Comment


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Coral in a mangrove swamp in the Raja Ampat Islands, Indonesia.

Set a global target for ecosystems

James E. M. Watson, David A. Keith, Bernardo B. N. Strassburg, Oscar Venter, Brooke Williams & Emily Nicholson

The conservation community must be able to track countries' progress in protecting wetlands, reefs, forests and more.

Next week, representatives of more than 190 nations are gathering in Rome to discuss how to halt the biodiversity crisis during this decade and beyond.

Since 2010, targets for conserving species have shaped policy and galvanized efforts to halt species loss worldwide, as part of the Convention on Biological Diversity (CBD; see www.cbd.int/sp/targets). Yet no such targets exist for ecosystems — despite the wealth of evidence showing that their health and functions are essential to the processes that maintain all life[1].

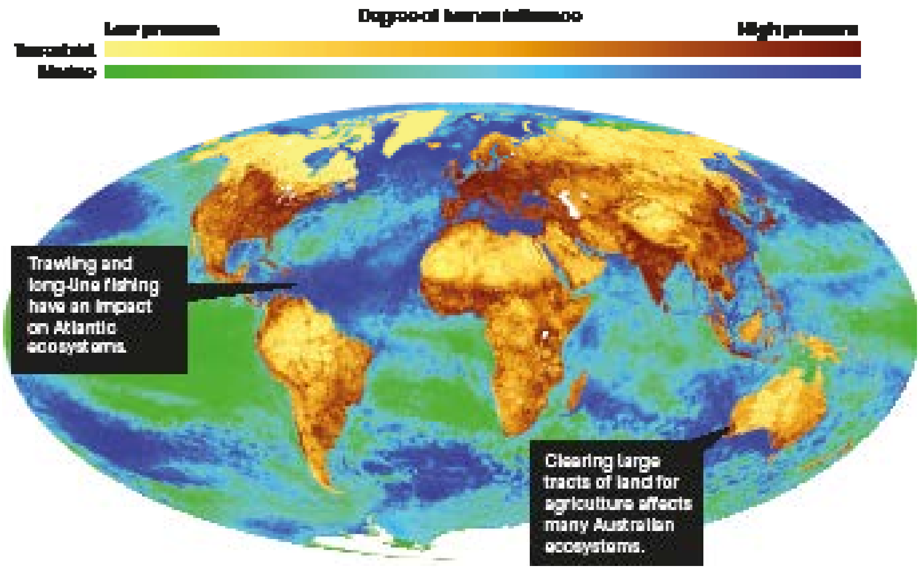
Targets that are specific, measurable, attainable, relevant and timely (SMART) are central to project planning and have proved to be effective in policies that seek to address global problems. For example, during the 1980s, a group of 20 nations agreed to set various limits on the production and consumption of chlorofluorocarbons. This helped to guide the phase-out of these substances under the Montreal Protocol, which came into effect in 1989 (ref. 2).

It is now possible to establish a SMART target for ecosystems, as well as metrics to track progress in meeting that goal. Nations are no longer limited by a lack of knowledge or methods when it comes to ecosystem mapping and assessment (see 'Under pressure'). What's more, they can use a proven and standardized approach for ecosystem risk assessment: the Red List of Ecosystems protocol, which was adopted by the International Union for Conservation of Nature (IUCN) in 2014.

We urge those attending next week's meeting to place an ecosystem-based goal and target alongside species-based ones in their discussions. Nations have a chance to ensure that all of the world's remaining intact ecosystems are retained by 2030, that overall ecosystem area and integrity increase by 2050, and that all that fall below a level of degradation defined by the Red List of Ecosystems protocol are restored.

The ratification of an international target will compel governments to act. This is the only way to halt the decline of ecosystems.

UNDER PRESSURE



SOURCES: J. E. M. WATSON *ET AL.* (MAP); DATA FROM O. VENTER *ET AL. NATURE COMMUN.* 7, 12558 (2016)/B. S. HALPERN *ET AL. SCI. REP.* 9, 11609 (2019).

Species and ecosystems targets

In 2010, the 193 nations that were parties to the CBD agreed to work together to prevent the extinction of known threatened species and improve their conservation status by 2020. They did this by ratifying Target 12 of the CBD 2011–20 strategic plan for biodiversity (see www.cbd.int/sp/targets).

Actions taken because of this and previous CBD targets have reduced the risk of extinction for many species, although direct links are hard to prove. For example, conservation efforts over the past 30 years have helped to cut the extinction rate of endangered birds by at least 40%, according to one analysis[3]. Previously endangered populations that are now growing include the Seychelles magpie-robin (*Copsychus sechellarum*) and a Brazilian parrot called Lear's macaw (*Anodorhynchus leari*).

Over the past decade, nations have been identifying and protecting the marine, terrestrial and freshwater sites that are of international importance to the conservation of vulnerable species. More than 16,000 of these 'key biodiversity areas' have now been identified worldwide (see go.nature.com/2xdtqb8). Government reports submitted to the CBD indicate that such areas are increasingly being protected[4]. One example is Itombwe Natural Reserve in the Democratic Republic of the Congo, which was formally established in 2016 to conserve several rare species, including the enigmatic Itombwe puddle frog (*Phrynobatrachus* sp.).

Such species-focused conservation activities are crucial. But they are not sufficient to sustain biodiversity and the benefits of nature to humanity.

Ecosystems, from the boreal forest and wetlands to coral reefs and mangroves, are more than the total of the plants and animals living in them[5]. Complex interactions between biological and physical systems drive processes that sustain all life. This includes production of clean water, regulation of air quality and climate through carbon sequestration and storage, soil formation, pollination and the production of food and wood for houses[1]. Indeed, natural systems are key to dealing with the effects of climate change, as highlighted by a 2019 study[6]. It estimated that, between 2000 and 2013, the impact on carbon levels of losing intact tropical forests (including indirect effects such as reduced biodiversity and increased selective logging) might be six times greater than was originally proposed[6].

