

Following are summaries of recent scientific studies on coral reef and fisheries management.

Are U.S. coral reefs on the slippery slope to slime?

J.M. Pandolfi, J.B.C. Jackson, N. Baron, R.H. Bradbury, H.M. Guzman, T.P. Hughes, C.V.Kappel, F. Micheli, J.C. Ogden, H.P. Possingham, E. Sala

*From **Science**, American Association for the Advancement of Science, 2005*

“Coral reefs provide ecosystem goods and services worth more than \$375 billion to the global economy each year. Yet, worldwide, reefs are in decline. Examination of the history of degradation reveals three ways to challenge the current state of affairs. First, scientists should stop arguing about the relative importance of different causes of coral reef decline: overfishing, pollution, disease, and climate change. Instead, we must simultaneously reduce all threats to have any hope of reversing the decline. Second, the scale of coral reef management—with mechanisms such as protected areas— has been too small and piecemeal. Reefs must be managed as entire ecosystems. Third, a lack of clear conservation goals has limited our ability to define or measure success.” The article goes on to analyze the condition of 17 reefs around the world along a scale from pristine to ecologically extinct. According to the scale, the reefs surrounding the main Hawaiian Islands are 60 percent of the way toward ecological extinction and are more degraded than those in the Red Sea, Belize, Bermuda and the Cayman Islands. Scoring worse were such places as the Virgin Islands and Jamaica. In comparison, reefs surrounding the Northwestern Hawaiian Islands are considered in better condition thanks in part to their isolation. Contact: John Pandolfi, j.pandolfi@uq.edu.au

The use of traditional knowledge in the contemporary management of a Hawaiian community’s marine resources

Kelson K. Poepoe, Paul K. Bartram and Alan M. Friedlander

*From **Fishers’ Knowledge in Fisheries Science and Management**, UNESCO, 2006*

This book chapter describes the Hawaiian tradition of consulting nature to determine “that the methods, times and places of fishing are compatible with local marine resource rhythms and biological renewal processes.” It provides an overview of how the Ho’olehua Hawaiian Homestead manages Mo‘omomi Bay on the northwest coast of Moloka‘i in this tradition. As a community that depends on the nearshore ocean for subsistence fishing, it has “an unwritten code of conduct for fishing” whose effectiveness is verified in this study. At least 12 other communities in Hawaii are considering how to adapt them, and in this chapter, the hui at Mo‘omomi proposes the following guiding principles for community-based fisheries management in Hawaii: “Fishers have responsibilities in the use of marine resources; fundamental tenets of traditional resource management include understanding basic processes of renewal and conducting harvest practices so as not to disrupt these processes; fishery conservation must function within a specific local context; communities and their individual members must exercise control over local inshore marine resource use and be accountable for the health and productivity of local resources; the emphasis should be on how fishing is conducted, not the quantity of fish harvested; the time dimension of ‘sustainable use’ should be intergenerational, not the four-year time cycle between political elections and agendas; sustainable yield does not mean maintaining resource abundance at a fixed level or an unexploited level; and fishing should be modulated in response to changing rhythms of resource abundance and productivity.” Contact: Alan Friedlander, afriedlander@oceanicinstitute.org

Coupling ecology and GIS to evaluate efficacy of marine protected areas in Hawaii

Alan M. Friedlander, Eric K. Brown, and Mark E. Monaco

*From **Ecological Applications**, Ecological Society of America, 2007*

Hawaii has established a system of 11 Marine Life Conservation Districts (MLCDs) over the past 40 years. While designed for public interaction, not for conserving or replenishing fish populations, these protected areas of differing sizes and habitats provide a certain amount of protection for fishes. The study showed that species richness, biomass and diversity “were significantly higher in MLCDs compared with adjacent fished areas across all habitat types. Overall fish biomass was 2.6 times greater in the MLCDs compared to open areas. In addition, apex predators and other species were more abundant and larger in the MLCDs, illustrating the effectiveness of these closures in conserving fish populations within their boundaries.” The study indicated that the larger the protected area, the more robust the fish populations, but said that the protected areas’ small sizes, shallow depths and limited habitat types mean they are not spilling over to nearby fished areas. The paper included data from other studies that compared the Main Hawaiian Islands (MHI) to the relatively pristine area of the northwestern Hawaiian Islands (NWHI): “mean fish biomass on hard-bottom habitats in fished areas in the MHI is 6.8 times less than in the NWHI, and within MLCDs, biomass is still 2.7 times less than in the NWHI. The biomass of predators in protected areas in the MHI is also 19 times less than those observed on unfished reefs in the NWHI.” The authors state that the 11 MLCDs protect only 0.03% of MHI reefs and recommend that these protected areas be expanded to cover 20-30% of the main islands’ total reef area to provide fisheries enhancement. The paper concludes by urging managers to take an ecosystem-based approach in preserving marine resources.

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A comparison of marine protected areas and alternative approaches to coral reef management

Timothy R. McClanahan, Michael J. Marnane, Joshua E. Cinner, William E. Kiene

*From **Current Biology**, 2006*

Few studies have objectively and simultaneously examined the types of marine protected areas that are most effective in conserving reef resources while also ensuring the socioeconomic security needed for long-term impacts. This study simultaneously explored success at reef conservation and socioeconomic sustainability at four national parks, four co-managed reserves, and three traditionally managed areas in Indonesia and Papua New Guinea. The authors said, “Underwater visual censuses of key ecological indicators revealed that the average size and biomass of fishes were higher in all areas under traditional management and at one co-managed reserve when compared to nearby unmanaged areas.” The study’s socioeconomic assessments revealed that this success in conservation occurred because of community compliance, reserve visibility, and length of time the management had been in place. The authors recommend that “in cases where the resources for enforcement are lacking, management regimes that are designed to meet community goals can achieve greater compliance and subsequent conservation success than regimes designed primarily for biodiversity conservation.” Contact: Michael J. Marnane, mmarnane@wcs.org

Effects of rotational closure on coral reef fishes in Waikiki-Diamond Head Fishery Management Area, Oahu, Hawaii

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*From **Marine Ecology Progress Series**, 2006*

This study explores whether rotational management, i.e. alternately closing and opening an area to fishing, might lead to effective biodiversity conservation and fisheries management for coral reefs. It uses data taken from the state of Hawaii's reef monitoring program to assess the effects of more than two decades of rotational management on fish stocks at the Waikiki-Diamond Head Fishery Management Area (FMA) on O'ahu, Hawai'i. According to the authors, "Fish biomass tended to increase during the one to two year closure periods, but the scale of these increases was insufficient to compensate for declines during open periods. The net effect was that, between 1978 and 2002, total biomass declined by around two-thirds. Coincident with this decline was the virtual disappearance of large fishes (>40 cm) of fishery-target groups: acanthurids, scarids and mullids. Such fishes, although initially common, were only rarely recorded in surveys after 1990. In 1988, a portion of the FMA was converted into the permanently closed Waikiki Marine Life Conservation District (MLCD). The initial effect of full closure was a reversal of the previous downward trend in fish biomass, and, even in the post habitat-decline period, biomass of target species within the MLCD has been nearly twice as high as in the FMA. Additionally, there have been no declines or even downward trends in maximum size of target families in the MLCD. Overall, rotational management, as implemented at the Waikiki FMA, has not been an effective means of conserving fish stocks or revitalizing public fishing grounds."

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