UN environment programme

CBD

Convention on Biological Diversity

Distr.
GENERAL

CBD/SBSTTA/24/3/Add.2/Rev.1
23 April 2021

ORIGINAL: ENGLISH

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

POST-2020 GLOBAL BIODIVERSITY FRAMEWORK: SCIENTIFIC AND TECHNICAL INFORMATION TO SUPPORT THE REVIEW OF THE UPDATED GOALS AND TARGETS, AND RELATED INDICATORS AND BASELINES

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 "updated zero draft", like the earlier version of the post-2020 global biodiversity framework, includes the 2050 Vision for Biodiversity[3] and proposes a set of goals for 2050 and associated milestones for 2030. It also contains a Mission and 20 Targets for 2030. The updated zero draft also contains information on the purpose of the framework, its theory of change, implementation support mechanisms, enabling conditions, and considerations for responsibility and transparency.

3. 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 document provides information to support the scientific and technical review of the proposed goals and targets in the updated zero draft of the post-2020 global biodiversity

* CBD/SBSTTA/24/1.

[1] CBD/WG2020/2/3.

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

[3] The 2050 Vision for Biodiversity is a world of "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." It was originally adopted in decision X/2.

framework.[4] It complements the note by the Executive Secretary on proposed indicators and monitoring approach for the post-2020 global biodiversity framework (CBD/SBSTTA/24/3/Add.1). This note is further supported by an information document (CBD/SBSTTA/24/INF/21).

4. Given the mandate above and the role of the Subsidiary Body on Scientific, Technical and Technological Advice 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.[5]

5. In section II, information is provided on the relationship between the 2050 Vision for Biodiversity and the proposed mission, goals and targets, taking into account the *Global Assessment Report on Biodiversity and Ecosystem Services* of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES), the fifth edition of the *Global Biodiversity Outlook*[6] and the second edition of the *Local Biodiversity Outlooks*, and other literature.

6. In sections III and IV, respectively, information is provided on each of the proposed goals and targets with the aim to:

(a) Outline the relevance of the topic addressed by the proposed goal or target in relation to the objectives of the Convention on Biological Diversity;

---

[4] A previous version of this document was made available for peer review and the document has been revised in the light of the comments received. Comments were received from Armenia, Belgium, Brazil, Canada, Colombia, Costa Rica, Ecuador, European Union, Finland, France, Honduras, Japan, Mexico, New Zealand, Portugal, Spain, Sweden, Switzerland, Syrian Arab Republic, Turkey, Uganda, United Kingdom of Great Britain and Northern Ireland, United States of America, African Centre for Biodiversity, Alliance of Bioversity International and International Center for Tropical Agriculture, American Chemistry Council, BirdLife International, Born Free Foundation, Brazilian Confederation of Agriculture and Livestock, Business for Nature, Campaign for Nature, Capitals Coalition, Center for Biological Diversity, Coalition for Conservation Genetics, Co'MAB, Commission on Ecosystem Management, Conservation International, Consortium of European Taxonomic Facilities, COST Action, CropLife International, David Shepherd Wildlife Foundation, Deakin University, Earth Advocacy Youth, Earth Law Center Environmental Investigation Agency, GBIKE, German Life Science Association, German Natural History Research Collections , GEO BON Genetic Composition Working Group, Global Industry Coalition, Global Environment Facility, Global Youth Biodiversity Network , IFAW, International Centre for Research in Agroforestry, International Chamber of Commerce, International Coral Reef Initiative, International Fertilizer Association, International Maritime Organization, IUCN , IUCN Conservation Genetics Specialist Group, IUCN SSC Phylogenetic Diversity Task Force , Key Biodiversity Area Secretariat, Kwanzaa Eco Farm Initiative, Leibniz Biodiversity Research Alliance, MAB France, MAVA, Mediterranean Protected Areas Network , Natural Resources Defense Council, New Wind Association, Outreach Network for Gene Drive Research, Peruvian Society of Environmental Law, Pesticide Action Network, Red List of Ecosystems Thematic Group, Rights of Mother Earth, Society for Conservation Biology Policy Committee and Conservation Genetic Working Group, Rights of Nature Sweden, The Nature Conservancy, UNEP-WCMC, West African Economic and Monetary Union, United Nations Conference on Trade and Development, WBCSD, Wildlife Conservation Society, World Commission on Protected Areas, World Resources Institute, WWF International, Yale University, York University and the Zoological Society of London. All of the comments are available from https://www.cbd.int/notifications/2021-012. However, given the number of comments received, the need to keep the document to a manageable length and the overall scope of the document, it was not possible to completely reflect all comments received in this document. Moreover, a number of the comments suggested the reformulation of the goals and targets of the post-2020 global biodiversity which fall outside the scope of this document; such comments will be compiled and made available to the Co-Chairs of the Working Group on the Post-2020 Global Biodiversity Framework. Some other comments suggested the inclusion of additional information, research and analysis which it was not possible to identify and/or undertake in the time available. The peer review comments were also considered in the revisions of document CBD/SBSTTA/24/INF/21, as appropriate.

[5] The issue of baselines is further discussed in CBD/SBSTTA/24/3Add.1, sect. III.

[6] CBD/SBSTTA/24/2.

(b) Summarize the current status and trends;

(c) Provide information to inform considerations of the level of ambition, particularly with respect to the quantitative elements of the proposed goals and targets, and addressing to the extent possible what the available evidence suggests is required to achieve the 2050 Vision (and proposed goals) and what may be feasible in the time frame of the post-2020 global biodiversity framework;

(d) Identify how the proposed targets relate to the proposed goals and illustrate the types of actions that may be employed to achieve the proposed targets.

7. In order to keep the document to a reasonable length, only a brief summary treatment of the issues addressed by the proposed goals and targets can be provided. The analysis of Goals A and B also draws on an information document (CBD/SBSTTA/24/INF/9) prepared by a group of experts convened by the Earth Commission in collaboration with Future Earth and the Secretariat of the Convention on Biological Diversity.

8. In section V below, the scopes of the proposed goals and targets are reviewed with respect to coverage of the Articles of the Convention, the drivers of biodiversity loss and the levers/leverage points for transformative change identified by IPBES, and the areas of transition outlined in the fifth edition of the *Global Biodiversity Outlook* and the second edition of *Local Biodiversity Outlooks*. In section V, a review of potential linkages with an updated Global Strategy for Plant Conservation is provided and more detailed considerations of this issue is contained in CBD/SBSTTA/24/INF/20.

9. The process for developing the post-2020 global biodiversity framework cuts across the work of the Convention and its subsidiary bodies. As such the information in this note is linked to a number of additional documents prepared for both the twenty-fourth meeting of the Subsidiary Body on Scientific, Technical and Technological Advice and the third meeting of the Subsidiary Body on Implementation. Examples of these include the proposed indicators and monitoring approach for the post-2020 global biodiversity framework,[7] the review of progress in the implementation of the Convention and the Strategic Plan for Biodiversity 2011-2020,[8] options to enhance planning, and reporting, and review mechanisms with a view to strengthening the implementation of the Convention.[9] These interlinkages should be kept in mind when considering this issue.

II. RELATIONSHIP BETWEEN THE VISION AND PROPOSED MISSION, GOALS AND TARGETS

10. At its fourteenth meeting, the Conference of the Parties agreed that 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) remained relevant for the post-2020 global biodiversity framework. Current trends show that most indicators of biodiversity (including natural ecosystem extent, species conservation status and population abundance) and nature's contributions to people, are declining.[10] Given that the 2050 Vision envisages an improved status for biodiversity and ecosystem services (nature's contributions to people)[11] and that the current status of and business-as-usual scenarios for biodiversity show continuing declines, pathways towards the 2050 Vision would require that these declines are progressively reduced, halted and reversed globally.[12] Models and

[7] CBD/SBSTTA/24/3/Add.1.

[8] CBD/SBI/3/2.

[9] CBD/SBI/3/11.

[10] IPBES (2019). *Global Assessment Report on Biodiversity and Ecosystem Services*. IPBES secretariat, Bonn, Germany. https://ipbes.net/global-assessment.

[11] "Ecosystem services" and "nature's contributions to people" are closely related concepts used interchangeably in this document. The relationship between the two terms is described in detail in the *Global Assessment* (IPBES, 2019).

