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Science on ecosystems and people to support the Kunming-Montreal Global Biodiversity Framework

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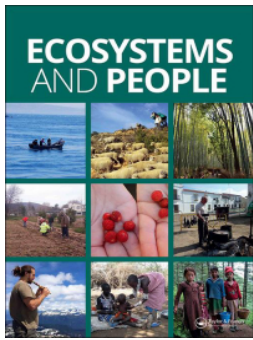
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Introduction

In December 2022, members of the Convention on Biological Diversity adopted the new Kunming-Montreal Global Biodiversity Framework (GBF) (<https://www.cbd.int/gbf/targets/>) to guide international biodiversity conservation efforts until 2030 in order to be able to live ‘in harmony with nature’ by 2050. This framework addresses the implementation gap left after the Aichi Biodiversity Targets, which were the previous global instrument for mainstreaming biodiversity conservation between 2010 and 2020 (IPBES, Díaz et al. 2019). As biodiversity continues to decline (IPBES, Díaz et al. 2019), the global scholarly community has been integrally involved in the development of the GBF, advancing crucial insights to support biodiversity strategies and action plans at different scales over time to ensure fair and effective conservation. In addition, the current situation demands that greater attention is paid to the diverse forms of human-nature connectedness and the co-production of knowledge and solutions by academia, governments, private sectors, alongside local communities and Indigenous Peoples to tackle issues of equity in biodiversity conservation, research, and management (Wyborn et al. 2021). Further research into the underlying political and justice dimensions of conservation and the recognition and inclusion of diverse knowledge systems and their holders (Pascual et al. 2022) is needed to support the actual achievement of the new Global Biodiversity Targets (for 2030) and Goals (for 2050).

Since 2018, *Ecosystems and People* has positioned itself as an inclusive, interdisciplinary, and transdisciplinary journal publishing work on the linkages between nature and people’s quality of life, and the implications of these diverse relations for the development of governance arrangements, management and policy that are equitable and just (Martín-Lopez et al. 2019). Thus, the mission and scope of the journal align well with the intent of the GBF. For example, the GBF seeks to include more prominently Indigenous Peoples and local knowledge holders and their diverse world-views and practices that are deeply tied to every element of their ecosystems, land, seas, kinship and cultural practices. This is a topic of increasing importance in *Ecosystems and People* (e.g. White and Lidskog 2023; Burke et al. 2023). The GBF also underlines the diversity

of human-nature relationships, in particular the role of nature’s contributions to people (NCP, Díaz et al. 2018), as reflected on by Kadykalo et al. (2019) and others. Moreover, the GBF’s emphasis on whole-of-society and other integrative approaches fits well with the journal’s aim to publish inter- and transdisciplinary work that provides practical solutions to real-world problems considering a diversity of actors, interests and knowledge systems. Finally, the GBF also underlines the role of women and girls as critical in achieving its Goals and Targets. *Ecosystems and People* has an editorial board that has for several years already achieved gender balance, exceeding the average across academic journals, cf. Liu et al. (2023). Moreover, *Ecosystems and People* continues to develop a culturally diverse editorial board that appropriately covers the different regions of the world (we acknowledge that this is an ongoing journey).

The aim of this editorial is to draw attention to the GBF targets that are most relevant to our readership, with two objectives: First, to suggest how *Ecosystems and People* may be a venue for emerging research insights in support of the GBF. Second, to highlight examples of recent research in *Ecosystems and People* that can contribute to enrich, or even challenge, the evidence and development of the GBF Targets.

The Kunming-Montreal Targets

The Kunming-Montreal GBF sets 23 Targets (see Figure 1), most of which are directly or indirectly relevant to the scope of *Ecosystems and People*. In this Editorial we focus on 13 targets that are particularly relevant as they have been reflected in recent publications in *Ecosystems and People*, or as they are important areas of future contributions to the journal.

