Changes in mangrove blue carbon under elevated atmospheric CO2

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The system controls the atmospheric carbon dioxide concentrations, flooding time, temperature, light, humidity and other environmental factors suitable for the study of costal wetland ecosystems global change manipulations. Credit: Jialin Zhang from Xiamen University

As one of the major blue carbon ecosystems, mangroves provide critical

ecosystem services in mitigating global climate change. However, future complex and variable climate conditions may lead to the uncertainty in trajectories of blue carbon capacity. Elevated atmospheric CO_2 concentrations (eCO_2) is projected to become a prominent driver of mangrove blue carbon in the future.

A group of scientists have reviewed studies on "changes in mangrove blue carbon under elevated atmospheric CO_2" to identify the pathways for how eCO_2 might influence mangrove ecosystem carbon cycling. The research is published as a review article in *Ecosystem Health and Sustainability*.

This review shows that mangrove has a negative feedback to climate change, whereby eCO_2 added to mangrove's ability to sequester additional carbon, which in turn reduces the rate by which CO_2 builds. Furthermore, eCO_2 affects warming and sea-level rise through alternate pathways, which might co-influence the mangrove response in both antagonistic and synergistic ways.

The scientists suggest more experiments are needed to understand the influence of eCO_2 on biological processes that might lead to greenhouse gas emissions, and they support investing in mesocosm-scale simulation experiments that could provide datasets for predicting future scenarios. Given the complexity of the interactions of biological and environmental factors with eCO_2, long-term field observations and in situ simulation experiments can help to better understand the mechanisms for proper model initialization to predict future changes in mangrove carbon sequestration.

More information: Xiaoxuan Gu et al, Changes in Mangrove Blue Carbon under Elevated Atmospheric CO 2, *Ecosystem Health and Sustainability* (2023). DOI: 10.34133/ehs.0033

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