Mangrove Fish Production is Largely Fuelled by External Food Sources: A Stable Isotope Analysis of Fishes at the Individual, Species, and Community Levels from Across the Globe

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Abstract

Coastal ecosystems are energetically connected through passive transport of nutrients but also by migrations of motile organisms. Mangroves are highly productive tropical ecosystems that replenish offshore populations of many species, but we know little about the degree to which this production is fuelled by prey from mangroves, especially in the cases in which mangroves are only accessible at high tide. Different results have been obtained on the importance of mangroves as feeding habitats, confounded by differences in species composition, seascape configuration, and methodology. In the present study, we took a more holistic approach by exploring reliance by fishes on mangroves as a feeding habitat at multiple ecological levels: from individuals to species to communities in mangrove ecosystems from across the globe, using a stable isotope approach. A two end-member mixing model showed a wide range (12–72%) in degree of reliance on mangrove food sources by fishes from different studies across the globe. However, analyzed at the levels of individual fish and species, reliance was low (for example, <25% for 55% of the species worldwide, or <50% for 85% of species, respectively) even though they were collected from sites that differed in geographical location, tidal regime, seascape structure, and species composition. The high fisheries productivity of mangroves appears to be energetically supported largely by food sources from adjacent habitats. In light of the ongoing rapid demise and fragmentation of mangrove and adjacent ecosystems, loss of ecosystem connectivity is likely to affect the productivity and functioning of tropical coastal ecosystems and the services they pro

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