UN environment programme

CBD

Convention on Biological Diversity

Distr.
GENERAL

CBD/SBSTTA/24/INF/21
29 April 2021

ENGLISH ONLY

SUBSIDIARY BODY ON SCIENTIFIC,
TECHNICAL AND TECHNOLOGICAL ADVICE
Twenty-fourth meeting
Online, 3 May – 9 June 2021
Item 3 of the provisional agenda*

DETAILED SCIENTIFIC AND TECHNICAL INFORMATION TO SUPPORT THE REVIEW OF THE PROPOSED GOALS AND TARGETS IN THE UPDATED ZERO DRAFT OF THE POST-2020 GLOBAL BIODIVERSITY FRAMEWORK

Note by the Executive Secretary

I. INTRODUCTION

1. The post-2020 global biodiversity framework is due to be adopted by the Conference of the Parties at its fifteenth meeting. The Co-Chairs of the Open-ended Working Group on the Post-2020 Global Biodiversity Framework, together with the Executive Secretary, developed a "zero draft" of the framework, published in January 2020, as requested by the Working Group at its first meeting.[1] An "updated zero draft" was published in August 2020, in the light of the discussions of the second meeting of the Working Group.[2] A "first draft" will be prepared ahead of the third meeting of the Working Group, taking into account the outcomes of the twenty-fourth meeting of the Subsidiary Body on Scientific, Technical and Technological Advice and the third meeting of the Subsidiary Body on Implementation.

2. The Working Group at its second meeting invited the Subsidiary Body on Scientific, Technical and Technological Advice at its twenty-fourth meeting to carry out a scientific and technical review of the updated goals and targets, and requested the Executive Secretary to provide information to support that review. Accordingly, the present information document,[3] prepared in collaboration with the United Nations Environment Programme World Conservation Monitoring Centre and with the financial support of the United Kingdom of Great Britain and Northern Ireland, provides detailed scientific and technical information related to the proposed 2050 goals and 2030 targets of the updated zero draft of the post-2020 global biodiversity framework. The information in this document was used in the preparation of CBD/SBSTTA/24/3/Add.2/Rev.1 on scientific and technical information to support the review of the proposed goals and targets in the updated zero draft of the post-2020 global biodiversity framework.

* CBD/SBSTTA/24/1.

[1] CBD/WG2020/2/3.

[2] CBD/POST2020/PREP/2/1.

[3] This draft document was revised following a peer-review process and reissued as an information document for the Subsidiary Body on Scientific, Technical and Technological Advice at its twenty-fourth meeting.

3. In the present document,[4] for each proposed goal and target in the post-2020 global biodiversity framework, information[5] is provided on the rationale for having a goal or target on the issue being addressed, on the current status and trends of the issue and on a set of considerations related to the formulation of the proposed goal or target and general global level considerations for monitoring progress. Links between the proposed goals and targets are also discussed. More detailed proposals for monitoring implementation of the post-2020 global biodiversity framework, including a proposed monitoring approach, and a proposed set of headline, component, and thematic indicators are presented in document CBD/SBSTTA/24/3/Add.1. Additional information on indicators is available in document CBD/SBSTTA/24/INF/16. More detailed information on the links between the proposed goals and targets of the post-2020 global biodiversity framework and the Sustainable Development Goals is presented in information document CBD/SBSTTA/24/INF/12.

4. Given the mandate above and the role of the Subsidiary Body in the development of the post-2020 global biodiversity framework, the present document is not an assessment of the proposed formulation of the goals and targets in the updated draft of the post-2020 global biodiversity. Rather this document is meant to identify a range of scientific and technical issues, based on scientific literature, related to the proposed goals and targets which the Subsidiary Body may wish to consider when developing its advice on this issue. Terms included in this document reflect the wording of the proposed goals and targets and/or those used in the source materials referenced. References to time periods are used for illustrative purposes. Neither the terms nor the time periods included in this document should be interpreted as advocating for a particular approach in the post-2020 global biodiversity framework.[6]

II. SCIENTIFIC AND TECHNICAL INFORMATION RELATED TO THE PROPOSED GOALS OF THE POST-2020 GLOBAL BIODIVERSITY FRAMEWORK

Ecosystems, species, and genetic diversity:[7]

Goal A - *The area, connectivity and integrity of natural ecosystems increased by at least [X%] supporting healthy and resilient populations of all species while reducing the number of species that are threatened by [X%] and maintaining genetic diversity*

5. This proposed goal addresses all three levels of biodiversity: ecosystems, species, and genetic diversity. Here, they are examined in turn.

A. Ecosystems

6. The area, connectivity and integrity of ecosystems are essential for the protection of species and genetic diversity, ecosystem functioning and for the continued provision of ecosystem services (nature's contributions to people). This proposed element of the goal is thus indispensable to the achievement of the 2050 Vision for Biodiversity (Living in harmony with nature where, by 2050, biodiversity is valued, conserved, restored and wisely used, maintaining ecosystem services, sustaining a healthy planet and delivering benefits essential for all people).

---

[4] A previous version of this document was made available for peer review and the document has been revised in light of the comments received. Further the revision also took into account review comments received on document CBD/SBSTTA/24/3/Add.2 which has been revised and made available as document CBD/SBSTTA/24/3/Add.2/Rev.1. All of the comments are available from https://www.cbd.int/notifications/2021-012.

[5] Given the interconnections between the proposed goals and targets of the post-2020 global biodiversity framework, information has been included where it is most relevant in order to reduce repetition and limit the length of the text. However, some of the information under a given proposed goal or target may also be relevant to other goals and/or targets.

[6] The issue of baselines is further discussed in section III of document CBD/SBSTTA/24/3Add.1

[7] The text in this subsection is largely based on CBD/SBSTTA/24/INF/9 and Diaz et al (2020) Set ambitious goals for biodiversity and sustainability, Science 370, 411-413, https://doi.org/10.1126/science.abe1530. It also draws on the IPBES Global Assessment and the fifth edition of the *Global Biodiversity Outlook* and references therein. Additional references are indicated in the text for specific points.

7. Natural ecosystems are understood to be those whose species composition is predominantly native and determined by the climatic and geophysical environment.[8] An ecosystem is generally understood to have integrity when its dominant ecological characteristics (e.g. elements of composition, structure, function, and ecological processes) occur within their natural ranges of variation and can withstand and recover from most perturbations.[9] Ecological connectivity is important to maintain the integrity of ecosystems across otherwise fragmented patches.

Status and trends

8. The status and trends of ecosystems vary by ecosystem type and by geographic area. For example:

(a) The rate of deforestation was around 10 million hectares per year between 2015 and 2020, but with widely varying trends in different countries and regions of the world, and loss of tree cover from tropical primary forests has been particularly high in the second half of this decade.[10] Globally about 40% of forests have high landscape-level integrity.[11] Further a recent study of more than 130 million tropical forest fragments on three continents found that forest fragmentation was close to a critical point, beyond which fragments will greatly increase in number and reduce in size;[12]

(b) Between 2000 and 2012 the rate of deforestation of mangrove had substantially decreased at the global level but remained high in South-East Asia, where half of all mangroves are located;[13]

(c) The area covered by natural wetlands has reduced by an average of 35% worldwide between 1970 and 2015. Losses have been relatively greater in coastal areas than inland areas. Over the same period artificial wetlands increased by more than 233%. [14] A further study found that permanent surface water was lost from an area of almost nine million hectares between 1984 and 2015. Loss was greatest in the Middle East and Central Asia and was the result of drought, river diversion and damming and water withdrawals. Over the same period, new permanent bodies of water covering more than 18 million hectares have formed elsewhere, largely from reservoir filling. All continents except Oceania had a net increase in permanent water bodies; [15]

(d) Rivers are becoming increasingly fragmented, further threatening freshwater biodiversity. An assessment in 2019 of the connectivity status of 12 million kilometres of rivers globally found that only 37 per cent of rivers longer than 1,000 kilometres remained free-flowing over their entire length, and 23 per

[8] A potential indicator is extent of native vegetation compared to potential native vegetation which is the vegetation that would exist in a given location in the absence of human activities. Alternative terms, such as native vegetation, are also used.

[9] Indicators of ecosystem integrity may include the structure, function, and composition of an ecosystem relative to the pre-industrial range of variation of these characteristics. For further details see Hansen et al (2021). Towards monitoring ecosystem integrity within the Post-2020 Global Biodiversity Framework. https://doi.org/10.32942/osf.io/eyqw5

[10] FAO (2020) Global Forest Resources Assessment 2020: Main report. Rome. https://doi.org/10.4060/ca9825en

[11] Grantham et al (2020) Anthropogenic modification of forests means only 40% of remaining forests have high ecosystem integrity. Nature Communications 11, 5978. https://doi.org/10.1038/s41467-020-19493-3

[12] Taubert et al (2018) Global patterns of tropical forest fragmentation. Nature, 554(7693), 519–522. https://doi.org/10.1038/nature25508

[13] Hamilton and Casey (2016) Creation of a high spatiotemporal resolution global database of continuous mangrove forest cover for the 21st century (CGMFC-21). Global Ecology and Biogeography, 25: 729-738 https://doi.org/10.1111/geb.12449; Biodiversity Indicators Partnership (2020) CGMFC-21 - Continuous Global Mangrove Forest Cover for the 21st Century. https://www.bipindicators.net/indicators/cgmfc-21-continuous-global-mangrove-forest-cover-for-the-21st-century

[14] Darrah (2019). Improvements to the Wetland Extent Trends (WET) index as a tool for monitoring natural and human-made wetlands. Ecological Indicators, 99, 294–298. https://doi.org/10.1016/J.ECOLIND.2018.12.032; Biodiversity Indicators Partnership (2020). Wetland Extent Trends (WET) index https://www.bipindicators.net/indicators/wetland-extent-trends-index.

[15] Pekel, et al (2016). High-resolution mapping of global surface water and its long-term changes. Nature, 540(7633), 418–422. https://doi.org/10.1038/nature20584

cent flowed uninterrupted to the ocean.[16] Further a recent study concluded that more than half of the world's river basins were heavily impacted by human activities;[17]

(e) Multiple pressures threaten coral reefs. While overfishing and destructive fishing practices are the most pervasive and immediate drivers of loss, higher sea temperatures have led to an increase in mass coral bleaching, compounded by the impact of ocean acidification.[18] A recent analysis of coral bleaching over the last two decades, based on information from 3351 sites in 81 countries, found that the probability of coral bleaching has been increasing over time[19] and preliminary analysis in 2020 of long-term data trends from nearly 700 coral reef sites around the world shows a decline in the level of hard coral cover.[20] Further there has also been a significant shift in the composition of coral reef communities in many locations, away from faster growing species that create complex habitat for reef-dwelling species, and towards slower-growing corals more resistant to higher temperatures, but offering less niche-space to other species.[21] In addition, at a warming of 1.5°C a further decline of 70 to 90% in corals projected. Losses are greater still at a warming of 2°C;[22]

(f) An estimated 3.3 million square kilometres of wilderness has been lost since the early 1990s, accounting for nearly one tenth of the total wilderness remaining at that time. In this context, wilderness refers to landscapes that are largely intact and relatively free of human disturbance – although many are occupied by and essential for indigenous peoples and local communities. By 2015, less than one quarter of the Earth's land surface (23.2%) was estimated to remain as wilderness;[23]

(g) In the marine environment about 13% of the ocean have no or little impact from anthropogenic stressors and could therefore be described as wilderness. These areas are mostly located in the high seas. Further of this area only 4.9% is covered by marine protected areas.[24]

Considerations

9. Overall, both the extent and integrity of most natural ecosystems continues to decline, and these trends will continue under business-as-usual scenarios. This would lead to further extinctions, further reductions in the abundance of species populations and genetic diversity and continued decline in ecosystem functions and services (nature's contributions to people). In some cases, major disruptions in ecosystem functioning at

[16] Grill, G et al. 2019. Mapping the World's Free-Flowing Rivers. Nature 569(7755): 215–21. https://doi.org/10.1038/s41586-019-1111-9

[17] Su et al (2021) Human impacts on global freshwater fish biodiversity. Science 371, 835–838. https://doi.org/10.1126/science.abd3369

[18] IPBES (2019): Global assessment report on biodiversity and ecosystem services of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services. IPBES Secretariat, Bonn, Germany;

[19] Hughes et al (2017). Coral reefs in the Anthropocene. Nature, 546, 82-90 3. https://doi.org/10.1038/nature22901

[20] Although the decline is less than expected based on past studies on coral cover and reef health. This is likely due to a number of factors including the small number of datasets available from before the 1990s, the high level of regional variation and a tendency to select relatively healthy reef sites to begin monitoring programmes. For further details see GCRMN (2020) Status of Coral Reefs of the World Report, Global Coral Reef Monitoring Network. https://gcrmn.net/about-gcrmn/2020-global-report-status-coral-reefs/

[21] Jackson et al. (2014). Status and Trends of Caribbean Coral Reefs: 1970-2012. GCRMN/ICRI/UNEP/IUCN; Moritz et al (2018) Status and Trends of Coral Reefs of the Pacific. GCRMN; Obura et al. (2017). Coral Reef Status Report for the Western Indian Ocean. GCRMN/ICRI All available online at: www.gcrmn.net

[22] IPCC, 2018: Summary for Policymakers. In: Global Warming of 1.5°C. An IPCC Special Report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty. In Press.

[23] IPBES (2019): Global assessment report on biodiversity and ecosystem services of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services. IPBES secretariat, Bonn, Germany. https://ipbes.net/global-assessment; Watson, et al (2016). Catastrophic Declines in Wilderness Areas Undermine Global Environment Targets. Current Biology, 26(21), 2929–2934. https://doi.org/10.1016/J.CUB.2016.08.049

[24] Jones et al (2018). The Location and Protection Status of Earth's Diminishing Marine Wilderness. Current Biology: CB. 28. 2683. https://doi.org/10.1016/j.cub.2018.07.081.

regional scales is projected and the stability of the earth system could be compromised. However, other scenarios demonstrate that it is possible to reverse these trends and to achieve a substantial increase in the overall extent and integrity of natural ecosystems by 2050, which would help to protect species, genetic diversity and the provision of ecosystem services.

10. The world's terrestrial, marine, coastal, and freshwater habitats exist on a gradient from natural to highly managed. How these habitats are protected, managed, and/or restored will play a major role in reaching the 2050 Vision for Biodiversity.

11. To reach the 2050 Vision, a significant net increase in both area, connectivity, and integrity of natural ecosystems is needed. This will need to be achieved by avoiding further loss of natural ecosystems where possible, and otherwise by reducing current rates of loss elsewhere. It will also require and restoring both converted and degraded ecosystems to reverse overall trends. Models, scenarios and other studies suggest that an increase in the area of natural ecosystems of the order of 10 to 15 per cent, globally, across all terrestrial ecosystem types, by 2050 may be feasible.[25] A plausible pathway towards such an outcome requires that net gain, or at minimum no net loss, be achieved globally by 2030. A review of past conservation actions in the marine environment suggests that it would be possible to achieve a substantial recovery in the abundance, structure and function of marine biodiversity by 2050 if major pressures, including climate change, are addressed.[26] However, quantitative model based scenarios of such pathways are not currently available.

12. Ecosystem restoration will be an essential part of efforts to achieve this goal. For example, some estimates suggest that restoring 20% of terrestrial managed ecosystems to "natural" ecosystems could reduce the global terrestrial extinction debt (predicted future extinction based on current pressures) by up to 70%.[27] However, while restoration will be essential it also has limitations. For example, restoration outcomes generally result in ecosystems with lower diversity and functionality than undisturbed ones. Further, some ecosystems are not amendable to restoration activities in the time frame covered by the post-2020 global biodiversity framework. Given this, priority should be given to retaining existing natural areas. In particular, the loss of existing intact and wilderness areas, areas with high integrity and biodiversity value, rare or vulnerable ecosystems, those essential for planetary function, and those which cannot be restored should be avoided.

13. With regard to restoration, it should be noted that the recovery of ecosystem integrity, (including species diversity and abundance and communities of species interacting within ecosystems) lags behind recovery of ecosystem area. So, achieving no net loss in biodiversity by a certain date would require achieving no net loss in ecosystem area, connectivity, and quality at an earlier date. [28] Further net gain, or no net loss approaches, if not qualified, carry high risk of harmful outcomes. Thus, in accounting for net changes, safeguards would be needed, for example, among other things, to ensure that any loss is replaced by the same or similar ecosystems and that critical ecosystems and functions are not lost. Similarly, special consideration may be needed for ecosystems which are challenging or currently impossible to restore, such

[25] For example, see Leclère et al. (2020). Bending the curve of terrestrial biodiversity needs an integrated strategy. Nature. 585, 551–556 https://doi.org/10.1038/s41586-020-2705-y; Strassburg et al (2020). Global priority areas for ecosystem restoration. *Nature* 586:724–729. https://doi.org/10.1038/s41586-020-2784-9

[26] Duarte et al (2020) Rebuilding marine life. Nature 580, 39–51 (2020). https://doi.org/10.1038/s41586-020-2146-7

[27] Strassburg et al (2020) Global priority areas for ecosystem restoration. Nature 586, 724–729 (2020). https://doi.org/10.1038/s41586-020-2784-9

[28] Diaz et al (2020), Set ambitious goals for biodiversity and sustainability, Science, 370, 411-413, https://doi.org/10.1126/science.abe1530; Bull et al (2020) Net positive outcomes for nature. Nature Ecology and Evolution 4, 4–7. https://doi.org/10.1038/s41559-019-1022-z; Maron et al (2018). Bold nature retention targets are essential for the global environment agenda. Nature Ecology and Evolution 2, 1194–1195. https://doi.org/10.1038/s41559-018-0595-2.

as some marine ecosystems. In addition, the impacts of climate change may make the restoration of some types of ecosystems, such as coral reefs, particularly problematic.[29]

14. An effective network of protected areas and other effective area-based conservation measures (OECMs) will be an important tool in ensuring the extent and integrity of ecosystems. The areas and locations covered by protected areas and OECMS is as, if not more, important than the total size of land or sea covered. If protected areas and other effective area-based measures are not properly situated (i.e. are not representative and do not cover areas important for biodiversity) their impact on conservation may be limited (see also proposed target 2).

15. The outcomes of conservation and restoration activities for the abundance and diversity of species, genetic diversity and ecosystem functions and services strongly depend on location and the ecosystem being addressed. Spatial targeting is therefore essential to achieve synergies with other aspects of this goal. The identification of areas of particular importance for biodiversity (for example, Key Biodiversity Areas) can inform such spatial targeting. Further ecosystems are used for various purposes and provide a range of essential ecosystem services on which people depend. The demand for ecosystem services by people may at times compete with conservation and sustainable use objectives. Given this there will be a need to balance competing demands on ecosystems. Integrated land and sea use or ecosystem use planning (including marine spatial planning) will be an important tool in the effective management of these demands by helping to obtain maximum benefits from conservation and restoration while avoiding or managing trade-offs (proposed target 1).

16. The conservation and sustainable use of biodiversity is also important in areas beyond "natural" ecosystems, including in both rural and urban environments. Managed ecosystems, such as agricultural ecosystems, (those whose biotic composition is the result of deliberate manipulation by people), managed appropriately, are essential for ecosystem functioning and services and, while not a replacement for natural ecosystems, can provide important habitat for species and contribute to habitat connectivity Recent research suggests that maintaining 20% of native vegetation in managed ecosystems can support biodiversity conservation goals and provide useful services for agricultural production.[30]

17. The actions towards this proposed goal would contribute towards the attainment of a number of targets under the Sustainable Development Goals, including SDG Targets 15.1,[31] 15.2,[32] and 15.5.[33] Similarly actions towards this proposed goal could also contribute to reaching the commitments set out in the Paris Agreement adopted under the United Framework Convention on Climate Change and to land degradation neutrality under the United Nations Convention to Combat Desertification.

Monitoring

18. Monitoring progress towards this goal will require information on both the extent and integrity of natural ecosystems. Given the diversity of ecosystems which exist, their dynamics and the different pressures on them, information which can be disaggregated by ecosystem type and to different scales will likely also be necessary. Further gathering information for some ecosystems, such as marine ecosystems, may be particularly challenging and may necessitate additional efforts. In addition, information on ecosystem restoration could also help to monitor progress towards this goal. Information on the extent of natural ecosystems is available, particularly with advances in remote sensing. There is comparatively less

[29] For example, the restoration of coral reefs has so far been applied at small scales and with mixed success and high costs (estimated at US$ 400,000/hectare (2010 US$) (Bayraktarov, et al (2019), Motivations, success, and cost of coral reef restoration. Restoration Ecology, 27: 981-991. https://doi.org/10.1111/rec.12977;

[30] Garibaldi et al (2020). Working landscapes need at least 20% native habitat. Conservation Letters. https://doi.org/10.1111/conl.12773.

[31] By 2020, ensure the conservation, restoration and sustainable use of terrestrial and inland freshwater ecosystems and their services, in particular forests, wetlands, mountains and drylands, in line with obligations under international agreements.

[32] By 2020, promote the implementation of sustainable management of all types of forests, halt deforestation, restore degraded forests and substantially increase afforestation and reforestation globally.

[33] Take urgent and significant action to reduce the degradation of natural habitats, halt the loss of biodiversity and, by 2020, protect and prevent the extinction of threatened species.

information on ecosystem integrity. With regards to restoration, various initiatives track commitments in this respect, however there is limited comprehensive information on the outcomes of restoration activities and on the total area restored or under restoration. Information on the pressures on ecosystems and restored areas could also help monitor progress towards this target.

Links to other proposed targets

19. Proposed target 1, addressing land-/sea-use change, contributes directly to improving ecosystem area and connectivity as well as to ecosystem integrity while targets 4 – 7 addressing other direct drivers of biodiversity decline contributes to various aspects of ecosystem integrity, including species richness and composition. Proposed target 2 on area-based conservation would address most direct drivers for specific sites in particular land and sea areas. Proposed targets 3 and 8 would also support the attainment of this goal to the extent that actions to promote the management of wild species address issues related to the extent and integrity of ecosystems. Proposed targets 9, 10 and 11 would directly contribute to improving the integrity of managed ecosystems. Proposed targets 12-20 would contribute to all aspects of this goal by addressing the indirect drivers of biodiversity change.

B. Species

20. Maintaining, or where possible restoring, the diversity of species and ensuring that populations of species are healthy (i.e. demographically and genetically viable, allowing long-term survival and adaptability) is clearly indispensable to the achievement of the 2050 Vision. Further, conserving species diversity and abundance is essential for the integrity (functioning and composition) of ecosystems and contributes to the conservation of genetic diversity. In order to meet the 2050 Vision, it will be necessary to reduce both the extinction rate (i.e. prevent species extinctions) and the extinction risk (i.e. reduce the number of species threatened with extinction and improve the status of threatened species), as well as to maintain or improve the population abundances and the natural geographical extent of all species.

Status and trends

21. Three components tend to be considered together in determining the status of species: the number of extinctions, the number of species that are threatened with extinction, and the abundance of species. Each of these three components are further discussed below:

(a) *Extinctions* - Currently, the global species extinction rate is at least tens to hundreds of times higher than the average over the past 10 million years, and the rate is increasing. However, extinctions are difficult to measure, and it is likely that more extinctions during this time period will be confirmed in the future;

(b) *Trends of threatened species* - A key indicator for measuring species extinction risk is the Red List Index, which measures overall extinction risk for taxonomic groups that have been comprehensively assessed. The index has declined, indicating increased extinction risk, for all listed groups (birds, mammals, amphibians, warm-water reef-forming corals, cycads) and for all regions since 2000. However the rate at which bird species have declined has been reduced through conservation action by at least 40 per cent, mainly preventing critically endangered bird species from becoming extinct.[34] Some species have also improved in conservation status, such as the Guam Rail which was Extinct in the Wild but is now living in the wild once again after reintroduction.[35] However, overall about 1 million species (or 13 per cent) are currently threatened with extinction, although the extinction risk varies significantly across taxa.[36] For

[34] Monroe et al. (2019). The dynamics underlying avian extinction trajectories forecast a wave of extinctions. Biology Letters, 15(12), 20190633. https://doi.org/10.1098/rsbl.2019.0633.

[35] IUCN (2019) Species recoveries bring hope amidst the biodiversity crisis - IUCN Red List. https://www.iucn.org/news/species/201912/species-recoveries-bring-hope-amidst-biodiversity-crisis-iucn-red-list.

[36] IPBES (2019). Global assessment report on biodiversity and ecosystem services of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services. IPBES secretariat, Bonn, Germany. https://ipbes.net/global-assessment.

comprehensively assessed taxonomic groups the proportion ranges from 7 (for some bony fish groups) to 63 per cent (for cycads), averaging about 24 per cent;[37]

(c) *Trends in abundance* - All indicators suggest that species abundance is declining globally. For example the Living Planet Index, an indicator of average relative population abundance is declining globally, with a 68 per cent decline between 1970 and 2016, and a 32 per cent decline since 2000.[38] However, trends vary among taxa and locations, with some groups showing increases or no change.[39] In the marine environment a recent assessment, based on projections from coupled ecosystem and earth-system models, concluded that over the 21st century significant biomass changes are projected to occur in 40-57% of the global ocean with declines in 68% to 84% of these areas unless climate change is meaningfully addressed. The impacts of this projected loss would be particularly severe for coastal developing countries.[40]

22. While extinctions, threat status and abundance can be measured with available information and indicators, the taxonomic coverage of available information is dominated by vertebrates and there are taxonomic and geographical biases in the available data. Further there is comparatively little information on plant and invertebrate groups and there tends to be less information available on tropical ecosystems (see also proposed target 19). It also important to note that there are an estimated 8.7 million species, of which only about 1 million have been described by science, and therefore for the majority of species little is known.[41]

C*onsiderations*

23. Scenarios suggest that a plausible pathway towards the 2050 Vision is to prevent an increase in extinction rates in the coming decade and to reduce them progressively through 2050, towards being as close as possible to background levels by 2050.[42] Halting human-induced extinction completely by 2030 is likely not realistic, especially given that certain threats, such as climate change, will continue to intensify and there are unavoidable time lags associated with conservation action. In this regard, a target has been proposed whereby the extinction of described species across all major groups and ecosystem types be kept to well

---

[37] IUCN (2020). The IUCN Red List of Threatened Species. Version 2020-2. Summary Statistics. https://www.iucnredlist.org/resources/summary-statistics.

[38] WWF (2020). Living Planet Report 2020: Bending the curve of biodiversity loss. WWF, Gland, Switzerland. https://livingplanet.panda.org/en-us/. The Living Planet Index is a measure of the state of the world's biological diversity based on population trends of vertebrate species from terrestrial, freshwater and marine habitats. While not a direct measure of abundance it is an indicator of it. The Living Planet Index (LPI) is calculated using the geometric mean of relative abundance. In order to improve the taxonomic and geographic representativeness of the index, the current iteration of the index accounts for the estimated number of species within biogeographical realms, and the relative diversity of species within them. See: McRae L, Deinet S, Freeman R (2017) The Diversity-Weighted Living Planet Index: Controlling for Taxonomic Bias in a Global Biodiversity Indicator. PLoS ONE 12(1): e0169156. https://doi.org/10.1371/journal.pone.0169156.

[39] Leung et al (2020). Clustered versus catastrophic global vertebrate declines. Nature. https://doi.org/10.1038/s41586- 020-2920-6.

[40] Boyce et al (2020) Future ocean biomass losses may widen socioeconomic equity gaps. Nature Communications 11, 2235. https://doi.org/10.1038/s41467-020-15708-9.

[41] Mora et al (2011). How Many Species Are There on Earth and in the Ocean? Plos Biology. https://doi.org/10.1371/journal.pbio.1001127.

[42] There are different estimates of background extinction rate depending on the methodology used and the species considered. For example, some estimates suggest that the background rate of extinction is approximately 1 extinction per million species per year, while others suggest rates of around 0.1 extinctions per million years. For mammals the background rate of extinction has been conservatively estimated at 2 mammal extinctions per 10,000 species per 100 years and for plants the background rate of extinction has been estimated at 0.05 to .13 extinctions per million species per year. For further details see Pimm et al (2006). Human impacts on the rates of recent, present, and future bird extinctions. *Proceedings of the National Academy of Sciences* 103 (29) 10941-10946; https://doi.org/10.1073/pnas.0604181103; Ceballos et al (2015). Accelerated modern human–induced species losses: Entering the sixth mass extinction. *Science Advances* 1(5), e1400253. https://doi.org/10.1126/sciadv.1400253; Gray (2019). The ecology of plant extinction: Rates, traits and island comparisons. Oryx, 53(3), 424-428. https://doi.org/10.1017/S0030605318000315; Vos et al (2014). Estimating the Normal Background Rate of Species Extinction. Conservation Biology. 29. https://doi.org/10.1111/cobi.12380.

below 20 per year over the next 100 years.[43] However, where both the species at risk and the drivers of decline are known, extinctions can probably be avoided given sufficient political will and investment.[44] Consideration will also need to be given to what extent actions to reach this target should focus on known threatened species or known species more generally.

24. Scenarios also suggest that it would be feasible to reduce the proportion of species threatened with extinction in the wild by 2030 and aim to reduce extinction risk across all species by 2050. Efforts to reduce extinction rate and risk should prioritize evolutionary distinct species to conserve evolutionary lineages across the entire "tree of life,"[45] as well as species in ecological and functional groups that have globally relevant roles either because they intervene in regulating processes at the continental or larger scales, such as migratory species, or because they are locally important across a large number of ecosystems around the world.

25. In most cases the ecological role of species (community assemblage and ecosystem functioning, and in turn the generation of some ecosystem services) depends on its existence in locally sufficient number of species. The goal could aim to improve, or at least maintain current levels by 2030, and progressively increase the diversity and abundance and distribution of populations of species thereafter, towards 2050. This would require halting and reversing the currently ongoing decline of both threatened and common species. Efforts should prioritize retaining and restoring local population diversity, abundances and ranges of species that have particularly important functional roles in ecosystems and to avoid increases in the abundance and spread of invasive alien species.

26. With regard to abundance, the Living Planet Index suggests that a 68 per cent decline has occurred since 1970. To get back to the 1970 level by 2050, it will be necessary to incrementally increase the abundance once again.[46] However, recent work suggests that the Living Planet Index is strongly influenced by those species with the most extreme population declines or increases. For example, if the populations with most severe declines are excluded, the overall index shows a slight increase, whereas excluding the populations with most increases shows, the index has a decline of 71 per cent.[47] Other analysis indicates that removing the populations with the most extreme declines or increases (some 20% of the populations within the index) results in an estimated declined of 42% since 1970.[48]

27. Improving the status of threatened species to reduce extinction risk, and maintaining abundance of common species, will require that the various direct and indirect drivers of biodiversity loss be reduced. Species are mainly threatened by habitat loss linked to the expansion of agriculture and aquaculture, followed by unsustainable use (logging, hunting, and fishing). Business as usual is likely to exacerbate the effects of these threats. For example, an assessment of modelled expansion of agricultural lands projected that more than 17,000 species will lose their habitat by 2050 with 1,280 species losing more than a quarter of their

---

[43] Rounsevell et al (2020). A biodiversity target based on species extinctions. Science. 368. 1193-1195. https://doi.org/10.1126/science.aba6592.

[44] Bolam et al (2020). How many bird and mammal extinctions have recent conservation action prevented? Conservation Letters https://conbio.onlinelibrary.wiley.com/doi/10.1111/conl.12762.

[45] Gumbs et al (2021). The Post-2020 Global Biodiversity Framework must safeguard the Tree of Life. bioRxiv 2021.03.03.433783 https://doi.org/10.1101/2021.03.03.433783.

[46] WWF (2020) Living Planet Report -2020: Bending the curve of biodiversity loss. Almond, R.E.A., Grooten M. and Petersen, T. (Eds). WWF, Gland, Switzerland. The Living Planet Index (LPI) is calculated using the geometric mean of relative abundance. In order to improve the taxonomic and geographic representativeness of the index, the current iteration of the index accounts for the estimated number of species within biogeographical realms, and the relative diversity of species within them. See: McRae L, Deinet S, Freeman R (2017) The Diversity-Weighted Living Planet Index: Controlling for Taxonomic Bias in a Global Biodiversity Indicator. PLoS ONE 12(1): e0169156. https://doi.org/10.1371/journal.pone.0169156.

[47] Leung et al (2020) Clustered versus catastrophic global vertebrate declines. Nature. https://doi.org/10.1038/s41586-020-2920-6

[48] Robin Freeman (2020) The Living Planet Index – data analysis, clusters and biodiversity loss https://www.zsl.org/blogs/science/the-living-planet-index--data-analysis-clusters-and-biodiversity-loss.

habitat.[49] Other key threats include invasive species, pollution, and climate change.[50] Many of these issues are addressed by the proposed targets in the post-2020 global biodiversity framework. For example, proposed targets 1 and 4-7 address the direct drivers of species loss (land-/sea-use change, exploitation of organisms, invasive alien species, pollution, and climate change, respectively). However, once a species has declined to a small population size, stopping threats alone might not be sufficient to prevent extinction, because such species are more vulnerable to stochastic processes, such as disease outbreaks or extreme weather events, as well as the genetic diversity necessary for resilience and adaptation. In these situations, more targeted conservation, or management action (proposed target 3) may be necessary for species recovery. Conservation actions may include reintroductions, species recovery actions, and *ex situ* conservation. Recent analyses suggest that 37 per cent of threatened species in comprehensively assessed taxonomic groups will require such additional actions.[51] These types of intensive actions are known to have avoided extinction for 28 to 48 bird and mammal species since 1993, and 11 to 25 species since 2010.[52] It is therefore possible to prevent extinctions even over relatively short timeframes with concerted action. Further, as many species are affected by multiple pressures, many of which act in synergistic ways, integrated approaches may be needed to address them effectively.

28. Protected areas and other effective area-based conservation measures (proposed target 2) will also be essential elements in reaching this element of the goal. Further, proposed targets 12-20 would contribute to all aspects of this goal by addressing the indirect drivers of biodiversity change. This proposed goal is also related to target 15.5[53] of the Sustainable Development Goals.

29. Reaching this goal is likely to require the balancing of the protection of habitats, which is critical to avoiding extinctions, with other land uses and sea uses, including for food production. However, modelling work indicates it would be possible to achieve this, if demand is reduced to sustainable and healthy levels, and food waste is reduced.[54] Further, various tools to monitor the spatial extent of threats to species exist which can help to balance these demands.[55]

Monitoring

30. Three types of information can help to monitor progress towards this goal: the number of extinctions, the status and trends of threatened species, and the abundance of species. Information on these three issues is available. However, as noted above, there are gaps in taxonomic and geographic coverage that should be born in mind (see also proposed target 19). Further there are often time lags in collecting these types of information. Information on the protection of important habitats is also available and can provide an indication of conservation action for areas with high diversity.

Links to other proposed targets

31. Proposed targets1, and 4 – 7 addressing issues related to the direct drivers of biodiversity decline. Proposed target 2 on area-based conservation would address most direct drivers for specific sites and

---

[49] Williams, et al (2020) Proactive conservation to prevent habitat losses to agricultural expansion. Nature Sustainability https://doi.org/10.1038/s41893-020-00656-5.

[50] Bolam et al (202) Preventing extinctions post-2020 requires species recovery actions as well as transformative change. In review. Preprint at https://www.biorxiv.org/content/10.1101/2020.11.09.374314v1.

[51] IUCN (2019) Species recoveries bring hope amidst the biodiversity crisis - IUCN Red List. Available at https://www.iucn.org/news/species/201912/species-recoveries-bring-hope-amidst-biodiversity-crisis-iucn-red-list.

[52] Bolam et al. (2020) How many bird and mammal extinctions has recent conservation action prevented? Conservation Letters. https://doi.org/10.1111/conl.12762.

[53] Take urgent and significant action to reduce the degradation of natural habitats, halt the loss of biodiversity and, by 2020, protect and prevent the extinction of threatened species.

[54] Leclère *et al*. (2020) Bending the curve of terrestrial biodiversity needs an integrated strategy. Nature, 585(7826), pp.551-556. https://doi.org/10.1038.

[55] Mair *et al*. (2021) Measuring spatially-explicit contributions to science-based species targets. Nature Ecology & Evolution (Accepted).

proposed target 3 and 8 are directly related to species management. Proposed targets 12-20 would contribute to all aspects of this goal by addressing the indirect drivers of biodiversity change.

C. Genetic diversity

32. Genetic diversity is one of the three levels of biodiversity. It is critical for the long-term stability, adaptability and resilience of biodiversity, both at the species and ecosystem levels and also supports the continued provision of nature's contributions to people.[56] Genetic diversity underpins the overall health of species and ecosystems and it is the source of many of the benefits societies depend on, including for food and medicine. Maintaining genetic diversity is therefore indispensable to the achievement of the 2050 Vision

Status and trends

33. The genetic diversity of cultivated and farmed species, their wild relatives, and other socio-economically important species, is declining, but the extent of this decline and its overall impacts are not well understood.[57] Further, the rate of loss of intraspecific diversity (genetic and phenotypic) is believed to be many times greater than the rate of species loss.[58] A recent assessment has conservatively estimated that there has been a 6% decline in wild genetic diversity since the industrial revolution and this decline has been most severe for island species.[59] Another study found a 2% decline in the genetic diversity of overharvested populations of fish.[60] Further, temperature changes associated with climate change are projected to pose a significant threat to genetic diversity. [61]

34. While there is limited information on the status of genetic diversity of wild species, in comparison to what is available on species and ecosystems, the overall negative trends in biodiversity (including extinction risk, abundance, habitat loss and degradation as described above) suggest that it is in decline overall. [62] For example:

(a) The extinction risk of wild relatives of domesticated or farmed birds and mammals is increasing. A Red List Index covering 55 wild mammal and 449 wild bird species, related to 30 domesticated mammals and birds that are sources of food, showed a decline of 2% from 1988 to 2016, suggesting that on average these species are moving closer to extinction. Fifteen of the wild relatives (seven mammals and eight birds) are currently Critically Endangered, indicating that the status of the wild relatives of farmed animals could deteriorate rapidly unless action is taken to reverse their decline;[63]

(b) Wild plants useful for economic, social, or cultural reasons are in a poor state of conservation worldwide. An indicator recently developed to assess the conservation status of nearly 7,000 useful wild

---

[56] Des Roches et al (2021). Conserving intraspecific variation for nature's contributions to people. Nature Ecology and Evolution. https://doi.org/10.1038/s41559-021-01403-5; Stange et al (2021). The importance of genomic variation for biodiversity, ecosystems and people. Nature Reviews Genetics 22, 89–105. https://doi.org/10.1038/s41576-020-00288-7.

[57] FAO 2010. The Second Report on the State of the World's Plant Genetic Resources for Food and Agriculture. Rome. http://www.fao.org/3/i1500e/i1500e.pdf; FAO. 2015. The Second Report on the State of the World's Animal Genetic Resources for Food and Agriculture, edited by B.D. Scherf & D. Pilling. FAO Commission on Genetic Resources for Food and Agriculture Assessments. Rome - http://www.fao.org/3/a-i4787e/index.html).

[58] Des Roches et al (2021) Conserving intraspecific variation for nature's contributions to people. Nature Ecology and Evolution. https://doi.org/10.1038/s41559-021-01403-5.

[59] Leigh et al (2019) Estimated six per cent loss of genetic variation in wild populations since the industrial revolution. Evolutionary Applications 12(8). https://doi.org/10.1111/eva.12810.

[60] Pinsk and Palumb (2014). Meta□analysis reveals lower genetic diversity in overfished populations. Molecular Ecology, 23: 29-39. https://doi.org/10.1111/mec.12509.

[61]Theodoridis et al (2021) Exposure of mammal genetic diversity to mid□21st century global change. Ecography. https://doi.org/10.1111/ecog.05588.

[62]Miraldo et al (2016). An Anthropocene map of genetic diversity. Science. 353. 1532-1535. https://doi.org/10.1126/science.aaf4381.

[63] McGowan, et al (2019). Tracking trends in the extinction risk of wild relatives of domesticated species to assess progress against global biodiversity targets. Conservation Letters, 12(1), e12588. https://doi.org/10.1111/conl.12588.

plant species found that fewer than three per cent were sufficiently conserved either through protected areas (*in situ*), or in seedbanks or botanic gardens (*ex situ*);[64]

(c) More than 15% of species in a randomly selected sample of 1,500 fish were estimated to be threatened with extinction, resulting[65] while the abundance of sharks and rays has declined by 71% since 1970.[66] Further some aquacultural practices have been shown to have negative effects on wild populations.[67]

35. For domesticated breeds of livestock, the proportion categorized as at risk or extinct is increasing, indicating a decline in livestock diversity, but the rate of increase is slowing, suggesting that countries may be making some progress in safeguarding domesticated animals. Out of 7,700 local breeds (i.e. breeds occurring in only one country), 2,021 are considered to be at risk of extinction. However, for 4,351 of them, the risk status remains unknown due to a lack of data or updated data.[68]

Considerations

36. Significant progress has been made in the *ex situ* conservation of crops, that is the collection of seeds from different genetic varieties for cataloguing and storage for possible future use.[69] However, there has been less progress with *in situ* conservation, including through continued cultivation on farms, which allows for ongoing adaptation to changing conditions (such as climate change) and agricultural practices. As such this goal implies a need for continued efforts to conserve genetic diversity through *ex situ* techniques with greater attention to maintaining and safeguarding genetic diversity *in situ*.

37. It is important to address the genetic diversity of both wild and domesticated species. The genetic diversity of wild species provides the variation essential to maintain ecosystem stability and ensure benefits to people, and supports species survival and adaptation, linking explicitly to ecosystems and species. Domesticated species include all components of agricultural biodiversity (crops and livestock). Genetic variation across the gene pool, including wild relatives of crops and livestock is necessary to sustain food and nutrition security and production systems to cope with pests and disease, changing environmental conditions and climate change. It is essential that genetic diversity be conserved to allow the process of natural selection and evolution to continue, including on farm and *ex situ* for domesticated species.

38. It is important to conserve genetic diversity across all species. Determining precise quantitative targets for maintaining genetic diversity may be difficult, but current knowledge suggests a maintaining a minimum of 90 per cent of the genetic diversity within species (i.e. across populations of the same species) by 2050 would be consistent with the 2050 Vision.[70]

---

[64] Khoury et al (2019). Comprehensiveness of conservation of useful wild plants: An operational indicator for biodiversity and sustainable development targets. Ecological Indicators, 98, 420–429. https://doi.org/10.1016/J.ECOLIND.2018.11.016; CIAT (2020). An indicator of the conservation status of useful wild plants. https://ciat.cgiar.org/usefulplants-indicator/.

[65] Miranda et al (2020). Monitoring Extinction Risk and Threats of the World's Fishes based on the Sampled Red List Index. https://doi.org/10.21203/rs.3.rs-129206/v1.

[66] Pacoureau, et al (2021) Half a century of global decline in oceanic sharks and rays. Nature 589, 567–571. https://doi.org/10.1038/s41586-020-03173-9

[67] For example, see Bourret et al (2011). Temporal change in genetic integrity suggests loss of local adaptation in a wild Atlantic salmon (Salmo salar) population following introgression by farmed escapees. Heredity 106, 500–510. https://doi.org/10.1038/hdy.2010.165 and Hutchinson et al (2003). Temporal Analysis of Archived Samples Indicates Marked Genetic Changes in Declining North Sea Cod (Gadus Morhua)." Proceedings: Biological Sciences 270, no. 1529 (2003): 2125-132. https://doi.org/10.1098/rspb.2003.2493

[68] Food and Agriculture Organization of the United Nations (2020). Domestic Animal Diversity Information System (DAD-IS). http://www.fao.org/dad-is/en/; A more detailed breakdown of risk categories, as well as data on transboundary breeds, is available at http://www.fao.org/dad-is/trend-in-risk-status/en/

[69] World Information and Early Warning System on Plant Genetic Resources for Food and Agriculture (WIEWS) http://www.fao.org/wiews/en/

[70] CBD/SBSTTA/24/INF/9. This value is in line with suggested approaches for the protection of genetic diversity in agricultural crops and animals in zoos where the conservation of 95% and 90% of genetic diversity, respectively, has been suggested.

39. Population abundance is a key factor in the maintenance of genetic diversity, and there is generally a correlation between population size and the rate of loss of genetic variation.[71] However, population abundance on its own it is not a sufficient proxy for genetic diversity since it does not account for within-population genetic diversity, hence the need for genetic diversity to be explicitly included in the Goals.[72]

40. Progress towards this proposed goal would contribute to the achievement of SDG target 2.5.[73] Further, there are a number of international processes related to or addressing genetic resources. The work undertaken by and under the Food and Agriculture Organization of the United Nations, the Commission on Genetic Resources for Food and Agriculture, and the International Treaty on Plant Genetic Resources for Food and Agriculture is particularly important.

Monitoring

41. Directly monitoring the status and trends of genetic diversity globally is challenging given the current information and technologies which are available. However, ongoing technical advances in genomic analysis,[74] decreasing costs and better data stewardship, could allow for more frequent genetic monitoring to occur. While information on the genetic diversity conserved in gene banks can help to monitor progress towards this target, it would only provide a subset of the information required. Further, trends in abundance and extinction of species, in the absence of more direct global measures of genetic diversity, could be used as proxies to help track progress but would require careful interpretations as these would not account for within-population genetic diversity.

Links to other proposed targets

42. Actions to achieve this element of the goal are identified under the various proposed targets in the post-2020 global biodiversity framework. Proposed targets 1 and 4-7 address issues related to the direct drivers of biodiversity loss and would therefore contribute to the conservation of genetic diversity across all species. Protected areas and other effective area-based conservation measures (proposed target 2) would contribute to the *in situ* conservation of genetic diversity of wild species, including the wild relatives of domesticated species (especially if targeted measures are taken). In addition, species-specific management interventions (proposed target 3) are critical for the conservation of genetic diversity of many threatened species. These interventions include *ex situ* conservation measures that could be extended to include *ex situ* conservation of domesticated species. Proposed target 9 would directly contribute to the *in situ* conservation of genetic diversity of domesticated species while also contributing to agricultural and aquaculture productivity and sustainability. Proposed target 12 on access and benefit sharing would also provide incentives in support of this goal. Proposed targets 13-20 would contribute to all aspects of this goal by addressing the indirect drivers of biodiversity change. More generally, the conservation of genetic diversity *in situ* is usually regarded as preferable to ex situ conservation as it allows for natural evolutionary processes to continue and *ex situ* approaches may fail to capture the full range of genetic diversity. However, *ex situ* approaches are nonetheless essential in some situations, such as when a species is on the verge of extinction.[75]

---

[71] Hoban et al (2020). Effective population size remains a suitable, pragmatic indicator of genetic diversity for all species, including forest trees. Biological Conservation. 253. 108906. https://doi.or/10.1016/j.biocon.2020.108906.