Target 1: biodiversity inclusive spatial planning of all areas

With regards to Target 1, we encourage contributions exploring the links between improved spatial planning processes and their ability to maintain habitats and biodiversity, the sustainable provision and use of NCP, and their contributions to quality of life. We are interested in the effects of integrating biodiversity

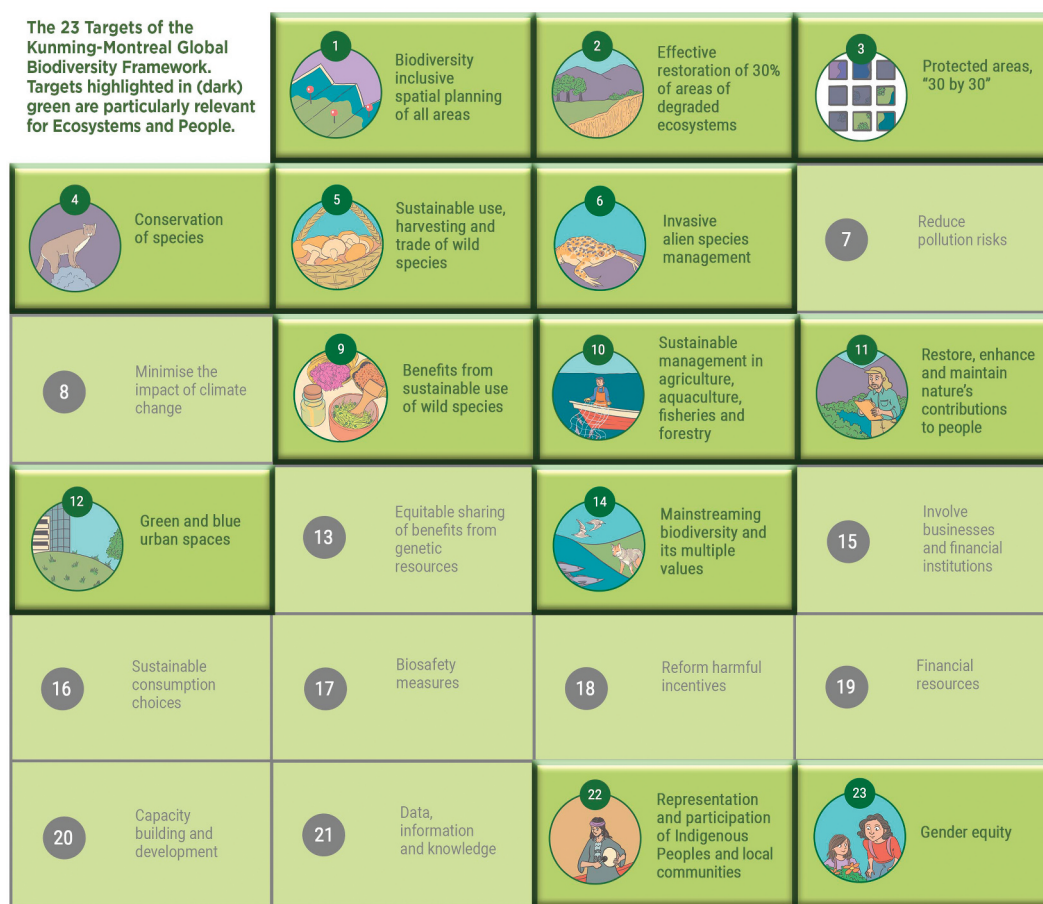


Figure 1. The 23 targets of the Kunming-Montreal Global Biodiversity Framework. Highlighted targets are particularly relevant for the scope of Ecosystems and People. Figure design: Francisca Carcamo (<https://www.panchulei.com>).

in spatial planning and environmental governance and management, across local, national and international scales. Examples of topics include innovative and inclusive (participatory) approaches for the planning of multifunctional landscapes and seascapes for biodiversity conservation or those addressing land use conflicts, trade-offs or synergies.

