

Scientists stress need for national marine biodiversity observation network

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With ocean life facing unprecedented threat from climate change, overfishing, pollution, invasive species and habitat destruction, a University of Florida researcher is helping coordinate national efforts to monitor marine biodiversity.

Humans depend on the ocean for food, medicine, transportation and recreation, yet little is known about how these vast ecosystems spanning 70 percent of the Earth's surface are functioning and changing. Following a workshop sponsored by U.S. federal agencies in 2010, researchers at eight institutions have proposed a blueprint for establishing a cooperative marine biodiversity observation network to monitor trends in marine ecosystem health and the distribution and abundance of oceanic life. The research will appear online in *BioScience* Thursday and in the journal's May print issue.

Biodiversity observation networks are indispensable tools, allowing scientists to follow and predict ecosystem changes to facilitate proactive responses to [environmental pressures](#), said study co-author Gustav Paulay, invertebrate zoology curator at the [Florida Museum of Natural History](#) on the UF campus.

"Biodiversity is important not only because it's what the natural world is about, but also because tracking it tells you how healthy things are," Paulay said. "As an indicator of ecosystem health and resilience, biodiversity is key for sustaining oceans that face accelerating [environmental change](#)."

Experts determined a national marine biodiversity observation network could be established using existing technology within five years with appropriate funding and collaboration, but the effort requires strong leadership to integrate all the necessary elements, Paulay said. The study provides a series of recommendations, including coordination of existing efforts, digitization of historical data—including vast museum collections – and establishment of regional centers to process and identify specimens.

"Tracking diversity is not just about tracking fish, or whales, or corals, but everything," Paulay said. "To date, there have been few attempts to track biodiversity broadly in the ocean."

From tiny phytoplankton and massive marine mammals to awe-inspiring sea dragons and ancient reefs, every element is important for healthy ecosystems, Paulay said.

Outside the U.S., efforts to create a marine biodiversity observation network have begun regionally in New Zealand and the European Union. The Smithsonian Institution also launched the first worldwide network of coastal field sites in 2012, a long-term project to monitor the ocean's coastal ecosystems.

Jim Carlton, a professor at Williams College in Massachusetts and director of the Maritime Studies Program of Williams College and Mystic Seaport, said the concept of a marine network is critical because elements are inter-related, from water quality and issues with fisheries to the regular arrival of new invasive species.

"It's rather amazing that in 2013, we don't have a well-established [marine biodiversity](#) network—how could we not?" said Carlton, who is not involved with the study. "All coasts around the world are changing and we have a remarkably poor understanding about the extent of that

change in many areas."

People are more dependent on oceans than they may realize, and without a coordinated network, researchers will not know how to manage these ecosystems, he said.

"The oceans are feeding hundreds of millions of people, they control the Earth's climate, 90 percent of all world goods travel on the ocean and most people in the world live within 100 miles of the sea," Carlton said. "For recreation, we rely on the fact that we can go to a beach and not get sick. We depend upon a huge amount of these resources in ways that we often don't know, but it really means maintaining the health of the ocean."

Divers have witnessed the effects of [climate change](#) most clearly on coral reefs, whose delicate ecology is highly sensitive to changes in maximum ocean temperatures, Paulay said.

"The scale of change was driven home to me in Palau in 1998, during a survey soon after the 1998 Pacific-wide warming event," Paulay said. "Palau is one of the gems of the world in terms of marine environments and reef diversity. When we returned to sites that once had acre upon acre of vibrant staghorn and bottlebrush corals covering the bottom, we found but a desert of dead skeletons—mortality was virtually 100 percent."

More information: Envisioning a Marine Biodiversity Observation Network. J. Emmett Duffy, Linda A. Amaral-Zettler, Daphne G. Fautin, Gustav Paulay, Tatiana A. Rynearson, Heidi M. Sosik, and John J. Stachowicz, *BioScience* , 2013.

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