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Mangrove Mapping in Macajalar Bay

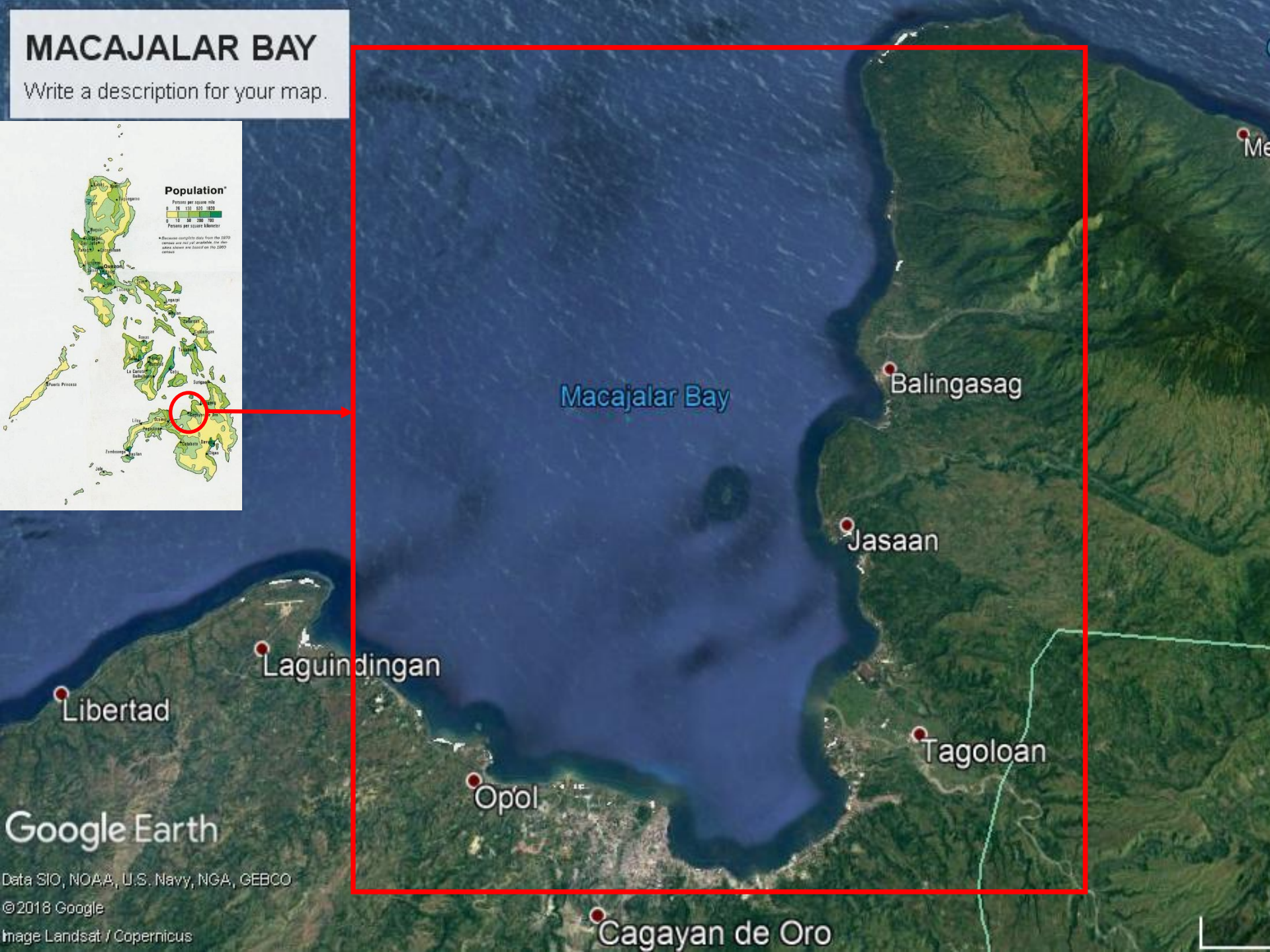


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Xavier University – Ateneo de Cagayan

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Research Assistant

MACAJALAR BAY

Write a description for your map.