Pandit et al. (2020) introduced a multi-criteria framework to assess responses to land degradation. Using a case study of forest restoration in Nepal, they identified key factors determining the effectiveness of restoration responses, concluding that more attention needed to be paid to cultural, social, technical, and political dimensions influencing the outcomes of restoration planning and implementation. Sandström et al. (2023) examined the role of mainstreaming biodiversity in decision-making and suggested that integrated spatial planning can be an effective instrument to consider the spatial implications of policies on biodiversity and ecosystem services, and to design response strategies. Kuiper et al. (2022) reported on a participatory scenario planning process to explore desirable nature futures for a national park in the Netherlands. They found that the participatory planning process successfully engaged stakeholders in the development of pluralistic perspectives for the park.

Target 2: effective restoration

The journal provides a platform for work examining how management practices at local and landscape levels, based on diverse knowledge systems and plural values, can effectively halt and reverse biodiversity loss and restore the capacity of ecosystems to provide NCP. Understanding the drivers of biodiversity loss and ecosystem degradation is critically important to efforts to reverse these trends (Scholes et al. 2018). We encourage contributions that investigate the policy and legal frameworks, formal and informal governance structures, intersectoral relationships, and spatial planning decisions that impact sustainable management.

A recent Special Issue in *Ecosystems and People* linking ecosystem restoration with human well-being in Latin America highlighted the importance of trans-disciplinary approaches that considered human perceptions, beliefs, emotions, knowledge, and behaviours in ecosystem restoration planning and implementation (Meli et al. 2022). Furthermore, in a recent study of a rehabilitated mangrove system in Vietnam, Carrie et al. (2022) concluded that understanding the different household-level needs for multiple ecosystem services and the households' adaptive

capacities were key to developing effective restoration strategies.

Target 3: protected areas, “30 by 30”

We invite contributions that analyse the usefulness of protected areas and other effective area-based conservation measures (OECMs) regarding biodiversity, but also their effect on potentially mediating land and sea-use conflicts. Further understanding of recognitional, procedural, and distributional equity aspects of NCP of any form of area-based conservation is needed (Loos et al. 2023). The role of Indigenous peoples and local communities in protecting and sustainably using nature is understudied, as well as the potential of participatory and co-management approaches to recognize multiple, plural values of nature and NCP, including convivial and rights-based conservation approaches which safeguard Indigenous People’s rights. We furthermore encourage submissions that unpack the problematic colonial legacy of many protected areas, allowing us to learn from the past toward more equitable ways.

Benetti and Langemeyer (2021) analysed distributional, procedural, and recognitional aspects of environmental justice in relation to ecosystem services in the Circeo National Park, Italy. They made recommendations for citizen involvement, communication, and more inclusive, needs-oriented planning processes. Palliwoda et al. (2021) analysed ecosystem service co-production across 137 terrestrial biosphere reserves in the European Union. They found differences in anthropogenic contributions to ecosystem service co-production between zones of the biosphere reserves dedicated to crop production, grazing, timber production, and recreation. Their analysis helped to better understand the potential effects of zoning in designated areas for conservation and the provision of NCP.

Target 4: conservation of species

In relation to Target 4, we invite social-ecological scholarship probing human-wildlife relations, particularly from knowledge systems and worldviews that do not separate nature from society. We welcome articles that study social-ecological management approaches to coexistence and conviviality inside and outside of protected areas, including studies of social perceptions of management strategies. Moreover, we seek interdisciplinary articles exploring species reintroductions, habitat restoration, and interventions to halt human-induced species declines. Finally, we invite studies that highlight the roles of bridging entities such as non-governmental actors

and civil society to include values and priorities (Neelakantan et al. 2021).

Previous examples of species conservation work published in our journal include the study on the governance of red panda (*Ailurus fulgens*) habitat in Nepal, where Shrestha et al. (2022) emphasised that the needs of marginalised people should be kept in mind for effective conservation. Barghusen et al. (2021) found that farmers’ positive personal norms towards protecting farmland bird diversity in the Netherlands were perceived as important as farmers’ economic motivations to participate in respective agri-environmental schemes.

