

BIODIVERSITY

Troubled Waters

Big marine reserves look good on maps, but nations need tough rules close to shore that will improve fisheries and biodiversity

By Olive Heffernan

ROCKFISH THRIVE in a kelp forest near Monterey, Calif., where protected areas have strict controls.



LAST JUNE RODOLPHE DEVILLERS STOOD ON THE Canadian parliament floor in Ottawa and gave the ministers there a stark warning. Devillers, a geography professor at Memorial University of Newfoundland, told them they should not allow industry to operate inside marine protected areas (MPAs), parcels set aside to safeguard ocean life. If the government continued to issue lax restrictions inside the nation's reserves, he said, "the Canadian MPA network is unlikely to bring the benefits the government and Canadians expect." The day before, he and 14 other scientists had sent a damning letter to two of the ministers, complaining about Canada's weak actions. They had also sent a copy to the media, and by the afternoon the story had become national news.

In particular, Devillers cautioned parliament against making this blunder in the highly anticipated Laurentian Channel MPA, an ocean reserve that would cover more than 11,000 square kilometers between Cape Breton in Nova Scotia and Newfoundland. It would be Canada's largest marine sanctuary ever, intended to protect leatherback turtles, porbeagle sharks, sea pens and other at-risk residents. It would also provide a safe stopover for migrating mammals such as the endangered blue whale and North Atlantic right whale.

A week later, on June 24, Canadian fisheries minister Dominic LeBlanc went public with the government's Laurentian Channel plan. In 80 percent of the reserve, corporations could drill for oil and gas. Ships could come and go as they pleased anywhere in the MPA. The size of the sanctuary had been cut by 33 percent so that big companies could still exploit major fishing grounds, and the number of sensitive species covered had dropped from 16 to six.

Worldwide, there are more than 15,000 MPAs, and the vast majority allow commercial activity. Even in the acclaimed Great Barrier Reef Marine Park, people can fish for endangered sharks, including hammerheads. The lenient designations "are nonsense if you compare this to protection on land," Devillers says.

To be effective, MPAs must be strict. That means either no-take—where all extraction is banned—or low-take—allowing only artisanal fishing for local consumption. Reserves this strict cover just 1.8 percent of the earth's seas.

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Already humans have fully exploited or overexploited 89 percent of global fish stocks and destroyed many of the world's coral reefs. To safeguard a healthy assortment of marine life, scientists say we need to sequester at least 30 percent of the seas in MPAs distributed worldwide. Crucially, much of that space should be close to busy shores. Done properly, this approach could bring enormous benefits for oceans and humans. If a region is truly left alone for long enough, fish and biodiversity can rebound even in places that were once decimated. More and larger fish spill over into neighboring waters, too. Smarter MPAs can even make marine ecosystems more resilient to other pressures, such as pollution, warming and acidification.

But right now the 30 percent goal is a long shot. Countries that have ratified the United Nations Convention on Biological Diversity have agreed to place 10 percent of their waters within MPAs by 2020. With less than two years to go, national leaders have been scrambling to draw up boundaries. In the rush, some have created weak reserves that have few restrictions, such as the Laurentian Channel. Other nations, including the U.K., have created vast no-take sanctuaries around remote overseas territories, such as Pitcairn Island in the Pacific. These places have no large commercial fisheries or other industry, so it is unclear if they offer much conservation benefit. "All we're doing is rebranding bits of ocean," says Bob Pressey, an expert in conservation planning at James Cook University in Australia.

Moreover, governments seem to close MPAs or move boundaries at will, even though the areas need to be in place for at least 10 years to provide any significant gain. In December, U.S. Secretary of the Interior Ryan Zinke called on President Donald Trump to open three marine national monuments to commercial fishing: Northeast Canyons and Seamounts, Rose Atoll and Pacific Remote Islands. Australia is reconsidering the Coral Sea Marine Park—a stunning expanse that is home to corals, fish, turtles, seabirds and whales—for industrial tuna fishing.

"As a conservationist, you have to welcome the closure of hundreds of thousands of square kilometers of ocean," says Peter Jones, who researches environmental governance at University College London. "But the very next question is: Is it really going to be effective?"

IN BRIEF

Nations have rushed to announce big marine protected areas, which can help sea creatures thrive, but many of the zones are in waters where little fishing occurs and few activities are hurting ocean life.

Countries should impose more strict no-take or low-take zones close to shore, where industrial activity is greatest. International agreements are also needed for the high seas.

California has made itself legally bound to follow scientific advice for protecting coastal waters, a benchmark for other states. And nations have reached one model agreement for international waters.



