UC SANTA BARBARA

THE Current

August 14, 2003
Gail Gallessich

# Long-Term Decline of Coral Reef Ecosystems Reported

An article in the August 15 issue of the journal Science warns against the human exploitation of coral reef ecosystems around the world, noting that these "ecosystems will not survive for more than a few decades, unless they are promptly and massively protected from human exploitation."

This warning comes out of a study of 14 coral reef ecosystems around the world conducted by a team of scientists organized by the National Center for Ecological Analysis and Synthesis (NCEAS). The Center is affiliated with the University of California, Santa Barbara and funded by the National Science Foundation.

The report's co-authors include UCSB researchers Robert Warner, professor of ecology, evolution and marine biology and Deborah McArdle, a doctoral student and marine advisor for the California Sea Grant program. They studied the history of coral reefs surrounding the Virgin Islands.

"There is a wide source of past information that hasn't been mined," said McArdle. For the study, she and other researchers searched out old books, information from historical societies, missionary reports, ship log books, naturalist sightings, and oral histories pertaining to the status of coral reef ecosystems over time. McArdle attended a conference on the history of marine animal populations where she met with representatives from Denmark to obtain information on past fisheries. (The Virgin Islands were once a territory of Denmark and many historical records about

the natural history of the Virgin Islands are held in Denmark.)

"Looking at historical records can redefine what normal is and redefine what restoration targets should be," said McArdle. "Traditionally, managers look back 10 to 20 years, but we may need to set our goals on baselines that existed further back in time."

The ecological histories were set up using consistent criteria, grading the reefs --

from pristine to extinct -- for seven categories of biota: large herbivores, large carnivores, small herbivores, small carnivores, corals, suspension feeders, and seagrass.

The authors used "cultural periods rather than calendar years because the magnitude of human impacts depends primarily on technological prowess and economic structures that were out of phase geographically until converging in the 20th century."

The report calls into question the idea that humans didn't have the capacity to overfish until 100 years ago. "We have gravely underestimated the capacity of humans to kill fish," said McArdle.

The study found the same trends among all 14 coral reef ecosystems. According to the article, "large animals declined before small animals and architectural species, and Atlantic reefs declined before reefs in the Red Sea and Australia, but the trajectories of decline were markedly similar worldwide. All reefs were substantially degraded long before outbreaks of coral disease and bleaching."

In fact, the article notes that most of the ecosystems were substantially degraded before 1900, yet "recent widespread and catastrophic episodes of coral bleaching and disease have distracted attention from the chronic and severe historical decline of reef ecosystems." The authors state that the only reasonable explanation for this earlier decline is overfishing, "although land-derived pollution could have acted synergistically with overfishing in some localities."

McArdle explained that public awareness of overfishing is not new -- citizens of Southern California were calling for marine reserves in the 1800s, and, in 1913, established a reserve around Catalina Island.

"Studying historical records can provide a window to the past," said McArdle. "This may help us to have a vision for the future."

---

## About UC Santa Barbara

The University of California, Santa Barbara is a leading research institution that also provides a comprehensive liberal arts learning experience. Our academic community of faculty, students, and staff is characterized by a culture of interdisciplinary collaboration that is responsive to the needs of our multicultural and global society. All of this takes place within a living and learning environment like no other, as we draw inspiration from the beauty and resources of our extraordinary location at the edge of the Pacific Ocean.