Google Earth

Data SIO, NOAA, U.S. Navy, NGA, GEBCO

© 2018 Google

Image Landsat / Copernicus

Macajalar Bay

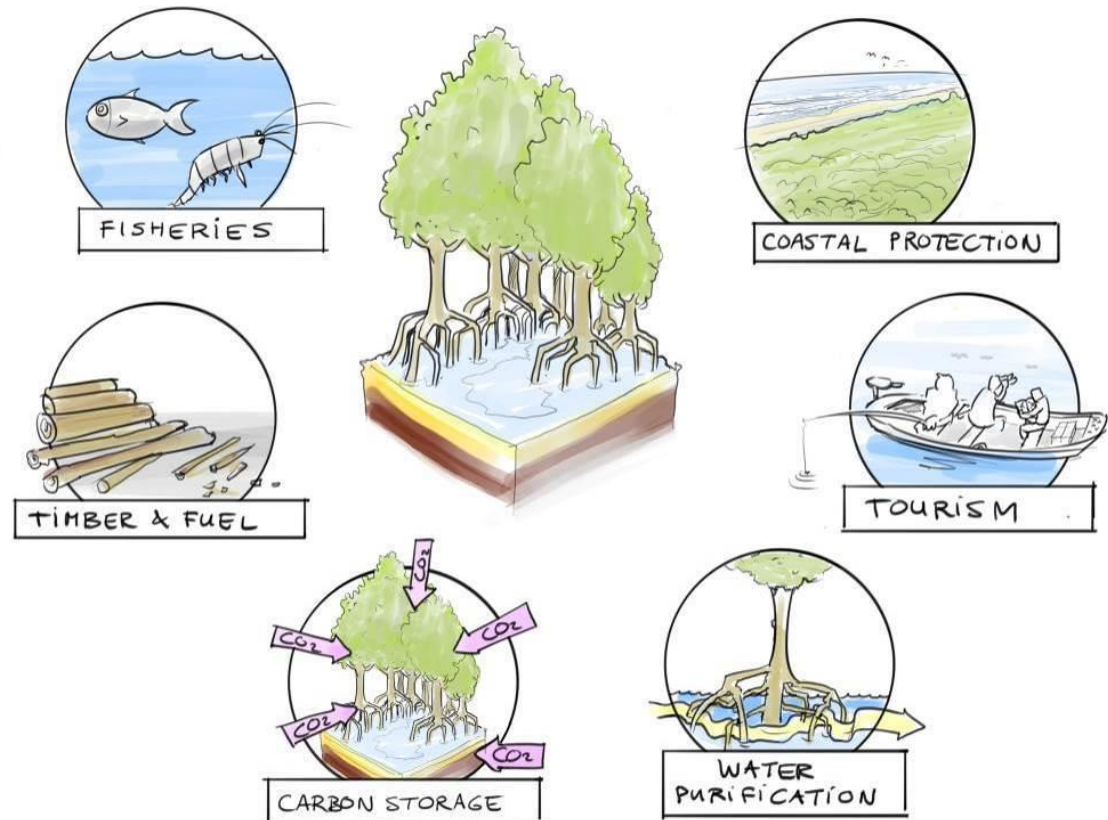
- Major fishing ground of northern Mindanao.
- Use as thoroughfares of cargo and passenger ships and boats.
- Coastal municipalities and cities were formed into Macajalar Bay Development Alliance (MBDA).





Mangrove forests

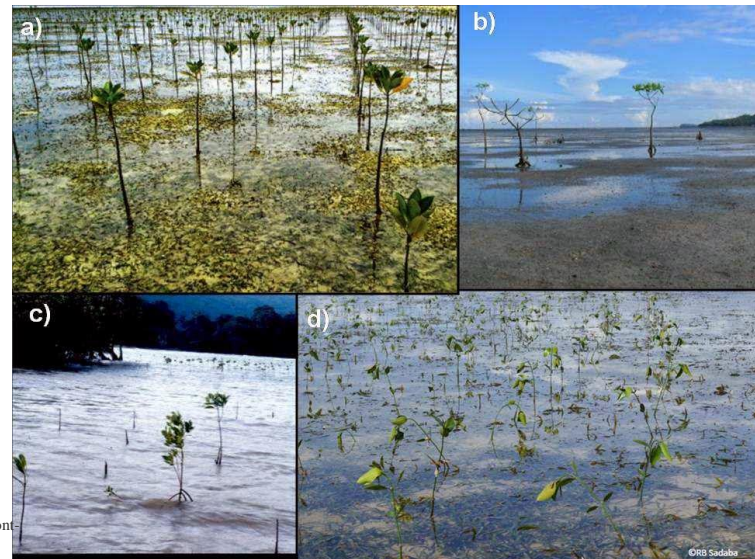
Provide many ecosystem services:

- Coastal protection from extreme wave action.
- Erosion control.
- Carbon sequestration.
- Maintenance of fisheries.



