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BIODIVERSITY AND HEALTH

Note by the Executive Secretary

I. BACKGROUND

1. The Conference of the Parties, in decision 14/4, paragraph 2, welcomed the Guidance on integrating biodiversity considerations into One Health approaches, among other holistic approaches,[1] and recognized the importance of ecosystem-based approaches for the delivery of multiple benefits to human health and well-being.

2. In paragraph 13 of the same decision, the Conference of the Parties requested the Executive Secretary, subject to the availability of financial resources, and invited the World Health Organization (WHO), in collaboration, as appropriate, with other members of the Inter-agency Liaison Group on Biodiversity and Health as well as other partners:

(a) To develop integrated science-based indicators, metrics and progress measurements tools on biodiversity and health;

(b) To develop targeted messaging approaches on mainstreaming biodiversity for the health sector, including as part of the delivery on the global communication strategy and messaging approaches as set out in decision XII/2;

(c) To develop a draft global action plan to mainstream biodiversity and health linkages into national policies, strategies, programmes and accounts, in order to further support Parties in the mainstreaming of biodiversity and health linkages, building upon decision XIII/6 and the guidance on integrating biodiversity considerations into One Health approaches, among other holistic approaches;

3. In paragraph 14 of the same decision, the Conference of the Parties requested the Executive Secretary, subject to the availability of resources, and invited WHO, along with other members of the Inter-agency Liaison Group on Biodiversity and Health, and other partners, as appropriate, to collaborate:

(a) To promote and facilitate dialogues on biodiversity-health approaches with relevant national, regional and subregional stakeholders, and organizations, as appropriate, in order to assist Parties in developing strategies to mainstream biodiversity-health linkages effectively through holistic approaches;

(b) To co-convene further regional and subregional capacity-building workshops on issues related to health and biodiversity in all regions;

(c) To compile information on relevant research, experiences and best practices on the microbiome and human health, and on the design, management and implementation of production systems based on the conservation and sustainable use of biological diversity and traditional knowledge and the

* CBD/SBSTTA/24/1.

[1] CBD/SBSTTA/21/9.

corresponding benefits to nutrition and healthy diets, particularly, but not restricted to, vulnerable and marginalized sectors;

(d) To explore a mechanism that would facilitate access to, regularly update, synthesize and disseminate scientific literature and other reports on health and biodiversity, with a view to supporting the development of good practice guidance.

4. Pursuant to these requests, the present document provides a review of activities and initiatives undertaken to further integrate biodiversity considerations into One Health approaches, among other holistic approaches. Section II reports on the activities implemented pursuant to the above-mentioned decisions. Section III contextualizes the relevance of One Health approaches, among other holistic approaches, and the recognition of interlinkages between biodiversity and health, in the light of the COVID-19 pandemic and the need to reduce the risk of future zoonotic pandemics. Section IV provides a draft recommendation for consideration by the Subsidiary Body on Scientific, Technical and Technological Advice. The draft global action plan to mainstream biodiversity and health linkages into national policies, strategies, programmes and accounts appears in the annex below.

II. REPORT ON ACTIVITIES UNDERTAKEN TO MAINSTREAM BIODIVERSITY AND HEALTH LINKAGES

5. This section provides a brief report on activities pursuant to the requests in paragraphs 13 and 14 of decision 14/4.

6. Science-based indicators, metrics and progress measurements tools are key to measure progress made towards the integration and mainstreaming of biodiversity and health linkages into policy agenda and action. In its current draft, the post-2020 global biodiversity framework and its corresponding draft monitoring framework include several draft health-related indicators. The draft global action plan for biodiversity and health (see paragraph 12 below and the annex) has been developed with its own milestones to monitor implementation; it also informs and provides links to the post-2020 global biodiversity framework indicators. The post-2020 global biodiversity framework indicators will also help to monitor progress made on the implementation of the draft global action plan.

