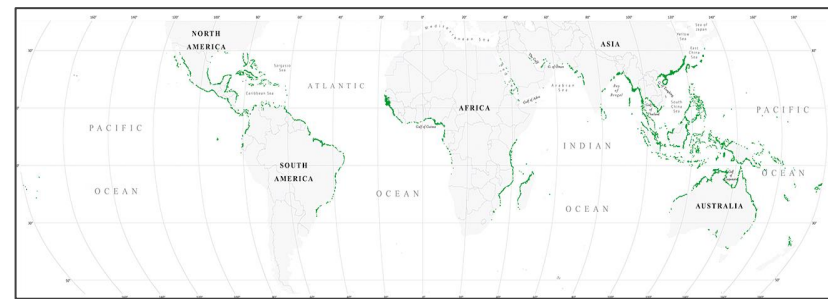
This presentation will be very mangrove-heavy...

It all hinges on one map

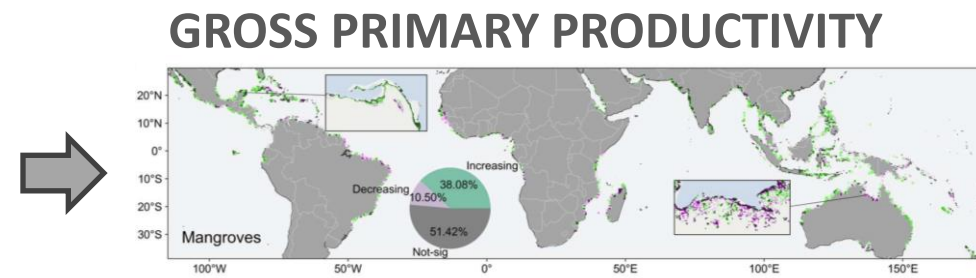


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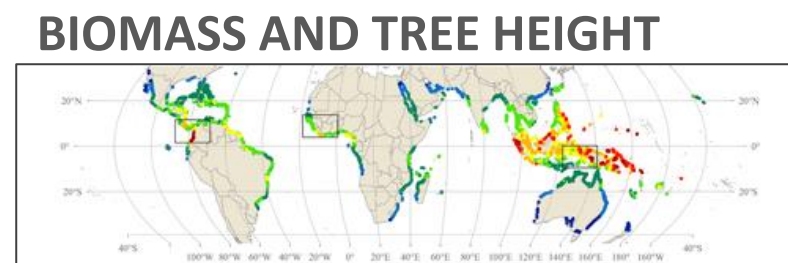
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Zheng et al. 2024. *Nature Ecology and Evolution* 8, 239-250.

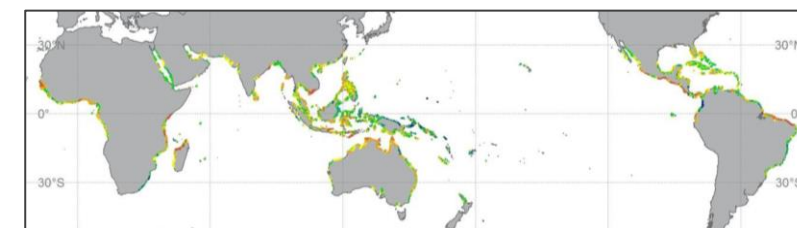


Hutchison et al. 2013. *Conservation Letters* 7, 233-240.

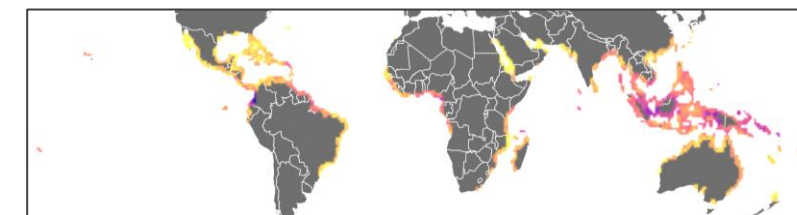
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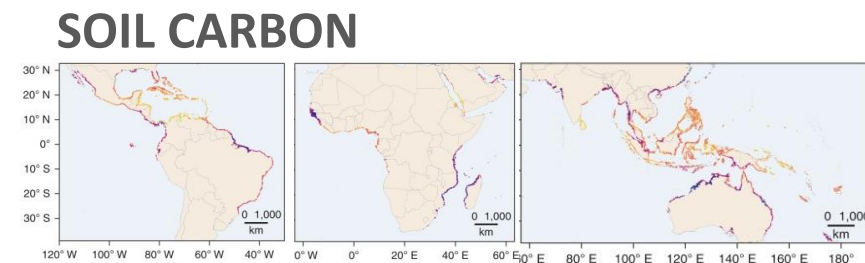
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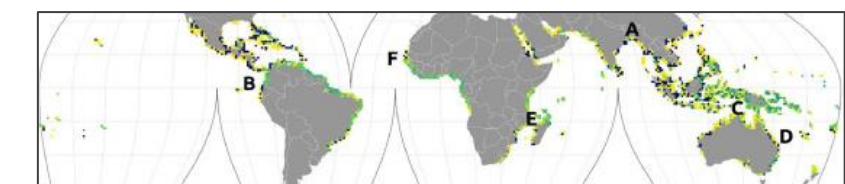
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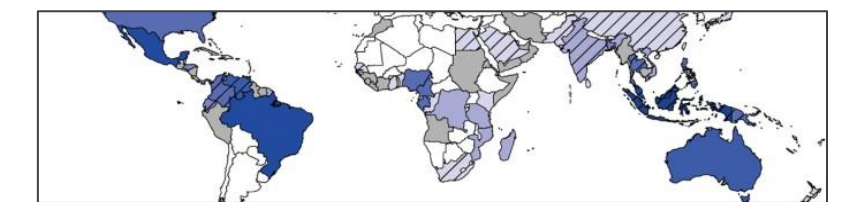
Rovai et al. 2018. *Nature Climate Change* 8, 534-538.