Targets 5 and 9: sustainable use, harvesting and trade of wild species

With regards to Targets 5 and 9, we welcome contributions that provide empirical analyses about the extent that wild species are harvested and traded and evidence of their sustainable harvest and trade. Understanding people’s motivation for harvesting and trading as well as their impact is crucial for creating socially acceptable and effective mechanisms for more sustainable use of species of wild flora and fauna. In particular, we encourage interdisciplinary and transdisciplinary research that broadens our understanding of the ecological, social, cultural, political, and economic aspects of harvest and trade of wild species and can offer effective and inclusive solutions.

Rothamel et al. (2021), for instance, studied sea turtle and other marine megafauna harvest and consumption in Madagascar. Interviews revealed that a vast majority of households bought and consumed sea turtle meat, but that financially more secure households consumed significantly more sea turtle meat. In another example, Herd-Hoare and Shackleton (2022) investigated the extent of locally harvested wild foods, traditional medicines, firewood, and building materials in South Africa along a gradient of landscape heterogeneity. They found that a diversity of landscapes and wild resources were key in supporting rural livelihoods.

Target 6: invasive alien species management

Alien invasive species are among the key drivers of biodiversity loss worldwide, and their impacts are aggravated by climate change and land-use change. Species are considered alien if they are non-native to an ecosystem and considered invasive if harmful to the native ecosystems and people’s quality of life. Although this premise seems straightforward to some, concepts such as ‘non-native’ and ‘harmful’ remain contested, especially in a rapidly changing

world (Head et al. 2015). *Ecosystems and People* encourages contributions that highlight the interactions between land- and seascape management of invasive alien species and native biodiversity and NCP. We are keen to publish research on how invasive alien species interact with multiple values of nature, and how this can play a role in biodiversity management and policy.

Yapi et al. (2023) studied the perceptions and knowledge of local people in South African grasslands in relation to invasive alien plant species. Australian wattles are prolific invasive plants in such landscapes, and this was recognized by both commercial and communal farmers. The study found that their wood was used for construction and fencing, while their negative impacts related to land degradation and water loss. While there was agreement between commercial and communal farmers on ecosystem services and disservices, they differed strongly in their preferred management strategies to deal with these trees. Similar findings were provided by other studies from South Africa and Nepal, which dealt with the medicinal and firewood use of *Psidium guajava* (Ruwanza and Thondhlana 2022), and the interactions between climate change, invasive species and the use of non-timber forest products (Gurung et al. 2021).

Target 10: sustainable management in agriculture, aquaculture, fisheries and forestry

Understanding how to ensure sustainable food production while conserving biodiversity in managed ecosystems is key to people's quality of life. Sustainable use and regenerative management of biodiversity should become a goal of agricultural, aquacultural, fisheries, and forestry systems (DeClerck et al. 2023). We encourage submissions on regenerative land and sea use, sustainable food production, agro-ecological practices, and studies framed under the source to sea approach. Biodiversity is a key entry point to enable transformative change and facilitate agroecological transitions towards sustainable agriculture and food systems (Barrios et al. 2020). Studies that reveal the value of biodiversity in production systems and their contributions to people's quality of life, including cultural linkages are welcome. Moreover, we encourage contributions that consider multiple actors and governance systems, appraise Indigenous and traditional knowledge systems, and are based on participatory approaches that document knowledge co-creation and innovation processes, or conduct transdisciplinary analyses across food sectors and systems.

Guo et al. (2021) found that collective approaches are an effective way to promote sustainable food

production and that the recognition of values of current Indigenous farming practices may help maintain and achieve sustainable production in the long term. Fischer et al. (2021) found that livelihoods, access to resources, governance and equity are central when resolving challenges around food production and biodiversity, and social-ecological approaches are able to capture their complexity. Similarly, Manlosa et al. (2023) highlighted the importance of understanding the role of institutions in shaping food system transformations and how deliberate considerations of structure, agency and power, through transdisciplinary engagement processes, can mitigate harmful outcomes for those involved.

