How much space does nature need? 30 percent of the planet may not be enough

Nature needs to be protected, scientists agree, but how best to do it is up for debate

Habitat loss and such human encroachment as this clear-cutting in the Amazon (shown) are a major threat to biodiversity worldwide. The United Nations is drafting an ambitious new set of conservation targets to safeguard species and prevent further losses.
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By Jonathan Lambert

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For millions of years, giants graced the murky depths of China's Yangtze River. The Chinese Paddlefish (*Psephurus gladius*), which could reach 7 meters in length, used its swordlike snout to sense the electrical perturbations made by smaller prey, snatching them in the dark. But no more.

The fish was declared extinct in 2019, a victim of overfishing and habitat loss.

Its story is being played out across the world. From winding rivers to the windswept tundra to the dense tropical forests of Borneo, nature is in trouble.

Plants and animals are increasingly threatened by human activities and habitat encroachment. One study estimates a million species face extinction within decades (*SN: 5/8/19*). That's 1 million distinct, idiosyncratic answers to the basic question of how to make a living on planet Earth, gone.

The scale of this potential loss has many countries worried. Aside from its inherent value, the natural world makes the planet livable through processes like cleaning the air, filtering water, cycling carbon dioxide and pollinating crops. So to stem this biodiversity loss, governments are now working to draft ambitious plans to set aside more space for natural habitats. Nature, after all, needs room to flourish.

A global plan under negotiation envisions designating 30 percent of land and sea as protected by 2030 — and 50 percent by 2050 — in order to revive ecosystems and safeguard the diversity of species on Earth, according to a draft text of the agreement under the U.N. Convention on Biodiversity.

But is 30 percent, or even 50 percent, enough? And enough for what exactly — to slow extinction rates, or to protect everything that's possible to protect, or something else entirely?

One basic goal is to preserve what's left. Humans have altered more than three-fourths of Earth's surface, and of the 14 terrestrial biomes — such as tropical rainforest, tundra or desert — eight have less than 10 percent of undeveloped wilderness remaining, researchers report in a 2016 study in *Current Biology*. Many species have already vanished, such as the Chinese Paddlefish and the brilliantly blue Spix's Macaw, not seen in Brazil's forests since 2000.

Spix's Macaw, pictured here in a German zoo, is considered extinct in the wild by the International Union for the Conservation of Nature. The brilliant blue birds once thrived in the forests of northeastern Brazil, but vanished because of habitat loss and poaching.
DPA PICTURE ALLIANCE/ALAMY STOCK PHOTO

At least for marine ecosystems, there's research to support the 30 percent target as a starting point. There's less firm evidence for land. But "the scientific consensus is telling us that we need [even] more ambitious targets," says Oscar Venter, a conservation scientist at the University of Northern British Columbia in Prince George. Targeting 30 percent of Earth's terrestrial regions for protection by 2030, he says, is "more a reflection of what's politically feasible, rather than what the best science says."

Eyeing ambitious targets

An idea like this is not unprecedented. In 2011, more than 190 countries agreed to 20 conservation goals, collectively referred to as the Aichi Biodiversity Targets, as part of the U.N. Convention on Biological Diversity. Those targets include efforts such as increasing awareness of biodiversity and incorporating the traditional knowledge of indigenous groups into conservation plans. More directly, governments agreed under the convention to each set aside 17 percent of their land and, for coastal countries, 10 percent of their seas, as protected areas by 2020. (The United States is the only country that has not ratified the agreement.)

The Aichi Targets acknowledged two key reasons for preserving the planet. "We have a responsibility to be stewards of the planet, because nature is important in and of itself," says Jane Lubchenco, a marine ecologist at Oregon State University in Corvallis and a former director of the National Oceanic and Atmospheric Administration. "But also because people benefit directly from healthy, productive and resilient ecosystems and abundant biodiversity."

The targets, while useful in motivating conservation efforts, still were "not sufficient," Lubchenco says. Setting targets "often doesn't translate into actually achieving those targets," she says, thanks to uneven coordination between scientists, government officials and other key actors like farms or the fishing industry. And while the agreement required that countries publish action plans, it did not demand reports on actual progress toward achieving the Aichi Targets.

