Climate change mitigation strategy through blue carbon in seagrasses ecosystem, Red Sea Coast, Egypt

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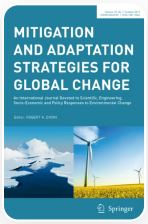


Mitigation and Adaptation Strategies for Global Change

Aims and scope

Submit manuscript

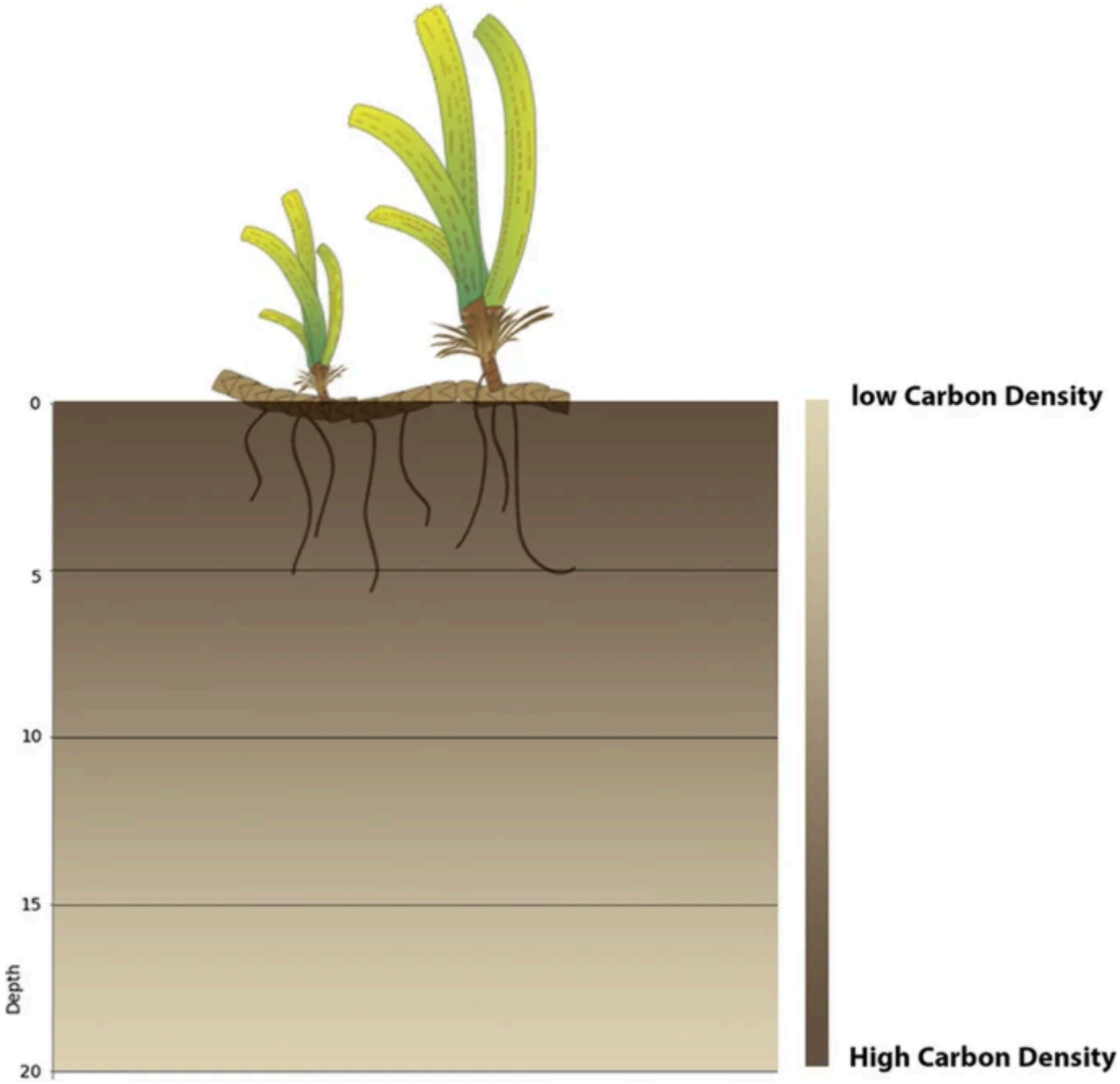
Rowan Elmahdy, Ahmed Mandour, Amr El-Sammak & Ahmed Elshazly

Abstract

The blue carbon ecosystems possess the potential to mitigate climate change impacts, support adaptation, assist in reaching the national and global net-zero goals, and secure social, economic, and environmental outcomes through sequestering and storing carb in sediments. The marine environment along the Red Sea coast of Egypt is distinguished by a high biodiversity with key marine ecosystems such as seagrasses meadows, coral reefs, and mangroves that can play a role in blue carbon ecosystems. To understand the capacity of the seagrasses to store carbon, this study aims at quantifying the vertical distribution of the organic carbon density (OCD) and the carbon sequestration potential (CSR) and evaluate the economic feasibility of seagrasses vegetation as a tool for

mitigating climate change. Two sediment cores were sampled from vegetated areas (inhabited with seagrasses species: *Thalassia hemprichii*) and one core from a non-vegetated area (for comparison) from three nearshore locations within Wadi El Gemal Protected Area, Red Sea Egypt. The OCD in the vegetated areas increased with depth and showed higher capacities of carbon storage compared to the non-vegetated area. The overall calculated CSR for seagrasses in Wadi El-Gemal is 341.65 g C m^{-2} yr^{-1}. These findings support the key role of seagrasses to mitigate climate change through CO2 sequestration and return an equivalent of 6,000 to 11,000 USD per year for every 100 hectares in monetary value. This highlights the importance of the conservation and restoration of seagrasses along the Red Sea coast and the potential of blue carbon finance that can be leveraged to meet national-level climate mitigation strategies and policies in Egypt.

Graphical Abstract



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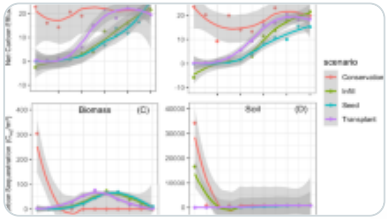

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Data availability

All data generated or analysed during this study are included in this published article.

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Contributions

All authors contributed to the conception and implementation of the study as well as the formulation and revision of the manuscript. Samples collection, analyses, data analysis and discussion were done Rowan Elmahdy, Ahmed Mandour, and Ahmed Elshazly. Conceptualization of the idea, guidance, and formulation of the manuscript were done by Amr El-Sammak, Ahmed Mandour, Ahmed Elshazly, and Rowan Elmahdy.

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Ethics declarations

Competing interests

The authors have no competing interests to declare that are relevant to the content of this article.

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