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Understanding Blue Carbon

By Anita Tang

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International carbon-trading markets have been around since the Kyoto Protocol, an international treaty adopted in 1997 that aimed to reduce the emission of gases that contribute to global warming.

However, carbon credits and carbon trading are still fairly new terms to the general public. An even newer term in the carbon markets is "blue carbon," something that even existing market players are trying to define.

A key fact is that blue carbon assets are among the Earth's most efficient absorbers and long-term repositories of carbon. This paper intends to provide readers with basic information about blue carbon. In a subsequent paper, I will take a deeper look at mangrove forests as a current big contributor to blue carbon.

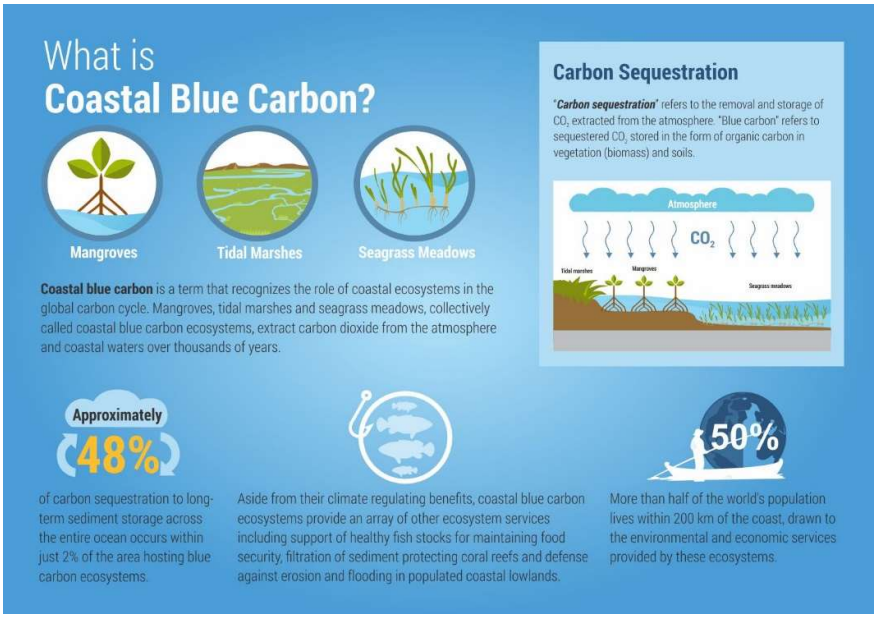
I. What is Blue Carbon?

Blue carbon refers to carbon captured by the world's ocean and coastal ecosystems.

Mangroves, tidal marshes, and seagrass meadows along the coast "capture and hold" carbon, forming a natural carbon sink. These coastal systems, though much smaller in size than the planet's forests, sequester carbon at a much faster rate, and can continue to do so for millions of years. Most of the carbon taken up by these ecosystems is stored below ground, and carbon found in coastal soil is often thousands of years old[1].

Mangroves, tidal marshes, and seagrasses are unique in their ability to sequester carbon, mitigate climate risk, improve livelihoods (support of healthy fish stocks for maintaining food security, filtration of sediment protecting coral reefs, and defense against erosion and flooding in populated coastal lowlands[2]), and safeguard biodiversity (sharks, whales, sea turtles[3]).[4]

Figure 1: Coastal Blue Carbon



Source: PEMSEA, Infographic – Coastal Blue Carbon, https://pemsea.org/publications/brochures-and-infographics/infographics/infographic-coastal-blue-carbon

[1] "What is Blue Carbon?" National Ocean Service. Retrieved on July 5, 2022, https://oceanservice.noaa.gov/facts/bluecarbon.html

