



A humpback whale breaching off the coast of Gabon. |  
T. Collins/Wildlife Conservation Society

## Marine Reserves Renew Hope in the Fight Against Climate Change

As the United Nations Oceans Conference gets underway in New York, researchers highlight the importance of protecting the oceans in combating the effects of global warming.

BY **JEN VIEGAS**  
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As the United Nations Oceans Conference gets underway this week in New York City, there is a double dose of renewed hope concerning global efforts to mitigate the impacts of climate change.

First, an international team of researchers has determined that marine reserves help to lessen the gravity of five major environmental problems tied to climate change: ocean acidification, sea-level rise, increased intensity of storms, shifts in species distribution, and decreased productivity and oxygen availability. The research is [published](#) in the *Proceedings of the National Academy of Sciences*.

Second, President Ali Bongo Ondimba of Gabon announced today at the UN conference his country's creation of a massive new network of marine protected areas consisting of 9 new marine parks and 11 new aquatic reserves. The network will be the largest of its kind in Africa and will expand Gabon's protected waters to be over 20,463 square miles. The area includes both shallow coastal regions and abyssal 2.5-mile ocean depths.

Despite the impressive size of the [protected areas](#), less than 5 percent of the planet's oceans has been set aside for protection. Governments now have a new tool, however, for making sizable improvements to the environment.



Underwater surveys led by the Wildlife Conservation Society, National Geographic, and Gabon's Agence Nationale de Parcs Nationaux (ANPN) uncovered a wealth of marine biodiversity (such as this eel peering out from a enclosure of sea anemones), providing valuable information for the formulation and creation of the new marine protected area network. | Enric Sala / National Geographic

Callum Roberts, a professor at the University of York's environment department and lead author of the *PNAS* study, said governments can use marine preserves as a tool for meeting their commitments under the [Paris Agreement on climate change](#), which recognized ocean ecosystems as a way to fight climate change.

"Government leaders can consider large, highly protected marine reserves as a feasible means to help their nations, and the world as a whole, to adapt and mitigate the impacts of climate change," he said.

Roberts and his team evaluated existing peer-reviewed studies on the beneficial effects that existing marine reserves have had around the world. They determined that protecting key coastal systems — mangroves, salt marshes, and seagrasses — offers localized reductions in carbon dioxide concentrations and water acidity, as do protections of deep water fish. Such teleost, or bony, fish were found to excrete high magnesium calcite crystals that dissolve at shallow depths and raise ocean alkalinity, thereby likely helping to reduce ocean acidification.



Gabon's marine protected area network will help protect pelagic fish populations such as these rainbow runners. |  
Eric Sala/National Geographic

Co-author Bethan O'Leary, a research fellow at the University of York, added that she and her colleagues found that marine reserves create areas of great biological productivity, which may allow exploited fish and other marine life animal stocks, as well as degraded habitats, to recover.

"This occurs, in part, because the protection of coastal wetland nurseries facilitates completion of life cycles that require multiple habitats and enhance fisheries," O'Leary said. "This even has an effect on stimulating primary productivity, and therefore CO<sub>2</sub> removal, by boosting nutrient cycling."

Matt Rand, who is the director of the Pew Bertarelli Ocean Legacy Project that supported part of the research, noted that a study published in March in the journal *Nature* found that the most effective marine reserves were those possessing the capacity for monitoring and enforcement.

"If there is strong local and community engagement, as well as engagement at the higher levels of government, there is a greater chance that a given reserve will be managed more effectively," Rand said.

Large, remote reserves pose the greatest challenges to monitoring. Satellites, drones, and other technologies, however, continue to make possible near-real time surveillance.



Rock Island, Palau. |  
Matt Rand

The researchers mentioned three marine reserves that they say are highly-protected: the Northwestern Hawaiian Islands Marine National Monument (also known as the Papahānaumokuākea Marine National Monument), the Pitcairn Islands Marine Reserve, and the Palau Marine National Sanctuary.

The Hawaiian monument, designated under former President George W. Bush in 2006, was expanded by former President Barack Obama in 2016 to over 579,153 square miles. “It is home to more than 7000 species, a quarter of which are endemic, or found nowhere else on Earth,” Rand said. “The area provides habitat for rare species, such as threatened green turtles, endangered Hawaiian monk seals, and false killer whales, as well as 14 million seabirds representing 22 species.”

The Pitcairn reserve protects nearly 320,465 square miles in the remote waters surrounding the Pitcairn Islands in the South Pacific Ocean. This marine region is home to over 1,200 species – including rare ones, such as the many-spined butterfly fish – which are found nowhere else on the planet.

The [Palau Marine National Sanctuary](#), designated in 2015, was highlighted by the researchers as being a highly-protected marine reserve. It covers 193,051 square miles, or more than 80 percent of the nation’s maritime territory.

“It is an area larger than California that is off limits to extractive activities, such as fishing, drilling, or mining,” Rand said. “The reserve was created to safeguard the future of the Palauan people, particularly as global change tightens its hold. It is exactly the kind of climate reserve that our study focuses on.”



A pair of bottlenose dolphins frolic in the waters of Mayumba National Park, previously the country's only national park dedicated to the protection of marine species and one of the locations of a recent coastal survey by WCS, National Geographic, and Gabon's Agence Nationale de Parcs Nationaux. | Peadar Brehony

The just-announced network of marine protected areas in Gabon adds to this worldwide collection of water-based sanctuaries. In addition to the dedication of President Ali Bongo Ondimba, the project has involved the efforts of the Waitt Foundation, National Geographic Pristine Seas, Wildlife Conservation Society's (WCS) Gabon Program and the Gabonese National Parks Agency. The Tiffany & Co. Foundation provided a \$1 million grant towards the WCS Marine Protected Area (MPA) Fund, which has a mission of establishing and strengthening MPAs around the world.

Cristián Samper, president and CEO of the WCS, said creating marine protected areas will help advance the health of the world's oceans.

"Gabon is showing great leadership with this massive expansion of efforts to protect its surrounding waters," he said. "MPAs are an important conservation tool protecting habitat, improving fisheries, supporting livelihoods, and securing the long-term health of marine biodiversity and the oceans."

Roberts, whose team was not involved in the Gabon work, is hopeful that the ambitious marine conservation plan for this African country will be properly enforced.

"Africa is an area that has taken the brunt of much of the planet's hunger for seafood," he said. "(The new marine protected areas network) is an interesting approach, and you want to believe that by implementing a network of protected areas, that Gabon will be able to enforce it effectively and the ecosystems will be able to recover. To make these areas properly effective, they will need high levels of protection from fishing and other sources of damage, as well as effective management, monitoring, and enforcement."

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Roberts and his colleagues believe that protecting more of the world's oceans will improve the outlook for the environmental recovery after [greenhouse gas emissions](#) have been brought under control. This strengthens the case that the UN ocean protection target can be raised from

10 to 30 per cent coverage by MPAs. This will require many more large-scale MPAs, however, on par with that of the one recently announced for Gabon, as well as protected areas that go beyond national jurisdictions.

The goals cross partisan politics, too.

As Rand said, working to establish marine reserves is a non-partisan effort that can take place no matter a country's leadership.

"The way to designate more reserves remains the same," he said. "Engage with the stakeholders — local people, scientists, fishermen, business leaders, government decision makers — to evaluate what the benefits are to having a marine reserve, and then build support and make that case to whomever the chief decision maker is."