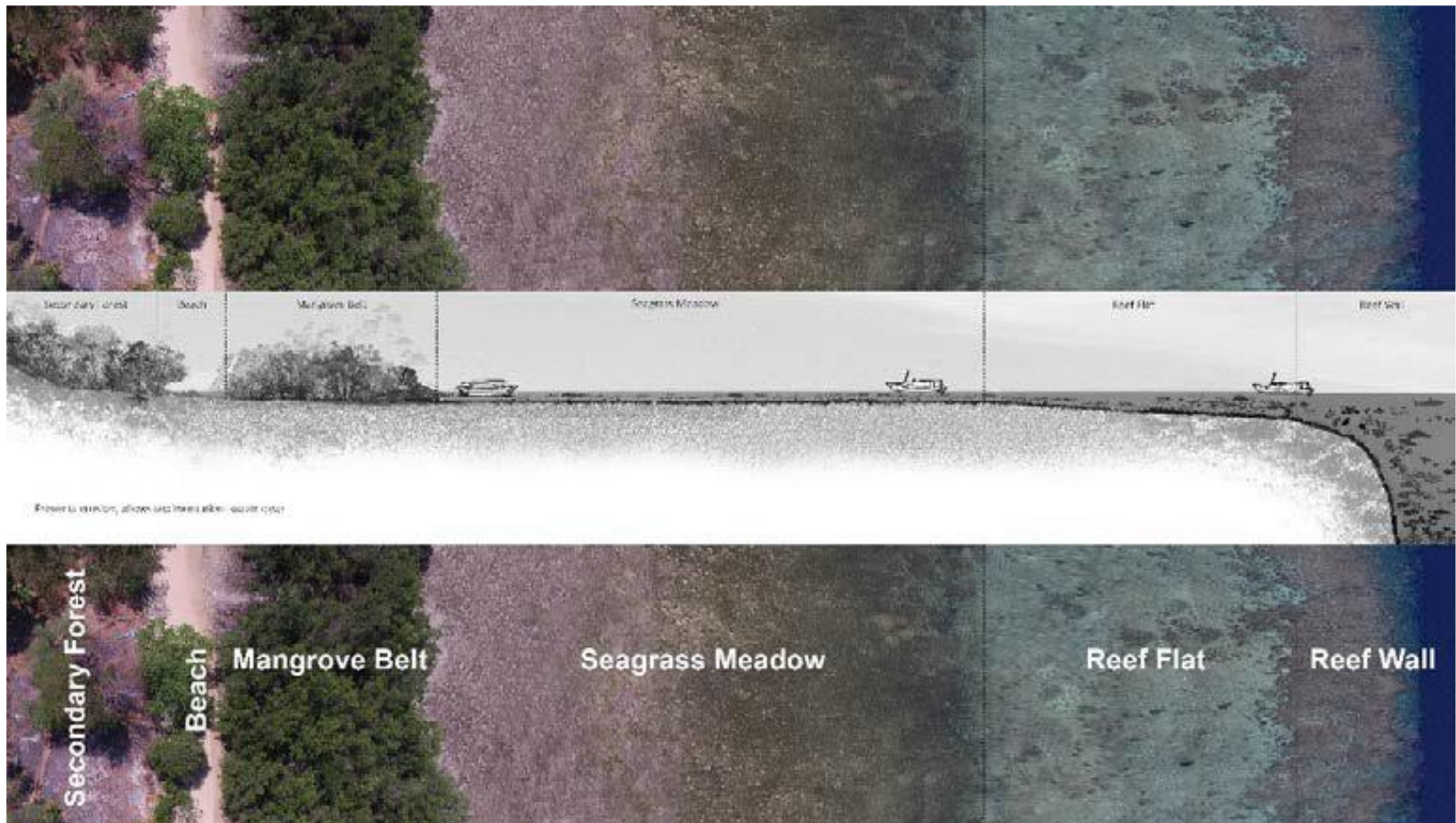
RATIONALE

- Decline of mangrove forest cover by almost 70% since 1900s prompted intense rehabilitation initiatives.
- 
- Indiscriminate planting without considering species-site suitability.
- 
- Ecological alteration and waste of time and resources.



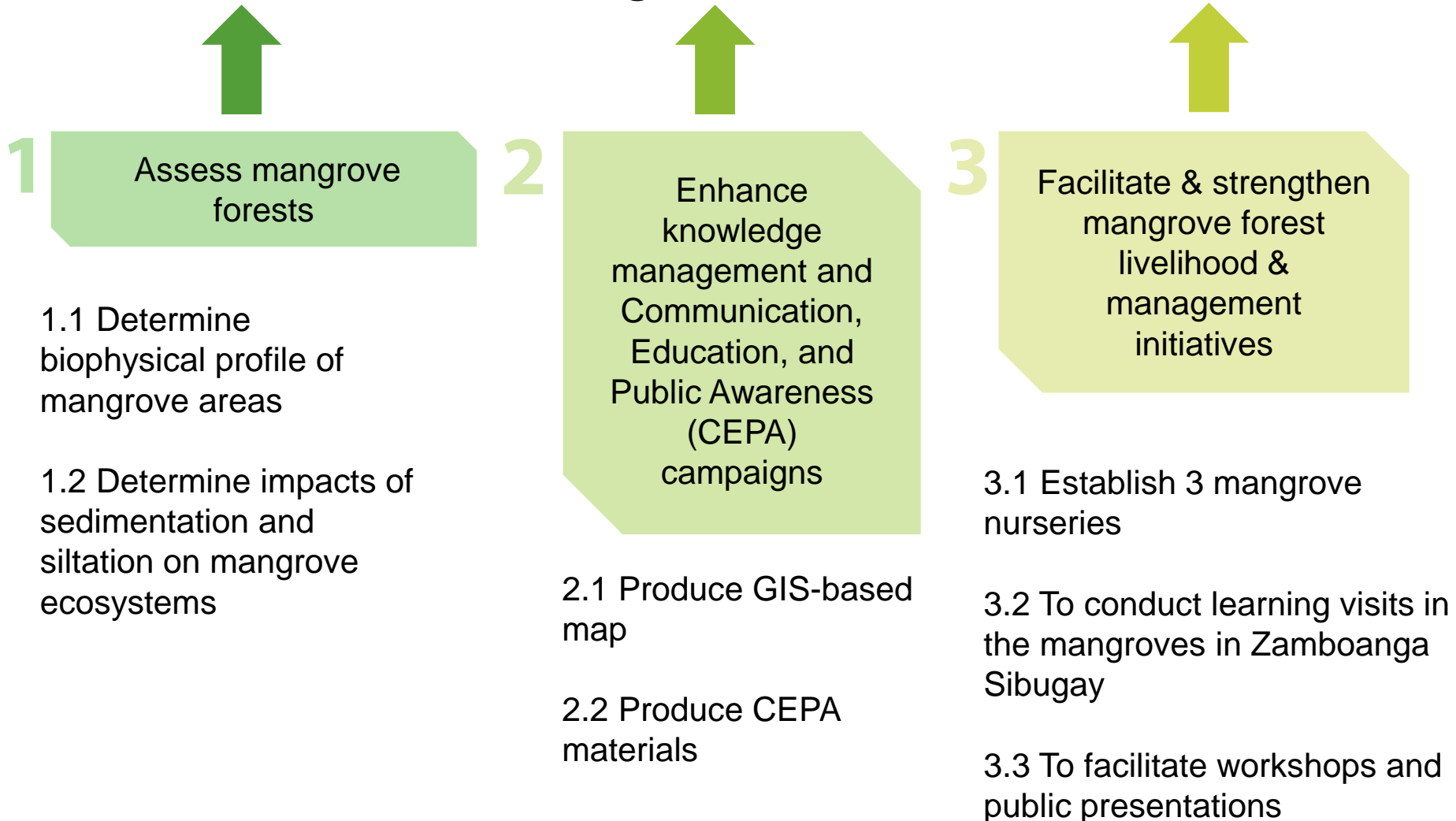
(2015, March 19). STOP SEAFRONT PLANTING OF MANGROVES ON SEAGRASS BEDS. Retrieved from <http://mangroveactionproject.blogspot.com/2015/03/stop-seafront-planting-of-mangroves-on.htm>

