

# Comparing the management effectiveness of a marine park and a multiple-use collaborative fisheries management area in East Africa

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## ABSTRACT

1. The coral reefs across the international border between Kenya and Tanzania, where historical differences in government policy and socio-economic conditions created two different management systems, were examined: a large permanent closed area and a collaborative fisheries management project that used gear management and small voluntarily and temporary closed areas, respectively. The diversity and ecology of the reefs in these two management systems were compared spanning a seven-year period to evaluate the effectiveness of the management and to assess the ecological response to a large-scale water-temperature anomaly in 1998.

2. Comparisons of rates of predation on sea urchins and of herbivory, using a seagrass assay, were made along with measures of benthic cover and fish abundance and diversity.

3. The collaborative fisheries management system was successful in increasing fish stocks, reducing erect algae, and maintaining ecological diversity and stability across the thermal anomaly. This management system, however, was not successful in protecting the expected full biodiversity of fish, predation rates on sea urchins, or the sensitive, branching coral species. Management of the fishery also increased fish stocks in the adjacent, large, permanently closed area, compared to Kenyan parks without this management.

4. The large, permanently closed area in the other system maintained high diversity, high predation rates on sea urchins and high herbivory rates, which maintained erect algae abundance and diversity at low levels. The temperature anomaly was destructive to a number of the dominant delicate branching coral species, but overall coral cover and diversity were maintained, although dominance switched from branching *Porites* spp. to *Seriatopora* spp. over this period. The large closed area system protected the undisturbed ecology of these reefs and associated ecological processes, and the full diversity of fish and coral, including sensitive species such as branching corals and slow-growing fish.

5. Collaborative fisheries and large permanent closed area management have different attributes that, when combined, should achieve the multiple purposes of sustainable fisheries, ecosystem functions and protection of fishing-sensitive species.

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