Technical Note

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PROTECTED AND CONSERVED AREAS: VITAL SOLUTIONS FOR BIODIVERSITY, CLIMATE, AND HUMAN HEALTH

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KEY MESSAGES

Protected and conserved Areas are vital solutions to a range of critical global problems. They are fundamental in avoiding the loss of biodiversity, are essential contributors to mitigating and adapting to climate change and are the first line of defence in avoiding future pandemics. Dramatically increasing the quality and quantity of protected and conserved areas is essential for a nature positive world that benefits people.

Nature and its vital contributions to people, termed biodiversity and ecosystem functions and services, are deteriorating worldwide (Diaz et al. 2018), with twenty-five per cent of assessed animal and plant species considered threatened. Climate change threatens to make our planet unliveable for humanity. Pandemics of Zoonotic disease are increasing in frequency, killing millions, and disrupting human societies.

These global crises are deeply interrelated. This technical note examines the scientific evidence that protected and conserved areas (called other effective area-based conservation measures or OECMs under the Convention on Biological Diversity) contribute as vital solutions to these pressing global problems (see Figure 1).

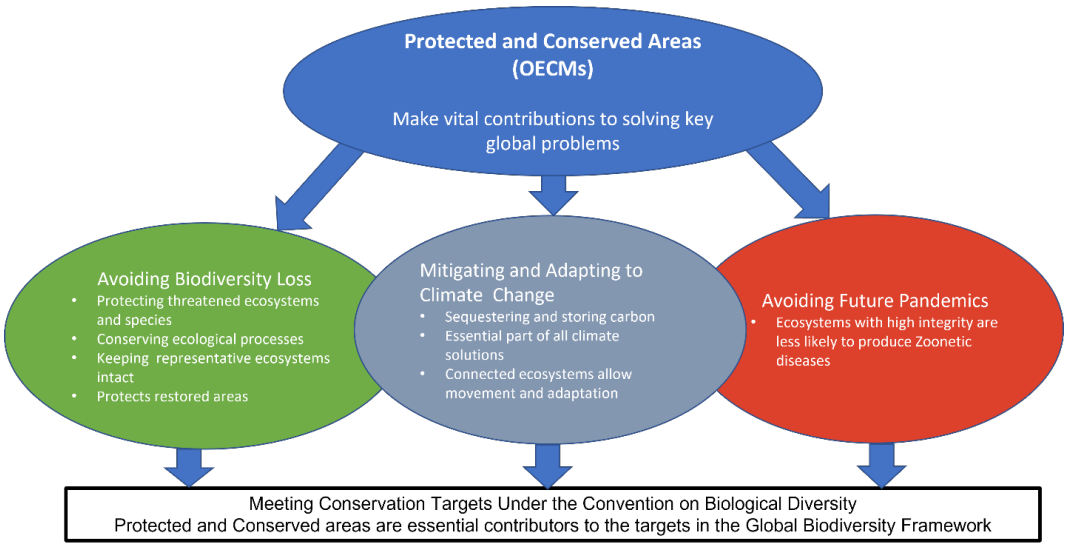

Figure 1. *Protected and conserved Areas support solving the critical challenges of biodiversity loss, mitigating, and adapting to climate change and avoiding future pandemics.*

Connection to the Convention on Biological Diversity (CBD)

The evolving Global Biodiversity Framework of the CBD includes several targets that are particularly relevant to solving these critical global problems. All these targets contribute to Goal A on the conservation of biodiversity (*note—the Target texts below are abbreviated summaries of current negotiations*):