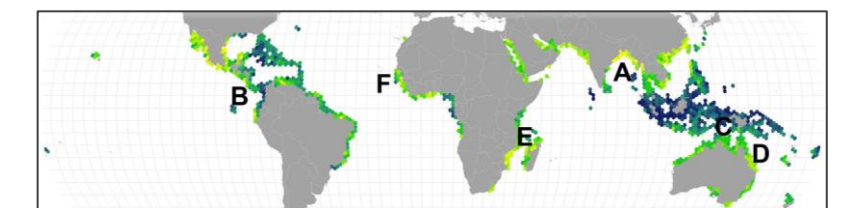
Maxwell et al. 2023. *Data in Brief* 50, 109621.



Jardine & Siikamäki 2014. *Environmental Research Letters* 9, 104013.



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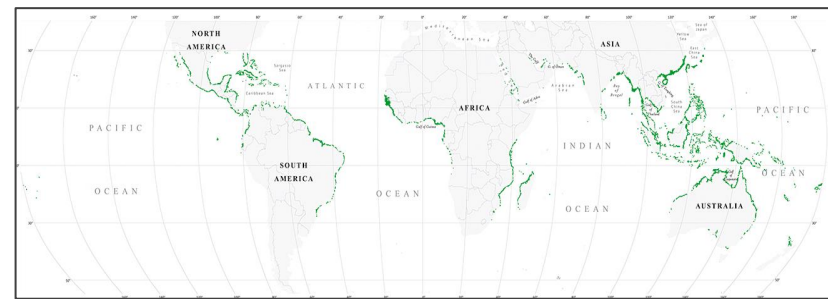


Sanderman et al. 2018. *Environmental Research Letters* 13, 055002.

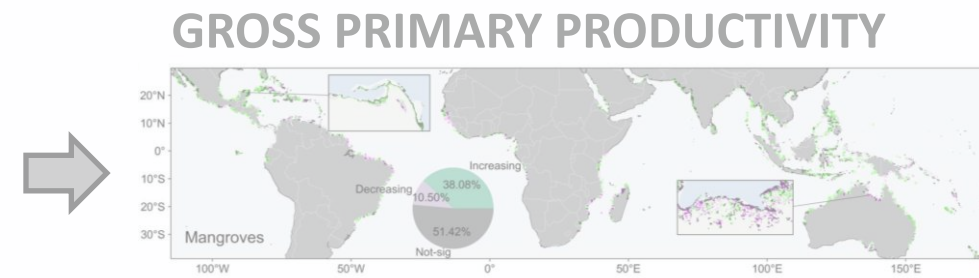
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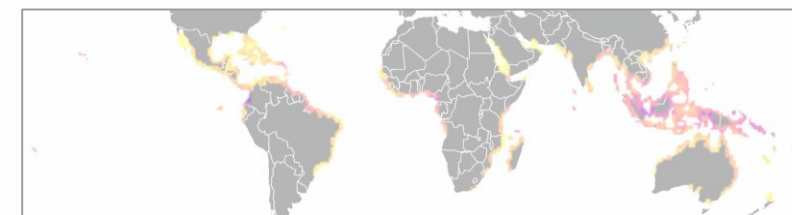
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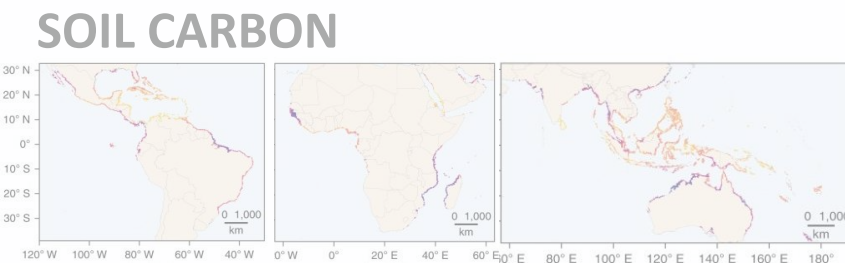