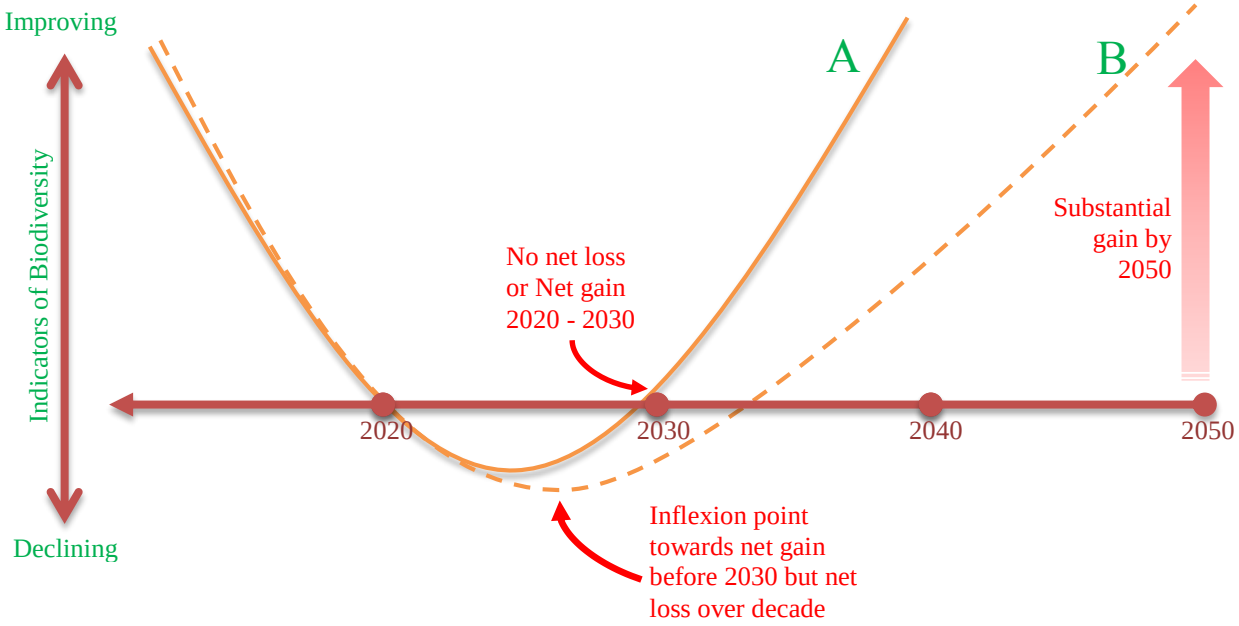
[12] Mace et al (2018), Aiming higher to bend the curve of biodiversity loss. Nature Sustainability 1, pp. 448-451. https://doi.org/10.1038/s41893-018-0130-0; Leclère et al (2020), Bending the curve of terrestrial biodiversity needs an integrated strategy. Nature, vol. 585, pp. 551–556. https://doi.org/10.1038/s41586-020-2705-y and section III of the *Global Biodiversity Outlook*, fifth edition.

scenarios suggest that this is feasible, at least for some indicators of biodiversity. As set out in the fifth edition of the *Global Biodiversity Outlook*, a portfolio of actions would be needed involving transformative change in the ways humans manage the planet including: scaling up conservation and restoration; action on climate change and other direct drivers of biodiversity loss; and changes in production and consumption patterns across all sectors, particularly food and agriculture. In turn, the fifth edition of the *Global Biodiversity Outlook* identifies eight distinct but interrelated areas where transitions are needed. These relate to the use of land, forests and other terrestrial ecosystems; the management of freshwater ecosystems; marine fisheries and other uses of the ocean; agricultural production systems; the food system (including diets, demand, supply chains and waste); the footprint and requirements of cities and infrastructure; the interaction between ecosystems and climate change; and the multi-faceted connections between nature and human health.

11. The proposed 2050 goals of the framework seek to translate the 2050 Vision into more tangible outcomes for biodiversity (ecosystems, species and genetic diversity), for people (nature's contributions to people), for the sharing of benefits from the use of genetic resources, as well as the means of implementation necessary to reach the Vision. Each goal is designed to represent a desired state of biodiversity in 2050 and has associated milestones for 2030 to gauge progress.

12. The figure below provides a conceptual illustration of two possible trajectories towards the 2050 Vision for Biodiversity based on the proposed mission of the post-2020 global biodiversity framework. Currently the available biodiversity indictors show an ongoing decline in the status and trends of biodiversity (see the vertical axis in figure 1). In order to reach the 2050 Vision, indicators must show a substantial improvement in the status of biodiversity by 2050. The proposed 2030 mission provides a summary statement of what is to be achieved in the decade 2021-2030 and how. The proposed mission statement, "To take urgent action across society to put biodiversity on a path to recovery for the benefit of planet and people," highlights the urgency of action. It also implies that the downward trend in biodiversity should be halted and reversed before 2030 (i.e. the inflection point would be before 2030). Figure 1 illustrates potential trajectories conceptually for two levels of ambition. A more ambitious approach would see no-net loss (the point where the curves cross the horizontal axis in figure 1) of the status of biodiversity and nature's contributions to people during the decade 2021-2030 or even a net gain (see line A). A less ambitious approach would see the status of biodiversity in 2030 below current levels, but still on an upward curve (see line B). In figure 1, both lines represent generalizations for a range of potential biodiversity indicators. In practice, it may be feasible to achieve more progress for some indicators than others. For example, as further explored in section III, for Goal A, improvement in the diversity and abundance of species in any ecosystem would be expected to lag behind improvements in ecosystem area. (In such a case, figure 1 could represent a scenario, where line A represents trends for ecosystem area, while line B represents trends in indicators of ecosystem integrity, or species-related indicators).

Figure. Illustration of current trends in biodiversity and possible trajectories to 2050 in relation to the proposed mission of the post-2020 global biodiversity framework



13. The proposed 2030 targets are action-oriented and represent desired achievements for 2030 that are necessary to place the world on a path to be able to reach the 2050 goals and the 2050 Vision. This should therefore be reflected in the formulation of the targets in such a way as to promote immediate action (in 2021) even if the target year for the result is 2030.

14. Given the information above, the proposed goals in the framework should be consistent with the 2050 Vision, and the actions set out in the proposed mission and targets should be commensurate with achieving the proposed 2030 milestones. The information provided in sections III and IV is intended to assist the Subsidiary Body in assessing this. Further, for the proposed targets to be commensurate with the 2050 Vision and the proposed goals, they must sufficiently address the direct and indirect drivers of biodiversity change. This is reviewed in section V of the document.

15. In undertaking a scientific and technical analysis of the goals and targets, the other elements of the post-2020 global biodiversity should be borne in mind. These include sections on the framework's purpose, its theory of change, implementation support mechanisms, enabling conditions, issues related to responsibility and transparency and outreach, awareness and uptake. Such elements will be essential to the implementation from the framework and complement its goals and targets. In addition, many of the goals and targets are interrelated and it will be important to keep these connections in mind.

III. INFORMATION TO SUPPORT THE SCIENTIFIC AND TECHNICAL REVIEW OF THE PROPOSED GOALS

Ecosystems, species and genetic diversity:[13]

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*

[13] 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.

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

Ecosystems

17. 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).

18. "Natural" ecosystems are understood to be those whose species composition is predominantly native and determined by the climatic and geophysical environment.[14] 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.[15] Ecological connectivity is important to maintain the integrity of ecosystems and to allow unimpeded movement of species within and across ecosystems and the flow of natural processes.

19. While the status and trends of ecosystems vary by ecosystem type and by geographic location,[16] the area, connectivity and integrity of most natural ecosystems are in decline, and these trends 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 resilience, functions and services. In some cases, major disruptions in ecosystem functioning at 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 area and integrity of natural ecosystems by 2050, which would help to protect species, genetic diversity and the provision of ecosystem services.

20. 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. It will also require restoring both converted and degraded ecosystems. 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.[17] A plausible pathway towards such an outcome requires that net gain, or at a 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.[18] However, quantitative model-based scenarios of such pathways are not currently available.

---

[14] 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.

[15] 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. Hansen et al (2021). Towards monitoring ecosystem integrity within the Post-2020 Global Biodiversity Framework. https://doi.org/10.32942/osf.io/eyqw5

[16] For example, 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. FAO (2020) Global Forest Resources Assessment 2020: Main report. Rome. https://doi.org/10.4060/ca9825en. Similarly, the area covered by natural wetlands has been reduced by an average of 35% worldwide between 1970 and 2015 and losses have been relatively greater in coastal areas than inland areas. Darrah et al (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. Further examples are provided in document CBD/SBSTTA/24/INF/21.

[17] 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.

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

21. While ecosystem restoration will be an essential part of efforts to achieve this goal, priority should be given to retaining existing natural ecosystems. In particular, the loss of existing intact 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. With regard to restoration, it should be noted that the recovery of ecosystem integrity (including species diversity and abundance and communities of interacting species 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.[19] 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 to, among other things, 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 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.

22. 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.

23. 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 per cent of native vegetation in managed ecosystems can support biodiversity conservation goals and provide useful services for agricultural production.[20]

24. 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 to 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/sea areas. 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.

Species

25. 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 genetic diversity.

26. 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. About 1 million species (or 13 per cent) are currently threatened with extinction, although the extinction risk varies significantly across taxa.[10] For comprehensively assessed taxonomic groups, the proportion ranges from 7 to 63 per cent across groups,

[19] 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.

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

averaging about 24 per cent.[21] The status of threatened vertebrate species continues to decline and will continue to do so under business-as-usual scenarios. The population abundance of many wild species is also declining. The Living Planet Index, an indicator of average relative population abundance, is declining globally, showing, up until 2016, a 68 per cent decline since 1970, including a 32 per cent decline since 2000.[22] However, trends vary among taxa and locations, with some groups showing increases or no change.[23]

27. To reach 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 geographical extent of all species. 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.[24] 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 will be kept to well below 20 per year over the next 100 years.[25] However, where both the species at risk and the drivers of decline are known, extinctions can be avoided given sufficient political will and investment. 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,"[26] 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.

28. 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 numbers of species. The goal could aim to improve, or at least maintain current levels by 2030, and progressively increase the diversity, 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.

---

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

[22] WWF (2020). *Living Planet Report 2020: Bending the Curve of Biodiversity Loss*. WWF, Gland, Switzerland. https://livingplanet.panda.org/en-us/

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

[24] 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 0.13 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.