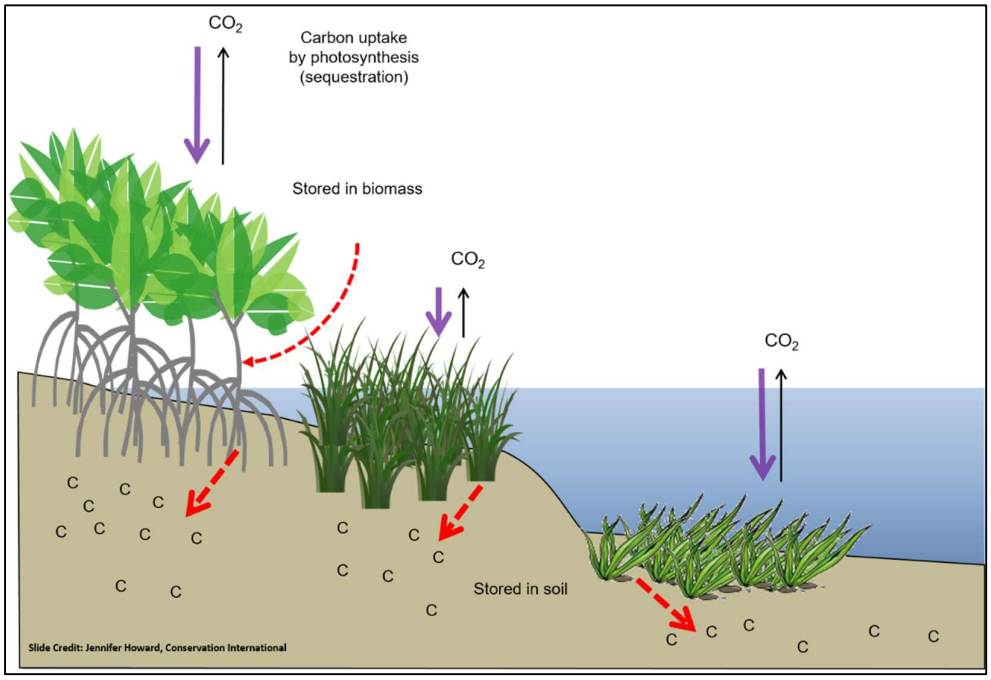
[2] "Infographic: Coastal Blue Carbon," PEMSEA, June 29, 2017. Retrieved on July 5, 2022, https://pemsea.org/publications/brochures-and-infographics/infographics/infographic-coastal-blue-carbon

[3] "The Importance of Blue Carbon Credits," Carboncredits.com. Retrieved on July 5, 2022, https://carboncredits.com/the-importance-of-blue-carbon-credits

[4] "What are Blue Carbon Credits and How to Maximize Their Impact," Whitney Johnston, World Economic Forum, September 21, 2021. Retrieved on July 5, 2022, https://www.weforum.org/agenda/2021/09/how-to-maximise-blue-carbon-credits

Approximately 48 percent of carbon sequestration to long-term sediment storage across the entire ocean occurs within just 2 percent of the area hosting blue carbon ecosystems (coastal wetlands).[2]

Figure 2: Carbon Stored and Sequestered by Coastal Wetlands



Source: Restore America's Estuaries, https://estuaries.org/coastal-blue-carbon/blue-carbon-science-projects

II. Blue Carbon Credit is a New Kid on the Block

Blue carbon credits are credits linked to carbon storage in coastal and marine ecosystems. Blue carbon credits are created by the growth and conservation of carbon-absorbing plants, such as mangrove forests and their associated marine habitat[3]. Blue carbon credits mostly focus on restoration and maintenance of mangroves, tidal marshes, and seagrasses to sequester atmospheric carbon-dioxide emissions[5].

The rules to allow these coastal and marine ecosystems to claim credits are relatively new. Verra, a U.S.-based non-profit entity and one of the top companies in the world to accredit projects that wish to join the carbon-credit market, first published its methodology to give credits to tidal wetland and seagrass restoration in 2015; and only expanded its rules to cover wetland conservation in September 2020.[6]

Until April 2021, Verra had only had applications for land-based projects. The scenario changed when the Virginia Nature Conservancy partnered with the University

[5] "Blue Carbon Credits Emerge as Potential New Market for Global Sustainability," Haley Toadvine, Earth.org, June 11, 2021. Retrieved on July 5, 2022, https://earth.org/blue-carbon-credit

[6] "Why the Market for 'Blue Carbon' Credits May Be Poised to Take Off," Nicola Jones, Yale Environment 360, April 13, 2021. Retrieved on July 6, 2022, https://e360.yale.edu/features/why-the-market-for-blue-carbon-credits-may-be-poised-to-take-off

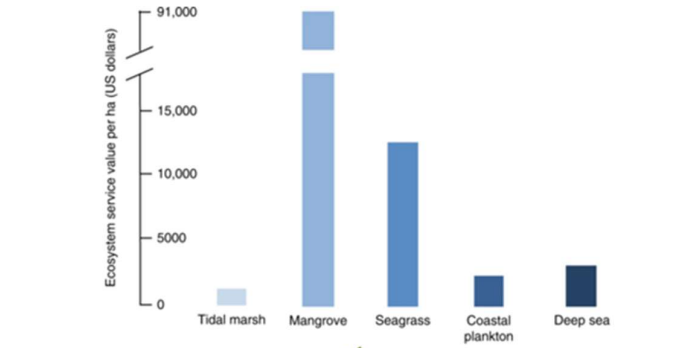
of Virginia and the Virginia Institute of Marine Sciences to plant over 70 million seeds in bays off Virginia's coasts – over the past two decades, conservation scientists spread more than 70 million seeds in the bays there, restoring 3,600 hectares of an ecosystem devastated by disease in the 1930s[6]. The project only recently applied for accreditation through Verra to sell carbon credits to large-scale corporations, making it the first seagrass project in the world to do so[5]. If successful, it will join a handful of other blue carbon-credit projects around the world, the vast majority of which are in mangrove restoration[6].