Target 11: restore, enhance and maintain nature's contributions to people

Ecosystems and People has a well-established body of papers on ecosystem services and NCP. We invite future work on NCP to be even more action-oriented from a practical conservation and land and sea management perspective. We particularly invite submissions that explore the implementation of knowledge about NCP in management and decision-making. Moreover, we welcome studies that analyse the spatial and temporal dynamics of NCP and use novel assessment methodologies, including participatory approaches that are open to Indigenous and local knowledge. Better understanding of the causal links between biodiversity, ecosystem processes and the coproduction of NCP in social-ecological systems is crucial to guide management decisions to maintain NCP. Moreover, NCP assessments that disaggregate beneficiaries are important in order to uncover equity dimensions of the use of NCP, in particular concerning the recognition of interests in NCP, but also the distribution of benefits and costs derived from a change in NCP provision.

Meacham et al. (2022) synthesised benefits derived from ecosystem service bundle analyses and identified that among the key issues concerning future ecosystem service bundle analyses are the choice of indicators, and the need to explore drivers of bundles and relationships between ecosystem services. Dade et al. (2022) looked into the decisive role of property rights to potential beneficiaries of timber production, drinking water use and recreational fishing in Adirondack Park, USA.

Target 12: green and blue urban spaces

In line with Target 12, we encourage submissions that unpack human-nature relationships in urban and peri-urban ecosystems, specifically the protection,

management, and restoration of ecosystems using green and blue spaces that equitably sustain and improve people's quality of life. We invite research focused on implementing nature-based solutions and their efficacy in green and blue urban spaces to promote NCP as a means to reduce biodiversity loss and improve connectivity of natural spaces. Crucial to Target 12 are relevant, replicable, and scalable monitoring and evaluation approaches to track the expansion of blue and green spaces in cities and across regions as well as equity measures to ensure fair access to ecosystem functions and NCP in urban spaces. Further, we provide space for work on the inclusive and participatory planning of new green and blue spaces, across timescales (i.e. short term strategies and actions and long term visions and scenarios) and knowledge systems that foster human-nature connectedness.

Through interviews and surveys, Aldana-Domínguez et al. (2022) assessed the relationships between ecosystems and people in a rapidly expanding metropolitan area in Barranquilla (Colombia), showing how urban and peri-urban ecosystem services were perceived and should be integrated into urban planning. Pertaining to the benefits of urban nature, Marquina et al. (2022) examined mushroom foraging in New York City, highlighting the need to consider multiple interconnected ecosystem services and associated relational values. With climate change, urbanisation, and projected demographic change in mind, Kabisch et al. (2021) applied multi-method field campaigns to assess the potential of urban parks to provide regulating and recreational ecosystem services, providing recommendations for local urban green space planning in Leipzig, Germany.

Target 14: mainstreaming biodiversity and its multiple values

The recent IPBES Assessment Report on the Diverse Values and Valuation of Nature (Pascual et al. 2022) found that mainstreaming the multiple values of biodiversity still remains one of the knowledge gaps in nature valuation (Termansen et al. 2022), leading to narrow policy decisions based on instrumental, monetary values (Pascual et al. 2022). We call here for a plural valuation of biodiversity that moves beyond merely monetary values and anthropocentric worldviews, and rather considers the multiple ways by which nature matters to people – i.e. instrumental, intrinsic, and relational values (Díaz et al. 2015; Pascual et al. 2017). To do so, valuation of biodiversity needs to (1) move beyond applying one valuation technique that only articulates one value type, (2) avoid reducing all values to a single metric, and (3) consider multiple social actors, including those historically marginalised (Martín-López 2023).