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

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

29. Actions to achieve this element of the goal are identified under the various proposed targets. Proposed targets 1 and 4-7 addressing issues related to the direct drivers of species loss (land-/sea-use change, exploitation of organisms, invasive alien species, pollution and climate change, respectively). Protected areas and other effective area-based conservation measures (proposed target 2) are also an essential contribution to the achievement of this element of the goal. In addition, species-specific management interventions (proposed target 3) will be needed to ensure the conservation of some species including the most endangered among them. Proposed targets 12-20 would contribute to all aspects of this goal by addressing the indirect drivers of biodiversity change.

Genetic diversity

30. Genetic diversity 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.[27] It is important to address the genetic diversity of both wild, domesticated and other farmed or cultured species as their dynamics are very different. 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 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.

31. There is limited information on the status of genetic diversity of wild species, in comparison to what is available on species and ecosystems, but overall negative trends in biodiversity (including extinction risk, abundance, habitat loss and degradation) suggest that it is in overall decline.[28] One conservative estimate suggests that a decline of within-population genetic diversity of about 6 per cent since the industrial revolution and an average decline of up to 27.6 per cent on islands.[29] Another study found a 2 per cent decline in the genetic diversity or overharvested populations of fish.[30] More information is available for domesticated species, species used in agriculture and aquaculture, species used for food and medicine, or species which are otherwise directly used by people. The genetic diversity of major crops is better conserved ex situ than the genetic diversity of minor crops, including neglected and underutilized species, and their wild species. However, declines in the diversity of many domesticated species and their wild relatives is well documented.

32. 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 that 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.[31] Though there are knowledge gaps in genetic diversity data, technical advances in genomic analysis,[32] decreasing costs and better data stewardship, could allow for more frequent genetic monitoring to occur.

---

[27] 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

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

[29] Leigh et al (2019). Estimated six per cent loss of genetic variation in wild populations since the industrial revolution. Evolutionary Applications 12: 1505– 1512. https://doi.org/10.1111/eva.12810

[30] 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.

[31] 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.

[32] 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.

33. 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.[33] 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.[34]

34. Actions to achieve this element of the goal are identified under the various proposed targets. 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.[35]

Nature's contributions to people[36]

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*

35. Nature's contributions to people[37] (a concept similar to and inclusive of ecosystem services[38]) refers to all the contributions from biodiversity to people's well-being or quality of life. They include (a) material contributions, such as the production of food, feed, fibre, medicines and energy, (b) regulating services, such as the regulation of air 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 well-being and experiences and supporting identities and culture, as well as maintaining options for future generations. While all people depend on nature's contributions to people, some groups are particularly dependent on them, including indigenous peoples and local communities and

[33] 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.

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

[35] 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

[36] 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*, the fifth edition of the *Global Biodiversity Outlook*, and the references therein. Additional references are indicated in the text for specific points.

[37] IPBES defines "nature's contributions to people" 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 of nature's contributions to people may be perceived as benefits or detriments depending on the cultural, temporal or spatial context.

[38] 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.

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 essential elements of the 2050 Vision, and directly underpin most of the Sustainable Development Goals.

36. Spatial analysis of the provision and need for ecosystem services shows that nature's contributions to people, for example to water quality regulation, coastal disaster risk reduction and pollination, are not evenly distributed across the world. Human needs also vary depending on the location. 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.[39]

37. Of the 18 categories of nature's contributions to people analysed in the IPBES *Global Assessment on Biodiversity and Ecosystem Services*,[10] 14 have shown a consistent declining global trend over the past 50 years. 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 ecosystem 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 people living in poverty and vulnerable situations are often most likely to suffer the impacts of declining contributions of nature.[40]

38. 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 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.[41]

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

(a) To 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;[42]

(b) To 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;[43]

---

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

[40] 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

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

[42] FAO. (2019). *State of the World's Biodiversity for Food and Agriculture*. FAO Commission on Genetic Resources for Food and Agriculture. Rome http://www.fao.org/3/CA3129EN/CA3129EN.pdf; Willett et al (2019). Our Food in the Anthropocene: The EAT-Lancet Commission on Healthy Diets from Sustainable Food Systems. *The Lancet* http://dx.doi.org/10.1016/S0140-6736(18)31788-4; Nielsen et al (2019). The Importance of Wild Meat in the Global South. *Ecological Economics* 146: 696-705. https://doi.org/10.1016/j.ecolecon.2017.12.018

[43]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-

(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[44] as well as reduce the risk of the emergence of infectious disease;[45]

(d) Achieve the goals of the Paris Agreement.[46]

40. 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 ecosystem-based approaches and nature-based solutions to climate change mitigation and adaptation, disaster risk-reduction, sustainable management of wild species, sustainable agricultural ecosystems, regulation of air and water, and urban green 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.

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

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

41. 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 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 (see also proposed target 12). Further, discussions are ongoing under the United Nations Convention on the Law of the Sea on and the 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.

42. 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. With respect to the International Treaty on Plant Genetic Resources for Food and Agriculture, which facilitates access to plant

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

[44] 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

[45] 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 Science-Policy Platform on Biodiversity and Ecosystem Services. IPBES secretariat, Bonn, https://doi.org/10.5281/zenodo.4147317.

[46] 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 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

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. 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.[47]

43. Information on benefits shared is sparse, particularly in monetary terms. For context, as of 2019, the global seed market is valued at about US$ 60 billion[48] and the total global pharmaceutical market at about US$ 1.25 trillion.[49] However, these figures are inclusive of costs, including development costs, which can be considerable. Corresponding information on profits is not publicly available. Almost three quarters of new drugs are either derived from or are synthetic mimics of a natural products,[50] though not all of these necessarily relate to the use genetic resources under the Convention.

44. 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 should also be given to how information on the different types of non-monetary benefits can be collected in a consistent way and in a way which allows information to be aggregated. The Internationally Recognized Certificates of Compliance published in the Access and Benefit-sharing Clearing-House offer relevant information in this respect.

45. 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*

46. 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. However, 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. 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.

---

[47] Information on the funds dispensed from the International Treaty on Plant Genetic Resources for Food and Agriculture 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/.

[48] 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).

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

[50] 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

47. There are multiple of means of implementation, including the provision of financial resources in accordance with Articles 20 and 21 of the Convention, capacity-building, technology transfer, the sharing of knowledge, experiences and lessons learned, partnerships, required for the effective implementation of the post-2020 global biodiversity framework. The capacity which currently exists in countries must be further built upon so that it can be substantially increased from current levels if the post-2020 global biodiversity is to be effectively implemented. The specific means for implementation required may vary from country to country, according to national needs and circumstances; however, a goal on this issue can be seen as a common commitment by all countries to increase the means of implementation available and the efficiency and effectiveness of these.

48. 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 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, there is currently no global-level synthesis available on the current status and needs for means of implementation for the post-2020 global biodiversity framework, other than finance.

49. Inadequate funding levels are a major impediment to effective biodiversity conservation in many countries and may be associated with failures to meet global targets.[51] Conservation investment has been demonstrated to reduce biodiversity loss.[52] Spending on biodiversity provides a very high social return on investment.[53] Thus, while increased 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.

50. Current global biodiversity finance is of the order of $100 billion per year, while estimates of funding needs for a comprehensive post 2020 global biodiversity framework are of the order of $800 billion per year, giving a funding gap of the order of $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.[54] 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,[55] 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

[51] 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

[52] 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

[53] 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

[54] These estimates should be considered indicative of the scale of the need given the complexities and interconnectedness of the issues. For further details on the methodology and its implications see 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/; Waldron et al (2020) *op. cit.;* 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.

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

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.[56]

51. Actions to achieve this element of the 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.

IV. INFORMATION TO SUPPORT THE SCIENTIFIC AND TECHNICAL REVIEW OF THE PROPOSED TARGETS

A. Reducing threats to biodiversity

Land-/sea-use change, spatial planning and restoration[57]

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.*

52. This proposed target relates to land-use and sea-use change , a major direct driver of biodiversity loss. 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.[10] 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 by both decreasing the loss and degradation (increasing the retention) and increasing the restoration of natural habitats. More effective and widespread spatial planning,[58] which accounts for biodiversity and the objectives of the Convention, will be crucial in accomplishing this.

53. 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[59] may include: (a) restoring converted areas back to natural states; (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 the first of these, ambition in restoring agricultural lands back to natural ecosystems may be limited by

[56] For examples 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

[57] The text in this subsection is largely based on the fifth edition of the *Global Biodiversity Outlook*, 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.

[58] 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. SpringerBriefs in Earth Sciences.

[59] In 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.

competing demands for land. However, one study showed 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.[60] 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. The contribution 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.[61] It should be noted that it is not currently feasible to fully restore many types of ecosystems in a decadal time frame.[62] Thus, preventing the loss and degradation of ecosystems in the first place is preferred (see also para. 21).

54. Given competing demands for land and sea areas and potential trade-offs comprehensive and biodiversity-inclusive 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.[63] 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 regard to conservation strategies or ecoregional plans, 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.[64] 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 States of the Food and Agriculture Organization of the United Nations (FAO) report having put in place complete and enabling policy, legal and institutional frameworks for integrated coastal zone management, and about half have partially developed frameworks awaiting adoption.[65] Specifically, with regard to the marine spatial planning, regional sea conventions could play an important role in advancing progress on this issue.

55. Comprehensive spatial planning would need to be complemented by protection of specific areas with 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. Progress towards this target will also be influence by the actions to address issues related to management, ownership and tenure (proposed target 20).

---

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

[61] Ibid.

[62] 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$) (Baryaktarov et al. 2019)).

[63] 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.

[64] 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.

