

**Seashores and Carbon Stores:
Investigating Carbon Sequestration in Blue Carbon Ecosystems from the World's
Remotest Atolls**

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Coastal ecosystems such as mangroves, salt marshes, and seagrasses have been recognized as blue carbon ecosystems (BCEs) and possible climate change mitigation target ecosystems due to their ability to store some of the highest carbon stocks per unit area and to sequester carbon over time scales relevant to climate change. From 2006 to 2015, the Khaled bin Sultan Living Oceans Foundation completed field research along a transect of remote shallow-water reefs covering approximately 65,000 km² across 125 atolls in 11 countries through their Global Reef Expedition (GRE). Through the GRE, the spatial extent of reef-associated habitats, including BCEs such as seagrass meadows and mangrove forests, was mapped and ground-truthed in each country, providing a key opportunity to construct initial estimates of BCE sequestration rates and stocks. Motivated by the need to better understand the extent and role of BCEs in climate change mitigation, we aim to construct initial estimates of blue carbon sequestration by integrating mapped BCE areas with published rates of carbon sequestration by each ecosystem. Preliminary results constructed from nine atolls in the Solomon Islands indicate that mangrove forests comprise 0.075 to 16.62 km², constituting 33.39% of the total mapped area of the study site. Using published carbon stock values from another IndoPacific mangrove forest (5.10 MgC_{org}km⁻²; Donato et al., 2011), we estimate 170.35 MgC_{org}km⁻² is stored as blue carbon by mangroves in these atolls. Of the nine atolls considered thus far, Vanikoro was estimated to have the highest mangrove-associated blue carbon stocks (84.7 MgC_{org}km⁻²) in the mapped extent of the Solomon Islands. Ongoing research will elucidate BCE extent, and integrate ranges of potential rates of blue carbon sequestration and standing carbon stocks in the other 116 atolls. Supported in part by NSF OCE award # 2319245.

Donato et al. (2011). Mangroves among the most carbon-rich forests in the tropics. *Nature Geoscience*, 4(5), 293–297.