1 SANCTUARIES, new and planned, will safeguard penguins in Antarctica's vast Ross Sea (1), leatherback turtles between Nova Scotia and Newfoundland (2), and porbeagle sharks along Canada's southeastern shores (3).



TRICKY TARGETS

NATIONAL GOVERNMENTS started designating large reserves on land more than a century ago; Yellowstone National Park was established in 1872. Progress in the seas has been much slower, but recent excitement has been high. Ten of the world's largest MPAs, many as big as some countries, have been created in the past two years, spurred by political targets such as the U.N.'s biodiversity goals. In 2016 President Barack Obama expanded the Papahānaumokuākea Marine National Monument, which surrounds the northwestern Hawaiian Islands, to twice the size of Texas.

Large MPAs, even in remote regions, can make marine ecosystems more resilient. But what happens within the reserves is just as important as size. Currently 86 percent of marine protected area globally is tied up in just 21 large reserves, most located in remote tropical waters where little fishing or other industry occurs. Few MPAs target populated, temperate regions, says Graham Edgar, a marine conservation biologist at the University of Tasmania. Of more than 17,000 marine species studied recently, only about 500 had more than 10 percent of their range within an MPA.

Improving marine biodiversity will require the establishment of MPAs in the coastal waters of almost every country. But trying to designate them in developed areas will be "very unpopular," says Robert Richmond of the University of Hawaii at Manoa. Only 0.03 percent of coastal waters along the U.S. mainland are under no-take restrictions. Less than 1 percent of Australia's coastal waters are no-take or low-take. And less than 0.01 percent of U.K. mainland coastal waters are no-take zones.

Of course, nations need stretches of ocean that they manage for fisheries. But problems arise when these places are counted as MPAs. This issue is acute in the U.S. In totting up its MPAs, it routinely includes areas that manage just one specific fishery or activity. For example, experts say an MPA around the Aleutian Islands prohibits only bottom trawling and does not address the region's overall health or biological diversity. Calling these sites MPAs is misleading because it "creates false benchmarks of national and global protection," says Heather Welch, a con-

servation expert at the University of California, Santa Cruz.

As the only U.N. member state to not ratify the Convention on Biological Diversity, the U.S. has lax classifications for MPAs, Welch says. If the country ratified the convention and adopted the categories for MPAs that are set by the International Union for Conservation of Nature (IUCN), its estimates would be more in line with those of other nations. Under those rules, the U.S. would be forced to declassify 28 percent of its MPAs and 51 percent of its protected waters, according to an analysis by Welch.

Other wealthy nations, such as the U.K., draw a distinction between MPAs and areas just managed for fisheries. Yet many of their MPAs are "weak"—they have few restrictions. And the U.K. counts these waters toward the U.N. goal of protecting 10 percent of the ocean by 2020.

The trouble stems in part from a 2008 ruling by the IUCN, which sets the criteria for nature reserves. It adopted two new categories—for both sea and land—that allow for multiple uses or sustainable exploitation. The rationale was that this action would help poor countries establish some level of safe waters while not undermining their dependence on the ocean for food.

But prosperous countries are now using these lenient categories to create MPAs that are wins for politicians who want to look like they are committed to conservation, without having to impose or enforce prohibitions on industry or the public. "This is beginning to blur the boundaries between protected and exploited areas," Jones says.

CALIFORNIA SUCCEEDS

ALTHOUGH CREATING EFFECTIVE MPAS in areas people depend on is difficult, it can be done. Under international law, countries control the use of ocean resources—from fishing to oil drilling—in a so-called exclusive economic zone that extends 200 nautical miles (370 kilometers) out from their shoreline. The law also allows them to preserve those waters. In the U.S., states divide up this zone. Back in 1999 the California Marine Life Protection Act was enacted, designed to set up a network of MPAs to safeguard valued regions, such as those near Big Sur and Monterey. After two failed attempts at implementing the legislation, in 2004 the state devised an initiative to guide how the MPA network would be formed.

The legislation instructed planners to use the best available science to determine MPA locations and to involve local stakeholders, such as fishers, shippers and divers, in planning. Funded with \$38 million from a public-private partnership, the process took until 2012 to complete. Now a network of 124 MPAs covers 16 percent of state waters (excluding San Francisco Bay); three fifths of the area is a designated no-take zone.

California is already reaping rewards. A 2015 study of 13 MPAs around the northern Channel Islands off the coast of Santa Barbara found that after 10 years of protection, species fished there, such as rockfish, were becoming bigger and more numerous. The fish were also expanding into neighboring areas. Conservationists hope to see similar results statewide.

