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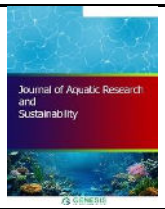

Editorial

Protecting mangrove habitats contributes to achieving global climate goals

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Abstract

Mangrove forests are critical ecosystems that play a significant role in climate change mitigation and adaptation. This editorial highlights the importance of protecting and restoring mangrove habitats as a strategic approach to achieving global climate goals, including those outlined in the Paris Agreement and the United Nations Sustainable Development Goals (SDGs). Mangroves store large amounts of carbon, protect coastal communities from extreme weather events, support marine biodiversity, and sustain local livelihoods. Despite their ecological and economic value, mangroves continue to face severe threats from human activities and climate change. The editorial calls for urgent action through stronger policies, community-based conservation, adequate financing, and science-based restoration efforts. It emphasizes that safeguarding mangrove habitats contributes directly to SDG 13 (Climate Action), SDG 14 (Life Below Water), SDG 1 (No Poverty), SDG 2 (Zero Hunger), and SDG 11 (Sustainable Cities and Communities). Preserving mangroves is essential for building a resilient and sustainable future.

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In the escalating battle against climate change, the world increasingly turns to nature for solutions that are sustainable, cost-effective, and equitable. Among the most powerful yet underappreciated of these natural allies are mangrove forests. Found along tropical and subtropical coastlines, mangroves provide essential ecological services and are one of the most efficient carbon sinks on Earth (Sunkur *et al.*, 2023). Despite their immense value, mangrove ecosystems are under growing threat from human activity and climate-induced pressures (Choudhary *et al.*, 2024; Elwin *et al.*, 2024). Safeguarding these habitats is not only an environmental imperative but also a direct pathway toward achieving global climate goals, including the targets outlined in the Paris Agreement and the United Nations Sustainable Development Goals.

Mangrove forests play a unique and irreplaceable role in mitigating climate change. These coastal ecosystems are capable of sequestering large amounts of atmospheric carbon dioxide, storing up to four times more carbon per hectare than terrestrial forests. This carbon is locked away in their dense root systems and waterlogged soils, where it can remain for centuries if undisturbed (Chen and Kirwan, 2024; Palit *et al.*, 2022). The concept of "blue carbon" highlights this function, positioning mangroves alongside other marine ecosystems like seagrasses and salt marshes as vital components of the global carbon budget. By conserving mangroves, countries can prevent the release of this stored carbon and contribute significantly to climate mitigation efforts, supporting SDG 13: Climate Action (Howard *et al.*, 2023).

Beyond carbon sequestration, mangroves serve as natural barriers against extreme weather events and sea-level rise, which are intensifying under global climate change. Their thick root networks reduce the force of incoming waves, stabilize shorelines, and prevent coastal erosion. This protective function shields millions of people living in low-lying coastal zones from the devastating impacts of cyclones, storm surges, and flooding (Risheharan *et al.*, 2025). The economic value of these services is substantial, often surpassing the benefits provided by engineered solutions such as seawalls or levees. In many cases, mangroves have saved lives and livelihoods where no other form of protection was viable. This function is especially critical in achieving SDG 11: Sustainable Cities and Communities, by making coastal settlements more resilient (Salem and Mercer, 2012).

Mangroves also support rich biodiversity and provide the foundation for productive coastal fisheries, which are critical to food security and income in many developing countries. Their dense foliage and submerged roots offer ideal nursery habitats for a wide range of marine species. For countless coastal communities, the health of mangrove ecosystems is directly tied to their economic and social well-being. Thus, protecting mangroves is not only an ecological priority but a matter of human survival and equity. These contributions align directly with SDG 14: Life Below Water, ensuring the protection of marine resources and ecosystem services (Sunkur *et al.*, 2023). The global community has increasingly acknowledged the importance of mangrove conservation in international agreements. Under the Paris Agreement, nations are encouraged to enhance carbon sinks and include nature-based solutions in their climate action plans. Many countries with mangrove coverage, such as Indonesia, Bangladesh, Brazil, and Kenya, have included mangrove protection and restoration in their nationally determined contributions. These actions align with Article 5 of the Paris Agreement, which underscores the significance of preserving and enhancing natural carbon reservoirs (Feng *et al.*, 2023; Slobodian *et al.*, 2025).

