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Maximum sustainable yield from fisheries: food production, resource rent and conservation

Ken H. Andersen^{1*}, Keith Brander¹, Lars Ravn-Jonsen³

1: DTU Aqua; 2: Department of Environmental and Business Economics, SDU

*Corresponding author email: kha@aqua.dtu.dk

Marine fisheries contribute about 17% of human protein consumption with a year global turnover on the order of 100 billion euro. The strategic objectives for managing fisheries, enshrined in international conventions, is to maintain or restore stocks to produce Maximum Sustainable Yield (MSY) and implement the ecosystem approach requiring that conservation constraints be respected. While the yield and conservation aims are to some extent compatible when a fishery for a single species is considered, species interactions entail that MSY for a species depends on the species with which it interacts and the yield and conservation objectives therefore conflict when an ecosystem approach to fisheries management is required. We apply a conceptual size- and trait-based model to clarify and resolve these issues, by determining the fishing pattern that maximizes the total yield of an entire fish community in terms of catch weight or economic rent under acceptable conservation constraints. Our results indicate that the eradication of large, predatory fish species results in a potential maximum catch at least four times as high as when conservation constraints are imposed. However, such a large catch could only be achieved at a cost of forgone rent; maximum rent extracts less than half of the potential maximum catch weight. When a conservation constraint is applied, catch can be maximized at negligible cost in forgone rent, compared with maximizing rent. Maximization of rent is the objective that comes closest to respecting conservation concerns.

