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INNOVATIVE STRATEGIES FOR CO₂ STORAGE IN MARINE ENVIRONMENTS: ASSESSING FEASIBILITY AND ENVIRONMENTAL IMPACT

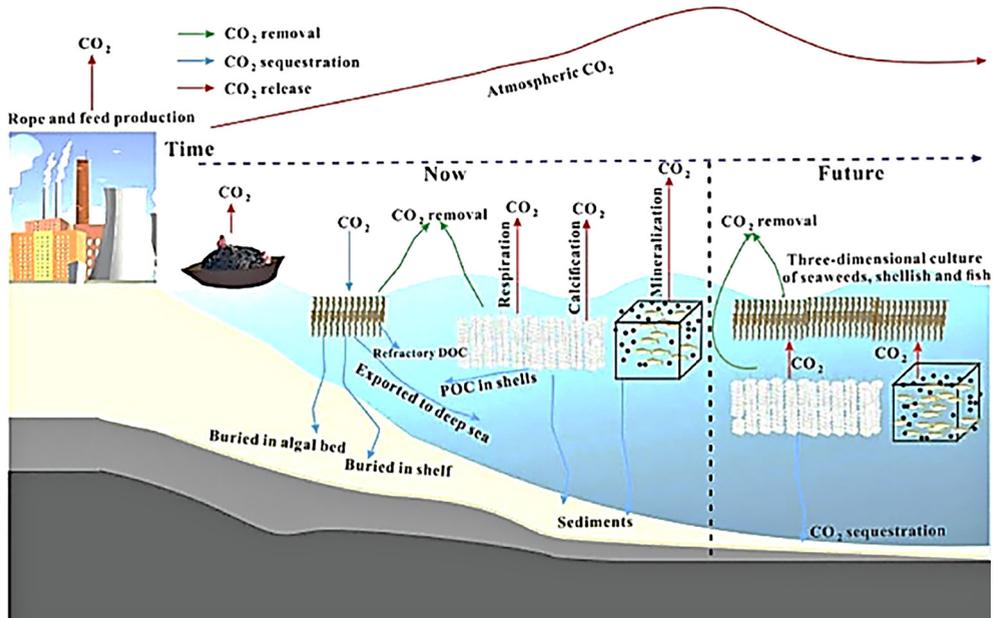
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Abstract – The rapid increase in atmospheric carbon dioxide (CO₂) due to human activities is a pressing concern that demands innovative solutions. The study examines the feasibility and impact of storing CO₂ in marine environments as a method to combat climate change. To explore various techniques for oceanic CO₂ sequestration, we investigate direct injection into deep-sea formations, mineral carbonation and the enhancement of natural processes like phytoplankton growth, which play a crucial role in carbon capture. The approach integrates oceanographic data, chemical modelling and ecological impact assessments to provide comprehensive analysis. The focus is on the stability of stored CO₂, the risks of leakage, and the potential effects on marine ecosystems. Some findings suggest that certain deep-sea geological formations offer secure long-term storage with minimal harm to marine life. Furthermore, the research emphasises the importance of addressing the regulatory and ethical challenges of oceanic CO₂ storage, highlighting the need for robust international guidelines and cooperation. In addition to the scientific and technical aspects, we consider the socio-economic implications of implementing these technologies. This publication presents a comprehensive overview of current research, identifies promising future directions and explores the socio-economic implications of marine CO₂ storage technologies. The objective is to foster collaboration among scientists, policymakers and stakeholders in developing sustainable carbon management solutions. By advancing our understanding of marine CO₂ storage, we aim to contribute to global efforts in mitigating climate change and promoting environmental sustainability.

Keywords – *Carbon management; carbon sequestration; climate change mitigation; ecological impact; environmental impact; leakage risks; oceanographic data; phytoplankton growth.*



Carbon removal, sequestration and release by mariculture in an important aquaculture area, China. Science of The Total Environment. (Source: Li W., Li X., Song C., Gao G. (2024).