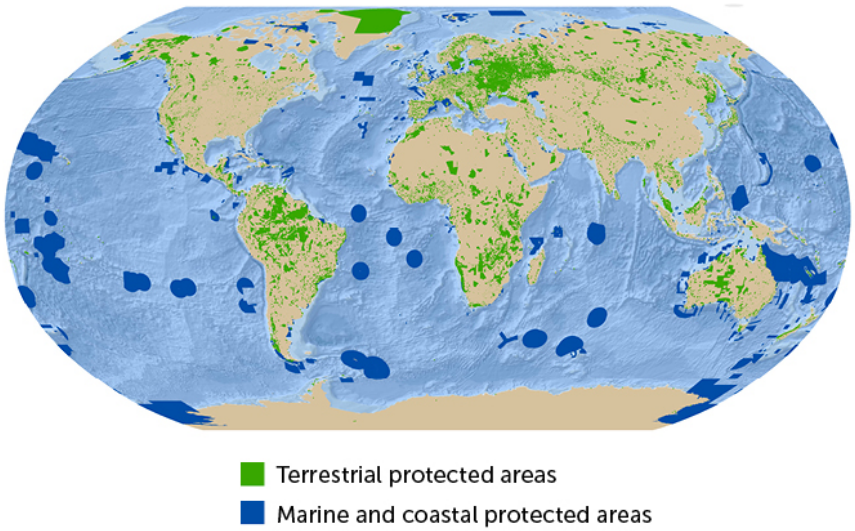
As the decade draws to a close, many targets remain unmet. Currently, about 15 percent of land and 7.4 percent of seas are in some way protected, or in line for protection, according to the U.N. Environment Programme World Conservation Monitoring Centre. Even so, current extinction rates are estimated to be 1,000 times higher than historical levels. Even common animals, such as American sparrows, have seen their numbers drop in recent decades (*SN: 9/19/19*).

That's led scientists and governments to conclude that the 2011 targets didn't go far enough.

Safe spaces

As of April 2020, nearly 15 percent of land (green) and about 7 percent of the seas (blue) were under some level of protection, according to the U.N. Environment Program World Conservation Monitoring Centre and the International Union for the Conservation of Nature.

Areas under some form of protection in 2020



WWW.PROTECTEDPLANET.NET/UNEP-WCMC, 2020

How much is enough?

Deciding how much of nature should be protected depends on the goal, whether that's keeping a specific animal from going extinct, preserving a unique ecosystem or ensuring the future of commercial fishing stocks. Different goals necessitate different kinds of protected areas.

The size of a protected area "is important, but it's not the only thing that matters," says Samantha Murray, an ocean law and policy expert at Scripps Institution of Oceanography at the University of California, San Diego.

When trying to prevent a specific animal from going extinct, biologists first try to figure out the minimum amount of habitat the species needs to persist. Wide-ranging species like North American caribou need about 10 percent of their natural range to be protected. Rarer species in microhabitats like a single valley or a specific island "typically need much more," Venter says, "potentially all the way up to 100" percent of their range. Figuring out those numbers is tricky, especially for understudied species. Additionally, it can be difficult to design a protected area that meets the diverse range requirements of all the species within it.

Another conservation approach focuses on protecting the rare slices of land and sea brimming with exceptional numbers of species. These so-called biodiversity hot spots include Australia's Great Barrier Reef, the Amazon River Basin and parts of the U.S. Great Smoky Mountains. Protecting these areas means protecting many different animals and plants all at once.

Finally, some conservation biologists argue for preserving vast tracts of wilderness not yet altered by human activity. The expansive boreal forests of Canada and Russia don't harbor as many species as the Amazon, but they do hold up to a third of the globe's terrestrial carbon and so are a key part of the Earth process of pulling climate-warming carbon dioxide out of the atmosphere. Protecting these areas, along with other large tracts of wild land, are crucial for solving both the climate crisis and the biodiversity crisis, says Eric Dinerstein, a conservation biologist at RESOLVE, a conservation nonprofit based in Washington, D.C.
Dinerstein and others argue that the situation is now so dire that all approaches are needed to save what's left. "There are no immutable laws of conservation biology, nothing that says this paradigm for saving nature is better than that paradigm. We need to do it all."

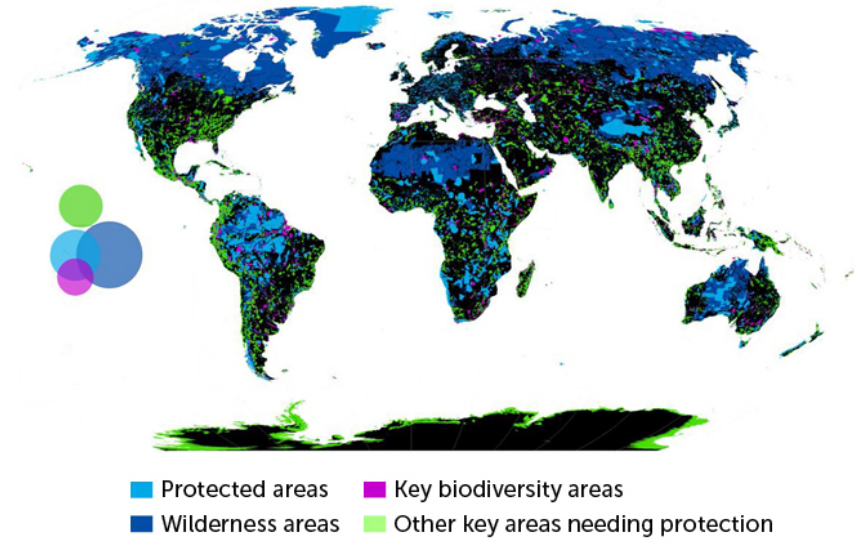
That same urgency is reflected in the recent flurry of proposals and analyses by scientists. Biologist E.O. Wilson says in his 2016 book *Half-Earth* that 80 percent of the planet's biodiversity can be saved by protecting half of the planet. Dinerstein and colleagues also laid out a plan in the June 2017 *BioScience* for preserving half the planet in a way that covers a diversity of ecosystems.