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RATES OF CHANGE



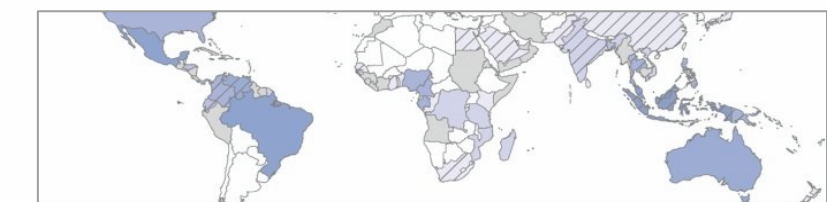
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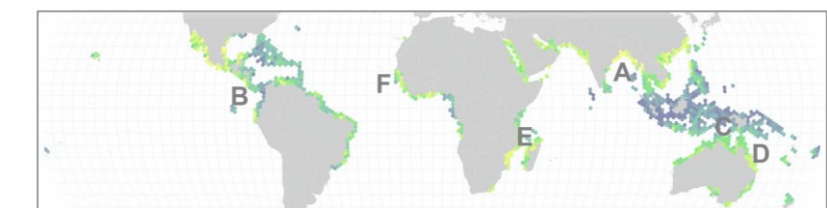
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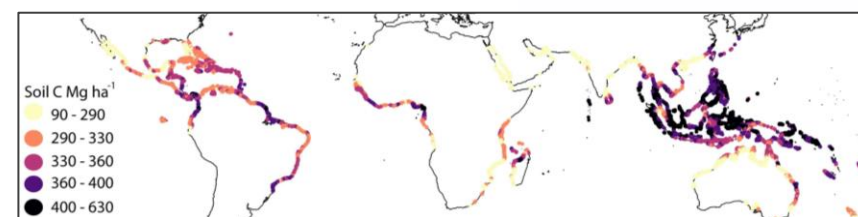
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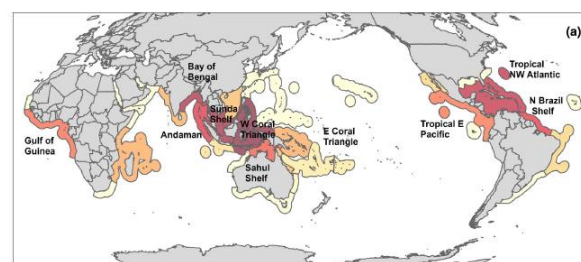
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CARBON LOSS

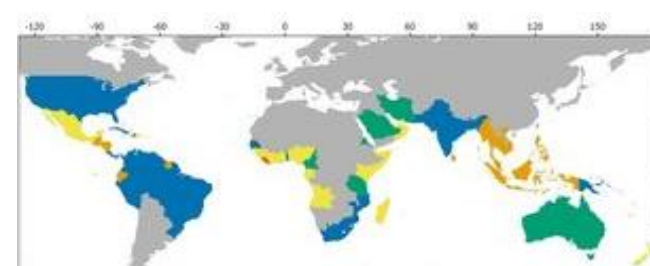


Chatting et al. 2022. *Frontiers in Marine Science* 9, 71876.



Adame et al. 2021. *Global Change Biology* 27, 3856-2866.

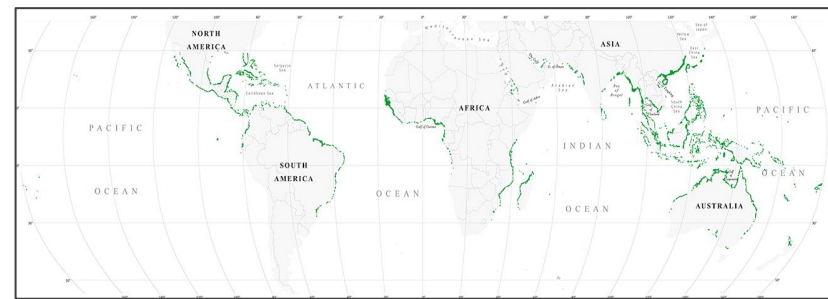
DRIVERS OF CHANGE



Goldberg et al. 2020. *Global Change Biology* 26, 5844-5855.

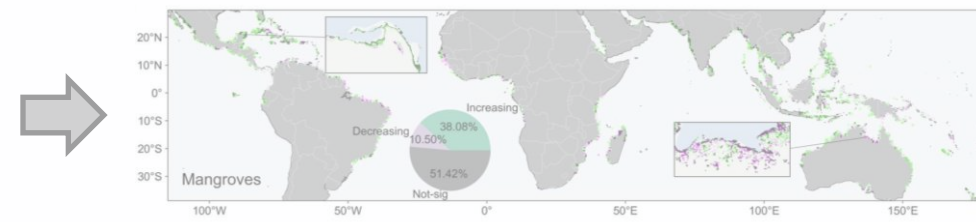
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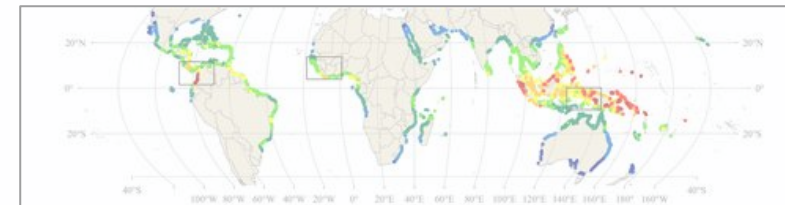
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GROSS PRIMARY PRODUCTIVITY



