Coastal Blue Carbon Ecosystems
Nature Based Solutions

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Blue carbon is the carbon stored in coastal and marine ecosystems, coastal wetlands. **Mangroves, tidal marshes and seagrasses** sequester and store large quantities of blue carbon in both the plants and the sediment below. For example, over 95% of the carbon in seagrass meadows is stored in the soils.

These coastal blue carbon ecosystems are found on every continent except Antarctica. **Mangroves, tidal marshes and seagrasses cover between 13.8 and 15.2 million hectares (Mha), 2.2 and 40 Mha, and 17.7 and 60 Mha**, respectively.

Despite the proven importance for ocean health and human wellbeing, 20-50 % of coastal blue carbon ecosystems have been converted or destroyed. Recent estimations showed that restoring wetlands can allow for up to 14 % of the mitigation potential needed to hold global temperature to 2°C above the preindustrial period (Griscom et al. 2017).

Measuring Carbon Stocks

Figure 1 Global Distribution of Blue Carbon Ecosystems

- When vegetation is removed and the land is either drained or dredged for economic development, (i.e. mangrove forest clearing for shrimp ponds, draining of tidal marshes for agriculture, and dredging in seagrass beds—all common activities in the coastal zones of the world), the carbon in the sediments is released into the atmosphere and ocean.
- Not only do these activities result in CO_2 emissions but they also result in losses of biodiversity and critical ecosystem services.
- Managers of coastal ecosystems are increasingly interested in assessing and monitoring carbon stocks and changes in carbon stocks over time.
- Blue carbon now offers the possibility to mobilize additional funds and revenue by combining best-practices in coastal management with climate change mitigation goals and needs.

Research and Observation New Insights on the Mitigation potential

Saltmarshes on coasts in the northern hemisphere have been storing carbon 2- to 5-times faster than in the southern hemisphere. This is because sea level rise has been faster in the northern hemisphere, whereas sea level in the southern hemisphere has been more stable. However, this historical pattern is now changing with global climate change and accelerated sea level rise, raising the question of what this means for the stability of coastal blue carbon ecosystems.

Southern hemisphere coastal wetlands – South America, Africa, and Australia – can tolerate more accelerated sea level rise then those in North America, Europe, and Asia, because they have more "accommodation space" (Figure 3).

This means that southern hemisphere wetlands have relatively more room to rise upward with sea level in elevation before the rising water drowns the plants. Importantly, accommodation space is also needed for blue carbon ecosystems to move inland with rising sea level (Figure 3). Policies that prevent construction of sea walls and other hard structures will provide space for coastal wetlands to migrate inland.

In areas where the marsh is free to migrate, formerly dry forests and abandoned agricultural land is transforming to blue carbon wetlands, preserving the many ecosystem services they provide.