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

Area-based conservation measures[66]

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.*

56. Protected areas and other effective area-based conservation measures, if well-sited, connected, integrated into the wider land- and sea-scape and managed effectively and equitably, remain essential measures to conserve biodiversity. Currently over 16 per cent of land and about 8 per cent of oceans (about 17 per cent of the marine areas within national jurisdiction and 1 per cent of areas beyond national jurisdiction) are covered by protected areas registered in the World Database on Protected Areas.[67] 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 into account as well as estimates of the size of other effective area-based conservation measures (OECMs), 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.[68] However, despite improvements, coverage of areas of importance to biodiversity show significant gaps. For example, 19 per cent of Key Biodiversity Areas, which are predominately terrestrial, are completely within protected areas and while the protection of these areas is currently increasing, 39 per cent have no protection.[69] Further the expansion of protected areas and OECMs in recent years has not been uniform[70] and while there has been steady growth in the size of protected areas overall, some specific protected areas have been reduced in size.[71] Moreover, there are gaps in terms of the representativeness of protected, how well they are connected to the wider land- and sea-scape and many protected areas are not effectively or equitably managed.[72] For example, only half of the global terrestrial protected area network comprises well connected areas.[73]

57. In order to safeguard ecosystem diversity, reduce the rate and risk of extinction and improve species population abundance as well as maintain and enhance many ecosystem services and nature's contributions to people in line with the Goals proposed in the updated draft of the post-2020 global biodiversity framework, 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. Estimates vary regarding the proportion of land and sea that needs to be covered by protected areas and OECMs in order to reach conservation objectives. For example, Key Biodiversity Areas currently cover 8.7 per cent of land and 2.1 per cent of oceans, but not all are currently protected; the area of current Key Biodiversity Areas outside protected areas represents 4.5 per cent of terrestrial area, and since additional Key Biodiversity Areas are being identified, this area will likely increase. Covering hotspots of endemic species, and other areas with a

---

[66] The text in this subsection is largely based on the fifth edition of the *Global Biodiversity Outlook*, 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.

[67] UNEP-WCMC and IUCN (2021) Protected Planet: The World Database on Protected Areas (WDPA)s. https://www.protectedplanet.net/en. Updated figures are expected in May 2021.

[68] SCBD (2020) *Global Biodiversity Outlook*, fifth edition. Montreal. https://www.cbd.int/gbo5

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

[70] 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

[71] 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

[72] Maxwell et al (2020) Area-based conservation in the twenty-first century. *Nature* 586, 217–227 (2020). https://doi.org/10.1038/s41586-020-2773-z; and Zafra-Calvo e al (2019) Progress toward Equitably Managed Protected Areas in Aichi Target 11: A Global Survey, *BioScience*, 69 (3) 191–197, https://doi.org/10.1093/biosci/biy143

[73] UNEP-WCMC, IUCN and NGS (2020). Protected Planet Live Report 2020. UNEP-WCMC, IUCN and NGS: Cambridge, United Kingdom; Gland, Switzerland; and Washington, D.C., United States of America. https://livereport.protectedplanet.net/

high density of threatened species from the IUCN Red List, would require 1 per cent additional to the current terrestrial protected area coverage.[74] 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.[75] In the marine environment, 321 ecologically or biologically significant marine areas (EBSAs), covering about 20 per cent 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.[76]

58. Many recent proposals converge around protecting 30 per cent or more of the land and sea surface by 2030, with the possibility of higher targets established subsequently,[77] and given future scenarios for land-/sea-use change and taking into account the potential for other 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.[78] However, the importance of focusing on biodiversity outcomes rather than spatial area is emphasized; an increase in coverage alone will not be sufficient.[79] Also, 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).

59. 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 about 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.[80] Similar limitations have also been identified for marine protected areas.[81]

---

[74] 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.

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

[76] Given differences in the coverage of different parts of the marine environment (seabed, 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.

[77] Dinerstein, et al (2019), *Op. cit*.; Visconti et al (2019). Protected area targets post-2020. *Science*. 364. eaav6886. https://doi.org/10.1126/science.aav6886; 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; 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.

[78] 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

[79] 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

[80] 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.

[81] 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.

60. 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 about 35 per cent of all areas that are currently under formal protection and 35% of all remaining land areas with very low human intervention are traditionally owned, managed, used, or occupied by indigenous peoples.[10]

61. 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 well-being.[82]

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%]*.

62. This proposed target addresses two distinct issues:

Active species management[83]

63. Based on information in global Red List assessments, species-specific management interventions will be needed to ensure the conservation of 37 per cent (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 such species.[84] Active 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.[85] However, these interventions are mostly "emergency room" type interventions and full recovery is only possible if the underlying drivers of loss are addressed.[86]

64. 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, planting and protection of seedlings) and ex situ conservation where needed. The scope of the target could be expanded to include ex situ conservation of genetic resources within species, including for crops and livestock and

---

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.

[82] 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.

[83] The text in this subsection draws on the fifth edition of the *Global Biodiversity Outlook*, and references therein, in particular the section related to Aichi Biodiversity Target 12. Additional references are indicated in the text for specific points.

[84] 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

[85] 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

[86] Bolam et al (in review), *op. cit*.

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.[87]

Reducing human-wildlife conflict[88]

65. 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. As a result of those actions and threats humans may damage or eliminate wildlife. These responses can be intentional and unintentional. Reducing human–wildlife conflict and improving co-existence is important 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 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.

66. Though specific examples of human-wildlife conflict are well known,[89] it is difficult, at present, to determine the specific quantitative level or amount of human wildlife conflict. In order to identify such a level, it will be necessary to identify appropriate indicators of such conflict. Human-wildlife conflict may be exacerbated unsustainable patterns of consumption and production and by poorly planned development, including encroachment into wild areas, conversion, distractions, degrading or reducing area of natural habitats, the feeding of wildlife, waste management and some tourism activities (some of these issues are addressed in proposed target 1 on spatial planning). It may be reduced by, among other things, the better land and sea-use planning, mitigation, including compensation,[90] and control measures. It may also be managed by empowering indigenous peoples and local communities and the use of rights-based approaches as well as through 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). Further, 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.

[87] 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.

[88] 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.

[89] See, for example, 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.

[90] 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.

Threats from overexploitation, trade and unsustainable use[91]

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.*

67. This proposed target addresses the direct exploitation of organisms, a major direct driver of biodiversity loss. The direct exploitation of wild populations of species is the largest direct driver of biodiversity loss in marine ecosystems and the second largest in terrestrial and freshwater ecosystems. While directly impacting the species that are the target of exploitation (e.g., fish, wild meat, timber, medicinal plants), it often also causes collateral harm 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).

68. Currently, many species on the IUCN Red List are threatened by 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. With regard to the world's marine fish stocks, a third are overfished and, under business-as-usual scenarios, this is projected to worsen.[92] 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.[93]

69. Specifically, with regard to the trade in wildlife, the value of international wildlife trade has increased by 500 per cent since 2005 and by 2,000 per cent since the 1980's. There are no similar estimates for the national or subnational trade in wildlife. It should also be noted that legal trade is not necessarily sustainable. With regard to illegal trade specifically, it has been estimated that this is conservatively worth between US$ 7 and 23 billion per year, or approximately 25 per cent 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.[94] 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).

70. Given the above, promoting sustainable use and trade 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. A range of actions will be required to reach the proposed target. For example:

(a) Investing in sustainable fisheries management (inclusive of distant water fleets), combatting illegal, unreported and unregulated fishing and removing harmful subsidies, could, by 2030, end overfishing, rebuild many stocks, and reduce threats to endangered species while increasing the provision of food, reducing costs and prioritizing the nutritional and livelihood needs of those most dependent on fisheries;[95]

---

[91] The text in this subsection draws on the fifth edition of the *Global Biodiversity Outlook*, and references therein, in particular the sections on Aichi Biodiversity Target 4 and 14 and the section related to pathways to the 2050 Vision for Biodiversity. Additional references are indicated in the text for specific points.

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

[93] 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;

[94] 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

[95] 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

(b) A combination of measures is needed to ensure that the supply of wild meat is sustainably and legally managed at the 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;[96]

(c) 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 drastically reduce the illegal and unregulated trade in endangered species and that posing particular risks for human health.[97]

71. 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.[98] 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). 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 8.

Preventing and controlling invasive alien species[99]

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.*

72. 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 socioeconomic well-being. 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.[100] Further, there is growing evidence that other pressures on biodiversity, such as climate change, can

---

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

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

[97] 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; Frank and Wilcove (2019) Long delays in banning trade in threatened species. Science. https://doi.org/10.1126/science.aav4013;

[98] 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

[99] The text in this subsection draws on the fifth edition of the *Global Biodiversity Outlook*, and references therein, in particular the section on Aichi Biodiversity 9. Additional references are indicated in the text for specific points.

[100] 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

facilitate the spread of invasive alien species, increase their impacts and/or cause established non-native species to become invasive.[101]

73. There is no evidence of slowing in the rate of invasion, at least for unintentional introductions linked to travel and trade.[102] Indeed, the projected growth in shipping, could increase the risk of invasions by between 3 and 20 times by 2050[103] unless shipping mediated vectors are strongly mitigated. This underscores the importance of instruments to prevent the introduction of invasive alien species.[104] Further, 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,[105] while one sixth of global land area and 16 per cent of global biodiversity hotspots are highly vulnerable to invasion.[106]

74. Currently more species are moving closer to extinction due to increased pressure from invasive alien species, than those native species given a better survival chance thanks to eradication or control of biological invaders. However, 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.[107]

75. 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.[108] This requires limiting new introductions and eradicating or controlling those invasive alien species that pose a significant risk for threatened species or the provision of ecosystem services.