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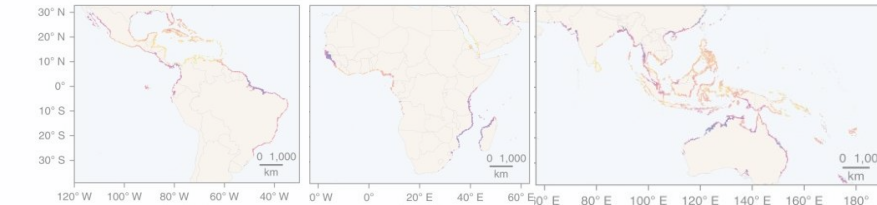
BIOMASS AND TREE HEIGHT



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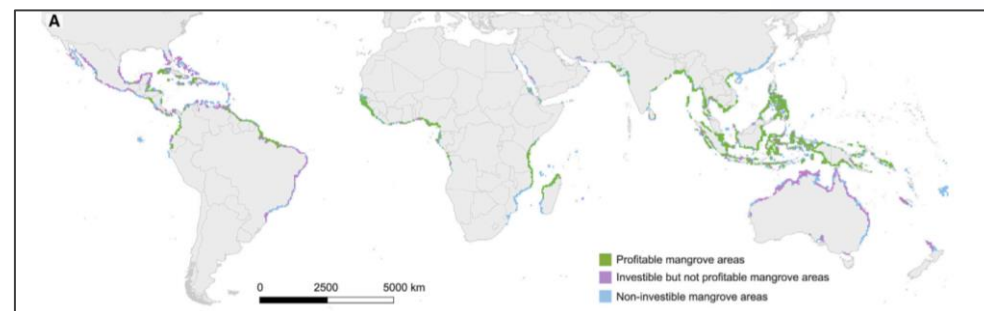
Hamilton & Friess 2018. *Nature Climate Change* 8, 240-244.

SOIL CARBON

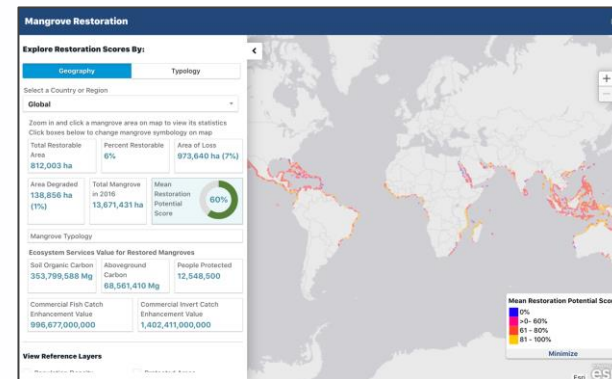


Rovai et al. 2018. *Nature Climate Change* 8, 534-538.

CONSERVATION AND RESTORATION POTENTIAL



Zeng et al. 2022. *Current Biology* 31, 1737-1743.



Worthington et al. *in rev.*



Simard et al. 2019. *Nature Geoscience* 12, 40-45.



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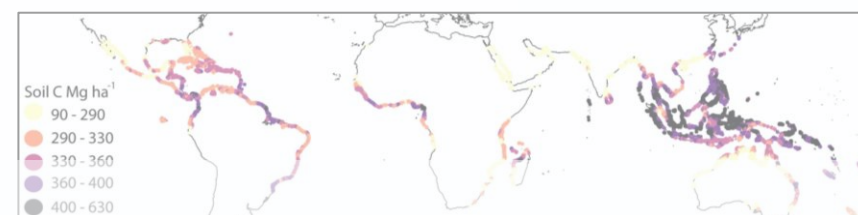


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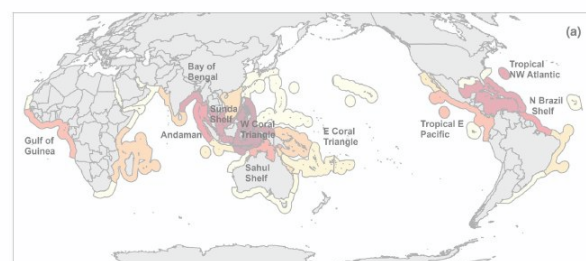


