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Conservation priorities mapping—a first step toward building area-based strategies

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An Editorial on the Frontiers in Science Lead Article

[Conservation Imperatives: securing the last unprotected terrestrial sites
harboring irreplaceable biodiversity](#)

Key points

- Globally, over 25% of species are at risk of extinction unless urgent action is taken to reverse biodiversity loss.
- New mapping tools that identify key areas to protect biodiversity hotspots will allow governments and conservation organizations to prioritize areas for protection to protect 30% of nature by 2030, as set out by the Global Biodiversity Framework in 2022.
- Effective area-based conservation requires inclusive and rights-based approaches that respect and draw upon a combination of knowledge systems.
- Protecting biodiversity hot spots requires careful planning that integrates future climate scenarios, ensures effective management, and considers specific social and economic drivers as well as political context.

Introduction

Time is definitely not on our side. Around 25% of species in assessed animal and plant groups are threatened, with over 1 million species already facing extinction, many within decades, unless transformative actions are taken to reduce the direct and indirect drivers of biodiversity loss (1).

Brazil is considered one of the most biologically diverse countries in the world, hosting an estimated 15–20% of the planet's biodiversity. However, there is widespread evidence of resilience loss, and the degradation of the Amazon rainforest poses a significant risk to global climate targets. Existing estimates on how much deforestation the Amazon could withstand before experiencing ecosystem collapse vary between 40% and 20% of its original cover. The combination of more frequent droughts and intense

forest fires driven by climate change, on top of continued deforestation, is transforming parts of the forest from a carbon sink into a net source (2), with major implications for biodiversity, global climate change, and the societies that depend on it for food, water, and health.

To reverse this trend for biodiversity globally, 196 countries agreed to a landmark Global Biodiversity Framework (GBF) in 2022, aimed at halting and reversing nature loss by 2030. The pace of degradation of natural habitats due to impacts of land-use change and global warming combined with the many challenges faced when implementing conservation actions, including local political contexts and lack of resources, puts enormous pressure on governments and conservation organizations to take sufficient, concerted action in the remaining six years.

Under Goal 3 of the GBF, which aims to conserve and equitably manage 30% of land, inland water, and coastal marine areas by 2030, countries need to decide how the expansion of protected and conserved area networks can more effectively address the impacts of both climate change and biodiversity loss. As part of a broader strategy to expand the global protected area network in a way that maximizes the protection of threatened and range-restricted species, Dinerstein et al. (3) identified key “Conservation Imperative” sites that are currently unprotected. Their analysis shows that Conservation Imperatives represent only 1.2% of the world’s terrestrial area, or 164 million hectares (Mha), most of which is concentrated in the tropics, and that the total estimated cost of protecting Conservation Imperatives in the tropics is US\$169 billion (3).

Some aspects mentioned by the authors, such as going beyond mapping the areas and estimating costs of purchasing and protecting areas for conservation, should be a core part of area-based conservation strategies if we want to ensure that protected and conserved area networks are more effective, equitable, inclusive, and durable in the long term.

Diverse and inclusive approaches to secure conservation sites

A diversity of approaches is needed to secure the protection of Conservation Imperatives. For example, effective area-based conservation requires inclusive and rights-based approaches that respect and draw upon a combination of knowledge systems. Indigenous peoples and local communities should be recognized, empowered, and respected as stewards of their lands, waters, and resources, actively participating in decision-making on processes that affect them. From conception to design to governance, area-based conservation must be inclusive, respond to local aspirations and challenges, and promote equitable natural resource governance.

Moreover, there are other opportunities to support long-term conservation goals beyond designated protected areas, such as private, government, community, and Indigenous-conserved areas that are managed in ways that make important environmental contributions, without this being the primary goal. The concept

of other effective area-based conservation measures (OECMs) may provide international recognition for unprotected sites that support conservation aims and is gradually being adopted by many countries. However, in many parts of the world, conflicts over land rights, access, and resources are common in these currently unrecognized sites, especially in deforestation frontiers where there is high pressure to convert areas historically occupied by local communities without formal recognition. Supporting local stewards, securing these diverse places, and ensuring ecological connectivity between them is of critical importance to long-term conservation goals.