76. Preventing the introduction of invasive alien species in the first place is more cost-effective than attempting to eradicate alien species once they become established. Given the number of pathways of introduction that exist, as well as the number of already established invasive alien species, prioritization may be required in both cases, focusing efforts on those invasive alien species which are particularly detrimental, such as those which are the main driver of decline of threatened species.[109] With regard to pathways, evidence suggests that the highest number of introductions occur through escape, transport-contaminants and intentional release to nature.[110] With regard to the control and/or eradication of invasive alien species, attention could be given to those which are having particularly detrimental effects in specific areas. Priority site would need to be identified but could include, among other places, Key Biodiversity Areas, Alliance for Zero Extinction Sites, protected areas, and/or areas where invasive alien species are posing a significant threat to species or ecosystem services.

---

[101] 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

[102] Seebens et al (2017). No saturation in the accumulation of alien species worldwide. *Nature Communications* 8: 14435. https://doi.org/10.1038/ncomms14435

[103] 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

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

[105] 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.

[106] 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.

[107] 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.

[108] 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.

[109] 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.

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

77. Registries of invasive alien species, such as the IUCN Global Register of Introduced and Invasive Species provides possible baseline information for assessing progress in reducing introductions and a standard Environmental Impact Classification of Alien taxa has been developed.[111] 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, the identification of priority sites, as noted above, would be needed to provide a baseline for assessing progress in control and eradication efforts. The IPBES Assessment on invasive alien species, due to be finalized in 2023 will provide further useful information relevant to this proposed target.

78. Progress towards this target could, depending on the invasive alien species being addressed, contribute to the attainment of the elements of proposed target 1 related to land and sea use and restoration. It may also contribute to the effective management of protected areas and other effective area-based conservation measures (proposed target 2). 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 socioeconomic impacts (proposed target 19).[112]

Reducing pollution[113]

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.*

79. Pollution is one of the main drivers of biodiversity loss, and many forms of pollution[114] impact on biodiversity and in various ways. Excess nutrients (especially nitrogen and phosphorus), including from the historic and ongoing application of fertilizers,[115] cause eutrophication and "dead zones" in freshwater and coastal areas. It also negatively impacts and affects species composition in terrestrial, freshwater, marine and coastal ecosystems, and contributes to air pollution, climate change and stratospheric ozone depletion. Pesticides, a type of biocide,[116] kill or harm targeted and untargeted 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.[117] Mining and the handling of waste material, often pollutes freshwater ecosystems with hazardous materials, such as mercury and cyanide. Noise (including underwater noise) and light pollution also disrupt the behaviour of many

[111] 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

[112] 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

[113] The text in this subsection draws on the fifth edition of the *Global Biodiversity Outlook*, and references therein, in particular the sections on Aichi Biodiversity Target 8. Additional references are indicated in the text for specific points.

[114] 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 among others

[115] 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

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

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

species and in some cases can kill or harm species.[118] Most of these 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.

80. Most forms of pollution are increasing in most parts of the world. Under business-as-usual scenarios, rates of nitrogen pollution are projected increase in many regions but decrease in others. [119] Rates of plastic pollution are projected to increase 2.6 times by 2040, almost tripling the cumulative plastic waste in the oceans.[120] Determining levels of pollutions which are not detrimental to biodiversity is challenging as these levels are context and location specific.

81. To achieve the 2050 Vision and the proposed Goals of the post-2020 global biodiversity framework it will be necessary to reduce substantially levels of pollution. 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,[121] and case experience suggests that such a target would be feasible.[122] 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,[123] 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.[124]

---

[118] 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. Chou et al (2021). International policy, recommendations, actions and mitigation efforts of anthropogenic underwater noise. Ocean & Coastal Management. 202. 105427. https://doi/org/10.1016/j.ocecoaman.2020.105427.

[119] 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

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

[121] 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

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

[123] 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.

[124] Gurr et al (2016) Multi-country evidence that crop diversification promotes ecological intensification of agriculture, Nature Plants. doi: 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.

82. 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 foreseeable technologies.[125] More generally, reduction in waste and pollution would be enabled by shifts to a more circular economy and many actions taken under the Basel, Rotterdam, Stockholm and Minamata Conventions as well as the regulatory framework to prevent pollution from dumping of wastes at sea, through the London Convention and London Protocol[126] could contribute to this target.[127] Actions to reach this target may also be linked to the proposed targets on production practices and supply chains (target 14) and unsustainable consumption patterns (target 15) as both of these issues can contribute to the generation of waste and pollution. 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,[128] 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[129]

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*.

83. Research on the causes and impacts of climate change makes it increasingly clear that the climate and biodiversity are interlinked. Climate change, and the associated pressure of ocean acidification, is already impacting biodiversity and is projected to have progressively greater impacts becoming the largest driver of biodiversity loss in the second half of this century. The impacts on biodiversity are much greater at 2 degrees C than at 1.5 degrees C above pre-industrial levels. Impacts of climate change on biodiversity include, among other things, loss of habitat, change in species behaviours, altered patterns of 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. Thus, effective and sustainable climate action, including stringent reductions in the use of fossil fuels, is a prerequisite to slowing and reversing biodiversity loss. Moreover, climate change impacts undermine ecosystem resilience and thus weaken the contribution of ecosystems to both mitigation and adaptation of climate change.

---

[125] 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

[126] Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter 1972 (London Convention) and its 1996 Protocol. https://www.imo.org/en/OurWork/Environment/Pages/London-Convention-Protocol.aspx.

[127] Specifically with regard to plastic and microplastic pollution, an ad hoc open-ended expert group established through the United Nations Environment Assembly (UNEA) 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 Assembly. 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

[128] 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.

[129] The text in this subsection draws on the fifth edition of the *Global Biodiversity Outlook*, and references therein, in particular the section related to the sustainable climate action transition. Additional references are indicated in the text for specific points.

84. A number of ecosystem-based approaches, such as conservation, ecosystem restoration and improved management of agriculture, forestry, fisheries, aquaculture,[130] can contribute to both 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.[131] 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.[132]

85. 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.[133] 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,[134] and recent guidance from IUCN requires a positive contribution for biodiversity for an intervention to qualify as a nature-based solution.[135] 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.

---

[130] 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

[131] Griscom et al (2017). Natural climate solutions. PNAS 114 (44) 11645-11650 https://doi.org/10.1073/pnas.1710465114; 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; 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; IPBES (2019). Global assessment report on biodiversity and ecosystem services of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services.

[132] 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.

[133] 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.

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

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

Meeting people's needs through sustainable use[136]

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.*

86. 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. The maintenance, in quantity and quality, of these benefits also provides 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.

87. Wild species of flora and fauna contribute to human well-being in multiple ways. 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.[137] However, while there are numerous examples of how wild species contribute to nutrition, food security, livelihoods, health and well-being and thousands of wild species used for food have been recorded, there is currently no global level synthesis of this type of information.[138]

88. 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. Thus, 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[139]

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%]*.

89. Currently, land-use change from the expansion of agriculture is the largest driver of terrestrial biodiversity loss and business as usual scenarios show continued habitat loss from the expansion of agriculture (for more than 87 per cent of the 19,859 species modelled).[140] In addition, many agricultural

[136] The text in this subsection draws on the fifth edition of the *Global Biodiversity Outlook*, 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.

[137] 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.

[138] For example, more than 28,000 plant species, 723 of which are threatened with extinction, have medicinal uses. (Antonelli et al (2020). *State of the World's Plants and Fungi 2020*. Royal Botanic Gardens, Kew. https://doi.org/10.34885/172).

[139] The text in this subsection draws on the fifth edition of the Global Biodiversity Outlook, and references therein, in particular the sections related to the Aichi Biodiversity Target 7, the sustainable food systems transition, the sustainable agriculture transition and the sustainable fisheries and oceans transition. Additional references are indicated in the text for specific points.

[140] 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.

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. Unsustainable practices in other managed ecosystems, such as those used for pasture, forestry and aquaculture, are also having negative impacts on biodiversity. 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).[10] 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.

90. 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.[141] While data exists for several crops under different biophysical (climate, soil, physiography) and socioeconomic contexts, there is no global productivity gap value across all agricultural or other production systems.[142] Further, the biophysical potential to increase yields in a sustainable manner varies globally, depending on climate, soil quality, and access to water.[143]

91. Achieving the 2050 Vision and the proposed Goals will also require reducing pesticide use and the overuse of fertilizers, improving water use efficiency and improvement to the management of soils[144] 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.

92. A number of possible actions can be taken to support the productivity, sustainability and resilience of biodiversity in agricultural and managed ecosystems. Most of these actions centre around the sustainable intensification of production practices which includes improving the efficiency of use of land and inputs of water, fertilizers, pesticides and other agrochemicals, including though genetic improvements to crops and livestock, substituting external inputs, and designing or redesigning systems based on agroecological approaches,[145] 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, reducing pollinator-dependent yield deficits and the integrated management of the forest and agricultural areas.[146] Some of these actions would also contribute to proposed target 6 related to reducing pollution from all sources, including excess nutrients. The actions to reach this target would also have co-benefits for

---

[141] 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

[142] 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).

[143] 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.

[144] Issues related to soil biodiversity will be further discussed by the Subsidiary Body on Scientific, Technical and Technological Advice at its twenty-fourth meeting, under agenda item 7. See CBD/SBSTTA/24/7/Rev.1 for further details.

[145] 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.

[146] 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.