Interconnected Marine ecosystems



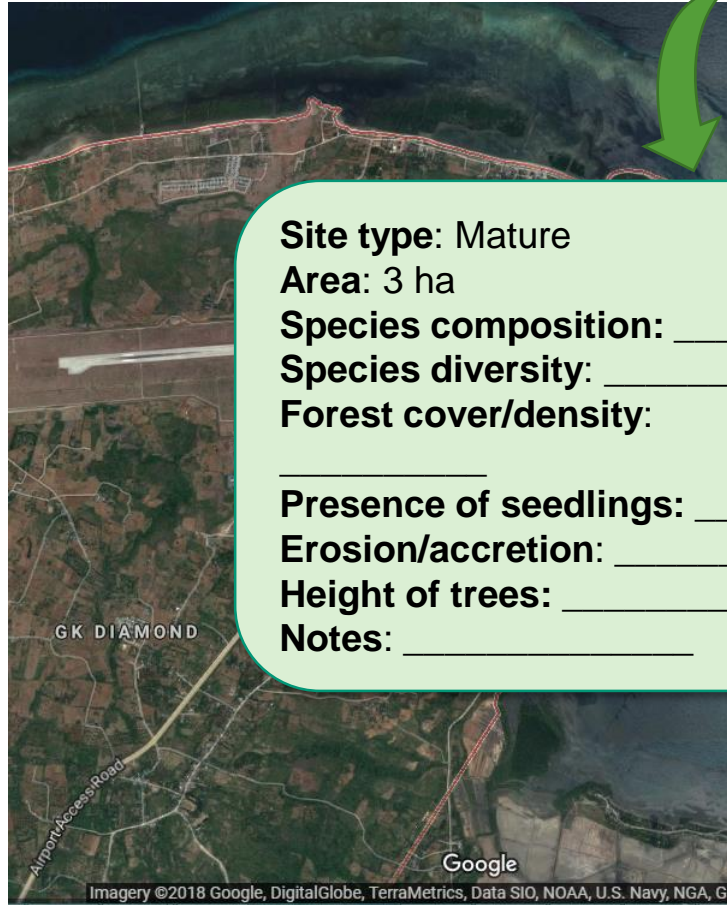
Rekittke, Joerg & Ninsalam, Yazid. (2016). Sliced Ecosystem: Modelling Transects of Vulnerable Marine Landscapes. 10.14627/537612005.