7. To maintain a momentum and raise awareness on interlinkages between biodiversity and health, targeted messages and questions/answers documents have been produced. An analysis of key messages and approaches in the last decades (CBD/SBSTTA/24/INF/26) suggests a progressive evolution and recognition of these linkages, including through the emergence of One Health as an inclusive transdisciplinary and cross-sectoral approach that recognizes the intrinsic connection between human health, animal health, and the health and resilience of nature. WHO and the Secretariat of the Convention on Biological Diversity (CBD), through their joint programme of work and the Inter-agency Liaison Group, and together with other actors, contributed to shape messages on interlinkages between biodiversity and health, and One Health approaches. To further increase awareness among the general public, policy and decision makers, the draft global action plan for biodiversity and health (see paragraph 12 below and the annex) suggests continued awareness-raising and capacity-building activities to reinforce alignment of messaging on biodiversity and health linkages and catalyse a One Health transition.

8. To assist Parties in developing strategies to mainstream biodiversity-health linkages effectively through holistic approaches, the Secretariat promoted and facilitated a number of dialogues on biodiversity-health approaches, including in the context of COVID-19 pandemic (CBD/SBSTTA-SBI-SS/2/INF/1). The Secretariat co-convened with WHO a second meeting of the Inter-agency Liaison Group on Biodiversity and Health virtually in May 2020. Among other things, the Group called for strengthened collaboration on the One Health approach between the United Nations Environment Programme (UNEP) and the existing tripartite alliance of the WHO, the World Organization for Animal Health (OIE), and the Food and Agriculture Organization of the United Nations (FAO).

9. The Secretariat also contributed to online events and workshops related to biodiversity and health interlinkages, including in relation to the need for a One-Health approach as noted in section III.

10. The Secretariat also provided inputs to United Nations system-wide strategies in response to COVID-19, and to ongoing discussions to strengthen the role of UNEP, alongside FAO, OIE and WHO in

their collaborative support to One Health, highlighting the importance of a biodiversity-inclusive and holistic approach.

11. A number of op-eds and articles in various media outlets have been published to emphasize the importance of biodiversity and health linkages to the general public and to continue to build momentum on these issues. In support of the draft global action plan for biodiversity and health, the Secretariat will continue to disseminate information as well as leading reports and publications, including through the Convention's website.

12. A draft global action plan for biodiversity and health, annexed to this note, has been developed in line with decision 14/4, to support Parties in mainstreaming biodiversity and health linkages into national policies, strategies, programmes and accounts, building on the guidance on integrating biodiversity considerations into One Health approaches. It is envisaged that the draft global action plan will also contribute to the implementation of the post-2020 global biodiversity framework, its goals and targets in order to achieve the vision of living in harmony with nature by 2050. The draft global action plan for biodiversity and health for 2021-2030 provides a strategic vision with specific objectives, action areas and activities for leveraging biodiversity and health interlinkages. It is intended that the implementation of the draft global action plan would help to catalyse the operationalization of the "biodiversity-inclusive One Health transition", one of eight areas of transition identified in the fifth edition of the *Global Biodiversity Outlook*.

13. The draft global action plan for biodiversity and health was issued for peer review and has been revised based on comments and feedback received. As part of the peer-review process, 29 submissions were received, out of which 15 were from Parties and 14 from observers.

14. With regard to the mainstreaming of biodiversity and health linkages raised by the Conference of the Parties in decision 14/4, paragraphs 6, 9 (a) and (b) and 12, the Secretariat developed a long-term approach to mainstreaming biodiversity within and across sectors to enhance implementation (CBD/SBI/3/13) and a subsequent action plan (CBD/SBI/3/13/Add.1), working with an Informal Advisory Group.[2] These documents consider biodiversity's contribution to human health and reflect on integrating goals and targets of the post-2020 global biodiversity framework within and across policies of sectors indirectly affecting biodiversity conservation, including the health sector. The proposed long-term approach will provide a broad framework to promote best practices on sustainable consumption and production and to support cross-sectoral mainstreaming of biodiversity, from global to regional and from national to local levels.