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. Other actions could include the conservation or restoration of native habitats within working landscapes of agricultural and other managed ecosystems A recent study recommended that at least 20 per cent of working landscapes should be maintained as native habitat to support conservation and ecosystem services.[147] Further progress towards this target will also be closely related to proposed target 15 on eliminating unsustainable consumption patterns.

Nature-based solutions and ecosystem services[148]

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.*

93. The proposed target relates to the benefits provided to people in relation to the services provided 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. 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" or "green infrastructure".

94. 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.[149] More than 80 per cent of urban dwellers were exposed to air pollution which exceeded limits set out by the World Health Organization.[150] 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).[151] 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.[152] 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.[153] However, some of these threats could be significantly reduced under sustainable development scenarios.

---

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

[148] The text in this subsection draws on the fifth edition of the *Global Biodiversity Outlook*, and references therein, in particular the section related to Aichi Biodiversity Target 14. Additional references are indicated in the text for specific points.

[149] 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/

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

[151] 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.

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

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

95. It has been estimated that more 1.7 billion people could benefit from the application of ecosystem-based approaches to watershed management.[154] Ecosystem-based approaches are increasingly used around the world, however information on the extent of their use and the number of people currently benefiting from them is incomplete. While 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.[155] Furthermore, in most cases nature-based or ecosystem-based solutions 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.

96. 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[156]

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.*

97. Green and blue spaces (i.e. areas of vegetation, inland and coastal waters generally in or near to urban areas) have a range of positive effects on human physical and mental well-being.[157] 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, the number of people visiting parks has increased.[158] Additionally, in many places, such areas also provide important connections to nature for people. Green and blue spaces can provide important habitat for species, improve habitat connectivity, provide ecosystem services and help mediate extreme events, if managed with such objectives in mind.[159]

---

[154] 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.

[155] https://www.iucn.org/theme/nature-based-solutions/resources/iucn-global-standard-nbs.

[156] The text in this subsection draws on the fifth edition of the Global Biodiversity Outlook, 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.

[157] 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.

[158] 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.

[159] 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.

98. 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.[160] This includes all places which are available for public use include squares, plazas and streets, as well as parks and recreational areas; many such areas may have little value for biodiversity. 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.[161] Thus, actions towards this target should give specific attention to urban dwellers.

99. 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 subnational 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 goals related to land and sea use change and restoration (target 1) as well to the proposed target related to 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.

Access and benefit-sharing[162]

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.*

100. 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, further supported by the Nagoya Protocol. Sharing the benefits from the use of genetic resources creates incentives for the conservation and sustainable use of biodiversity and contributes to the creation of a fairer and more equitable economy to support sustainable development. Further, Article 9 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.

101. 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. There is much information on measures put in place 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-

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

[160] United Nations (2020). Goal 11: Make cities inclusive, safe, resilient and sustainable. https://www.un.org/sustainabledevelopment/cities/

[161] 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.

[162] The text in this subsection draws on the fifth edition of the *Global Biodiversity Outlook*, 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.

Parties). Under the International Treaty on Plant Genetic Resources for Food and Agriculture, more than 76,000 contracts known as Standard Material Transfer Agreements by February 2020 have been put in place.[163] More generally, an analysis of corporate reports and websites of cosmetic and food companies found that references to access and benefit-sharing 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).[164]

102. 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 effectiveness of bilateral and multilateral approaches to benefit sharing is also the subject of analysis and discussion.165

103. 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 the monetary and non-monetary benefits shared (see Goal C). This proposed target could complement Goal C by focusing on the measures to be taken to ensure or facilitate benefit-sharing. 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.

B. Tools and solutions for implementation and mainstreaming

Integration of biodiversity[166]

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.*

104. Reaching the goals of the post-2020 global biodiversity framework and the 2050 Vision for Biodiversity will require that biodiversity moves from the periphery of decision making to become a core consideration in decision and planning processes across government and all sectors of the economy and of society, recognizing the multiple values of biodiversity. Progress towards this target will support the attainment of most of the proposed goals and targets of the post-2020 global biodiversity framework. It will be a particularly important aspect of the means of implementation (proposed goal D).

105. Over 90 countries have compiled accounts in line with the System of Environmental-Economic Accounting (SEEA) and at least 24 countries have published ecosystem accounts under the Experimental Ecosystem Accounting programme, part of the SEEA framework. A sample of the Voluntary National

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

[164] 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.

[165] For example, see Ruiz Muller, Manuel. 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.

[166] The text in this subsection draws on the fifth edition of the *Global Biodiversity Outlook*, and references therein, in particular the section related to the Aichi Biodiversity Target 2. Additional references are indicated in the text for specific points.

Reviews for implementation of the Sustainable Development Goals shows that approximately half of the reporting countries have mainstreamed biodiversity throughout their reports. 47 of the 170 Parties that have developed, updated or revised their national biodiversity strategies and action plans (NBSAPs) 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, and 40 Parties indicate that biodiversity has been integrated into their national development plan or equivalent instruments.

106. Progress towards this target will require a range of actions and many of these will directly or indirectly contribute to the attainment of all of the other proposed targets in the post-2020 global biodiversity framework. Generally, there will be a need for greater and more explicit recognition of all biodiversity values in key national strategic policy and planning documents. This will need to be supported by the further development and more effective use of instruments or policy tools for addressing biodiversity and ecosystem services and functions in a comprehensive manner within and across different sectors and policy areas. For such instruments and tools to be effective, they will need to be underpinned by effective biodiversity monitoring and quality biodiversity information (proposed target 19). The development of biodiversity-inclusive spatial plans (proposed target 1) could also be helpful in this respect.

107. More specific actions to reach this target will 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. Discussions under the Convention on a draft long-term approach to mainstreaming is also relevant[167]

108. 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 useful information with regard to the multiple values of biodiversity.

Sustainable production and supply chains[168]

Target 14. *By 2030, achieve reduction of at least [50%] in negative impacts on biodiversity by ensuring production practices and supply chains are sustainable.*

109. The production and supply chains used to meet the demand for goods and services directly and indirectly support current patterns of unsustainable use, one of the main direct drivers of biodiversity loss.[10] Reducing the negative impacts on biodiversity from production practices and supply chains will be important in making progress towards the 2050 Vision for Biodiversity.

110. By some estimates, 90 per cent of global biodiversity loss and half of global greenhouse gas emissions can be linked to the extraction and processing of natural resources.[169] The impacts of productions systems and supply chains related to food (agriculture in terrestrial environments, affecting freshwater and coastal areas too, and fisheries and aquaculture in marine and freshwater environments), as well as forestry, are particularly important, though the impacts vary greatly with the commodity produced as well as the mode of production. For example, a recent 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

[167] 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.

[168] The text in this subsection draws on the fifth edition of the *Global Biodiversity Outlook*, 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.

[169] 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. https://www.resourcepanel.org/reports/global-resources-outlook.

richness by 13-44 per cent.[170] Extractive industries, energy and infrastructure development also have large impacts.

111. While Governments have a particularly important role to play in reducing the negative impacts from production practices and supply chains, producers and retailers across all sectors will also need to be involved. Already many organizations have increased efforts to reflect biodiversity considerations 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. 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. [171] Further, 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.[172] 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.

112. An important dimension of production practices and supply chains is trade patterns. While these 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).[173] The impacts of resource-intensive production processes age generally shifting from high-income importing countries to low income exporting countries,[174] with over 80 per cent of the impacts of food crop consumption in industrialized countries occurring in other countries for example.[175] Actions towards this target and the monitoring of progress towards it require assessment and disclosure of the dependencies and impacts of production practices and supply chains on biodiversity so that they can be taken into account by business, policymakers and the general public, and the impacts progressively reduced. 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 productive sectors and associated supply chains.[176] While some of these actions, in particular those related to certification schemes and standards in international markets,

---

[170] 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.

[171] Union for Ethical BioTrade (2018). UEBT Biodiversity Barometer 2018 - https://static1.squarespace.com/static/577e0feae4fcb502316dc547/t/5b51dbaaaa4a99f62d26454d/1532091316690/UEBT+-+Baro+2018+Web.pdf; 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.

[172] 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.

[173] 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.

[174] 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.

[175] 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.

[176] 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 CBD/SBI/3/13/Add.1.

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.[177]

113. The actions taken to 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), 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).

Sustainable consumption[178]

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.*

114. Unsustainable consumption underlies each of the main direct drivers of biodiversity loss. Reaching the 2050 Vision will require that the use of biological resources does not exceed the capacity of the earth to generate them. This target is closely related to proposed target 14 related to supply chains.

115. Patterns of consumption globally are currently unsustainable and are having negative impacts on both species and ecosystems.[179] 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.[180] 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.[181]

116. Generally, actions towards this target will need to focus on those which will reduce the overall demand for resources and limit waste. This will require action across society, 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.

117. 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[182] while annual discards from fisheries represent about 10 per cent of annual catches.[183] 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. 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

---

[177] 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.

[178] The text in this subsection draws on the fifth edition of the *Global Biodiversity Outlook*, 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.

[179] 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.

[180] 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.

[181] Managi and Kumar (2018). *Inclusive Wealth Report 2018*. United Nations Environment Programme: https://www.unenvironment.org/resources/report/inclusive-wealth-report-2018.

[182] United Nations Environment Programme (2021). *Food Waste Index Report 2021*. Nairobi. https://www.unep.org/resources/report/unep-food-waste-index-report-2021.

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

resources which are consumed, promoting the use of goods from sustainable sources, support for biodiversity friendly business practices, 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.