[72] CBD/SBSTTA/24/INF/9.

[73] Maintain genetic diversity of seeds, cultivated plants, farmed and domesticated animals and their related wild species, including through soundly managed and diversified seed and plant banks at national, regional and international levels, and ensure access to and fair and equitable sharing of benefits arising from the utilization of genetic resources and associated traditional knowledge as internationally agreed.

[74] For example, see Tsuji et al (2020). Environmental DNA analysis shows high potential as a tool for estimating intraspecific genetic diversity in a wild fish population. Molecular Ecology Resources 20(5): 1248-1258. https://doi.org/10.1111/1755-0998.13165.

[75] McGowan et al (2017). IUCN Guidelines for Determining When and How Ex Situ Management Should Be Used in Species Conservation. Conservation Letters, 10: 361-366. https://doi.org/10.1111/conl.12285.

Nature's contributions to people[76]

Goal B - *Nature's contributions to people have been valued, maintained or enhanced through conservation and sustainable use supporting global development agenda for the benefit of all people*

43. Nature's contributions to people[77] (a concept similar to and inclusive of ecosystem services[78]) refers to all the contributions from biodiversity to people's wellbeing or quality of life. They include (a) material contributions, such as the production of food, feed, fibre, medicines, raw materials and energy, (b) regulating services, such as the regulation of air, soil and water quality, climate regulation, pollination, regulation of pests and diseases and provision of habitat, and (c) other non-material contributions, such as learning, inspiration, health, physical, psychological, spiritual wellbeing and experiences and supporting identities and culture, as well as maintaining options for the future generations. While all people depend on natures' contributions to people some groups are particularly dependent on them, including indigenous and local communities and people living in vulnerable situations. The need to maintain, and where appropriate, enhance nature's contributions to people provides a strong rationale for the conservation and sustainable use of biodiversity. They are also essential elements of the 2050 Vision and directly underpin most of the Sustainable Development Goals.

Status and trends

44. Spatial analysis of the provision and need for ecosystem services shows that nature's contributions to people, for example water quality regulation, coastal disaster risk reduction and pollination, are not evenly distributed across the world. Human needs also vary depending on the location. Where the two coincide, nature's contributions to people are highest. In some areas, however, people's needs and access to nature's contributions are not adequately met. The number of people who can benefit from nature's contributions to people depends not only on nature's ability to provide the benefit, but also on societies' ability to use them sustainably and to manage their distribution, fairly and equitably, within and between generations.[79]

45. Of the 18 categories of nature's contributions to people analysed in the IPBES *Global Assessment on Biodiversity and Ecosystem Services*, 14 have shown a consistent declining global trend over the past 50 years. These declines are the result of the overall decline in biodiversity at the ecosystem, species, and genetic level. Almost all of the categories relating to the regulation of environmental processes are in decline, suggesting that the capacity of ecosystems to sustain nature's contributions to people are being compromised. The only categories of nature's contributions to people showing an increasing trend are those relating to material benefits, such as the provision of food, feed, materials, and energy. However, the continued provision of these contributions may be compromised by the ongoing decline in ecosystems area, connectivity, and integrity as well as in the decline of the regulating services that support such provision. Further the demand for these material benefits may itself drive further pressure on biodiversity. Groups of

[76] The text in this subsection is largely based on CBD/SBSTTA/24/INF/9 and Diaz et al (2020), Set ambitious goals for biodiversity and sustainability, *Science*, 370, 411-413, https://doi.org/10.1126/science.abe1530, as well as the IPBES *Global Assessment*, GBO-5, and the references therein. Additional references are indicated in the text for specific points.

[77] IPBES defines nature's contributions to people (NCP) as: all the contributions, both positive and negative, of living nature (i.e. diversity of organisms, ecosystems, and their associated ecological and evolutionary processes) to the quality of life for people. Beneficial contributions from nature include such things as food provision, water purification, flood control, and artistic inspiration, whereas detrimental contributions include disease transmission and predation that damages people or their assets. Many NCP may be perceived as benefits or detriments depending on the cultural, temporal or spatial context.

[78] The Millennium Ecosystem Assessment defined ecosystem services as the benefits people obtain from ecosystems. These include provisioning services such as food and water; regulating services such as flood and disease control; cultural services such as spiritual, recreational, and cultural benefits; and supporting services, such as nutrient cycling, that maintain the conditions for life on Earth.

[79] Chaplin-Kramer et al (2019). Global modelling of nature's contributions to people. *Science* 366, 255–258. https://doi.org/10.1126/science.aaw3372.

people living in poverty and vulnerable situations are often most likely to suffer the impacts of declining contributions of nature.[80]

Considerations

46. Under business-as-usual scenarios declines in nature's contributions to people are projected to worsen with one assessment showing water quality regulation, coastal protection and pollination all significantly compromised by 2050. As a result, up to 5 billion people, largely in Africa and South Asia, would face higher water pollution and insufficient pollination for food and nutrition. Hundreds of millions of people across all continents would face heightened coastal risk. However, under scenarios of sustainable development, these negative trends could be reduced, eliminated or reversed.[81]

47. An ambitious goal for nature's contributions to people would, among other things, help to:

(a) Deliver greater food security for 4 billion people, including the 2 billion who remain hungry, the more than 500 million people who are highly dependent on fisheries, and the more than 150 million households harvesting wild meat;

(b) Deliver improved drinking water for about 600 million people currently dependent on untreated sources, enhance resilience for 75-300 million people at risk of coastal storms and 1 billion people living in floodplains;[82]

(c) Maintain the well-being of about 4 billion people who rely on natural medicines for their health care and the 50 per cent of the global population living in urban areas[83] as well as reduce the risk of the emergence of infectious disease;[84]

(d) Achieve the goals of the Paris Agreement.[85]

48. Progress towards this goal would contribute to the attainment of SDG Target 15.9 related to the integration of ecosystem and biodiversity values into national and local planning, development processes, poverty reduction strategies and accounts and vice versa.

Monitoring

49. Tracking progress towards this proposed target will require information on the extent to which biodiversity values have been reflected in various planning and decision-making processes. While some information on this issue is available, there is currently no globally comprehensive information available. In addition, most of the global information on the values of nature's contributions to people focuses on financial

---

[80] Dasgupta (2021). The Economics of Biodiversity: The Dasgupta Review HM Treasury. United Kingdom. https://www.gov.uk/government/publications/final-report-the-economics-of-biodiversity-the-dasgupta-review.

[81] Chaplin-Kramer et al (2019). Global modelling of nature's contributions to people. *Science* 366, 255–258. https://doi.org/10.1126/science.aaw3372.

[82]WHO (2019). https://www.who.int/news-room/fact-sheets/detail/drinking-water; Jeandron et al. (2019). Predicting quality and quantity of water used by urban households based on tap water service. *Clean Water* 2: 23. https://doi.org/10.1038/s41545-019-0047-9; Di Baldassarre et al (2013). Socio-hydrology: conceptualising human-flood interactions. *Hydrology and Earth System Sciences*, 17: 3295–3303. https://doi.org/10.5194/hess-17-3295-2013.

[83] Bodeker et al (2005). WHO. *Global Atlas of Traditional, Complementary and Alternative Medicine*. Geneva, Switzerland: World Health Organization. https://apps.who.int/iris/handle/10665/43108.

[84] United Nations Environment Programme and International Livestock Research Institute (2020). Preventing the Next Pandemic: Zoonotic diseases and how to break the chain of transmission. Nairobi, Kenya. https://www.unep.org/resources/report/preventing-future-zoonotic-disease-outbreaks-protecting-environmentanimals-and; IPBES (2020). Workshop Report on Biodiversity and Pandemics of the Intergovernmental Platform on Biodiversity and Ecosystem Services. IPBES secretariat, Bonn, Germany, https://doi.org/10.5281/zenodo.4147317.

[85] Griscom et al (2017) Natural climate solutions. Proceedings of the National Academy of Sciences 114 (44) 11645-11650; https://doi.org/10.1073/pnas.1710465114; Roe, S., et al (2019). Contribution of the land sector to a 1.5 °C world. *Nature Climate Change*. 9, 817–828. https://doi.org/10.1038/s41558-019-0591-9. Seddon et al (2021). Getting the message right on nature□based solutions to climate change. Global Change Biology. 27: 1518-1546. https://doi.org/10.1111/gcb.15513.

values. Information related to other types of values are not readily available in a form that can be easily analysed or tracked. Information on the number of people benefiting from nature's contributions could also be used to help track progress towards this target. However, consideration would need to be given to what type of contributions and values to monitoring as all people benefit from nature's contributions to some extent. Further, information on the amount of benefits to people from nature could be used to track progress and the 18 types of ecosystems services identified by the IPBES could provide a basis for this.[86]

Links to other proposed targets

50. Nature's capacity to continue delivering its contributions to people is reliant on the area and integrity of both natural and managed ecosystems and their constituent species and within-species genetic diversity and between-species phylogenetic diversity. Thus, actions to reach proposed targets 1 and 4-7, which address issues related to the direct drivers of biodiversity loss (respectively, land/sea use change, exploitation of organisms, invasive alien species, pollution and climate change), as well as the proposed targets on effective area-based conservation measures (target 2), will indirectly contribute to this Goal. Proposed targets 7-11 will directly contribute to realizing benefits to people from nature's contributions through nature-based solutions and ecosystem-based approaches to climate change mitigation and adaptation, disaster risk-reduction, sustainable management of wild species, sustainable agricultural ecosystems, regulation of air and water, and green and blue spaces. Proposed targets 12-20 would contribute to all aspects of this goal by addressing the indirect drivers of biodiversity change, and also by influencing the distribution of benefits. Further the number of people who can benefit from nature's contributions to people depends not only on nature's ability to provide benefits, but also on societies' ability to manage demand and the distribution of benefits. As such processes related to decision making (proposed target 20) will also be important.

Fair and equitable sharing of benefits from the utilization of genetic resources

Goal C - *The benefits, from the utilization of genetic resources are shared fairly and equitably*

51. The fair and equitable sharing of benefits from the utilization of genetic resources is one of the three objectives of the Convention on Biological Diversity[87] and the primary objective of Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization. A framework for the implementation of this objective of the Convention is provided in Article 15 of the text of the Convention while the Nagoya Protocol aims to further operationalize it. A number of additional international instruments and processes address this issue, including the International Treaty on Plant Genetic Resources for Food and Agriculture and the Commission on Genetic Resources for Food and Agriculture (see also proposed target 12). Further, there are ongoing discussions under the United Nations Convention on the Law of the Sea on an international legally binding instrument on the conservation and sustainable use of marine biological diversity of areas beyond national jurisdiction. Access and benefit-sharing (ABS) also provides an important incentive for the conservation and sustainable use of biodiversity. Hence ABS is an essential element in reaching the 2050 Vision for Biodiversity.

Status and trends

52. With a view to further enhancing the fair and equitable sharing of benefits from the utilization of genetic resources, Parties adopted a supplementary agreement in the Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization to the Convention on Biological Diversity. The Nagoya Protocol, which came into force in October 2014, provides a transparent legal framework for the effective implementation of the access and benefit sharing objective of the Convention. The Protocol addresses the benefits arising from their utilization of genetic resources and associated traditional knowledge by setting out core obligations for its Parties to take measures in relation to access, benefit-sharing and compliance. It aims to provides greater legal certainty and transparency for both

[86] IPBES is also undertaking a Methodological assessment regarding the diverse conceptualization of multiple values of nature and its benefits, including biodiversity and ecosystem functions and services. The assessment, which will be considered during IPBES's ninth session, will also be relevant.

[87] Article 2 (Objectives) of the Convention.

providers and users of genetic resources, helps to ensure benefit-sharing, in particular when genetic resources are accessed or removed from a provider country and establishes more predictable conditions for those wanting to access genetic resources.

53. Information on the benefits derived from ABS agreements is limited. Looking specifically at the Nagoya Protocol, 27 Parties have reported having received benefits from granting access to genetic resources and/or associated traditional knowledge for their utilization, and some of those benefits are contributing to the conservation and sustainable use of biodiversity. Given that the benefits received take various forms (monetary and non-monetary), and that often the content of the ABS agreements are confidential, it is not currently possible to put an overall value on the total amount of benefits shared.

54. With respect to the International Treaty on Plant Genetic Resources for Food and Agriculture, which facilitates access to plant genetic resources for farmers and plant breeders to develop new crop varieties and adapt agricultural production to a changing environment, over 5.5 million samples have been transferred globally, through more than 76,000 contracts known as Standard Material Transfer Agreements by February 2020.[88] The benefit-sharing fund under the Treaty has, to date, dispersed over US$ 26 million , through 80 projects in 67 developing countries, also providing non-monetary benefits and supporting conservation and sustainable use of plant and assisting farming communities in developing countries to improve food security by helping them cope with climate change and other threats to food production.[89]

55. In recent years progress has also been made under a number of other international bodies and initiatives to extend access to genetic resources and the fair and equitable sharing of benefits from their utilization. For example work by the Intergovernmental Conference on the Conservation and Sustainable Use of Marine Biodiversity of Areas Beyond National Jurisdiction (BBNJ),[90] work under the Pandemic Influenza Preparedness Framework for the Sharing of Influenza Viruses and Access to Vaccines and Other Benefits[91] are also relevant to ABS issues.

56. Information on benefits shared is sparse. it is likely a very small proportion of the total revenues of the relevant sectors. For context, as of 2019, the global seed market is valued at about US$ 60 billion[92] and the total global pharmaceutical market at about US$ 1.25 trillion.[93] However, these figures are inclusive of costs including development costs which can be considerable. Corresponding information on profits is not publicly available. Further almost three-quarters of new drugs are either derived from or are synthetic mimics of a natural products, though not all of these necessarily relate to the use genetic resources under the Convention.[94]

---

[88] International Treaty on Plant Genetic Resources for Food and Agriculture - http://www.fao.org/plant-treaty/en/

[89] Information on the funds dispensed from the ITPGRFA Benefit Sharing Fund in individual countries is available at: http://www.fao.org/plant-treaty/areas-of-work/benefit-sharing-fund/overview/en/.Information on non-monetary benefits (technology transfer, capacity building, information exchange, etc.). is available at https://www.bioversityinternational.org/e-library/publications/detail/non-monetary-benefit-sharing-mechanisms-within-the-projects-funded-by-the-benefit-sharing-fund/

[90] Intergovernmental Conference on the Conservation and Sustainable Use of Marine Biodiversity of Areas Beyond National Jurisdiction https://www.un.org/bbnj/.

[91] Pandemic Influenza Preparedness (PIP) Framework. https://www.who.int/influenza/pip/en/.

[92] Businesswire (2021) https://www.businesswire.com/news/home/20200206005534/en/Global-Seed-Market-2020---This-Market-was-Worth-a-Value-of-USD-61.50-Billion-in-2019---ResearchAndMarkets.com (accessed 29/01/21).

[93] Statista (2021) https://www.statista.com/statistics/263102/pharmaceutical-market-worldwide-revenue-since-2001/ (accessed 29/01/21).

[94] Of the new drugs developed between 1981 and 2019 18.4% were biological, 3.8% were natural, 0.8% were a natural botanical product, 18.9% were derived from a natural product but with a semisynthetic modification, 11.5% were a synthetic natural product mimic, 3.2% were synthetic but with a pharmacophore that was from a natural product, 11% were synthetic but with a pharmacophore that was from a natural product and a natural product mimic and 7.5% were a vaccine. For further details, see Newman and Cragg (2020), Natural products as sources of new drugs over the nearly four decades from 01/1981 to 09/2019. Journal of Natural Products. 83, 770-803. https://doi.org/10.1021/acs.jnatprod.9b01285.

Considerations

57. The main action required to reach this goal will be putting in place necessary mechanisms and processes to enable the benefits from the utilization of genetic resources to be shared fairly and equitably. The first assessment and review of progress in the implementation of the Nagoya Protocol revealed that Parties and non-Parties to the Protocol are at various stages in these processes (see also propose target 12). Currently the Nagoya Protocol is fully operational in about 87 countries, meaning that they have put in place national access and benefit sharing measures and established competent national authorities. Further, about 25 countries which are not currently Party to Nagoya Protocol have put in place some form of access and benefit sharing measures. Currently, about 40% of countries currently either do not have any form of access and benefit sharing mechanisms in place or have not provided information to the Convention on them. Given this, this proposed goal implies that some countries would need to create or establish ABS mechanisms while for other countries in may entail modifying or further implementing existing mechanisms to ensure their effectiveness. Another important consideration is that some countries are primarily providers of genetic resources and/or associated traditional knowledge and others are mostly users or have decided not to require prior informed consent for access.

58. As noted above information on the benefits derived from access and benefit sharing agreements is limited. As such this proposed goal implies a need for additional reporting on the benefits shared through ABS processes. In addition, given that reporting processes on this issue have already been established under the Nagoya Protocol, consideration should also be given to how any additional efforts can complement and build on these efforts and not detract from or duplicate them.

Monitoring

59. As noted above, information on the benefits provided through access and benefit sharing is limited however information on this will be required to monitor progress towards this proposed goal. Given that the benefits derived from the access and use of genetic resources and associated traditional knowledge can take various forms, including monetary and non-monetary benefits, consideration will need to be given to how information on the different types of benefits can be collected in consistent way and in a way which allows information to be aggregated. The Internationally Recognized Certificates of Compliance published in the ABS Clearing-House offer relevant information in this respect. Further, given that the contents of ABS agreements are often confidential consideration needs to be given to how such information could be accessed or used when reporting on the benefits being shared.

Links to other proposed targets

60. Proposed Target 12 on ABS measures directly contributes to achieving this Goal. Further proposed targets related to the integration of biodiversity values in planning processes (target 13), improving biodiversity information (target 19) and more equitable decisions making (target 20) would indirectly support the achievement of this goal by helping to create an enabling environment.

Means of implementation

Goal D - *Means of implementation are available to achieve all goals and targets in the framework*

61. The post-2020 global biodiversity framework will need to be implemented primarily through activities at the national and/or subnational levels, with supporting action at the regional and global levels. The capacity for implementing the Convention in terms of human, technical and financial resources is limited in most countries, especially in developing countries, in particular the least developed countries and small island developing States, as well as countries with economies in transition. The limited means of implementation has been frequently noted by Parties as an obstacle to the implementation of the Convention. Reaching the 2050 Vision for biodiversity will require that the necessary means of implementation are available to enable Parties and stakeholders to undertake the necessary actions. These means of implementation will be required throughout the life of the post-2020 global biodiversity framework at level commensurate with the ambition of the other goals.

Status and trends

62. There are multiple means of implementation, including financial resources, capacity-building, technology transfer, the sharing of knowledge, experiences and lessons learned, and partnerships. All of these means of implementation will be required for the effective implementation of the post-2020 global biodiversity framework.

63. The majority of global level information on means of implementation focuses on financial resources (see proposed target 18). Current global biodiversity finance is of the order of US$ 100 billion per year, while estimates of funding needs for a comprehensive post 2020 global biodiversity framework are of the order of US$ 800 billion per year, giving a funding gap of the order of US$ 700 billion per year. These estimates include not only the costs of conservation interventions (protected areas, control of invasive alien species and protection of ecosystems in coastal and urban areas), but also the estimated costs of transforming agricultural, forestry and fishery sectors to sustainability.[95] Currently, more than $500 billion is spent on subsidies considered particularly harmful to biodiversity; removal and/or redirection of such subsidies could greatly reduce the funding need,[96] as could other actions to address the drivers of biodiversity loss, and to reflect biodiversity in decision making processes. Improving the effectiveness and efficiency of biodiversity financing could help to reduce the amount of resources required. Further, while the identified funding gap is significant, it is small in comparison with the potential benefits from realizing the 2050 Vision.[97]

64. There is no global level information on non-financial implementations needs for the effective implementation of the post-2020 global biodiversity framework. However, the need for capacity building, technology transfer, cooperation, and partnerships, have been frequently noted by Parties. In recent years a number of initiatives and processes have been established to increase the amount of non-financial resources available to implement the Convention. These include initiatives related to capacity-building and scientific and technology transfer.[98] While there is no global baseline information available on these types of means of implementation, the information available suggests that these need to be further supported and scaled up.

Considerations

65. The extent to which the Convention can be effectively implemented is influenced by the means available to do so. The specific means of implementation required will vary from country to country, according to national needs and circumstances, however a goal on this issue should be seen as a common commitment by all countries to increase the means of implementation available and the efficiency and effectiveness of these. Actions to reach this proposed goal should bear in mind the provisions of Article 18, on technical and scientific cooperation, Article 20, on financial resources and Article 21 on the financial mechanism.

66. The need for capacity-building, technology transfer, cooperation, and partnerships, has been frequently noted by Parties in their national reports and national biodiversity strategies and action plans. In

---

[95] Deutz et al (2020). Financing Nature: Closing the global biodiversity financing gap. The Paulson Institute, The Nature Conservancy, and the Cornell Atkinson Center for Sustainability. https://www.paulsoninstitute.org/key-initiatives/financing-nature-report/; and Waldron et al (2020) Protecting 30% of the planet for nature: costs, benefits and economic implications. Working paper analysing the economic implications of the proposed 30% target for areal protection in the draft post-2020 Global Biodiversity Framework. https://www.conservation.cam.ac.uk/files/waldron_report_30_by_30_publish.pdf. A discussion of these results is provided in CBD/SBI/3/5/Add.2. Estimation of resources needed for implementing the post-2020 global biodiversity framework preliminary second report of the panel of experts on resource mobilization. See proposed Target 18, for more detailed information on the range of estimates of current expenditures and funding needs.

[96] See proposed Target 17 for more information on the status of harmful subsidies.

[97] For example, see Dasgupta (2021) The Economics of Biodiversity: The Dasgupta Review HM Treasury. United Kingdom. https://www.gov.uk/government/publications/final-report-the-economics-of-biodiversity-the-dasgupta-review

[98] For further information, see document CBD/SBI/3/7 on capacity development, technical and scientific cooperation and technology transfer and document CBD/SBI/3/7/Add.1 on a draft long-term strategic framework for capacity development to support implementation of the post-2020 global biodiversity framework. Issues related to these documents will be further discussed under agenda item 7 of the third meeting of the Subsidiary Body on Implementation.

recent years, a number of initiatives and processes have been established to increase the amount of non-financial resources available to implement the Convention. However, currently there is no global level synthesis available on the status and needs for means of implementations for the post-2020 global biodiversity framework, other than finance.

67. Inadequate funding levels are a major impediment to effective biodiversity conservation in many countries and may be associated with failures to meet global targets.[99] Conservation investment has been demonstrated to reduce biodiversity loss[100] and a recent study, found that public biodiversity investments were associated with about a 1% reduction in the number of threatened species and in the rate of biodiversity loss.[101] As such, spending on biodiversity provides a very high social return on investment[102] and biodiversity resource mobilization from all sources is not only necessary to reduce, halt and reverse biodiversity loss (i.e. to bend the curve on biodiversity loss) it is also likely to generate net economic benefits for both present and future generations.

68. In addition to financial resources, greater support for non-financial means of implementation will be needed to implement the post-2020 global biodiversity framework. These means of implementation can take various forms and be delivered through various channels.

69. Consideration also needs to be given to the fact that the types and amounts of means of implementation may vary throughout the implementation period of the post-2020 global biodiversity framework. For example, the means of implementation required for the period from 2021 to 2030 and from 2030 onwards may not necessarily be the same.

70. National biodiversity strategies and action plans (NBSAPs) are the principal policy instrument for the implementation of the Convention at the national level. As such NBSAPS will be essential instruments in outlining the actions and means of implementation needed to implement the post-2020 global biodiversity framework nationally. While the majority of Parties went through a process to align their NBSAPs with the Strategic Plan for Biodiversity 2011-2020, for many Parties there were significant time lags between the adoption of the Strategic Plan and the development of an updated NBSAPs, and the national targets contained in the NBSAPs tended to be less ambitious than the corresponding Aichi Targets or have a narrower scope. In addition, the number of Parties that adopted their NBSAPs as policy instruments was limited, and few NBSAPs were adopted as whole-of-government instruments. In addition, few NBSAPs contained strategies for resource mobilization, communication and public awareness, and capacity development or reflected gender considerations. These issues likely delayed actions in implementing the Strategic Plan for Biodiversity 2011-2020 and reduced the effectiveness of the actions taken. In the post-2020 period, avoiding such delays and limitations will be essential in taking effective actions to reach the targets and goals in the post-2020 global biodiversity framework.

---

[99] Waldron et al (2013) Targeting global conservation funding to limit immediate biodiversity declines. Proceedings of the National Academy of Sciences. 110 (29) 12144-12148; https://doi.org/10.1073/pnas.1221370110.

[100] Waldron et al (2017) Reductions in global biodiversity loss predicted from conservation spending. Nature, 551(7680), 364-367. https://doi.org/10.1038/nature24295; Seidl et al (2021) The effectiveness of national biodiversity investments to protect the wealth of nature. Nature Ecology and Evolution. https://doi.org/10.1038/s41559-020-01372-1.

[101] Seidl et al (2021) The effectiveness of national biodiversity investments to protect the wealth of nature. Nature Ecology & Evolution. https://doi.org/10.1038/s41559-020-01372-1.

[102] Johnson et al (2020). Global Futures: modelling the global economic impacts of environmental change to support policy-making. Technical Report, January 2020. https://www.wwf.org.uk/globalfutures; Waldron et al (2020) Protecting 30% of the planet for nature: costs, benefits and economic implications. Working paper; Second report of the High-level Panel on Global Assessment of Resources for Implementing the Strategic Plan for Biodiversity 2011-2020 - https://www.cbd.int/financial/hlp/doc/hlp-02-report-en.pdf.

71. Actions towards this goal could also help to reach a number of the targets in the 2030 Agenda for Sustainable Development. These include targets 14.a,[103] 15.a,[104] 15.b,[105] and 15.c.[106]

Monitoring

72. To monitor the implementation of this proposed goal information on the means of implementation made available, from all sources, for national implementation of the post-2020 global biodiversity framework will be needed. In the case of financial resources various processes are already collecting relevant data (see proposed target 18). However, information on other means of implementation, including scientific and technical transfer, capacity-building and partnerships, are less readily available and what is available cannot be easily aggregated or analysed.

Links to other proposed targets

73. Actions to achieve this goal are identified under the various proposed targets. Proposed target 19 (knowledge) would contribute to building technical capacity and the evidence base for effective action. Proposed target 18 (financial resources) directly contributes to the provision of financial resources. Proposed target 17 (incentive measures) could directly and indirectly support resource mobilization, supported by proposed target 13 (biodiversity mainstreaming). Proposed target 12 (access and benefit-sharing) also has the potential to generate monetary and non-monetary benefits which could be used to support the implementation of the post-2020 global biodiversity framework nationally and compliment other funding from other sources.

III. SCIENTIFIC AND TECHNICAL INFORMATION RELATED TO PROPOSED TARGETS 1 TO 7 ADDRESSING TOOLS AND SOLUTIONS FOR IMPLEMENTATION AND MAINSTREAMING

Land-/sea-use change, spatial planning, and restoration[107]

Target 1. *By 2030, [50%] of land and sea areas globally are under spatial planning addressing land/sea use change, retaining most of the existing intact and wilderness areas, and allow to restore [X%] of degraded freshwater, marine and terrestrial natural ecosystems and connectivity among them.*

74. This proposed target relates to land-use and sea-use change, a major direct driver of biodiversity loss and the role of spatial planning in addressing this issue. Under business-as-usual scenarios, land use change (including deforestation and the loss and fragmentation of wetlands, savannahs, grasslands, and other ecosystems) is projected to remain the largest driver of terrestrial biodiversity loss, mainly due to the expansion of agriculture (including livestock) as well as infrastructure development.[108] Coastal development and changes in sea-use through off-shore development is also a significant pressure on the world's marine and coastal ecosystems. To achieve the 2050 Vision and the proposed Goals, the loss of existing intact and wilderness areas through land/sea use change must be avoided, reduced, and reversed. This is to be achieved

[103] Increase scientific knowledge, develop research capacity and transfer marine technology, taking into account the Intergovernmental Oceanographic Commission Criteria and Guidelines on the Transfer of Marine Technology, in order to improve ocean health and to enhance the contribution of marine biodiversity to the development of developing countries, in particular small island developing States and least developed countries.

[104] Mobilize and significantly increase financial resources from all sources to conserve and sustainably use biodiversity and ecosystems.

[105] Mobilize significant resources from all sources and at all levels to finance sustainable forest management and provide adequate incentives to developing countries to advance such management, including for conservation and reforestation.

[106] Enhance global support for efforts to combat poaching and trafficking of protected species, including by increasing the capacity of local communities to pursue sustainable livelihood opportunities.

[107] The text in this subsection is largely based on GBO-5, and references therein, in particular the sections on the sustainable land and forest transition, the sustainable freshwater transition and the sustainable fisheries and ocean transition and the references contained therein. Additional references are indicated in the text for specific points.

[108] IPBES (2019): Global assessment report on biodiversity and ecosystem services of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services. IPBES secretariat, Bonn, Germany. https://ipbes.net/global-assessment.

by both decreasing the loss and degradation (increasing the retention) and increasing the restoration of natural habitats. More effective and widespread spatial planning,[109] which accounts for biodiversity and the objectives of the Convention, in both terrestrial and marine ecosystems, will be crucial in accomplishing this. Spatial planning provides a means of efficient and coherent allocation of conservation actions for sustainable territorial development, while also considering the needs of different stakeholders and multiple policy objectives. It therefore provides a means to achieve or balance multiple objectives for a given area.[110]

Status and trends

75. This proposed target addresses a number of issues related to land and sea use change and the quality of freshwater, marine and terrestrial natural ecosystems. Each of the issues covered in this proposed target are discussed below:

(a) *Spatial planning* - It is not currently possible to accurately measure what proportion of the earth is considered under spatial planning, partly because there is no standard definition of what constitutes a spatial plan and a range of approaches and tools for planning are used at different scales. Further, spatial planning can be conducted without necessarily accounting for biodiversity. Only a handful of countries are known to have undertaken comprehensive spatial planning that integrate biodiversity objectives. Further the information in national biodiversity strategies and action plans and national reports to the Convention also suggests that the use of spatial planning in relation to biodiversity is limited. With regard to conservation strategies or ecoregional plans, issues related to spatial planning but more narrow in focus, a recent assessment calculated that about 50 per cent of terrestrial ecoregions had some form of these in place, but the operational status of many of them was uncertain.[111] In the marine realm, marine spatial planning tools have been modified to better enable practitioners to consider ecological connectivity in decision making. However, fewer than one-third of the member countries of FAO report having put in place complete and enabling policy, legal and institutional frameworks for integrated coastal zone management (ICZM), and about half have partially developed frameworks awaiting adoption;[112]

(b) *Land and sea use change and wilderness areas* - Natural habitats continue to be lost and degraded (also see proposed goal a). Wild and intact areas are being lost through continued encroachment of human pressures into previously pristine spaces. Such areas are not only of critical importance for the functioning of the planet, but they also act as a buffer to species loss.[113] It is estimated that 77 per cent of the land area has been modified to some extent by human activities.[114] Terrestrial wilderness areas (defined by a lack of human activity) declined by 3.3 million km^2 between the early 1990s and 2009.[115] In the marine environment, about two thirds of the global ocean (77% of national jurisdictions) show evidence of increased

[109] There are different definitions of spatial planning, but it is generally understood as a method or process for analyzing and allocating the spatial and temporal distribution of activities in a given environment in order to achieve various objectives, including social, ecological and economic. See Metternicht (2017). Land Use and Spatial Planning: Enabling Sustainable Management of Land Resources. Springer Briefs in Earth Sciences.

[110] Simeonova et al (2017) Natura 2000 and Spatial Planning. Final report for the European Commission (DG ENV) (Project 07.0202/2015/716477/ETU/ENV. B.3), https://ec.europa.eu/environment/nature/knowledge/pdf/Natura_2000_and_spatial_planning_final_for_publication.pdf

[111] Dinerstein et al (2017) An Ecoregion-Based Approach to Protecting Half the Terrestrial Realm. BioScience 67, no. 6: 534–45. https://doi.org/10.1093/biosci/bix014.

[112] FAO. (2020). The State of World Fisheries and Aquaculture 2020. Sustainability in action. Rome. https://doi.org/10.4060/ca9229en.

[113] Di Marco et al (2019) Wilderness Areas Halve the Extinction Risk of Terrestrial Biodiversity. Nature 573, no. 7775: 582–85. https://doi.org/10.1038/s41586-019-1567-7; Hill et al (2018). Worldwide impacts of past and projected future land-use change on local species richness and the Biodiversity Intactness Index. https://doi.ogb/10.1101/311787

[114] Watson et al (2018) Protect the Last of the Wild. Nature 563, no. 7729: 27–30. https://doi.org/10.1038/d41586-018-07183-6.

[115] Watson et al (2016) Catastrophic Declines in Wilderness Areas Undermine Global Environment Targets. Current Biology 26, No. 21: 2929–34. https://doi.org/10.1016/j.cub.2016.08.049.

human impacts with 5% being heavily impacted and 10% having low impacts.[116] It is also estimated that 87 per cent of the oceans have been modified to some extent by human activities.[117] It is also estimated that about 13% of the ocean have no or little impact from anthropogenic stressors and could therefore be described as wilderness. These areas are mostly located in the high seas. Further, only 4.9% of this area is covered by marine protected areas;[118]

(c) *Restoration of degraded natural ecosystems* –Progress towards the restoration of 15 per cent of degraded ecosystems by 2020 has been limited, despite ambitious restoration programmes under way or proposed in many regions.[119] It is estimated that major commitments for ecosystem restoration by countries total almost 300 million hectares to date.[120] These include pledges of 173 million hectares under the Bonn Challenge and the New York Declaration on Forests, as well as pledges under additional national schemes. Of the restoration commitments made, only about one third (34%) comprise regeneration of natural forest, with 45% of the planned areas comprising plantations and 21% agroforestry.[121] Further a recent assessment identified more than 12,000 offset projects, an issue related to restoration but different in scope, covering more than 15 million hectares across 37 countries;[122]

(d) *Connectivity* - A recent study considering both the extent of human impact as well as the connectedness of intact areas found that nearly three quarters of terrestrial ecoregions are highly degraded.[123] Approximately 70 per cent of remaining forest is within 1 kilometre of the forest's edge[124] and about half of all terrestrial protected areas are considered isolated.[125] A further study estimated that, while approximately 40% of terrestrial areas can be considered intact, only 9.7% of terrestrial protected areas (on average 11% of each countries terrestrial protected area estate) can be considered as structurally connected.[126] The world's intact forest landscapes were estimated to have declined from 12.8 million km^2 in 2000 to 11.61 million km^2 in 2017[127] and only 17.4 million km^2 of forest retain high landscape-level integrity.[128] The Biodiversity Intactness Index, an index showing the relative intactness of local species communities, estimates that, on average, species communities have lost approximately one quarter of their biotic intactness and that

---

[116] Halpern, et al. (2015) Spatial and Temporal Changes in Cumulative Human Impacts on the World's Ocean. Nature Communications 6, no. 1: 7615. https://doi.org/10.1038/ncomms8615.

[117] Watson et al (2018). Protect the Last of the Wild. Nature 563, No. 7729: 27–30. https://doi.org/10.1038/d41586-018-07183-6.

[118] Jones et al (2018). The Location and Protection Status of Earth's Diminishing Marine Wilderness. Current Biology 28. 2683. https://doi.org/10.1016/j.cub.2018.07.081.

[119] Aichi Biodiversity Target 15 previous addressed the restoration of degraded habitats.

[120] Lewis et al (2019). Regenerate natural forests to store carbon. Nature, 568. https://www. nature.com/articles/d41586-019-01026-8; Lewis et al reports a total figure of 292 mha based on data from http://www.bonnchallenge.org/ and the Forest Landscape Restoration tracking inventory at https://infoflr.org/, accessed in October 2017.

[121] YDF Assessment Partners. (2019). Protecting and Restoring Forests: A Story of Large Commitments yet Limited Progress. New York Declaration on Forests Five-Year Assessment Report. Climate Focus (coordinator and editor). https://forestdeclaration.org/; This figure is reported in relation to the commitments under the Bonn Challenge/NYDF, which comprises about 60% of the total commitments. It may be the case that there is additional implementation which has not been reported through these channels.

[122] Bull and Strange (2018) The global extent of biodiversity offset implementation under no net loss policies. Nature Sustainability. https://doi.org/10.1038/s41893-018-0176-z.

[123] Beyer et al (2019) Substantial Losses in Ecoregion Intactness Highlight Urgency of Globally Coordinated Action. Conservation Letters: e12592. https://doi.org/10.1111/conl.12692.

[124] Haddad et al (2015) Habitat Fragmentation and Its Lasting Impact on Earth's Ecosystems. Science Advances 1, No. 2: e1500052. https://doi.org/10.1126/sciadv.1500052.

[125] Saura et al (2018) Protected Area Connectivity: Shortfalls in Global Targets and Country-Level Priorities. Biological Conservation 219, no: 53–67. https://doi.org/10.1016/j.biocon.2017.12.020.

[126] Ward et al (2020) Just ten percent of the global terrestrial protected area network is structurally connected via intact land. Nature Communication11, 4563. https://doi.org/10.1038/s41467-020-18457-x.

[127] Potapov et al (2017) The Last Frontiers of Wilderness: Tracking Loss of Intact Forest Landscapes from 2000 to 2013. Science Advances 3, no. 1: e1600821. https://doi.org/10.1126/sciadv.1600821.

[128] Grantham et al (2020) Anthropogenic Modification of Forests Means Only 40 per cent of Remaining Forests Have High Ecosystem Integrity. Nature Communications 11, no. 1: 5978. https://doi.org/10.1038/s41467-020-19493-3.

intactness in over half of the land surface has fallen below sustainable levels.[129] Further land degradation has resulted in widespread fragmentation of natural areas causing impairment of ecosystem functioning resulting in loss of biodiversity.[130] In the marine realm, where knowledge gaps are greater than for terrestrial environments, a main tool for supporting and restoring connectivity is through marine protected area networks.[131]

Considerations

76. In order to put biodiversity on a path to recovery by 2030 in line with the proposed Mission of the post-2020 global biodiversity framework, there would need to be a net gain of natural ecosystem area by 2030, while preventing the loss of existing intact and wilderness areas, as well as areas with high biodiversity value (for example those areas identified as Key Biodiversity Areas) (see proposed Target 2) or keeping such loss to an absolute minimum. Restoration[132] may include: (a) restoring converted areas back to natural habitats; (b) improving the ecological integrity of degraded natural areas; and (c) rehabilitating converted and degraded areas (e.g. degraded agricultural lands) to improve both productivity and integrity. With reference to the first of these, ambition in restoring agricultural lands back to natural ecosystems may be limited by competing demands for land. However, one study showed that that up to 55 per cent of converted land could be restored while maintaining current agricultural production if existing yield gaps could be closed by 75 per cent.[133] Similar estimates are not currently available for marine, coastal and inland water ecosystems. Improving the ecological integrity of degraded natural habitats and rehabilitating converted and degraded habitats to improve both productivity and integrity would be dependent on addressing logistical and other practical constraints.

77. The contribution of restoration activities to the desired outcomes for ecosystems, species, and genetic diversity (proposed Goal A), as well as cost-effectiveness, can be enhanced by evidence-based prioritization of the areas to be retained and restored. For example, restoring 15 per cent of converted lands in priority areas could avoid over 60 per cent of expected extinctions.[134] It should be noted that it is not currently feasible to fully restore many types of ecosystems in a decadal time frame.[135] Thus, preventing the loss and degradation of ecosystems in the first place is preferred.

78. While restoration will be a critical element of reaching this target, care will need to be taken in restoration activities to guard against negative unintentional impacts of human wellbeing and livelihoods, that human rights are ensured and that conservation outcomes are not undermined through inappropriate approaches to restoration.[136] In this respect, collaboration and partnerships with indigenous peoples and local

---

[129] Smith et al (2019) Synergies between the Key Biodiversity Area and Systematic Conservation Planning Approaches. Conservation Letters 12, no. 1: e12625. https://doi.org/10.1111/conl.12625.

[130] Haddad et al (2015) Habitat Fragmentation and Its Lasting Impact on Earth's Ecosystems. Science Advances 1, no. 2: e1500052. https://doi.org/10.1126/sciadv.1500052.

[131] Balbar et al (2019) The Current Application of Ecological Connectivity in the Design of Marine Protected Areas. Global Ecology and Conservation 17: e00569. https://doi.org/10.1016/j.gecco.2019.e00569.

[132] Through decision 14/5, the Conference of the Parties adopted the short-term action plan on ecosystem restoration which could help to inform actions towards the attainment of this proposed target.

[133] Strassburg et al (2020). Global priority areas for ecosystem restoration. *Nature* 586:724–729. https://doi.org/10.1038/s41586-020-2784-9.

[134] Strassburg et al (2020). Global priority areas for ecosystem restoration. *Nature* 586:724–729. https://doi.org/10.1038/s41586-020-2784-9.

[135] For example, the restoration of co.ral reefs has so far been applied at small scales and with mixed success and high costs (estimated at 400,000USD/ hectare (2010 US$) (Bayraktarov, et al (2019). Motivations, success and cost of coral reef restoration. Restoration Ecology. 27. https://doi.org/10.1111/rec.12977).

[136] Holl (2017) Restoring tropical forests from the bottom up. Science 355, 455–456. https://doi.org/10.1126/science.aam5432; Fleischman et al (2020) Pitfalls of Tree Planting Show Why We Need People-Centered Natural Climate Solutions. Bioscience https://doi.org/10.1093/biosci/biaa094; Erbaugh et al (2020) Global forest restoration and the importance of prioritizing local communities. Nature Ecology & Evolution. https://doi.org/10.1038/s41559-020-01282-2; Adams et al (2016) Impacts of large-scale forest restoration on socioeconomic status and local livelihoods: what we know and do not know. Biotropica 48, 731–744

communities in restoration activities may be helpful to both avoid intentional negative impacts and also to improve the effectiveness of restoration activities.[137] Further, giving focus efforts of degraded lands which are not contested for other uses may also be warranted.[138]

79. Given competing demands for land and sea areas, comprehensive spatial planning across all landscapes and seascapes (i.e., marine spatial planning) will be needed to allow socioeconomic development to continue while also conserving biodiversity and maintaining ecosystem services in line with the levels of ambition suggested above, and to ensure connectivity between natural habitats.[139] Spatial planning is practiced variously and unevenly among countries and currently there is no global synthesis available to assess the proportion of the earth that is considered to be 'under spatial planning'. This is partly because there is no standard definition of what constitutes a spatial plan and a range of approaches and tools for planning are used at different scales. However, the information in national biodiversity strategies and action plans and national reports to the Convention suggests that the use of spatial planning in relation to biodiversity is limited. With regards to conservation strategies or ecoregional plans, a recent assessment calculated that around 50 per cent of terrestrial ecoregions had some form of these in place but the operational status of many of them was is uncertain.[140] In the marine realm, spatial planning tools have been modified to better enable practitioners to consider ecological connectivity in decision making. However fewer than one-third of Member Countries of the FAO report having put in place complete and enabling policy, legal and institutional frameworks for integrated coastal zone management (ICZM), and about half have partially developed frameworks awaiting adoption.[141] Specifically with regard to the marine spatial planning, regional sea conventions could play an important role in advancing progress on this issue.

80. Scaling up the use of spatial planning, in both terrestrial and marine ecosystems, will require coordinated and comprehensive assessments by multiple stakeholders, including government, business and communities often across national boundaries. Spatial plans can be developed to address multiple criteria, for example threatened species, key habitats, ecological corridors, productive activities, and local priorities and conditions. Developing capacity of local actors to understand, undertake, and use spatial planning and to consider multiple criteria will be important in ensuring the effectiveness of spatial planning.[142] Comprehensive spatial planning which takes into account the conservation and sustainable of biodiversity as well as the conditions, characteristics and importance of different ecosystem types and national and international objectives could be complemented by, and contribute to, the protection of specific areas with

(2016). https://doi.org/10.1111/btp.12385; Malkamäki et al (2018) A systematic review of the socio-economic impacts of large-scale tree plantations, worldwide. Global. Environmental Change 53, 90–103. https://doi.org/10.1016/j.gloenvcha.2018.09.001; and Agrawal and Redford (2009) Conservation and Displacement: An Overview. Conservation and Society 7, 1–10. https://doi.org/10.4103/0972-4923.54790.

[137] Reyes García et al (2019) The contributions of Indigenous Peoples and local communities to ecological restoration. Restor Ecol, 27: 3-8. https://doi.org/10.1111/rec.12894

[138] Xie et al (2020) Conservation opportunities on uncontested lands. Nature Sustainability 3, 9–15. https://doi.org/10.1038/s41893-019-0433-

[139] Van der Biest et al (2019) Aligning biodiversity conservation and ecosystem services in spatial planning: Focus on ecosystem processes. Science of The Total Environment. 712. 136350. https://doi.org/10.1016/j.scitotenv.2019.136350; Egli et al (2018) Winners and losers of national and global efforts to reconcile agricultural intensification and biodiversity conservation. Global Change Biology 24: 2212– 2228. https://doi.org/10.1111/gcb.14076

[140] Dinerstein et al (2017) An Ecoregion-Based Approach to Protecting Half the Terrestrial Realm. BioScience 67, no. 6: 534–45. https://doi.org/10.1093/biosci/bix014

[141] FAO. (2020). The State of World Fisheries and Aquaculture 2020. Sustainability in action. Rome. https://doi.org/10.4060/ca9229en

[142] Smith et al (2019). Synergies between the Key Biodiversity Area and Systematic Conservation Planning Approaches. Conservation Letters 12, no. 1 (2019): e12625. https://doi.org/10.1111/conl.12625; Williams et al (2020) Minimising the Loss of Biodiversity and Ecosystem Services in an Intact Landscape under Risk of Rapid Agricultural Development. Environmental Research Letters 15, no. 1: 014001. https://doi.org/10.1088/1748-9326/ab5ff7 and Villarreal-Rosas, et al (2020) Advancing Systematic Conservation Planning for Ecosystem Services. Trends in Ecology & Evolution 35, no. 12: 1129–39. https://doi.org/10.1016/j.tree.2020.08.016.

high biodiversity value (see proposed target 2), and by measures to reduce the other direct (proposed targets 4-7) and indirect drivers (proposed targets 8, 13-20) of biodiversity loss and ecosystem degradation.[143] Progress towards this target will also be influence by the actions to address issues related to management, ownership, and tenure (proposed target 20).

