MANAGEMENT STRATEGIES TO CONSERVE MARINE BIODIVERSITY

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INTRODUCTION

Biodiversity is the variety of living organisms and their habitats: the structure, composition, dynamics, and function of living systems acquired over millions of years of evolution. Marine biodiversity is extremely rich but is poorly understood and has only recently become the subject of conservation concerns (Norse, 1993). Biodiversity refers to the spatial organization of plants and animals in a hierarch at the genetic, organism, population, species, community, ecosystem, and seascape levels (Hughes and Noss, 1992; Norse, 1993). Major threats to biodiversity are habitat destruction, environmental changes, and overfishing (Upton, 1992). Losses of biodiversity at the genetic and species levels are of special concern because they are permanent.

This article focuses on management strategies that protect marine biodiversity and promote sustainable resource use. These strategies are evaluated in terms of their ability to fulfill three criteria: economic efficiency, flexibility, and ease of implementation. The emphasis of current fishery management practice is on fishing, which includes all extractive harvesting activities. Fishing is socially and economically important, but if done improperly or to excess, fishing can threaten biodiversity (Huntsman, 1994). It is also important to protect water quality and habitat from other destructive human activities that include poor land use practices and pollution, especially the release of excess sediments, nutrients, sewage, and toxic materials. Other activities that can threaten marine biodiversity include oil and gas extraction, vessel traffic, and release of diseases and parasites from mariculture.

In this paper we describe a management strategy to conserve biodiversity; a strategy incorporating impacts on habitat, and the biological, social and economic factors of overfishing. We propose new management tools including use of habitat restoration and marine reserves to maintain biodiversity and sustain fisheries. Finally, we review an application in the Florida Keys National Marine Sanctuary in the context of some testable scientific hypotheses.

CONCLUSIONS

At a time when diversity of oceanic fishes is threatened, fishery management can no longer strive simply to maximize yield while ignoring biological interactions, the physical and biological environments, and impacts of fishing gears and catches on habitat and biodiversity. There is a clear need to improve monitoring methods and change from single species management to ecosystem management to protect marine biodiversity and promote sustainable use. Research and education are essential to increase public appreciation of biodiversity and the impacts of human activities. Both resource managers and users need to develop realistic expectations and a risk-averse philosophy toward resource exploitation and management effectiveness. To be effective, decision makers must maintain a systems view of the resources. Proposed marine reserves in the Florida Keys present a unique research opportunity to clarify the relative impacts of fisheries exploitation and oceanographic processes in determining reef biodiversity and abundance of reef resources.