118. 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. Further, the impacts of consumption and what is considered sustainable will vary between types of resources and products and how these are extracted, harvested and/or produced.[184] 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), 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[185]

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].*

119. The Convention on Biological Diversity requires that Parties should, 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[186] 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.[187] A target on biotechnology therefore has the potential to advance considerations of this issue under the Convention, including the Cartagena Protocol on Biosafety.[188] 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 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.[189]

---

[184] 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 CBD/SBI/3/13/Add.1.

[185] 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.

[186] Under the Convention, "biotechnology" means any technological application that uses biological systems, living organisms, or derivatives thereof, to make or modify products or processes for specific use (Article 2 of the Convention). 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.

[187] Convention on Biological Diversity, Article 8(g).

[188] The 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 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.

[189] Article 19 of the text of the Convention.

120. Biotechnology encompasses a range of specific technologies and products and is an evolving area with rapid technological developments. Biotechnology can have 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.

121. 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. However, there is no global systematic quantitative information currently available on actual and potential adverse impacts of biotechnology on biodiversity or on reductions of such impacts through biosafety measures.

122. Actions to achieve this target should take into account mechanisms already in place under the Cartagena Protocol. 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 organisms for intentional introduction into the environment. The publication and use of information in the Biosafety Clearing-House is progressively improving, including by developing countries. For example, by January 2020, 2,055 risk assessment reports and 2,134 decisions on introduction into the environment had been notified to the Clearing-House.

Incentives[190]

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.*

123. Harmful incentives, including subsidies, are one of the main indirect drivers of biodiversity loss, particularly as they affect decisions around land-/sea-use, consumption and production patterns, overexploitation, pollution and climate change. Substantial and widespread changes to harmful incentives, will be a necessary and critical step to ensure the conservation and sustainable use of biodiversity.

124. 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.[191] 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.[192] Further, despite increased subsidies for clean energy, fossil-fuel support remains high, at $478 billion in 2019.[193] Taking into account environmental costs, other externalities and lost tax revenue the total cost of subsidies that damage nature is estimated to be of the order of $4-6 trillion per year.[194] Harmful subsidies greatly exceed the finance that is allocated to promote conservation and sustainable use of biodiversity (see proposed target 19).

---

[190] The text in this subsection draws on the fifth edition of the *Global Biodiversity Outlook*, and references therein, in particular the section related to the Aichi Biodiversity Targets 3. Additional references are indicated in the text for specific points.

[191] 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

[192] 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. 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.

[193] OECD (2020), OECD Inventory of Fossil-fuel support measures (database), http://www.oecd.org/fossil-fuels/data/

[194] 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*

125. A necessary first step in reaching a target on this issue is the identification of those incentives which are harmful to biodiversity.[195] In most countries and regions, there are likely to be a number of incentives which are having negative effects on biodiversity and some countries have taken steps to identify them. In the redirection, repurpose, reform or elimination of harmful incentives priority could be given to those particularly harmful to biodiversity and which also impede other societal objectives or are not effective from a socio-economic perspective. The redirection, repurposing, 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.[196] 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.[197]

126. Most countries have national incentives which are beneficial for biodiversity in place. These take various forms and global consistent information on them is not available. One exception to this, however, is information on biodiversity-relevant taxes, fees and charges, and tradeable permits. According to OECD, the revenue generated from biodiversity-relevant taxes is approximately $7.4 billion per year, a little over 1 per cent of total revenue generated from all environmentally relevant taxes in OECD countries.[198]

127. Financial savings from redirection, repurposing, reform and/or elimination of harmful subsidies has the potential to make resources available for the conservation and sustainable use of biodiversity as well as for other societal objectives. [199] 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.

Resource mobilization[200]

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.*

128. The progress towards a target on resource mobilization will have implications on the feasibility of achieving the other proposed targets and goals in the post-2020 global biodiversity framework. The lack of financial resources has frequently been noted as a limitation to the conservation and sustainable use of biodiversity.

129. OECD data suggest that global biodiversity finance is of 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),

---

Biodiversity: The Dasgupta Review. HM Treasury. United Kingdom. https://www.gov.uk/government/publications/final-report-the-economics-of-biodiversity-the-dasgupta-review

[195] 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.

[196] For example, see Schuhbauer etal (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.

[197] World Bank (2020). Mobilizing private finance for nature. https://pubdocs.worldbank.org/en/916781601304630850/Finance-for-Nature-28-Sep-web-version.pdf.

[198] OECD (2020) Tracking Economic Instruments and Finance for Biodiversity. https://www.oecd.org/environment/resources/tracking-economic-instruments-and-finance-for-biodiversity-2020.pdf

[199] 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.

[200] The text in this subsection draws on the fifth edition of the *Global Biodiversity Outlook*, 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.

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).[201] In 2018-2022, funding directly relevant to biodiversity provided through the Global Environment Facility 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. However, given the risk of double counting, the lower of these figures may be closer to the true value.[202] Biodiversity funding through international flows including official development assistance doubled during the last decade, but total funding is estimated to have increased more modestly.

130. 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.[203]

131. These estimates suggest a funding gap of the order of $700 billion per year. However, this gap could be closed substantially by subsidy reform (see proposed target 17) both by reducing the need for finance and through the contributions that may be made from redirected subsidies. Further, 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.

132. While the current funding gap for biodiversity is significant, the potential benefits derived from the effective conservation and sustainable use of biodiversity need to be considered. For example, a recent estimate suggests that 55 per cent of global gross domestic product, or $41.7 trillion, are highly or moderately dependent on biodiversity and ecosystem services.[204] This is addition to the range of other ecosystem services that biodiversity provides. Further, a recent review of the effectiveness of national biodiversity investments to protection of biodiversity, based on a sample of 30 countries, observed that biodiversity funding was associated with a reduction in the number of threatened species and the rate of biodiversity loss of about 1 per cent per year.[205]

133. Actions towards this target should bear in mind the provisions of Article 20 of the Convention. A combination of resources from domestic and international sources as well as from the public and private sectors will be needed. Some additional resources could come from a combination of (a) reducing subsidies and other expenditures causing harm to biodiversity and thereby reducing the total funding need; (b) making

---

[201] 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

[202] 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/

[203] Deutz et al (2020), *op. cit;* 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.

[204] 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.

[205] Seidl et al *(2021)* The effectiveness of national biodiversity investments to protect the wealth of nature. *Nature Ecology and Evolution* 5, 530–539. https://doi.org/10.1038/s41559-020-01372-1

use of funds redirected from subsidy reform; (c) generating additional resources from all sources, including domestic and international sources as well as public and private sources; (d) making use of funds which also serve other objectives, such as addressing climate change, where objectives coincide or overlap (e) enhancing the effectiveness and efficiency of resource use. Proposals have been made for a new financial institution guided by the principle of fiscal equivalence: 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.[206]

134. 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[207]

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.*

135. Quality and timely biodiversity information is required to identify 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 information remains limited or absent for many issues and the proportion of people who aware of the importance of biodiversity remains limited.

136. Biodiversity information is growing at a rapid rate, and indicators are becoming more readily available and various national, regional and global biodiversity observation networks are being established. While there is no single indicator for the availability of biodiversity information, growth is demonstrated by, for example, the number of species assessed for extinction risk in the IUCN Red List, which has doubled in the past decade, passing 120,000 species in 2020, or the number of species occurrence records freely accessible through the Global Biodiversity Information Facility (GBIF), which has reached more than 1.6 billion. The Barcode of Life Data System (BOLD) has established a library of more than half a million public 'Barcode Index Numbers'. Further, through remote sensing, information on the extent and quality of ecosystems is increasingly available. However, important gaps in biodiversity information remain and our ability to effectively and quickly analyse existing data is limited. 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. Information related to the open ocean and deep-sea is particularly limited.[208] The IUCN Red List assessments still only covers 6 per cent of described species and of the species assessed only 15 per cent are marine species. Gaps in species

[206] 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; 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

[207] The text in this subsection draws on the fifth edition of the Global Biodiversity Outlook, and references therein, in particular the section related to the Aichi Biodiversity Targets 20. Additional references are indicated in the text for specific points.

[208] Danovaro et al (2017) The deep-sea under global change. Current Biology, 27 (11). https://doi.org/10.1016/j.cub.2017.02.046

and ecosystem observations, information and data are largely mirrored in genetic data gaps.[209] In addition to these gaps, important challenges remain in terms of the ease of access and use of information, its timeliness and quality. Moreover, the lack of socioeconomic data relevant to biodiversity, including gender-specific data, can lead to misleading information and compromise effective management.

137. 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.[210]

138. 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 educational 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.[211]

139. Progress towards this target will require greater support for research and innovation, data acquisition, management and sharing and monitoring systems as wells associated investment and capacity-building for these. This includes efforts to address major imbalances in the location and taxonomic focus of biodiversity studies and monitoring as well as to address 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. The greater recognition and support for the role of indigenous peoples and local communities 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 improve biodiversity information while also raising awareness.[212] Actions to better share biodiversity information, for example through national clearing-house mechanisms, will also be needed. Scaling up access, use and support of technological advances in monitoring, cataloguing and sharing biodiversity information will be important to filling information gaps.

---

[209] Miraldo et al (2016). An Anthropocene map of genetic diversity. *Science*. 353 (6307)1532-1535. https://doi.org/10.1126/science.aaf4381.

[210] 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

[211] 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

[212] 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

140. 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 be needed to both formal learning, such as in schools and universities, as well as in informal contexts, such as through the guidance of elders, as well as in museums and parks, and through films, television and literature.