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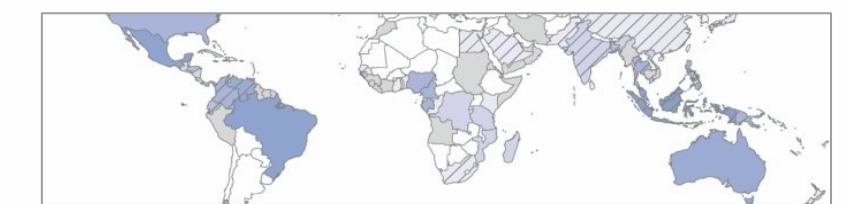
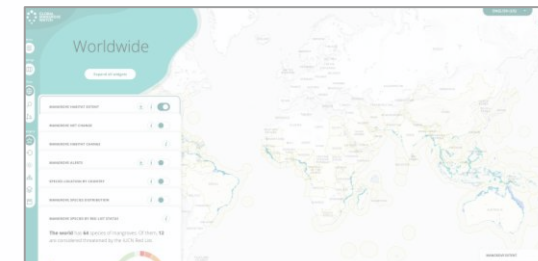
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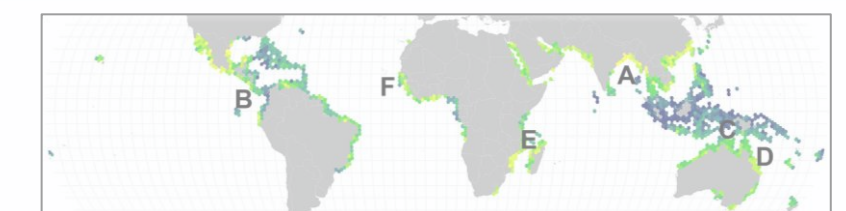


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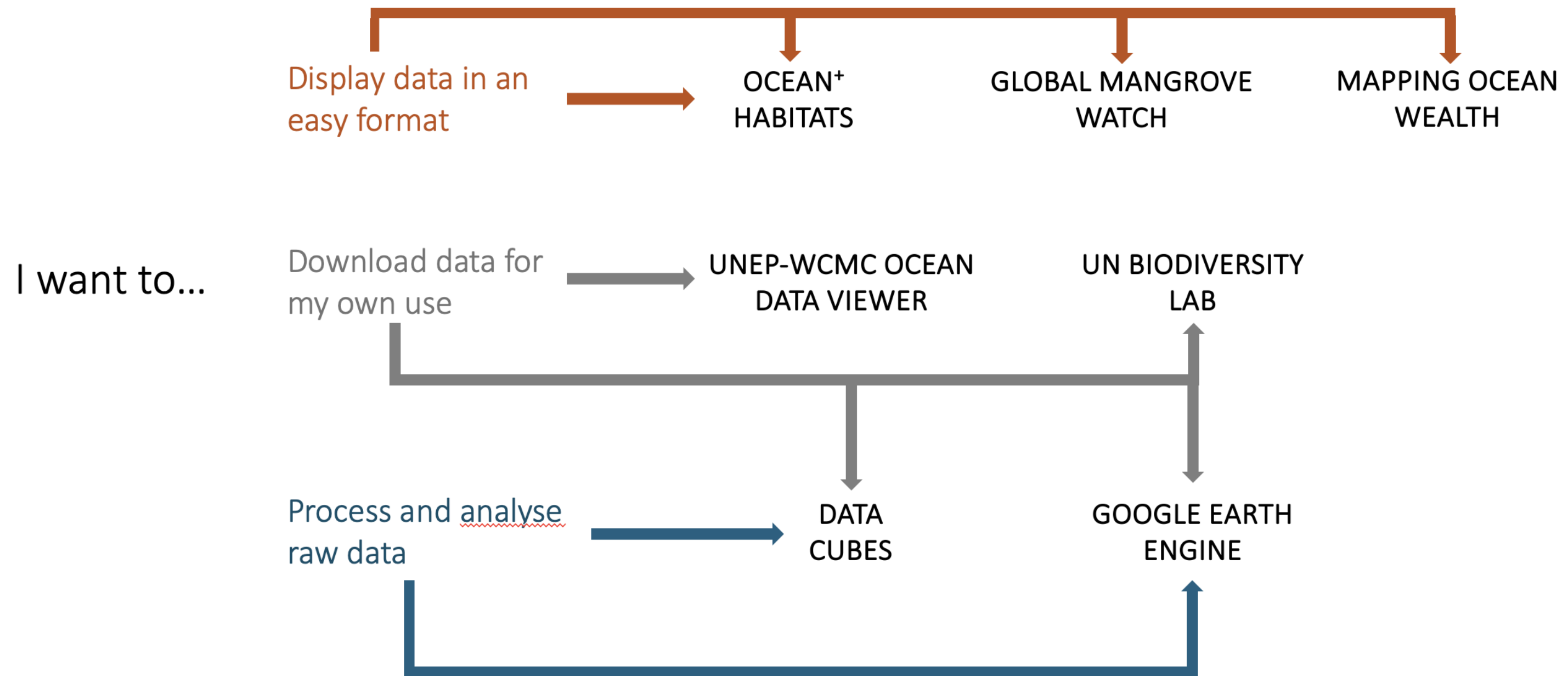
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But other coastal ecosystems are catching up

We now have a global map of tidal marshes, and a map of supratidal forests is on its way (but seagrasses are still lagging, and for many other marine/coastal wetlands we have no maps at all), so we can do many of the same things now

And the following slides are still examples of approaches you can use for coastal (and inland) wetlands that you can adapt if you have national spatial data for other ecosystems

There are plenty of data warehouses



UNEP-WCMC Ocean Data Viewer

www.data.unep-wcmc.org

<https://data-gis.unep-wcmc.org/>



PROS

- Lots of data!
- Most are downloadable as GIS files
- Lots of ecosystems!
- Biophysical, as well as ecological data

CONS*

- Datasets are quite dated

A screenshot of the UNEP-WCMC Ocean Data Viewer web application. The interface has a blue header with the UNEP-WCMC logo and the text "OCEAN DATA VIEWER". Below the header is a search and filter bar. The main content area is a world map showing the distribution of four species: Melon-Headed Whales, Hector's Dolphins, Grey Seals, and Hawaiian Monk Seals. Each species distribution is shown as a colored area on the map. On the left side, there is a list of datasets with their titles, species distribution information, publication dates, and versions. At the bottom, there is a footer with the Proteus logo, a disclaimer, and the UNEP-WCMC logo.