Venter and colleagues estimate targeting a little less than that — about 44 percent — can safeguard biodiversity. The team arrived at that number, in a study posted at bioRxiv.org in November 2019, by tweaking boundaries around existing protected areas. The result is a global patchwork of protected areas with enough space for the 28,594 species of mammals, birds, amphibians, reptiles, dragonflies and crustaceans the researchers had data for, and includes some of the world's richest areas of biodiversity.

Mapping a way forward

One recent analysis by a team of conservation biologists finds that 44 percent of land must be protected or soundly managed to stem the biodiversity crisis. This map shows existing protected areas (light blue), key biodiversity areas (purple) and wilderness (dark blue), while new conservation priorities identified by the researchers' analysis are in green. The Venn Diagram shows the degree of overlap between each category.

Where protections exist and where they are needed



J.R. ALLEN ET AL/BIORXIV.ORG 2019

Broad and ambitious goals, like preserving 30 percent by 2030, are important for galvanizing international action. “But ambitious targets are only good if countries are strategic in where they place protected areas,” Venter says.

Problems with big targets

Indeed, not all biologists agree that setting such targets is the best strategy. “A big single number [alone] isn’t going to help, and it misses what we need to do to protect biodiversity,” says conservation biologist Stuart Pimm at Duke University. He says it’s more important to focus on the most threatened biodiversity hot spots.

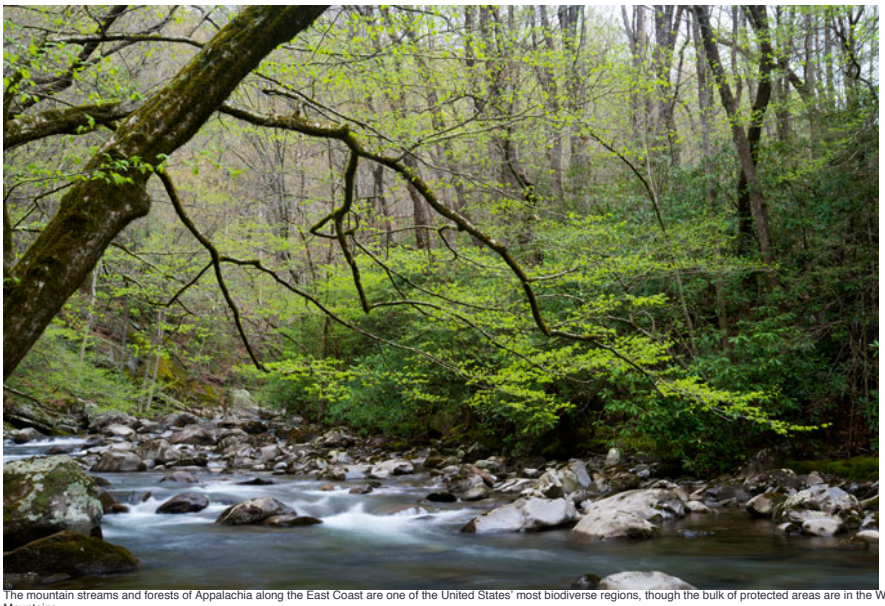
Much of Pimm’s work focuses on connecting forest fragments with natural corridors, which can functionally increase an animal’s habitat even when protecting more land area isn’t feasible. Recent research shows that connecting fragmented habitats can boost biodiversity, for both animals and plants (*SN: 9/26/19*).

Biodiversity also is not evenly distributed around the globe; coral reefs, for example, account for less than 1 percent of the ocean floor, but house more than 25 percent of marine life. So having all countries aiming for the same targets might be counterproductive. Some countries may need to protect more than 30 percent of their territory, others less.

