

Stratifying herbivore fisheries by habitat to avoid ecosystem overfishing of coral reefs

Peter J. Mumby

Marine Spatial Ecology Lab, School of Biological Sciences, University of Queensland, St Lucia, Qld 4072
Australia

Abstract

The problem of ecosystem overfishing has mostly focused on the function of forage fish as prey for apex predators. Here, I consider another ecosystem function, herbivory, that affects habitat quality. Parrotfish are an important fishery in many parts of the Caribbean and the dominant herbivorous fish on its coral reefs. Herbivory helps control macroalgae which compete with coral and can impede reef resilience if allowed to bloom. Thus, long-term maintenance of reef habitat quality, which underpins fisheries, requires sufficient parrotfish stock. Ecosystem models predict that reductions in parrotfish grazing could have deleterious impacts on reef habitat yet the determination of ecologically-sustainable levels of parrotfish harvest remains elusive. An initial solution to this dilemma is proposed for areas where an outright ban on herbivore exploitation is considered infeasible. Fisheries management has tended to consider coral reefs as a single habitat such that regulations apply evenly throughout exploitable areas. But reef habitats are not equally susceptible to ecosystem overfishing and some do not appear to have a strong requirement for parrotfish grazing. One habitat, *Orbicella* Reef, has a high dependence on herbivory whereas the state of another dominant habitat – gorgonian plain – appears to be driven by environmental factors (e.g., wave exposure). Ecosystem-based fisheries management could be improved by restricting parrotfish harvest on *Orbicella* reefs yet allowing exploitation on gorgonian plain. Management could then focus on achieving a sustainable yield on gorgonian plains without the added complexity of estimating catch levels that avoid ecosystem overfishing.