81. Actions taken to reach this proposed target would contribute to a number of other international processes and initiatives. For example, a number of targets under the 2030 Agenda for Sustainable Development, including targets 6.6,[144] 14.2,[145] 15.1,[146] 15.2,[147] 15.3,[148] and 15.5[149] among others, are relevant to this proposed target in the post-2020 global biodiversity framework. Further actions related to restoration could contribute to the Bonn Challenge, which aims to restore 150 million ha of degraded and deforested land by 2020 and 350 million ha by 2030, the UN-REDD's Green Gigaton Challenge, which aims to achieve at least one gigaton of high-quality emissions reductions by 2025, and the Great Green Wall initiative, which aims to restore 100 million hectares of degraded land, sequester 250 million tons of carbon and create 10 million green jobs.

Monitoring

82. Information on land use change is generally available, particularly with the use of remote sensing. However, gaps exist for some ecosystems and measuring issues related to habitat quality, such as connectivity and degradation, remains challenging. For the marine environment less information is available and significant information gaps exist. Where this is the case information on the pressures on marine environments may be able to serve as proxies.

83. With regards to restoration, various initiatives are monitoring progress on this issue and information and land and sea use change can be used to help to determine progress towards this element of the proposed target. However different approaches and definitions of what constitutes degraded and restored habitat makes assessing progress towards this target in a consistent way challenging.

84. As noted above there is no global level information on the use of spatial planning, partly because there is no standard definition of what constitutes a spatial plan and a range of approaches and tools for planning are used. Further the use of spatial planning occurs at various scales. In addition, the evidence for the use of spatial planning that is available often focus on specific aspects of spatial plans such as prioritisation or connectivity. While relevant, these issues may not necessarily be indicative of spatial planning more generally. An alternative to using the area of land and sea under spatial planning could be monitoring the extent to which spatial plans have been official recognized in relevant planning processes.

---

[143] Lombard et al (2019) Practical Approaches and Advances in Spatial Tools to Achieve Multi-Objective Marine Spatial Planning. Frontiers in Marine Science, 6: https://doi.org/10.3389/fmars.2019.00166166; Botts et al (2019), Practical actions for applied systematic conservation planning. Conservation Biology, 33: 1235-1246. https://doi.org/10.1111/cobi.13321; Smith et al (2019) Synergies between the key biodiversity area and systematic conservation planning approaches. Conservation Letters.12:e12625. https://doi.org/10.1111/conl.12625; Groves and Game (2015) Conservation Planning: Informed Decisions for a Healthier Planet, 608 pp., Roberts and Company Publishers Inc., Colorado, USA. ISBN 978-1-936221-51-6; Strassburg et al (2020) Global priority areas for ecosystem restoration. Nature 586, 724–729 (2020). https://doi.org/10.1038/s41586-020-2784-9.

[144] By 2020, protect and restore water-related ecosystems, including mountains, forests, wetlands, rivers, aquifers and lakes

[145] By 2020, sustainably manage and protect marine and coastal ecosystems to avoid significant adverse impacts, including by strengthening their resilience, and take action for their restoration in order to achieve healthy and productive oceans.

[146] By 2020, ensure the conservation, restoration and sustainable use of terrestrial and inland freshwater ecosystems and their services, in particular forests, wetlands, mountains and drylands, in line with obligations under international agreements.

[147] By 2020, promote the implementation of sustainable management of all types of forests, halt deforestation, restore degraded forests and substantially increase afforestation and reforestation globally.

[148] By 2030, combat desertification, restore degraded land and soil, including land affected by desertification, drought and floods, and strive to achieve a land degradation neutral world.

[149] Take urgent and significant action to reduce the degradation of natural habitats, halt the loss of biodiversity and, by 2020, protect and prevent the extinction of threatened species.

However additional efforts would be needed to gather this information as it is not readily available. Further this approach would not necessarily indicate the effectiveness of spatial planning processes.

Links to other proposed goals and targets

85. The attainment of this target would directly contribute to the progress towards proposed Goal A on ecosystems species and genetic diversity. The elements of the target related to spatial planning would also contribute to Goal D on means of implementation. The elements on spatial planning would also contribute to the proposed targets which have implications for the management of terrestrial and marine ecosystems including proposed targets 2 (area-based conservation measures), 4 (reducing threats from overexploitation and unsustainable use), 6 (reducing pollution), 9 (sustainability of agriculture and other managed ecosystems) and 11 (access to green/blue spaces) and indirect drivers (proposed targets 8, 13-20) of biodiversity loss and ecosystem degradation.

Area-based conservation measures[150]

Target 2. *By 2030, protect and conserve through well connected and effective system of protected areas and other effective area-based conservation measures at least 30 per cent of the planet with the focus on areas particularly important for biodiversity.*

86. Protected areas and other effective area-based conservation measures (OECMs), if well-sited, connected, integrated into the wide land and sea scape, and managed effectively and equitably, remain essential measures to conserve biodiversity. Protected areas and OECMs are important mechanisms for the *in situ* conservation of biodiversity and ecosystem services.[151] Protected areas and OECMs function best as "systems", conserving and connecting habitats across the landscape and seascape. Protected areas have been shown to bring about positive conservation outcomes within their boundaries,[152] to maintain species populations,[153] and to reduce pressures on forests in comparison to unprotected areas.[154] They can also contribute to human wellbeing and the achievement of multiple Sustainable Development Goals.[155]

Status and trends

87. A protected area is a geographically defined area, which is designated or regulated and managed to achieve specific conservation objectives.[156] An OECM is a geographically defined area other than a protected area, which is governed and managed in ways that achieve positive and sustained long-term outcomes for the *in situ* conservation of biodiversity, with associated ecosystem functions and services and where applicable, cultural, spiritual, socio–economic, and other locally relevant values.[157] In February 2021, the World Database on Protected Areas showed that 15.4 per cent of the world's terrestrial and inland water

[150] The text in this subsection is largely based on GBO-5, and references therein, in particular the sections on the sustainable land and forest transition, the sustainable freshwater transition and the sustainable fisheries and ocean transition and the references contained therein. Additional references are indicated in the text for specific points.

[151] IPBES (2019): Summary for policymakers of the global assessment report on biodiversity and ecosystem services of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services. IPBES secretariat, Bonn, Germany.

[152] Geldmann, et al (2013). Effectiveness of terrestrial protected areas in reducing habitat loss and population declines. In Biological Conservation (Vol. 161, pp. 230–238). Elsevier. https://doi.org/10.1016/j.biocon.2013.02.018

[153] Barnes M., *et al.* (2016). Wildlife population trends in protected areas predicted by national socio-economic metrics and body size. Nature Communications 7, 12747, 1-9 https://doi.org/10.1038/ncomms12747 and Gray C.L., *et al.* (2016). Local biodiversity is higher inside than outside terrestrial protected areas worldwide. Nature. Communications. 7, 12306, 1-7. https://doi.org/10.1038/ncomms12306

[154] Geldmann, et al (2019). A global-level assessment of the effectiveness of protected areas at resisting anthropogenic pressures. Proceedings of the National Academy of Sciences of the United States of America, 116(46), 23209–23215. https://doi.org/10.1073/pnas.1908221116

[155] UNEP-WCMC, IUCN and NGS (2021) Protected Planet Live Report 2021. UNEP-WCMC, IUCN and NGS: Cambridge UK; Gland, Switzerland; and Washington, D.C., USA.

[156] Article 2 of the Convention on Biological Diversity

[157] CBD COP Decision 14/8

environments were covered by protected areas, with 7.7 per cent of the marine area covered (including 17.8 per cent of marine areas within national jurisdiction, and 1.2 per cent of marine areas beyond national jurisdiction). [158] When information in the newly established World Database on OECMs is considered global terrestrial coverage increases to 16.4 per cent.[159] While many terrestrial protected areas would include inland water ecosystems, there are no comparable figures for the coverage of inland water ecosystems. Taking into account recent announcements and commitments on protected areas as well as estimates of the size of other effective area-based conservation measures, the targets of having 17 per cent terrestrial areas and 10 per cent of marine area under protection, as expressed in Aichi Biodiversity Target 11, are likely to have been met or exceeded.[160]

88. Despite the progress made in increasing the size of the world's protected areas and OECMs, a number of challenges remain. These include:

(a) There are important gaps in relation to the representativeness of protected areas and their coverage of important biodiversity areas. As of September 2020, 19 per cent of Key Biodiversity Areas, which are predominantly terrestrial, were completely within protected areas, but 39 per cent had no protection.[161] In addition many terrestrial and marine ecoregions still lack protection, particularly in areas beyond national jurisdiction;[162]

(b) The expansion of protected areas and OECMs in recent years has not been uniform[163] and while there has been steady growth in the size of protected areas overall some specific protected areas have been reduced in size;[164]

(c) Connectivity is limited. One estimate suggests that only half of the global terrestrial protected area network consists of connected lands. [165] Another estimate suggests that less than 10% of the global protected area estate is structurally connected via intact land.[166] Further connectivity of marine protected areas is challenging.[167] There is a need to improve connectivity and coverage of important areas, in order to ensure that the world's protected areas function as an effective system;

(d) Only around 11 per cent of the world's protected areas have management effectiveness assessments recorded in the Global Database on Protected Area Management Effectiveness. [168] While effective management and equitable governance remain challenging to assess, a review of available data

---

[158] UNEP-WCMC and IUCN (2020) Protected Planet: The World Database on Protected Areas (WDPA) On-line, October 2020, Cambridge, UK: UNEP-WCMC and IUCN. Available at: www.protectedplanet.net

[159] UNEP-WCMC and IUCN (2020) Protected Planet: The World Database on Other Effective Area-based Conservation Measures (WD-OECM) On-line, October 2020, Cambridge, UK: UNEP-WCMC and IUCN. www.protectedplanet.net.

[160] SCBD (2020) *Global Biodiversity Outlook* 5. Montreal. https://www.cbd.int/gbo5

[161] BirdLife International, IUCN and UNEP-WCMC (2020). Protected area coverage of Key Biodiversity Areas - www.keybiodiversityareas.org;

[162] UNEP-WCMC, IUCN and NGS (2020). Protected Planet Live Report 2020. UNEP-WCMC, IUCN and NGS: Cambridge UK; Gland, Switzerland; and Washington, D.C., USA. https://livereport.protectedplanet.net/

[163] Maxwell et al (2020) Area-based conservation in the twenty-first century. Nature 586, 217–227 https://doi.org/10.1038/s41586-020-2773-z

[164] Lewis et al (2019) Dynamics in the global protected□area estate since 2004. Conservation Biology, 33: 570-579. https://doi.org/10.1111/cobi.13056

[165] UNEP-WCMC, IUCN and NGS (2020). Protected Planet Live Report 2020. UNEP-WCMC, IUCN and NGS: Cambridge UK; Gland, Switzerland; and Washington, D.C., USA. https://livereport.protectedplanet.net/

[166] Ward et al (2020) Just ten percent of the global terrestrial protected area network is structurally connected via intact land. Nature Communication 11, 4563. https://doi.org/10.1038/s41467-020-18457-x

[167] Balbar and Metaxas (2019). The current application of ecological connectivity in the design of marine protected areas. Global Ecology and Conservation. 17. e00569. https://doi.org/10.1016/j.gecco.2019.e00569.

[168] UNEP-WCMC, IUCN and NGS (2020). Protected Planet Live Report 2020. UNEP-WCMC, IUCN and NGS: Cambridge UK; Gland, Switzerland; and Washington, D.C., USA. https://livereport.protectedplanet.net/

suggests that the effectiveness of protected areas varies significantly.[169] Further a recent review of forest loss in protected areas, based on information on more than 18,000 terrestrial protected areas, concluded that while protected areas reduced deforestation rates by 41%, they did not eliminate deforestation all together. The same study also concluded that, when effectiveness was taken into account, only 6.5% of the world's forests are protected.[170]

Considerations

89. In order to safeguard ecosystem diversity, reduce the rate and risk of extinction and improve species population abundance as well as maintain and enhance the provision of ecosystem services, protected area and OECM coverage needs to be expanded with appropriate prioritization (i.e. coverage of key areas, ecological representativity, and connectivity)and management improved. Consideration of issues related to connectivity, ecological representation, and coverage of areas of importance for biodiversity and ecosystem services will also be needed.

90. Estimates vary regarding the proportion of land and ocean that should be within protected areas and OECMs. For example, Key Biodiversity Areas currently cover 8.7% of land and 2.1% of oceans, but not all are currently protected; the area of current KBAs outside protected areas represents 4.5% of terrestrial area, and since additional KBAs are being identified, this area will likely increase.[171] Covering hotspots of endemic species, and other areas with a high density of threatened species from the IUCN Red List of Threatened Species, would require about 1% additional to the current terrestrial protected area coverage.[172] However, adequately covering species niche's for birds, mammals and amphibians would require expanding current areas to about 34 per cent of the land area.[173] In the marine environment 321 ecologically or biologically significant marine areas (EBSAs), covering about 20% of the world's oceans have been identified. These areas could help to prioritize the protection of the marine environment, among other potential management approaches.[174]

91. Many recent assessments converge on around 30 per cent or more of the land and global ocean covered by protected areas and OECMs by 2030, with the possibility of higher targets established subsequently.[175] Given future scenarios for land-use change and taking into account the potential for other

---

[169] Geldmann et al (2019). A global-level assessment of the effectiveness of protected areas at resisting anthropogenic pressures. Proceedings of the National Academy of Sciences of the United States of America, 116(46), 23209–23215. https://doi.org/10.1073/pnas.1908221116

[170] Wolf et al. (2021) A forest loss report card for the world's protected areas. Nature Ecology and Evolution https://doi.org/10.1038/s41559-021-01389-0

[171] This area will increase, potentially significantly, as additional key biodiversity areas are identified for additional species groups, ecosystems, and other biodiversity features.

[172] Dinerstein et al (2019). A Global Deal for Nature: Guiding principles, milestones, and targets. Science Advances, 5(4), eaaw2869. https://doi.org/10.1126/sciadv.aaw2869.

[173] Hanson et al (2018). Global conservation of species' niches. Nature, volume 580, 232–234. https://doi.org/10.1038/s41586-020-2138-7

[174] Given differences in the coverage of different parts of the marine environment (sea bed, sea surface, water column) described as EBSAs or covered by MPAs, there is currently no definitive estimate on the area of EBSAs covered by protected areas or OECMs.

[175] Dinerstein et al (2019). A Global Deal for Nature: Guiding principles, milestones, and targets. Science advances, 5(4), eaaw2869. https://doi.org/10.1126/sciadv.aaw2869; Visconti et al (2019). Protected area targets post-2020. Science. 364. eaav6886. https://doi.org/10.1126/science.aav6886; and IUCN (2016). Increasing marine protected area coverage for effective marine biodiversity conservation. https://portals.iucn.org/library/sites/library/files/resrecfiles/WCC_2016_RES_050_EN.pdf; Bhola et al (2020) Perspectives on area□based conservation and its meaning for future biodiversity policy. Conservation Biology. https://doi.org/10.1111/cobi.13509; O'Leary et al (2016) Effective Coverage Targets for Ocean Protection. Conservation Letters, 9: 398-404. https://doi.org/10. 1111/conl.12247; Woodley et al (2019). A review of evidence for area□based conservation targets for the post□2020 global biodiversity framework. PARKS. 31-46. https://doi.org/10.2305/IUCN.CH.2019.PARKS-25-2SW2.en; Dinerstein et al (2020) A "Global Safety Net" to reverse biodiversity loss and stabilize Earth's climate. Science Advances 6(36) eabb2824. https://doi.org/10.1126/sciadv.abb2824; Jones et al (2019). Area requirements to safeguard Earth's marine species. One Earth https://doi.org/10.1016/j.oneear.2020.01.010; Hannah, et al (2020), 30% land conservation and climate action reduces tropical extinction risk by more than 50%. Ecography, 43: 943-953. https://doi.org/10.1111/ecog.05166.

effective area based conservation measures, such a target is likely feasible and necessary to put the world on a path to reach proposed Goal A.[176] However, the importance of focusing on biodiversity outcomes rather than spatial area is emphasized; an increase in coverage alone will not be sufficient.[177] Similarly a recent assessment found that marine protected areas could have simultaneous benefits for protecting biodiversity, increase fisheries yields and secure carbon stocks from human activity if properly sited.[178] Further the same assessment found that a globally coordinated network of marine protected areas could be twice as effective as one solely determined by national-level planning. Therefore, there is strong evidence that an effective system of protected areas and OECMs will need to be ecologically representative, effectively managed, equitably governed, well-connected, cover areas of particular biodiversity importance, and is adequately monitored. It will also require that effects on human wellbeing are taken into account.[179]

92. While OECMs may already cover a large part of the planet, greater efforts will be needed to identify, map and recognise them, including with the consent of their custodians where relevant and appropriate. The identification and mapping of OECMs should go hand-in-hand with appropriate support to enable them to maintain and enhance their conservation outcomes.[180]

93. In addition, the coverage and location of protected areas and OECMs, attention also needs to be given to their management effectiveness which is currently challenging to assess. Only around 11 per cent of the world's protected areas have management effectiveness assessments recorded in the Global Database on Protected Area Management Effectiveness, but a review of available data suggests that the effectiveness of protected areas varies significantly.[181] Similar limitations have also been identified for marine protected areas.[182]

94. An important aspect of the effectiveness of protected areas and OECMs is the involvement of relevant actors and stakeholders. In this respect the active involvement of Indigenous Peoples and Local Communities is particularly important (see proposed target 20) in ensuring that the management is effective and equitable, especially when it is considered that around 35% of all areas that are currently under formal

---

[176] Immovilli and Kok (2020). Narratives for the 'Half earth' and 'Sharing the planet' scenarios. A literature review, PBL Netherlands Environmental Assessment Agency, The Hague, PBL publication number 4226. https://www.pbl.nl/en/publications/narratives-for-the-%E2%80%9Chalf-earth%E2%80%9D-and-%E2%80%9Csharing-the-planet%E2%80%9D-scenarios; Leclère et al (2020) Bending the curve of terrestrial biodiversity needs an integrated strategy. Nature https://doi.org/10.1038/s41586-020-2705-y

[177] Maxell et al (2020) Area-based conservation in the 21st century. Nature, volume 586, pages 217–227. https://doi.org/10.1038/s41586-020-2773-z; Pimm et al (2018) How to protect half of Earth to ensure it protects sufficient biodiversity Science Advances. 4 (8). https://doi.org/10.1126/sciadv.aat2616

[178] For example, 90% of the maximum potential biodiversity benefits from marine protected areas could be achieved by protecting 21% of the ocean (43% of EEZs and 6% of high seas). Similarly, food provision could be increased by 5.9 million metric tonnes by strategically protecting 28% of the ocean, while eliminating 90% of the risk of future caron emissions from bottom trawling would require protecting 3.6% of the ocean. Areas where these three benefits overlap represent 0.3% of the global ocean while two of the three benefits occur in 2.7% of global ocean area. For further discussion see Sala et al (2021) Protecting the global ocean for biodiversity, food and climate. Nature (2021). https://doi.org/10.1038/s41586-021-03371-z

[179] Schleicher et al (2019) Protecting half of the planet could directly affect over one billion people. Nature Sustainability 2, 1094–1096 (2019). https://doi.org/10.1038/s41893-019-0423-y

[180] IUCN-WCPA Task Force on OECMs, (2019). Recognising and reporting other effective area-based conservation measures. Gland, Switzerland: IUCN. https://portals.iucn.org/library/node/48773

[181] For example, see Geldmann et al (2019). A global-level assessment of the effectiveness of protected areas at resisting anthropogenic pressures. Proceedings of the National Academy of Sciences of the United States of America, 116(46), 23209–23215. https://doi.org/10.1073/pnas.1908221116; Wolf et al (2021) A forest loss report card for the world's protected areas. Nature Ecology and Evolution https://doi.org/10.1038/s41559-021-01389-0; Acreman et al (2020) A novel systematic review distils eight lessons for effective conservation. Conservation Letters. 13:e12684. https://doi.org/10.1111/conl.12684.

[182] For example, see Costello and Ballantine (2015) Biodiversity conservation should focus on no-take Marine Reserves: 94% of Marine Protected Areas allow fishing. Trends in Ecology and Evolution 30:507-509; Dureuil et al (2018) Elevated trawling inside protected areas undermines conservation outcomes in a global fishing hot spot. Science 362:1403. https://doi.org/10.1126/science.aau0561; Ban et al (2017) Social and ecological effectiveness of large marine protected areas. Global Environmental Change. 43. 82-91. https://doi.org/10.1016/j.gloenvcha.2017.01.003.

protection and 35% of all remaining land areas with very low human intervention are traditionally owned, managed, used, or occupied by indigenous peoples.[183]

95. To ensure provision of ecosystem services and to maintain integrity of planetary ecological processes, natural ecosystems need to be maintained and restored beyond protected areas and biodiversity also needs to be nurtured in managed ecosystems (see proposed targets 1 and 9). Further some countries and regions have a greater share of certain ecoregions or areas particularly important for biodiversity. The need for mechanisms that can support a globally effective system of protected areas and OECMs that does not have negative economic or social impacts, particularly in developing countries and the territories of indigenous peoples and local communities may need to be considered.

96. Additional types of action that could be undertaken towards this target could include, but are not limited to:

(a) Enhancing the monitoring of the effectiveness and conservation outcomes of protected areas and OECMs (proposed target 19);

(b) The greater integration or mainstreaming of protected areas and OECMs across national policies and planning processes (proposed target 1);

(c) Greater collaboration between neighbouring countries for transboundary planning and cooperation in the management of protected areas and OECMs, where relevant;

(d) Improving and conserving connectivity, for example, by establishing ecological networks and corridors;

(e) Additional efforts to identify areas important for biodiversity, such as Key Biodiversity Areas, in need of protection.

The actions taken to reach this proposed target have the potential to contribute to a number of the targets under the Sustainable Development Goals. This includes targets 6.6, [184], 14.2,[185], 14.5,[186] 15.1,[187] and 15.4.[188]

97. Protected areas and OECMS will be crucial elements in reaching the proposed goals and targets of the post-2020 global biodiversity framework. However, the designation of strict protected areas could, in some cases, lead to trade-offs with other land-uses and other proposed targets under the post-2020 global biodiversity framework. Such trade-offs can be minimised by ensuring that stakeholders and rights-holders are involved in the design and governance of protected areas and OECMs (proposed target 20), that allowances for sustainable use within protected areas and OECMs is permitted where appropriate, and that all protected areas and OECMs are equitably governed.

Monitoring

98. Monitoring progress towards this target will require information on the extent of protected areas and OECMs, their representativeness, connectivity and effectiveness. Data on the location and size of protected areas and OECMs is already being reported through the World Database on Protected Areas (WDPA), and

[183] IPBES (2019). Global assessment report on biodiversity and ecosystem services of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services. IPBES secretariat, Bonn, Germany. https://ipbes.net/global-assessment;

[184] By 2020, protect and restore water-related ecosystems, including mountains, forests, wetlands, rivers, aquifers and lakes Target 11.4: Strengthen efforts to protect and safeguard the world's cultural and natural heritage.

[185] By 2020, sustainably manage and protect marine and coastal ecosystems to avoid significant adverse impacts, including by strengthening their resilience, and take action for their restoration in order to achieve healthy and productive oceans.

[186] By 2020, conserve at least 10 per cent of coastal and marine areas, consistent with national and international law and based on the best available scientific information.

[187] By 2020, ensure the conservation, restoration and sustainable use of terrestrial and inland freshwater ecosystems and their services, in particular forests, wetlands, mountains and drylands, in line with obligations under international agreements.

[188] By 2030, ensure the conservation of mountain ecosystems, including their biodiversity, in order to enhance their capacity to provide benefits that are essential for sustainable development.

World Database on Other Effective Area-based Conservation Measures (WD-OECM). The data in WDPA is relatively well developed, with over 80 per cent of records updated in 2020. However, additional efforts are needed to further populate the WD-OECM. In particular, more efforts are needed to identify and map OECMs, in consultation with stakeholders and rights holders where relevant.

99. Management effectiveness data can be reported and collected through to the Global Database on Protected Area Management Effectiveness (GD-PAME).[189] However, as with WD-OECM, further efforts are needed to develop and populate the database. For example, GD-PAME currently only indicates if a management review system is in place.

100. The information in the databases above could also be combined with other sources of information, such as the World Database of Key Biodiversity Areas, in order to further track progress towards this target. Similarly, there are regional processes, such as those related to regional seas conventions, which could be used to complement global level data. Additional efforts are also likely required to be able to effectively monitor progress on addressing the more qualitative aspects of protected areas, including representivity, connectivity and equitable management.

Links to other proposed goals and targets

101. An effective network of protected areas would directly contribute to reaching Goal A. It would also help to address a number of the proposed targets in the post-2020 global biodiversity framework. This includes proposed targets related to habitat loss (targe 1), and species (targets 4 and 8). Further progress towards this target could also help to address those targets related to ecosystem services (proposed target 7 and 10). More generally the benefits from an effective network of protected areas and OECMS has the potential to generate a range of socio-economic benefits, including issues related to climate change, and human wellbeing.[190]

Active species management and Reducing human-wildlife conflict

Target 3. *By 2030, ensure active management actions to enable wild species of fauna and flora recovery and conservation, and reduce human-wildlife conflict by [X%].*

102. Species are one of the three levels of biodiversity. The active management of wild species, including by reducing human-wildlife conflict, will be essential in reaching the 2050 Vision for Biodiversity. Further reducing human-wildlife conflict would benefit human safety and livelihoods, and also ensure conservation needs can be met. The target therefore directly supports the implementation of parts of proposed goal A.

103. This proposed target addresses two distinct but related issues. Firstly, it addresses the direct management of wild species. Secondly, it addresses the reduction of human-wildlife conflict. Each issue is addressed in turn below.

[189] UNEP-WCMC and IUCN (2020) Protected Planet: Global Database on Protected Area Management Effectiveness (GD-PAME) On-line, October 2020, Cambridge, UK: UNEP-WCMC and IUCN. www.protectedplanet.net.

[190] For example, see Goldstein et al (2020) Protecting irrecoverable carbon in Earth's ecosystems. Nature Climate Change 10, 287–295. https://doi.org/10.1038/s41558-020-0738-8; Dinerstein et al (2020). A "Global Safety Net" to reverse biodiversity loss and stabilize Earth's climate. Science Advances. 6. https://doi.org10.1126/sciadv.abb2824; Sala et al (2021) Protecting the global ocean for biodiversity, food and climate. Nature 592, 397–402. https://doi.org/10.1038/s41586-021-03371-z; Laffoley et al (2020) Evolving the narrative for protecting a rapidly changing ocean, post□COVID□19. Aquatic Conservation: Marine and Freshwater Ecosystems 1-23. https://doi.org/10.1002/aqc.3512; De Lamo et al (2020) Strengthening synergies: how action to achieve post-2020 global biodiversity conservation targets can contribute to mitigating climate change. UNEP-WCMC, Cambridge, United Kingdom.

A. Active species management[191]

Status and trends

104. Active management measures have been instrumental in preventing a significant number of bird and mammal extinction in past decades, and have demonstrated that, in principle, it is possible to prevent extinction in most cases where both the species and the cause of the threat are known.[192] However, these interventions are mostly "emergency room" type interventions and full recovery is only possible if the underlying drivers of loss are addressed.[193]

105. Based on information in the IUCN Red List of Threatened Species, species-specific management interventions will be needed to ensure the conservation of at least 37% (2,707) of species which are threatened or extinct in the wild and therefore to achieve the species component of proposed Goal A. Based on this global data there are on average (median) about 40 threatened species per country, but about ten countries contain over 200 species, in need of recovery actions, including ex situ conservation, reintroductions and other species-specific interventions.[194] There is broad taxonomic coverage within the analysis, although plants and invertebrates are underrepresented in the underlying data.

Considerations

106. As noted above, the number of species that require active management varies by country and in some countries, such as those with high diversity, the number of species requiring management is likely to be large. This suggests that prioritization may be required in some cases. Further the pressures on species which bring about the need for active management will also vary by country. Identifying clear objectives in threatened species management can help to make the process more efficient.[195]

107. Relevant actions related to this aspect of the proposed target include species reintroductions, species recovery actions (such as vaccinations, supplementary feeding, provision of breeding sites, and planting and protection of seedlings), habitat management and restoration, and *ex situ* conservation where needed. Further some species may require more than one type of intervention. Similarly, some of these active management actions may need to be aligned with a reduction in threats to the species (proposed targets proposed targets 1, 4-7) as well as the enhancement of protected areas and OECMS (proposed target 2) in order for them to be fully effective. The scope of the target could be expanded to include *ex situ* conservation of genetic resources within species, including for crops and livestock and their wild relatives. Species-specific management interventions are needed in addition to protected areas (proposed target 2) and addressing of the direct drivers of biodiversity loss (proposed targets 1, 4-7). The latter being particularly important in protecting isolated populations of species and ensuring the conservation of genetic diversity.[196]

108. Specifically for plants, the guidance developed as part of the Global Strategy for Plant Conservation could help to inform the types of actions needed to reach this element of the proposed target.[197] In addition,

---

[191] The text in this subsection draws on GBO-5, and references therein, in particular the section related to Aichi Biodiversity Target 12. Additional references are indicated in the text for specific points.

[192] Bolam et al (2020) How many bird and mammal extinctions has recent conservation action prevented? Conservation Letters, e12762. https://doi.org/10.1111/conl.12762.

[193] Bolam et al (in review) Preventing extinctions post-2020 requires recovery actions and transformative change, https://www.biorxiv.org/content/10.1101/2020.11.09.374314v1.abstract.

[194] Bolam et al (in review) Preventing extinctions post-2020 requires recovery actions and transformative change, https://www.biorxiv.org/content/10.1101/2020.11.09.374314v1.abstract.

[195] Scheele et al (2018) How to improve threatened species management: an Australian perspective. Journal of Environmental Management, 223, pp.668-675. https://doi.org/10.1016/j.jenvman.2018.06.084.

[196] Hoban et al (2020) Taxonomic similarity does not predict necessary sample size for ex situ conservation: A comparison among five genera. Proceedings of the Royal Society B: Biological Sciences. 287. 20200102. 10.1098/rspb.2020.0102.

[197] The Global Strategy for Plan Conservation (GSPC) was originally adopted by the Conference of the Parties to the Convention in 2002 and aimed to achieving a series of 16 outcome-oriented and measurable targets by 2010. A revised set of targets for 2020

a follow up to GSPC in the context of the post-2020 global biodiversity framework could stimulated collaboration and synergies to assist in implementation.

109. The effective implementation of species management measures may also require the participation of relevant actors (proposed target 20). For example, 75 per cent of threatened species in Australia have ranges that overlap with Indigenous People's lands, indicating the potential contributions of Indigenous Peoples and local communities to species management actions.[198] Similarly many wild species, by some estimates up to 40%, are used by people and the involvement of relevant stakeholders will be crucial to the effectiveness of management interventions (see also proposed target 4).[199]

Monitoring

110. Monitoring this element of the proposed target would require information on the number of species that require active management and the number of species for which such management is implemented. While there have been some assessments of this, more regular monitoring and data collection efforts are likely needed.[200] Further, information on the number of species which have recovered following management interventions could also be used. This is the concept behind the proposed Green Status of Species, which is currently under development.[201]

Links to other proposed goals and targets

111. The attainment of this element of the target would directly contribute to the progress towards proposed Goal A on ecosystems species and genetic diversity. It would also contribute to the attainment of the targets addressing the direct drivers of biodiversity to the extent that the actions addressed these pressures on species. This includes proposed targets addressing land use change (target 1), overexploitation (target 3), invasive alien species (target 5), and pollution (target 6).

B. Reducing human-wildlife conflict[202]

Status and trends

112. Human-wildlife conflict is commonly described as conflict that occurs between people and wildlife, through the actions of and threats posed by wildlife that have an adverse effect on human life, health, well-being, and/or livelihoods.[203] As a result of those actions and threats, humans may harm or eliminate wildlife. These responses can be intentional and unintentional. Reducing human–wildlife conflict and improving co-existence is important both to improve human health and well-being (e.g. avoiding danger, property damage, and disease transmission) and to reduce threats to wildlife, both intentional (e.g. reprisals against large land mammals that may damage crops or threaten human life or livestock) and unintentional (e.g. competing

---

were agreed at COP-10 in 2010, with a decision that implementation of the GSPC should be pursued as part of the broader framework of the Strategic Plan for Biodiversity 2011-2020. For further information, see https://www.cbd.int/gspc/.

[198] Renwick et al (2017) Mapping Indigenous land management for threatened species conservation: An Australian case-study. PloS one, 12(3), p.e0173876. https://doi.org/10.1371/journal.pone.0173876.

[199] Marsh et al (202) Prevalence of sustainable and unsustainable use of wild species inferred from the IUCN Red List. Preprint available at https://www.biorxiv.org/content/10.1101/2020.11.04.367763v2.

[200] For example see Bolam et al (in review) Preventing extinctions post-2020 requires recovery actions and transformative change, https://www.biorxiv.org/content/10.1101/2020.11.09.374314v1.abstract

[201] Akçakaya et al (2018) Quantifying species recovery and conservation success to develop an IUCN Green List of Species. Conservation Biology, 32: 1128-1138. https://doi.org/10.1111/cobi.13112 and IUCN (2021) The IUCN Green Status of Species. https://www.iucnredlist.org/about/green-status-species#:~:text=The%20Green%20Status%20assesses%20species,major%20human%20impacts%2Fdisruption%3B%20AND.

[202] The text in this subsection draws primarily on Nyhus (2016): Human–wildlife conflict and coexistence, Annual Review of Environment and Resources, 41. 10.1146/annurev-environ-110615-085634, Luc Hoffmann Institute (2020): The state of knowledge and practice on human–wildlife conflicts. https://luchoffmanninstitute.org/wp-content/uploads/2020/03/LucHoffmannInstitute-humanwildlifeconflict-web.pdf. Additional references are indicated in the text for specific points.

[203] FAO (2019) Human and wildlife conflict. http://www.fao.org/forestry/wildlife/67288/en/.

demands for the use of ecosystems and other resources and marine by-catch). It is an essential element of efforts to maintain or reintroduce many keystone species and usual requires targeted management interventions. Though numerous examples of human wildlife conflict exist,[204] it is difficult, at present, to determine a specific quantitative level or amount of human wildlife conflict or to determine the number of people which are impacts globally.

Considerations

113. Though specific examples of human-wildlife conflict are well known,[205] it is difficult, at present, to determine the specific quantitative level or amount of human wildlife conflict. There is very limited global data available on human-wildlife conflict. Further human-wildlife conflict is often a context specific issue. As such a first step towards this target may be the greater identification and collection of information on human-wildlife conflict (proposed target 19).

114. Human-wildlife conflict can be exacerbated by unsustainable patterns of consumption and production and poorly planned development, including that which results in encroachment into wild areas, the conversion, destruction, degradation or reduction of natural habitats, inappropriate waste management and some tourism activities. As such human-wildlife conflict can be reduced by, among other things, better land and sea use planning, and by mitigation, including compensation and control measures. [206] It may also be managed by empowering indigenous peoples and local communities, the use of rights-based approaches, education, awareness raising, compensation for damage and other incentive measures (some of these issues are addressed under proposed target 20 on participation in decision-making). Other actions which may be required are the development of action plans, shared governance systems, and the development of physical infrastructure, such as barriers and other deterrents.[207]

115. While the focus of this proposed target is on human-wildlife conflict, it is important to note that many human -wildlife interactions can also be positive. Thus, this issue is closely related to the issues addressed in proposed target 4 on the harvesting, trade and use of wild species of fauna and flora and proposed target 8 on the benefits from biodiversity related to nutrition, food security, livelihoods, health and well-being.

Monitoring

116. There is currently no global level information or indicators on human-wildlife conflict. However, there are numerous national and subnational examples. Some work is underway to develop guidelines and a standard to address human-wildlife conflict, which may be useful in monitoring progress in the future.[208]

Links to other proposed goals and targets

117. The attainment of this element of the target would directly contribute to the progress towards proposed Goal A on ecosystems species and genetic diversity.

---

[204] For example, see Gulati et al (2021) Human casualties are the dominant cost of human–wildlife conflict in India. Proceedings of the National Academy of Sciences 118 (8) e1921338118; https://doi.org/10.1073/pnas.1921338118.

[205] For example, see Sharma et al (2020) Mapping human–wildlife conflict hotspots in a transboundary landscape, Eastern Himalaya. Global Ecology and Conservation. 24. https://doi.org/10.1016/j.gecco.2020.e01284.

[206] Ravenelle and Nyhu (2017) Global patterns and trends in human–wildlife conflict compensation**.** Conservation Biology. 31, 1247–1256, https://doi.org/10.1111/cobi.12948.

[207] CPW: CPW fact sheet on sustainable wildlife management and human−wildlife conflict. Available at https://www.cbd.int/sustainable/doc/cpw-factsheets/cpw-fs-hwc-en.pdf.

[208] Luc Hoffmann Institute (2020): The state of knowledge and practice on human–wildlife conflicts. Available at https://luchoffmanninstitute.org/wp-content/uploads/2020/03/LucHoffmannInstitute-humanwildlifeconflict-web.pdf

Threats from overexploitation, trade and unsustainable use[209]

Target 4. *By 2030, ensure that the harvesting, trade and use of wild species of fauna and flora is legal, at sustainable levels and safe.*

118. This proposed target addresses the exploitation of organisms, a major direct driver of biodiversity loss. While directly impacting the species that are the target of exploitation (e.g., fish, wild meat, timber, medicinal plants), it often also causes collateral impacts to other species and affects the functioning of ecosystems. Since people depend on wild species for food, medicine, construction materials and other products, unsustainable harvest and consumption jeopardizes these uses as well as the livelihoods of those engaged (see also proposed target 8). While legal use is not always sustainable, illegal trade is associated with threats to biodiversity and human health. Promoting sustainable use is therefore integral to achieving the 2050 Vision and the proposed Goals of the post-2020 global biodiversity framework. It is also one of the three objectives of the Convention which also recognizes the customary sustainable use of biodiversity by indigenous peoples and local communities.

Status and trends

119. Humans depend on wild species as a source of food, medicine, construction materials and other product,[210] with wildlife exploitation providing livelihoods and income for rural communities[211] as well as driving international trade.[212] For example more than 28,000 plant species, 723 of which are threatened with extinction, have documented medicinal uses,[213] while thousands of wild species used for food have been recorded, including large numbers of plants, birds, insects, mammals and mushrooms.[214]

120. The unsustainable harvest and overexploitation of wild species are major threats to biodiversity and associated ecosystem services, causing recent increases in extinction rates and biodiversity decline as well as creating potential risks for human health and wellbeing.[215] Further, where exploitation for trade occurs, species abundance has been found to decline between 62% and 76% with local extirpations observed.[216] Exploitation may also cause collateral harm to non-target species and ecosystems, for example due to

---

[209] The text in this subsection draws on GBO-5, and references therein, in particular the sections on Aichi Biodiversity Target 4, 14 and 14 and section related to Pathways to the 2050 Vision for Biodiversity. Additional references are indicated in the text for specific points.

[210] Leadley et al (2014) Progress towards the Aichi Biodiversity Targets: An Assessment of Biodiversity Trends, Policy Scenarios and Key Actions. Secretariat of the Convention on Biological Diversity, Montreal, Canada. Technical Series 78, 500 pages.

[211] Robinson et al (2018). Supplying the wildlife trade as a livelihood strategy in a biodiversity hotspot. Ecology and Society 23(1):13. https://doi.org/10.5751/ES-09821-230113.

[17] UNODC. 2020. World wildlife crime report: trafficking in protected species. United Nations Office on Drugs and Crime. https://www.unodc.org/documents/data-and-analysis/wildlife/2020/World_Wildlife_Report_2020_9July.pdf

[213] Antonelli et al (2020). State of the World's Plants and Fungi 2020. Royal Botanic Gardens, Kew. https://doi.org/10.34885/172

[214] FAO. 2019. The State of the World's Biodiversity for Food and Agriculture, FAO Commission on Genetic Resources for Food and Agriculture Assessments. Rome. 572 pp.

[215] 't Sas-Rolfes et al (2019). Illegal Wildlife Trade: Scale, Processes, and Governance. Annual Review of Environment and Resources 44:201–28. https://doi.org/10.1146/annurev-environ-101718-033253; Joppa et al (2016). Filling in biodiversity threats gaps. Science 80 (353), 416–418. https://doi.org/10.1126/science.aaf3565; IPBES (2019): Global assessment report on biodiversity and ecosystem services of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services. IPBES secretariat, Bonn, Germany; Can et al (2019). Dealing with deadly pathogens: Taking stock of the legal trade in live wildlife and potential risks to human health. Global Ecology and Conservation 17 (2019) e00515. https://doi.org/10.1016/j.gecco.2018.e00515; WWF (2020) Living Planet Report 2020 - Bending the curve of biodiversity loss. WWF, Gland, Switzerland. https://livingplanet.panda.org/en-us/ and United Nations Environment Programme and International Livestock Research Institute (2020). Preventing the Next Pandemic: Zoonotic diseases and how to break the chain of transmission. Nairobi, Kenya. https://www.unep.org/resources/report/preventing-future-zoonotic-disease-outbreaks-protecting-environment-animals-and

[216] Morton et al (2021) Impacts of wildlife trade on terrestrial biodiversity. Nature Ecology & Evolution. https://doi.org/10.1038/s41559-021-01399-y; Johnson et al (2017). Biodiversity losses and conservation responses in the Anthropocene. Science 356 (6335), 270-275. https://doi.org/10.1126/science.aam9317.

overfishing.[217] Overexploitation can also impact the abundance of (common) species by reducing their density or distribution range, fragmenting populations, impacting the role in ecosystem function and reducing genetic diversity.[218] However, managed sustainably, the use of wild species has the potential to reduce extinction risk and meet human needs.[219]

121. A total of 40 per cent of the species on the IUCN Red List are threatened by unsustainable use. Top threats to species linked to utilization include their use as pets, display animals, horticulture and human consumption. Further of the species listed as threatened or near-threatened on the IUCN Red List, overexploitation is reported to be the most prevalent threat to 6241 species (72 per cent of species in these categories). Of these overexploited species 4,049 were affected by logging, 1,680 by hunting, 1,118 by fishing and 557 by plant harvesting.[220] A further study examining 10,098 species across 10 comprehensively assessed taxa on The IUCN Red List, found that 16 per cent of species had intentional use as a documented threat.[221] Hunting, especially for commercial use, has been implicated in the overall declines in bird (58 per cent) and mammal (83 per cent) populations in the tropics.[222] Hunting pressure on tropical mammals is estimated to have reduced species distributions by 41 per cent, due to the combined impacts of hunting and land use change.[223] The use of bird species is often unsustainable, with utilised species less likely to remain extant than non-utilised species,[224] while use is the most common threat to orchids.[225]

122. The 2020 Living Planet Index (LPI) tracks the abundance of more than 21,000 threatened and non-threatened populations of mammals, birds, fish, reptiles and amphibians around the globe.[226] A recent analysis of more than11,000 population time-series (from 2,944 species) from the LPI indicated that wildlife use can be both a driver of negative population trends or a driver of species recovery. Utilised populations of mammals, birds and fish declined by an average of 50 per cent over the period 1970–2016, compared with an average decline of only 3 per cent for non-utilized populations; however utilized populations were less likely to be in decline when management actions were in place. [227]

---

[217] Secretariat of the Convention on Biological Diversity (2020) Global Biodiversity Outlook 5. Montreal; MacNeil, et al (2020) Global shark and conservation potential of reef sharks. Nature. 583 (7818): 801-806. https://doi.org/10.1038/s41586-020-2519-y; Bearzi et al (2008). Overfishing and the disappearance of short-beaked common dolphins from western Greece. Endangered Species research. 5:1-12. https://doi.org/10.3354/esr00103.

[218] Reynolds et al (2006) Overexploitation. Chapter 8 in Principles of Conservation Biology, 3rd Edition (pp.253-277).Sinauer; Kenchington (2003) The effects of fishing on species and genetic diversity. In FAO, 2003. Responsible Fisheries in the Marine Ecosystem.

[219] Cooney et al (2018) Wildlife, Wild Livelihoods: Involving Communities in Sustainable Wildlife Management and Combatting the Illegal Wildlife Trade. United Nations Environment Programme, Nairobi, Kenya. https://doi.org/10.13140/RG.2.2.11770.85449; Marsh et al (2020). Prevalence of sustainable and unsustainable use of wild species inferred from the IUCN Red List. bioRxiv preprint. https://doi.org/10.1101/2020.11.04.367763.

[220] Maxwell et al (2016) Biodiversity: the ravages of guns, nets and bulldozers. Nature 536, 143–145 https://doi.org/10.1038/536143a.

[221] Marsh et al (2020) Prevalence of sustainable and unsustainable use of wild species inferred from the IUCN Red List. bioRxiv preprint. https://doi.org/10.1101/2020.11.04.367763.

[222] Benítez-López et al (2017) The impact of hunting on tropical mammal and bird populations. Science 356(6334): 180-183. https://doi.org/10.1126/science.aaj1891.

[223] Gallego-Zamorano et al (2020) Combined effects of land use and hunting on 534 distributions of tropical mammals. Conservation Biology 34(5): 1271-1280. https://doi.org/10.1111/cobi.13459.

[224] Butchart (2008) Red List Indices to measure the sustainability of species use and impacts of invasive alien species. Bird Conservation International 18: S245–S262. https://doi.org/10.1017/S095927090800035X.

[225] Wraith and Pickering (2018) Quantifying anthropogenic threats to orchids using the IUCN Red List. Ambio. 47(3):307-317. https://doi.org/10.1007/s13280-017-0964-0.

[226] WWF (2020) Living Planet Report 2020 - Bending the curve of biodiversity loss. WWF, Gland, Switzerland. https://livingplanet.panda.org/.

[227] McRae et al (2020) A global indicator of utilised wildlife populations: regional trends and the impact of management. bioRxiv preprint doi: https://doi.org/10.1101/2020.11.02.365031.