Sustainable management of Macajalar Bay mangrove forests

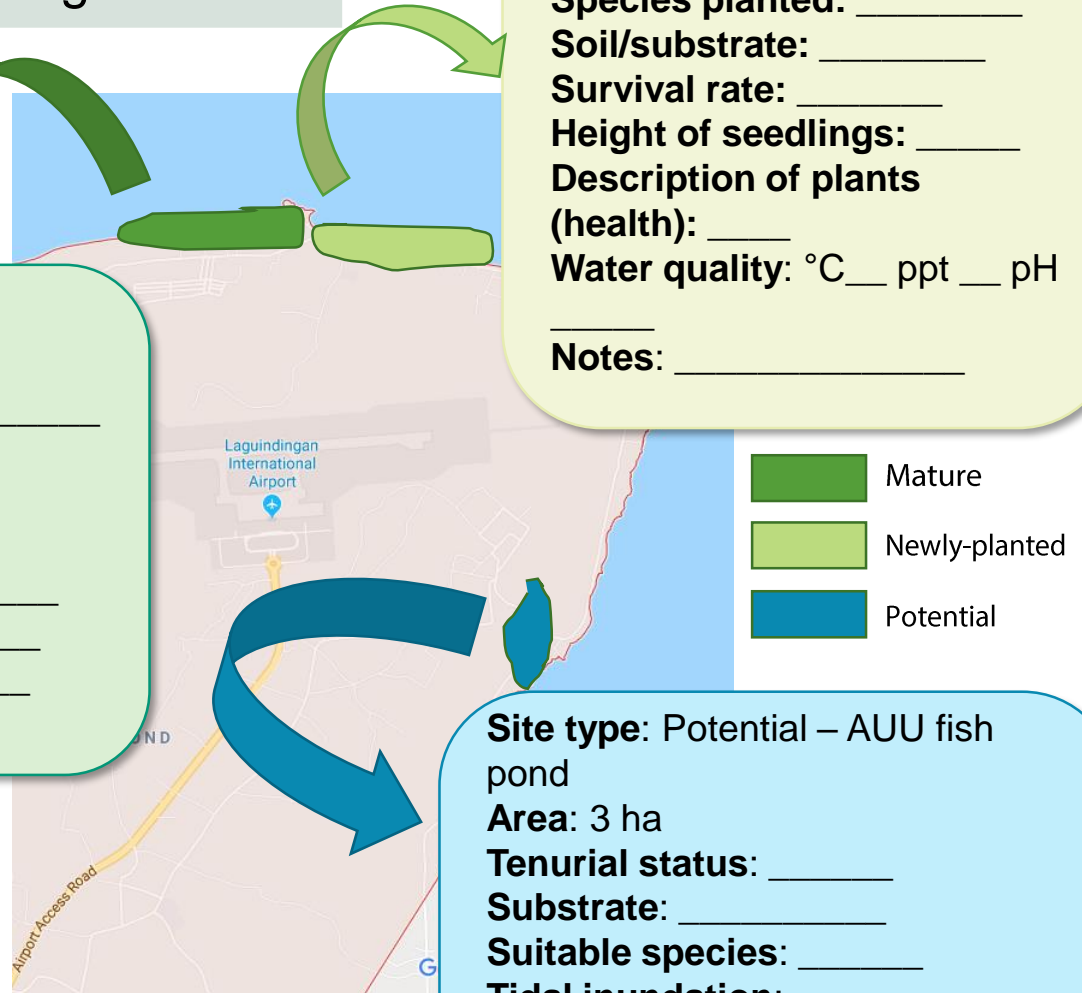




Parameters and other mangrove info



Site type: Mature
Area: 3 ha
Species composition: _____
Species diversity: _____
Forest cover/density: _____
Presence of seedlings: _____
Erosion/accretion: _____
Height of trees: _____
Notes: _____



Site type: Newly-planted
Area: 3 ha
Species planted: _____
Soil/substrate: _____
Survival rate: _____
Height of seedlings: _____
Description of plants (health): _____
Water quality: °C__ ppt __ pH

