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Assessment and management of multispecies multigear fisheries: a case study from San Miguel Bay, the Philippines.

This work uses ecological theory to explore the interactions between fishing and the ecosystem and examines the implications for fisheries assessment and management. The multispecies, multigear fishery of San Miguel Bay, the Philippines is used as a case-study. Three approaches were taken. The first was to descriptively and analytically assess the fishery. Catch rates in 1992-1994 and 1979-1982 were similar, but all other indications are that the fishery suffers from growth, recruitment and ecosystem overfishing. Large scale effort has decreased, but small scale effort has intensified and diversified. The second approach was to model the ecosystem using ECOPATH an equilibrium mass-balance model. The model described a relatively mature and resilient ecosystem, dependent on detrital and benthic flows. Different fishing gears have differential impacts on the ecosystem and these are modified by the interactive effects of predation and competition. In the third approach, a dynamic multispecies model, ECOSIM was used. The impacts of fishing by a multisector fishery on a multispecies resource were dynamically explored under top-down and bottom-up trophic hypotheses. The results demonstrated that the interplay of fishing mortality, species interactions and flow dynamics have profound implications for fisheries assessment and management. The uncertainties concerning the resource dynamics were explored using an adaptive management approach. Four ECOSIM models of the San Miguel Bay were used, top-down, bottom-up, immigration plus top-down and immigration plus bottom-up. Analysis of the EVPI showed that there was no value in learning more about the uncertainty or distinguishing between the different resource models. It was concluded that although an active experimental adaptive management was not worthwhile, adaptive management, using feedback information from the response of the resource to management actions as recommended. This thesis demonstrates the critical importance of an ecosystem-based approach to understanding fisheries dynamics.