123. In the marine environment global fish production (from marine or aquaculture capture fisheries, for human consumption and non-food uses) has increased on all continents, with global capture fisheries production in 2018 reaching a record of 96.4 million tonnes. Globally, the state of marine fishery resources has continued to decline, with the Mediterranean and Black Sea being identified as areas with the highest percentage of stock fished at unsustainable levels.[228]

124. Wildlife trade is highly diverse and includes ornamental plants, fish and corals, exotic leather goods, pets, timber, gums and oils, furniture and musical instruments.[229] Between US$ 8 - 20 billion a year (excluding fisheries and timber) of wildlife trade is estimated to be illegal.[230] As well as being a serious environmental crime, illegal wildlife trade also threatens the stability and security of societies and causes substantial economic costs.[231] Illegal activities, including illegal, unreported and unregulated (IUU) fishing, illegal logging and illegal harvesting of wild animals, constitute a major threat to both nature and livelihoods. Wildlife trade, including illegal trade, is also recognized as a possible pathway for alien invasive species and the spread disease (see also proposed target 5).[232]

125. The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) is the key legal framework for regulating and protecting species from overharvesting for international trade and regulates the international trade of more than 38,700 species.[233] An analysis of CITES trade data indicated that approximately 100 million whole-organism equivalents were legally traded each year between 2005–2014 (including wild and captive sources).[234] For mammals, birds, reptiles, invertebrates and plants, there is evidence of a substantial and significant shift in trade from wild-sourced to captive specimens over time.[235] However, comprehensive international trade data are not available for all species in trade, and many taxa are only used and traded domestically.

126. The harvesting, hunting, trade and consumption of wild species can also increases the risk of pathogens jumping from wildlife hosts to humans and livestock.[236] A total of 60 per cent of emerging infectious diseases are zoonoses, of which at least 70 per cent originate in wildlife, the global trade in live animals has high potential to act as a transmission pathway for zoonotic disease outbreaks, jeopardising global human health.[237] Further, infectious diseases from wildlife have emerged at an increased pace over the last century, with viruses originating in wild mammals of particular concern (e.g. HIV, Ebola and SARS).[238] As such the safety of harvesting, trade and use practices is crucial.

---

[228] FAO. 2020. The State of World Fisheries and Aquaculture 2020. Sustainability in action. Rome. https://doi.org/10.4060/ca9229en.

[229] Oldfield (ed) (2003). The trade in wildlife: regulation for conservation. Earthscan Publications Ltd.

[230] Myburgh in Haken (2011). Transnational Crime in the Developing World, Global Financial Integrity, Washington, DC, United States of America and European Union. 2016. EU Action Plan against wildlife trafficking. (COM (2016) 87 final). ISBN 978-92-79-55076-8, https://doi.org/10.2779/016138.

[231] Lawson and Vines (2014) Global impacts of the illegal wildlife trade. The costs of crime, insecurity and institutional erosion. Chatham House. ISBN 978 1 78413 004 6.

[232] Garcia-Diaz et al (2017). The illegal wildlife trade is a likely source of alien species. Conservation Letters, November/December 2017, 10(6), 690–698. https://doi.org/10.1111/conl.12301; and Harfoot et al (2018), Unveiling the patterns and trends in 40 years of global trade in CITES-listed wildlife. Biological Conservation 223 47-57. https://doi.org/10.1016/j.biocon.2018.04.017.

[233] Convention on International Trade in Endangered Species of Wild Fauna and Flora www.cites.org

[234] This represents an increase from 9 million whole-organism equivalents traded each year between 1975–1985. Convention on International Trade in Endangered Species of Wild Fauna and Flora www.cites.org

[235] Harfoot et al (2018) Unveiling the patterns and trends in 40 years of global trade in CITES-listed wildlife. Biological Conservation 223 47-57. https://doi.org/10.1016/j.biocon.2018.04.017

[236] Karesh et al (2005). Wildlife Trade and Global Disease Emergence. Emerging Infectious Diseases, Volume 11, Number 7. https://doi.org/10.3201/eid1107.050194.

[237] Jones et al (2008). Global trends in emerging infectious diseases. Nature 451, 990–993. https://doi.org/10.1038/nature06536.

[238] WWF Global Science. (2020). Beyond Boundaries: Insights into emerging zoonotic diseases, nature, and human well-being. Internal science brief. https://unemg.org/wp-content/uploads/2020/07/WWF-Science-Brief_Beyond-Boundaries_5.6.20_lowres.pdf

Considerations

127. Currently, many species on the IUCN Red List are threatened due to overexploitation (including through by-catch) and trade, including illegal trade. For example, a recent assessment identified more than 11,702 species which are at risk of extinction as a result of trade. Often this harvest is legal but may not be adequately regulated. However, managed, sustainable use has the potential to forestall extinctions, aid recovery, and meet human needs.[239]

128. Specifically, with regard to the trade in wildlife, the value of international wildlife trade has increased by 500% since 2005 and by 2,000% since the 1980's. There are no similar estimates for the national or sub-national trade in wildlife. It should also be noted that legal trade is not necessarily sustainable. With regards to illegal trade specifically it has been estimated that this conservatively worth between US$7 and 23 billion per year, or approximately 25% of the value of legal markets. Unsustainable use and trade of species is associated with threats to biodiversity and human health, including links to disease emergence.[240] Unregulated harvesting (including illegal, unreported and unregulated fishing), trade and use of wild species can also increase the risk of invasive alien species (addressed under proposed target 5).

129. The introduction and enforcement of stronger regulation and monitoring, through national measures as well as international processes, such as those supported by CITES, the United Nations Convention against Transnational Organized Crime, and the United Nations Office on Drugs and Crime could reduce the illegal and unregulated trade in threatened species and that posing particular risks for human health.[241] Further, a combination of measures is needed to ensure that the supply of wild meat is sustainably and legally managed at source, to reduce the demand for unsustainably managed and/or illegal wild meat in towns and cities, and to enable governance, while respecting customary sustainable use.[242]

130. About a third of the worlds' marine fish stocks are overfished and under business-as-usual scenarios this is projected to worsen.[243] However, scenarios also suggest that investing in fisheries management (inclusive of distant water fleets), combating illegal, unreported and unregulated fishing and removing harmful subsidies, could, by 2030, end overfishing, rebuild many stocks, and reduce threats to species at risk while increasing the provision of food, reducing costs and prioritizing the nutritional and livelihood needs of those most dependent on fisheries.[244]

---

and Olival et al (2017). Host and viral traits predict zoonotic spillover from mammals. *Nature* 546, 646–650. https://doi.org/10.1038/nature22975.

[239] Marsh et al (2020) Prevalence of sustainable and unsustainable use of wild species inferred from the IUCN Red List. bioRxiv preprint. https://doi.org/10.1101/2020.11.04.367763.

[240] IPBES (2020). Workshop Report on Biodiversity and Pandemics of the Intergovernmental Platform on Biodiversity and Ecosystem Services. IPBES secretariat, Bonn, Germany, https://doi.org/10.5281/zenodo.4147317; Johnson et al (2015) Spillover and pandemic properties of zoonotic viruses with high host plasticity. Scientific Reports 7;5:14830. https://doi.org/10.1038/srep14830; Jones, *et al (2008)* Global trends in emerging infectious diseases. *Nature* 451, 990–993 (2008). https://doi.org/10.1038/nature06536; Frank and Wilcove (2019) Long delays in banning trade in threatened species. Science. https://doi.org/10.1126/science.aav4013.

[241] IPBES (2020). Workshop Report on Biodiversity and Pandemics of the Intergovernmental Platform on Biodiversity and Ecosystem Services. IPBES secretariat, Bonn, Germany, https://doi.org/10.5281/zenodo.4147317; United Nations Environment Programme and International Livestock Research Institute (2020). Preventing the Next Pandemic: Zoonotic diseases and how to break the chain of transmission. Nairobi, Kenya. https://www.unep.org/resources/report/preventing-future-zoonotic-disease-outbreaks-protecting-environment-animals-and

[242] Coad L et al (2019) Towards a sustainable, participatory and inclusive wild meat sector. Bogor, Indonesia: CIFOR. https://doi.org/10.17528/cifor/007046

[243] FAO. 2020. The State of World Fisheries and Aquaculture 2020. Sustainability in action. Rome. https://doi.org/10.4060/ca9229en

[244] Costello et al (2016) Global fishery prospects under contrasting management regimes. Proceedings of the National Academy of Sciences 113 (18) 5125-5129 https://doig.org/10.1073/pnas.1520420113; Cabral et al (2019) Designing MPAs for food security in open-access fisheries. Scientific Reports. 9(1):8033. https://doi.org/10.1038/s41598-019-44406-w; Costello et al (2020) The future of food from the sea. Nature. 588, 95-100. https://doi.org/10.1038/s41586-020-2616-y

131. Actions to address the legality, sustainability and safety of the use of wild species of fauna and flora need to take place at the point of harvest, landing, during transportation and trade, and at point of final consumption – the latter affecting overall demand.[245] Thus, proposed targets 18 and 19 are synergistic with this one. Proposed target 17 provides direct support to all elements of this target through the focus on eliminating harmful subsidies and redirecting subsides to support legal, sustainable and safe harvest, trade and use of wild species. Actions should also respect the customary sustainable use of biodiversity by indigenous peoples and local communities (proposed Target 8, which is closely related to this target, is also relevant in this regard).

132. A range of additional actions may also be required to reach the proposed target. Examples of these include:

(a) Identification and targeted efforts towards sustainable management of species most at risk of overexploitation;

(b) Scientific stock assessments of wild populations and development of monitoring systems. For example, currently scientific stock assessments are being undertaken on approximately half of global marine catches;[246]

(c) Greater controls on harvest levels (e.g. quotas, catch limits, hunting restrictions measures to mitigate by-catch);

(d) Increased capacity of local communities to pursue sustainable livelihoods;

(e) Enhanced enforcement of existing legislation and increased efforts to curb illegal harvest and trade;

(f) Development of additional regulatory and non-regulatory measures, including certification;

(g) Greater engagement with a broad range of actors (e.g. state, non-state, civil society, consumers, experts) and greater inter-agency and international cooperation.

133. This proposed target also has links to a number of targets adopted through other processes. For example the actions taken to reach this proposed target could also be relevant to the attainment of several targets under the Sustainable Development Goals, including targets 14.4, [247] 15.2,[248] 15.5,[249] 15.7,[250] and

[245] Coad et al (2019) Towards a sustainable, participatory and inclusive wild meat sector. Bogor, Indonesia: CIFOR. https://doi.org/10.17528/cifor/007046; Booker (2019) Engaging local communities in tackling illegal wildlife trade: A synthesis of approaches and lessons for best practice. Conservation Science and Practice, 1(5), e26. https://doi.org/10.1111/csp2.26; Lavorgna and Sajeva (2020) Studying Illegal Online Trades in Plants: Market Characteristics, Organisational and Behavioural Aspects, and Policing Challenges. European Journal of Criminal Policy and Research. https://doi.org/10.1007/s10610-020-09447-2

[246] Watson et al (2018) Protect the Last of the Wild. Nature 563, no. 7729: 27–30. https://doi.org/10.1038/d41586-018-07183-6.

[247] By 2020, effectively regulate harvesting and end overfishing, illegal, unreported and unregulated fishing and destructive fishing practices and implement science-based management plans, in order to restore fish stocks in the shortest time feasible, at least to levels that can produce maximum sustainable yield as determined by their biological characteristics

[248] By 2020, promote the implementation of sustainable management of all types of forests, halt deforestation, restore degraded forests and substantially increase afforestation and reforestation globally

[249] Take urgent and significant action to reduce the degradation of natural habitats, halt the loss of biodiversity and, by 2020, protect and prevent the extinction of threatened species Target

[250] Take urgent action to end poaching and trafficking of protected species of flora and fauna and address both demand and supply of illegal wildlife products

15.c.[251] Similarly, this proposed target is relevant to CITES goals 1[252] and 3[253] as well as to targets 5[254] and 6[255] adopted under the Convention on the Conservation of Migratory Species of Wild Animals.

134. The IPBES Thematic assessment of the sustainable use of wild species, due to be finalized in 2022, will provide further useful information relevant to this proposed target.

Monitoring

135. Comprehensive data for monitoring the sustainable and safe harvesting, trade and use of wild species is limited. However, a number of datasets contain relevant information on certain types of species. For example:

(a) The CITES Trade Database[256] and the UNODC World WISE Database[212] provide data and trends on the volumes of legal and illegal wildlife trade in CITES-listed wild fauna and flora species and their products. The CITES Trade Database holds over 21 million records of legally traded wildlife data.[257] The UNODC World Wise Database (which contains information on about 180,000 seizures) aggregates illicit wildlife trade data from various sources, including the CITES Annual Illegal Trade Reports.[258] However this information is limited to species that are CITES-listed and therefore may lead to biases towards more charismatic species, both due to the listings and enforcement effort;

(b) The FAO maintains statistics on various aspects of fish stocks and catch;[259]

(c) The Living Planet Index is based on time-series data of more than 16,500 populations trends of over 4,000 threatened and non-threatened vertebrate species from terrestrial, freshwater and marine habitats.[260] It is limited in scope in that it covers vertebrates only, but allows for investigations of trends between utilised and non-utilised species, and managed and unmanaged populations;[261]

(d) The Red List Index tracks extinction risk as trends in survival probability over time, for five groups in which all species have been assessed at least twice (mammals, birds, amphibians, corals and cycads).[262] The index can be disaggregated to consider species which are affected by unsustainable use;

---

[251] Enhance global support for efforts to combat poaching and trafficking of protected species, including by increasing the capacity of local communities to pursue sustainable livelihood opportunities

[252] Trade in CITES-listed species is conducted in full compliance with the Convention in order to achieve their conservation and sustainable use.

[253] Parties (individually and collectively) have the tools, resources and capacity to effectively implement and enforce the Convention, contributing to the conservation, sustainable use and the reduction of illegal trade in CITES-listed wildlife species.

[254] Governments, key sectors and stakeholders at all levels have taken steps to achieve or have implemented plans for sustainable production and consumption, keeping the impacts of natural resource use on migratory species well within safe ecological limits to promote the favourable conservation status of migratory species and maintain the quality, integrity, resilience, and connectivity of their habitats and migratory routes.

[255] Fisheries and hunting have no significant direct or indirect adverse impacts on migratory species, their habitats or their migration routes, and impacts of fisheries and hunting are within safe ecological limits.

[256] A guide to using the CITES Trade Database https://trade.cites.org/cites_trade_guidelines/en-CITES_Trade_Database_Guide.pdf

[257] CITES Trade Database Download. Version 2020.1. CITES Secretariat, Geneva, Switzerland. Compiled by UNEP-WCMC, Cambridge, UK. https://trade.cites.org./

[258] UNODC (2020) World wildlife crime report: trafficking in protected species. United Nations Office on Drugs and Crime. https://www.unodc.org/unodc/en/data-and-analysis/wildlife.html

[259] For further details see http://www.fao.org/fishery/statistics/en

[260] Living Planet Index. https://livingplanetindex.org/home/index

[261]McRae et al (2020) A global indicator of utilised wildlife populations: regional trends and the impact of management. bioRxiv preprint https://doi.org/10.1101/2020.11.02.365031.

[262] Red List Index https://www.iucnredlist.org/assessment/red-list-index.

(e) The MSC Certified Catch measures the green weight catch of fisheries certified by the Marine Stewardship Council and compares this to total wild capture production as reported by the FAO.[263] The data set it is restricted to catch from MSC certified fisheries.

136. Additional data collection/collation - particularly for non-CITES species, domestic trade and illegal trade - would be beneficial to enhance monitoring and assessment of the sustainability of trade at various scales. Further, the information that is available on trade tends to focus on charismatic species and vertebrates. Identification of those species that are not yet covered by key datasets, as well as those that are not currently traded, but that could be traded in the future would also facilitate monitoring.

Links to other proposed goals and targets

137. The attainment of this target would directly contribute to the progress towards proposed Goal A on ecosystems species and genetic diversity as well as proposed Goal B on ensuring benefits to people. It would also contribute to the attainment of the targets 8 (meeting people's needs through sustainable use), 9 (sustainability of agriculture and other managed ecosystems and 14 (sustainable production and supply chains) and 15 (sustainable consumption).

Preventing and controlling invasive alien species[264]

Target 5. *By 2030, manage, and where possible control, pathways for the introduction of invasive alien species, achieving [50%] reduction in the rate of new introductions, and control or eradicate invasive alien species to eliminate or reduce their impacts, including in at least [50%] of priority sites.*

138. Invasive alien species are one of the main direct drivers of biodiversity loss at the global level, and in some ecosystems, such as many island ecosystems, they are the leading cause of biodiversity decline. They can impact biodiversity at the genetic, species and ecosystem levels as well as impact human and socio-economic wellbeing. They have contributed to more than half of the animal extinctions for which the cause is known and carry large economic costs.[265] The impacts of invasive alien species on island ecosystems can be particularly severe.[266] Invasive alien species primarily affect biodiversity by preying on native species or competing with them for resources and space. In addition to their environmental impacts, invasive alien species can pose a threat to food security, human health and economic development. Some invasive alien species are also agents of infectious disease. For example, *Batrachochytrium dendrobatidis*, the causal agent of chytrid fungal disease and spread mainly through trade in amphibians, has contributed to the decline of over 500 amphibian species (6.5 per cent of all described amphibian species), 90 of which are presumed extinct, making it the most destructive invasive species on record.[267] Invasive alien species also have the potential to act in synergistic manners with other drivers of biodiversity loss, including habitat loss, climate change, unsustainable use and pollution. Further there is growing evidence that other pressures on biodiversity, such as climate change, can facilitate the spread of invasive alien species, increase their impacts and/or cause established non-native species to become invasive.[268] Addressing invasive alien species is

[263] MSC certified fish catch https://www.bipindicators.net/indicators/msc-certified-catch.

[264] The text in this subsection draws on GBO-5, and references therein, in particular the section on Aichi Biodiversity 9. Additional references are indicated in the text for specific points.

[265] Clavero and García-Berthou (2005) Invasive species are a leading cause of animal extinctions. Trends in ecology & evolution 20:110. https://doi.org/10.1016/j.tree.2005.01.003; and Pimentel et al (2005) Update on the environmental and economic costs associated 29 with alien-invasive species in the United States. Ecological Economics 52:273–288. https://doi.org/10.1016/j.ecolecon.2004.10.002.

[266] Bellard et al (2016). Alien species as a driver of recent extinctions. Biology letters. 12. https://doi.org/10.1098/rsbl.2015.0623.

[267] Scheele et al (2019). Amphibian fungal panzootic causes catastrophic and ongoing loss of biodiversity. *Science* 363, 1459-1463, https://doi.org/10.1126/science.aav0379 ; Fisher and Garner (2020) Chytrid fungi and global amphibian declines. Nature Reviews Microbiology 18, 332–343. https://doi.org/10.1038/s41579-020-0335-x.

[268] Spear et al (2021) The Invasion Ecology of Sleeper Populations: Prevalence, Persistence, and Abrupt Shifts, BioScience, 71 (4) 357–369, https://doi.org/10.1093/biosci/biaa168; Robinson et al (2020) Double trouble: the implications of climate change for biological invasions. NeoBiota 62: 463-487. https://doi.org/10.3897/neobiota.62.55729.

therefore essential to reaching proposed goal A of the post-2020 global biodiversity framework. Further this target, to the extent that the actions taken to address invasive alien species would improve the provision of ecosystem services, would also contribute to the attainment of proposed goal b.

Status and trends

139. Available evidence suggests that the occurrence of invasive alien species is increasing, with travel, trade, infrastructure, and tourism facilitating the movement of species beyond natural bio-geographical barriers and by creating new pathways for their introduction.[269] One-sixth of global land area and 16 per cent of global biodiversity hotspots are highly vulnerable to invasion.[270]A recent assessment has projected that the number of established invasive alien species per continent is expected to increase by 36% between 2005 and 2050.[271] In addition the increasing impacts of climate change may lead to an increase in the range of some types of invasive alien species,[272] while the projected growth in shipping is likely to increase the risk of invasions by between 3 and 20 times by 2050 unless shipping mediated vectors [273] are strongly mitigated.[274] This underscores importance of instruments to prevent the introduction of invasive alien species.

140. The IUCN Global Register of Introduced and Invasive Species shows that the cumulative number of invasive alien species increased by about 100 from 2000-2010 and a further 30 species since.[275] This information could be used to help inform any numeric targets on the effectiveness of pathway management. However, the time lags that exist between when a species is introduced and when it is identified and reported can be significant.

141. Currently the number of species moving closer to extinction due to increased pressure from invasive alien species is greater than the number of species improving in risk status as a result of the eradication or control efforts. This is shown in the negative trend of the Red List Index (impacts of invasive alien species), indicating that assessed birds, mammals and amphibians are increasingly being driven towards extinction by the pressure of invasive alien species.

142. More than 800 eradications of invasive mammals on islands (almost 200 since 2010) have been successful, with positive benefits for an estimated 236 native terrestrial species on 181 islands.[276] Such eradications have benefited more than one hundred highly threatened species of birds, mammals and reptiles. There are far fewer examples of successful efforts to eradicate invasive alien species in continental ecosystems and overall it appears that efforts to combat species invasions have not been effective enough to keep up with increasing globalization, and in particular the impact of massively expanded trade (imports and

---

[269] Seebens et al (2017). No saturation in the accumulation of alien species worldwide. *Nature Communications* 8: 14435. https://doi.org/10.1038/ncomms14435 and Pyšek *et al*. (2020) Scientists' warning on invasive alien species. Biological Reviews. 95, pp:1511-1534. https://doi.org/10.1111/brv.12627.

[270] Early et al (2016) Global threats from invasive alien species in the twenty-first century and national response capacities. Nature Communications 7:12485. https://doi.org/10.1038/ncomms12485.

[271] Seebens et al (2021). Projecting the continental accumulation of alien species through to 2050. Global Change Biology 27: 970– 982. https://doi.org/10.1111/gcb.15333.

[272] Bellard et al (2018) Insights from modelling studies on how climate change affects invasive alien species geography. Ecology and Evolution. 8(11), 5688-5700. https://doi.org/10.1002/ece3.4098.

[273] For example, those related to the International Convention for the Control and Management of Ships' Ballast Water and Sediments.

[274] Sardain et al (2019) Global forecasts of shipping traffic and biological invasions to 2050. Nature Sustainability 2: 274–282. https://doi.org/10.1038/s41893-019-0245-y.

[275] The apparently slower rate since 2010 is likely the result of time delays between the time a species is introduced and reported as having established populations in a country or island. Global Register of Introduced and Invasive Species (GRIIS). http://www.griis.org/about.php; and Pagad et al (2018). Introducing the Global Register of Introduced and Invasive Species. Scientific Data 5:170202. https://doi.org/10.1038/sdata.2017.202.

[276] Jones et al (2016) Invasive mammal eradication on islands results in substantial conservation gains. Proceedings of the National Academy of Sciences. 113:4033–4038. https://doi.org/10.1073/pnas.1521179113

exports have roughly tripled since 2000, for example), providing additional opportunities to carry species into alien environments.

Considerations

143. To achieve the 2050 Vision and the proposed goals of the post-2020 global biodiversity framework it will be necessary to limit the spread and impact of invasive alien species.[277] This requires limiting new introductions and eradicating or controlling established invasive alien species that pose a significant risk for threatened species or the provision of ecosystem services.

144. Preventing the introduction of invasive alien species in the first place is more cost-effective than attempting to eradicate them once they become established. There are numerous actions which can be taken to prevent the introduction of invasive alien species, but these all revolve around managing the pathways of introduction. Common introduction pathways include shipping, horticulture, trade, aquaculture, transportation, forestry and pet/aquarium species, live food and bait, and contaminants, among others. The variety and relative importance of each pathway varies with national circumstances. Given the number of pathways of introduction that exist, the prioritization of efforts to monitor, manage and control them may be needed. One criterion to inform this prioritization is the frequency of past invasion events. An analysis of data stored in the Global Invasive Species Database (GISD) and a regional database in Europe (DAISIE) to identify the most common pathways suggests the highest number of introductions occurred through escape,[278] transport-contaminants[279] and intentional release[280] to nature.[281] This suggests, in the absence of more country or region specific information, prioritization efforts should focus on these three pathways. Further analysis suggests that the dominant causes of introductions also vary between high-income and low-income countries. In the case of the later, imports, particularly of plants and pets, have been identified as being particularly important, while in the former it is passenger air travel.[282] Further, while there has been progress in identifying the pathways through which both terrestrial and aquatic species enter new environments and become invasive, weak border controls in many countries prevent this knowledge from being acted upon[283]. This suggests the need for increased efforts in this respect.

145. Most countries already have some types of measures in place to manage introduction pathways. For example, in the sixth national reports to the Convention on Biological Diversity, countries commonly note the development of rules and regulations related to import and export requirements, measures to control and manage ballast water, and the establishment of phytosanitary and zoosanitary checkpoints at national points

---

[277] McGeoch and Jetz (2020). Measure and Reduce the Harm Caused by Biological Invasions One Earth, 1, 171-4. https://doi.org/10.1016/j.oneear.2019.10.003

[278] Escape refers to the movement of (potentially) invasive alien species from confinement (e.g., in zoos; aquaria; botanic gardens; agriculture; horticulture; aquaculture and mariculture facilities; scientific research or breeding programmes; or from keeping as pets) into the natural environment. Through this pathway the organisms were initially purposefully imported or otherwise transported to the confined conditions, but then escaped from such confinement, unintentionally. This may include accidental or irresponsible release of live organisms from confinement, including cases such as the disposal of live food into the environment or the use of live baits in an unconfined water system.

[279] Transport–Contaminant refers to the unintentional movement of live organisms as contaminants of a commodity that is intentionally transferred through international trade, development assistance, or emergency relief. This includes pests and diseases of food, seeds, timber and other products of agriculture, forestry, and fisheries as well as contaminants of other products.

[280] Release in nature refers to the intentional introduction of live alien organisms for the purpose of human use in the natural environment. Examples include for biological control, erosion control (and dune stabilization), for fishing or hunting in the wild; landscape "improvement" and introduction of threatened organisms for conservation purposes.

[281] UNEP/CBD/SBSTTA/18/9/Add.1

[282] Early et al (2016) Global threats from invasive alien species in the twenty-first century and national response capacities. *Nature Communications* 7:12485. https://doi.org/10.1038/ncomms12485.

[283] Bacon, et al (2012). Gaps in border controls are related to quarantine alien insect invasions in Europe. PloS one 7:e47689. https://doi.org.10.1371/journal.pone.0047689; and Convention on Biological Diversity (2014) UNEP/CBD/ SBSTTA/18/9 - Review of work on invasive alien species and considerations for future work. Pathways of introduction of invasive alien species, their prioritization and management - http://www.cbd.int/doc/meetings/sbstta/sbstta18/official/sbstta-18-09-en.pdf

of entry. Parties also commonly address the development and implementation of strategies related to biosecurity (including border control, inspection, quarantine, early warning systems and rapid response systems), and awareness raising. However, despite these efforts, as noted above, the number of invasive alien species being introduced appears to be increasing. Therefore, actions towards this proposed target should consider how existing efforts for pathway management could be further expanded and strengthened.

146. The prioritization of eradication and control efforts for established invasive alien species will likely also be required given the number of invasive alien species present in countries and regions. Focusing efforts on those invasive alien species which are particularly detrimental, such as those which are the main driver of decline of threatened species, may be warranted.[284] For example, on the IUCN Red list there are currently more than 3,700 critically endangered or endangered species which are threatened by invasive alien species. Priority could be given to controlling or eradicating invasive alien species which are having serious detrimental effects on areas of importance for biodiversity areas, such Key Biodiversity Areas (including Alliance for Zero Extinction) sites, protected areas, and/or areas where invasive alien species are posing a significant threat to species or ecosystem services.

147. While invasive alien species have clear negative effects on biodiversity, some of them have nonetheless become important to livelihoods and wellbeing, including for some indigenous peoples and local communities. As such, considerations should be given to the potential impacts of control and eradication efforts to livelihoods and how these may be addressed.

148. There are a number of international agreements and processes addressing invasive alien species. These include the International Convention for the Control and Management of Ships' Ballast Water and Sediments, developed under the International Maritime Organization, which entered into force in 2017 and the updated International Standards for Phytosanitary Measures developed under the International Plant Protection Convention. The guidance and activities of these other processes could be considered in the actions taken to reach this proposed target. Further the IPBES thematic assessment on invasive alien species and their control, due to be finalized in 2023, will provide further useful information relevant to this proposed target.

Monitoring

149. Monitoring progress towards this target will require information on the rate of new invasive alien species introductions. Some of the information noted above could be helpful in informing discussions on this issue. For example the IUCN Global Register of Introduced and Invasive Species documents the cumulative number of invasive alien species and a standard Environmental Impact Classification of Alien taxa has been developed.[285] Other registries include those maintained by International Plant Protection Convention, Centre for Agriculture and Bioscience International, European Network on Invasive Alien Species and DAISIE among others. However, this data can be associated with significant time delays between the time a species is introduced and reported as having established populations in a country or island. Its usefulness in monitoring progress towards this proposed target, especially given its ten-year time period, would need to be determined. In addition, detecting invasive alien species in some types of ecosystems, such as the marine environment, can be particularly challenging.

150. Information on the number of successful eradication and control activities could also help to inform progress towards this target. Some of this information is available through available databases. However, the comprehensiveness of this information would need to be determined. Similarly, information on the eradication of invasive alien species from priority sites would require the identification of these sites as well

[284] Essl et al (2020) The Convention on Biological Diversity (CBD)'s Post-2020 target on invasive alien species – what should it include and how should it be monitored? In Frameworks used in Invasion Science. NeoBiota 62: 99–121. https://doi.org/10.3897/neobiota.62.53972.

[285] Pagad et al (2018). Introducing the Global Register of Introduced and Invasive Species. Scientific Data, 5, 170202. https://doi.org/10.1038/sdata.2017.202; IUCN (2020) IUCN EICAT Categories and Criteria. The Environmental Impact Classification for Alien Taxa: First edition. Gland, Switzerland and Cambridge, United Kingdom. https://doi.org/10.2305/IUCN.CH.2020.05.en.

as information on the eradication and control efforts ongoing in them. While some information is available for some areas, such as island ecosystems, the comprehensiveness of this information would need to be determined. The IPBS Assessment on invasive alien species, due to be finalized in 2023 will provide further useful information relevant to this proposed target.

Links to other proposed goals and targets

151. The attainment of this target would directly contribute to proposed Goal A on ecosystems species and genetic diversity by helping to address one of the main direct drivers of biodiversity loss. It could also contribute to the attainment targets related to land and sea use and restoration (proposed target 1), to the effective management of protected areas and other effective area-based conservation measures (proposed target 2) and to the active management of species (proposed target 3) to the extent that invasive alien species are causing the changes in land- and seascapes and posing a threat to species). Progress towards this target would also be supported by greater efforts to identify and understand invasive alien species, including information on their spread, impact and effectiveness of interventions, as well as on their socio-economic impacts (proposed target 19).[286]

Reducing pollution[287]

Target 6. *By 2030, reduce pollution from all sources, including reducing excess nutrients [by x%], biocides [by x%], plastic waste [by x%] to levels that are not harmful to biodiversity and ecosystem functions and human health.*

152. Pollution is one of the main direct drivers of biodiversity loss.[288] There are many types of pollution[289] and their impacts on biodiversity vary. Excess nutrients (especially nitrogen and phosphorus), including from the historic and ongoing application of fertilizers,[290] cause eutrophication and 'dead zones' in freshwater and coastal areas. It also negatively impacts and affects species composition in terrestrial, freshwater and marine and coastal ecosystems. Pesticides, a type of biocide[291], kill or harm organisms. Plastic waste, particularly in the marine environment, impacts flora and fauna in various ways. Persistent organic pollutants also remain a threat to biodiversity due to their persistent, bio accumulative and toxic properties.[292] Mining and the handling of waste material, often pollutes freshwater ecosystems with hazardous materials like mercury and cyanide. Noise (including underwater noise) and light pollution also disrupt the behaviour

[286] McGeoch et al (2019). Measure and Reduce the Harm Caused by Biological Invasions. One Earth. 1. 171-174. https://doi.org/10.1016/j.oneear.2019.10.003; Courchamp et al (2017) Invasion Biology: Specific Problems and Possible Solutions. Trends in Ecology & Evolution 32 (1) 13–22, https://doi.org/10.1016/j.tree.2016.11.001; Latombe, et al (2017) A Vision for Global Monitoring of Biological Invasions. Biological Conservation, vol. 213, pp. 295–308, https://doi.org/10.1016/j.biocon.2016.06.013; Vanderhoeven et al (2017) Tracking Invasive Alien Species (TrIAS): Building a Data-Driven Framework to Inform Policy. Research Ideas and Outcomes, 3 p. e13414, https://doi.org/10.3897/rio.3.e13414

[287] The text in this subsection draws on GBO-5, and references therein, in particular the sections on Aichi Biodiversity Target 8. Additional references are indicated in the text for specific points.

[288] IPBES (2019): Global assessment report on biodiversity and ecosystem services of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services. E. S. Brondizio, J. Settele, S. Díaz, and H. T. Ngo (editors). IPBES secretariat, Bonn, Germany.

[289] In addition to the pollutants listed in this section, other types of pollution include synthetic and organic, persistent, bioaccumulative and toxic (PBT) substances, persistent organic pollutants (POPs), pharmaceutical residues, personal care additives, heavy metals, and edocrine disruptors.

[290] For example, see Van Meter et al (2018) Legacy nitrogen may prevent achievement of water quality goals in the Gulf of Mexico. Science, 360(6387), 427-430. https://doi.org/10.1126/science.aar4462; and Goyette et al (2018). Low buffering capacity and slow recovery of anthropogenic phosphorus pollution in watersheds. Nature Geoscience, 11(12), 921-925. https://doi.org/10.1038/s41561-018-0238-x

[291] There are different definitions of biodicides but they generally include pesticides, bactericides, preservatives and disinfectants. Pesticides include herbicides, insecticides, termiticides, nematicides, rodenticides and fungicides.

[292] Jepson and Law (2016) Persistent pollutants, persistent threats. Science 352 (6292). 1388-1389 https://doi.org/10.1126/science.aaf9075

of many species and can threatened birds and cetaceans.[293] Most pollutants also have negative impacts on human health and some groups, such indigenous peoples and local communities, women, children and people living in vulnerable situations, may be disproportionately affected. [294] Many pollutants are also harmful to human wellbeing and contribute to other societal challenges, including air pollution, climate change and stratospheric ozone depletion.

Status

153. The dynamics of different types of pollutants vary and determining levels of pollutions which are not detrimental to biodiversity is challenging as these levels are context and location specific. Some pollutants directly cause the mortality of species while others may have broader impacts on entire ecosystems. Further some types of pollution can accumulate through time and are relatively long lived while others can be more easily removed or sequestered. In addition, some types of pollution originate from specific or distinct locations and events while others originate from more diffuse sources. Quantitative assessments of pollution tend to focus on a small number of variables and data quality and quantity is inconsistent across assessments, with information on greenhouse gases and particulates being the most consistently reported.[295] These different dynamics makes it challenging to present information for pollution as a whole. Given this, information on the status on the three types of pollution identified in the proposed target are presented separately below:

(a) *Nutrients* - Excessive levels of nutrients, in particular of reactive nitrogen and phosphorous, are considered one of the main drivers of global change, affecting species composition in terrestrial, freshwater and coastal ecosystems with cascading effects on biodiversity, ecosystem function and human wellbeing. Agricultural fertilizers are a major source of both nitrogen and phosphorous pollution though significant nitrogen pollution also comes from factory farming. The average use nitrogen use per area of cropland has remained stable during this decade,[296] and under business-as-usual scenarios, rates of nitrogen pollution are projected increase in many regions but decrease in others. [297]Further despite increasing good practice in the use and management of fertilizers, nutrient levels continue to be at levels detrimental to biodiversity. Organic and nutrient enrichment, sewage, industrial discharges and land run-off have led to increases in oxygen low "dead zones" and algal blooms in both marine and freshwater ecosystems in the last 50 years.[298] Under business-as-usual scenarios, rates of nitrogen pollution are projected increase in many regions but decrease in others;[299]

---

[293] Sanders et al (2020). A meta-analysis of biological impacts of artificial light at night. *Nature Ecology & Evolution*. 5, 74–8). https://doi.org/10.1038/s41559-020-01322-x; Duarte et al (2021). The soundscape of the Anthropocene ocean. *Science* 371(6529), eaba4658. https://doi.org/10.1126/science.aba4658; Slabbekoorn (2019). Noise pollution. Quick Guide. *Current Biology* 29(19). https://doi.org/10.1016/j.cub.2019.07.018.

[294] Fernández-Llamazares Á, et al (2020) A State-of-the-Art Review of Indigenous Peoples and Environmental Pollution. Integrated Environmental Assessment and Management May;16(3):324-341. https://doi.org/10.1002/ieam.4239.

[295] IPBES (2019): Global assessment report on biodiversity and ecosystem services of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services. E. S. Brondizio, J. Settele, S. Díaz, and H. T. Ngo (editors). IPBES secretariat, Bonn, Germany.

[296] The term biocide may have different interpretations depending on national legislation, so it is very important to define this term and what it encompasses e.g. synthetic pesticides etc.

[297] Biodiversity Indicators Partnership (2020). Trends in Nitrogen Deposition. https://www.bipindicators.net/indicators/trends-in-nitrogen-deposition, based on information from the International Nitrogen Initiative https://initrogen.org/; and Lamarque et al (2013) The Atmospheric Chemistry and Climate Model Intercomparison Project (ACCMIP): overview and description of models, simulations and climate diagnostics. Geoscientific Model Development. 6, 179–206. https://doi.org/10.5194/gmd-6-179-2013.

[298] Global Chemical Outlook II, 2019 https://www.unenvironment.org/explore-topics/chemicals-waste/what-we-do/policy-and-governance/global-chemicals-outlook.

[299] Biodiversity Indicators Partnership (2020). Trends in Nitrogen Deposition. https://www.bipindicators.net/indicators/trends-in-nitrogen-deposition, based on information from the International Nitrogen Initiative https://initrogen.org/; and Lamarque et al (2013) The Atmospheric Chemistry and Climate Model Intercomparison Project (ACCMIP): overview and description of models, simulations and climate diagnostics. Geoscientific Model Development. 6, 179–206. https://doi.org/10.5194/gmd-6-179-2013.

(b) *Plastic* - Rates of plastic pollution are projected to increase 2.6 times by 2040, almost tripling the cumulative plastic waste in the oceans.[300] Further marine plastic pollution has increased tenfold since 1980, affecting at least 267 species, including 86 per cent of marine turtles, 44 per cent of seabirds and 43 per cent of marine mammals.[301] Plastic ingestion by marine animals (birds, turtles, whales) combined with entanglement with floating litter create substantial risks to marine wildlife.[302] Further a recent study estimated that the rate of plastic ingestion by fish has doubled, increasing by about 2.4 per cent per year. This increase is attributed to increased rates of plastic consumption as well as improved methodologies to detect plastic in fish.[303] Actions taken in many countries to minimize plastic waste and manage it in an environmentally sound manner have not been sufficient to reduce this source of pollution;

(c) *Biocides*[304] – Biocides are a broad category of substances which are used to control, deter, or eliminate harmful organisms. Various biocides are used globally. Average pesticide use, while stable, remains at a level that has a detrimental impact on biodiversity. Further the use of certain types of pesticides have been found to be particularly detrimental for certain types of biodiversity, such as pollinators[305]. More generally the global demand for chemical-based products continues to rise. Worldwide sales in chemicals were worth approximately US$3.5 trillion (excluding pharmaceuticals) in 2017 and chemicals production is expected to double in size between 2017 and 2030.[306] However not all of these chemicals are be biocides and therefore these values only provide contextual information.

154. In addition to the types of substances noted above a range of other substances can also be pollutants, including mercury[307] and persistent organic pollutants (POPs). Furthermore the impacts of noise and light pollution on biodiversity are increasing recognizes, though there is no global level information on how widespread these impacts are.[308] In addition a growing category of pollution is e-waste. Production of electronic waste, which often contains toxic and hazardous chemicals, is a growing source of pollution – with a reported increase of 20 per cent from 2014 to 2019. At the same time recycling rates remain low – 17 per cent.[309]

---

[300] Lau et al (2020). Evaluating scenarios towards zero plastic pollution. *Science* 369(6510) https://doi.org/10.1126/science.aba9475.

[301] IPBES (2019): Global assessment report on biodiversity and ecosystem services of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services. E. S. Brondizio, J. Settele, S. Díaz, and H. T. Ngo (editors). IPBES secretariat, Bonn, Germany.

[302] Joint Group of Experts on the Scientific Aspects of Marine Environmental Protection (2015). *Fate and Effects of Microplastics in The Marine Environment: A Global Assessment.* Kershaw, P.J. (ed.). London: International Maritime Organization. http://ec.europa.eu/environment/marine/goodenvironmental-status/descriptor0/pdf/GESAMP_microplastics%20full%20study.pdf .

[303] Savoca et al (2021) Plastic ingestion by marine fish is widespread and increasing. Global Change Biology https://doi.org/10.1111/gcb.15533.

[304] The term biocide may have different interpretations depending on national legislation. In the consideration of this proposed target it may be necessary to develop a common understanding of what this term encompasses. Biocides generally include pesticides, bactericides, preservatives and disinfectants. Pesticides include herbicides, insecticides, termiticides, nematicides, rodenticides and fungicides.

[305] For example, neonicotinoids, a widely used class of insecticides have been found to have particularly negative impacts honeybees.

[306] United Nations Environment Programe (2019). Global Chemical Outlook II. https://www.unenvironment.org/explore-topics/chemicals-waste/what-we-do/policy-and-governance/global-chemicals-outlook.

[307] Informal or poorly regulated artisanal and small-scale gold mining (ASGM), often using mercury and operating within or in the vicinity of protected areas, has been reported to be the cause of land degradation and deforestation, the contamination of soil and water bodies, and overuse of forest resources.

[308] Sanders et al (2020). A meta-analysis of biological impacts of artificial light at night. *Nature Ecology & Evolution*. 5, 74–8). https://doi.org/10.1038/s41559-020-01322-x; Duarte et al (2021). The soundscape of the Anthropocene ocean. *Science* 371(6529), eaba4658. https://doi.org/10.1126/science.aba4658; Slabbekoorn (2019). Noise pollution. Quick Guide. *Current Biology* 29(19). https://doi.org/10.1016/j.cub.2019.07.018.

[309] Forti et al (2020) The Global E-waste Monitor 2020: Quantities, flows and the circular economy potential. United Nations University (UNU)/United Nations Institute for Training and Research (UNITAR) – co-hosted SCYCLE Programme, International

155. The impacts of pollution on biodiversity are difficult to quantify globally given the different types of pollutants and their varied impacts. However, the Red List Index indicates that impacts of pollution continue to drive species towards extinction.[310] Furthermore surface water quality has continued to decline over the last five decades; it is estimated that over 80 per cent of urban and industrial wastewater is released to freshwater systems without adequate treatment. This is a volume six times as large as in all of the world's rivers or about 300-400 million tons of contaminants.[311] This has direct implications for biodiversity as well as human health as nearly 50% of global inland fish catch comes from water basins under high or moderate threat including from pollution in its many forms.[312]

Considerations

156. The actions taken to reach this proposed target will need to vary according to the pollutant under consideration and different metrics will be needed for different types of pollution. With regard to nitrogen a target of at least halving nitrogen waste by 2030, has been proposed,[313] and case experience suggests that such a target would be feasible.[314]

157. With regard to pesticides, a number of studies show that pesticide use could be significantly reduced while increasing yields and reducing costs, especially when combined with the redesign of agricultural production systems (on-farm biodiversity could be both a contributor and a beneficiary to such a shift, see proposed Target 9). For example, empirical evidence, from a range of crops and regions, shows that, in many systems, pesticide use can be reduced by between 20 per cent and 70 per cent without reducing yields or farmer income when accompanied by appropriate agronomic practices. In some cases, improved yields and/or incomes can accompany reductions in pesticide use, often associated with increases in the populations of natural enemies of pests.[315]

158. With regard to plastic, a recent expert study on plastic waste estimates that pollution rates could be reduced by about 40 per cent (from 2016 to 2040) through a combination of replacing, recycling and waste management, suggesting that a reduction of about 20 per cent by 2030 would be feasible with current and

---

Telecommunication Union (ITU) & International Solid Waste Association (ISWA), Bonn/Geneva/Rotterdam. https://globalewaste.org.

[310] Biodiversity Indicators Partnership (2020). Red List Index (impacts of pollution). https://www.bipindicators.net/indicators/red-list-index/red-list-index-impacts-of-pollution.

[311] IPBES (2019) Global assessment report on biodiversity and ecosystem services of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services. IPBES secretariat, Bonn, Germany. https://ipbes.net/global-assessment

[312] FAO (2020) The State of World Fisheries and Aquaculture 2020. Sustainability in action. Rome. https://doi.org/10.4060/ca9229en.

[313] Sutton et al (2021) The Nitrogen Decade: mobilizing global action on nitrogen to 2030 and beyond. One Earth 4(1), 10-14. https://doi.org/10.1016/j.oneear.2020.12.016 and Colombo Declaration on Sustainable Nitrogen Management. https://papersmart.unon.org/resolution/uploads/colombo_declaration_final_24_oct_2019.pdf.

[314] For example, Cui et al (2018) Pursuing sustainable productivity with millions of smallholder farmers. Nature 555, 363–366. https://doi.org/10.1038/nature25785.

[315] Gurr et al (2016) Multi-country evidence that crop diversification promotes ecological intensification of agriculture, Nature Plants. https://doi.org/10.1038/nplants.206.14. Settle et al (1996) Managing tropical rice pests through conservation of generalist natural enemies and alternative prey, Ecology, 77(7), 1996, pp 1975-1988. Lechenet et al (2017). Reducing pesticide use while preserving crop productivity and profitability on arable farms. Nature Plants volume 3(17008). https://doi.org/10.1038/nplants.2017.8; Vasileiadis et al (2016). Farm□scale evaluation of herbicide band application integrated with inter□row mechanical weeding for maize production in four European regions. Weed Research 56(4), 313-322. https://doi.org/10.1111/wre.12210; National Research Council. 2003. Frontiers in Agricultural Research: Food, Health, Environment, and Communities. Washington, DC: The National Academies Press. https://doi.org/10.17226/10585. Wan et al (2020) multispecies coculture promotes ecological intensification of vegetable production. Journal of cleaner production 257 120851. https://doi.org/10.1016/ j.jclepro.2020.120851; HLPE. 2019. Agroecological and other innovative approaches for sustainable agriculture and food systems that enhance food security and nutrition. A report by the High Level Panel of Experts on Food Security and Nutrition of the Committee on World Food Security, Rome.

foreseeable technologies.[316] More generally, reduction in waste and pollution would be enabled by shifts to a more circular economy.[317]

159. The actions taken to reach this proposed target could help to implement several other international processes and regional seas conventions. For example, the Strategic Approach to International Chemicals Management (SAICM)[318] is developing a "Beyond 2020" instrument with targets and possible indicators. Further the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal, the Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade, the Stockholm Convention on Persistent Organic Pollutants, and the Minamata Convention on Mercury also have relevant processes which are relevant to this proposed target. Further, in 2019, the Conference of the Parties to the Basel Convention unanimously adopted the Plastic Waste Amendments.[319] Further, in the marine realm, the International Maritime Organisation has a series of conventions related to pollution, the principal one being the International Convention for the Prevention of Pollution from Ships (MARPOL) covering prevention of pollution of the marine environment by ships from operational or accidental causes. Other conventions relating to prevention of marine pollution include: International Convention Relating to Intervention on the High Seas in Cases of Oil Pollution Casualties, Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter and the London Protocol, International Convention on Oil Pollution Preparedness, Response and Co-operation, Protocol on Preparedness, Response and Co-operation to pollution Incidents by Hazardous and Noxious Substances, International Convention on the Control of Harmful Anti-fouling Systems on Ships, 2001 and the International Convention for the Control and Management of Ships' Ballast Water and Sediments. Specifically, with regards to plastic and microplastic pollution, an ad hoc open-ended expert group established through United Nations Environment Assembly identified potential national, regional and international response options to address marine litter and microplastics. These options will be considered during the fifth session of the United Nations Environment Assembly.[320] As such there is a potential for synergies across multiple international processes, particularly with regards to common actions, shared indicators and data collection.