Healthy Blue Carbon Ecosystems / Degraded Blue Carbon Ecosystems

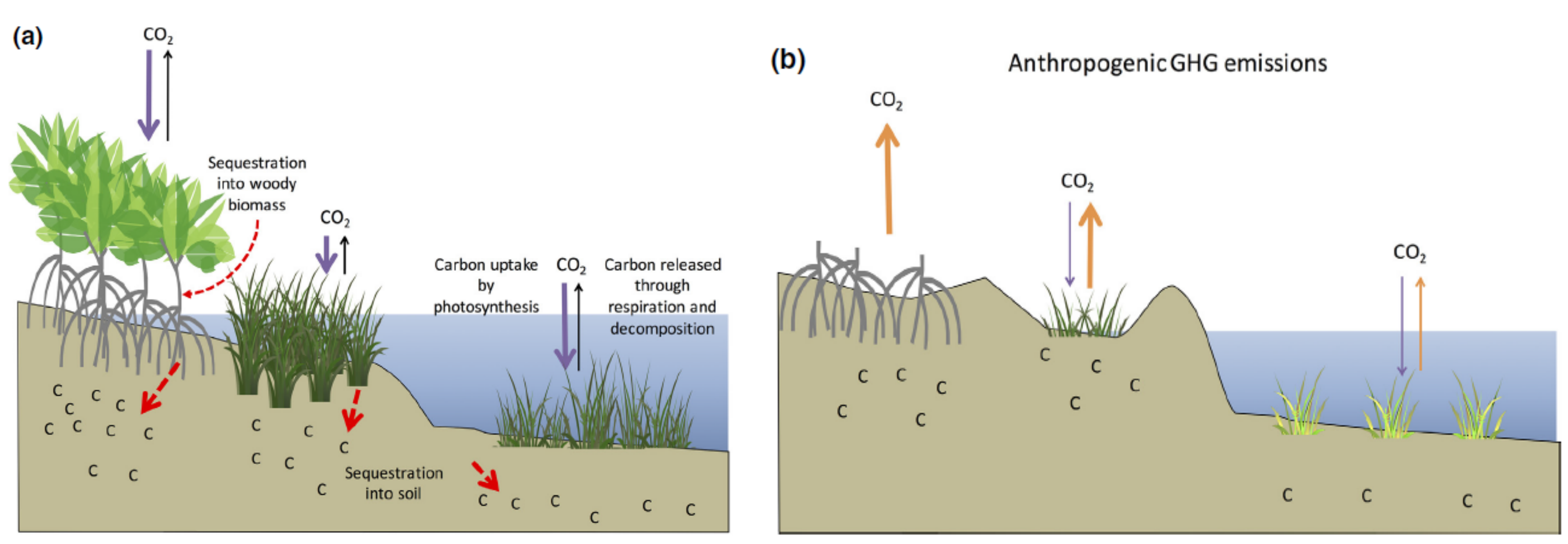

Figure 2 intact (a) and degraded (b) coastal blue carbon ecosystems and related carbon sequestration and emission pathways (from left to right: mangroves, tidal marshes, and seagrasses),Howard et al., 2017

Migration of Coastal Blue Carbon Ecosystems

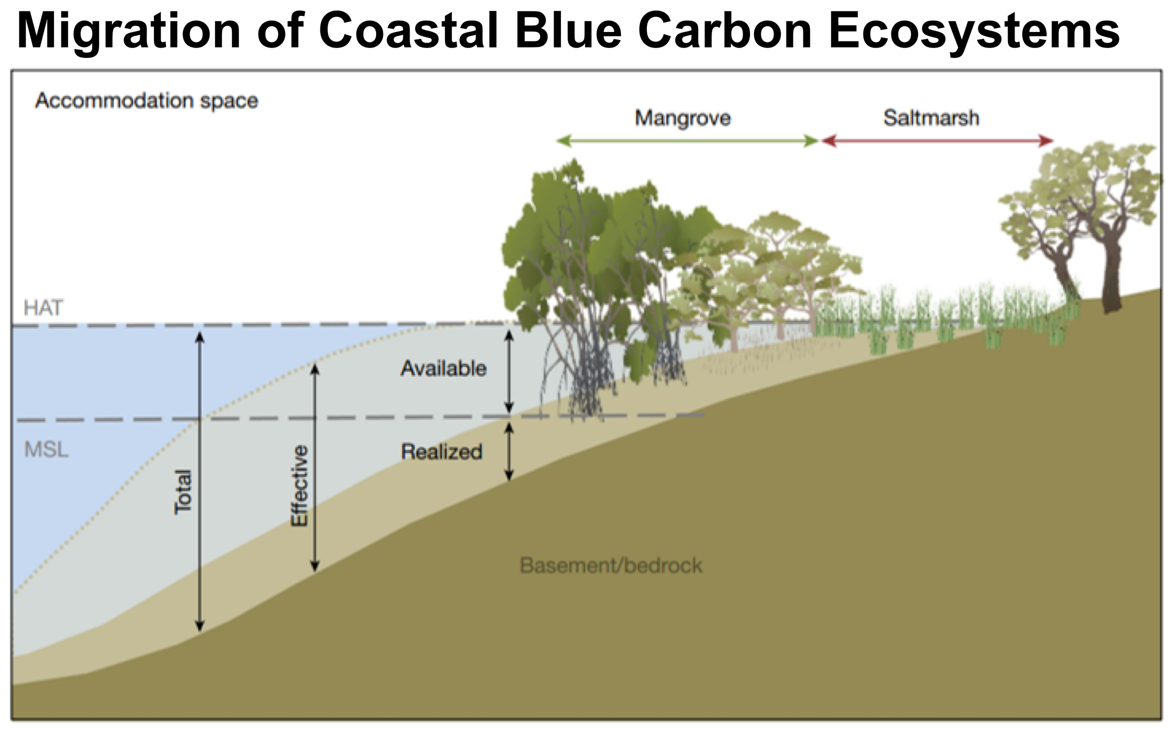

Figure 3. Blue carbon ecosystems such as mangroves and saltmarshes exist in a small elevation window between mean sea level (MSL) and the highest astronomical tides (HAT). The available space for gaining elevation and sequestering carbon in soils is the distance between the present soil surface and HAT (i.e. the two dashed lines). They will continue to sequester carbon as long as there is sediment available to fill up the available space, and they can also migrate inland as sea levels rise. After Rogers et al. 2019.

Next steps: Blue Carbon Science to Action

Expand and integrate observation of Blue Carbon stocks and Carbon fluxes.

Investigate the climate feedbacks and interactions.

Study the impact of informal settlements on Blue Carbon ecosystems.

Enforce non disruptive technologies to protect Blue Carbon ecosystems.

Guide on how to include Blue Carbon Ecosystems in NDCs.

Highlight the co-benefits, when protecting and restoring Blue Carbon ecosystems.

Concrete contributions of ocean science to the work of UNFCCC, through its SBSTA, include: matching Parties' needs in climate change science with opportunities for capacity development in ocean science; elucidating scientific and technical aspects of the Global Stocktake; identifying targets and developing the related methodologies to measure progress; assisting in the design of the next generation of integrated climate models and predictions; and stimulating ocean science production reflecting the needs and aspirations of UNFCCC Parties.

For more info:
http://thebluecarboninitiative.org