Meta-analysis reveals that utilization of mangrove and seagrass nursery habitats across the globe is related to tidal regime rather than biogeographic region

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Abstract

Identification of critical life-stage habitats is key to successful conservation efforts. Juveniles of some species show great flexibility in habitat use while other species rely heavily on a restricted number of juvenile habitats for protection and food. Considering the rapid degradation of coastal marine habitats worldwide, it is important to evaluate which species are more susceptible to loss of juvenile nursery habitats and how this differs across large biogeographic regions. Here we used a meta-analysis approach to investigate habitat use by juvenile reef fish species in tropical coastal ecosystems across the globe. Densities of juvenile fish species were compared among mangrove, seagrass and coral reef habitats. In the Caribbean, the majority of species showed significantly higher juvenile densities in mangroves as compared to seagrass beds and coral reefs, while for the Indo-Pacific region seagrass beds harbored the highest overall densities. Further analysis indicated that differences in tidal amplitude, irrespective of biogeographic region, appeared to be the major driver for this phenomenon. In addition, juvenile reef fish use of mangroves increased with increasing water salinity. In the Caribbean, species of specific families (e.g. Lutjanidae, Haemulidae) showed a higher reliance on mangroves or seagrass beds as juvenile habitats than other species, whereas in the Indo-Pacific family-specific trends of juvenile habitat utilization were less apparent. The findings of this study highlight the importance of incorporating region-specific tidal inundation regimes into marine spatial conservation planning and ecosystem based management. Furthermore, the significant role of water salinity and tidal access as drivers of mangrove fish habitat use implies that changes in seawater level and rainfall due to climate change may have important effects on how juvenile reef fish use nearshore seascapes in the future

Key Word mangrove, regime, biogeographic