160. This proposed target is also linked to several of the targets under the Sustainable Development Goals. This includes targets 6.3,[321] 12.4,[322] and 14.1.[323]

---

[316] The Pew Charitable Trusts and SYSTEMIQ (2020). Breaking the Plastic Wave. A comprehensive assessment of pathways towards stopping ocean plastic pollution. https://www.pewtrusts.org/-/media/assets/2020/10/breakingtheplasticwave_mainreport.pdf.

[317] United Nations Environment Programe (2019). Global Chemical Outlook II. https://www.unenvironment.org/explore-topics/chemicals-waste/what-we-do/policy-and-governance/global-chemicals-outlook.

[318] SAICM is a voluntary policy framework to promote chemical safety around the world. Through its multi-stakeholder and multi-sectoral approach, SAICM is contributing to the sound management of chemicals and waste through the entire life cycle and complements the above mentioned chemical Conventions as well other emerging policy issue and issues of concern (e.g. lead in paint, endocrine disrupting chemicals, environmental persistent pharmaceutical pollutants and nanomaterials).

[319] With the Plastic Waste Amendments, all plastics waste and mixtures of plastics waste generated by Parties to the Basel Convention, with a few exceptions, will be subject to the prior informed consent procedure, unless they are destined for recycling in an environmentally sound manner and are almost free from contamination and other types of wastes. It will also provide an incentive for the private sector, governments and other stakeholders to strengthen capacities for recycling, and thus mitigating adverse impacts of unsound management of plastic waste on the biodiversity and ecosystem services.

[320]. For more information see the Chair's summary of the work of the ad hoc open-ended expert group on marine litter and microplastics - https://wedocs.unep.org/bitstream/handle/20.500.11822/34635/K2100061.pdf? sequence=11&isAllowed=y.

[321] By 2030, improve water quality by reducing pollution, eliminating dumping and minimizing release of hazardous chemicals and materials, halving the proportion of untreated wastewater and substantially increasing recycling and safe reuse global.

[322] By 2020, achieve the environmentally sound management of chemicals and all wastes throughout their life cycle, in accordance with agreed international frameworks, and significantly reduce their release to air, water and soil in order to minimize their adverse impacts on human health and the environment.

[323] By 2025, prevent and significantly reduce marine pollution of all kinds, in particular from land-based activities, including marine debris and nutrient pollution.

Monitoring

161. Monitoring progress towards this proposed target will require information on the use of different types of pollutants. While some information on nutrients (in particular nitrogen), biocides and plastics is available, this information is not always collected in a consistent way or updated in a timeframe suitable for tracking progress towards a target with a 2030 deadline. Further as noted above trends in pollution vary by substance as do their impacts on the environment. This creates challenges in identifying appropriate baselines and indicators. However ongoing monitoring efforts, including those linked with the processes noted above could help to address some of these challenges.[324]

Links to other proposed goals and targets

162. The attainment of this target would directly contribute to the progress towards proposed Goal A on ecosystems species and genetic diversity. To the extent that the actions taken to reach this target addressed issues related to waste, it would also contribute to proposed target 14 (sustainable production and supply chains) and 15 (sustainable consumption). Similarly, some ecosystem-based approaches to address nutrient pollution, such as the conservation and restoration of wetlands and the use of bivalve shellfish and seaweed aquaculture,[325] are also relevant (see proposed target 8). Further while some activities targeted to specific pollutants will be needed, some interventions have the potential to address multiple pollutants. For example, the better management and treatment of wastewater, including at the level of watersheds, could address nutrient, plastic and pesticide pollution.

Mitigation and adaption[326]

Target 7. *By 2030, increase contributions to climate change mitigation adaption and disaster risk reduction from nature-based solutions and ecosystem-based approaches, ensuring resilience and minimizing any negative impacts on biodiversity*.

163. Research on the causes and impacts of climate change makes it increasingly clear that the climate and biodiversity crises are interlinked.[327] Biodiversity is threatened by climate change both directly and indirectly.[328] Climate change, and the associated pressure of ocean acidification, is one of the key drivers of change to biodiversity, impacting species survival and distribution, contributing to ecosystem degradation,

[324] For example, there is ongoing indicator work under the intersessional process on SAICM. The Basel, Rotterdam and Stockholm conventions have a joint clearing-house mechanism that facilitate the exchange of information and expertise relevant to these conventions. The Stockholm Convention also has a Global Monitoring Plan data warehouse with monitoring data related to persistent organic pollutants. As part of the Minamata Convention information on Artisanal and small-scale gold mining with mercury use is collected as part of National Action Plans and its specific strategies. The Food and Agriculture Organization, through FAOSTAT, collects information on pesticide and fertilizer use.

[325] Dvarskas et al (2020). Quantification and Valuation of Nitrogen Removal Services Provided by Commercial Shellfish Aquaculture at the Subwatershed Scale. Environmental Science & Technology 54 (24), 16156-16165. https://doi.org/10.1021/acs.est.0c03066

[326] The text in this subsection draws on GBO-5, and references therein, in particular the section related to the sustainable climate action transition. Additional references are indicated in the text for specific points.

[327] IPCC (2019). Climate Change and Land: an IPCC special report on climate change, desertification, land degradation, sustainable land management, food security, and greenhouse gas fluxes in terrestrial. In press; IPBES (2019). Global assessment report on biodiversity and ecosystem services of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services. E. S. Brondizio, J. Settele, S. Díaz, and H. T. Ngo (editors). IPBES secretariat, Bonn, Germany / Secretariat of the Convention on Biological Diversity (2020). Global Biodiversity Outlook 5. Montreal; IPCC, 2019: Summary for Policymakers. In: IPCC Special Report on the Ocean and Cryosphere in a Changing Climate. In press.

[328] Biodiversity is also an important for carbon sequestration. For example, oceans and terrestrial ecosystems are a sink for approximately 50% of anthropogenic carbon dioxide emissions (Watson et al (2020) Revised estimates of ocean-atmosphere CO2 flux are consistent with ocean carbon inventory. Nature Communications 11, 4422 https://doi.org/10.1038/s41467-020-18203-3; Tharammal et al (2019). A review of the major drivers of the terrestrial carbon uptake: Model-based assessments, consensus, and uncertainties. Environmental Research Letters. 14. https://doi.org/10.1088/1748-9326/ab3012.

and exacerbating the effects of unsustainable ecosystem management.[329] Its observed effects are accelerating across marine, terrestrial and freshwater ecosystems, with some ecosystems, such as coral reefs, already severely affected.[330] Climate change is projected to have progressively greater impacts becoming the largest driver of biodiversity loss in the second half of this century. Moreover, climate change impacts undermine ecosystem resilience and thus weaken the contribution of ecosystems to both mitigate and adapt to climate change and can also interact with other pressures of biodiversity further driving loss. Limiting global warming and considering possible impacts of mitigation and adaptation strategies on biodiversity is thus of crucial importance to the 2050 Vision of living in harmony with nature.

Status and trends

164. The potential of working with nature to support climate change mitigation and adaptation is increasingly recognized.[331] The terms "nature-based solutions" or "ecosystem-based approaches" are increasingly used to describe such approaches and are umbrella terms that cover a wide range of strategies including ecosystem-based adaptation,[332] ecosystem-based mitigation, ecosystem-based disaster risk reduction,[333] "green" and "blue" infrastructure or "ecological engineering". However, it is important to note that nature-based solutions are not limited to addressing climate change and can include nature-based strategies for addressing other societal challenges, such as those linked to food security or human health.

165. Nature-based solutions and ecosystem-based approaches for adaptation to climate change have been shown to be effective for many purposes, including to regulate water flows, protect shorelines, retain agricultural soils and reduce air temperature in cities (sometimes in hybrid solutions combined with built infrastructure).[334] Nature-based solutions can also reduce the occurrence and severity of disasters caused by extreme weather events, which are expected to become more common with climate change.[335] Frequently cited advantages of nature-based solutions are there relatively low cost and the potential to generate co-benefits in the form of food, marketable products, jobs, biodiversity conservation, improved health, and recreation potential.[336] Recent research has also highlighted the benefits that actions primarily motivated by

[329] IPBES (2019) Global assessment report on biodiversity and ecosystem services of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services. IPBES secretariat, Bonn, Germany; and Kapos et al (2019) The Role of the Natural Environment in Adaptation, Background Paper for the Global Commission on Adaptation. Rotterdam and Washington, D.C.: Global Commission on Adaptation.

[330] IPBES (2019) Global assessment report on biodiversity and ecosystem services of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services. IPBES secretariat, Bonn, Germany

[331] See e.g. The Nature-Based Solutions for Climate Manifesto, developed for the UN Climate Action Summit 2019, available at: https://wedocs.unep.org/xmlui/handle/20.500.11822/29705.

[332] The use of biodiversity and ecosystem functions and services, as part of an overall adaptation strategy, contributing to the well-being of societies, including indigenous peoples and local communities, and helping people adapt to the adverse effects of climate change; CBD/COP/DEC/14/5

[333] The holistic, sustainable management, conservation and restoration of ecosystems to reduce disaster risk, with the aim to achieve sustainable and resilient development; Estrella and Saalismaa (2013) Ecosystem-based DRR: An overview. In: Renaud, F., K. Sudmeier-Rieux & M. Estrella (eds.). The role of ecosystems in disaster risk reduction, United Nations University Press, 440 pp.

[334] Global Commission on Adaptation (2019) Adapt Now: A Global Call for Leadership on Climate Resilience. Washington, DC: World Resources Institute; and Chausson et al (2020) Mapping the effectiveness of nature□based solutions for climate change adaptation. Global Change Biology 26(11), 6134 - 6155. https://doi.org/10.1111/gcb.15310

[335] UNDRR (2020) Ecosystem-Based Disaster Risk Reduction: Implementing Nature-based Solutions for Resilience, United Nations Office for Disaster Risk Reduction – Regional Office for Asia and the Pacific, Bangkok, Thailand.

[336] Kapos et al (2019) The Role of the Natural Environment in Adaptation, Background Paper for the Global Commission on Adaptation. Rotterdam and Washington, D.C; Global Commission on Adaptation; United Nations Environment Programme (2021) Adaptation Gap Report 2020. Nairobi; IPCC (2019) Climate Change and Land: an IPCC special report on climate change, desertification, land degradation, sustainable land management, food security, and greenhouse gas fluxes in terrestrial ecosystems. In press.

biodiversity conservation can bring for climate change mitigation and adaptation and disaster risk reduction, and have consequently raised awareness of the importance of conservation and sustainable use.[337]

166. Through various international processes, countries have made various pledges and commitments to promote or use nature-based solutions and ecosystem-based approaches related to climate change and disaster risk reduction, though the specifically terminology used often varies. These include through Land Degradation Neutrality plans under the UNCCD; disaster management plans under the Sendai Framework; pledges under the Bonn Challenge; National REDD+ Strategies and Action Plans; and Nationally Determined Contributions (NDCs) or National Adaptation Plans[338] under UNFCCC. Specifically with regards to the UNFCCC, as of 2019, 130 countries (66% of signatories to the Paris Agreement) had included nature-focused actions for climate change mitigation and/or adaptation in the commitments made in their NDCs.[339] Further, all National Adaptation Plans included measures corresponding to ecosystem-based adaptation.[340] However many of these commitments do not include quantitative values. In addition, adaptation actions are rarely linked to specific climate hazards and potential synergies between mitigation and adaptation are often missed.[341] Further despite recent increases in actions that could be called nature-based solutions or ecosystem based approaches to climate change, such actions only receive a small share of overall funding for climate change mitigation and adaptation.[342] Opportunities to make greater use of such approaches, particularly in measures to protect or restore coastal ecosystems and peatlands, are often missed.[343]

167. While many nature-based solutions or ecosystem based approaches are compatible with biodiversity conservation and sustainable use and the provision of biodiversity benefits, there are also cases of programmes that have had negative impacts on biodiversity and/or on the wellbeing of indigenous peoples and local communities.[344] Risks of such negative impacts could grow in future if climate action does not take account of social and environmental standards or safeguards.[345]

Considerations

168. The impacts on biodiversity are much greater with an increase of global temperatures by 2 degrees Celsius than by an increase of 1.5 degrees Celsius above pre-industrial levels. Impacts of climate change on biodiversity include, among other things, loss of habitat, change in species behaviours, altered patterns of

[337] De Lamo et al (2020) Strengthening synergies: how action to achieve post-2020 global biodiversity conservation targets can contribute to mitigating climate change. UNEP-WCMC, Cambridge, United Kingdom / WWF (2019) Enhancing Nationally Determined Contributions through Protected Areas. WWF, Washington, United States.

[338] Lo (2016). Synthesis report on experiences with ecosystem-based approaches to climate change adaptation and disaster risk reduction. Technical Series No.85. Secretariat of the Convention on Biological Diversity, Montreal, 106 pages; United Nations Environment Programme (2021) Adaptation Gap Report 2020. Nairobi; and IUCN and UNCCD (2019) Report on the IUCN-UNCCD Joint Work Plan 2015-2020.

[339] Seddon et al (2020) Global recognition of the importance of nature-based solutions to the impacts of climate change. Global Sustainability, 3, E15. https://doig.org/10.1017/sus.2020.8.

[340] Terton and Greenwalt (2020) Building Resilience with Nature: Ecosystem-based Adaptation in National Adaptation Plan Processes. NAP Global Network, Winnipeg, Canada.

[341] Seddon et al (2019) Nature-based Solutions in Nationally Determined Contributions: Synthesis and recommendations for enhancing climate ambition and action by 2020. Gland, Switzerland and Oxford, United Kingdom: IUCN and University of Oxford; United Nations Environment Programme (2021). Adaptation Gap Report 2020. Nairobi.

[342] United Nations Environment Programme (2021) Adaptation Gap Report 2020. Nairobi; Griscom et al (2017) Natural climate solutions. Proceedings of the National Academy of Sciences, 114(44), pp.11645-11650. https://doi.org/10.1073/pnas.1710465114

[343] Seddon et al (2019) Nature-based Solutions in Nationally Determined Contributions: Synthesis and recommendations for enhancing climate ambition and action by 2020. Gland, Switzerland and Oxford, United Kingdom: IUCN and University of Oxford.

[344] IPBES (2019) Global assessment report on biodiversity and ecosystem services of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services. IPBES secretariat, Bonn, Germany.

[345] IPCC (2019) Climate Change and Land: an IPCC special report on climate change, desertification, land degradation, sustainable land management, food security, and greenhouse gas fluxes in terrestrial ecosystems. In press.

species movement and increased risk of extinction. Further while climate change affects all ecosystems, its impacts are particularly harmful to some types of ecosystems, such as coral reefs, mountains and ice related habitats, because they are range restricted, slow growing or forming, and/or have limited ability to adapt to rising temperatures. It has been estimated that with a global temperature increase of 2°C, 5 per cent of species will be at risk of climate-related extinction, while a 4.3°C warming would put 16 per cent of species at risk.[346] Species extinctions will affect ecosystem services for human well-being and economic activity and may cause a downward spiral of resource depletion and increasing vulnerability[347] as well as feedback loops leading to further emissions of carbon from vegetation and soils.[348] Therefore, effective and sustainable climate action is a prerequisite to slowing and reversing biodiversity loss.

169. A number of ecosystem-based approaches, such as conservation, ecosystem restoration and improved management of agriculture, forestry, fisheries and aquaculture[349] could contribute to both climate change mitigation and adaptation, while also contributing to biodiversity goals, the provision of ecosystem services and disaster-risk reduction. In fact a number of studies indicate that such "natural climate solutions" (a sub-group of nature-based solutions) could provide about one-third of the total net emission reduction effort required to keep climate change close to 1.5 degrees C above pre-industrial levels complementing stringent reductions in emissions from fossil fuels which are essential.[350] Available evidence on the effectiveness of ecosystem based interventions suggest that most interventions can be effective in reducing adverse climate impacts, with more synergies than trade-offs between reduced climate impacts and broader ecological, social, and climate change mitigation outcomes, but also reveals gaps in the available evidence, with limited peer□reviewed studies from low and lower middle□income countries.[351]

170. Actions to increase contributions to climate change mitigation adaption and disaster risk reduction from nature-based solutions or ecosystem-based approaches are also closely related to proposed target 10 which also addresses nature-based solutions. To ensure fairness, equity and effectiveness, it is generally recognized that indigenous peoples and local communities should be fully involved in the development and implementation of ecosystem-based approaches. In addition, while many proposed ecosystem-based interventions have co-benefits for biodiversity, this is not always the case, and careful assessment of synergies and trade-offs is required.[352] In particular, tree planting is not always appropriate, especially of non-native species in monoculture plantations. The voluntary guidelines for the design and effective implementation of ecosystem based approaches to climate change adaptation and disaster risk reduction adopted by the Conference of the Parties contain principals and safeguards addressing this issue,[353] and recent guidance from IUCN requires a positive contribution for biodiversity for an intervention to qualify as a

[346] IPBES (2019) Global assessment report on biodiversity and ecosystem services of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services. IPBES secretariat, Bonn, Germany.

[347] Kapos et al (2019). The Role of the Natural Environment in Adaptation, Background Paper for the Global Commission on Adaptation. Rotterdam and Washington, D.C.: Global Commission on Adaptation.

[348] IPCC (2019) Climate Change and Land: an IPCC special report on climate change, desertification, land degradation, sustainable land management, food security, and greenhouse gas fluxes in terrestrial ecosystems. In press.

349 Froehlich et al (2019). Blue growth potential to mitigate climate change through seaweed offsetting. Current Biology, 29(18), 3087-3093. https://doi.org/10.1016/j.cub.2019.07.041; Theuerkauf et al (2019). A global spatial analysis reveals where marine aquaculture can benefit nature and people. PLoS One, 14(10), e0222282. https://doi.org/10.1371/journal.pone.0222282.

[350] Griscom et al (2017) Natural climate solutions. Proceedings of the National Academy of Science 114 (44) 11645-11650; https://doi.org/10.1073/pnas.1710465114 and Roe et al (2019) Contribution of the land sector to a 1.5 °C world. Nature Climate Change. 9, 817–828. https://doi.org/10.1038/s41558-019-0591-9.

[351] Chausson et al (2020) Mapping the effectiveness of Nature□based Solutions for climate change adaptation. Global Change Biology 26: 6134– 6155. https://doi.org/10.1111/gcb.15310.

[352] CBD/SBSTTA/23/INF/1; Seddon et al (2021) Getting the message right on nature□based solutions to climate change. Global Change Biology 27: 1518-1546. https://doi.org/10.1111/gcb.15513; Seddon et al (2020). Understanding the value and limits of nature-based solutions to climate change and other global challenges. Philosophical Transactions of the Royal Society B: Biological Sciences. 375. 20190120. https://doi.org/10.1098/rstb.2019.012.

[353] Decision 14/5. The issue of tradeoffs in Ecosystem-based approaches for adaptation is also addressed in decision X/33.

nature-based solution.[354] The phase-out of fossil fuels requires the development of alternative, renewable energy sources, as well as improved energy efficiency. Inevitably, renewable energy as well as some adaptation measures, have potential impacts on biodiversity. It will be important therefore to avoid or minimize any such negative impacts.

171. Barriers to a wider uptake of nature-based solutions for climate change and disaster risk reduction include a lack of awareness within relevant sectors, information gaps, and limited access to existing information on distribution and management options for ecosystem services relevant to climate change mitigation and adaptation and the buffering of natural hazards.[355] However there are a number of relevant initiatives and declarations which could help overcome these barriers and also offer opportunities for creating 'virtuous cycles', in which nature-based solutions reduce climate impacts and strengthen the resilience of biodiversity and its capacity to continue to provide services. Examples include the Nature-based Solutions for Climate Manifesto,[356] launched at the Secretary General's Climate Action Summit in 2019, the Nature Based Solutions Action Track of the Global Commission on Adaptation,[357] and the decisions made at the twenty-fifth meeting of the Conference of the Parties to UNFCCC underlining the essential contribution of nature to addressing climate change and its impacts and the need to address biodiversity loss and climate change in an integrated manner.[358] Nature-based solutions have also been identified by the Presidency of the twenty-sixth meeting of the Conference of the Parties to UNFCCC as a priority for that meeting.[359] Nature-based solutions have also been highlighted as a possible cornerstone for a green recovery from the economic crisis caused by the Covid-19 pandemic.[360]

172. Actions towards this target could contribute to several of the targets under the Sustainable Development Goals. This includes targets 1.5,[361] 11.b, [362] 13.1,[363] among others. Similarly they would also contribute to targets or objectives under other international processes including the UNFCCC and the Paris Agreement, the Sendai Framework for Disaster Risk Reduction, resolutions on climate change and wetlands under the Ramsar Convention, the New York Declaration on Forests, the United Nations Decade on Ecosystem Restoration and the Bonn Challenge on Forest and Landscape Restoration among others.

Monitoring

173. Information on potential and achieved emission reductions/sequestration is available from IPCC reports, national climate change strategies and related documents (such as national REDD+ strategies) and national reporting to the UNFCCC. In the case of climate change adaptation and disaster risk reduction, less

---

[354] IUCN Global Standard for NbS. https://www.iucn.org/theme/nature-based-solutions/resources/iucn-global-standard-nbs

[355] Kapos, V., Wicander, S., Salvaterra, T., Dawkins, K., Hicks, C. 2019. The Role of the Natural Environment in Adaptation, Background Paper for the Global Commission on Adaptation. Rotterdam and Washington, D.C.: Global Commission on Adaptation. / Statistics Norway (2018). Barriers to progress in REDD preparations. Can high quality satellite data save time and costs? Statistisk sentralbyrå. Oslo-Kongsvinger, Norway. / Somarakis, G., Stagakis, S., and Chrysoulakis, N. (Eds.). (2019). ThinkNature Nature-Based Solutions Handbook. ThinkNature project funded by the EU Horizon 2020 research and innovation programme under grant agreement No. 730338. doi:10.26225/jerv-w202.

[356] Available at: https://wedocs.unep.org/bitstream/handle/20.500.11822/29705/190825NBSManifesto.pdf?sequence=1&isAllowed=y

[357] https://www.wri.org/our-work/project/global-commission-adaptation/action-tracks/nature-based-solutions

[358] UNFCCC Dec. 1/CP.25, available at https://unfccc.int/sites/default/files/resource/cp2019_13a01E.pdf

[359] https://www.gov.uk/government/speeches/increasing-ambition-towards-a-climate-resilient-zero-carbon-economy

[360] Nature4Climate (2020). Nature-Positive Recovery: For People, Economy & Climate. Report. / WWF&ILO (2020). Nature Hires: How Nature-based Solutions can power a green jobs recovery. Gland and Geneva, Switzerland.

[361] By 2030, build the resilience of the poor and those in vulnerable situations and reduce their exposure and vulnerability to climate-related extreme events and other economic, social and environmental shocks and disasters.

[362] By 2020, substantially increase the number of cities and human settlements adopting and implementing integrated policies and plans towards inclusion, resource efficiency, mitigation and adaptation to climate change, resilience to disasters, and develop and implement, in line with the Sendai Framework for Disaster Risk Reduction 2015–2030, holistic disaster risk management at all levels.

[363] Strengthen resilience and adaptive capacity to climate related hazards and natural disasters in all countries.

information is available. Further, there are no global level estimates or maps showing the potential for ecosystem-based adaptation and ecosystem-based disaster risk reduction and few national level assessments of ecosystem services that support adaptation or opportunities to reduce vulnerability through restoration. Further reporting on nature-based solutions actions and their results is not standardized and thus hard to synthesize meaningfully. Information on achieved reductions in vulnerability is particularly hard to obtain due to the difficulty in establishing counterfactuals (information on what would have happened without the measures).

174. In the near term, information on national commitments and plans through the processes noted above could be used to help monitor progress towards this target. In addition opportunities for the collection of further information may exist through synergies with other initiatives, including the Task Force on Monitoring of the UN Decade on Ecosystem Restoration, efforts to develop indicators for Land Degradation Neutrality under the Sustainable Development Goals and related efforts under the UNCCD, and national reporting on national determined contributions under the UNFCCC.

Links to other proposed goals and targets

175. The attainment of this target would directly contribute to the progress towards proposed Goal A on ecosystems species and genetic diversity. It would also contribute to the attainment of the targets addressing land use change (target 1), protected areas and other effective area based conservation measures (target 2), nature-based solutions ecosystem-based approaches to the regulation of air and water quality, hazards and extreme events (proposed target 10) and access to green and blue spaces (target 11).

IV. SCIENTIFIC AND TECHNICAL INFORMATION RELATED TO PROPOSED TARGETS 8 TO 12 ADDRESSING MEETING PEOPLE'S NEEDS THROUGH SUSTAINABLE USE AND BENEFIT-SHARING

Meeting people's needs through sustainable use and benefit-sharing[364]

Target 8. *By 2030, ensure benefits, including nutrition, food security, livelihoods, health and well-being, for people, especially for the most vulnerable through sustainable management of wild species of fauna and flora.*

176. Biodiversity is the source of many goods and services on which human well-being depends. These are particularly important for people living in vulnerable situations. However, while they are essential to well-being, the pressures placed on biodiversity to deliver them often impacts their continued provision. Conversely the maintenance, in quantity and quality, of these benefits also provide an important incentive for the conservation and sustainable use of biodiversity. Ultimately it will not be possible to reach the 2050 Vision if the benefits provided by biodiversity, particularly those related to nutrition, food security livelihoods, health and well-being are not ensured.

Status and trends

177. Wild species of flora and fauna contribute to human well-being in multiple ways.[365] Contributions to food and nutrition are particularly important. For example, globally it is estimated that bushmeat can make up to 85 per cent of protein intake of people living in or near forests while more than 30 million people are estimated to be reliant on reef-based resources to meet their food, income and livelihood needs.[366] Further

[364] The text in this subsection draws on GBO-5, and references therein, in particular the sections related to the sustainable food systems transition, the sustainable agriculture transition and the biodiversity-inclusive One Health Transition. Additional references are indicated in the text for specific points.

[365] For additional information see the text and references associated with proposed target 4.

[366] Sumaila (2017) Investments to reverse biodiversity loss are economically beneficial. Current Opinion in Environmental Sustainability. 29, 82-88. https://doi.org/10.1016/j.cosust.2018.01.007

more than 28,000 plant species, 723 of which are threatened with extinction, have medicinal uses,[367] while thousands of wild species used for food have been recorded, including large numbers of plants, birds, insects, mammals and mushrooms.[368] In addition, a recent review on the relationship between intraspecific (genetic and phenotypic) diversity and nature's contributions to people identified 22 species of plants, fishes, insects, and fungi whose morphological and physiological characteristics and life histories were important to the provision of different contributions to people.[369] However, while there are numerous examples of how wild species contribute to nutrition, food security, livelihoods, health and wellbeing and thousands of wild species used for food have been recorded, there is currently no global level synthesis of this type of information.

178. The unsustainable harvest and overexploitation of wild species are major threats to biodiversity and associated ecosystem services, causing recent increases in extinction rates and biodiversity decline as well as creating potential risks for human health and well-being.[370] Overexploitation can also impact the abundance of (common) species by reducing their density or distribution range, fragmenting populations, impacting the role in ecosystem function and reducing genetic diversity.[371] However, managed sustainably, the use of wild species has the potential to reduce extinction risk and meet human needs.[372]

Considerations

179. Many of the pressures on wild species of flora and fauna arise from efforts to maximize the provision of one type of benefit. For example, maximizing the use of forest resources for the harvest of timber (livelihoods) may undermine the provision of benefits related to nutrition, food security and health. Similarly, pressure to maximize one type of benefit in the short term may also undermine the provision of benefits in the long term. For example, unsustainable fishing practices may benefit current livelihoods but will ultimately harm them in the long term. Given this there is a need for strategies which avoid unnecessarily trade-offs resulting from maximizing one benefit at the expense of another and which optimize the provision of multiple benefits in the long term.[373]

180. Different actions and metrics to track progress towards this proposed target may be needed depending on the benefit and/or species being considered. Further many of the actions needed to reach this target will overlap with those required for proposed target 3 related to the active management of wild species of fauna and flora as well as with proposed target 4 on the legal, safe and sustainable harvest, trade and use

[367] Antonelli *et al.,* (2020). *State of the World's Plants and Fungi 2020*. Royal Botanic Gardens, Kew. DOI: https://doi.org/10.34885/172

[368] FAO. 2019. The State of the World's Biodiversity for Food and Agriculture. FAO Commission on Genetic Resources for Food and Agriculture Assessments. Rome. 572 pp.

[369] Des Roches et al (2021) Conserving intraspecific variation for nature's contributions to people. Nature Ecology and Evolution. https://doi.org/10.1038/s41559-021-01403-5

[370]'t Sas-Rolfes et al (2019) Illegal Wildlife Trade: Scale, Processes, and Governance. Annual Review of Environment and Resources 44:201–28. https://doi.org/10.1146/annurev-environ-101718-033253; Joppa et al (2016) Filling in biodiversity threats gaps. Science 80 (353), 416–418. https://doi.org/10.1126/science.aaf3565; IPBES (2019) Global assessment report on biodiversity and ecosystem services of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services. IPBES secretariat, Bonn, Germany; Can et al (2019) Dealing with deadly pathogens: Taking stock of the legal trade in live wildlife and potential risks to human health. Global Ecology and Conservation 17 (2019) e00515. https://doi.org/10.1016/j.gecco.2018.e00515; WWF (2020) Living Planet Report 2020 - Bending the curve of biodiversity loss. WWF, Gland, Switzerland. https://livingplanet.panda.org/en-us/ and United Nations Environment Programme and International Livestock Research Institute (2020) Preventing the Next Pandemic: Zoonotic diseases and how to break the chain of transmission. Nairobi, Kenya. https://www.unep.org/resources/report/preventing-future-zoonotic-disease-outbreaks-protecting-environment-animals-and

[371] Reynolds et al (2006) Overexploitation. Chapter 8 in Principles of Conservation Biology, 3rd Edition (pp.253-277). Sinauer; and Kenchington (2003) The effects of fishing on species and genetic diversity. In FAO, 2003. Responsible Fisheries in the Marine Ecosystem.

[372] Cooney et al (2018) Wildlife, Wild Livelihoods: Involving Communities in Sustainable Wildlife Management and Combatting the Illegal Wildlife Trade. United Nations Environment Programme, Nairobi, Kenya. https://doi.org/10.13140/RG.2.2.11770.85449 and Marsh et al (2020) Prevalence of sustainable and unsustainable use of wild species inferred from the IUCN Red List. bioRxiv preprint. https://doi.org/10.1101/2020.11.04.367763

[373] Secretariat of the Convention on Biological Diversity (2010) Global Biodiversity Outlook 3. Montréal, 94 pages

of wild species of fauna and flora. The IPBES Assessment on sustainable use of wild species, due to be finalized in 2022, will provide further useful information relevant to this proposed target.

Monitoring

181. Monitoring progress towards this target could use information on trends in the different kinds and amounts of benefits people derive from wild species of flora and fauna. Similarly, information on the number of people benefiting from the use of wild species of flora and fauna could be used to monitor progress. However, while there are numerous examples of how wild species contribute to nutrition, food security, livelihoods, health and wellbeing, there is currently no global level aggregation of this type of information nor is there comprehensive information on the number of people benefiting from these types of species.

Links to other proposed goals and targets

182. The attainment of this target would directly contribute to the progress towards proposed Goal B on nature's contributions to people. The main actions related to this target will centre around the sustainable management of wild species. This will require management which takes into account various uses of biodiversity (both consumptive and non-consumptive). It will also require the management of the demand for these. As such the actions needed to reach this target will overlap with those required for proposed targets 3, 4 and 8 related to the active management, sustainable harvest and trade of wild species of fauna and flora as well as those related to sustainable production (target 14) and consumption (target 15). Actions should also respect the customary sustainable use of biodiversity by indigenous peoples and local communities (proposed Target 4, which is closely related to this target, is also relevant in this regard).The IPBES Assessment on sustainable use of wild species, due to be finalized in 2022 will provide further useful information relevant to this proposed target and proposed target 4.

Sustainability of agriculture and other managed ecosystems[374]

Target 9. *By 2030, support the productivity, sustainability and resilience of biodiversity in agricultural and other managed ecosystems through conservation and sustainable use of such ecosystems, reducing productivity gaps by at least [50%].*

183. The expansion of agricultural land to meet the growing human demands for food, fibre and energy is currently the most important cause of biodiversity loss and business as usual scenarios show continued habitat loss from the expansion of agriculture (for more than 87% of the 19,859 species modelled).[375] Population growth and changing lifestyles are projected to further drive the demand for agricultural products.[376] In addition, many agricultural practices, such as intensive tillage, inappropriate or excessive fertilizer and pesticide use as well as the overuse of antibiotics in livestock also tend to reduce biodiversity. Considering these trends agriculture is likely to remain a major driver of biodiversity loss into the future; therefore increasing the productivity (i.e. reduce productivity gaps) and sustainability of agriculture and other managed ecosystems is essential to put the world on track to reach the 2050 Vision for Biodiversity.[377] In

[374] The text in this subsection draws on GBO-5, and references therein, in particular the sections related to the Aichi Biodiversity Target 7, the sustainable food systems transition, and the sustainable agriculture transition. Additional references are indicated in the text for specific points.

[375] Williams et al (2021) Proactive conservation to prevent habitat losses to agricultural expansion. Nature Sustainability 4, 314–322. https://doi.org/10.1038/s41893-020-00656-5 IPBES (2019): *Global assessment report on biodiversity and ecosystem services of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services*. E. S. Brondizio, J. Settele, S. Díaz, and H. T. Ngo (editors). IPBES secretariat, Bonn, Germany; Newbold *et al*. (2015) Global effects of land use on local terrestrial biodiversity. Nature 520, 45–50. https://doi.org/10.1038/nature14324

[376] Tilman et al (2011). Global food demand and the sustainable intensification of agriculture. *Proceedings of the national academy of sciences*, *108*(50), 20260-20264. https://doi.org/10.1073/pnas.1116437108; Kastner et al (2012). Global changes in diets and the consequences for land requirements for food. *Proceedings of the National Academy of Sciences*, *109*(18), 6868-6872. https://doi.org/10.1073/pnas.1117054109

[377] Leclère, D., et al (2020). Bending the curve of terrestrial biodiversity needs an integrated strategy. *Nature*, *585*(7826), 551-556. https://doi.org/10.1038/s41586-020-2705-y; Secretariat of the Convention on Biological Diversity (2020) Global Biodiversity Outlook 5. Montreal

addition, despite important progress in recent years, overall, biodiversity continues to decline in many forests managed for wood and other products (see also proposed target 14).[378] Similarly, aquaculture, which involves a range of species in various aquatic systems, can have a range of negative impacts on biodiversity if not properly managed. These impacts include the destruction of coastal habitats, pollution, and the introduction of invasive alien species and pathogens. To achieve the 2050 Vision and the proposed Goals of the post-2020 global biodiversity framework there is a need to increase the productivity of production land- and sea-scapes, and in particular of existing agricultural areas, in order to limit as reduce the demand for land and water resources.[379] Achieving the 2050 Vision and the proposed Goals will also require reducing pesticide use, and the overuse of fertilizers and water to sustainable levels and improvement the management of soils[380] and forests. This proposed target focuses on these objectives and specifically on how enhanced biodiversity in agricultural and other managed ecosystems can contribute to these objectives.

Status and trends

184. Crop and grazing lands cover about 40 per cent of the global land surface and this is expected to increase under business as usual.[381] Traditional methods of intensification of production on existing land tend to leads to a simplification of production landscapes in terms of both ecosystems and species, and often have negative externalities, such as soil degradation, pollution from excess fertilisers and pesticides, the use of antibiotics, and water depletion among others, that all impact further on biodiversity beyond the simple loss of habitat.[382]

185. A substantial amount of the world's biodiversity is found in ecosystems managed by people, and biodiversity in these ecosystems underpins their productivity and resilience. Biodiversity can be harnessed to sustainably increase productivity in managed ecosystems through practices that seek to improve ecological functions (e.g. integrated pest management), support system resilience and reduce the need for inputs that are harmful for biodiversity.[383] For example, diversified production systems, that integrate multiple crops, livestock, fish and trees on farms promote productivity and sustainability,[384] including through synergistic interactions; biodiversity in production landscapes also helps reduce the incidence of pests and diseases; and, abundant and diverse pollinators support improved yields and nutritional quality of crops that depend on animal pollination.[385] Conversely, reductions in biodiversity can reduce the ability of managed ecosystems

[378] IPBES (2019) Global assessment report on biodiversity and ecosystem services of the Intergovernmental Science Policy Platform on Biodiversity and Ecosystem Services. IPBES secretariat, Bonn, Germany.

[379] IPBES (2019) Global assessment report on biodiversity and ecosystem services of the Intergovernmental Science Policy Platform on Biodiversity and Ecosystem Services. IPBES secretariat, Bonn, Germany; Leclère et al (2020), Bending the curve of terrestrial biodiversity needs an integrated strategy. *Nature*, volume 585, pp. 551–556. https://doi.org/10.1038/s41586-020-2705-y

[380]Issues related to soil biodiversity will be further discussed by SBSTTA-24 under agenda item 7. See document CBD/SBSTTA/24/7/Rev.1 for further details.

[381] Ramankutty et al (2015). Farming the planet: 1. Geographic distribution of global agricultural lands in the year 2000. Glob. Biogeochem. Cycles 22, GB1003. https://doi.org/10.1029/2007GB002952 ; Kastner et al (2012). Global changes in diets and the consequences for land requirements for food. *Proceedings of the National Academy of Sciences*, *109*(18), 6868-6872. https://doi.org/10.1073/pnas.1117054109

[382] European Environment Agency (2019) The European environment – state and outlook 2020. https://www.eea.europa.eu/publications/soer-2020; Kleijn et al (2009) On the relationship between farmland biodiversity and land-use intensity in Europe. Proceedings of the royal society B: biological sciences, 276(1658), pp.903-909. https://doi.org/10.1098/rspb.2008.1509; Geiger et al (2010) Persistent negative effects of pesticides on biodiversity and biological control potential on European farmland. Basic and Applied Ecology, 11(2), pp.97-105. https://doi.org/10.1016/j.baae.2009.12.001; FAO. 2019. The State of the World's Biodiversity for Food and Agriculture, FAO Commission on Genetic Resources for Food and Agriculture Assessments. Rome. 572 pp.

[383] FAO (2019) The State of the World's Biodiversity for Food and Agriculture. FAO Commission on Genetic Resources for Food and Agriculture Assessments. Rome. 572 pp.

[384] Renard and Tilman (2019) National food production stabilized by crop diversity. Nature 571, 257–260. https://doi.org/10.1038/s41586-019-1316-y.

[385] Pacheco et al (2013) Integration of crops, livestock, and forestry: a system of production for the Brazilian Cerrados. Embrapa Arroz e Feijão-Capítulo em livro científico (ALICE); Little and Edwards (2003) Integrated livestock-fish farming systems. Food

to provide these services. More diverse ecosystems are also more resilient to shocks, natural hazards, climate variability and change.

186. Productive agricultural and other managed ecosystems support global and local social, environmental and economic goals. The biodiversity within these systems produces the food, nutrition, feed, fibre and energy we need, support regulating and other services that maintain the provision of these benefits and services like clean water and a liveable climate. Biodiversity in managed ecosystems supports food security and nutrition for all people.[386] Agricultural and other managed ecosystems often also provide important non-material benefits as they foster social cohesion, a sense of belonging and often aesthetic enjoyment.

187. There has been a substantial expansion of efforts to promote sustainable agriculture, forestry and aquaculture over recent years. Despite this progress, biodiversity continues to decline in landscapes used to produce food and timber; and food and agricultural production remains among the main drivers of global biodiversity loss.[387] However trends in agricultural, forestry and aquaculture systems vary:

(a) *Agriculture* - The negative impacts of agricultural expansion and intensification on biodiversity have been well documented and include species population declines, loss of range and increased extinction risks, loss of habitats, loss of genetic diversity – including of crop and livestock wild relatives.[388] While the use of fertilizers and pesticides has stabilized globally, it has done so at high levels. Further, many key components of biodiversity in food and agriculture at genetic, species and ecosystem levels are in decline.[389] Changes in land use and agricultural production practices can also drive the emergence of new pests and diseases, for example in livestock and humans.[390] Further land degradation, an important cause of productivity gaps, has reduced productivity in 23 per cent of the global terrestrial area while between $235 billion and $577 billion in annual global crop output is at risk as a result of pollinator loss.[391] These impacts vary across regions and countries and across systems and scale. High-input monoculture-based cropping over large areas or intensive livestock production leads to different impacts from intensive but more diversified agricultural landscapes or from low-input shifting cultivation systems. However the use of practices and approaches regarded as favourable to the sustainable use and conservation of biodiversity in agricultural ecosystems is reportedly increasing.[392] These include integrated land management, land rehabilitation, support to organic agriculture, agroforestry development, promoting research on crop

---

and Agriculture Organisation of the United nations. Rome http://www.fao.org/3/y5098e/y5098e00.htm; Bianchi et al (2006) Sustainable pest regulation in agricultural landscapes: a review on landscape composition, biodiversity and natural pest control. Proceedings of the Royal Society B. 2731715–1727, http://doi.org/10.1098/rspb.2006.3530; Zheng et al (2017) Traditional symbiotic farming technology in China promotes the sustainability of a flooded rice production system. Sustainability Science 12(1), 155-161.https://doi.org/10.1007/s11625-016-0399-8; Snyder (2019) Give predators a complement: Conserving natural enemy biodiversity to improve biocontrol. Biological Control. 135. https://doi.org/10.1016/ j.biocontrol.2019.04.017; IPBES (2016). The assessment report of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services on pollinators, pollination and food production. Secretariat of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services, Bonn, Germany. 552 pages.

[386] FAO (2019) The State of the World's Biodiversity for Food and Agriculture. FAO Commission on Genetic Resources for Food and Agriculture Assessments. Rome. 572 pp.

[387] Secretariat of the Convention on Biological Diversity (2020) Global Biodiversity Outlook 5. Montreal.

[388] FAO (2019) The State of the World's Biodiversity for Food and Agriculture. FAO Commission on Genetic Resources for Food and Agriculture Assessments. Rome. 572 pp.

[389] FAO (2019) The State of the World's Biodiversity for Food and Agriculture. FAO Commission on Genetic Resources for Food and Agriculture Assessments. Rome. 572 pp.

[390] Keesing et al (2010) Impacts of biodiversity on the emergence and transmission of infectious diseases. Nature, 468(7324), pp. 647-652. https://doi.org/10.1038/nature09575

[391] IPBES (2019) Global assessment report on biodiversity and ecosystem services of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services. IPBES secretariat, Bonn, Germany.

[392] Pretty et al (2018) Global assessment of agricultural system redesign for sustainable intensification. Nature Sustainability, 1(8), pp.441-446 https://doi.org/10.1038/s41893-018-0114-0

efficiency and resilience, encouraging agricultural diversification and lower fertilizer use.[393] With regards to yield gaps, these vary across crops, production systems and regions. While data exists for several crops under different biophysical (climate, soil, physiography) and socio-economic contexts, there is no global productivity gap value across all agricultural or other production systems. [394] Further, the biophysical potential to increase yields in a sustainable manner varies globally, depending on climate, soil quality, and access to water;[395]

(b) *Forestry* - Globally, about 1.15 billion hectares of forest is managed primarily to produce wood and non-wood forest products, and this area has remained relatively stable since 1990.[396] The area of forest under long-term management plans has increased significantly to an estimated 2.05 billion hectares in 2020, equivalent to 54% of the forest area, an increase of around 10% since 2010. The area of forestry certified under the Forest Stewardship Council or the Programme for the Endorsement of Forest Certification schemes has increased significantly within the last decade (by 28.5% during 2010-2019). This indicates a growing proportion of timber production for which there is third party verification of responsible forest management related to biodiversity conservation, as well as social, economic, cultural and ethical dimensions. Despite these advances, overall, biodiversity in forests continue to decline;[397]

(c) *Aquaculture* - Aquaculture includes production of a broad variety of aquatic plants, seaweeds, algae, molluscs, crustaceans and echinoderms, as well as finfish. It takes place in inland, coastal and marine environments. The contribution of aquaculture to global fish production is increasing, though aquaculture growth rates have slowed from the rapid expansion of the first decade of this century.[398] Overall, much inland-water aquaculture, constituting approximately two-thirds of the total world production, is considered sustainable.[399] However, expansion of aquaculture can have negative impacts on coastal and marine ecosystems and affect species diversity, through direct destruction of coastal wetlands (for example, mangroves) and pollution (for example from nutrients, faeces, antibiotics) of coastal habitats as well as the introduction of alien invasive species and pathogens. Some types of aquaculture also require large amounts of fish meal, which contributes to further depleting fisheries stocks, though these effects are species dependent.[400] However the proportion of fish meal coming from capture fisheries is declining, with more coming from bycatch, and the farming of seaweed and microalgae. Technological improvements in

[393] FAO (2019) The State of the World's Biodiversity for Food and Agriculture. FAO Commission on Genetic Resources for Food and Agriculture Assessments. Rome. 572 pp; and Secretariat of the Convention on Biological Diversity (2020) Global Biodiversity Outlook 5. Montreal.

[394] Productivity can be measured in various ways. Generally, it means inputs (such as land, fertilizers, pesticides, energy, labour, and capital) in relation to the outputs generated. It can also be defined as land productivity or yield (for example volume of resource generated per ha land or water).

