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Abstract

Transitional Waters: Critical Habitats for Coastal Fish Species and Fisheries †

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Abstract

Transitional waters—such as estuaries, lagoons, deltas, and coastal wetlands—are dynamic environments where freshwater and seawater interact, forming highly productive and biologically diverse ecosystems. Shaped by temperature and salinity gradients, tidal influence, sediment transport, and nutrient-rich conditions, these habitats support diverse ecological functions. Their structural complexity—including seagrass beds, salt marshes, mudflats, and mangroves—provides essential habitats for many fish species. These areas are crucial for fish life cycles, serving as nurseries, spawning grounds, feeding zones, and refuges from predators. Many commercially important species depend on them during early life stages before moving offshore, making them vital for both commercial and recreational fisheries. Beyond food provision, they deliver key ecosystem services, including water purification, coastal protection, and carbon storage. Research on the fish community of the Ria Formosa lagoon in Portugal since the 1980s highlights long-term changes in the fish community and the dominant role of habitat structure and temporal dynamics. Subtidal seagrass beds support higher fish abundance and diversity than unvegetated areas, acting as key nursery habitats and provide important fish provisioning services. Seasonal variation is also central, driven by recruitment pulses of marine migrants in late winter–spring. Recent pressures on this system have been driven by human activity and environmental change. Seagrass loss reduces nursery and feeding areas, while pollution degrades water quality. Overfishing (including illegal fishing), recreational activities, and aquaculture expansion add stress. Climate warming and invasive species such as *Caulerpa prolifera*, further disrupt ecosystem balance and threaten biodiversity. Sustainable management—such as habitat restoration, protected areas, and integrated policies—is essential to preserve the ecological and economic value of this unique lagoon. Ongoing research, monitoring, habitat restoration, and stakeholder engagement remain critical for ensuring resilience.

Keywords: transitional waters; critical fish habitat; nursery role; fish provisioning services; Ria Formosa lagoon

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