- Target 1: Ensure that all land and sea areas globally are under integrated biodiversity-inclusive spatial planning addressing land- and sea-use change, retaining existing intact and wilderness areas.
- Target 2: Ensure that at least 20% of degraded freshwater, marine and terrestrial ecosystems are under restoration, ensuring connectivity among them and focusing on priority ecosystems.
- Target 3: Conserve at least 30% globally of land freshwater and marine areas in protected areas and other effective area-based conservation measured that are effectively managed and equitably governed.
- Target 4. Ensure active management actions to enable the recovery and conservation of species and their genetic diversity
- Target 8: Minimize the impact of climate change on biodiversity, contribute to mitigation and adaptation through ecosystem-base approaches.
- Target 12: Significantly increase the area, quality, and benefits from green and blue spaces in urban areas, ensuring biodiversity-inclusive urban planning, enhancing native biodiversity, ecological connectivity, and integrity, and improving human health and well-being and connection to nature.
- Target 21: Ensure the full, equitable, inclusive, effective and gender-responsive representation and participation in decision-making, and access to information related to biodiversity by Indigenous peoples and local communities.

All these targets focus on some aspect of area-based nature protection, with Target 3 focused exclusively on protected areas and OECMs. The science is robust that we need a dramatic increase in both the quality and quantity of area-based nature conservation (Woodley et al. 2019). The need is clear, humanity's future is at stake.

Area-based Conservation is Essential to Halt and Reverse Biodiversity Loss

Key Messages:

- **There are significant and ongoing declines in natural ecosystem area, ecological integrity, species abundance and genetic diversity.**
- **Biodiversity creates the ecosystem services on which all humans depend—the fate of humanity is tied to the fate of biodiversity.**
- **Protected and conserved areas are effective in conserving biodiversity when they are well designed, effectively managed and equitably governed.**
- **Conserving at least 30% of the Earth will not occur without the leadership of, and support for, Indigenous people and local communities.**

Why Protected and Conserved Areas?

A key objective of the CBD is the conservation of biological diversity. Under the CBD, the developing Global Biodiversity Framework (GBF) identifies direct (e.g., habitat destruction and degradation, direct exploitation, invasive alien species, pollution, and climate change) and indirect drivers of biodiversity loss (e.g., human population size, economic growth, subsidies, food consumption). By mitigating land and sea-use change (see Figure 2), protected and conserved areas are key solutions to the most significant cause of biodiversity loss, namely habitat destruction and degradation. They can also play a critical role in mitigating other causes of biodiversity loss, specifically overexploitation, invasive alien species and even climate change.

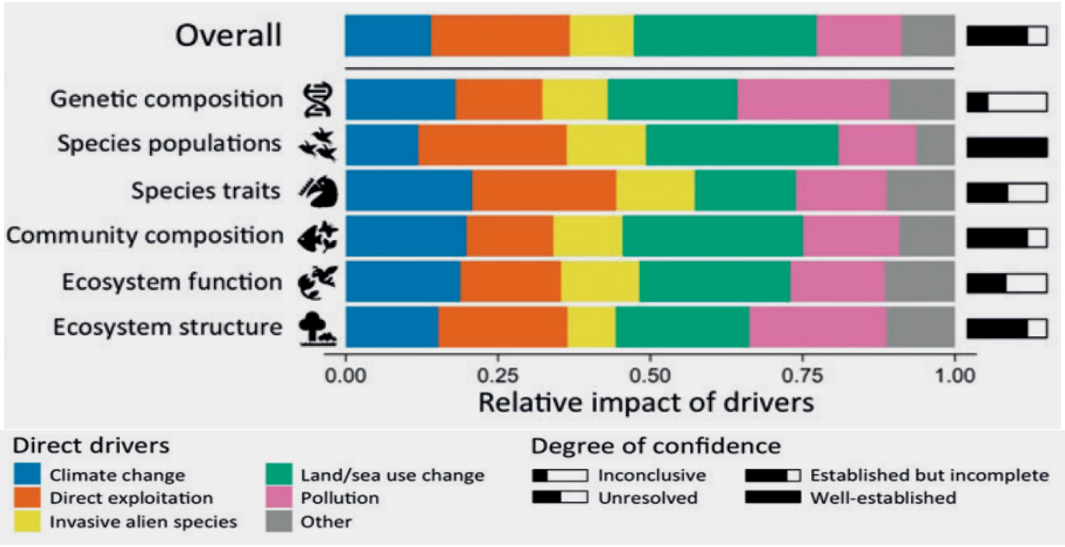

Figure 2. *Relative importance of drivers across facets of biodiversity (from IPBES GA Figure 2.2.22). Confidence levels in attribution are indicated by the black bars. The green bars represent land/sea use change.*