[395] Cunningham et al (2013) To close the yield-gap while saving biodiversity will require multiple locally relevant strategies. Agriculture, Ecosystems & Environment, 173, pp.20-27, https://doi.org/10.1016/j.agee.2013.04.007

Tilman et al (2011) Global food demand and the sustainable intensification of agriculture. Proceedings of the National Academy of Sciences, 108(50), 20260-20264. https://doi.org/10.1073/pnas.1116437108; Baudron and Giller (2014) Agriculture and nature: Trouble and Strife? Biological Conservation. 170, 232–245. https://doi.org/10.1016/j.biocon.2013.12.009

[396] FAO. 2020. Global Forest Resources Assessment 2020: Main report. Rome. https://doi.org/10.4060/ca9825en

[397] IPBES (2019) Global assessment report on biodiversity and ecosystem services of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services. IPBES secretariat, Bonn, Germany.

[398] FAO (2020) The State of World Fisheries and Aquaculture 2020. Sustainability in action. Rome. https://doi.org/10.4060/ca9229en

[399] Secretariat of the Convention on Biological Diversity (2020) Global Biodiversity Outlook 5. Montreal.

[400] Naylor et al (2000) Effect of aquaculture on world fish supplies. Nature, 405(6790), 1017–1024. https://doi.org/10.1038/35016500

aquaculture are reducing impacts on water quality.[401] Similarly the greater use of marine spatial planning to identify areas suitable for aquaculture can also help to reduce potential negative impacts. [402]

Considerations

188. To meet the objectives of the proposed target, actions are needed on two main fronts: (a) restoring and increasing productivity of agricultural and other managed ecosystems where large productivity gaps exist in order to avoid further expansion into natural ecosystems, and (b) conserving and sustainably using biodiversity to support the productivity, sustainability and resilience of these ecosystems.

189. The fifth edition of the *Global Biodiversity Outlook* sets out a number of components to enhance productivity of managed ecosystems while minimizing negative impacts on biodiversity.[403] A major component of this is 'sustainable intensification'. Sustainable intensification aims to improve the efficiency of use of land and inputs of water, fertilizers and pesticides, including through genetic improvements to crops and livestock and substituting external inputs, based on agroecological approaches.[404]

190. Globally productivity increases are also needed to avoid the conversion of natural ecosystems (proposed Goal A and proposed targets 1 and 2).[405] Many approaches for sustainable intensification are available that can help to minimize negative impacts of fertilisers and pesticides and other agrochemicals, including though genetic improvements to crops and livestock, substituting external inputs, and designing or redesigning systems based on agroecological approaches,[406] as appropriate. Examples of the types of actions needed include increasing the use of integrated pest management, reducing and more targeted use of pesticides, antibiotics, fertilizers and irrigation water, decreasing soil erosion and degradation, the restoration of degraded agricultural lands, decreasing residues and runoff of pesticides and excess nutrients, increasing resource use efficiency and reducing pollinator-dependent yield deficits and the integrated management of forest and agricultural areas.[407] The actions to reach this target would also have co-benefits for biodiversity and help to improve the diversity and abundance of organisms, in particular insects and birds, including the abundance of pollinators and natural enemies of pests. For example, a recent study looking at agri-environmental schemes could be used to increase species richness.[408] Other actions could include the conservation or restoration of native habitats within working landscapes of agricultural and other managed ecosystems and a recent study recommended that at least 20 per cent working landscapes should be

401 FAO (2020) The State of World Fisheries and Aquaculture 2020. Sustainability in action. Rome. https://doi.org/10.4060/ca9229en

402 Aguilar-Manjarrez (2017). Aquaculture zoning, site selection and area management under the ecosystem approach to aquaculture. A handbook. Report ACS18071. Rome, FAO, and World Bank Group.

403 Secretariat of the Convention on Biological Diversity (2020) Global Biodiversity Outlook 5. Montreal

404 HLPE, 2019. Agroecological and other innovative approaches for sustainable agriculture and food systems that enhance food security and nutrition. A report by the High Level Panel of Experts on Food Security and Nutrition of the Committee on World Food Security, Rome. http://www.fao.org/3/ca5602en/ca5602en.pdf

405 However, note that some evidence indicates that approaches to this may affect outcomes. For example, technology-driven intensification has been found to be strongly land saving at a global level while market-driven intensification is often a major cause of land expansion and deforestation. For further details, see Byerlee et al (2014). Does intensification slow crop land expansion or encourage deforestation? Global Food Security. 3. https://doi.org/10.1016/j.gfs.2014.04.001.

406 Altieri et al (2015) Agroecology and the design of climate change-resilient farming systems. Agronomy for Sustainable Development. 35, 869–890. https://doi.org/10.1007/s13593-015-0285-2; Fischer et al. (2017) Reframing the Food–Biodiversity Challenge. Trends in Ecology and Evolution 32:335-345. https://doi.org/10.1016/j.tree.2017.02.009; Gliessman (2018) Defining agroecology. Agroecology and Sustainable Food Systems 42:599–600. https://doi.org/10.1080/21683565.2018.1432329

407 IPBES (2016) Assessment report of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services on pollinators, pollination and food production. Secretariat of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services, Bonn, Germany.

408 Fabian et al (2021) A multitaxa assessment of the effectiveness of agri-environmental schemes for biodiversity management. Proceedings of the National Academy of Sciences. 118 (10) e2016038118; https://doi.org/10.1073/pnas.2016038118

maintained as native habitat to support conservation and ecosystem services.[409] Further progress towards this target will also be closely related to proposed target 15 on eliminating unsustainable consumption patterns.

191. The biophysical potential to increase yields in a sustainable and efficient manner varies globally, depending on climate, soil quality, and access to water, but landscapes also vary in their inherent biodiversity, the production systems they can support, and socio-economic factors that may affect their adoption.[410] Therefore, approaches to sustainable agricultural intensification for reducing productivity gaps should be location specific.

192. Productivity gaps are generally considered at the level of a product (e.g. yield gaps in crops, feed conversion ratios for meat etc.). However, some production systems can be designed specifically for diverse functions, for example, in agroforestry systems where productivity of one crop (e.g. cocoa, oil palm) is not maximised but the system also produces other crops, timber, food, and services like carbon sequestration and water regulation. Such systems can be designed to use land more efficiently than monocultures, so that through their "land sharing", they may support "land sparing". In this case, the consideration of "multifunctionality gaps" may be more appropriate than productivity. So-called Multifunctional Land Equivalent Ratios can be used to assess such gaps.[411]

193. Furthermore, land use planning and restoration (proposed target 1) can support context and scale appropriate action to meet productivity targets in agricultural and other managed ecosystems, whilst supporting their sustainability and resilience and avoid expansion into natural habitats; reducing pollution from excess nutrients and biocides will help reduce impacts of agriculture on biodiversity, whilst sustainable agricultural practices can help support this reduction (proposed target 6). Finally, sustainable supply chains that aim to reduce their impacts on biodiversity (proposed target 14) can help drive the changes needed towards achieving the proposed target.

194. Recent analysis illustrates the strong interlinkages between biodiversity and the world's ability to meet the 2030 Agenda for Sustainable Development and identifies biodiversity as one of the most potent levers to achieve sustainability.[412] In particular actions to reach this proposed target could also help to reach SDG targets

[409] Garibaldi et al (2020) Working landscapes need at least 20% native habitat. Conservation Letters. e12773. https://doi.org/10.1111/conl.12773

[410] Cunningham et al (2013) To close the yield-gap while saving biodiversity will require multiple locally relevant strategies. Agriculture, Ecosystems & Environment, 173, pp.20-27; Tilman et al (2011) Global food demand and the sustainable intensification of agriculture. Proceedings of the National Academy of Sciences, 108(50), 20260-20264. https://doi.org/10.1073/pnas.1116437108; Baudron and Giller (2014) Agriculture and nature: Trouble and Strife? Biological Conservation. 170, 232–245. https://doi.org/10.1016/j.biocon.2013.12.009

[411] Khasanah et al (2020) Oil Palm Agroforestry Can Achieve Economic and Environmental Gains as Indicated by Multifunctional Land Equivalent Ratios. Frontiers in Sustainable. Food Systems. 3: 122. https://doi.org/10.3389/fsufs.2019.00122

[412] Blicharska et al (2019) Biodiversity's contributions to sustainable development. Nature Sustainability 2, 1083–1093 https://doi.org/10.1038/s41893-019-0417-9; Obrecht et al (2021) Achieving the SDGs with Biodiversity. Swiss Academies Factsheets, 16(1), pp.1-11. https://doi.org/10.5281/zenodo.4457298 and Gil et al (2018) Sustainable development goal 2: Improved targets and indicators for agriculture and food security. Ambio, 1-14. https://doi.org/10.1007/s13280-018-1101-4

2.3,[413] 2.4,[414] 2.5,[415] 6.4,[416] 14.4,[417] 14.7,[418] 15.1,[419] and 15.2.[420] Other international agreements and organizations with relevant targets, processes or objectives include the United Nations Framework Convention on Climate Change, the International Tropical Timber Agreement, the Ramsar Convention on Wetlands of International Importance, FAO's global plans of action and the New York Declaration on Forests.

Monitoring

195. Assessing progress in reducing productivity gaps[421] will require an assessment of potential productivity. As productivity gaps are context specific it may be challenging to assess this issue globally with a singly measure. Alternatively, so-called multifunctional land equivalent ratios could also be considered to assess progress in reducing the productivity gap across multiple relevant objectives, such as crop production, carbon sequestration, water regulation and other ecosystem services.[422] However, using such approaches globally and for different crop types may pose challenges. Information on changes in practices that affect sustainability and resilience could also be used to track progress towards this target. However, this would require further analysis in order to directly link this information to productivity gaps.

Links to other proposed goals and targets

196. The attainment of this target would directly contribute to the progress towards proposed Goal B on nature's contributions to people. It would also contribute to the attainment of the proposed targets addressing land/sea use change (target 1), species management (target 3), reducing overexploitation (target 4), sustainable production and supply chains (target 14), and sustainable consumption (target 15). It may also contribute to target 16 on biosafety, to the extent that actions taken to reach this target address issues related to this topic.

---

[413] By 2030, double the agricultural productivity and incomes of small-scale food producers, in particular women, indigenous peoples, family farmers, pastoralists and fishers, including through secure and equal access to land, other productive resources and inputs, knowledge, financial services, markets and opportunities for value addition and non-farm employment.

[414] By 2030, ensure sustainable food production systems and implement resilient agricultural practices that increase productivity and production, that help maintain ecosystems, that strengthen capacity for adaptation to climate change, extreme weather, drought, flooding and other disasters and that progressively improve land and soil quality.

[415] By 2020, maintain the genetic diversity of seeds, cultivated plants and farmed and domesticated animals and their related wild species, including through soundly managed and diversified seed and plant banks at the national, regional and international levels, and promote access to and fair and equitable sharing of benefits arising from the utilization of genetic resources and associated traditional knowledge, as internationally agreed.

[416] By 2030, substantially increase water-use efficiency across all sectors and ensure sustainable withdrawals and supply of freshwater to address water scarcity and substantially reduce the number of people suffering from water scarcity.

[417] By 2020, effectively regulate harvesting and end overfishing, illegal, unreported and unregulated fishing and destructive fishing practices and implement science-based management plans, in order to restore fish stocks in the shortest time feasible, at least to levels that can produce maximum sustainable yield as determined by their biological characteristics.

[418] By 2030, increase the economic benefits to small island developing States and least developed countries from the sustainable use of marine resources, including through sustainable management of fisheries, aquaculture and tourism.

[419] By 2020, ensure the conservation, restoration and sustainable use of terrestrial and inland freshwater ecosystems and their services, in particular forests, wetlands, mountains and drylands, in line with obligations under international agreements.

[420] By 2020, promote the implementation of sustainable management of all types of forests, halt deforestation, restore degraded forests and substantially increase afforestation and reforestation globally.

[421] Productivity can be measured in various ways. Generally, it means inputs (such as land, fertilizers, pesticides, energy, labour, and capital) in relation to the outputs generated. It can also simply be defined as land productivity, or yield (for example volume/ha land), which may be appropriate when seeking to assess the efficiency of land use.

[422] Khasanah et al (2020) Oil Palm Agroforestry Can Achieve Economic and Environmental Gains as Indicated by Multifunctional Land Equivalent Ratios. Frontiers in Sustainable Food Systems. 3: 122. https://doi.org/10.3389/fsufs.2019.00122

Nature-based solutions and ecosystem services[423]

Target 10. *By 2030, ensure that, nature-based solutions and ecosystem approach contribute to regulation of air quality, hazards and extreme events and quality and quantity of water for at least [XXX million] people.*

197. The proposed target relates to the benefits provided to people by ecosystems (or nature's contributions to people) such as regulating water flow, preventing erosion, providing protection against extreme events through physical barriers, or filtering pollutants. Such key ecosystems may include forests and wetlands especially in upstream areas, coral reefs, mangroves kelp forests, and sea-grass beds. They may also include managed ecosystems. These ecosystem services underpin the health and well-being of people, therefore safeguarding these ecosystem services is a key element of the 2050 Vision for Biodiversity. The protection and restoration of such ecosystems to address societal needs are sometimes known as "ecosystem-based approaches", "nature-based solutions"[424] or "green infrastructure". Such approaches often have co-benefits for biodiversity and, as such, can offer effective ways of reaching multiple objectives in coherent and integrated ways.

Status and trends

198. Ecosystems provide a range of services which are essential to human wellbeing. Those services related to the regulation of water and air and the prevention or mitigation of impacts of hazards and extreme events are particularly important.

199. Globally about half of the world's population (3.6. billion people) live in areas which are potentially water-scarce at least one month out of the year.[425] By 2050 this could reach 4.8 to 5.7 billion people. Further, globally the demand for water has been growing at a rate of about 1% per year as a result of population growth, economic development and changing consumption patterns. [426] Nature-based solutions and ecosystem-based approaches offer potential solutions to these challenges. However, despite their potential benefits, nature-based solutions or ecosystem-based approaches to water management account less than 1% of total investments in water resource management.[427]

200. More than 80 per cent of urban dwellers were exposed to air pollution which exceeded limits set out by the World Health Organization.[428] While this occurred in all regions, people in low income cities were the most impacted.[429] Further, 4.2 million premature deaths were attributable to poor ambient air quality in

[423] The text in this subsection draws on GBO-5, and references therein, in particular the section related to Aichi Biodiversity Target 14. Additional references are indicated in the text for specific points.

[424] The terms nature-based or ecosystem-based approaches are used as a shorthand to refer to the various ways in which societies can work with biodiversity or nature to address socio-economic challenges. While generally discussed in the contexts of carbon sequestration, the terms have broader meanings and include a range of approaches, including the promotion of the use of natural pollinators, the use of biological enemies of agricultural pests in agricultural systems, and ensuring genetic diversity in managed systems to ensure resiliency to threats and pressures. It may also include the restoration of degraded areas, such as of wetlands and mangrove forests, the protection of forested watersheds, and the creation of green and blue spaces to address issues related to water and air quality and resiliency to extreme events and hazards.

[425] United Nations World Water Assessment Programme/UN-Water. (2018) The United Nations World Water Development Report 2018: Nature-Based Solutions for Water. Paris, UNESCO. https://www.unwater.org/publications/world-water-development-report-2018/

[426] United Nations World Water Assessment Programme/UN-Water. 2018. The United Nations World Water Development Report 2018: Nature-Based Solutions for Water. Paris, UNESCO. https://www.unwater.org/publications/world-water-development-report-2018/

[427] United Nations World Water Assessment Programme/UN-Water. 2018. The United Nations World Water Development Report 2018: Nature-Based Solutions for Water. Paris, UNESCO. https://www.unwater.org/publications/world-water-development-report-2018/

[428] World Health Organization (2016). WHO Global Urban Ambient Air Pollution Database. https://www.who.int/phe/health_topics/outdoorair/databases/cities/en/

[429] World Health Organization (2016) Ambient air pollution: A global assessment of exposure and burden of diseasehttps://apps.who.int/iris/bitstream/handle/10665/250141/9789241511353-eng.pdf?sequence=1

2016.[430] While there are numerous examples of where and how natured-based or ecosystem-based approaches have been used to address air quality, no global level information on the use of these approaches is available.

201. Between 2000 and 2019 there were more than 7,000 recorded disaster events which affected more than 4 billion people and caused approximately 1.2 million deaths. The majority of these were related to floods (44 per cent of events) and storms (28 per cent of events) followed by droughts (5 per cent of events) and wildfires (3 per cent).[431] Under various scenarios, by 2030 the economic costs of extreme events, floods, storms and drought events is estimated to be on the order of US$ 200–400 billion per year. Further many of these hazards and extreme events are projected to become more severe and more frequent with the effects of climate change. For example, 300 million people are projected to be living in coastal areas that experience sever floods once a year by 2050.[432] Further the number of people affected by flooding is projected to reach 1.6. billion by 2050 with economic impacts on the order of US$ 45 trillion.[433] In many countries various forms of ecosystem or nature-based solutions are being used to build resiliency against such events. However, no global level estimates are available to indicate how widespread the use of these approaches is and how many people are currently benefiting from their use. Similarly, there is no global level information on the number of people which could potentially benefit from these approaches in the future.

202. Under various scenarios, the decline of regulating services originating from biodiversity is expected to increase. For example, a recent assessment concluded that by 2050, under future scenarios of land use and climate change, 4.5 billion people will be affected by poor water quality as a result of diminishing ecosystem services. This decline will be particularly detrimental in Africa and South Asia. Similarly, half a billion people by 2050 are projected to face coastal risks, such as shoreline erosion and flooding.[434] Other estimates suggest that on our current trajectory the degradation of, and unsustainable pressures on, the natural environment and global water resources will put at risk 52 per cent of the world's population, 45 per cent of global gross domestic product and 40 per cent of global grain production.[435] However, some of these threats could be significantly reduced under sustainable development scenarios.

Considerations

203. Nature-based solutions and ecosystem-based approaches are one tool to help ensure the continued provision of essential ecosystem services while also incentivizing the conservation and sustainable use of biodiversity.[436] Actions to promote this target include reducing the direct pressures on the ecosystems that provide such services (see proposed targets 1, 3-6), and proactive measures to conserve and restore key ecosystems (see proposed targets 1 and 2), or to create or recreate green and blue spaces in urban areas (see

[430] United Nations Statistics Division (2021) Make cities and human settlements inclusive, safe, resilient and sustainable. https://unstats.un.org/sdgs/report/2020/goal-11/

[431] United Nations Office for Disaster Risk Reduction (2020) Human cost of disasters. An overview of the last 20 years 2000-2019. https://www.undrr.org/media/48008/download

[432] Kulp and Strauss (2019) New elevation data triple estimates of global vulnerability to sea-level rise and coastal flooding. Nature Communications 10, 4844. https://doi.org/10.1038/s41467-019-12808-z

[433] United Nations World Water Assessment Programme/UN-Water. 2018. The United Nations World Water Development Report 2018: Nature-Based Solutions for Water. Paris, UNESCO.

[434] Chaplin-Kramer et al (2019) Global modelling of nature's contributions to people. Science 366, 255–258. https://doi.org/10.1126/science.aaw3372

[435] United Nations World Water Assessment Programme (2019) The United Nations World Water Development Report 2019: Leaving No One Behind. Paris, UNESCO. https://unesdoc.unesco.org/ark:/48223/pf0000367306

[436] For examples and other relevant information on this issue see European Commission (2020). Nature-based solutions State of the art in EU-funded projects. https://op.europa.eu/en/publication-detail/-/publication/8bb07125-4518-11eb-b59f-01aa75ed71a1 and European Commission (2019). The EU–Brazil sector dialogue on nature-based solutions Contribution to a Brazilian roadmap on nature-based solutions for resilient cities. https://op.europa.eu/en/publication-detail/-/publication/12818f2c-f545-11e9-8c1f-01aa75ed71a1

proposed target 11). It has been estimated that more than 1.7 billion people could benefit from the application of ecosystem-based approaches to watershed management.[437]

204. While nature-based solutions are increasingly used around the world, information on the extent of their use and the number of people currently benefiting from them is incomplete. While nature-based solutions or ecosystem-ecosystem based approaches often have co-benefits for biodiversity and help to create incentives for their use and their mainstreaming into decision making and planning processes, these co-benefits are not always guaranteed. However, some definitions of nature based solutions emphasize that unless there are benefits for biodiversity or the environment, a given intervention would not qualify as a nature based solution.[438] Furthermore, in most cases nature-based solutions or ecosystem-based approaches will not be sufficient on their own to fully meet objectives for water and air quality or to completely prevent or mitigate extreme events and hazards. As such the use of nature-based solutions and ecosystem-based approaches should not detract from efforts to address the direct and indirect pressures on biodiversity and the other pressures which contribute to these hazards.

205. The actions taken towards a target on this issue could contribute to a number of the targets adopted under the 2030 Agenda for Sustainable Development. This includes SDG targets 1.5,[439] 3.9,[440] 6.1,[441] 6.3,[442] 6.5, [443] 6.6,[444] 11.5,[445] 11.6,[446], 11.7,[447] 11.b,[448] and 13.1.[449] Further nature-based solutions or ecosystem based approaches are being discussed and considered under a number of additional processes. These include the Sendai Framework for Disaster Risk Reduction, the United Nations Framework Convention on Climate Change and the United Nations Convention to Combat Desertification among others. As such actions towards this proposed target could also potentially contribute to these other processes.

Monitoring

206. Different types of information could be used to monitor progress towards this proposed target. Information on the number of people being affected by poor air and water quality, and hazards is available

[437] Abell et al (2017) Beyond the Source: The Environmental, Economic and Community Benefits of Source Water Protection. Arlington, Virginia, United States of America, The Nature Conservancy. https://www.nature.org/en-us/what-we-do/our-insights/perspectives/a-natural-solution-to-water-security/?src=r.global.beyondthesource

[438] For example, see: https://www.iucn.org/theme/nature-based-solutions/resources/iucn-global-standard-nbs.

[439] By 2030, build the resilience of the poor and those in vulnerable situations and reduce their exposure and vulnerability to climate-related extreme events and other economic, social and environmental shocks and disasters.

[440] By 2030, substantially reduce the number of deaths and illnesses from hazardous chemicals and air, water and soil pollution and contamination.

[441] By 2030, achieve universal and equitable access to safe and affordable drinking water for all.

[442] By 2030, improve water quality by reducing pollution, eliminating dumping and minimizing release of hazardous chemicals and materials, halving the proportion of untreated wastewater and substantially increasing recycling and safe reuse globally.

[443] By 2030, implement integrated water resources management at all levels, including through transboundary cooperation as appropriate.

[444] By 2020, protect and restore water-related ecosystems, including mountains, forests, wetlands, rivers, aquifers and lakes.

[445] By 2030, significantly reduce the number of deaths and the number of people affected and substantially decrease the direct economic losses relative to global gross domestic product caused by disasters, including water-related disasters, with a focus on protecting the poor and people in vulnerable situations.

[446] By 2030, reduce the adverse per capita environmental impact of cities, including by paying special attention to air quality and municipal and other waste management.

[447] By 2030, provide universal access to safe, inclusive and accessible, green and public spaces, in particular for women and children, older persons and persons with disabilities.

[448] By 2020, substantially increase the number of cities and human settlements adopting and implementing integrated policies and plans towards inclusion, resource efficiency, mitigation and adaptation to climate change, resilience to disasters, and develop and implement, in line with the Sendai Framework for Disaster Risk Reduction 2015-2030, holistic disaster risk management at all levels.

[449] Strengthen resilience and adaptive capacity to climate-related hazards and natural disasters in all countries,

and is regularly updated through different processes. As such this information could provide useful baseline information, though it would not always directly relate to biodiversity. Similarly, information on the number of extreme events occurring in a year is also available and could be useful. However, this information would not necessarily provide information related to biodiversity or on the application of nature-based solutions, though it could potentially serve as a proxy and/or compliment other types of information.

207. Information on the application of nature-based solutions could also be used to track progress towards this proposed target. However, most of the information available on this subject relates to specific projects. As such the information that is currently available is not in a form that would allow it to be easily aggregated and analysed. Similarly, information on the number of people benefiting from such programmes on nature-based solutions could also be used to track progress. However, such information is not currently available for all countries nor is it in a form that could be easily aggregated or analysed.

Links to other proposed goals and targets

208. Actions to reach this target include reducing the direct pressures on the ecosystems that provide services related to the regulation of air quality, hazards and extreme events and quality and quantity of water (see proposed targets 1, 3-6), and proactive measures to conserve and restore key ecosystems (see proposed targets 1 and 2), or to create or recreate green and blue spaces in urban areas (see proposed target 11). Further actions towards this target could also help to addressed proposed targets related to climate change mitigation adaption and disaster risk reduction (target 7), ensuring benefits for people (target 8) and the productivity, sustainability and resilience of biodiversity in agricultural and other managed ecosystems (target 9) to the extent that nature based solutions and ecosystem based approaches provide co-benefits relevant to these issues.

Access to green/blue spaces[450]

Target 11. *By 2030, increase benefits from biodiversity and green/blue spaces for human health and well-being, including the proportion of people with access to such spaces by at least [100%], especially for urban dwellers.*

209. Green and blue spaces (i.e. areas of vegetation, inland and coastal waters generally in or near to urban or peri-urban areas) have a range positive effects on human physical and mental well-being. [451] The critical importance of urban nature in providing resilience in time of crisis has been further demonstrated by the COVID-19 pandemic, during which access to green spaces in cities and the countryside has been an important factor in supporting health and well-being while people observe social distancing requirements. For example, a recent global assessment concluded that since February 16, 2020 the number of people visiting parks had increased in comparison to pre COVID-19 pandemic levels. This increase was positively corelated with restrictions on social gatherings, movement and the closure of workplaces and indoor recreation centres and illustrates the potential values of such areas in times of crisis.[452] More generally, in many places green and blue spaces also provide important connections to nature for people. Such areas can

[450] The text in this subsection draws on GBO-5, and references therein, in particular the section related to the sustainable cities and infrastructure transition. Additional references are indicated in the text for specific points.

[451] For example, see Tyrväinen et al (2019). Health and well-being from forests – experience from Finnish research. Santé Publique, S1(HS1), 249-256. https://doi.org/10.3917/spub.190.0249; Wood et al (2018). Not All Green Space Is Created Equal: Biodiversity Predicts Psychological Restorative Benefits From Urban Green Space. Frontiers in Psychology 9. https://doi.org/10.3389/fpsyg.2018.02320; Liddicoat et al (2018). Landscape biodiversity correlates with respiratory health in Australia. Journal of Environmental Management. 206. 113-122. https://doi.org/10.1016/j.jenvman.2017.10.007.

[452] Geng et al (2021) Impacts of COVID-19 pandemic on urban park visitation: a global analysis. Journal of Forestry Research. 32, pages553–567. https://doi.org/10.1007/s11676-020-01249-w

also provide important habitat for species, improve habitat connectivity, provide ecosystem services and help mediate extreme events, such as floods and heat waves, if managed with such objectives in mind. [453]

Status and trends

210. Information on access to biodiverse green and blue spaces is limited. In 2019 about 47 per cent of people lived within 400 metres of an open public space, but with significant regional variation (from about 27% in Eastern and South-Eastern Asia to more than 78% in Australia and New Zealand). Further smaller cities tended to have greater access to open public spaces then larger ones.[454] In 2019 information from 610 cities in 95 countries suggests that about 16% of land is allocated to streets and open public spaces, with streets accounting for about three times as much area then other open public spaces. Public open spaces include all places which are available for public use, including squares, plazas and streets, as well as parks and recreational areas; many such areas have little value for biodiversity. The information which is available specifically on access to green and blue areas is generally focused on specific cities and global level information is limited.

Considerations

211. World population is expected to grow to around 8.5 billion people by 2030 and 9.7 billion by 2050, with the proportion of people residing in urban areas increasing from 55% in 2018 to 68% by 2050. Further by 2030 there are expected to be 43 megacities (cities with more than 10 million inhabitants), with most of these being in developing regions. The increasing trend towards urbanization risks separating people further from nature, with potential negative effects on human health and reduced understanding of biodiversity, the ecosystem services it provides and their importance. While all people require access to green and blue spaces for their physical and psychological well-being, access to such spaces is generally more limited for urban dwellers. Further, more economically and/or socially marginalized groups often have more limited access to such spaces.[455] As such actions towards this target, particularly given the expected population increase in urban areas, should give specific attention to urban dwellers.

212. Access to green and blue spaces can be increased by creating such spaces and/or increasing access to them. In this sense, issues related to the interconnections between urban environments and other areas should be considered. Actions towards this target will likely require the direct involvement and participation of city and other sub-national authorities as these entities often have the mandate for the planning and development of urban environments. Actions towards this target may also contribute to the attainment of the proposed targets related to land and sea use change and restoration (target 1), and protected areas and other effective area-based conservation measures (target 2). Actions towards this target could also contribute to the attainment of proposed targets 7 and 10 to the extent that green and blue spaces are also used as nature-based solutions to different societal challenges. Further the actions taken towards this target could also help to reach proposed goal A to the extent that green and blue spaces help to improve habitat extent, connectivity and quality. The actions towards this target could also contribute to the attainment of SDG target 11.7.[456]

---

[453] Lepczyk, et al (2017). Biodiversity in the City: Fundamental Questions for Understanding the Ecology of Urban Green Spaces for Biodiversity Conservation. BioScience. 67. https://doi.org/10.1093/biosci/bix079; Aronson et al (2017). Biodiversity in the city: key challenges for urban green space management. Frontiers in Ecology and the Environment. 15. https://doi.org/10.1002/fee.1480; Norton et al (2026) Urban Biodiversity and Landscape Ecology: Patterns, Processes and Planning. *Current Landscape Ecology Reports* 1, 178–192. https://doi.org/10.1007/s40823-016-0018-5

[454] United Nations (2020) Goal 11: Make cities inclusive, safe, resilient and sustainable. https://unstats.un.org/sdgs/report/2020/goal-11/

[455] Geary et al (2021) A call to action: Improving urban green spaces to reduce health inequalities exacerbated by COVID-19. Preventive Medicine. 145. 106425. https://doi.org/10.1016/j.ypmed.2021.106425; Miró et al (2018). Links between ecological and human wealth in drainage ponds in a fast-expanding city, and proposals for design and management. Landscape and Urban Planning. 180. 93-102. https://doi.org/10.1016/j.landurbplan.2018.08.013

[456] By 2030, provide universal access to safe, inclusive and accessible, green and public spaces, in particular for women and children, older persons and persons with disabilities.

Monitoring

213. Monitoring progress towards this proposed target would require information on the benefits provided by blue/green spaces. The information that is currently available on this issue is largely based on case studies in specific locations and is therefore difficult to aggregate or analyse in a consistent manner. Information on the number of people with access to green and blue spaces is more readily available and with advances in remote sensing additional information may become available in the future. However currently there is limited global level information available.

Links to other proposed goals and targets

214. The attainment of this target would directly contribute to the progress towards proposed Goal B on nature's contributions to people. It would also contribute to the attainment of the proposed targets addressing land and sea use change (target 1), protected areas (target 2), nature-based solutions and ecosystem-based approaches to climate change related to climate change mitigation adaption and disaster risk reduction (target 7) and nature-based solutions and ecosystem approach contribute to regulation of air quality, hazards and extreme events and quality and quantity of water (target 10).

Access and benefit-sharing[457]

Target 12. *By 2030, increase by [X] benefits shared for the conservation and sustainable use of biodiversity through ensuring access to and the fair and equitable sharing of benefits arising from utilization of genetic resources and associated traditional knowledge.*

215. The fair and equitable sharing of the benefits arising out of the utilization of genetic resources is one of the three objectives of the Convention on Biological Diversity,[458] further supported by the Nagoya Protocol. Sharing the benefits from the use of genetic resources can create incentives for the conservation and sustainable use of biodiversity and can contributes to the creation of a fairer and more equitable economy to support sustainable development. Further Article 9 of the text of the Nagoya Protocol indicates that Parties should encourage users and providers to direct benefits arising from the utilization of genetic resources towards the conservation of biological diversity and the sustainable use of its components. This proposed target links directly to proposed Goal C of the post-2020 global biodiversity framework.

Status and trends

216. The main action required to reach this target is for countries that provide and use genetic resources and associated traditional knowledge to put in place appropriate measures for the access and benefit-sharing of genetic resources and ensure that such measures are applied so that benefit sharing can be further supported. Some countries have chosen to put in place access and benefit sharing measures as part of their implementation of the Nagoya Protocol, which came into force in October 2014 and covers genetic resources and associated traditional knowledge and sets out core obligations for its Parties to take measures in relation to access, benefit-sharing (ABS) and compliance. As of March 2020, 130 Parties to the CBD have ratified the Protocol.

217. There is much information on measures put in place for ABS in the context of the Nagoya Protocol. For example, many countries have put in place ABS measures (96 Parties to the Nagoya Protocol and 24 non-Parties), have established one or more competent national authorities (80 Parties and 7 non-Parties) and have designated one or more checkpoints for collecting and receiving relevant information (80 Parties and 7 non-Parties). In addition, several countries (21 Parties and 29 non-Parties) are in the process of developing ABS measures or are planning to do so. So far, 22 Parties have published 1994 internationally recognized certificates of compliance and 6 countries have published 35 checkpoint communiqués.

---

[457] The text in this subsection draws on GBO-5, and references therein, in particular the section related to the Aichi Biodiversity Target 16. It also draws on information contained in the Access and Benefit-sharing Clearing-House – https://absch.cbd.int/countries.

[458] Article 2 (Objectives) of the text of the Convention. A framework for the implementation of this objective is provided in Article 15 of the text of the Convention.

218. Several additional international instruments and processes address the issue of access to, and the fair and equitable sharing of benefits arising from utilization of, genetic resources and associated traditional knowledge. For example the International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA), adopted in 2001, with the objectives of the conservation and sustainable use of plant genetic resources for food and agriculture and the fair and equitable sharing of the benefits arising out of their use, in harmony with the Convention on Biological Diversity, for sustainable agriculture and food security. As of November 2020, 147 are countries are Party to the ITPGRFA and 57 countries have provided reports about their ABS measures to facilitate the exchange of plant material to implement the ITPGRFA. Further, over 5.6 million samples have been transferred globally, with more than 76,000 contracts concluded - known as Standard Material Transfer Agreements (SMTAs) by February 2020.[459]. Other relevant instruments dealing with issues related to ABS are the FAO Commission on Genetic Resources for Food and Agriculture, the Pandemic Influenza Preparedness Framework for the Sharing of Influenza Viruses and Access to Vaccines and Other Benefits, and the process to develop an agreement on the Conservation and Sustainable Use of Marine Biodiversity of Areas Beyond National Jurisdiction.

219. More generally, an analysis of corporate reports and websites of cosmetic and food companies found that references to ABS appear to be receiving increasing attention including by 17 per cent of beauty companies (up from 2 per cent in 2009) and 5 per cent of food and beverage companies (up from 2 per cent in 2012).[460]

Considerations

220. The first assessment and review of progress in the implementation of the Nagoya Protocol revealed that Parties and non-Parties to the Protocol are at various levels with regards to ABS, and that there are several areas requiring further work. These include the need to develop ABS measures, to enhance implementation of the provisions on compliance and monitoring the utilization of genetic resources, including the designation of checkpoints, as well as the provisions to support the full and effective participation of indigenous peoples and local communities in the implementation of the Protocol, and to raise awareness among relevant stakeholders and encourage their participation in its implementation.

221. Currently the Nagoya Protocol is fully operational in about 87 countries, meaning that they have put in place national access and benefit sharing measures and established competent national authorities. Further about 25 countries which are not currently Party to Nagoya Protocol have put in place some form of access and benefit sharing measures. This means that about 40% of countries currently either do not have any form of access and benefit sharing mechanisms in place or have not provided information to the Convention on them. Given this, this proposed target would imply that some countries would need to create or establish ABS mechanisms while for other countries in may entail modifying or further implementing existing mechanisms to ensure their effectiveness.

222. Other international instruments and processes that address this issue include the FAO Commission on Genetic Resources for Food and Agriculture, the Pandemic Influenza Preparedness Framework for the Sharing of Influenza Viruses and Access to Vaccines and Other Benefits, and the process to develop an agreement on the Conservation and Sustainable Use of Marine Biodiversity of Areas Beyond National Jurisdiction. The issue of Digital Sequence Information related to genetic resources in relation to both access and benefit sharing is currently being examined under several of these instruments and processes. The

[459] International Treaty on Plant Genetic Resources for Food and Agriculture - http://www.fao.org/plant-treaty/en/

[460] Union for Ethical BioTrade (2019). UEBT Biodiversity Barometer 2019, Special Edition – Asia - https://static1.squarespace.com/static/577e0feae4fcb502316dc547/t/5d0b61d53df5950001ac0059/1561027031587/UEBT+Biodiversity+Barometer+2019+.pdf

effectiveness of bilateral and multilateral approaches to benefit sharing is also the subject of analysis and discussion.[461]

223. Proposed Goal C of the post-2020 global biodiversity framework focuses on the benefits shared (i.e. the outcomes). However, there is little systematic information on benefits shared (see proposed Goal C). This target could also contribute to proposed goal D on means of implementation to the extent that the monetary and non-monetary benefits arising from the utilization of genetic resources are directed towards the implementation the post-2020 global biodiversity framework. Similarly progress towards this target could also contribute to targets related to resource mobilization (proposed target 18) and knowledge (proposed target 19). Putting in place appropriate measures and ensuring that they are effectively applied may also require capacity building and awareness raising of relevant stakeholders.

224. This proposed target could complement the Goal by focusing on the measures to be taken to ensure and facilitate benefit-sharing. Actions towards this target could also help to reach SDG Target 15.6[462] which is also related to the fair and equitable sharing of the benefits arising from the utilization of genetic resources.

Monitoring

225. Monitoring progress towards this proposed target would require information on the amount of benefits shared through relevant ABS processes. Given that the benefits derived from the access and use of genetic resources and associated traditional knowledge can take various forms, including monetary and non-monetary benefits, consideration needs to be given to how information on the different types of benefits can be collected in consistent way and in a way which allows information to be aggregated. A further challenge is that some benefits associated with ABS agreements are not publicly accessible due to confidentially agreements.

Links to other proposed goals and targets

226. The attainment of this target would directly contribute to the progress towards the proposed goals on nature's contributions to people (Goal B), on the fair and equitable sharing of benefits from the utilization of genetic (Goal C) and on the means of implementation (Goal D). This target would also contribute to the attainment of proposed target 18 on financial resources to the extent that the actions taken to reach this target result in the generation of financial resources that are used to further implement the post-2020 global biodiversity framework and the Convention.

V. SCIENTIFIC AND TECHNICAL INFORMATION RELATED TO PROPOSED TARGETS 13 TO 20 ADDRESSING TOOLS AND SOLUTIONS FOR IMPLEMENTATION AND MAINSTREAMING

Integration of biodiversity[463]

Target 13. *By 2030, integrate biodiversity values into policies, regulations, planning, development processes, poverty reduction strategies and accounts at all levels, ensuring that biodiversity values are mainstreamed across all sectors and integrated into assessments of environmental impacts.*

[461] For example, see Muller (2015). Genetic Resources as Natural Information: Implications for the Convention on Biological Diversity and the Nagoya Protocol. London and New York: Routledge; Neumann et al (2018) Global biodiversity research tied up by juridical interpretations of access and benefit sharing. Organisms Diversity and Evolution 18, 1–12 https://doi.org/10.1007/s13127-017-0347-1; Laird et al (2020). Rethink the expansion of access and benefit sharing. Science. 367. 1200. https://doi.org/10.1126/science.aba9609.

[462] Promote fair and equitable sharing of the benefits arising from the utilization of genetic resources and promote appropriate access to such resources, as internationally.

[463] The text in this subsection draws on GBO-5, and references therein, in particular the section related to the Aichi Biodiversity Target 2. Additional references are indicated in the text for specific points.

227. Transforming social and economic systems means improving our relationship with nature, understanding its value and putting that value at the heart of our planning and decision-making processes.[464] The underlying and direct drivers of biodiversity loss often manifest because the value of biodiversity and nature is not adequately recognised in decision-making. This leads to processes that contribute to biodiversity loss, with subsequent negative impacts on economies, societies and individuals.[465] Addressing the direct and underlying drivers of biodiversity loss will require changing existing patterns of consumption and behavioural change by individuals, organizations, governments, businesses, financial institutions to ways that recognise biodiversity. [466] Understanding, awareness and appreciation of the multiple values of biodiversity and nature and our dependencies and impacts on it help to underpin the willingness of public and private actors and individuals to make such changes.[467] Public awareness can also help create the political will to stimulate action.[468]

228. Integrating biodiversity values into policies, regulations, planning, development processes, poverty reduction strategies and accounts at all levels, will help to ensure that the diverse values of biodiversity (i.e. economic, biophysical, social and cultural - and opportunities derived from its conservation and sustainable use as well as equitable sharing of benefits arising from its utilisation), are recognized and reflected in all relevant public and private planning and decision-making. Reforming sectoral and segmented decision-making to promote integration across sectors and jurisdictions has been identified as a key intervention in tackling the underlying indirect drivers of biodiversity loss.[469] Without the full integration of biodiversity values across all sectors, measures for conservation and sustainable use will be undermined[470] as many development and economic activities that threaten biodiversity will continue if they are not appropriately accounted for.

---

[464] United Nations Environment Programme (2021) Making Peace with Nature: A scientific blueprint to tackle the climate, biodiversity and pollution emergencies - Key messages. UNEP, Nairobi. https://wedocs.unep.org/bitstream/handle/20.500.11822/35114/MPNKM.pdf?sequence=18&isAllowed=y

[465] IPBES (2019) Summary for policymakers of the global assessment report on biodiversity and ecosystem services of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services. IPBES secretariat, Bonn, Germany. 56 pages. https://ipbes.net/sites/default/files/inline/files/ipbes_global_assessment_report_summary_for_policymakers.pdf

[466] Dasgupta (2021) The Economics of Biodiversity: The Dasgupta Review, H-M Treasury, London. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/957291/Dasgupta_Review_-_Full_Report.pdf

[467] UN Environment Programme World Conservation Monitoring Centre (2020) Biodiversity Measures for Business: Corporate biodiversity measurement and disclosure within the current and future global policy context. Cambridge, UK, 60 pp. https://www.unep-wcmc.org/system/comfy/cms/files/files/000/001/845/original/aligning_measures_corporate_reporting_disclosure_dec2020.pdf

[468] IPBES (2019) Summary for policymakers of the global assessment report on biodiversity and ecosystem services of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services. IPBES secretariat, Bonn, Germany. 56 pages. Available at: https://ipbes.net/sites/default/files/inline/files/ipbes_global_assessment_report_summary_for_policymakers.pdf

[469] IPBES (2019) Summary for policymakers of the global assessment report on biodiversity and ecosystem services of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services. IPBES secretariat, Bonn, Germany. https://ipbes.net/sites/default/files/inline/files/ipbes_global_assessment_report_summary_for_policymakers.pdf

[470] Karlsson Vinkhuyzen et al (2014) Mainstreaming biodiversity where it matters most. Wageningen University: Public Administration and Policy Group, Wageningen University and PBL Netherlands Environmental Assessment Agency, Wageningen. https://edepot.wur.nl/335490; Secretariat of the Convention on Biological Diversity (2014) Global Biodiversity Outlook 4, Secretariat of the Convention on Biological Diversity Montréal, 155 pages. https://www.cbd.int/gbo4/ and UNDP and UNEP (2015) Mainstreaming Environment and Climate for Poverty Reduction and Sustainable Development: A Handbook to Strengthen Planning and Budgeting Processes. UNDP-UN Environment Poverty-Environment Initiative, Nairobi. https://www.undp.org/content/undp/en/ home/librarypage/poverty-reduction/mainstreaming-environment-and-climate-for-poverty-reduction-and-.html

Status and trends

229. There has been a steady upward trend in the number of countries incorporating biodiversity values into national accounting and reporting systems.[471] However, there is limited evidence demonstrating that biodiversity has been truly integrated into development and poverty reduction planning.

230. This proposed target addresses a number of issues previously covered in Aichi Biodiversity Target 2.[472] Of the Parties that assessed progress towards their national targets related to Aichi Target 2, more than a third reported that they were on track to reach (35%) or exceed them (2%). More than half (55%) reported progress but not at a rate that would allow them to meet Aichi Target 2. Few Parties report that they are were making no progress (6%) or were moving away from reaching (2%) the target. However, few national targets match (7%) or exceed (1%) the scope and level of ambition set out in the Aichi Target 2. The national targets that have been established largely focus on the integration of biodiversity values into national development strategies and poverty reduction strategies. Many of the targets relate to the issue of policy coherence and/or the integration of biodiversity into decision-making generally. Relatively few NBSAPs addresses the integration of biodiversity values into national and local planning processes, national accounting or reporting processes.

231. Standards for integrating environmental and economic information have been available through the System of Environmental-Economic Accounting (SEEA) since 2012.[473] The number of countries with programmes on environmental-economic accounting has increased steadily from 49 countries in 2006 to 91 countries in 2020.[474] Further, by the end of 2019, 24 countries had published ecosystem accounts under the Experimental Ecosystem Accounting programme, part of the SEEA framework. The United Nations Statistical Commission adopted the SEEA Ecosystem Accounting in March 2021.[475]

232. A total of 47 Parties with national biodiversity strategies and action plans (NBSAPs) developed, updated or revised after the adoption of the Strategic Plan for Biodiversity 2011-2020 include links to poverty eradication and/or integrate this objective into their principles, targets and/or actions.[476] Similarly, 40 Parties indicate in their NBSAPs that biodiversity has been integrated into their national development plan or equivalent instruments.[477] An analysis of 144 NBSAPs suggests that developing countries, especially in Africa, reflect the importance of biodiversity in key productive sectors, including agriculture, forestry and fisheries, in national planning process more than in developed countries. This may partly be due to the involvement of a broader range of stakeholders in developing NSBAPs (also relevant to proposed target 20) in developing countries compared with the process in developed countries.[478]

233. As part of the review mechanisms for the 2030 Agenda for Sustainable Development, member states are encouraged to undertake national reviews of progress. A sample of the Voluntary National Reviews for

---

[471] Secretariat of the Convention on Biological Diversity (2014) Global Biodiversity Outlook 4. https://www.cbd.int/gbo4/; Secretariat of the Convention on Biological Diversity (2020) Global Biodiversity Outlook 5. https://www.cbd.int/gbo5/; and CBD/SBI/3/2/Add.2.

[472] By 2020, at the latest, biodiversity values have been integrated into national and local development and poverty reduction strategies and planning processes and are being incorporated into national accounting, as appropriate, and reporting systems.

