

Linkage between fish functional group distribution and coral reef benthic habitat composition in the Western Indian Ocean

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Abstract

Benthic habitat composition is a key factor that structures assemblages of coral reef fishes. However, natural and anthropogenic induced disturbances impact this relationship. This study investigates the link between benthic habitat composition and fish functional groups in countries in the Western Indian Ocean (WIO). Benthic composition (percent cover of live corals, algae, and rubble) of 32 sites was quantified visually. The densities and size class of 12 coral associated trophic functional groups of fish were estimated at the same sites using 50 x 5 m belt transects. Cluster analysis was applied to identify and characterise reefs based on benthic cover and revealed five habitat types characterised by varying percentage cover of live hard corals, soft corals, fleshy and turf algae. These benthic habitats of the WIO showed geographic variations where sites from central Tanzania and northern Mozambique were associated with habitats dominated by live hard corals, fleshy and turf algae. Northern Madagascar reefs showed habitats, dominated by live hard corals and fleshy algae, while benthic habitats in Comoros were characterised by a dominance of live hard corals and turf algae. Reef sites in Madagascar and Comoros were also characterised by habitats with high benthic diversity. Variation in benthic variables influenced the relative abundance and biomass of fish functional groups. Corallivores, invertivores, detritivores, and grazers showed an association with diverse habitats, while planktivores and small excavators showed an antagonistic association with these habitats. Algal dominated habitats showed a higher biomass of browsers and omnivores than coral dominated habitats. These links between benthic habitat type and fish functional groups should inform conservation and management planning.

Keywords: Ecosystem functionality, evenness, reef resilience management, SIMPROF, spatial characterisation, topographical complexity