Evidence that protected areas work to conserve biodiversity

There is strong scientific evidence that protected and conserved areas can effectively conserve biodiversity (Barnes et. al, 2016, Geldmann et al. 2018, Langhammer et al, 2022). The challenge is that effectiveness results only when protected areas are well designed, effectively managed and equitably governed. These ideas are well expressed in the quantity and quality elements of draft Target 3 in the Global Biodiversity Framework of the CBD.

Parties made strong progress with achieving the percentage targets of the Aichi Target 11 but had far less success with quality elements (MacKinnon et al. 2021). Target 3 in the new Global Biodiversity Framework emphasises both quality and quantity.

Quantity

The target level of protecting ***"at least 30%"*** *of land, sea and freshwater* is well supported in the scientific literature as the lower limit for effective biodiversity conservation (Woodley et al. 2019, O'Leary et al. 2016). For example, protecting 30% of the land areas that contain the most important areas for biodiversity will conserve 81% of terrestrial species (Jung et al. 2021) and similar ranges have been assessed for ocean biodiversity (Zhao et al. 2020). Protected areas and OECMs are intended to protect a range of biodiversity and ecosystem values (e.g., species and ecosystems at risk, representativity, ecological viability, geographically restricted species, climate refugia, etc.). As more

values are included, the greater the area that needs to be protected, but focussing on quantity alone is not sufficient (Gurney et al. 2021, Obura et al. 2021, Dudley and Stolton, 2022).

Quality

- ***Areas of importance for biodiversity***—Strengthening and expanding current protected area networks need to focus on areas with important biodiversity values, increase representivity and be a more efficient and effective use of conservation resources (Butchart et al. 2015).
- ***Well-connected—***Ecological connectivity between protected areas and conserved areas is essential for the integrity of the sites, allowing daily and seasonal species movement, dispersal, and adaptation to climate changes (Hilty et al. 2020). Area-based conservation needs to move from being site-based to network-based, ensuring that together PAs and OECMs deliver effective networks (ibid).
- ***Effectively managed***—There is now considerable evidence that successful biodiversity outcomes at the site level are a result of effective management, including appropriate investment and staff capacity (Geldmann et al. 2018, Gill et al. 2017). Achieving Target 3 will require significant investments and capacity building in PAs and OECMs (Geldmann et al., 2021, Robson et al. 2021,
- ***Equitably governed***—There are legitimate concerns that increasing protection to 30% of land and sea area may displace or adversely impact Indigenous Peoples and local communities (IPLCs). Protecting at least 30% of the Earth will not occur without the leadership, support and partnership of Indigenous Peoples and local communities. Protected and conserved areas can provide enormous benefits at the local level, but they should be established and managed with due regard for human rights (Tauli-Corpuz et al. 2020). Conservation works best when it is equitable: based on full participation, shared and transparent decision-making, rights-based approaches, and fair benefit sharing (Borrini-Feyerabend et al., 2013) (**supporting Target 21**). The 30% target provides an opportunity to strengthen and recognize local governance, as well as security of tenure and support to IPLC-led conservation by demonstrating the global environmental values of such management.

The IUCN's Green list standard for protected and conserved areas (Hockings et al. 2019) is based on the evidence that positive biodiversity outcomes in protected and conserved areas require them to be well designed, equitably governed, and effectively managed.