[473] The System of Environmental-Economic Accounting (SEEA) is a framework that integrates economic and environmental data to provide a more comprehensive and multipurpose view of the interrelationships between the economy and the environment and the stocks and changes in stocks of environmental assets. For further information, see https://seea.un.org/

[474] SEEA Around the World. https://seea.un.org/content/global-assessment-environmental-economic-accounting

[475] System of Environmental Economic Accounting - https://seea.un.org/ecosystem-accounting

[476] Secretariat of the Convention on Biological Diversity (2020) Global Biodiversity Outlook 5. Secretariat of the Convention on Biological Diversity, Montreal. https://www.cbd.int/gbo/gbo5.

[477] Secretariat of the Convention on Biological Diversity (2020) Update on progress in revising/updating and implementing national biodiversity strategies and action plans, including national targets. CBD/SBI/3/2/Add.1. https://www.cbd.int/doc/c/d2b9/ebf9/5e0c96b85bc233a413a433bd/sbi-03-02-add1-en.pdf

[478] Whitehorn et al (2019) Mainstreaming biodiversity: A review of national strategies. Biological Conservation 235 157–163. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7083249/

implementation of the Sustainable Development Goals shows that approximately half of the reporting countries have mainstreamed biodiversity throughout their reports.

Considerations

234. The integration of biodiversity values is as a key instrument for addressing the direct and indirect drivers of biodiversity loss and for achieving multiple environmental and development goals. Articles 6 (b), 10 (a) (c), 14, 11, 7 (c) and 8 (i) and (l) of the text of the Convention all call for the integration of biodiversity into various planning and development processes.[479]

235. In general, the integration of biodiversity values into relevant policies and processes[480] will require the greater recognition of all values of biodiversity and ecosystem services. It also requires identifying and developing policy instruments, tools and/or instruments for addressing biodiversity and ecosystem services values in a comprehensive manner within and across different sectors and planning and decision-making processes.[481] Support, including resources (proposed target 18) and monitoring (proposed target 19), will be needed to ensure that these processes are effective. The greater use of the System for Environmental-Economic Accounting (SEEA) standard could also help in this respect.[482]

236. Progress towards this target will require a range of specific actions, many of which will directly or indirectly contribute to the attainment of all of the other proposed targets in the post-2020 global biodiversity framework.[483] Specific actions to reach this target could include greater efforts to incorporate biodiversity values and considerations into sectoral policies, including policies related to development, forestry, agriculture, fisheries, energy, finance, and other economic sectors; to develop natural capital accounts; to undertake more effective strategic environmental assessments and environmental impact assessments and to further develop tools, guidelines and methodologies to support institutions in decision-making among other things. Actions could also include carrying out national ecosystem assessments and mapping, undertaking studies on biodiversity values,[484] support for spatial and land use planning (see also proposed target 1), establishing science-policy platforms, adopting or updating relevant legislative acts, regulations and standards, the promotion of polycentric governance systems, and support for environmental education programmes among other things. However, each country will need to ultimately determine its own institutional mechanisms and sequencing of actions according to its own national circumstances.[485] Further

[479] Text of the Convention on Biological Diversity. www.cbd.int/convention/text/

[480] These may include national development plans, poverty reduction strategies, green growth strategies, green economy strategies and sector plans (e.g. agriculture, fisheries, forestry, tourism, trade and development, and finance) among other things.

[481] Stålhammar (2021) Assessing People's Values of Nature: Where Is the Link to Sustainability Transformations? Frontiers in Ecology and Evolution. 9. https://doi.org/10.3389/fevo.2021.624084

[482] The SEEA Central Framework was adopted by the UN Statistical Commission in 2012 as the first international standard for environmental-economic accounting. In addition, the SEEA Experimental Ecosystem Accounting (SEEA EEA) was endorsed by the UN Statistical Commission in 2013 as the basis for further development of this new field of national accounting, and the SEEA EEA was formally published in 2014. On 11 March 2021, the United Nations adopted a new statistical framework to better account for biodiversity and ecosystems in national economic planning and policy decision-making, allowing countries to use a common set of rules and methods to track changes in ecosystems and their services. For further information see https://seea.un.org/content/seea-central-framework

[483] The draft long-term approach to mainstreaming and the associated action plan, currently submitted to the Subsidiary body on Implementation at its third meeting, identifies are range of pertinent strategic action areas and provides an indicative list of possible actions. For more information, see CBD/SBI/3/13 and Add.1.

[484] The IPBES Methodological assessment regarding the diverse conceptualization of multiple values of nature and its benefits, including biodiversity and ecosystem functions and services, due to be finalized in 2022, will provide information on the multiple values of biodiversity.

[485] Huntley and Redford (2014) Mainstreaming Biodiversity in Practice: a STAP Advisory Document. Global Environment Facility, Washington, D.C. http://www.thegef.org/sites/default/files/publications/Mainstreaming-Biodiversity-LowRes_1.pdf; Redford et al (2015) Mainstreaming Biodiversity: Conservation for the Twenty-First Century, Frontiers in Ecology and Evolution, Volume 3 5. https://doi.org/10.3389/fevo.2015.00137 and Manuel et al (2016) Key Ingredients, Challenges and Lessons from Biodiversity Mainstreaming in South Africa: People, Products, Process. OECD Environment Working Papers No. 107, OECD Publishing, Paris. http://dx.doi.org/10.1787/5jlzgj1s4h5h-en

the successful integration of biodiversity values into decision making processes will likely require balancing trade-offs between some socio-economic and biodiversity objectives.[486] Further, the development of biodiversity-inclusive spatial plans (proposed target 1) could also be helpful in this respect. Discussions under the Convention on a draft long-term approach to mainstreaming is also relevant.[487]

237. Actions towards this target would also contribute targets related to other international processes. This includes targets 15.9, 11.b, 13.1, 1.5, 17.14 of the Sustainable Development Goals as well as processes related to United Nations Framework Convention on Climate Change and the Paris Agreement, the 2018–2030 Strategic Framework under the United Nations Convention to Combat Desertification, the International Treaty on Plant Genetic Resources for Food and Agriculture (2001)[488] and several of the goals and targets of the fourth Ramsar Strategic Plan (2016–2024).[489] The actions to reach this proposed target would also help to contribute to a number of other framework and/or declarations including the Global Forest Goals and Targets of the United Nations Strategic Plan for Forests 2030 (2017-2030)[490], the FAO Strategy on Mainstreaming Biodiversity across Agricultural Sectors, [491] the Land Degradation Neutrality targets and the Sendai Framework for Disaster Risk Reduction (2015–2030).

Monitoring

238. A historic challenge in monitoring progress towards targets on this issue has been determining appropriate and consistent definitions and baselines. Measures related to the integration of biodiversity in decision making processes often rely on secondary data or are drawn from sources that apply different criteria and timelines creating challenges for data analysis and aggregation.[492]

239. Generally, monitoring progress towards the proposed target would require information on the processes countries and relevant organisations have put in place to integrate the values of biodiversity into decision making, and on the outcomes and impacts of these processes.[493] While some information on the number of countries integrating biodiversity values into decision making is available, including through the processes noted above, there is limited information on relevant actions by non-governmental actors. Further there is limited information on the effects or impacts of these actions. Information generated in relation to

---

[486] Global Environment Facility Independent Evaluation Office (2019) Evaluation of GEF Support to Mainstreaming Biodiversity, Evaluation Report No. 134, GEF IEO, Washington, DC. https://www.gefieo.org/sites/default/files/ieo/evaluations/files/biodiversity-mainstreaming-2018_1.pdf; Smith et al (2020) Biodiversity mainstreaming: A review of current theory and practice. IIED, London. https://pubs.iied.org/pdfs/17662IIED.pdf

[487] The draft long-term approach to mainstreaming and the associated action plan, currently submitted to the Subsidiary body on Implementation at its third meeting, identifies are range of pertinent strategic action areas and provides an indicative list of possible actions. For more information see CBD/SBI/3/13 Add.1.

488 FAO (2009) International Treaty on Plant Genetic Resources for Food and Agriculture. FAO. Rome. http://www.fao.org/3/i0510e/i0510e.pdf

[489] In particular, Goal 1, Target 1; Goal 3, Target 11 and Goal 4, Target 16. Ramsar Convention Secretariat, 2016. The Fourth Ramsar Strategic Plan 2016–2024. Ramsar handbooks for the wise use of wetlands, 5th edition, vol. 2. Ramsar Convention Secretariat, Gland, Switzerland. https://www.ramsar.org/sites/default/files/hb2_5ed_strategic_plan_2016_24_e.pdf

[490] United Nations Forum on Forests Secretariat, DESA (2019) Global forest goals and targets of the UN Strategic Plan for Forests 2030. United Nations, New York. https://www.un.org/esa/forests/wp-content/uploads/2019/04/Global-Forest-Goals-booklet-Apr-2019.pdf

[491] FAO (2020) FAO Strategy on Mainstreaming Biodiversity across Agricultural Sectors. Food and Agriculture Organization of the United Nations, Rome. https://doi.org/10.4060/ca7722en and http://www.fao.org/3/ca7722en/CA7722EN.pdf

[492] Global Environment Facility Independent Evaluation Office (2019) Evaluation of GEF Support to Mainstreaming Biodiversity, Evaluation Report No. 134. GEF IEO, Washington, DC. https://www.gefieo.org/sites/default/files/ieo/evaluations/files/biodiversity-mainstreaming-2018_1.pdf

[493] Smith et al (2020) Biodiversity mainstreaming: A review of current theory and practice. IIED, London. https://pubs.iied.org/pdfs/17662IIED.pdf and IIED and UNEP-WCMC (2017) Mainstreaming biodiversity and development: guidance from African experience 2012-17. IIED, London. https://pubs.iied.org/pdfs/17608IIED.pdf

the Long-term Strategic Approach to Mainstreaming Biodiversity and its Action Plan (LTAM),[494] including its proposed indicators, could also be used to monitor progress towards this proposed target.

Links to other proposed goals and targets

240. The attainment of this target would directly contribute to the progress towards all of the proposed goals and targets of the post-2020 global biodiversity framework as it relates to the integration of biodiversity into decision making and planning processes generally. It will be a particularly important aspect of the means of implementation (proposed goal D) and in reaching those targets related to the productive sectors, nature's benefits to people and mainstreaming (proposed targets 6, 8, 9, 10, 11, 14, 15, 17, 19 and 20).

Sustainable production and supply chains[495]

Target 14. *By 2030, achieve reduction of at least [50%] in negative impacts on biodiversity by ensuring production practices and supply chains are sustainable.*

241. Biodiversity loss is exacerbated by unsustainable production practices, which are in turn driven by global consumption patterns and facilitated by domestic and international supply chains. [496] Over the past decades, trade in commodities has become increasingly globalised and production systems have become more efficient in servicing the growing consumption patterns of the global economy. This has created market opportunities for countries around the world and supported economic growth. However, it has also significantly contributed to the loss of biodiversity in many areas and regions. There is therefore a need to address the growing global demand for products and services while mitigating the negative environmental impacts of production and supply chain systems. Addressing these issues will be critical to achieving the 2050 Vision for Biodiversity.

Status and trends

242. Production practices in a range of sectors, including agriculture, forestry, fisheries, harvesting of wild species, energy and mining,[497] are all impacting biodiversity. By some estimates, resource extraction and processing account for over 90 per cent of global biodiversity and water stress impacts and half of global greenhouse gas emissions.[498] Additionally, the conversion of natural ecosystems to farming and plantations, and the continued exploitation of remaining natural and semi-natural ecosystems to deliver raw materials such as timber and fish are increasingly exacerbating other drivers of change, such as climate change, pollution and the spread of invasive alien species, which are, in turn, likely to further exacerbate negative impacts on biodiversity.[499] More specifically:

(a) The expansion of agriculture over recent decades has led to land-use conversion at a large scale, often at the expense of natural ecosystems such as forests, wetlands and grasslands (see also proposed targets 2 and 8). High-impact commodities in particular, such as livestock, soy and oil palm, are contributing to 70 - 80 per cent of total global deforestation;[500]

---

[494] CBD/SBI/3/13 and Add.1.

[495] The text in this subsection draws on GBO-5, and references therein, in particular the sections related to the Aichi Biodiversity Targets 4 and 7. Additional references are indicated in the text for specific points.

[496] IPBES (2019). Global assessment report on biodiversity and ecosystem services of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services. IPBES secretariat, Bonn, Germany. https://ipbes.net/global-assessment;

[497] Maxwell et al (2016) Biodiversity: the ravages of guns, nets and bulldozers. Nature 536, 143 – 145. https://doi.org.10.1038/536143a

[498] IRP (2019) Global Resources Outlook 2019: Natural Resources for the Future We Want. A Report of the International Resource Panel. United Nations Environment Programme. Nairobi, Kenya. http://hdl.handle.net/20.500.11822/27517

[499] IPBES (2019) Summary for policymakers of the global assessment report on biodiversity and ecosystem services of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services. IPBES secretariat, Bonn, Germany.

[500] IRP (2019) Global Resources Outlook 2019: Natural Resources for the Future We Want. http://hdl.handle.net/20.500.11822/27517

(b) Globally the rate of forest loss has slowed since 2000. However, changes in forest cover vary, with declines mostly experienced in the highly biodiverse tropics (with accelerating declines being experienced in some regions) and increases of cover mostly in temperate and boreal forests[501] (also see proposed target 1). Further the choice of forest management regime influences biodiversity significantly. For example a meta-analysis of 287 studies found that biodiversity impacts vary greatly depending on the practices used to manage forests for timber production with selection and retention systems and reduced impact logging having minimal effects on species richness while more intensive systems, such as timber plantations, clear-cutting and conventional selective logging may reduce species richness by 13-44 per cent;[502]

(c) Biodiversity loss in marine ecosystems has been predominantly driven by the overexploitation of species through unsustainable fishing practices. One in three fish stocks are considered overfished and further biodiversity losses are experienced through by-catch of non-target species, seafloor destruction[503] and impacts on mangroves and corals. As fishing industries expand into new locations and deeper waters, impacts are set to continue to increase under business-as-usual scenarios. In some locations the illegal, unreported and unregulated is also a significant issue;

(d) Pressures on wild meat resources are rising, driven by increases in demand, growing urbanisation and access to new lands through infrastructure and extractives industries. Unsustainable hunting is impacting 20 per cent of the species assessed through the IUCN Red List of Threatened Species and is frequently reported as a threat to protected areas;[504]

(e) Compared to other land uses, the energy and mining sectors have a smaller spatial footprint. However, despite this, the extraction of primary materials (including oil, gas, metals, minerals and coal) has significant negative impacts on biodiversity and threaten approximately 18 per cent of species listed on the IUCN Red List.[505] Further these types activities can also open up previously inaccessible or remote areas leading to an influx of people, infrastructure and other land or ocean use activities (for example, agriculture, fishing and hunting) which can further drive habitat conversion or exploitation of natural resources. In addition, the energy and mining sectors are increasingly moving into new and often relatively undisturbed, environments, such as the deep sea;[506]

243. An important dimension of production practices and supply chains is trade patterns. While trade patterns have advanced economic and social development they have also created a situation where the spatial impacts of production are decoupled from consumption (telecoupling).[507] The impacts of resource-intensive production processes age generally shifting from high-income importing countries to low income exporting

[501] IPBES (2019): Summary for policymakers of the global assessment report on biodiversity and ecosystem services of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services.

[502] Chaudhary et al (2016), Impact of Forest Management on Species Richness: Global MetaAnalysis and Economic Trade-Offs. *Scientific Reports*. 6, 23954; https://doi.org/10.1038/srep23954

[503] WWF (2020) Living Planet Report 2020 - Bending the curve of biodiversity loss. Almond, R.E.A., Grooten M. and Petersen, T. (Eds). WWF, Gland, Switzerland. https://livingplanet.panda.org/

[504] Coad et al (2019) Towards a sustainable, participatory and inclusive wild meat sector. Bogor, Indonesia: CIFOR. https://www.cifor.org/knowledge/publication/7046/

[505] World Economic Forum (2020) New Nature Economy Report II – The Future of Nature and Business. https://www.weforum.org/reports/new-nature-economy-report-ii-the-future-of-nature-and-business

[506] Fauna & Flora International (2020) An Assessment of the Risks and Impacts of Seabed Mining on Marine Ecosystems. FFI: Cambridge, United Kingdom. https://cms.fauna-flora.org/wp-content/uploads/2020/03/FFI_2020_The-risks-impacts-deep-seabed-mining_Executive-Summary.pdf

[507] IPBES (2019) Summary for policymakers of the global assessment report on biodiversity and ecosystem services of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services, IPBES secretariat, Bonn, Germany. 56 pages. https://doi.org/10.5281/zenodo.3553579.

countries.[508] For example, over 80 per cent of the impacts of food crop consumption in industrialised countries in other countries.[509] Further, there remains issues with traceability and transparency of supply chains, and how to appropriately measure the impacts of these on biodiversity.[510]

244. The contribution of global trade systems to the loss and degradation of biodiversity and the risks this poses to future production is becoming more widely recognized by governments, the private sector, and finance institutions. This has led to various initiatives, such as voluntary certification schemes, zero deforestation commitments, finance standards, and due diligence legislation, to identify and manage the impacts and dependencies that supply chains have on biodiversity and ecosystem services.[511] Further the number of businesses taking biodiversity into account in their supply chains, reporting processes and activities appears to be increasing, though information is limited. For example, an analysis of corporate reports and websites of cosmetic and food companies found that references to biodiversity increased significantly over the current decade. Among those reviewed, the number of companies in the beauty sector that referred to biodiversity increased from 13% in 2009 to 49% in 2019. For food and beverage companies the corresponding figures were 53% in 2012 and 76% in 2019. While this trend is positive, the depth and quality of the information provided is limited and is mostly related to palm oil, deforestation and sustainable packaging. Despite the increasing number of these efforts across different resources and commodities, there remain significant challenges in scaling these due to issues with traceability to production sites, navigating the complexity of voluntary schemes and free trade agreements, and ensuring the scope of application is sufficient.[512] The planned IPBES methodological assessment of the impact and dependence of business on biodiversity and nature's contributions to people may provide useful information in this regard.

Considerations

245. Reducing the negative impacts of production practices and supply chains will require actions that address both direct and indirect impacts across a range of socio-economic systems. While reversing negative trends caused by these systems is possible, it will require integrated interventions applied at scale and a mix of trade policy, national laws, due diligence requirements, voluntary commitments, environmental management systems and standards and finance standards.[513]

246. More specific actions towards this target could include developing requirements for assessment and disclosure of the dependencies and impacts of production practices and supply chains on biodiversity. This would allow biodiversity relevant information to be more easily taken into account by businesses, policymakers and the general public. Additional possible actions to support and encourage more sustainable practices could include the further promotion of environmental impact assessment practices, labelling and certification schemes and/or moratoria, including environmental considerations in trade contracts, policies and agreements and the development and implementation of national, regional and global action plans for

[508] UNEP and IRP (2020) Sustainable Trade in Resources: Global Material Flows, Circularity and Trade. United Nations Environment Programme. Nairobi, Kenya. https://www.unenvironment.org/resources/publication/sustainable-trade-resources-global-material-flows-circularity-and-trade

[509] Chaudhary and Kastner (2016) Land use biodiversity impacts embodied in international food trade. Global Environmental Change 38, 195-204. https://doi.org/10.1016/j.gloenvcha.2016.03.013 and Marques et al (2019) Increasing impacts of land use on biodiversity and carbon sequestration driven by population and economic growth. Nature Ecology and Evolution 3, 628–637 (2019). https://doi.org/10.1038/s41559-019-0824-3

[510] For example, Global Forest Watch Pro https://pro.globalforestwatch.org/ and Trase https://trase.earth/

[511] De Maria et al (2020) Global Soybean Trade. The Geopolitics of a Bean. United Kingdom Research and Innovation Global Challenges Research. https://doi.org/10.34892/7yn1-k494

[512] Green et al (2019) Linking global drivers of agricultural trade to on-the-ground impacts on biodiversity, Proceedings of the National Academy of Sciences of the United States of America. National Academy of Sciences, 116(46), pp. 23202–23208. https://doi.org/10.1073/pnas.1905618116

[513] Leclère et al (2020) Bending the curve of terrestrial biodiversity needs an integrated strategy. Nature 585, 551–556. https://doi.org/10.1038/s41586-020-2705-y; World Economic Forum (2020) New Nature Economy Report II – The Future of Nature and Business. https://www.weforum.org/reports/new-nature-economy-report-ii-the-future-of-nature-and-business

productive sectors and associated supply chains.[514] While some of these actions, in particular those related certification schemes and standards in international markets, can have positive impacts, for small-scale processors and farmers, who often lack the financial and technical capacity to apply and comply with complex and stringent requirements, they can pose challenges.[515]

247. To drive the action needed across multiple scales, there is a need to increase efforts to understand the production footprint of corporate and country supply chains. Understanding trade and consumption flows will allow for international, national and business policy to direct attention towards efforts that reduce high biodiversity impact. Adoption of Multi-Regional Input Output (MRIO) assessment approaches can support the measurement and reduction of impacts from different sectors and their international dependencies. At the company level, tools are emerging that support an understanding of the impacts and dependencies of supply chains on biodiversity to support sustainable sourcing efforts. These need to be increased and scaled over the coming years to support further ambition and action to address negative biodiversity impacts.

248. A diverse set of actions will also be required to reduce the impact footprint of production systems on biodiversity.[516] These include efforts to: halt deforestation and the conversion of natural habitats; establish no-take fishing zones; restore habitats and degraded land; protect key and endemic species; enhance resource efficiency; introduce circular economy approaches; and reduce overall consumption. Progress can be further supported through spatial planning approaches that identify optimal production areas and sustainable sourcing standards across both domestic and international supply chains.

249. There are a growing number of initiatives aimed at supporting sustainable sourcing practices, including certification schemes, sourcing commitments, trade negotiations, standards setting and guidelines. However, a lack of harmonization between these limits the uptake and effectiveness in addressing negative impacts. One of the key challenges in scaling these efforts is the lack of incentives (proposed target 17) in place to overcome the direct and opportunity costs associated with sustainable production systems. Greater awareness (proposed target 19) of the nature-related risks of unsustainable production is needed to drive a market-based system that rewards sustainability. Future efforts to improve the standardization, uptake and alignment of commitments across government and the private sector, will help to identify priority areas, leverage points, potential leakage to other production areas, and opportunities for coordinated solutions across supply chains.[517]

250. There will be a need for greater recognition and accountability for cross border impacts of production and supply chains. Growth in population and the global economy has led to an increased demand for energy and materials that has been facilitated by a tenfold increase in global trade. These advances have fuelled economic and social development but have also led to a spatial decoupling of production from consumption, thereby shifting impacts on nature and ecosystems.[518] At present, conservation-based policies at the country level often govern domestic activities and do not account for the impacts associated with international trade.[519] The inclusion of environmental considerations into bilateral and multilateral trade agreements would help to support progress on the integration of impact considerations across the value chain and thereby

[514] The draft long-term approach to mainstreaming and the associated action plan, referenced above, contains a strategic action area directly relevant to this target and provides an indicative list of possible actions. For more information, see CBD/SBI/3/13 and Add.1.

[515] FAO. 2020. The State of Agricultural Commodity Markets 2020. Agricultural markets and sustainable development: Global value chains, smallholder farmers and digital innovations. Rome, FAO. https://doi.org/10.4060/cb0665en

[516] World Economic Forum (2020) New Nature Economy Report II – The Future of Nature and Business. https://www.weforum.org/reports/new-nature-economy-report-ii-the-future-of-nature-and-business

[517] Green et al (2019) Linking global drivers of agricultural trade to on-the-ground impacts on biodiversity, Proceedings of the National Academy of Sciences of the United States of America. National Academy of Sciences, 116(46), pp. 23202–23208. https://doi.org/10.1073/pnas.1905618116

[518] IPBES (2019) Summary for policymakers of the global assessment report on biodiversity and ecosystem services of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services.

[519] WWF (2020) Living Planet Report 2020 - Bending the curve of biodiversity loss. Almond, R.E.A., Grooten M. and Petersen, T. (Eds). WWF, Gland, Switzerland. https://livingplanet.panda.org/

help to reduce negative impacts on biodiversity. Further recognizing and anticipating future shifts in global consumer demand patterns and resource use will be imperative for establishing sustainable supply chains.[520]

251. The biggest trade-offs in actions to reach this target is likely to be balancing the need for habitat protection with the level of resource acquisition and material production needed to meet projected demands for products, services and resources associated with a growing global human population.[521] To achieve this, integration and coordinated action is required across the post-2020 targets (including proposed targets on the use of wild species (target 4); on sustainable and productive agriculture (proposed target 9); on consumption patterns (target 15); and on incentive and subsidy reform (target 17). Trade-offs are also likely to occur between biodiversity protection and the acceleration towards the energy transition. Action to combat climate change will lead to increases in renewable technologies which in turn may place increased demand on mined materials and minerals.[522] To help alleviate these pressures, it will be necessary to identify approaches that scale circular models, support nature-positive metals and minerals extraction practices and facilitate sustainable supply chains.[523]

252. The actions taken to reach this target also have the potential to support the attainment of several targets under the 2030 Agenda for Sustainable Development. These include These include targets 2.4,[524] 8.4,[525] 9.4,[526] 12.1,[527] 12.2,[528] and 12.6.[529] In addition there are several other relevant frameworks and agreements which have processes with implications for issues related to trade and biodiversity. These include:

(a) The World Trade Organization, which has a number of agreements and understandings that apply to agricultural trade, including the 1994 General Agreement on Tariffs and Trade and the 1995 Agreement on Agriculture. The Agreement on Agriculture aims to establish a fair and market orientated trading system while accounting for the need to protect the environment. WTO members are in continuing conversations on agricultural trade reform;

(b) The UNCTAD BioTrade Initiative's Principles and Criteria cover goods and services derived from native biodiversity under the criteria of environmental, social and economic sustainability;

(c) The FAO Global plans of action established by the Commission on Genetic Resources for Food and Agriculture provide strategic frameworks and recommendations for the conservation and

---

[520] IRP (2019). Global Resources Outlook 2019: Natural Resources for the Future We Want. http://hdl.handle.net/20.500.11822/27517

[521] WWF (2020) Living Planet Report 2020 - Bending the curve of biodiversity loss. WWF, Gland, Switzerland. https://livingplanet.panda.org/

[522] World Bank (2020) Minerals for Climate Action: The Mineral Intensity of the Clean Energy Transition. https://www.worldbank.org/en/topic/extractiveindustries/brief/climate-smart-mining-minerals-for-climate-action

[523] World Economic Forum (2020) New Nature Economy Report II – The Future of Nature and Business. https://www.weforum.org/reports/new-nature-economy-report-ii-the-future-of-nature-and-business

[524] By 2030, ensure sustainable food production systems and implement resilient agricultural practices that increase productivity and production, that help maintain ecosystems, that strengthen capacity for adaptation to climate change, extreme weather, drought, flooding and other disasters and that progressively improve land and soil quality

[525] Improve progressively, through 2030, global resource efficiency in consumption and production and endeavour to decouple economic growth from environmental degradation, in accordance with the 10-Year Framework of Programmes on Sustainable Consumption and Production, with developed countries taking the lead

[526] By 2030, upgrade infrastructure and retrofit industries to make them sustainable, with increased resource-use efficiency and greater adoption of clean and environmentally sound technologies and industrial processes, with all countries taking action in accordance with their respective capabilities.

[527] Implement the 10-Year Framework of Programmes on Sustainable Consumption and Production Patterns, all countries taking action, with developed countries taking the lead, taking into account the development and capabilities of developing countries

[528] By 2030, achieve the sustainable management and efficient use of natural resources.

[529] Encourage companies, especially large and transnational companies, to adopt sustainable practices and to integrate sustainability information into their reporting cycle.

sustainable use of genetic resources for food and agriculture. These plans include targets, indicators and verifiers to monitor implementation of the plan and associated activities;

(d) The Codex Alimentarius is a collection of international food standards, guidelines and codes of practice that contribute to the safety, quality and fairness of international food trade;

(e) The International Tropical Timber Organization (ITTO) supports members with efforts to conserve biodiversity, implement sustainable forest management, restore degraded forest landscapes and encourage the sustainable use of forest resources. Further, the 2006 International Tropical Timber Agreement outlines a number of measures intended to promote the 'expansion and diversification of international trade in tropical timber from sustainably managed and legally harvested forest and the sustainable management of tropical timber producing forests;[530]

(f) The International Seabed Authority has a mandate to organize, regulate and control all mineral-related activities in the international seabed area and ensure the effective protection of the marine environment from harmful effects that may arise from deep-seabed related activities. This includes a responsibility to take necessary measures to ensure the protection of the marine environment from harmful effects arising from human activities.

Monitoring

253. Monitoring progress towards this target will require information on the impacts of production practices and supply chains on biodiversity. As noted above the types of the impacts and economic sectors involved are wide reaching and are dependent on several factors. For monitoring impacts of production and supply chains information related to the overall status and trends of biodiversity will be required. Some of the information used to monitor the implementation of the other proposed goals and targets in the post-2020 global biodiversity framework could be used in this respect. However, this information would need to be linked or otherwise considered in relation to production patterns and supply chains. Further, information on the management interventions put in place to address production patterns and supply chains could also be used to help monitor progress towards this target. Information from both the public and private sectors is likely to be required to do this effectively. Currently information related to the private sector is relatively limited so consideration may be needed of how this information could be effectively collected.[531]

Links to other proposed goals and targets

254. The attainment of this target would directly contribute to the progress towards the proposed goals on ecosystems, species and genetic diversity (Goal A) and on nature's contributions to people (Goal B). Progress towards this target would also contribute to the attainment of many of the proposed targets in the post-2020 global biodiversity framework including the proposed targets on land/sea use change (target 1), the management actions to enable wild species of fauna and flora (target 3), the harvesting, trade and use of wild species of fauna and flora (target 4), invasive alien species (target 5), reducing pollution (target 6) and the productivity, sustainability and resilience of biodiversity (target 9). Similarly, balancing the protection of biodiversity with issues related to sustainable use, (proposed targets 8 and 12) will also be important to addressing production patterns and supply chains. There are also connections between other proposed targets looking to identify tools and solutions for implementation and mainstreaming (proposed targets 13, 15, and 17).

[530] International Tropical Timber Agreement (2006), Article 1.

[531] UN Environment Programme World Conservation Monitoring Centre (2020) Biodiversity Measures for Business: Corporate biodiversity measurement and disclosure within the current and future global policy context. Cambridge, United Kingdom. https://doi.org/10.13140/RG.2.2.27417.65121

Sustainable consumption[532]

Target 15. *By 2030, eliminate unsustainable consumption patterns, ensuring people everywhere understand and appreciate the value of biodiversity, and thus make responsible choices commensurate with 2050 biodiversity vision, taking into account individual and national cultural and socioeconomic conditions.*

255. Unsustainable consumption is a not only a direct driver of biodiversity loss but also underlies each of the five main direct drivers of biodiversity loss. Reaching the 2050 Vision will require that the use of resources and the generation of waste does not exceed what can be sustainably provided and absorbed by the Earth. This target is closely related to proposed target 14 addressing to supply chains.

Status and trends

256. Patterns of consumption globally are currently unsustainable and are having negative impacts on both species and ecosystems. [533] The growth in the global economy over the last 50 years, and the associated increase in production and consumption, has been accompanied by a threefold increase in natural resource extraction and energy use, which, in turn, has had a range of effects on biodiversity.[534]

257. An increasing number of governments and businesses are developing plans for more sustainable consumption. However, these are not being implemented on a scale that eliminates the negative impact of unsustainable human activities on biodiversity. Further while natural resources are being used more efficiently, the aggregated demand for resources continues to increase, and therefore the impacts of their use remain well above safe ecological limits. Between 2011 and 2016, the ecological footprint has remained at approximately 1.7 times the level of biocapacity – in other words, requiring '1.7 Earths' to regenerate the biological resources used by our societies.[535] While the ecological footprint has appeared to stabilize in recent years it is still well above what can be considered sustainable. Further, a recent analysis showed that global stocks of natural capital had declined per person by nearly 40 per cent between 1992 and 2014, compared with a doubling of produced capital and a 13 per cent increase in human capital over the same period.[536]

258. With regards to the impacts of unsustainable consumption on species, the Red List Index for internationally traded species shows a continued increase in extinction risk for those bird species associated with international trade, typically meeting the demand for pet birds kept in cages. Similarly, the Red List Index for the impacts of utilization shows that, on average, the use by people is increasing the degree to which species of birds, mammals and amphibians are threatened with extinction.

Considerations

259. Unsustainable consumption is the point where the amount of resources being extracted or used exceeds the amount of resources that can be provided on a sustainable basis while maintaining ecosystem functionality. Specific limits will vary with different ecosystems and species depending on ecosystem compositions and conditions, the species being considered, and the type and magnitude of pressures being applied.

---

[532] The text in this subsection draws on GBO-5, and references therein, in particular the sections related to the Aichi Biodiversity Targets 4 and 7. Additional references are indicated in the text for specific points.

[533] Otero et al (2020) Biodiversity policy beyond economic growth. Conservation Letters.13:e12713. https://doi.org/10.1111/conl.12713; Dasgupta (2021) The Economics of Biodiversity: The Dasgupta Review HM Treasury. United Kingdom. https://www.gov.uk/government/publications/final-report-the-economics-of-biodiversity-the-dasgupta-review

[534] United Nations Environment Programme (2021) Making Peace with Nature: A scientific blueprint to tackle the climate, biodiversity and pollution emergencies. Nairobi. https://www.unep.org/resources/making-peace-nature

[535] Global Footprint Network (2020) Ecological Footprint. https://www.footprintnetwork.org/our-work/ecological-footprint. The ecological footprint was estimated to be about 1.6 planets in 2020 – the decrease, probably temporary, driven by the global economic slowdown resulting from the COVID-19 pandemic.

[536] Managi and Kumar (2018). Inclusive Wealth Report 2018. United Nations Environment Programme: https://www.unenvironment.org/resources/report/inclusive-wealth-report-2018

260. The effects of unsustainable consumption on biodiversity can be direct, for example through the overharvesting of a specific species, or indirect, for example by being mediated through habitat loss resulting from the need for more production purposes. While improvements in efficiencies and reducing waste and other losses are important in ensuring more sustainable consumption, ultimately the demand for resources will need to be reduced globally if this target is to be achieved. For example the interim report of an independent review on the economics of biodiversity found that efficiencies alone cannot lead to sustainable use of natural capital assets, and that long-term sustainability involves confronting difficult questions involving what and how we consume, how we manage our waste and the role of family planning and reproductive health.[537]

261. Generally, actions towards this target will need to focus on those which will reduce the overall demand for resources and limit waste. This will include changes in personal values, norms, economic and social operating rules, technologies, and regulations.[538] Action across society will be require, with governments having a particularly important role to play in creating an enabling environment for actions by the private sector and individuals, including though achieving elements of proposed target 17 on incentives. Further a greater recognition of people's dependency on biodiversity (proposed targets 13 and 19) and of the negative impacts upon biodiversity from current models of economic and human behaviour will be needed.

262. More specifically, sustainable consumptions patterns can be achieved in two main ways. The first is by improving efficiencies and reducing waste from current consumption patterns. For example about 17 per cent of global food production is wasted[539] while annual discards from fisheries represent around 10% of annual catches.[540] Significant efforts are already ongoing to improve efficiencies and reducing waste, including by promoting circular economy approaches, however, the aggregated demand for resources continues to increase, and therefore the impacts of their use remain well above safe ecological limits. Further, the generation of waste continues to be a significant issue. Just looking a food waste, a recent assessment estimated that in 2019 approximately 931 million tonnes of food waste, representing 17% of total global food production, was generated. Of this, 61% came from households, 26% from food services and 13% from retail. The assessment also found that household food waste generation was broadly similar across country income groups.[541] Therefore, the second important action will be putting in place measures and tools to reduce the overall demand for resources. This could include promoting changes in consumer preferences for the amount and type of resources which are consumed, promoting the use of goods from sustainable sources, support for biodiversity-friendly business, developing national procurement policies that are in line with the objectives of the Convention, and the development of methods to promote science-based information on biodiversity in consumer and producer decisions.

263. It is important to note that while the global demand for resources needs to be reduced there will be regional variation, and in some countries and regions consumption patterns may need to increase to meet societal objectives related to development and poverty alleviation. Finding ways to address this need in a sustainable way will be important.[542]

---

[537] Human capital includes knowledge, education and skills. Managi and Kumar (2018). Inclusive Wealth Report 2018. United Nations Environment Programme: https://www.unenvironment.org/resources/report/inclusive-wealth-report-2018

[538] United Nations Environment Programme (2021). Making Peace with Nature: A scientific blueprint to tackle the climate, biodiversity and pollution emergencies. Nairobi. https://www.unep.org/resources/making-peace-nature

[539] United Nations Environment Programme (2021). Food Waste Index Report 2021. Nairobi. https://www.unep.org/resources/report/unep-food-waste-index-report-2021

[540] FAO. 2020. The State of World Fisheries and Aquaculture 2020. Sustainability in action. Rome. https://doi.org/10.4060/ca9229en

[541] United Nations Environment Programme (2021). Food Waste Index Report 2021. Nairobi. https://wedocs.unep.org/bitstream/handle/20.500.11822/35280/FoodWaste.pdf

[542] The draft long-term approach to mainstreaming and the associated action plan, currently submitted to the Subsidiary Body on Implementation at its third meeting, identifies are range of pertinent strategic action areas and provides an indicative list of possible actions. For more information see CBD/SBI/3/13 and Add.1.

264. This proposed target also has links to a number of the Sustainable Development Goals, including targets 8.4[543] and 12.2.[544]

Monitoring

265. Sustainable consumption is a multifaceted issued addressing environmental, economic and social issues. It also relates to the overall amount of resources being consumed but also the processes in place to mediate this consumption. As such monitoring progress towards this proposed target could require information on the overall use of resources, the types of resources being consumed, the impacts of consumption on biodiversity and information on the amount of waste being generated. Information may also be required on the amount of resources the Earth can sustainably provide and the amount of waste it can absorb in order to put levels of consumption in context.

Links to other proposed goals and targets

266. The actions taken the reach this target could directly or indirectly contribute to many of the proposed targets in the post-2020 global biodiversity framework, including the proposed targets on land/sea use change (target 1), management actions for wild species of fauna and flora (target 3), the harvesting, trade and use of wild species of fauna and flora (target 4), reducing pollution (target 6) and the productivity, sustainability and resilience of biodiversity (target 9).) and the integration of biodiversity values into planning processes (target 13). Further the scope of this target will require the involvement of all actors in reaching it. This includes the private sector, and in particular retailers, as well as individual consumers. Raising awareness of the impacts of current consumption patterns will be important in bring about more sustainable patterns of consumption (proposed target 20).

Biosafety[545]

Target 16. *By 2030, establish and implement measures to prevent, manage or control potential adverse impacts of biotechnology on biodiversity and human health reducing these impacts by [X].*

267. Under the Convention on Biological Diversity, biotechnology means any technological application that uses biological systems, living organisms, or derivatives thereof, to make or modify products or processes for specific use.[546] The Convention on Biological Diversity requires that Parties, as far as possible and as appropriate, establish or maintain means to regulate, manage or control the risks associated with the use and release of living modified organisms resulting from biotechnology which are likely to have adverse environmental impacts that could affect the conservation and sustainable use of biological diversity, taking also into account the risks to human health.[547] The Convention also includes provisions to facilitate access to environmentally safe biotechnologies for the conservation and sustainable use of biodiversity.[548] A target on biotechnology could therefore help to advance considerations of this issue under the Convention. The Convention also requires that Parties take legislative, administrative or policy measures, as appropriate, to provide for the effective participation in biotechnological research activities by Parties, especially developing countries, and that Parties take all practicable measures to promote and advance priority access

[543] Improve progressively, through 2030, global resource efficiency in consumption and production and endeavour to decouple economic growth from environmental degradation, in accordance with the 10 Year Framework of Programmes on Sustainable Consumption and Production, with developed countries taking the lead.

[544] By 2030, achieve the sustainable management and efficient use of natural resources.

[545] The text in this subsection draws on document CBD/SBI/3/3 and the information contained in the Biosafety Clearing House – http://bch.cbd.int/. Additional references are indicated in the text for specific points.

[546] Article 2, Convention on Biological Diversity.

[547] Article 8(g), Convention on Biological Diversity.

[548] Article 16, Convention on Biological Diversity.

on a fair and equitable basis by Parties, especially developing countries, to the results and benefits arising from biotechnologies based upon genetic resources provided by those Contracting Parties.[549]

268. In response to Article 19, paragraph 3, of the Convention, the Cartagena Protocol on Biosafety was adopted in January 2000 as a supplementary agreement to the Convention on Biological Diversity.[550] The Protocol entered into force on 11 September 2003. The overall objective of the Protocol is to contribute to ensuring an adequate level of protection in the field of the safe transfer, handling and use of living modified organisms resulting from modern biotechnology[551] that may have adverse effects on the conservation and sustainable use of biological diversity, taking also into account risks to human health, and specifically focusing on transboundary movements.[552] Given this, a target on biotechnology also has the potential to indirectly advance biosafety considerations under the Cartagena Protocol on Biosafety.

Status and trends

269. Under the Convention on Biological Diversity the consideration of biotechnology takes into account its potential benefits as well as how to ensure that potential adverse environmental impacts derived from it are avoided or minimized. Further both the Convention and the Cartagena Protocol place obligations on Parties to regulate, manage and control the risks associated with the use and release of living modified organisms resulting from biotechnology.

270. Globally many countries have measures in place to control risks associated with the use and release of living modified organisms which are likely to have adverse environmental impacts and under Article 8 (g) of the Convention there is an obligation to develop and maintain national biosafety systems. Currently no baseline information is available on the number of countries which have such measures in place, in part because to date there has been no explicit reporting requirements on this issue under the Convention. However, for those countries that are Party to the Cartagena Protocol more comprehensive information is available. For example 55 per cent of Parties to the Cartagena Protocol reported having fully introduced the necessary legal, administrative and other measures for the implementation of the Protocol; an additional 39% of Parties report that they have measures partially place, and these cover most of the Parties that report taking decisions on living modified organism for intentional introduction into the environment.[553] Further the publication and use of information in the Biosafety Clearing House is progressively improving and by January 2020, 2,055 risk assessment reports and 2,134 decisions on introduction into the environment had been notified to the Biosafety Clearing House.[554]

Considerations

271. Biotechnology encompasses a range of specific technologies and products and is an evolving area with rapid technological developments. Biotechnology has potential positive, neutral or negative impacts on biodiversity depending on the products that are developed and/or how they are used. The proposed target focuses on preventing, managing or controlling, potential adverse impacts.

272. Risk assessments of actual and potential adverse impacts on biodiversity have been undertaken for different biotechnology products and this information can be accessed through different mechanisms, including the Biosafety Clearing House Mechanism. However, there is no global systematic quantitative

[549] Article 19 of the text of the Convention.

[550] The Cartagena Protocol on Biosafety. https://bch.cbd.int/

[551] Under the Cartagena Protocol "modern biotechnology" means the application of in vitro nucleic acid techniques, including recombinant deoxyribonucleic acid (DNA) and direct injection of nucleic acid into cells or organelles, or fusion of cells beyond the taxonomic family, that overcome natural physiological reproductive or recombination barriers and that are not techniques used in traditional breeding and selection.

[552] Article 1, Cartagena Protocol on Biosafety.

[553] CBD/SBI/3/3/Add.1.

[554] The Cartagena Protocol on Biosafety. https://bch.cbd.int/

information currently available on actual and potential adverse impacts of biotechnology on biodiversity or on reductions of such impacts through biosafety measures.

273. One of the main actions related to the safe use of biotechnology is ensuring appropriate processes and mechanisms are in place to prevent possible risks to biodiversity resulting from the use and/or release of biotechnology. Depending on national circumstances these regulatory frameworks and mechanisms could take various forms. Further, many Parties to the Convention and the Cartagena Protocol have already put in place measures to address issues related to biotechnology and therefore future targets on this issue would need to take into account how such a target would complement and not duplicate or detract from these efforts.

274. The formulation of a target on this issue should also take into account how a target could remain valid in light of the rapid advances in the development of biotechnology. In addition, consideration may also be needed on how future discussions on issues related to biotechnology under the Convention, for example on synthetic biology, may inform the development of a target on biotechnology.

275. The Liaison Group on the Cartagena Protocol on Biosafety that was tasked with considering a proposed target on biosafety provided guidance on four key elements that could be incorporated into a target on biosafety.[555] The core elements identified by the liaison group relate to measures to prevent potential adverse impacts of biotechnology on biodiversity, risk assessment and risks management, information exchange for informed biosafety decision-making and restoration and compensation for damage to conservation and sustainable use of biological diversity caused by living modified organisms.[556]

Monitoring

276. Currently there is no global level information on the number of adverse impacts of biotechnology on biodiversity and human health. This lack of information may create a challenge in monitoring progress towards this target unless processes are put in place to address it, including putting in place appropriate reporting processes and methodologies to collect this information in a comprehensive manner.

277. Progress towards this proposed target could be monitored by tracking information on the number of countries which have put in place measures to prevent potential adverse impacts of biotechnology on biodiversity, to undertaken risk assessment and risks management, to exchanged information related to biosafety decision-making and to provide restoration and compensation for damage to conservation and sustainable use of biological diversity caused by living modified organisms. For those countries which are already Parties to the Cartagena Protocol this information is already being collected and is accessible. For those countries which are not Party to protocol appropriate reporting processes may need to be put in place.

Links to other proposed goals and targets

278. The attainment of this target would directly contribute to the progress towards the proposed goal on means of implementation (Goal D). To the extent that biotechnology is also used in the production of food, this target may also contribute to the attainment of proposed target 8.

Incentives[557]

Target 17*. By 2030, redirect, repurpose, reform or eliminate incentives harmful for biodiversity, including [X] reduction in the most harmful subsidies, ensuring that incentives, including public and private economic and regulatory incentives, are either positive or neutral for biodiversity.*

279. Harmful incentives, including subsidies, are one of the main indirect drivers of biodiversity loss, particularly as they can affect decisions around land/sea-use, consumption and production patterns, overexploitation, pollution, and climate change. Harmful incentives generally emanate from policies or programmes that induce unsustainable behaviour harmful to biodiversity, often as unanticipated and

[555] CBD/CP/LG/2019/1/6.

[556] For further information, see CBD/CP/LG/2019/1/6.

[557] The text in this subsection draws on GBO-5, and references therein, in particular the section related to the Aichi Biodiversity Targets 3. Additional references are indicated in the text for specific points.

unintended side effects of policies or programmes designed to achieve other objectives. Types of possibly harmful incentives include production subsidies and consumer subsidies while policies and laws governing resource use, such as land tenure systems and environmental resource management, can also have harmful effects. Substantial and widespread changes to harmful incentives, including subsidies, will be a necessary and critical step to ensure the conservation and sustainable use of biodiversity.