III. ONE-HEALTH AND INTERLINKAGES BETWEEN BIODIVERSITY AND HEALTH IN THE CONTEXT OF THE COVID-19 PANDEMIC

15. Biodiversity and human health are closely interlinked across a wide range of scales, from the planetary to that of individual human microbiota. While the relationship between biodiversity and infectious disease is complex, the loss and degradation of biodiversity undermines the web of life and increases the risk of disease spillover from wildlife to people. The COVID-19 pandemic has further highlighted the need to restore the relationship between people and nature and to build back better, with a view to reducing the risk of future zoonotic pandemics.

16. In the light of the current situation with the COVID-19 pandemic, special virtual sessions of the Subsidiary Body on Scientific, Technical and Technological Advice (SBSTTA) and the Subsidiary Body on Implementation (SBI) were convened in December 2020 to further discuss interlinkages between biodiversity and health, One Health, and the response to COVID-19 and pandemics. In preparation for the special session, the Secretariat produced a discussion document providing further insights on biodiversity, One Health and the response to COVID-19 (CBD/SBSSTA-SBI-SS/2/2) as well as a technical information note on biodiversity and pandemics (CBD/SBSTTA-SBI-SS/2/INF/1). The preparatory documents also refer to leading reports and activities developed by partners and organizations, including WHO, UNEP, and the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES),

[2] https://www.cbd.int/mainstreaming/doc/IAG-ECN-Members-2019-07.pdf

emphasizing the complex interlinkages between pandemics and biodiversity, including in the context of the COVID-19 pandemic.

17. The special session discussed the importance of a more integrated, cross-sectoral and biodiversity-inclusive One Health approach that would address the common drivers of biodiversity loss, climate change, increased pandemic risk while supporting better health and well-being outcomes. The response and recovery from COVID-19 paves the way for both short-term stimulus measures and longer-term approaches to "build back better" in line with the 2030 Agenda for Sustainable Development, and to increase preparedness, prevent and reduce the risk of future pandemics. In the context of the COVID-19 pandemic recovery and as part of the post-2020 global biodiversity framework, there is a unique opportunity to further integrate the full range of linkages between biodiversity and health.

18. The Secretariat contributed to leading reference documents further investigating the link between biodiversity and zoonotic diseases, including:

(a) WHO/CBD *Questions and Answers on Biodiversity and Infectious Diseases*;

(b) The report of UNEP and the International Livestock Research Institute on *Preventing the Next Pandemic: Zoonotic Diseases and How to Break the Chain of Transmission*;

(c) The Joint Statement of the Collaborative Partnership for Sustainable Wildlife Management on *The COVID-19 Challenge: Zoonotic Disease and Wildlife*;

(d) The report on the Workshop on Biodiversity and Pandemics convened by IPBES.

The fifth edition of the *Global Biodiversity Outlook* also includes a section on "the Biodiversity-inclusive One Health transition" – one of eight areas of transition that may be needed to achieve living in harmony with nature by 2050. Other activities undertaken by the Secretariat in the light of the COVID-19 pandemic are summarized in CBD/SBSSTA-SBI-SS/2/2.[3]

19. Also of relevance in this regard is the recent establishment of the One Health High-Level Expert Council by WHO, OIE, FAO, and UNEP. Finally, the "Berlin principles on One Health" were released as an "update" of the Manhattan Principles on the occasion of the One Planet, One Health, One Future conference held in 2019.[4]

IV. SUGGESTED RECOMMENDATION

20. The Subsidiary Body on Scientific, Technical and Technological Advice may wish to recommend that the Conference of the Parties at its fifteenth meeting adopt a decision along the following lines:

The Conference of the Parties,

Recognizing that the health sector, on the one hand, depends on biodiversity and the ecosystem functions and services that biodiversity underpins, and that the loss of biodiversity can impact the health sector negatively, and that, on the other hand, the health sector has potential impacts on biodiversity which may threaten the provision of ecosystem functions and services that are vital to humanity,

Recalling decision XII/21, XIII/6 and 14/4 on biodiversity and health and decision XIII/3 on the mainstreaming and integration of biodiversity within and across sectors, and acknowledging the guidance on integrating biodiversity considerations into One Health approaches, among other holistic approaches,

Recognizing that the COVID-19 pandemic has further highlighted the importance of the relationship between people and nature and highlights the urgency of addressing the biodiversity crisis alongside the climate crisis, the need for transformative change as part of the "build back better" agenda, and the recognition of a biodiversity-inclusive One Health approach that would support preventing and reducing the risk of future zoonotic pandemics,

[3] The present document also contains links to a number of relevant reports including those mentioned in this paragraph.