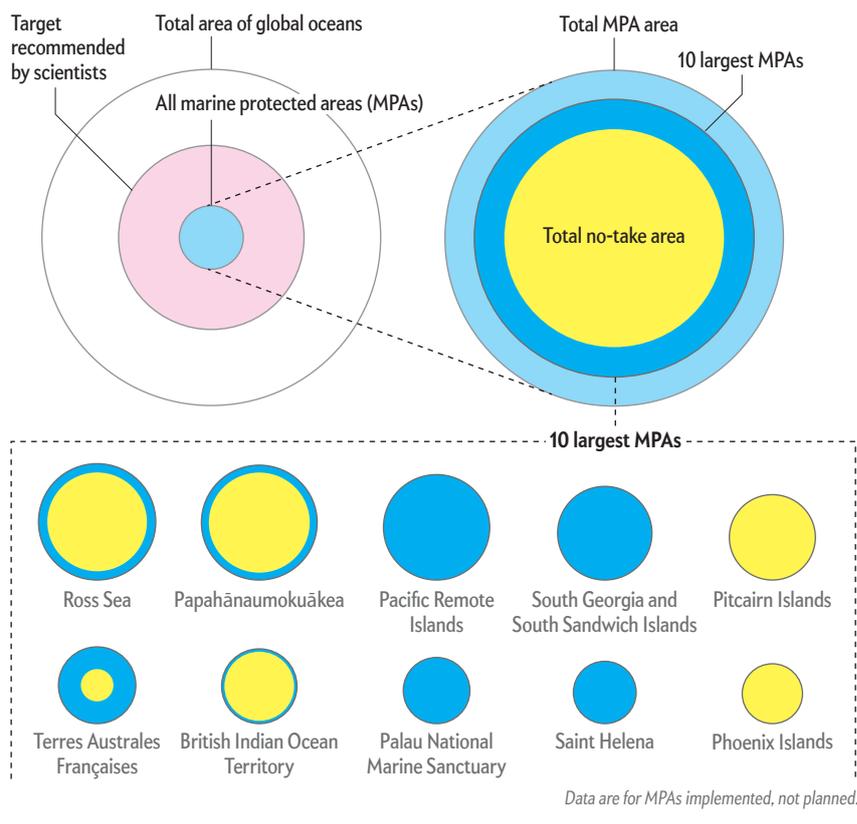
Elizabeth De Santo, an expert in marine planning at Franklin & Marshall College, says that California succeeded because it had a legal mandate to follow scientific advice and involved scientists throughout the process. It also took into account the needs of local communities and ensured there was “buy in” from everyone.

In 2009 the U.K. tried to mimic this process. It had around 500 MPAs but just two tiny no-take zones, one covering a paltry 2.6 square kilometers in Scotland’s Lamlash Bay. So the government started to plan a network of marine conservation zones, or MCZs. Following long consultations with stakeholders, in 2011 a scientific panel recommended 127 sites for protection, plus an additional 65 no-take areas.

The proposals faced all kinds of opposition—from Oil & Gas UK, an industry group that claimed interference with exploration; from the Port of London, which said that MPAs were being

Circles of Life

Countries are designating large swaths of ocean as marine protected areas, or MPAs (small circles). These zones limit commercial activity, to keep ecosystems healthy. The strongest restrictions are no-take (yellow), in which all fishing is banned, or low-take (fishing only for local consumption). Some MPAs have weak rules, however (blue), or a mix. Scientists say that the world should sequester 30 percent of the seas (pink) and that more MPAs should be close to shore where most activity occurs; the 10 largest MPAs make up 68 percent of reserves, and many are in remote waters.



unduly located in areas of economic activity; and from the National Federation of Fishermen’s Organizations, which argued that more scientific evidence was needed for particular sites.

Without a legal requirement to follow the science, the national government caved, according to a recent paper by De Santo. Just 50 of the original 127 MCZ sites have been approved, and they currently lack any management. Every recommended no-take MPA has been scrapped.

Canadian ministers consult scientists when first identifying areas suitable for MPA status, but then they talk to commercial stakeholders behind closed doors. Devillers says he was “shocked” by the rationale used to justify certain commercial activities inside the Laurentian Channel: “Those decisions were not scientifically sound.”

PROTECTION ON THE HIGH SEAS

IN INTERNATIONAL WATERS beyond the exclusive economic zones, the political process of creating MPAs is in its infancy. The high

seas are a free-for-all. Overfishing is rife, and endangered species are caught routinely. Until last year this vast expanse—two thirds of the planet's oceans—lacked a single large MPA. Although a few global laws regulate select activities such as seabed mining, no rules preserve biodiversity. Furthermore, “there’s a lot of connectivity between the high seas and coastal regions,” says Lance Morgan, president of the Marine Conservation Institute, a U.S. nonprofit aimed at securing strong, permanent MPAs.