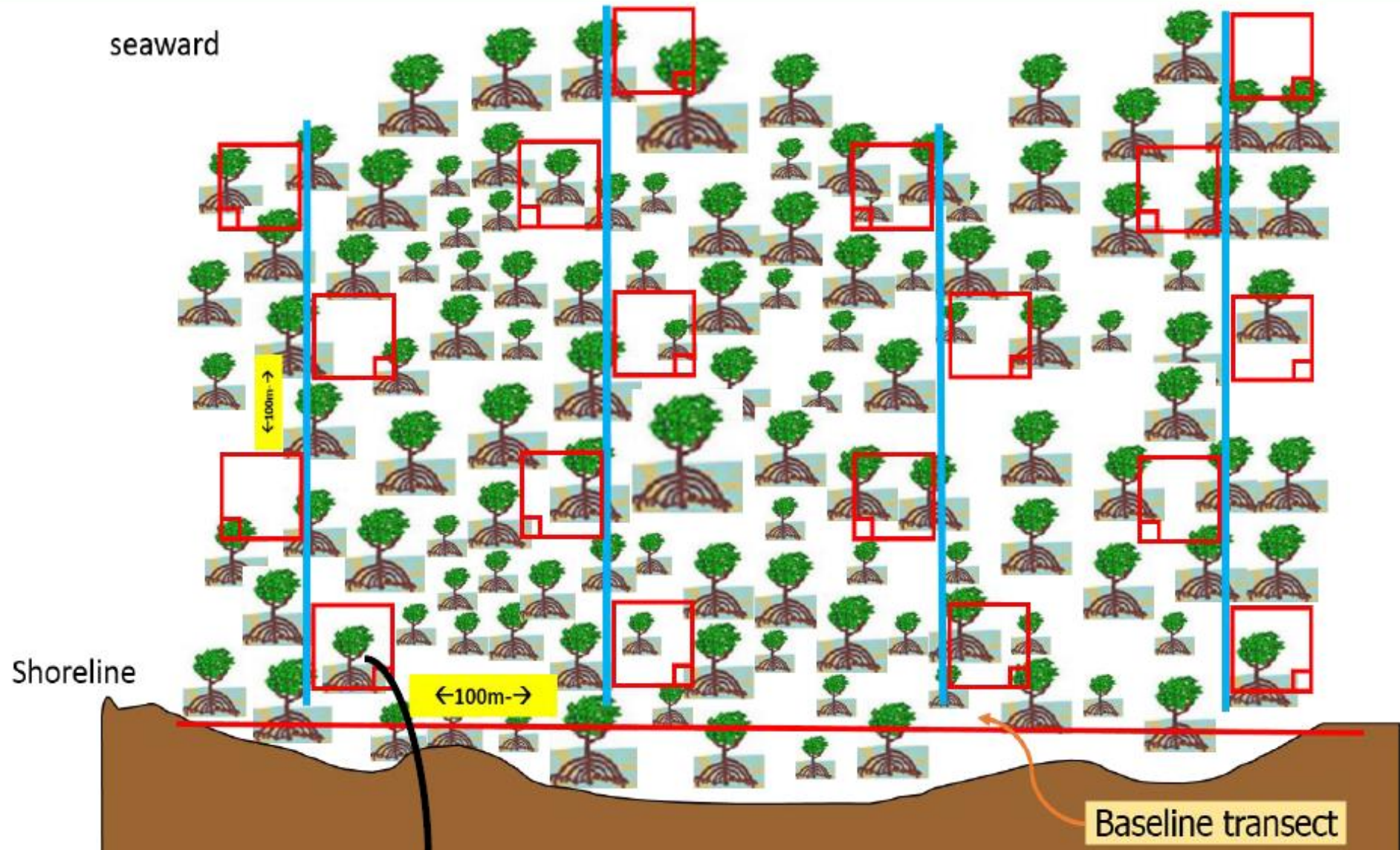
Notes: _____

Site type: Potential – AUU fish pond
Area: 3 ha
Tenural status: _____
Substrate: _____
Suitable species: _____
Tidal inundation: _____
Elevation/tidal zone: _____
Natural vegetation: _____
Water quality: °C__ ppt __ pH

Notes: _____

Municipality of Laguindingan

- Transect-plot method



- **Line-intercept method**



- **Line-intercept method**



METHODOLOGY

- **Measuring the GBH (girth at breast height)**

- ***Sonneratia alba***



METHODOLOGY: Water analysis

- **Measuring pH and temperature**



- **Measuring salinity**



- **Gathering GPS point for the mapping**



INITIAL DATA : Maps

Laguindingan

Planted mangroves

Legend

- waterways
- 1950 Nipa (NAMRIA)
- 1950 Mangrove (NAMRIA)
- 2018 Mangrove Survey





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Legend

- waterways
- 1950 Nipa (NAMRIA)
- 1950 Mangrove (NAMRIA)
- 2018 Mangrove Survey

Alubijid

Planted mangroves

Google Earth

Image © 2019 CNES / Airbus
© 2018 Google

1 km



El Salvador

Planted mangroves

Legend

- waterways
- 1950 Nipa (NAMRIA)
- 1950 Mangrove (NAMRIA)
- 2018 Mangrove Survey



Google Earth

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Legend

- waterways
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- 2018 Mangrove Survey

Opol and Cagayan de Oro



Google Earth

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Legend

- waterways
- 1950 Nipa (NAMRIA)
- 1950 Mangrove (NAMRIA)
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Cagayan de Oro