Viability of Conservation Imperatives in the long term

Dinerstein et al. (3) state that the long-term viability of Conservation Imperatives and the endangered species they contain must be subjected to feasibility analyses to assess the dynamic nature of threats and model the effects of climate change.

Several new analyses now map overlapping areas of high biodiversity and carbon storage, identifying carbon-biodiversity hotspots (although there has been much debate on the correlation between these two attributes at different scales). Alarming, results indicate that these hotspots remain largely unprotected (4). Given the challenges in establishing newly protected areas, prioritizing opportunities to protect ecosystems that store high levels of irrecoverable carbon, increase biodiversity coverage, and maximize stability under climate change scenarios is key to advancing global commitments of both the United Nations Framework Convention on Climate Change (UNFCCC) and the Convention on Biological Diversity (CBD).

It is also important to assess the viability of protected areas in the long term using future climate scenarios. While previous global priority-setting exercises have lacked information on climate refugia due to data limitations and uncertainty in model assumptions, the inclusion of such data in planning exercises is now possible using recently developed metrics (5). Climate velocity-based metrics or the more recently developed Bioclimatic Ecosystem Resilience Index are some of the alternatives to integrate climate change scenarios into priority settings for area-based conservation (6).

Mobilizing resources for securing and managing protected areas

One of the caveats highlighted by Dinerstein et al. (3) is that they did not attempt to estimate the costs for the management of Conservation Imperatives. Many existing protected areas are severely underfunded and consequently are not managed effectively. Protected areas are subjected to many threats that impact biodiversity conservation, such as fires, illegal conversion of habitats, or poaching. Adequate funding is essential when addressing these issues. Moreover, while protected areas are

intended to permanently safeguard natural ecosystems, evidence points to widespread legal changes that temper, reduce, or eliminate protected areas, known as protected area downgrading, downsizing, and degazettement (PADDD). A global assessment from Golden Kroner et al. (7) showed that, between 1892 and 2018, 73 countries enacted 3749 PADDD events, removing 519,857 square kilometers from protection and tempering regulations in an additional 1,659,972 square kilometers; 78% of events were enacted since 2000. Most of these legal rollbacks authorized new or expanded industrial-scale resource extraction and development, such as building infrastructure, industrial agriculture, and mining.

Therefore, to ensure long-term conservation of biodiversity, the costs for implementing and consolidating protected areas must be part of the global resources' mobilization efforts. Innovative financial instruments and models could play an important role, such as in establishing trusted nature-based solutions, debt restructuring, and payments for ecosystem services.

An example of long-term funding for protected area implementation—the Amazon Protected Areas Program (ARPA)—was established in 2002 and supports 120 protected areas, covering 62 Mha or the equivalent of 20% of the remaining Amazon rainforest in Brazil. Since 2014, ARPA has been based on an approach called Project Finance for Permanence (PFP), which helps establish public policies and secure necessary funding to meet specific goals within a defined, long-term period. From 2008 to 2020, a period of increasing deforestation in the Brazilian Amazon, the protected areas supported by ARPA prevented nearly 260,000 hectares of forest loss, avoiding the release of 104 million tons of CO₂ emissions (8). Also applied in conservation initiatives in Bhutan, Canada, Colombia, Costa Rica, and Peru, PFPs have financed the protection of over 120 Mha.

A roadmap toward 2030 biodiversity targets

With fewer than six years ahead to meet the 30 by 30 target, global leaders will need to act fast and effectively to reverse the

trends of nature loss and carbon emissions and their impact on human societies. To do so involves a multifactor process that takes into consideration the latest science on biodiversity loss and ecosystem degradation, as well as economic and social drivers and political context analyses. The work by Dinerstein et al. (3) on mapping the initial areas to protect is an important piece of the puzzle. If protected, the areas mapped will make a significant contribution to reducing the conservation gap for many threatened species.

In the 2030 roadmap, collective conservation efforts should equally prioritize conserving species with sustaining nature's contributions to people, such as enabling access to natural resources that are critical for livelihoods and maximizing climate mitigation and adaptation opportunities.

Statements

Author contributions

MF: Writing – original draft, Writing – review & editing.

Conflict of interest

The author declares that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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