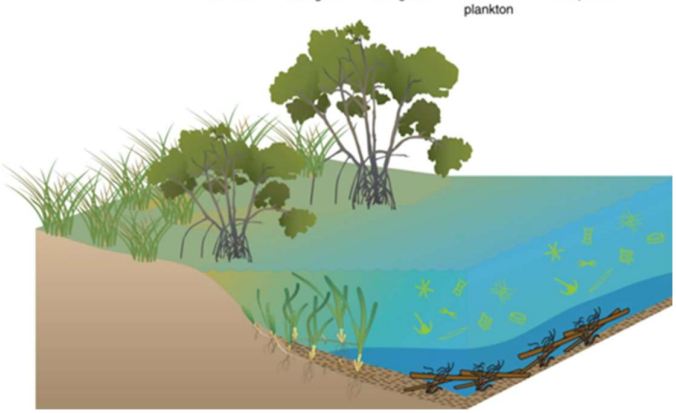
1. Efficiency in Capturing Carbon

According to the United Nations Educational, Scientific and Cultural Organization (UNESCO), blue-carbon assets are among the Earth's most efficient absorbers and long-term repositories of carbon. Protecting and restoring the mangroves-forest, tidal-marshes, and seagrasses-marine ecosystems can reduce global carbon emissions by as much as 1.4 billion tons of CO_2-equivalent (CO_2e) emissions annually by 2050, according to the World Resources Institute.[7]

Figure 3 depicts 2009 estimates of the economic value of blue-carbon ecosystems per hectare.

Figure 3: Economic Value of Blue Carbon Ecosystems Per Hectare (2009 Estimates)





Source: Wikipedia, https://en.wikipedia.org/wiki/File:Economic_value_of_blue_carbon_ecosystems_per_hectare.webp

[7] "Banking on 'Blue Carbon'," Peter Sainsbury, Carbon Risk, July 5, 2022. Retrieved on July 5, 2022, https://carbonrisk.substack.com/p/banking-on-blue-carbon

2. Opening the Doors for More Blue Carbon Credits[6]

The vast majority of blue carbon-credit projects around the world are mangrove restorations. Up till the first quarter of 2021, Verra has issued a grand total of just under 970,000 credits to blue-carbon projects. Mangrove projects are now ramping up dramatically in scope, with one alone aiming to soak up millions of tons of CO_2e a year. Scientists are also working hard to account for the carbon in other ecosystem types – seagrasses, salt marshes, seaweeds, and seafloor sediments – so they, too, can enter the market.

The earlier mentioned seagrass-meadow project off the shores of Virginia has brought back eelgrass (Zostera marina) – a keystone species that supports crustaceans, fish, and scallops, and is now absorbing the equivalent of nearly half a metric ton of CO_2 per hectare per year. If this project is certified for blue carbon credits, it is a vote of confidence for seagrass restoration as one viable way for human to fight against global climate change.

Seagrasses may have more carbon-mitigation potential than mangroves simply because there are so many of them. According to the High Level Panel, seagrasses alone might account for half of the 1.4 billion tons of blue carbon greenhouse gas-mitigation potential.

III. Conclusion

Currently, marine-based forestation projects have lagged behind land-based forestation projects due to the fact that the latter group offers easier, cheaper, and larger-scale operation. However, the ocean has the needed capacity to put a brake on global warming and at the same time provide food, boost biodiversity, and protect local coasts from storms and tides. Ecologist Enric Sala, a National Geographic Explorer-in-Residence, noted: "The ocean has long been seen as a victim of climate change, but it's also a big part of the solution."[8]

Blue carbon is about coastal-habitat conservation. When these systems are damaged, a huge amount of carbon is emitted back into the atmosphere, adding negative impacts to the climate. Therefore, protecting and restoring coastal habitats should help keep check on climate change. When we protect the carbon in coastal systems, we protect healthy coastal environments that provide many other benefits to humankind and other living species.

[8] "UN Report Warns of Grave Consequences if Mangroves Not Protected," Mike Gaworecki, Mongabay, March 11, 2015. Retrieved on July 6, 2022, https://news.mongabay.com/2015/03/un-report-warns-of-grave-consequences-if-mangroves-not-protected