Nature Conservation is Essential for Mitigating Climate Change

Key Messages:

- **Thirty % of the global increase in CO_2 has been caused by land and sea alteration and degradation**
- **Climate change and biodiversity loss are interrelated problems; the resolution of one requires the resolution of the other.**
- **Every pathway to limiting global warming below 1.5 °C includes nature conservation and restoration. Nature conservation is essential to solving the climate crises.**
- **Conserving and restoring nature are climate solutions that are rapid and cost effective.**

- **According to UNFCCC, Nature can provide 37% of cost-effective CO_2 mitigation—critical to Paris Agreement**
- **Terrestrial and marine ecosystems play a key role in regulating climate. They currently absorb half of manmade carbon emissions.**

Impact of abusing nature on Climate

The role of nature in the global carbon cycle is clear. Significant amounts of carbon are stored in soils, sediments and living biomass in terrestrial, coastal, and marine ecosystems (see Figure 3). For example, terrestrial ecosystems store about 2100 Gt of carbon in living organisms, litter, and soil organic matter: almost three times as much as is currently present in the atmosphere (Friedlingstein et al. 2020).

The global carbon cycle has been changed by burning fossil carbon, as well as causing massive degradation and transformation to global ecosystems. Since the Industrial Revolution, the destruction and alteration of global ecosystems have contributed 30% of the additional carbon now causing climate change. Without intact ecosystems (**supporting Target 8**), the climate problem would be far worse, as nature absorbs about 50% of the current global carbon emissions. Approximately 27% of anthropogenic CO_2 emissions are reabsorbed annually into the land surface (from forest regrowth and enhanced photosynthetic CO_2 uptake) and a further 22% of anthropogenic CO_2 emissions is estimated to be absorbed by the ocean (Friedlingstein et al. 2020).

When ecosystems are degraded, they release carbon, thereby contributing to the global climate problem. Currently logging, clearcutting, fires, and other forms of forest degradation account for 20% of all global CO_2 emissions (ibid). However, globally forests and peat lands are still a critical carbon sink (Harris et al. 2021), which are widespread from the boreal to the tropics.

Currently, 23.0% of ecosystem-based carbon is within protected areas. Half of Earth's ecosystem-based carbon is concentrated on just 3.3% of its land, highlighting opportunities for targeted efforts to increase global climate (see Figure 3). Some 33.6% ecosystem-based carbon is in the territories of Indigenous peoples and local communities, illustrating the need to support conservation led by Indigenous and local communities.

The UNFCCC COP 26 meeting in Glasgow pledged to halt and reverse deforestation by 2030 (https://ukcop26.org/glasgow-leaders-declaration-on-forests-and-land-use/). The Glasgow Climate Pact, recognized the importance of protecting, conserving, and restoring nature and ecosystems to achieve the Paris Agreement temperature goal, including through forests and other terrestrial and marine ecosystems acting as sinks and reservoirs of greenhouse gases and by protecting biodiversity, while ensuring social and environmental safeguards. The draft CBD Global Biodiversity Framework's **Target 8** calls on Parties to "Minimize the impact of climate change on biodiversity and contribute to mitigation and adaptation."

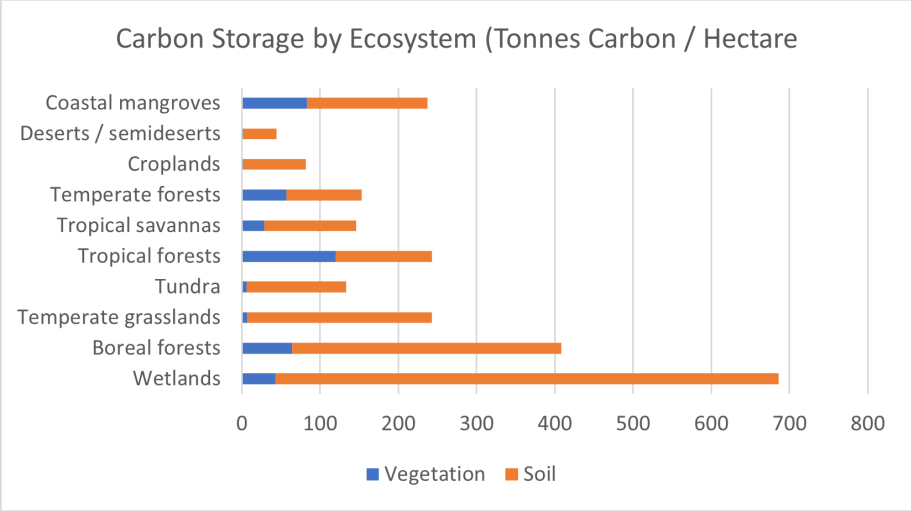

Figure 3. *Average Carbon stored by Ecosystem Type. (Data source IPCC, 2019) Focusing some protected and conserved areas where carbon richness and important biodiversity areas overlap can have important benefits for conserving carbon.*