By applying the IPBES values framework in a spatial manner to elicit the values of grasslands in Bavaria (Germany), Schmitt et al. (2022) found that relational values resonate more than instrumental and intrinsic values. Moreover, Sandström et al. (2023) found that mainstreaming biodiversity and its multiple values into sectoral policies has the potential to improve biodiversity conservation and to sustain the delivery of NCP.

Target 22: representation and participation of Indigenous Peoples and local communities

We call for contributions that study how diverse peoples, their cultures and knowledge systems relate to biodiversity conservation and sustainable and regenerative use, particularly from research led by Indigenous Peoples and local communities. Non-extractive studies that elucidate and enable learning from Indigenous peoples' reciprocal relationships with the land are needed. As well, we welcome studies from decolonial and equity-driven perspectives that effectively deliver biodiversity conservation. Experimental studies that give voice to non-academic actors, through transdisciplinary partnerships, using art-based methods and other means are welcome. Analyses of conservation projects that are in conflict with human rights are needed, particularly where findings can identify pathways towards reducing inequities and while increasing biodiversity protection.

Coelho-Junior et al. (2020) analysis uncovered how Brazil's policies on COVID-19 threatened Quilombola (Afro-Brazilian descendants of slaves who fled to forests) communities and the high biodiversity in their traditional territories. Pérez-Ramírez et al. (2021) explored how human-nature connectedness is key to establish principles of belonging, stewardship, and connections to nature between local communities. Burke et al. (2023) review of the scientific literature published in Spanish on biocultural approaches to sustainability identified that future research would benefit from greater attention to power relations and context-specific dynamics and that there is room to improve approaches and tools to promote the co-production of knowledge. Ardoin et al. (2022) showed how Community Listening Sessions can provide a safe space for challenging, high-social-cost discussions, about issues such as climate change, biodiversity loss, and socio-environmental equity.

Target 23: gender equity

We need a better understanding of the linkages between gender equity and the conservation and sustainable use of biodiversity in different social-

ecological and cultural contexts. *Ecosystems and People* encourages gender perspectives on policy and management of biodiversity and NCP. We are interested in work that unpacks the impact of gender on the equitable access to and distribution of the benefits derived from the sustainable use of NCP and on the costs of management decisions (including potential gender-differentiated impacts on livelihoods from land/sea use restrictions through conservation measures). Studies are welcome that analyse how knowledge, interests, needs and values differ between genders and how such insights can be useful for decision-making leading to the protection of biodiversity and its sustainable use. Moreover, knowledge is needed on how to best ensure support of and commitment of all genders to conservation. We also need to know more about the factors that enable participation of different genders in biodiversity conservation. *Ecosystems and People* welcomes studies that analyse the impact of empowering women in land and natural resource management (access to resources, equal voice in decision-making processes, capacity building) on achieving more sustainable use

of ecosystems and biodiversity. The journal also welcomes studies with an intersectional perspective, which consider the potential impacts of factors such as ethnicity, age, culture, and disability on biodiversity conservation.

Recent work in the journal has only started to address some of these questions. In their review on Indigenous and local knowledge, Burke et al. (2023) synthesised evidence of gendered knowledge, highlighting among others the knowledge of women on the use of biodiversity such as mushrooms or fruit seeds, on food rituals and the management of agrobiodiversity. In addition, Huertas Herrera et al. (2023) found in a social media analysis that men filmed significantly more exotic fauna than women, while for native fauna such differences were not observed.

