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Blue Carbon Why it is Important

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WHEN we think of carbon, a deep black material comes to mind; however, it exists in nature as several allotropes with different colours. For example, graphite is grey-black, while amorphous carbons such as soot, lamp black and carbon black are black, diamond is colourless, and fullerenes are yellow to brown. In many other forms, inorganic carbons have different colours too. Now, a colour-based description has emerged, describing the properties and distributions of organic carbon, including black, brown, red, blue, green and teal. Colours like blue, green, and teal highlight the role of carbon in climate change mitigation through sequestration, and colours like black, brown, and red are related to the Earth's heat balance or the promotion of cryospheric melting.

Among those, blue carbon, which refers to the carbon sequestered by oceanic environments such as mangrove forests, salt marshes, and sea grasses, including weeds and sediments, is considered the most important. This has also attracted the special interest of policymakers and environmental scientists as a solution for climate change mitigation. This is because blue carbon ecosystems are the most productive in the world, meaning they usually grow a lot each year and sequester large amounts of carbon. Moreover, their soils are largely anaerobic; therefore, carbon that gets incorporated into them decomposes very slowly, remaining intact and stored for thousands of years.

Approximately 33 billion metric tonnes of carbon have been stored in the blue carbon ecosystems today, which, besides carbon sequestration, also provides various benefits and services. These are important for climate change adaptation along the coast globally, including protection from storms and sea level rise, prevention of shoreline erosion, regulation of coastal water quality, provision of habitats for commercially important fisheries and endangered marine species and food security for many coastal communities.

The carbon sequestration capabilities of these ecosystems consist of three main components, namely mangroves, salt marshes, and seagrasses, which are evident from the facts detailed in Table 1. It shows that mangroves sequester carbon 56 times faster than the tropical forests.

The coastal blue carbon ecosystems are along the coasts of every continent except Antarctica. Mangroves are predominantly in the inter-tidal zones of tropical and sub-tropical shores. Countries with the highest mangrove area include Indonesia, Australia, Mexico, Brazil, Nigeria, Malaysia, Myanmar, Papua New Guinea, Cuba, India, Bangladesh and Mozambique. Tidal marshes are intertidal ecosystems on sheltered coastlines ranging from sub-Arctic to the tropics, most extensively in temperate zones in Europe, North America, Australia and higher latitudes in South America and Africa. However, seagrass meadows are communities of underwater flowing plants found in coastal waters of all continents except Antarctica. More than 60 seagrass species exist, as many as 10 to 13 may co-occur in tropical sites.

Despite all the benefits and services rendered, the concentration of carbon dioxide in the atmosphere is constantly rising and has already crossed its critical limit of 400 ppm (parts per million). Consequently, global warming is increasing unabated, leading to climate change and other