* Personal view, not Ramsar Convention on Wetlands!

UN Biodiversity Lab

www.unbiodiversitylab.org



PROS

- Even more data!
- Most are downloadable as GIS files
- Lots of ecosystems!
- Much more up to date
- Sorts data by research question

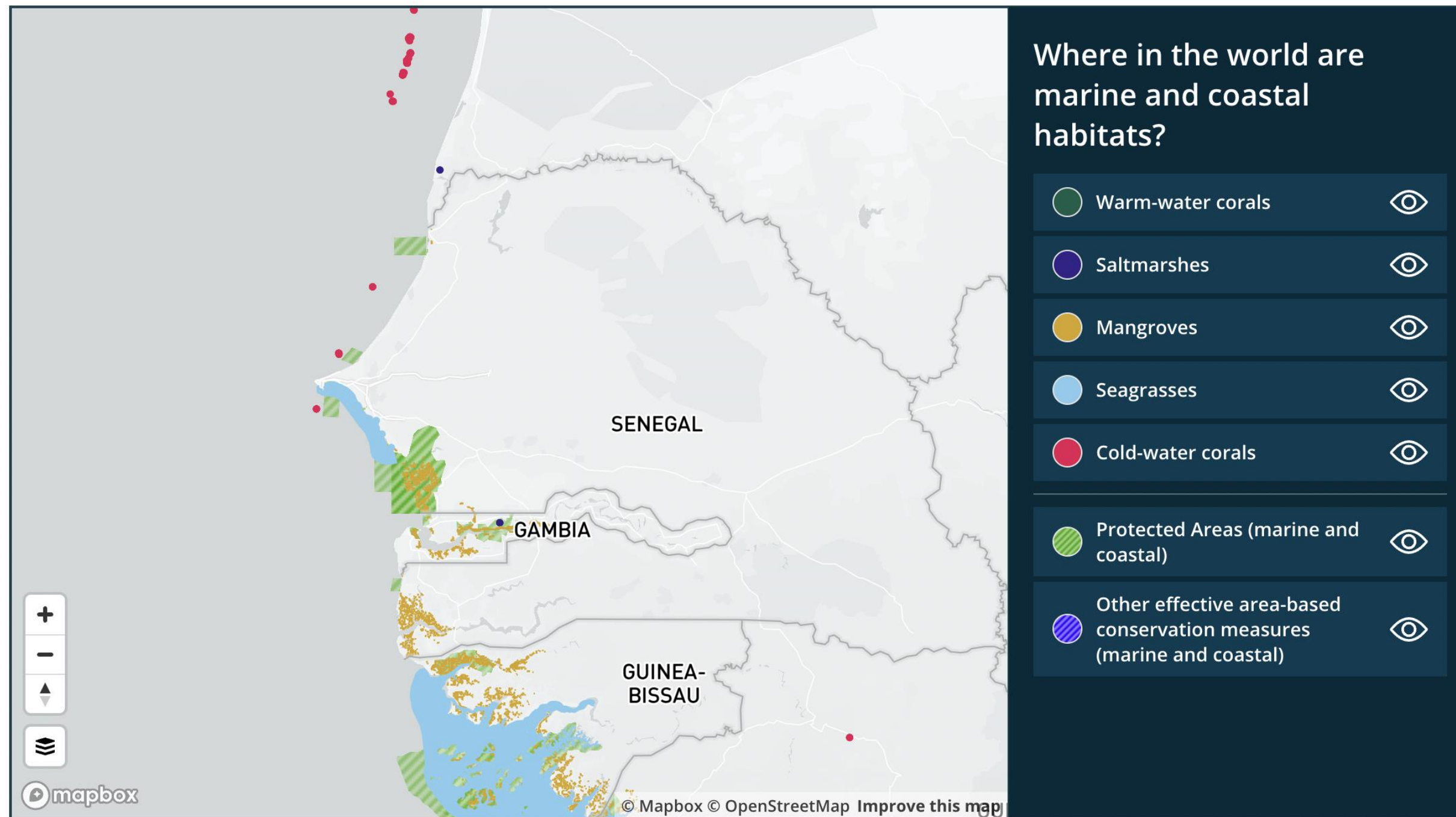
CONS

- Not all data downloadable, or easy to find



Ocean+ Habitats

www.habitats.oceanplus.org



PROS

- Great data dashboard and syntheses per country
- Great communication tool
- Species level information (IUCN Red List)

