

Blue carbon sinks in South Africa and the need for restoration to enhance carbon sequestration

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Abstract

Blue carbon ecosystems (mangroves, salt marshes, and seagrasses) contribute towards climate change mitigation because they are efficient at sequestering atmospheric CO₂ into long-term total ecosystem carbon stocks. Destruction or disturbance therefore reduces sink capacity and leads to significant CO₂ emissions. This study reports the first national estimates of: 1) total carbon storage, 2) CO₂ emissions from anthropogenic activities, 3) the potential for restoration to enhance carbon sequestration for blue carbon ecosystems in South Africa. Mangrove ecosystems have the greatest carbon storage per unit area (253–534 Mg C ha⁻¹), followed by salt marshes (100–199 Mg C ha⁻¹) and seagrasses (45–144 Mg C ha⁻¹). Salt marshes are the most extensive and contribute 67 % to the national carbon stock of 4000 Gg C. Since 1930, 6500 ha has been lost across all blue carbon ecosystems (26 % of the natural extent), equivalent to losing 1086 Gg C from the national carbon stock. Historic CO₂ emissions were estimated at an average rate of 30,266 t CO₂e yr⁻¹. Despite losses, a total of 3998 ha could be restored to increase carbon sequestration and CO₂ removals of 14,845 tCO₂e.yr⁻¹. Extractive activities have declined rapidly in recent decades, but abiotic pressures on estuarine ecosystems (flow modification, reduced water quality, and artificial breaching) have been increasing. There is an urgent need to quantify the potential impact of these pressures and include them in estuarine management and restoration plans. Blue carbon ecosystems cover a relatively small area in South Africa, but they are valued for their multiple ecosystem services that contribute towards climate change adaptation and biodiversity co-benefits. These ecosystems need to be included in national policies driving climate change response in the Agriculture, Forestry and Other Land-Use (AFOLU) sector, such as incorporating them into the wetland subcategory of the national GHG inventory.