Google Earth

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1 km



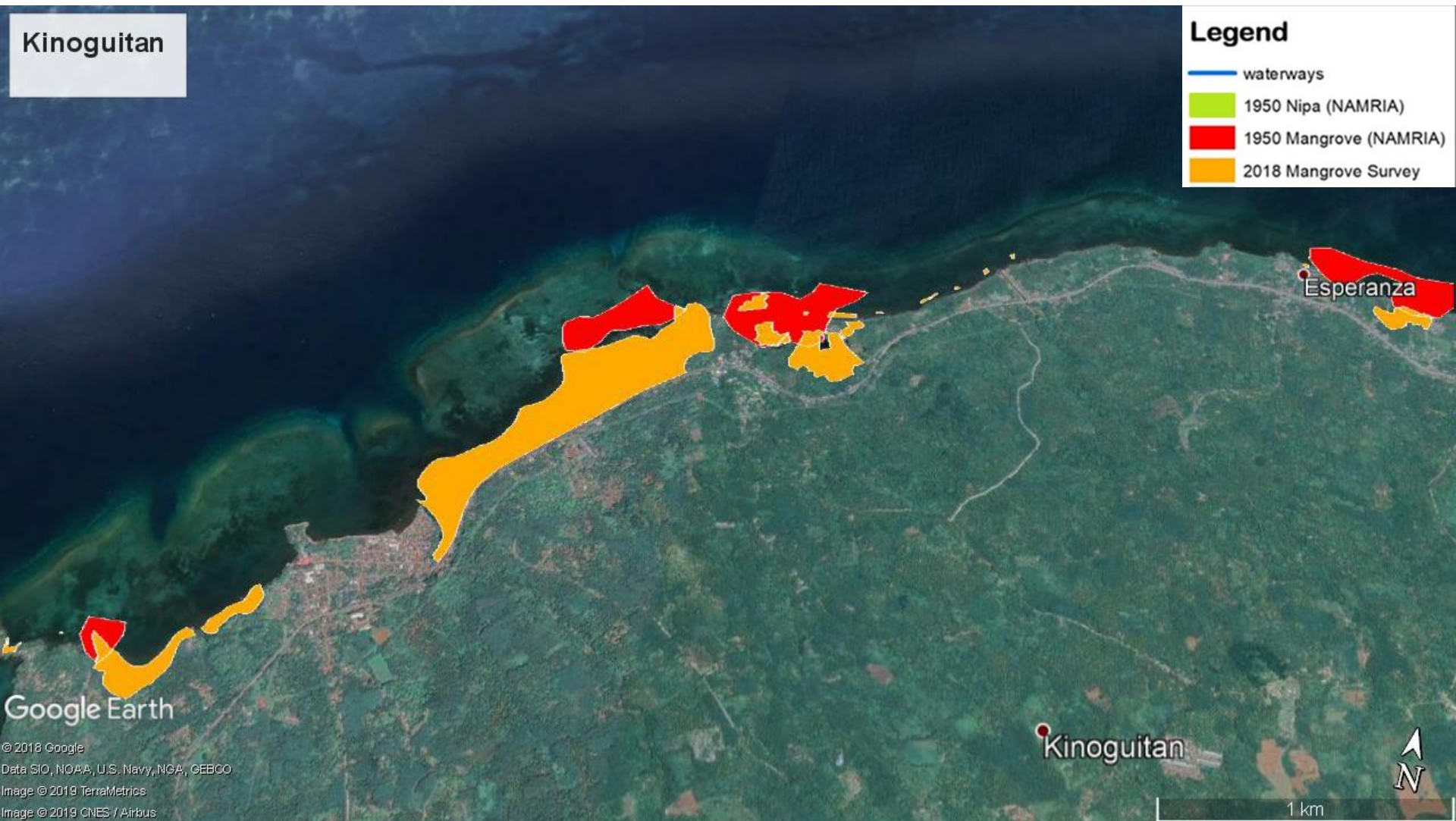


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Legend

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Google Earth

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CHALLENGES

- Some mangrove areas are difficult to access.

Hazardous debris



Knee-deep mud and water



Thick root systems



CHALLENGES

- Abandoned fishponds posed difficult accessibility.
- Adverse weather conditions like heavy continuous rains delayed the work.
- New mangroves were not accounted for in the reconnaissance survey.



SUMMARY



- Give science-based recommendations.
- Establish relationship with LGUs and fisherfolks organizations.
- Provide CEPA materials on the importance of mangroves.
- Provide an inventory of mangrove species in Macajalar bay.
- Generate an updated GIS-based mangrove map.

Thanks for listening!