> **"Nations have a chance to ensure that all of the world's remaining intact ecosystems are retained by 2030."**

Thanks to substantial advances in mapping and monitoring, scientists can now diagnose ecosystems' defining features and the processes that threaten them[5,7]. Take the demise of tidal flats revealed by satellite technology. Such mapping showed that coastal development and sea-level rise destroyed 16% of these ecosystems between 1984 and 2016. This has reduced storm protection and food provision for billions of people[8]. Remote sensing is similarly monitoring tropical forests[9], ice cover[10], coral reefs[11] and mangroves[12]. For instance, at least 12% of the world's mangroves were lost between 1996 and 2010 because of human activities[13].

Pivotal to these efforts has been the development of the Red List of Ecosystems protocol, a set of criteria for identifying ecosystems that are most at risk of collapse[14]. It lays out how to define and map ecosystems, and enables systematic risk assessment using an array of indicators of extent and degradation.

So far, the Red List criteria have been used to assess more than 2,800 ecosystems in 100 countries across all continents[15]; 45% of those systems were found to be at risk of collapse (D.A.K., unpublished observation). These efforts could serve as a starting point for work towards an international target for conserving ecosystems.

Ecosystem-level conservation is already affecting decisions on resource use and management made by national governments, non-governmental organizations and industry[15]. For example, a 2017 assessment of ecosystems in Colombia — Amazon rainforests, tropical dry forests, high Andean cloud forests, lowland savannah and other types — classified almost half (44%) as either 'endangered' or 'critically endangered', as defined by the Red List protocol[16].

This results from human activities such as forest clearance for illegal coca crops, cattle ranching and mining. The finding has prompted the Colombian government to focus on the amount of land given protected area status, and to consider the restoration of critically endangered ecosystems.

In South Africa and Australia, businesses wanting to encroach on ecosystems that are classed as critically endangered or endangered must first conduct a full environmental impact assessment for their proposed project. Likewise, Finland's first government-led systematic ecosystem assessment, completed in 2008, resulted in increased protection of threatened forest under the nation's Environment Protection Act and Forest Act[17].

In China, assessments of the rapid decline of tidal-flat ecosystems has catalysed efforts to better understand, manage and protect them. Tidal flats surrounding the Yellow Sea in east Asia support the migration of up to three million shorebirds and stabilize the coastline for more than 150 million people, also providing them with storm protection and food[18]. In July 2019, two of these important migratory sites were added to the United Nations Educational, Scientific and Cultural Organization (UNESCO) World Heritage List after being classified as endangered under the IUCN criteria .

Action and accountability

It is difficult to accurately assess progress towards conservation targets at the species level — a major constraint on their effectiveness. Monitoring of at-risk species is often infrequent and numbers fluctuate naturally from year to year. Such species also tend to be elusive. At the ecosystem level, a SMART target should therefore enable frequent tracking of ecosystems using remote sensing and modelling. This could result in more-transparent reporting of the status of Earth's ecosystems, enhancing public awareness of their current trajectories and the consequences of their decline.

Any ecosystem target should set limits on degradation that mark the irreversible loss of key processes[14]. A target should also highlight the importance of conserving healthy ecosystems over restoring degraded ones. Such restoration is technologically and economically challenging and, as yet, there is no evidence that complete restoration of an ecosystem is even possible. Nevertheless, restoration has a key role in avoiding species extinctions and mitigating climate change, and should be part of an ecosystem goal.

RICARDO OLIVEIRA/AFP/GETTY

Human impacts such as overfishing have affected the Amazon River ecosystem in Brazil.

The Rome meeting is the second of three working-group meetings for negotiations leading up to a new set of biodiversity targets, which will replace those agreed in 2010. This 2030 global strategic plan for biodiversity will be formally established in October by the signatories to the CBD.

This year marks the implementation of the pledges made in the Paris climate agreement, and the United Nations Decade on Ecosystem Restoration begins in 2021. The launch of the 2030 strategic plan in October is an unprecedented opportunity — perhaps the last — for humanity to address multiple environmental problems at once. Whereas a species target forces nations to report on their progress only in relation to biodiversity, an ecosystem target would necessitate simultaneous reporting on wins across three fronts: biodiversity, climate change and sustainability (specifically, on the United Nations Sustainable Development Goals for human development and well-being).

World leaders must be held accountable for the current and future state of their countries' ecosystems.

The authors

James E. M. Watson is a professor of conservation science at the University of Queensland, St Lucia, Australia, and director of the Science and Research Initiative at the Wildlife Conservation Society, Bronx, New York, USA. **David A. Keith** is a professor of botany at the University of New South Wales, Australia, and senior principal research scientist at the New South Wales Department of Planning, Infrastructure and Environment, Hurstville, Australia. **Bernardo B. N. Strassburg** is a professor of sustainability science at the Pontifical Catholic University of Rio de Janeiro and executive director of the International Institute for Sustainability, Rio de Janeiro, Brazil. **Oscar Venter** is an associate professor at the Natural Resource and Environmental Studies Institute, University of Northern British Columbia, Prince George, Canada. **Brooke Williams** is a PhD candidate at the Centre for Biodiversity and Conservation Science, University of Queensland, St Lucia, Australia. **Emily Nicholson** is an associate professor at the Centre for Integrative Ecology, Deakin University, Burwood, Victoria, Australia.
e-mail: jwatson@wcs.org

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