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Sea cucumber fisheries: global analysis of stocks, management measures and drivers of overfishing

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Abstract

Worldwide, most sea cucumber fisheries are ineffectively managed, leading to declining stocks and potentially eroding the resilience of fisheries. We analyse trends in catches, fishery status, fishing participation and regulatory measures among 77 sea cucumber fisheries through data from recent fishery reports and fishery managers. Critical gaps in fisheries biology knowledge of even commonly targeted species undermine the expected success of management strategies. Most tropical fisheries are small-scale, older and typified by numerous (>8) species, whereas temperate fisheries are often emerging, mono-specific and industrialized. Fisher participation data indicated about 3 million sea cucumber fishers worldwide. Fisher participation rates were significantly related to the average annual yield. PERMANOVA analysis showed that over-exploited and depleted fisheries employed different sets of measures than fisheries with healthier stocks, and a non-metric multidimensional scaling ordination illustrated that a broad set of regulatory measures typified sustainable fisheries. SIMPER and regression tree analyses identified that the dissimilarity was most related to enforcement capacity, number of species harvested, fleet (vessel) controls, limited entry controls and rotational closures. The national Human Development Index was significantly lower in countries with over-exploited and depleted fisheries. Where possible, managers should limit the number of fishers and vessel size and establish short lists of permissible commercial species in multispecies fisheries. Our findings emphasize an imperative to support the enforcement capacity in low-income countries, in which risk of biodiversity loss is exceptionally high. Solutions for greater resilience of sea cucumber stocks must be embedded within those for poverty reduction and alternative livelihood options.

Keywords Beche-de-mer, ecosystem approach, fisheries stocks, invertebrate, regulatory measures, resource management

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