CONS

- Broad ecosystems only
- Limited data

Global Mangrove Watch

www.globalmangrovetwatch.org



PROS

- Great widgets
- Can do custom areas
- Can do calculations
- Deforestation alerts
- Very up to date
- Can upload your own data

CONS

- Mangroves only

Mapping Ocean Wealth

<https://maps.oceanwealth.org/#/data>

The screenshot shows the Mapping Ocean Wealth web application interface. The page features a dark-themed map of the world with a sidebar on the left containing filters and data layers. The sidebar includes sections for 'Calculators for Blue Carbon', 'Apps for Blue Carbon', and 'Data Layers for Blue Carbon'. The 'Data Layers for Blue Carbon' section is expanded, showing three layers: 'Mangrove Blue Carbon (Aboveground)', 'Mangrove Blue Carbon: Soil Organic Carbon', and 'Seagrass Blue Carbon (Soil)'. The map displays a dark theme with a color scale for 'Above Ground Carbon' ranging from 0 to 2,000 km and 1,000 mi. The map shows the North Pacific Ocean and North Atlantic Ocean, with various cities and countries labeled.

PROS

- Really interesting data layers e.g., ecosystem services
- Can do some calculations

CONS

- Lots of different 'apps' can be confusing
- Not all data can be downloaded
- Focused on a few ecosystems

Clarke Labs

<https://www.aquaculture.earth/coastal/index.html>



PROS

- Some unique datasets

CONS

- Narrow focus
- Not global coverage

Data Cubes

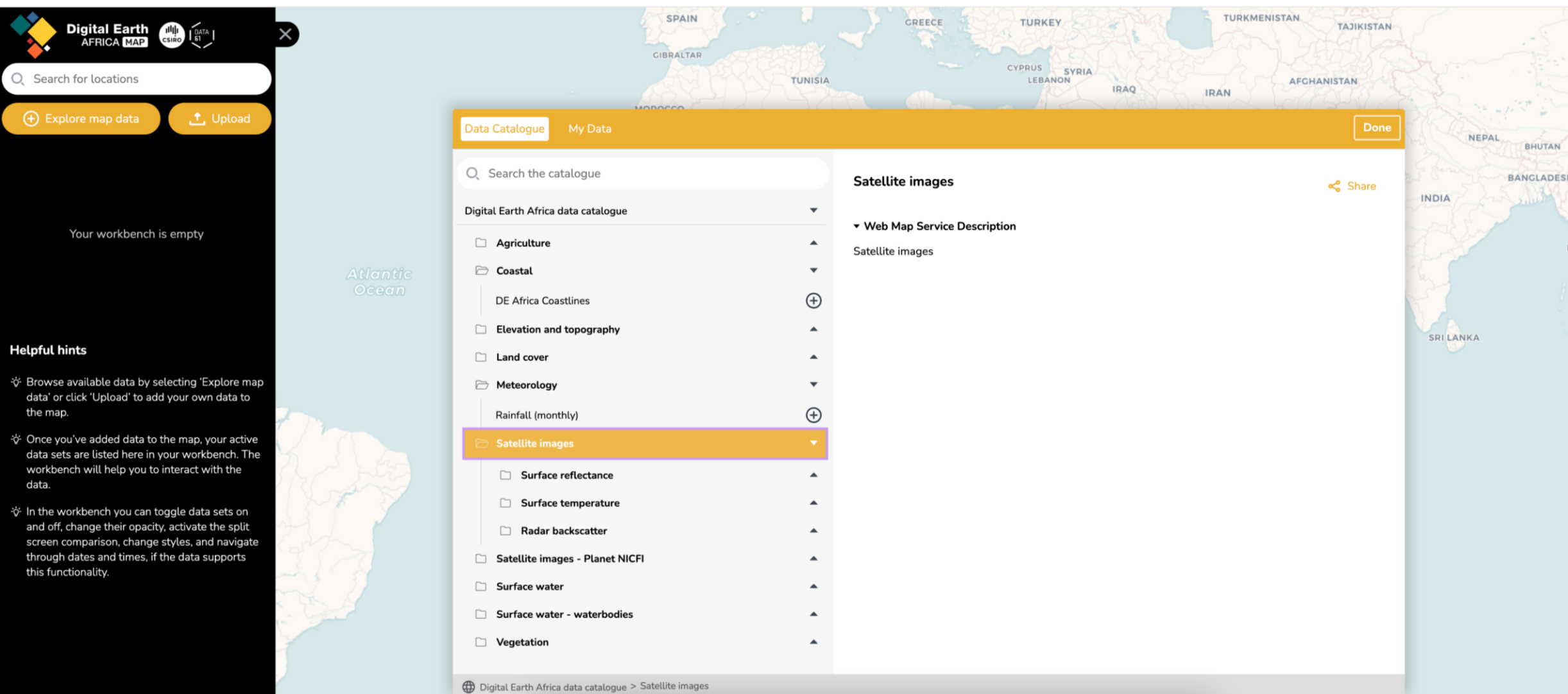
Open source data library and platforms for display and analysis of complex spatial data e.g., Open Cube, Digital Earth Africa <https://maps.digitalearth.africa/>