“If you’re looking at the Amazon, for instance, recent research has shown that we probably need 80 to 90 percent of the Amazon intact,” Pimm says. Otherwise, the rainforest may begin a rapid transformation into drier savannah, compromising the water cycle for the whole continent.

Additionally, countries rushing to meet their goals might only go for the low-hanging fruit. “Areas that are too cold, too hot or too remote” to hold any agricultural or commercial promise are easy targets, but not necessarily the areas most in need of protection, Pimm says.

The United States could get to 30 percent relatively quickly by preserving sparsely populated Western tracts of desert or high plains. Most of the country’s biodiversity, however, is in the southeast. For instance, more endemic salamander species are crawling around Appalachian streams and lakes than anywhere else in the world, yet much of their range remains unprotected. Similarly, protecting most of icy Greenland would effectively meet the European Union’s 30 percent obligation.



The mountain streams and forests of Appalachia along the East Coast are one of the United States’ most biodiverse regions, though the bulk of protected areas are in the West. Here, a stream runs through the Great Smoky Mountains.

BETTY4240/ISTOCK/GETTY IMAGES PLUS

"Large area targets may just encourage countries to protect areas that aren't going to do much for biodiversity," Pimm says. "Do we need to protect more of the planet? Of course, but we should do so in a smart, targeted way."

What does protection mean, anyway?

Designating a protected area is just the beginning. Protections need to be enforced through policing and prosecuting for illegal fishing, tree felling, hunting or pollution. Otherwise, protections don't work — and conservation efforts fall flat. A 2010 analysis published in *Environmental Management* found that only 24 percent of protected areas were being soundly managed.

Places designated only on paper as protected "can give the illusion of protection where none really exists," says Murray, the Scripps ocean law and policy expert. "We could create the largest marine protected area in the world, but if we just walk away, it doesn't do anyone any good."

Having fully protected national parks across 30 percent of the globe is probably not feasible, conservationists say. But there are other ways of managing land and sea to meet conservation goals.

"Indigenous lands in Canada are a great example," Venter says. These lands allow for hunting and gathering activities, but not large-scale habitat clearing. And there is evidence that such an approach works. Indigenous lands in Canada, Brazil and Australia had similar, or slightly higher, levels of vertebrate diversity than non-indigenous protected areas in the same countries, researchers reported in November 2019 in *Environmental Science & Policy*.

The quarter of Earth's land now owned, used or occupied by indigenous communities holds about 80 percent of Earth's biodiversity, according to a 2008 World Bank report. So empowering these groups to manage their lands could help countries achieve their targets, Venter suggests.

Moving toward consensus

Still, many biologists say that percentage targets, even if clumsy, do play an important role. Some "countries have taken great pride in getting close or meeting [Aichi] goals," and that can be a sign of how well countries are preserving nature, says Hugh Possingham, chief scientist at The Nature Conservancy in Brisbane, Australia. But it's not the whole story.

"Relying solely on targets is a bit like relying only on blood pressure to indicate health," Possingham says. He hopes that the eventual agreement incorporates more simple but meaningful metrics, for example, an estimate of how much a country's biodiversity is captured by existing protected areas. "That would give a fuller picture of how well we're doing."

Greenland hosts the world's largest national park, protecting nearly 1,000,000 square kilometers of its mountainous coast and icy interior (the mountains at Ofjord in Northeast Greenland National Park shown here).
GRID ARENDAL/FLICKR (CC BY-NC-SA 2.0)

Countries are still months away from finalizing a new agreement. A broad outline of the framework was released in January for months of discussions before the next U.N. Convention on Biodiversity. The timeline for those discussions has been extended due to the ongoing coronavirus pandemic. The meeting, originally scheduled for October 15 to 29 in Kunming, China, has been delayed to sometime in 2021

Parts of the outline suggest it will address some of the failings of the Aichi Targets, says Aleksandar Rankovic, a senior research fellow at the Institute for Sustainable Development and International Relations in Paris. "There has been a strong cooperative spirit," he says. "Most delegations seem intent on improving the agreement."

For example, the outline stipulates that whatever land and sea each country designates as protected, 60 percent of that should be "of particular importance for biodiversity." What counts as a site of particular importance remains to be determined, but Rankovic says baking this kind of language into the document is a key step towards ensuring countries protect what needs protecting.

Rankovic hopes the COVID-19 pandemic serves as a wake-up call about the importance of keeping wild environments intact, as recent research links deforestation to the emergence of zoonotic diseases, like COVID-19, in humans.

"The fact that we have a biodiversity-related global pandemic that started where we're supposed to gather to propose ways to solve the biodiversity crisis is quite powerful as

a symbol," he says. Reaching a deal "could be a big moment" in preventing a global extinction crisis. "But if we come out more divided, it will be harder to lay the groundwork for solving this crisis."