Importance of different carbon sources for macroinvertebrates and fishes of an interlinked mangrove-mudflat ecosystem (Tanzania). Estuarine, Coastal and Shelf Science

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Abstract

Mangroves function as important shelter and feeding habitats for marine fauna, but the degree to which mangrove-derived carbon contributes to local food webs has long been debated. In this study, stable isotope analysis was used as a technique to elucidate the role of mangrove carbon in the diets of the macroinvertebrate and fish fauna of an intertidal fringing mangrove forest and adjacent intertidal/subtidal mudflats in a macrotidal Tanzanian estuary. The expectation was that sessile species and those with low motility depend to a larger extent on local carbon sources than highly motile species. A clear distinction in δ13C was present between primary producers from mangrove and mudflat habitats. Macroinvertebrates revealed a gradient in their δ13C where Sesarma crabs were the only species that directly utilised mangrove carbon by feeding on mangrove leaves/detritus. Uca crabs and the gastropod Littoraria scabra showed a higher dependence on microphytobenthos from the mangrove substratum. Among the fish fauna, the amphibious mudskipper was the only species to which the mangroves were accessible during low tide. Consequently this was the only fish species for which it was clear that it fed in the mangrove habitat, most commonly on mangrove-associated Uca crabs. All other species of sessile as well as motile macroinvertebrates and fish from the mangrove and mudflat habitat showed a high degree of utilisation of mudflat carbon. Overall, mangrove carbon thus contributed little to the mangrove and mudflat food webs, despite the high tidal amplitude and the resulting potential for exchange of carbon and fauna in the estuary studied here. Utilisation of mangrove carbon appears to depend more on the ecology of the species in consideration (e.g., species-specific use of zones within the mangrove habitat) than on their potential motility or tolerance to exposure during low tide.

Key Word macroinvertebrates, mangrove-mudflat ecosystem