Participation[213]

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.*

141. 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 taken into account in decision making processes related to biodiversity. 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, as a means to enable conservation and sustainable use of biodiversity by all actors and to contribute to social objectives, including poverty alleviation, health and human well-being.

142. Analysis of national biodiversity strategies and action plans (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. 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 processes.

143. Reaching this target will require a greater recognition of the rights and roles of indigenous peoples and local communities, women and youth as leaders and key actors in action towards biodiversity conservation and sustainable use and that these groups are further enabled and encouraged to play this role. Similarly, ensuring that their rights, particularly as they relate to owning, using, accessing, controlling, transferring, inheriting and otherwise taking decisions about land and related resources, are respected would contribute to the effective implementation of the post-2020 global biodiversity framework as well as broader societal objectives, including issues addressed in the 2030 Agenda for Sustainable Development.[214] The progress towards this target would contribute to the attainment of all of the other proposed goals and targets in the post-2020 global biodiversity framework.

144. 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.

V. SCOPE OF THE PROPOSED GOALS AND TARGETS

145. This section reviews the scope of the proposed goals and targets in relation to the articles of the Convention, the drivers of biodiversity loss, the levers/leverage points for transformative change identified

[213] The text in this subsection draws on the fifth edition of the *Global Biodiversity Outlook*, 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.

[214] General Assembly resolution 70/1, annex.

by IPBES, and the areas of transition proposed in the fifth edition of the *Global Biodiversity Outlook* and the second edition of *Local Biodiversity Outlooks*.

146. The proposed goals and targets of the framework address all three objectives of the Convention and most of its substantive provisions. However, a few provisions are incompletely and/or not explicitly addressed. For example, while proposed target 19 refers to traditional knowledge and proposed target 20 refers to the participation of indigenous peoples and local communities in decision-making, the provisions of Article 8(j) are not fully addressed.[215] Article 9 on ex situ conservation is addressed in proposed target 3 but only in the context of threatened species. The proposed targets do not completely address Article 13 on public education and awareness, but parts are covered by proposed targets 15 and 19.[216] Matters related to Articles 7(b) and 8(l), which require the identification and monitoring of activities that have or are likely to have significant adverse impacts on biodiversity and for such activities to be regulated or managed, and Article 14 on impact assessment are implicit in many of the proposed targets but not covered explicitly. Article 16 on technology is not directly addressed in a target.

147. The proposed targets of the framework explicitly address each of the main direct drivers of biodiversity loss identified in the IPBES *Global Assessment*, namely land and sea use change (proposed targets 1), exploitation of organisms (target 4), invasive alien species (target 5), pollution (target 6), and climate change (target 7). However, in keeping with the respective roles of the Convention on Biological Diversity and the United Nations Framework Convention on Climate Change (UNFCCC), the proposed target on climate change covers only those mitigation and adaptation actions contributed and affected by biodiversity and ecosystems.

148. With respect to the indirect drivers of biodiversity loss, as categorized by IPBES, the proposed targets of the framework address many aspects of the economic drivers, including production (targets 9), supply chains (target 14), consumption (target 15), incentives (targets 17) and financial resources (target 18). Some aspects of the indirect drivers related to governance, institutions, values, beliefs, norms (for example in proposed targets 13, 19 and 20) and technological drivers (explicitly in proposed target 16, and implicitly in proposed target 9) are addressed in framework. Demographic drivers and are not addressed in the updated zero draft of the post-2020 global biodiversity framework.

149. Two of the five levers (incentives, and strengthening law and policy) for transformational change identified by the IPBES *Global Assessment* are completely addressed.[217] With regard to the leverage points identified by the IPBES *Global Assessment*, waste and consumption are addressed in proposed target 15, and externalities and tele-coupling are partly addressed in target 14. Inequality and justice and inclusion are partially addressed in terms of equitable participation (proposed target 20).[218] Technology, innovation and investment are partially addressed in terms of resource mobilization (proposed target 18) and education, knowledge generation and sharing are addressed through proposed target 19 (knowledge). Values are partially addressed in terms of the better reflection of the values of biodiversity in decision-making processes (proposed target 13). Visions of a good life are addressed through the 2050 Vision for Biodiversity to which all proposed targets and goals contribute.

150. The proposed targets address most aspects of the eight areas of sustainability transition outlined in the fifth edition of the *Global Biodiversity Outlook*. Three of them align very closely with particular proposed targets. The land and forest transition is addressed by proposed target 1 while proposed target 2 is also relevant. The sustainable agriculture transition is addressed by proposed target 9. The sustainable climate action transition is largely addressed by proposed target 7. The freshwater transition is largely addressed

[215] Tradition knowledge is also addressed in the section of the updated zero draft of the post-2020 global biodiversity framework relating to implementation support mechanisms.

[216] The issue of education and awareness is also addressed in the sections of the updated zero draft of the post-2020 global biodiversity framework relating to implementation support mechanisms and outreach, awareness and uptake.

[217] The other levers identified by IPBES are cross-sectoral cooperation, pre-emptive action and decision-making in the context of resilience and uncertainty.

[218] The other leverage point identified by IPBES is inequalities.

through proposed targets 1, 2, 5, 6 and 10 while the fisheries and oceans transition is addressed through targets 1, 2, 4, 6, 7, 8, and 9. However, as demonstrated by these multiple cross-references, freshwater and marine issues are perhaps less clearly identifiable in the framework than terrestrial issues. Aspects of the Food systems transition relating to waste and consumption are addressed in proposed target 15, but with no particular or explicit focus on food. The cities and infrastructure transition is partly addressed through proposed targets 1, 10 and 11. The Biodiversity-inclusive One Health transition is partly covered through proposed targets 1, 4, 9, 10 and 11, but with no particular focus on a One Health approach.

151. Gender is an important consideration across the framework. Gender specific actions may be particularly relevant for targets 8-11, 13, 15, 19 and 20.

152. The proposed goals and targets largely cover the scope of the Aichi Biodiversity Targets, but with more comprehensive approaches to land-/sea-use change, sustainable use, and nature-based solutions. It also addresses supply chains, biosafety, and urban green spaces and green infrastructure. On the other hand, there is less prominence of public awareness (Aichi Target 1), fisheries and aquaculture (Aichi Targets 6 and 7), and coral reefs (Aichi Target 10). Coverage of traditional knowledge and indigenous peoples and local communities is less developed than in Aichi Target 18.

153. Links between the updated zero draft of the post-2020 global biodiversity framework and the Sustainable Development Goals are examined in information document CBD/SBSTTA/24/INF/12.

VI. LINKS TO A POTENTIAL UPDATED GLOBAL STRATEGY FOR PLANT CONSERVATION

154. This section reviews how the proposed goals and targets of the post-2020 global biodiversity framework may relate to an updated Global Strategy for Plant Conservation (GSPC). The GSPC was adopted in 2002 and updated in 2010. It represented the first use of outcome-oriented targets under the Convention. The latest review of the Strategy has shown that, while the targets of the GSPC were not met, countries have made considerable progress towards achieving many of them. The progress is the result of actions under the strategy, with several new initiatives developed specifically to address GSPC targets. In the absence of the GSPC, these actions would not likely have taken place. These include the establishment of a World Flora Online, which provides an open-access web-based compendium of the world's 350,000 species of vascular plants and mosses, and a Global Tree Assessment, which aims to have completed Red List assessments for all the world's tree species. Some of the lessons learned from the implementation of the GSPC were that the GSPC provided an important entry point for many non-governmental organizations to support for the implementation of the Convention on Biological Diversity. It has stimulated considerable growth in networks and partnerships at national and global levels and has resulted in the development of a broadly-based, multi-stakeholder, united community, committed to ensuring the conservation and sustainable use of plant diversity into the future. The experiences also point to the potential benefit for a Global Strategy for Plant Conservation that is updated and harmonized within the broader context of the post-2020 global biodiversity framework and which and more firmly embedded within it that was the case for the Strategic Plan for Biodiversity 2011-2020.[219]

155. All of the proposed goals and targets of the post-2020 global biodiversity framework are relevant to plant conservation. Some of them are amenable to the setting of specific sub-targets (or components) for plants. Such specificity could support monitoring since, in many cases, knowledge is more complete for plants, especially higher plants, than for other taxa. For example, more specific sub-goals for the conservation of plant species and plant genetic diversity could be established under proposed Goal A. Similarly a sub-target related to proposed target 2 could specify the in situ conservation of plant diversity

[219] Secretariat of the Convention on Biological Diversity (2020). *Global Biodiversity Outlook*, fifth edition. Montreal. https://www.cbd.int/gbo5; Sharrock (2020). *Plant Conservation Report 2020: A review of progress in implementation of the Global Strategy for Plant Conservation 2011-2020*. Secretariat of the Convention on Biological Diversity, Montreal, Canada, and Botanic Gardens Conservation International, Richmond, United Kingdom. *Technical Series No. 95*. https://www.cbd.int/gbo5/plant-conservation-report-2020

and of areas of particular importance for plants, while a sub-target related to proposed target 3 could cover the ex situ conservation of wild and domesticated plant species and genetic diversity. In addition, a sub-target related to proposed target 4 could include a focus on the sustainable use of medicinal plants, timber species and other harvested wild plants and/or provide a focus on the benefits of medicinal plants and of plant diversity for nutrition. Further information on a possible approach to an updated Global Strategy on Plant Conservation and how it might relate to the post-2020 global biodiversity framework is provided in document CBD/SBSTTA/24/INF/20.

_____