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Monitoring Mangrove Biomass and Carbon Stocks in the Brazilian Amazon: Insights from GEDI and Sentinel-2 for Conservation

PROBLEM

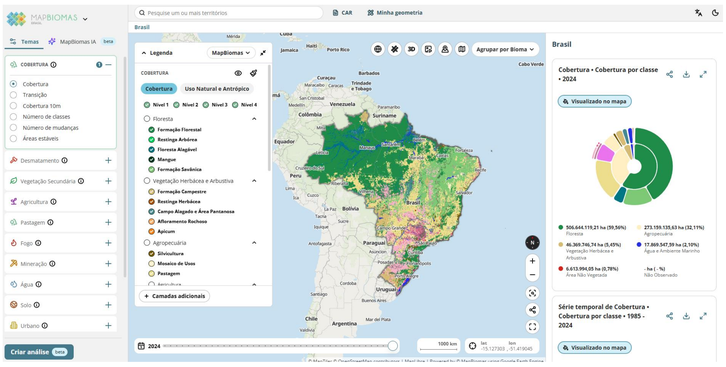
Mangroves play crucial roles in biodiversity conservation, regional water regulation, and the provision of natural resources, **being fundamental** to the ecological balance in coastal regions. The use of natural resources in these ecosystems **affects fundamental processes**, such as **nutrient cycling**, **biomass production**, and **carbon stocks**, which are crucial for mitigating the effects of **climate change**.

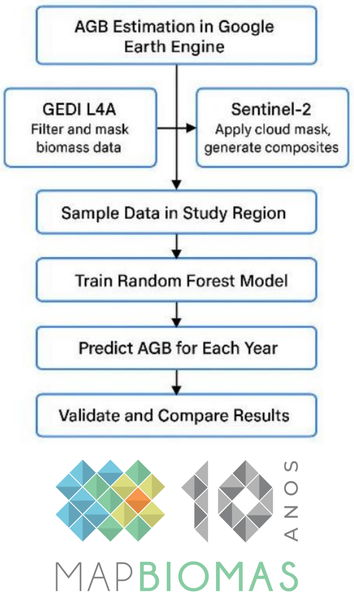
GENERAL OBJECTIVE

This study analyzes the dynamics of aboveground biomass (AGB) and carbon stocks in the mangroves of the Caeté-Taperaçu Marine Extractive Reserve, Brazilian Amazon, between 2019 and 2023.

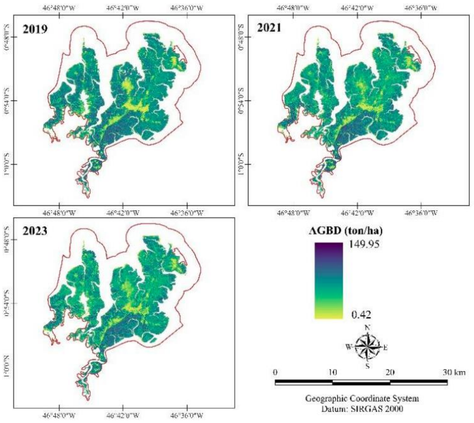
PROPOSAL

By leveraging geotechnologies like **remote sensing** and **GIS** to monitor environmental changes and inform adaptive management, this study analyzes the spatial dynamics of **aboveground biomass** and **carbon stocks** in the RESEX Caeté-Taperaçu mangroves from **2019 to 2023**. The findings aim to strengthen sustainable management strategies for protected areas throughout the Amazon.

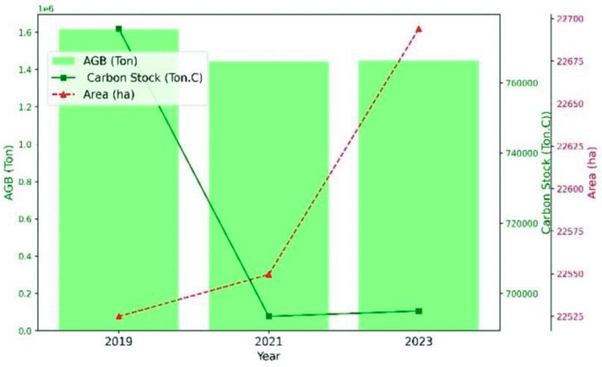




RESULTS



- The **AGBD** values ranged from 0.42 to 149.95 tons/ha.
- The lower values observed in the central area of the AOI and near sand dune edges.
- The Mean AGBD assigned 66.68±26.13 ton/ha, 59.45±23.40 ton/ha, and 59.28±23 for 2019, 2021, and 2023.



- Between 2019 and 2021, there was a reduction of approximately 10.57% in the stock, decreasing from 775,388.59 tons to 693,514.76 tons.

CONCLUSIONS

- Integrating **GEDI** and **Sentinel-2** data efficiently **estimated biomass** and **carbon stock** with **good** model **performance** (R2 = 0.70).
- The **results** reinforce the **importance of RESEXs** in preserving **ecosystem services** and coping with climate change.
- Improving carbon stock estimates is **essential** to **reinforce** the role of **mangroves** in climate change mitigation and to inform national REDD+ strategies.

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