Improvements could come soon. Last December the first ever large high-seas MPA went into force. It covers 1.55 million square kilometers in Antarctica’s Ross Sea, considered to be one of the least altered ecosystems on earth and home to 16,000 species, including fish, seals, penguins and whales. Some 72 percent of the reserve will be no-take; other sections will allow limited harvesting for scientific research.

Because no international mechanisms exist to create MPAs, the reserve was established by agreement from all members of the Commission for the Conservation of Antarctic Marine Living Resources, which includes the European Union and 24 other countries—the U.S., the U.K., Russia and Australia among them. The deal “is paving the way for other MPAs on the high seas,” Devillers says. He notes that the reserve “is also one of the few examples that we have of a large MPA that is not in tropical waters.”

Ironically, last October the same group failed to agree on creating a similar MPA in East Antarctica. The proposal, rejected for the sixth year running, would protect the region’s krill, cold-water corals and Adélie penguins, which in 2017 suffered a catastrophic failure when only two chicks survived from a breeding colony of about 36,000 adults.

Creating more MPAs will require new treaties. U.N. member states have begun discussing a new law they hope to craft as early as 2019. Skeptics worry that policing extensive areas far out to sea may be difficult, an issue that plagues large national MPAs generally. But satellite technologies are emerging that make monitoring and enforcement easier, an important advance for managing remote reserves such as the one in the Ross Sea.

QUALITY VS. QUANTITY

THE ROSS SEA MPA is also important because it includes specific objectives related to conservation, habitat protection, ecosystem monitoring and fisheries management. As Pressey noted, the size of a reserve is not what matters. Indeed, the discussion among conservationists is slowly moving away from quantity to quality, a message that Devillers was eager to push in his Ottawa testimony. “To reach certain targets, governments had to create large MPAs,” Devillers says. “We’re now trying to push a message to governments that the real challenge is making a difference. It’s the location and the level of protection.”

But where can such science-based insight come from—especially along coastlines that are biologically important but also of interest to industry? One option, Pressey suggests, is that the IUCN represent ocean protection at a global level, above national governments, and provide visionary leadership on where and how MPAs are created.

Even without that mandate, the IUCN could devise clearer definitions of the different levels of protection. Many experts say the MPA label should only apply if a reserve mandates no-take or care-

fully controlled low-take. Other areas intended for sustainable use or multiple uses should be renamed, perhaps as “managed areas,” Morgan suggests, which could end the political smoke screen.

The U.N. could also demand that only no-take MPAs can count toward a nation’s 10 percent target for 2020. And it could enforce one of its existing recommendations that nations place at least 10 percent of their coastal waters within strict MPAs rather than drawing all their MPA boundaries far offshore.

Some aquatic scientists, such as Ray Hilborn of the University of Washington, argue that instead of focusing on MPAs, nations should strengthen fisheries management to reduce overfishing, which allows marine food webs to rebound across swaths of ocean without MPA-style rules. But critics say that managing fisheries through common mechanisms such as gear restrictions or seasonal closures does little to preserve entire ecosystems; they note that many of the world’s fisheries are declining despite decades of management.

To spread global cooperation, officials from other countries say the U.S. should finally ratify the Convention on Biological Diversity. That would encourage it to adopt the same criteria for MPAs as every other nation and not the weaker definitions it leans on now. Welch says the move “could instigate the proclamation of new, fully protected and permanent MPAs.”

In the meantime, nations can look to California for ways to make strict MPAs work in busy coastal areas. And despite some glaring weaknesses, the Great Barrier Reef Marine Park has also managed to set no-take zones along certain coasts by allowing commercial use in other, less sensitive areas.

One advantage California has is its wealth, as well as private donors who are willing to fund conservation along with the state. A 2017 analysis of global MPAs published in *Nature* reported that well-staffed MPAs have the best conservation outcomes. Staffing an MPA—for monitoring activities and enforcing rules—costs money. Regions with modest coffers have to be creative. Palau, a Pacific island nation that made 80 percent of its territorial waters a no-take MPA in 2015, used public financing, through crowd-funding, to partly pay for creation and enforcement.

Conservation organizations can play a positive role by highlighting MPAs with good practices. In 2016 the Marine Conservation Institute launched the Global Ocean Refuge System to highlight MPAs that are especially pristine and well managed.

Marine protected areas cannot solve all the oceans’ problems. But if done well, they can help sea creatures by providing refuge out of harm’s way. If MPAs are not doing that, then they may not be useful. “We have to push for protected areas in the ocean until species loss stabilizes,” Devillers says. “That’s the only real metric we can use.”

MORE TO EXPLORE

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