PROS

- Powerful tool for analysis
- Lots of different datasets

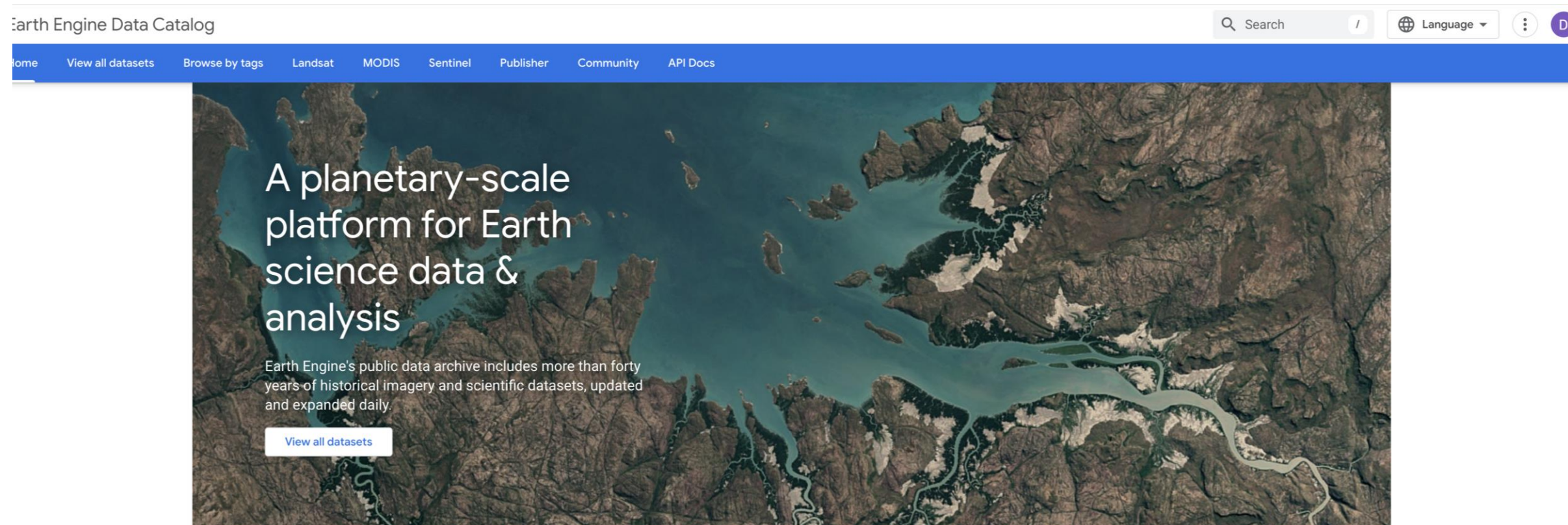
CONS

- Not global coverage

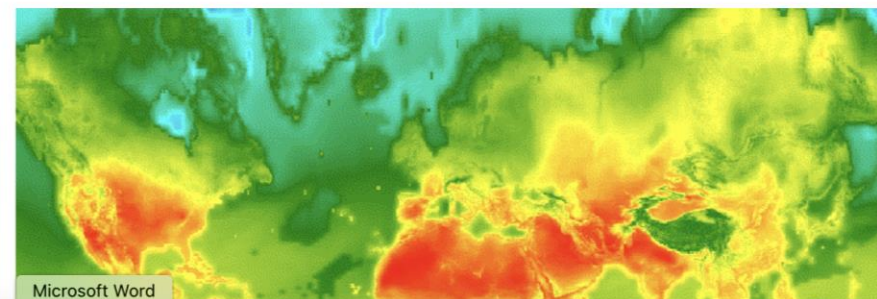


Google Earth Engine

<https://developers.google.com/earth-engine/datasets/>



Climate and Weather



PROS

- The ultimate data cube
- It has EVERYTHING
- Powerful tool for data processing and analysis

CONS

- Needs some remote sensing knowledge

Habitat restoration potential

<https://maps.coastalresilience.org/mangrove-restoration/>



nature ecology & evolution

Article

<https://doi.org/10.1038/s41559-022-01926-5>

Challenges and opportunities for achieving Sustainable Development Goals through restoration of Indonesia's mangroves

Received: 21 October 2021

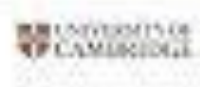
Sigit D. Sasmito^{1,2,10,11}✉, Mohammad Basyuni^{3,4,10,11}✉, Age Kridalaksana⁵,
Meli F. Saragi-Sasmito⁶, Catherine E. Lovelock⁷ & Daniel Murdiyarto^{8,9}

Accepted: 7 October 2022

Uses spatial data of biophysical factors important for (mangrove habitat growth)

Global, regional (Asia), nations (Indonesia)

Could be created for any habitat if you have sufficient data



A note of caution!

Global data aren't always suitable for national-scale use. Make sure it fits your purpose!

- Spatial resolution
- Ecosystem definitions
- Time periods (e.g., does it fit the timescale you need for national GHG reporting?)

Global data need cross-check and validation with national data sources

Global data are often more suitable for *inter-country* comparison (a scale above NWI)

Thank you
Questions?

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