A sea change for ocean resource management

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Credit: Tiago Fioreze / Wikipedia

Ocean ecosystems around the world are threatened by overfishing, extensive shipping routes, energy exploration, pollution and other consequences of ocean-based industry. Data exist that could help protect these vulnerable ecosystems, but current management strategies often can't react quickly enough to new information, said San Diego State University biologist Rebecca Lewison.

She and colleagues from several other academic, governmental and non-

governmental organizations endorse a new approach called "dynamic ocean management" in a paper published today in the journal *BioScience*.

"Dynamic ocean management is an exciting coming-together of science and management," said Lewison, one of the project's lead scientists. "It captures the best available science and directs it to meet the needs of resource managers and industry. What's exciting about this research is that it puts science to work, fundamentally changing the way we manage oceans."

Traditional ocean management strategies tend to be static, Lewison explained, with fixed boundaries in space and time. Unfortunately, there's often a sizable lag time between what scientists and ocean users know and when that knowledge is applied to management policies.

For example, consider California's leatherback sea turtles. Research on this endangered species is critical, said Sara Maxwell, an ecologist at Old Dominion University and another lead scientist on the project. There are numerous protected marine areas for these animals, but if the turtles shift their habitats, the protective policies lose their effectiveness.

"Managers are trying to put more dynamic approaches into place to protect leatherbacks and other species, and this is what we identify in this paper," said Maxwell.

Lewison, Maxwell and their colleagues at the Center for Ocean Solutions, Stanford University, the National Oceanic and Atmospheric Administration, and several other universities, argue for an approach that better incorporates real-time information from satellite data, ocean monitoring arrays, climate fluctuations and crowd-sourced reports from ocean users into applications that advance both conservation and sustainable resource use.

With support from NASA and the Center for Ocean Solutions, Lewison and her colleagues are working to develop approaches through which ocean managers and industry work together, using real-time information to better manage resources. However, the success of this project will depend on cooperation from the industries that use ocean's resources—both in terms of contributing data and following the guidelines based on that information.

Fortunately, Lewison said, dynamic ocean management is often in line with profit goals of industries such as shipping and fishing. For example, scallop fisheries on the U.S. Atlantic coast have a regulated quota for the amount of bycatch or, accidentally caught animals. Once they hit that quota, the lucrative scallop fishing grounds are closed. The fisheries are motivated from a profitability standpoint to avoid bycatch, which also helps protect the ecosystems they work in.

Working with university partners, these scallop fisheries have developed a system for reporting where and how much bycatch they bring in, then feeding that information into a map. The next day, scallop fishers receive these maps so they know where they can bring in more scallops and less bycatch.

Lewison and her colleagues are aiming for that kind of cooperation on a much wider scale across multiple industries.

"We want dynamic ocean management to be an industry standard," she said. "We're bringing ocean management into the 21st century. We know too much about the world now to keep managing the ocean in the same old way."

Provided by San Diego State University