Mangrove composition

- **East Coast**

- **Sonneratia/
Avicennia**



- **East Coast**

- **Sonneratia**



Mangrove composition

- **East Coast**



- **Sonneratia/
Avicennia**

- **West Coast**

- **Rhizophora sp.**



- **Planted**

- **West Coast**

- **Rhizophora sp.**



- **Planted**

- **West Coast**

- **Rhizophora sp.**



- **Planted**

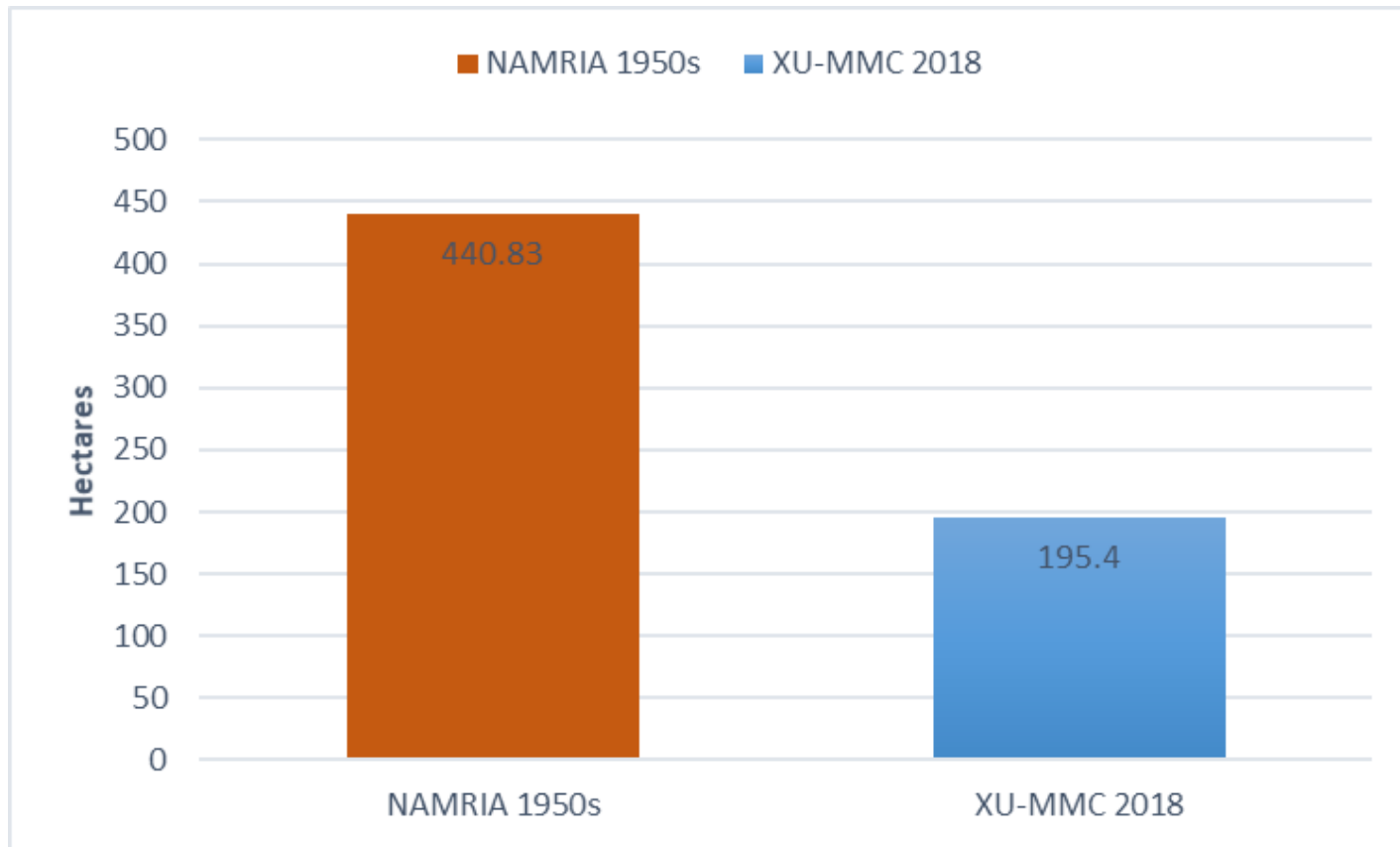
- **West Coast**



- **Planted**

- **Rhizophora sp.**

INITIAL DATA : Mangrove Area



1950 vs 2018 Mangrove area in Macajalar bay

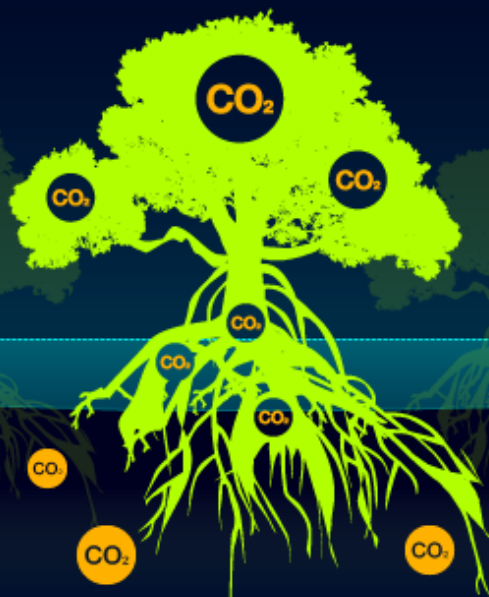
Carbon Dynamics in Mangroves



1

Photosynthesis

Mangroves take up atmospheric CO_2 to form their leaves, stems, branches trunks and roots



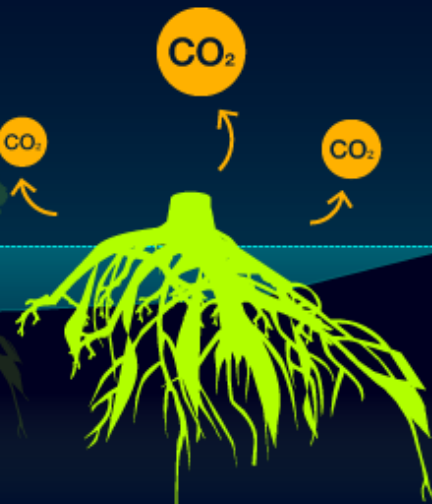
2

Sequestration

As carbon-containing leaves, stems and branches fall, accumulating sediment and detritus bury them, reducing oxygen levels and slowing their decomposition by bacteria.

Buried carbon can remain stored for centuries or longer if not disturbed.

Long-term storage of carbon away from atmospheric oxygen by burial, in long lived tree trunks or in any other way is called "sequestration".



3

Release

The carbon remains in storage until it is eventually released through respiration or mangrove-sediments are disturbed by human or storm activities.

Disturbance of sediments by severe natural events (hurricane, tsunami etc.) or human activities (excavation, dredging, logging) exposes buried carbon to oxygen, quickly releasing the stored carbon back to the atmosphere as CO_2 .