Conclusion

In closing, the GBF represents both a challenge and a promising opportunity to advance a biodiversity conservation agenda in ways that enhance quality of

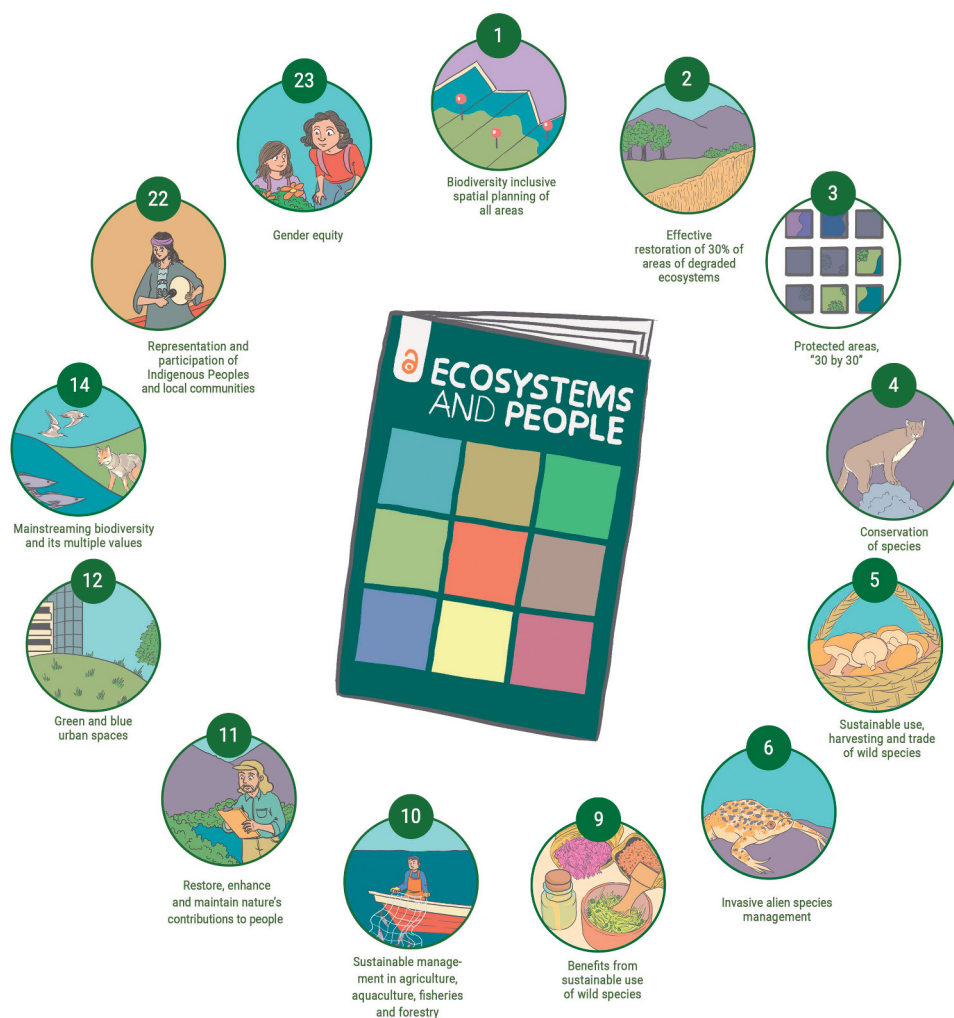


Figure 2. 13 Targets of the Kunming-Montreal Global Biodiversity Framework which are of particular relevance for *Ecosystems and People*. Figure design: Francisca Carcamo (<https://www.panchulei.com>).

life. We have pointed our readers and authors to some specific leverage points within the GBF and its implementation, on which we hope to contribute, as a journal and a community (Figure 2).

By highlighting recent findings from *Ecosystems and People* which are relevant to the conversation, and by stimulating such contributions in the future, we hope to continue to advance the debate, raise awareness, and contribute to the creation of robust knowledge and means of implementation needed for reaching the GBF targets. For the past five years, since the change in name and scope, *Ecosystems and People* has been the home for a community of diverse scholars that have provided empirical and theoretical, inter- and transdisciplinary insights to help advance the established targets. Our diverse editorial board will continue to build on this trajectory towards these and other imminent knowledge gaps and blind spots which are pivotal for the effective and equitable implementation of the GBF. We encourage authors to even stronger highlight the policy and practice implications of their findings for conservation and land management in light of the new global biodiversity targets.

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