



“Not a one-shot game”: Researchers call for iterative marine resource management

Combined perspectives from social and natural sciences highlight the importance of a dynamic, community-led approach to marine protected areas

By: Laura Anderson and Lilli Carlsen

In a new study, researchers remind through novel analysis that marine resource management should be as dynamic as the ocean itself, and not just a “one-shot game.” Research co-led by [Alfredo Giron-Nava](#) at the Stanford Center for Ocean Solutions and [Anastasia \(Tasha\) Quintana](#) at UC Santa Barbara investigated feedback loops for community-based conservation in northwest Mexico. The team took an interdisciplinary approach to develop a conceptual model that takes into account both social and ecological factors. Their results suggest that adaptation, learning, and leadership embedded within fishing communities contribute to a greater and growing impact—positive feedback loops—for conservation and fisheries

management. The [paper](#), published in *Frontiers in Marine Science*, is part of a special issue focusing on the work of early career researchers.

The 2021 World Ocean Day “[Conservation Action](#)” focus calls for support for the growing global movement to protect 30% of the ocean by 2030. Now, over 70 countries support the “30x30” campaign, as well as non-governmental organizations (NGOs) and communities around the world. Marine protected areas (MPAs) serve as one of the primary conservation tools for achieving this goal, and there is a growing need to explore and understand MPA management strategies and models.

“We have been trying to build an interdisciplinary collaboration where ideas from a social scientist and a natural scientist can work in harmony,” said Giron-Nava. “This is an example of how an increasingly interdisciplinary community of young researchers can break through some of the scientific silos that have existed for a while and address problems in a different way.”

Fishing communities in Baja California, Mexico have designed and renewed a network of temporary no-take *Zonas de Refugio Pesquero*, or fishing refugia, aimed at rebuilding fisheries. Qualitative interviews with fishers found a range of perceptions regarding refugia design. “For fishers, they’re trying to make a living. The long-term conservation of the fishery is in line with their objectives, but they’re much less wed to the concept of a strict MPA or the concept of marine reserves,” explained Quintana, a NSF postdoctoral fellow at UC Santa Barbara’s Marine Science Institute. “In the case of the *refugios*, they’ve been able to develop a fluid conceptualization of what they are and take control of their fisheries.”

“For the communities that had the biggest designs—with the largest, most ambitious MPAs [...] that even expanded in the second iteration—the common characteristic was that they had a strong leader,” said Giron-Nava. “We learned that strong leadership was the key to successfully implementing ambitious plans.”

While strong leadership, trust and empowerment in a community can benefit MPA design, the model also predicts negative feedback loops and a danger of decreasing trust. The authors want to explore these factors to better understand when and how loops break as well as how a community can respond if an MPA falls into a negative spiral.

As the researchers explained, MPAs can serve as dynamic tools for fisheries management and conservation, areas that can adapt to climate change and shifting needs. Importantly, an

adaptive management process can prioritize the participation of fishing communities. Small-scale fishers bring comprehensive and intergenerational knowledge of their ocean and coastal ecosystems, which informs their leadership in participative management processes.

“There’s this idea of biosphere stewards, which is the idea that the people who depend on a resource are the closest to the ground and the most invested,” said Quintana. “Policymakers who want to protect the ocean should think seriously about how they can empower fishers, as biosphere stewards, to protect their own seas.”

[Read more from Giron-Nava and Quintana in a Stanford Center for Ocean Solutions Q&A >](#)

[Read the *Frontiers in Marine Science* paper >](#)

Alfredo Giron-Nava is an André Hoffmann Fellow at the [Stanford Center for Ocean Solutions](#) and the [World Economic Forum Centre for the Fourth Industrial Revolution](#). Anastasia Quintana is a NSF Postdoctoral Fellow at the [University of California Santa Barbara Marine Science Institute](#). The paper was co-authored by Samuel Urmey at the [Monterey Bay Aquarium Research Institute](#), Alli Cramer at [Washington State University](#), Santiago Domínguez-Sánchez at the [Centro para la Biodiversidad Marina y la Conservación A.C.](#), Salvador Rodríguez-Van Dyck at [Sociedad de Historia Natural Niparajá, A.C.](#), and Octavio Aburto-Oropeza at the [Scripps Institute of Oceanography](#). Amy Hudson Weaver at [Sociedad de Historia Natural Niparajá, A.C.](#) and Xavier Basurto at [Duke University Marine Laboratory](#) are senior authors.

Contact

Anastasia Quintana | anastasiaquintana@ucsb.edu

Alfredo Giron-Nava | agiron@stanford.edu

Stanford Center for Ocean Solutions | oceansolutions@stanford.edu

University of California Santa Barbara | harrisontasoff@ucsb.edu