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A Blue Paradox

As ocean conservation efforts kick into high gear amid concerns over climate change, food insecurity and habitat degradation, a disturbing phenomenon may also be on the rise: preemptive overfishing in a given area in anticipation of impending conservation policies.

“We show that efforts to close off fishing in a major part of the world’s ocean paradoxically led to more fishing, thus undermining the very conservation goal that was being sought,” Kyle Meng, a professor at the UC Santa Barbara Bren School of Environmental Science & Management, said of his new research. Meng is a co-author of “The blue paradox: Preemptive overfishing in marine reserves,” now published in the Proceedings of the National Academy of Sciences. The findings have implications for general conservation efforts, as well as methods that scientists use to monitor and evaluate policy efficacy.

According to the researchers, while efforts to curtail overfishing and promote ocean biodiversity through the establishment of marine reserves have generally had positive results, the period leading up to implementation of policy can be a particularly vulnerable one. Fishers, perhaps fearing the decline of their livelihood, recreation or general entitlement to their activity, tend to over-extract resources immediately before the protections become official.

“A simple way to think about it is that fishers face a ‘use it or lose it’ dilemma,” said Grant McDermott, a professor at the University of Oregon and fellow co-author of the study. “And, like I presume many of us would in their situation, they invariably

choose to fish as much as possible while they still can.”

Such behavior was noted in the team’s recent observation of the Phoenix Islands Protected Area (PIPA), a swath of central Pacific Ocean roughly the size of California, known for its remarkably diverse marine ecosystem. Using datasets and continuous satellite monitoring provided by Global Fishing Watch, the researchers found that in the period leading up to the ban on fishing in PIPA that was enacted on January 1, 2015 — a successful ban celebrated by conservationists and scientists alike — preemptive fishing placed PIPA in a more impoverished state by the time the policy was enforced. In fact, this extra preemptive fishing was equivalent to 1.5 years of avoided fishing following the ban.

Such events are not new, according to the study. In other environmental domains, similar policies affecting endangered species, water and land resources, and climate change policy, have seen similar anticipatory behaviors. For example, in advance of the 1973 Endangered Species Act (ESA), private landowners in North Carolina and elsewhere deforested their properties to minimize land-use restrictions that would go into play upon settlement by woodpecker colonies. As a result, red-cockaded woodpecker habitats declined after the bird gained protected status via ESA. This phenomenon also was evident in non-environmental circles, such as after the 2012 Sandy Hook massacre, when calls for tougher legislation led to a surge in firearm sales.

However, these previous examples are all land-based and involve clearly demarcated property rights, according to the authors. The striking thing about this latest study, they said, is that it demonstrates preemptive resource extraction can occur even in a marine setting, where property rights are usually far from secure. The precise conditions that would allow for this to occur in such a “commons” remains a topic for future research, however.

“While we do not know exactly why this behavior is occurring just yet,” said Meng, “it is not hard to imagine that a fisher who has expertise in a particular fishing region may want to take advantage of that experience before a ban is implemented. After the ban, that know-how no longer has any value.”

“Our goal in this study was to find out whether preemptive extraction is actually occurring in a marine setting and to quantify the effects,” added McDermott. “Now that we’ve established those facts, we hope to uncover the underlying mechanisms

more precisely in subsequent research."

In terms of marine overfishing, the researchers extrapolate that if other marine reserve announcements were to trigger similar preemptive fishing behavior, it could temporarily increase the share of global over-extracted fisheries from 65 percent to 72 percent. This increase, they say, undermines the very objective of the marine reserve and can push fisheries and fish populations in an already precarious state to a point of no return even before a ban is enacted. In addition, they said, a further depleted fish population means less income for fishers and the communities they live in.

"While a certain amount of preparatory time is needed for any future policy, we do urge future marine reserves to be implemented in a quicker manner," said co-author Christopher Costello, who is a professor at the Bren School. "Additionally, the ability to continuously monitor fishing activity around the world using data from Global Fishing Watch also suggests that such preemptive action can be detected and discouraged from happening even before the fishing ban takes place."

The group is currently investigating those possible remedies and exploring why fishers are engaging in this preemptive fishing behavior.

"Undercovering the exact motives behind this phenomenon will help us go a long way toward ultimately preventing it from happening," Meng said.

About UC Santa Barbara

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