Ecosystem-based assessment of the Malindi-Ungwana Bay prawn fishery using ecological indicators

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The study aimed to describe indicators that will contribute to development of an ecosystem-based approach to fisheries management (EAFM) of prawn resources in the Malindi-Ungwana Bay, Kenya. A comprehensive EAFM is required to holistically assess and manage fisheries resources and their associated habitats. The project identified and assessed ecological indicators based on the objectives of sustainability of harvests, biodiversity conservation, and maintenance of habitat quality. A desktop analysis was performed on data sourced from; the State Department of Fisheries, Research vessels, KMFRI, and on-project fieldwork. Trends in historical landings (1985-2010) of the prawns from the Malindi-Ungwana Bay were analysed using LOWESS. Number-size spectra analysis was used to assess the ecological state of the bay while, Biomass Trophic Level spectra (BTLS) analysis was applied as a potential tool for analysing multi-factor effects on the bay. Indiseas based ecosystem indicators were used to quantify the impact of prawn fishery on the biodiversity of the bay. Results indicate a long-term series with two peaks (in 1997 and 2000) in historical landings of penaeid shrimps with a monotonous decline in catches from 2002. Number -size spectra analysis made from artisanal landings (2008-2012) indicated effects of fishing on the ecosystem. The number-size spectra results showed increased fishing mortality with time (2008-2012) and a general increase in fisheries productivity of the bay. BTLS analysis using the fish by-catch data indicated reduced levels of biomass across trophic levels and a decline in trophic levels of the fish species caught, indicating a fishing - down of the food web. Biodiversity and conservation based indicators adopted from the Indiseas program showed the Malindi-Ungwana Bay ecosystem is ecologically degraded in terms of fish sizes, trophic characteristics and proportion of predators. The study recommended adoption of the described ecological indicators and tools as means for evaluating and monitoring the Malindi-Ungwana Bay resources and ecosystem status. However, there is need to initiate more long-term monitoring programs in order to strengthen the temporal scale of analysis. Additional socio-economic and biological data will be needed in order to develop a holistic EAFM model for the management of the Malindi-Ungwana Bay resources.

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