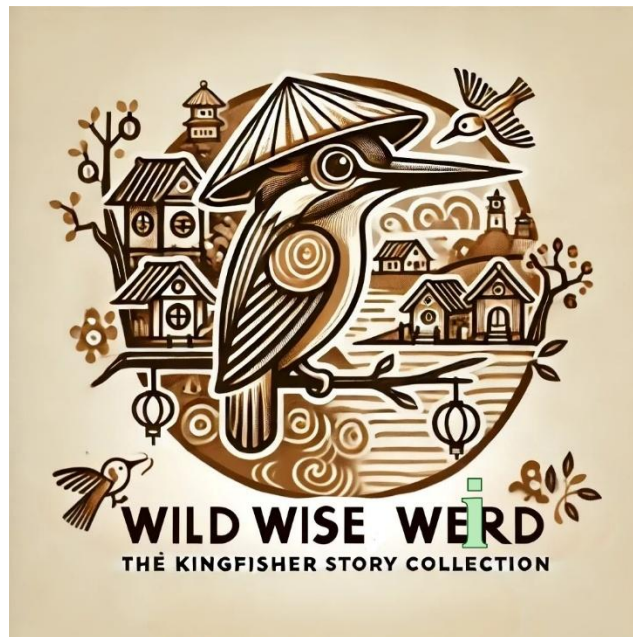


Coastal Wetlands in Peril: Navigating the Anthropocene's Rising Tides

Cuốc Lùn

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“All the birds clap loudly and cheerfully because the emission reduction goal is accomplished. The Earth will become beautiful again like it used to be, and the pond will have plenty of fish.”

In “GHG Emissions”; *Wild Wise Weird* [1]



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Coastal wetlands—including marshes, mangroves, and tidal flats—rank among the most productive and valuable ecosystems on Earth. They offer critical services such as storm buffering, carbon storage, water purification, and support for biodiversity [2,3]. These ecosystems have also sustained human settlements for over 7,000 years, particularly in fertile river deltas that nurtured the rise of early urban civilizations [4,5].

Yet in the Anthropocene—a geological era defined by intensive human activity—coastal wetlands face mounting threats. Centuries of land reclamation, urban expansion, and the construction of more than 50,000 dams globally have drastically reduced freshwater and sediment flows to coasts, accelerating the degradation of wetland systems [6].

Climate change further intensifies these pressures. Rising sea levels, stronger storms, and increasing temperatures are testing the resilience of coastal wetlands. Although wetlands can adapt by migrating inland or building elevation through sediment accumulation, these processes are increasingly constrained. Infrastructure, limited sediment supply, and narrow migration corridors often prevent wetlands from keeping pace with sea-level rise. Scientific thresholds suggest that vertical adaptation is unlikely when sea levels rise faster than 5–7 millimeters per year—a rate already surpassed in many coastal regions.

Moreover, inland migration often occurs at the expense of freshwater wetlands or upland ecosystems, leading to a transformation rather than a net gain in wetland areas. As warming temperatures shift species distributions, mangroves are expanding poleward, frequently replacing temperate salt marshes.

Efforts to leverage “blue carbon” storage in coastal soils and vegetation for climate mitigation offer limited global impact. Similarly, while nitrogen pollution has been a concern, current levels in most watersheds do not appear to destabilize marsh ecosystems on a broad scale [6].

Ultimately, coastal wetlands are both casualties and indicators of environmental change. Their decline signals a deeper imbalance between human development and natural systems. Protecting these ecosystems requires coordinated efforts that blend ecological knowledge with inclusive policy. In doing so, we affirm a fundamental truth: sustaining the health of nature is essential to sustaining human life [7,8].

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