Mangrove conservation also plays a crucial role in alleviating poverty and ensuring sustainable livelihoods, particularly in rural and coastal areas. Communities that rely on mangrove forests for fishing, wood collection, honey production, and tourism benefit directly from healthy ecosystems. When these forests are degraded, those

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livelihoods are put at risk. Protecting mangrove ecosystems, therefore, strengthens social and economic resilience, contributing to SDG 1: No Poverty and SDG 2: Zero Hunger, by supporting income generation and food supply in vulnerable regions (Ebeler *et al.*, 2025; Nyangoko *et al.*, 2022). Despite their recognized value, mangrove forests are vanishing at a troubling pace. Over one-third of global mangrove cover has been lost in the last half-century due to human activities such as aquaculture expansion, urban development, agriculture, and pollution. The drive for short-term economic gains has often come at the cost of long-term ecological sustainability. Mangroves are also highly vulnerable to climate change itself, particularly rising sea levels, altered salinity, and increased frequency of extreme weather events. These combined pressures are pushing many mangrove systems to the brink of collapse (Goldberg *et al.*, 2020).

To prevent further loss and to realize the climate benefits that mangroves can offer, urgent and coordinated action is required. Stronger environmental regulations must be implemented to prohibit the conversion of mangrove areas for commercial development. National climate strategies should fully incorporate mangrove conservation as a central pillar, not a peripheral add-on. This includes recognizing the role of blue carbon in national greenhouse gas inventories and allocating funding toward mangrove-related projects (Chamberland-Fontaine *et al.*, 2022). Restoration of degraded mangrove areas offers a promising avenue for reversing past damage. Successful restoration, however, demands more than planting trees—it requires an understanding of local hydrology, soil conditions, species selection, and community dynamics. Involving local communities is essential, as they possess the traditional knowledge, cultural connections, and day-to-day experience to ensure sustainable outcomes. When empowered and properly supported, communities can become stewards of these critical ecosystems, fostering both environmental restoration and livelihood development (Wodehouse and Rayment, 2019).

Financing remains a key challenge. While the global climate finance landscape is evolving, funding for coastal ecosystem conservation is still insufficient. Mechanisms such as payment for ecosystem services, carbon credits, and public-private partnerships must be expanded and made accessible to countries and communities engaged in mangrove protection. International development banks, philanthropic organizations, and national governments all have a role to play in bridging this funding gap (Meraj and Hashimoto, 2025; zu Ermgassen and Löfqvist, 2024). Research and innovation also hold promise in improving mangrove management. Advances in satellite monitoring and geographic information systems can help track changes in mangrove cover, identify restoration opportunities, and ensure accountability in conservation programs. Scientific collaboration across nations can lead to the development of best practices and scalable models for mangrove rehabilitation (Sunkur *et al.*, 2023).

The road ahead is clear. To meet the world's climate goals, natural climate solutions must be at the forefront, and mangroves must be treated as essential infrastructure in that strategy. Protecting and restoring mangrove habitats is not a luxury or a secondary concern—it is a practical, cost-effective, and scientifically validated means of mitigating climate change while promoting sustainable development. The global community has the knowledge, tools, and experience to act. What is needed now is the political will and collective commitment to prioritize mangrove conservation at all levels—from local councils to international summits. Every hectare of mangrove saved is a contribution to a more stable climate, a more secure coastline, and a more sustainable future. The time to act is now, before more of these vital ecosystems are lost to neglect and mismanagement. By protecting mangrove habitats today, we take a decisive step toward achieving the global climate goals that will define the planet's tomorrow.

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Conflict of interest

The authors declare no competing interests.

Authors' contribution

Abdulla-Al-Asif contributed to the conceptualization and writing of this editorial. The author has read and approved the final version of the published editorial.

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