In addition to protecting existing intact ecosystems, ecological restoration (**Target 2**) is a key part of the solution for both biodiversity loss and climate change. The draft Global Biodiversity Framework calls for 30% land, sea and inland water to be in protected and conserved areas by 2030 (**Target 3**) and a further 20% of degraded lands to be restored (**supporting Target 2**). These targets are both significant contributors to meeting the GBF's **Goal A** (Halting Biodiversity Loss). Strassburg et al. (2020) found that focused ecosystem restoration of only 15% of converted lands in priority areas could avoid 60% of expected species extinctions while sequestering 30% of the total CO_2 increase in the atmosphere since the Industrial Revolution." In addition to the benefits to climate and biodiversity, this level of restoration would increase adaptive capacity for hundreds of millions of people.

There are optimal solutions to protecting both carbon and biodiversity. For example, Jung et al. (2021) optimized a global solution that minimizes the number of threatened species (**supporting Target 4**), carbon retention and ecosystem services. They found that selecting 30% of terrestrial land area would conserve respectively 60.7% of the estimated total carbon stock, and 66% and 89.8% of all clean water, as well as meet conservation targets for 57.9% of all species considered. If priority was given to biodiversity only, managing 30% of optimally located land area for conservation may be sufficient to meet conservation targets for 81.3% of the terrestrial plant and vertebrate species considered. So, deciding where to place protected and conserved areas can benefit both climate and biodiversity.

Nature Conservation Diminishes the Likelihood of Pandemics

Key Messages:

- **Converting and degrading natural ecosystems are major drivers of zoonotic pathogen spillover from wildlife to humans.**
- **Protecting and restoring intact ecosystems decreases the chances of zoonotic disease spillover from wildlife to human populations.**
- **Protected and conserved areas with high ecological integrity help prevent the emergence of zoonotic diseases.**

A “one health” approach works to maintain the interconnected health of ecosystems, people, and livestock. By keeping healthy ecosystems in protected and conserved areas, we reduce the risk of zoonotic diseases spreading from wild nature to people and livestock. In addition, healthy nature provides countless benefits in the form of medicines, and physical mental health in people (**supporting Target 12**).

The World Health Organization estimates that 80% of humanity use natural medicines. Some 65% of new drugs for a wide variety of diseases come from nature (Newman and Craig 2020). Nature is fundamental to human health for medicines and well as the direct mental and physical health benefits of being in nature (Bratman et al. 2019). Visits to protected areas are effective ways to treat human illness, such as depression (Naidoo et al. 2019) (**supporting Target 12**).

Most (60%) human infectious diseases are zoonotic (Rahman et al. 2020), meaning they originated as transfers from animals to humans, often via human livestock. Emerging zoonotic disease, such as Covid 19, are a growing threat to human health, affecting billions of people and costing hundreds of billions of US dollars of economic damage in the past 20 years (Karesh et al. 2012). While there are many sources and many vectors for zoonotic diseases, there is strong connection with degraded ecosystems (Gibb et al. 2020). Maintaining healthy intact ecosystems reduces the likelihood and emergence of zoonotic disease (Reaser et al., 2022).

Land-use change has been linked to more than 30 per cent of new diseases reported since 1960 (IPBES, 2020). When ecosystems are degraded, the individual organisms remaining in those ecosystems become stressed and are much more likely to have reduced immune systems and become shedders of that pathogen. the probability of pathogens spreading in degraded ecosystems is higher than in intact ecosystems. This is the idea behind landscape immunity points to the need to manage ecosystems for intactness as one critical solution to avoiding future pandemics of zoonotic disease (Plowright et al. 2020). This chain of infect, shed, spill and spread is illustrated in Figure 4.