Status and trends

280. The value of subsidies that are harmful or potentially harmful to biodiversity is estimated at about $500 billion per year, or about five to six times more than total spending for biodiversity.[558] The most harmful elements include government support to agriculture (about $230 billion, including $116 billion from OECD countries), and capacity-enhancing subsidies for fishing fleets (over $ 20 billion).[559] Further despite increased subsidies for clean energy, fossil-fuel support remains high, at $478 billion in 2019. Taking into account environmental costs, other externalities and lost tax revenue the total cost of subsidies that damage nature is estimated to be on the order of $4-6 trillion per year.[560] Currently, harmful subsidies greatly exceed the finance that is allocated to promote conservation and sustainable use of biodiversity (see proposed target 18).

281. There are numerous national and regional examples of incentives which are beneficial for biodiversity. Examples include agri-environment schemes in which farmers receive payments to implement agricultural techniques that support biodiversity in farmed landscapes (proposed target 9), taxation policies which favour the use of renewable energy, the promotion of payment for ecosystem services and offset schemes, and establishing certification and compensation schemes to incentivize activities such as sustainable ecotourism, landscape conservation, and the adoption of more efficient technologies. Other examples include efforts to encourage local land management, the provision of compensation for the reduction of harmful activities, and actions to recognize indigenous and local land use rights (proposed target 20). While the use of these types of incentives is increasing there is currently no global level quantitative aggregation of their use available. One exception to this however is information on biodiversity-relevant taxes, fees and charges, and tradeable permits which are tracked through the Organisation for Economic Co-operation and Development (OECD)'s database on Policy Instruments for the Environment (PINE), to which more than 110 countries currently provide data. As of 2020, 206 biodiversity-relevant taxes are currently in force in 59 countries; 179 biodiversity-relevant fees and charges are currently in force in 48 countries; and 38 biodiversity-relevant tradeable permit schemes are currently in force in 26 countries. Examples of biodiversity-relevant taxes include those that are applied on pesticides, fertilizers (proposed target 6), forest products and timber harvests (proposed targets 5 and 9) to reflect the negative environmental externalities generated by the use of the natural resource or by pollutants (proposed target 6). According to the OECD,

---

[558] OECD (2020) A Comprehensive Overview of Global Biodiversity Finance. https://www.oecd.org/environment/resources/biodiversity/report-a-comprehensive-overview-of-global-biodiversity-finance.pdf

[559] OECD (2019) Producer and Consumer Support Estimates. OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-pcse-data-en; Sumaila et al (2019) Updated estimates and analysis of global fisheries subsidies. Marine Policy, 109, 103695. https://doi.org/10.1016/j.marpol.2019.103695; Deutz et al (2020) Financing Nature: closing the global biodiversity financing gap. https://www.paulsoninstitute.org/key-initiatives/financing-nature-report/ ; Sumaila et al (2010) A bottom-up re-estimation of global fisheries subsidies. J Bioecon 12, 201–225 https://doi.org/10.1007/s10818-010-9091-8; Sumaila et al (2019). A global dataset on subsidies to the fisheries sector. Data in Brief. 27. https://doi.org/10.1016/j.dib.2019.104706; The Paulson Institute, The Nature Conservancy, and the Cornell Atkinson Center for Sustainability; Martini and Innes (2018) Relative Effects of Fisheries Support Policies, OECD Food, Agriculture and Fisheries Papers, No. 115, OECD Publishing, Paris, https://doi.org/10.1787/bd9b0dc3-en; Martini and Innes (2018), Relative Effects of Fisheries Support Policies, OECD Food, Agriculture and Fisheries Papers, No. 115, OECD Publishing, Paris, https://doi.org/10.1787/bd9b0dc3-en.

[560] Coady et al (2019) Global Fossil Fuel Subsidies Remain Large: An Update Based on Country-Level Estimates IMF Working Paper 19/89. International Monetary Fund. https://www.imf.org/en/Publications/WP/Issues/2019/05/02/Global-Fossil-Fuel-Subsidies-Remain-LargeAn-Update-Based-onCountry-Level-Estimates-46509 and Dasgupta (2021) The Economics of Biodiversity: The Dasgupta Review HM Treasury. United Kingdom. https://www.gov.uk/government/publications/final-report-the-economics-of-biodiversity-the-dasgupta-review

the revenue generated from biodiversity-relevant taxes is approximately $7.4 billion per year, a little over one per cent of total revenue generated from all environmentally-relevant taxes in OECD countries. [561]

Considerations

282. Article 11 of the Convention requires that each contracting Party should, as far as possible and as appropriate, adopt economically and socially sound measures that act as incentives for the conservation and sustainable use of components of biological diversity. Similarly, Article 20 of the Convention requires that each Contracting Party undertakes to provide, in accordance with its capabilities, financial support and incentives in respect of those national activities which are intended to achieve the objectives of the Convention, in accordance with its national plans, priorities and programmes. As such a target on incentives could be viewed as a means of further operationalising these articles of the Convention.

283. A necessary first step in reaching a target on this issue is the identification of those incentives which are harmful or potentially harmful to biodiversity and some countries have taken steps to identify these. [562] In most countries and regions, there are likely to be a number of incentives which are having negative effects on biodiversity. In the redirection, repurpose, reform or elimination of harmful incentives priority could be given to those particularly harmful to biodiversity and those which also impede other societal objectives or are not effective from a socio-economic perspective. The redirection, repurpose, reform or elimination of harmful incentives should also take into account the impacts of these actions on those groups who are currently benefiting from them.[563] Further, while the redirection, repurpose, reform or elimination of harmful incentives will need to be led by national governments, private financial institutions and multilateral development banks could also play an enabling role on this issue through their financing, lending and insurance practices.[564]

284. Actions towards this target will support progress towards most of the other proposed targets in the post-2020 global biodiversity framework and in particular those addressing the direct and indirect drivers of biodiversity loss and those related to meeting people's needs through sustainable use and benefit-sharing. Further financial savings from the redirection, repurposing, reform and/or elimination of harmful subsidies has the potential to make resources available for the conservation and sustainable use of biodiversity (proposed target 18) as well as for other societal objectives. [565] The UNDP BIOFIN methodology already includes taking action on harmful incentives and subsidies as one of its proposed financial solutions to close the biodiversity financing gap.[566]

285. A number of international processes and initiatives have also established targets or processes related harmful incentives, including subsidies. For example, Sustainable Development Goal 14.6 [567] calls for prohibiting certain forms of fisheries subsidies which contribute to overcapacity and overfishing and to eliminate

[561] OECD (2020) Tracking Economic Instruments and Finance for Biodiversity. https://www.oecd.org/environment/resources/tracking-economic-instruments-and-finance-for-biodiversity-2020.pdf

[562] Earlier guidance developed under the Convention, in the form of modalities and milestones for Aichi Biodiversity Target 3 adopted by the Conference of the Parties in decision XII/3, could be used to help inform such an exercise.

[563] For example, see Schuhbauer et al (2020) The Global Fisheries Subsidies Divide Between Small-and Large-Scale Fisheries. Frontiers in Marine Science 7. https://doi.org/10.3389/fmars.2020.539214

[564] World Bank (2020). Mobilizing private finance for nature. https://pubdocs.worldbank.org/en/916781601304630850/Finance-for-Nature-28-Sep-web-version.pdf

[565] The draft long-term approach to mainstreaming and the associated action plan, currently submitted to the Subsidiary Body on Implementation at its third meeting, identifies are range of pertinent strategic action areas and provides an indicative list of possible actions. See CBD/SBI/3/13 and Add.1.

[566] BIOFIN. https://www.biodiversityfinance.net/

[567] By 2020, prohibit certain forms of fisheries subsidies which contribute to overcapacity and overfishing, eliminate subsidies that contribute to illegal, unreported and unregulated fishing and refrain from introducing new such subsidies, recognizing that appropriate and effective special and differential treatment for developing and least developed countries should be an integral part of the World Trade Organization fisheries subsidies negotiation.

subsidies that contribute to illegal, unreported and unregulated fishing. Negotiations are ongoing under the World Trade Organization to develop an agreement on fisheries subsidies to deliver on this SDG target.

Monitoring

286. Monitoring progress towards this target will require information on the total amount of harmful incentives, in place. In the case of harmful subsidies, information is available for different economic sectors through organizations such as the OECD. For non-financial incentives, such as laws, regulations and policies, there is relatively little globally comparable information available.

Links to other proposed goals and targets

287. The attainment of this target would contribute to the progress towards the proposed goal on ecosystems, species and genetic diversity (Goal A) as incentives, including subsidies, harmful to biodiversity underline most of the direct drivers of biodiversity loss. This proposed target also has the potential to contribute to the attainment of proposed targets on land and sea use change (target 1), overexploitation (target 4), pollution (target 6), sustainable use (target 8), the sustainability of agriculture and other managed ecosystems (target 9), sustainable production and supply chains (target 14) and sustainable consumption. To the extent that the financial resources made available through the elimination, reform or redirection of harmful incentives and subsidies are applied to biodiversity conservation, the progress towards this proposed target would also contribute to target 18 on financial resources.

Resources mobilization[568]

Target 18. *By 2030, increase by [X%] financial resources from all international and domestic sources, through new, additional and effective financial resources commensurate with the ambition of the goals and targets of the framework and implement the strategy for capacity-building and technology transfer and scientific cooperation to meet the needs for implementing the post-2020 global biodiversity framework.*

288. The post-2020 global biodiversity framework will need to be implemented through activities at the national or subnational levels, with supporting action needed at the regional and global levels. The financial resources for implementing biodiversity activities is limited in many countries, especially in developing countries, and in particular the least developed countries and small island developing states, as well as countries with economies in transition. The lack of financial resources has frequently been noted as a limitation to the conservation and sustainable use of biodiversity and the implementation of the Convention.

289. In decision 14/22, on resource mobilization, the Conference of the Parties affirmed that resource mobilization would be an integral part of the post-2020 global biodiversity framework. The progress towards a target on resource mobilization will have implications on the feasibility of achieving all of the other proposed goals and targets in the post-2020 global biodiversity framework. Further, while higher levels of resources do not necessarily guarantee higher levels of conservation, research has shown that, on average, a higher allocation of resources into biodiversity programmes and projects is associated with reduced biodiversity loss.[569] Similarly, a recent study, based on information from 30 countries found that public biodiversity investments were associated with about a 1% reductions in the number of threatened species and that each US$ 1 billion investment in biodiversity was associated with an annual reduction of 0.57% in the proportion of species threatened with extinction.[570]

---

[568] The text in this subsection draws on GBO-5, and references therein, in particular the section related to the Aichi Biodiversity Targets 20. It also draws on document CBD/SBI/3/5 and its related addenda. Additional references are indicated in the text for specific points.

[569] Waldron et al (2017) Reductions in global biodiversity loss predicted from conservation spending. Nature, 551(7680), 364-367. https://doi.org/10.1038/nature24295

[570] Seidl et al (2021) The effectiveness of national biodiversity investments to protect the wealth of nature. Nature Ecology & Evolution. https://doi.org/10.1038/s41559-020-01372-1

Status and trends

290. OECD data suggest that global biodiversity finance is on the order of $78 – 91 billion per year (2015-2017 average). Data reported to the Convention on Biological Diversity is consistent with these estimates. This funding comes from a variety of sources, including domestic sources (about $67.8 billion per year), international public biodiversity finance ($3.9 billion per year between 2015 and 2017 for finance that has biodiversity as a principal focus, and $9.3 billion per year if other finance with significant elements related to biodiversity) and the private sector (conservatively $6.6-13.6 billion per year).[571] In 2018-2022, funding directly relevant to biodiversity provided through the GEF was about $1.3 billion. More recent and comprehensive estimates which, among other things, account for expenditure on natural infrastructure, biodiversity offsets and additional contributions from the business and finance sectors, suggest that biodiversity finance is between about $120 billion and $140 billion per year. However, given the risk of double counting, the lower of these figures may be closer to the true value.[572]

291. Trends in biodiversity finance over the last ten years have generally been positive. Over the last decade there have been increases in domestic resources for biodiversity in some countries, with resources remaining broadly constant for others. Information provided through the financial reporting framework related to Aichi Biodiversity Target 20 indicates that 28 Parties had increasing trends in their domestic biodiversity resources while 24 had no change and 13 had decreasing trends. For 13 Parties, trends could not be detected or were inconclusive. With regards to international public biodiversity finance, which includes official development assistance (ODA) and non-concessional flows (both bilateral and multilateral), has roughly doubled over the decade. This is consistent with information provided by Parties through the financial reporting framework related to Aichi Biodiversity Target 20 which shows that ten Parties had at least doubled their international aid flows for biodiversity by 2015. Further Parties that are members of the OECD Development Assistance Committee (DAC) collectively increased their support to international public biodiversity finance by 130% between 2006-2010 and 2015. The financing made available as official development assistance through DAC member countries has in turn generated an estimated $ 200 million to $510 million private biodiversity finance in 2018. Similarly, between 2006-2010 and 2018-2022, funding directly relevant to biodiversity provided through the Global Environment Facility increased by more than 30%. Therefore, overall funding through international flows, including official development assistance has roughly doubled during the last decade while total funding is estimated to have increased more modestly.

Considerations

292. Not meaningfully addressing the ongoing decline of biodiversity, including by ensuring required resources are available, will have significant economic impacts. For example, one report estimates, that under a business as usual scenario, more than US$ 470 billion could be lost annually by 2050 in terms of reduced economic growth (0.67 per cent of global GDP annually) as a result of biodiversity loss. Under the same business as usual scenario the estimated cumulative loss between 2011 and 2050 would be more than US$ 9 trillion. In contrast there could be a cumulative benefit of about US$ 11 billion annually (0.02 per cent of global GDP by 2050) under a scenario where the world adopts a more sustainable development agenda and enhances management of land and sea areas that are important for biodiversity and ecosystem services.[573] Further a recent estimate suggests that 55% of global gross domestic product, or $41.7 trillion, is highly or moderately dependent on biodiversity and ecosystem services.[574] This is addition to the range of other

[571] OECD (2020) A Comprehensive Overview of Global Biodiversity Finance. https://www.oecd.org/environment/resources/biodiversity/report-a-comprehensive-overview-of-global-biodiversity-finance.pdf

[572] Deutz et al (2020). Financing Nature: Closing the global biodiversity financing gap. The Paulson Institute, The Nature Conservancy, and the Cornell Atkinson Center for Sustainability. https://www.paulsoninstitute.org/key-initiatives/financing-nature-report/

[573] Johnson, et al (2020). Global Futures: modelling the global economic impacts of environmental change to support policy-making. Technical Report, January 2020. https://www.wwf.org.uk/globalfutures

[574] Retsa et al (2020) Biodiversity and Ecosystem Services – A business case for re/insurance, SwissRe Institute. https://www.swissre.com/institute/research/topics-and-risk-dialogues/climate-and-natural-catastrophe-risk/expertise-publication-biodiversity-and-ecosystems-services.

ecosystem services that biodiversity provides. Therefore, even with the limited data available, an ambitious approach to biodiversity resource mobilization is likely to not only be a requirement to bend the curve on biodiversity loss but would also generate net economic benefits for both present and future generations.

293. Determining funding needs for the implementation of the post-2020 global biodiversity framework is challenging given that the framework is still under development and different methodological approaches exist for estimating financial needs. Recent estimates of funding needs, per year, focussing primarily on expanding and improving protected areas suggests funding needs in the range of $103-178 billion or $149-192 billion. Protecting urban and coastal ecosystems and controlling invasive alien species is estimated to cost an additional $200 billion, while the estimated costs for transforming agricultural, forestry and fishery sectors are estimated at $442-580 billion. This gives a total estimate of $722-967 billion per year.[575] This, combined with the estimates above suggest a funding gap of the order of $700 billion per year for biodiversity. The actions taken to address this funding gap should bear in mind the provisions of Article 20 of the Convention. Resources to fill this gap could come from a combination of:

(a) Reducing subsidies and other expenditures causing harm to biodiversity and thereby reducing the total funding need and making use of funds redirected from subsidy reform (proposed target 17);

(b) Generating additional resources from all sources, including domestic and international sources as well as public and private sources;

(c) Making use of funds which also serve other objectives, such as addressing climate change, where objectives coincide or overlap. For example, the Green Climate Fund (GCF), established under the United Nations Framework Convention on Climate, had, as of June 2020, a portfolio whose total value was $19 billion, comprised of 128 projects and programmes worldwide, including co-financing from project partners. About $2.9 billion of this total has been invested to support 41 projects related to ecosystem-based mitigation and adaptation activities (32% of the GCF portfolio by the number of projects, or 15.2% by value). Within these projects, investment directly channelled to supporting and restoring ecosystems and ecosystem services amounts to $700 million. Similarly, the Land Degradation Neutrality (LDN) Fund, spearheaded by the Global Mechanism of the United Nations Convention to Combat Desertification (UNCCD) is an impact investment fund blending resources from the public, private and philanthropic sectors to support achieving land-degradation neutrality through sustainable land management and land restoration projects implemented by the private sector;

(d) Enhancing the effectiveness and efficiency of resource use. This could include, for example, ensuring that appropriate plans and policies are in place, establishing necessary partnerships and platforms, ensuring policy coherence across government ministries and sectors, and enhancing capacity-building, technical assistance and technological cooperation. It would also include improved, monitoring and reporting on resource needs as well as the identification of funding priorities. Such issues are addressed under proposed target 13 in the updated zero draft of the post-2020 global biodiversity framework which addresses, among other things, the integration of biodiversity values into policies, regulations, planning, development processes. Proposed target 20 on ensuring equitable participation in decision making and rights over relevant resources is also relevant. Enhancing effectiveness and efficiency of resource use may also entail ensuring that biodiversity financing is appropriately targeted. For example, with regard to international public biodiversity finance, historically most has tended to focus on terrestrial and freshwater biodiversity, with only about 4% of bilateral biodiversity-related ODA addressing marine biodiversity.[576]

---

[575] Deutz et al (2020). Financing Nature: Closing the global biodiversity financing gap. The Paulson Institute, The Nature Conservancy, and the Cornell Atkinson Center for Sustainability. https://www.paulsoninstitute.org/key-initiatives/financing-nature-report/; and Waldron et al (2020) Protecting 30% of the planet for nature: costs, benefits and economic implications. Working paper analysing the economic implications of the proposed 30% target for areal protection in the draft post-2020 Global Biodiversity Framework. https://www.conservation.cam.ac.uk/files/waldron_report_30_by_30_publish.pdf. For a further discussion of this issue, see CBD/SBI/3/5/Add.2.

[576] OECD (2020) A Comprehensive Overview of Global Biodiversity Finance. https://www.oecd.org/environment/resources/biodiversity/report-a-comprehensive-overview-of-global-biodiversity-finance.pdf

294. In addition to the actions noted above, processes related to access and benefit sharing (proposed target 12) have the potential to generate some of the funding necessary to address the funding needs associated with the implementation of the post-2020 global biodiversity framework. Similarly, some of the possible actions to reach targets on sustainable production (proposed target 14) and sustainable consumption (proposed target 15) could also help to generate resources for the conservation and sustainable use of biodiversity. In addition, proposals have also been made for a new financial institution guided by the principle of fiscal equivalence (i.e. those who benefit from the good in question should also pay for the costs of provision). Such a mechanism would incentivize nations to supply global benefits of conserving biodiversity, for example through protected areas.[577] This proposed target is also related to Targets 10.b[578] and17.3[579] under the Sustainable Development Goals.

Monitoring

295. Monitoring the implementation of a target on resource mobilization would need to consider the amount of resources made available for biodiversity through domestic channels and international public biodiversity finance as well as resources from both public and private sources.

296. Existing international statistical frameworks and reporting frameworks could help to provide some of the information necessary to monitor the implementation of this proposed target. On domestic biodiversity-related expenditures, this includes (a) the government finance statistics (expenditures by functions of government) maintained by the International Monetary Fund, (b) the Organisation for Economic Co-operation and Development and (c) the framework for environmental expenditure accounts of the United Nations System of Environmental Economic Accounting (SEEA), operated by Eurostat and the Organisation for Economic Co-operation and Development. On international biodiversity-related resource flows, this includes the Creditors Reporting System of the OECD. Monitoring the provision of financial resources through other channels, such as the private sector or philanthropic organisations, would be more challenging as no organisation is currently tracking this information in a consistent manner. Similarly, no global level information on the effectiveness of biodiversity finance is currently available.

Links to other proposed goals and targets

297. The attainment of this target would contribute to the attainment of all the proposed goals and targets in the post-2020 global biodiversity. It would be particularly relevant for reaching proposed goal D on the means of implementation. The targets that relate to biodiversity mainstreaming (proposed targets 13, 14 and 15) and incentives (proposed target 17) are supportive of this target. In addition, processes related to access and benefit sharing (proposed target 12) have the potential to contribute to the generation of resources for the conservation and sustainable use of biodiversity Furthermore, this target will support all of the other proposed targets.

Knowledge[580]

Target 19*: By 2030, ensure that quality information, including traditional knowledge, is available to decision makers and public for the effective management of biodiversity through promoting awareness, education and research.*

---

[577] Dröste et al (2019) Designing a global mechanism for intergovernmental biodiversity financing, Conservation Letters. 2019; volume 12, issue 6: e12670. https://doi.org/10.1111/conl.12670; and Dasgupta (2021) The Economics of Biodiversity: The Dasgupta Review. HM Treasury, United Kingdom. https://www.gov.uk/government/publications/final-report-the-economics-of-biodiversity-the-dasgupta-review

[578] Encourage official development assistance and financial flows, including foreign direct investment, to States where the need is greatest, in particular least developed countries, African countries, small island developing States and landlocked developing countries, in accordance with their national plans and programmes.

[579] Mobilize additional financial resources for developing countries from multiple sources.

[580] The text in this subsection draws on GBO-5, and references therein, in particular the section related to the Aichi Biodiversity Targets 20. Additional references are indicated in the text for specific points.

298. Quality and timely data, information and knowledge on biodiversity, it's effective management and use and the drivers of its loss is required to identify the threats to biodiversity, to determine priority actions for conservation and sustainable use and to determine if such actions are effective. Biodiversity information, including traditional knowledge, will underpin progress towards all of the proposed goals and targets of the post-2020 global biodiversity framework. It will also be essential in tracking the progress in the attainment of these. Similarly, improving public understanding of biodiversity, including awareness of its values, and the steps that can be taken to conserve and use it sustainably, will underpin progress towards the 2050 Vision for Biodiversity. However, despite important advances in recent years, biodiversity-related information remains limited or absent for many issues and the proportion of people who aware of the importance of biodiversity remains limited.

Status and trends

299. Biodiversity information is growing at a rapid rate. The number of indicators available to monitor changes relating to biodiversity, at varying spatial and temporal scales has increased[581] and, on average, countries are using more indicators in their national reports then they have previously. Further, remote sensing information on the extent and quality of ecosystems is increasingly available and various global and regional observation networks, such as GEO-BON and its regional and thematic BONs, have been established to better monitor biodiversity. Artificial intelligence is increasingly being used to support species recognition through citizen science platforms and is being applied to support near real-time monitoring of wildlife through images captured by camera traps. Bioacoustic monitoring and satellite-based animal tracking are among a range of other technological applications enabling rapid expansion of the data available to support biodiversity knowledge.

300. The growth in the availability of data and information on biodiversity is demonstrated by a number of metrics. For example, the number of species assessed for extinction risk in the IUCN Red List of Threatened Species has doubled in the past decade, passing 120,000 species during 2020. The number of species occurrence records freely accessible through the Global Biodiversity Information Facility (GBIF) passed one billion during 2018, and stood at more than 1.4 billion by May 2020, a seven-fold increase over the decade. The Ocean Biodiversity Information System (OBIS), which specializes in mobilizing data to support research and policy on marine biodiversity, provided access to nearly 60 million occurrence records relating to more than 131,000 species in 2020, compared with 22 million records in 2010. Further the Barcode of Life Data System (BOLD) has established a library of more than half a million public 'Barcode Index Numbers', clustering genetic sequences into units corresponding with known species, thus helping with identification to support a range of research and policy applications. These types of data are widely used in research relating to conservation, impacts of climate change, invasive alien species, food security and human health, among other policy-relevant areas. In addition there are also an increasing number of data platforms under development to support decision making, such as UN Biodiversity Labs, the European Union Knowledge Centre, and the Integrated Biodiversity Assessment Tool, among others, and some indicator providers are making indicator information more accessible.

301. In recent years, there has also been growing recognition and documentation of the potential value of traditional knowledge to the conservation and sustainable use of biodiversity, including through community-based monitoring programmes. However, traditional and indigenous knowledge remains poorly recognized, and is still often marginalized.[582] Further, there is often a lack of communication between indigenous peoples and local communities and the scientific community and assessments of biodiversity often do not take local and traditional knowledge into account.[583] This is despite the fact that numerous examples have demonstrated

[581] CBD/SBSTTA/INF/24/16 and https://www.bipindicators.net/

[582] For example, see Cámara-Leret, R., and Dennehy, Z (2019) Information gaps in indigenous and local knowledge for science-policy assessments. Nat Sustain 2, 736–741. https://doi.org/10.1038/s41893-019-0324-0

[583] IPBES (2019), Global assessment report on biodiversity and ecosystem services of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services. IPBES secretariat, Bonn, Germany; Forest Peoples Programme et al (2020), *Local Biodiversity Outlooks* 2: The contributions of indigenous peoples and local communities to the implementation of the

the ways in which bringing traditional knowledge together with science can lead to constructive solutions to various challenges and lead to the development of policies which are more tailored to on-the-ground realities. One indication of progress in this regard is the conceptual framework of the Intergovernmental Science Policy Platform on Biodiversity and Ecosystem Services (IPBES) which gives explicit consideration of diverse scientific disciplines, stakeholders, and knowledge systems, including indigenous and local knowledge. Indigenous knowledge holders also contributed significantly to the IPBES Global Assessment on Biodiversity and Ecosystem Services. Further, recognizing the knowledge, innovations, practices, institutions and values of indigenous peoples and local communities and ensuring their inclusion and participation in environmental governance (proposed target 20) often enhances their quality of life as well as the conservation, restoration and sustainable use of biodiversity.

302. There is no globally consistent information showing trends in awareness and attitudes towards biodiversity or on the extent to which biodiversity is addressed through different education channels. However, a survey of a limited number of countries suggests a slight upward trend in peoples' willingness to act for biodiversity between 2009 and 2017.[584]

Considerations

303. Ensuring the availability and accessibility of high-quality biodiversity related information is essential for effective decision making. As such progress towards this target will support the attainment of all of the other proposed goals and targets in the post-2020 global biodiversity framework.

304. Progress towards this target will require greater support for research and innovations data acquisition, management and sharing, monitoring systems as wells associated investment and capacity building for these. While the amount of biodiversity information continues to increase, major imbalances exist in the location and taxonomic focus of this information for example, species data is still strongly biased towards animal species, especially birds, and higher plants, and many of the most diverse ecosystems, especially in the tropics, are still greatly underrepresented. Further there is comparatively more information available on terrestrial ecosystems and species then on freshwater and marine ones, with information related to the open ocean and deep-sea being particularly limited.[585] Similarly, information on intraspecific (genetic and phenotypic) diversity is often limited. For example, the IUCN Red List assessments covers 6 per cent of described species, and of the species assessed only 15% are marine species. Further, as of late 2020, only 1.1% of species evaluated by IUCN were evaluated at the intraspecific level.[586] Gaps in species and ecosystem observations, information and data are largely mirrored in genetic data gaps.[587] Actions towards this target will therefore require efforts to address major imbalances in the location and taxonomic focus of biodiversity studies and monitoring. In addition, there is little information on the ways that different drivers of biodiversity loss interact.[588]

305. Knowledge gaps related to the consequences of biodiversity loss for people, including indigenous peoples and local communities, women, youth, and people living in vulnerable situations also need to be

---

Strategic Plan for Biodiversity 2011–2020 and to renewing nature and cultures. A complement to the fifth edition of the *Global Biodiversity Outlook*. Moreton-in-Marsh, England, www.localbiodiversityoutlooks.net.

[584]Union for Ethical BioTrade (2018). UEBT Biodiversity Barometer 2018 - https://static1.squarespace.com/static/577e0feae4fcb502316dc547/t/5b51dbaaaa4a99f62d26454d/1532091316690/UEBT+-+Baro+2018+Web.pdf and Union for Ethical BioTrade (2019). UEBT Biodiversity Barometer 2019, Specifical Edition – Asia – https://static1.squarespace.com/static/577e0feae4fcb502316dc547/t/5d0b61d53df5950001ac0059/1561027031587/UEBT+Biodiversity+Barometer+2019+.pdf

[585] Danovaro et al (2017) The deep-sea under global change. Current Biology, 27 (11). https://doi.org/10.1016/j.cub.2017.02.046

[586] Des Roches et al (2021) Conserving intraspecific variation for nature's contributions to people. Nature Ecology and Evolution. https://doi.org/10.1038/s41559-021-01403-5

[587] Miraldo et al (2016). An Anthropocene map of genetic diversity. Science. 353 (6307)1532-1535. https://doi.org/10.1126/science.aaf4381

[588] Mazor et al (2018) Global mismatch of policy and research on drivers of biodiversity loss. Nature Ecology and Evolution 2, 1071–1074 (2018). https://doi.org/10.1038/s41559-018-0563-x

addressed through broadened monitoring efforts. The greater recognition and support for the role of indigenous peoples and local communities (proposed target 20) in monitoring the status, trends and threats to biodiversity, such as through community-based monitoring approaches, will be important in this respect. Further greater support of citizen science initiatives could help to both improve biodiversity information while also raising awareness.[589]

306. Recognizing the knowledge, innovations, practices, institutions and values of indigenous peoples and local communities, and ensuring their free, prior and informed consent in collecting, sharing and use of these, as well as their inclusion and participation in environmental governance (proposed target 20), often enhances their quality of life as well as the conservation, restoration and sustainable use of biodiversity. These issues are recognized the Tkarihwaié:ri code of ethical conduct and the Akwé: Kon guidelines. However, traditional and indigenous knowledge remains poorly recognized, and is still often marginalized.[590]

307. Making biodiversity information available to decision makers and the public will require actions to ensure that information can be easily accessed. In some cases, this will require addressing issues related to the costs of accessing information and promoting the use of open-access standards. Similarly, much biodiversity information is only available in English. This makes it challenging for some people to access and make use of the information while the focus on English language resources also means that important biodiversity information in other languages are often overlooked.[591] Efforts may therefore be needed to broaden the consideration of data sources in multiple languages as well as to explore means of making English language research more accessible to people whose mother tongue is not English.

308. Scaling up the use and support of recent technological advances in cataloguing and sharing biodiversity information will also be important to improve the accessibility of biodiversity information. Various initiatives are already in place to help address this issue and could be further expanded and/or built on. For example, the clearing-house mechanism (CHM) of the Convention on Biological Diversity facilitates the exchange of information, expertise, tools and technologies. It comprises a global network of national CHMs and of partners and a central platform hosted by the CBD Secretariat. The number of national CHM websites has grown from 89 in 2010 to 101 in 2020 and more countries are in the process of developing sites and/or linking them to the central CHM. Parties are also making use of the Bioland Tool, a turnkey solution developed by the Secretariat, to help Parties establish or improve their national CHMs. Other initiatives include the Data Reporting Tool (DART) for multilateral environmental agreements which supports

[589] Chandler et al (2017). Contribution of citizen science towards international biodiversity monitoring. Biological Conservation. 213 (Part B), 280-294. https://doi.org/10.1016/j.biocon.2016.09.004

[590] IPBES (2019), Global assessment report on biodiversity and ecosystem services of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services. IPBES secretariat, Bonn, Germany; Forest Peoples Programme et al (2020), *Local Biodiversity Outlooks* 2: The contributions of indigenous peoples and local communities to the implementation of the Strategic Plan for Biodiversity 2011–2020 and to renewing nature and cultures. A complement to the fifth edition of the *Global Biodiversity Outlook*. Moreton-in-Marsh, England, www.localbiodiversityoutlooks.net. Wiseman and Bardsley (2016) Monitoring to Learn, Learning to Monitor: A Critical Analysis of Opportunities for Indigenous Community□Based Monitoring of Environmental Change in Australian Rangelands. Geographical Research, 54: 52– 71. https://doi.org10.1111/1745-5871.12150; Shaffer (2014) Making Sense of Local Climate Change in Rural Tanzania Through Knowledge Co-Production. Journal of Ethnobiology 34(3), 315-334. https://doi.org/10.2993/0278-0771-34.3.315; Tengö et al (2014) Connecting Diverse Knowledge Systems for Enhanced Ecosystem Governance: The Multiple Evidence Base Approach. AMBIO 43, 579–591. https://doi.org/10.1007/s13280-014-0501-3; Tengö et al (2017) Weaving knowledge systems in IPBES, CBD and beyond—lessons learned for sustainability. Current Opinion in Environmental Sustainability. 26–27. 17-25. https://doi.org/10.1016/j.cosust.2016.12.005; Hill et al. 2020, Working with Indigenous, local and scientific knowledge in assessments of nature and nature's linkages with people. Current Opinion in Environmental Sustainability 43:8-20. https://www.sciencedirect.com/science/article/pii/S1877343519301447

[591] For example, see Nuñez et al (2020) Ignoring non□English□language studies may bias ecological meta□analyses. Ecology and Evolution. 10(13). 6373-6384. https://doi.org/10.1002/ece3.6368; Nuñez et al (2019) Assessing the uneven global distribution of readership, submissions and publications in applied ecology: Obvious problems without obvious solutions. Journal of Applied Ecology. 56(1) 4-9. https://doi.org/10.1111/1365-2664.13319; and Amano et al (2013). Four barriers to the global understanding of biodiversity conservation: wealth, language, geographical location and security. Proceedings of the Royal Society B. 28020122649 http://doi.org/10.1098/rspb.2012.2649.

synergies in the field of knowledge management and InforMEA which provides centralized access to information related to different multilateral environmental agreements.

309. With regard to education and awareness, the development and implementation of coherent, strategic and sustained communication, education and public awareness efforts will be needed. Different types of education and public awareness activities or campaigns will be needed to reach the different audiences. Similarly, attention will need to be paid to both formal learning, such as in schools and universities, and learning in informal contexts, such as through the guidance of elders, as well as in museums and parks and through films, television and literature.

310. Progress and actions towards this proposed target also have the potential to support the attainment of several related SDG Targets. These include SDG Targets 4.7,[592] 9.5,[593] 12.8,[594] 13.3,[595] and 17.8.[596]

Monitoring

311. Tracking progress towards this proposed target will require information on the amount of biodiversity information which is available and accessible to policymakers and the general public. The amount of biodiversity information available over time would be expected to continue to increase, however determining the rate of this increase is challenging as trends in biodiversity information availability cannot currently be measured globally owing to the different types of biodiversity information which exists. Similarly assessing the representativeness of biodiversity information globally is also problematic for the same reasons. However, in the case of a few specific indicators or metrics, including those noted above, it would be possible to determine trends. How representative these trends would be of the biodiversity information situation generally would need to be determined.

Links to other proposed goals and targets

312. The attainment of this target would contribute to the progress towards the proposed goal on means of implementation (Goal D). Progress towards this target would also help to support the progress made towards all of the proposed targets in the post-2020 global biodiversity framework as ensuring the availability of quality information will support the effective decisions making, planning and actions required to implement all aspects of the post-2020 global biodiversity framework.

Participation[597]

Target 20: *By 2030, ensure equitable participation in decision-making related to biodiversity and ensure rights over relevant resources of indigenous peoples and local communities, women and girls as well as youth, in accordance with national circumstances.*

---

[592] By 2030, ensure that all learners acquire the knowledge and skills needed to promote sustainable development, including, among others, through education for sustainable development and sustainable lifestyles, human rights, gender equality, promotion of a culture of peace and non-violence, global citizenship and appreciation of cultural diversity and of culture's contribution to sustainable development.

[593] Enhance scientific research, upgrade the technological capabilities of industrial sectors in all countries, in particular developing countries, including, by 2030, encouraging innovation and substantially increasing the number of research and development workers per 1 million people and public and private research and development spending.

[594] By 2030, ensure that people everywhere have the relevant information and awareness for sustainable development and lifestyles in harmony with nature.

[595] Improve education, awareness- raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning.

[596] By 2020, enhance capacity- building support to developing countries, including for least developed countries and small island developing States, to increase significantly the availability of high-quality, timely and reliable data disaggregated by income, gender, age, race, ethnicity, migratory status, disability, geographic location and other characteristics relevant in national contexts.

[597] The text in this subsection draws on GBO-5, and references therein, in particular the sections related to the Aichi Biodiversity Targets 14 and 17. Additional references are indicated in the text for specific points. It also draws on the second edition of the Local Biodiversity Outlooks. https://localbiodiversityoutlooks.net/ and the review of 2015-2020 Gender Plan of Action (CBD/SBI/3/2/Add.3).

313. Reaching the 2050 Vision for Biodiversity will require a whole of society approach. Given this, it is important that the views, perspectives, and experiences of all groups are considered in decision making processes. This will require equitable participation in decision making, with particular attention being needed to ensure that the views and rights of indigenous peoples and local communities, women and girls, and youth are effectively taken into account. Further, different rights regimes and frameworks may apply to these groups and should be taken into account. Equal rights to relevant resources, particularly land, may be considered an important component of an enabling environment for biodiversity action by all actors. It would also contribute to other social objectives, including poverty alleviation, health and human well-being.

Status and trends

314. While most countries have multiple biodiversity related decision-making processes, national biodiversity strategies and action plans (NBSAPs) are the principal instruments for implementing the Convention at the national level. As such most of the information which is readily available on biodiversity related decision-making focuses on NBSAPs. Analysis of NBSAPs has shown that opportunities for effective action in support of biodiversity have been missed due to insufficient involvement of indigenous peoples and local communities, women, youth and a broad set of stakeholders. For example, only 40 Parties reported that indigenous peoples and local communities were involved in the revision processes of their national biodiversity strategies and action plans. Similarly, less than half of recent NBSAPs have included some reference to gender or women's issues, often on a limited basis.[598] Aside from the NBSAP, most Parties and subnational authorities will also have a range of additional biodiversity relevant decision-making processes in place. Given the breadth of these, no globally comprehensive information is available on the extent to which indigenous peoples and local communities, women and girls and youth are effectively participating in these. There is no information available on the participation of youth in NBSAP processes and only a few NBSAPs refer to this group.

315. The important role of indigenous peoples and local communities in biodiversity management has been long recognized under the Convention on Biological Diversity and in other international processes. However, the views, perspectives and rights of indigenous peoples and local communities are often not considered in decision making. Given that indigenous peoples and local communities are the custodians or managers of more than 38 million square kilometres of land across 87 countries and that these areas intersect 40% of all terrestrial protected areas and ecologically intact landscapes and that these lands cover more than 10% of the range of an estimated 2,175 species, the effectiveness of biodiversity related decision-making is greatly hindered by not taking their views and rights into account.[599]

316. Women have long been excluded from or under-represented in biodiversity-related decision-making processes, which contributes to an often marginalized role in implementation efforts and limits the effectiveness of measures to conserve and sustainably use biodiversity. This is despite the important role women play in resource management in countries and communities around the world, and the evidence that women's inclusion in resource management groups can lead to better conservation and resource governance outcomes.[600] It also raises concerns more generally on progress towards achieving gender equality and the empowerment of all women and girls. Women are under-represented in all levels of decision-making, including national parliaments, where they make up about a quarter of parliamentarians globally.[601] In respect to land rights, despite important advances in legislation to strengthen women's land rights, significant gaps

[598] CBD/SBI/2/2/Add.3.

[599] Garnett et al (2018) A spatial overview of the global importance of Indigenous lands for conservation. Nature Sustainability volume 1, 369–374. https://doi.org/10.1038/s41893-018-0100-6; O'Bryan, et al (2021), The importance of indigenous peoples' lands for the conservation of terrestrial mammals. Conservation Biology. https://doi.org/10.1111/cobi.13620

[600] Leisher et al (2016) Does the gender composition of forest and fishery management groups affect resource governance and conservation outcomes? A systematic map. Environmental Evidence 5 (6). https://doi.org/10.1186/s13750-016-0057-8

[601] Inter-Parliamentary Union (2020) Women in parliaments are the percentage of parliamentary seats in a single or lower chamber held by women. https://data.worldbank.org/indicator/SG.GEN.PARL.ZS ; Inter-Parliamentary Union (2021) Women in parliament in 2020. The year in review. https://www.ipu.org/women-in-parliament-2020

between countries and regions remain. 164 countries explicitly recognize women's rights to own, use, make decisions and use land as collateral on equal terms with men. However, of these only 52 countries guarantee these rights both in law and practice.[602] Further, globally women make up less than 15 per cent of agricultural land holders.[603]

317. Globally there is limited information on the involvement of youth in decision making processes related to biodiversity. This is despite the fact that they will be directly impacted by the progress made towards the 2050 Vision for Biodiversity. While numerous youth initiatives around the world are having positive impacts on biodiversity, these are rarely accounted for in decision making processes.

Considerations

318. Equitable participation in biodiversity-related decision-making and relevant resource rights of indigenous peoples and local communities, women and girls and youth are cross-cutting issues, and actions taken to fulfil them would contribute to the achievement of all of the proposed goals and targets in the post-2020 global biodiversity framework. Numerous examples have demonstrated the ways in which bringing indigenous peoples and local communities, women and youth, into decision making can lead to constructive solutions to various issues, while rights over relevant resources provides an important means for these groups to both participate in decision-making and to support the implementation of effective solutions.

319. The preamble of the Convention on Biological Diversity recognizes the vital role that women play in the conservation and sustainable use of biological diversity and affirms the need for the full participation of women at all levels of policy-making and implementation for biodiversity conservation. Similarly, the text of the Convention recognizes the close and traditional dependence of many indigenous and local communities embodying traditional lifestyles on biological resources and that Parties should, as far as possible and as appropriate, subject to national legislation, respect, preserve and maintain knowledge, innovations and practices of indigenous and local communities relevant for the conservation and sustainable use of biodiversity.

320. Aichi Biodiversity Target 18 addressed traditional knowledge while Aichi Biodiversity Target 14, to a limited extent, addressed issues related to gender, as well as to indigenous peoples and local communities and youth, in respect to the restoration and safeguarding of ecosystem services. As such this proposed target can be viewed as a continuation of these established commitments. Further in setting out the process for developing the post-2020 global biodiversity framework the Conference of the Parties, in decision 14/34, decided that the process should be, among other things, participatory, inclusive and gender responsive, including by systematically integrating a gender perspective and ensuring appropriate representation, particularly of women and girls, in the process. Given this, a target related to participation, particularly as it relates to the participation of women and indigenous peoples and local communities can be seen as building on and from this decision.

321. Indigenous peoples and local communities, women and youth are leaders and key actors in biodiversity conservation and sustainable use. Failure to adequately recognize these contributions, including in the preparation and implementation of national biodiversity strategies and action plans, is a missed opportunity. Similarly ensuring their rights are respected would contribute to the establishment of effective implementation environment for the post-2020 global biodiversity framework and broader societal objectives, including issues addressed in the 2030 Agenda for Sustainable Development.

322. Biodiversity-related decision-making occurs across levels of government and across different ministries and at different scales. It also occurs across sectors. Consideration should therefore be given to how this complexity can be reflected in actions to reach this target. Further equitable participation in decision making related to biodiversity can take multiple forms and will vary by country and the type of decision being made. However, generally participation could range from promoting and encouraging the participation

[602] OECD (2019) SIGI 2019 Global Report: Transforming challenges into opportunities. https://www.oecd-ilibrary.org/sites/bc56d212-en/index.html?itemId=/content/publication/bc56d212-en

[603] FAO. The gender gap in land rights. http://www.fao.org/3/I8796EN/i8796en.pdf

and representation of indigenous peoples and local communities and women in electoral processes, to ensuring equal and effective participation on advisory boards, resource governance bodies, and in formal consultation processes, and to ensuring that mechanisms exist for the views and perspectives of these groups to be meaningfully considered prior to decisions being made.

323. Under the Convention on Biological Diversity, the programme of work on Article 8(j) guides much of the work related to indigenous peoples and local communities. With regard to gender, the 2015-2020 Gender Plan of Action includes possible actions for Parties to undertake in implementing the Convention.[604] Both of these could help to inform the types of actions needed to reach this proposed target.

324. Progress towards this proposed goal would contribute to the attainment of broader societal objectives, including SDG Targets 1.4,[605] 5.5,[606] 5.a[607] and 16.7.[608] In addition, there are numerous other agreements and processes which reflect the importance of promoting the participation of indigenous peoples and local communities, women and girls and youth in decisions making processes and in ensuring their rights. Examples of these include the Beijing Declaration and Platform for Action promoting gender equality and women's empowerment, the United Nations Declaration on the Rights of Indigenous Peoples, and the United Nations Convention on the Rights of the Child.

325. The IPBES methodological assessment regarding the diverse conceptualization of multiple values of nature and its benefits, including biodiversity and ecosystem functions and services will provide further information relevant to this target.

Monitoring

326. Monitoring progress towards this target will require information on equitable participation. This could include information on the number of indigenous peoples and local communities, women, girls, and youth that participate in decision making processes. Information on the effectiveness of this participation may also be required. Aside from information on the number of women represented in national parliaments, there is currently no global level information available on these two issues. In addition, information will also be required on the number of indigenous peoples and local communities, women, girls, and youth with equal rights to relevant resources. While some information on this issue is available, it mostly relates to rights to own, use, make decisions and use land as collateral.

Links to other proposed goals and targets

327. The attainment of this target would contribute to the progress towards the proposed goal on means of implementation (Goal D). Progress towards this target would also help to support the progress made towards all of the proposed targets in the post-2020 global biodiversity framework as effective equitable participation in decision-making will enhance the effectiveness of decisions making, planning and actions required to implement all aspects of the post-2020 global biodiversity framework.

---

[604] A process is under way to update the gender plan of action in relation to the post-2020 global biodiversity framework.

[605] Ensure that all men and women, particularly the poor and the vulnerable, have equal rights to economic resources, as well as access to basic services, ownership, and control over land and other forms of property, inheritance, natural resources, appropriate new technology, and financial services including microfinance

[606] Ensure women's full and effective participation and equal opportunities for leadership at all levels of decision-making in political, economic and public life

[607] Undertake reforms to give women equal rights to economic resources, as well as access to ownership and control over land and other forms of property, financial services, inheritance and natural resources, in accordance with national law

[608] Ensure responsive, inclusive, participatory and representative decision-making at all levels