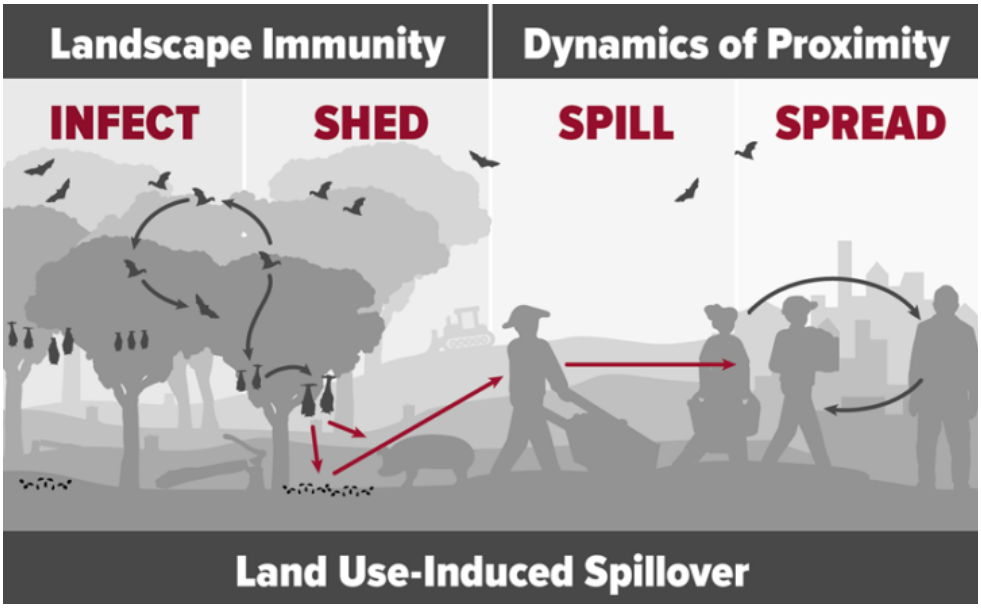

Figure 4. *Land-use induced spillover describes how ecosystem degradation drives both the infection and shedding of pathogens from wildlife and the dynamics of animal-human proximity. The infect-shed-spill-spread cascade is the beginning of a potential pandemic. (From: Reaser et al. 2022).*

Tropical rainforests are especially important sources of potential zoonotic disease, because of the high diversity of rodents, primates and bats, which are the mammalian groups that have been the main source of zoonotics (Allen et al., 2017). Tropical forests have suffered high rates of deforestation and fragmentation, which degrade these ecosystems. It is anticipated that tropical forest will drive more pandemic emergence in the future (Loh et al., 2015; Faust et al., 2018).

In response the global spread of COVID-19, there have been calls in both the scientific literature (Reaser et al. 2022) as well as government policy to increase landscape conservation as a disease prevention measure. A healthy natural environment is critical to human health, well-being, and prosperity globally and underpins sustainable development (2021 G7 Summit). Protected and conserved area work to minimize land degradation and increase the integrity of ecosystem, reducing the likelihood of future epidemics and pandemics. Protected and conserved areas can play an important role in preventing future disease outbreaks by maintaining ecosystem integrity (Dobson et al., 2020).

IUCNs World Commission on Protected Areas (WCPA) has taken a leadership role in promoting protected and conserved areas as part of a One Health approach.

Conclusion

Halting and reversing biodiversity under the CBD will require important work on all the targets of the global biodiversity framework. All targets are necessary and important. Protected areas and OECMs are well-developed approaches that can be effective in conserving nature, mitigating and adapting to climate change, providing cost effective health benefits to human societies and minimizing the likelihood of pandemics. Protected and conserved areas are proven effective nature-based solutions.

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