[4] https://oneworldonehealth.wcs.org/About-Us/Mission/The-2019-Berlin-Principles-on-One-Health.aspx

Stressing that mainstreaming biodiversity in the health sector and leveraging biodiversity and health co-benefits is essential for halting the loss of biodiversity and for the achievement of the post-2020 global biodiversity framework and the goals and objectives of multilateral agreements and international processes, including the 2030 Agenda for Sustainable Development,[5]

Recognizing the long-standing collaboration between the Secretariat of the Convention on Biological Diversity and the World Health Organization, which contributes to a strengthened understanding of biodiversity-health linkages and to raising the importance of One Health approaches,

Taking note of the report on the Workshop on Biodiversity and Pandemics convened by the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services,[6]

1. *Welcomes* the strengthened collaboration on the One Health approach by the World Health Organization, the World Organization for Animal Health, the Food and Agriculture Organization of the United Nations, and the United Nations Environment Programme, including the recent establishment of the One Health High-level Expert Council;

2. *Invites* Parties, other Governments and relevant stakeholders to consider opportunities for "build back better" responses to COVID-19, including short-term stimulus measures and longer-term approaches to contribute to the conservation and sustainable use of biodiversity, and thereby contribute to reducing the risk of future pandemics, including through a biodiversity-inclusive One Health approach, making use, as appropriate, of the information provided in the fifth edition of the *Global Biodiversity Outlook* and the note prepared by the Executive Secretary for the special virtual sessions of the Subsidiary Body on Scientific, Technical and Technological Advice and the Subsidiary Body on Implementation on Biodiversity, One Health, and the response to COVID-19 and pandemics, convened in December 2020;[7]

3. *Endorses* the global action plan for biodiversity and health annexed to the present decision, and *encourages* Parties to implement this plan, including through the mainstreaming of biodiversity and health linkages into existing and future policies, plans and strategies, as appropriate, and the reinforcement of collaboration among ministries and agencies responsible for the sectors identified in the global action plan for biodiversity and health, with a view to enhancing implementation of the post-2020 global biodiversity framework and the 2030 Agenda for Sustainable Development;[5]

4. *Invites* the World Health Organization, relevant expert groups and multilateral initiatives:

(a) To support the implementation of the global action plan for biodiversity and health in cooperation with other relevant partners;

(b) To further support the development and implementation of measures, guidance and tools for promoting and supporting the mainstreaming of biodiversity and health linkages;

(c) To support reporting on health-related indicators for the monitoring of the implementation of the post-2020 global biodiversity framework and the global action plan for biodiversity and health;

5. *Requests* the Executive Secretary, subject to the availability of resources, and in collaboration with the World Health Organization and other partners:

(a) To facilitate, as appropriate, the implementation of the global action plan for biodiversity and health;

(b) To continue collaboration with the World Health Organization, the World Organisation for Animal Health, the Food and Agriculture Organization of the United Nations and the United Nations Environment Programme, including, as appropriate, the One Health High-level Expert Council, to promote a biodiversity-inclusive One Health approach;

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[5] See General Assembly resolution 70/1 of 25 September 2015.

[6] https://ipbes.net/sites/default/files/2020-12/IPBES%20Workshop%20on%20Biodiversity%20and%20Pandemics%20Report_0.pdf

[7] CBD/SBSSTA-SBI-SS/2/2)

(c) To report on progress to the Subsidiary Body on Scientific, Technical and Technological Advice prior to the sixteenth meeting of the Conference of the Parties.

Annex

DRAFT GLOBAL ACTION PLAN FOR BIODIVERSITY AND HEALTH

Leveraging biodiversity and health linkages to achieve a healthy living in harmony with nature

Contents

I. OVERVIEW

1. The global action plan for biodiversity and health, developed in line with decisions XII/21, XIII/6, and 14/4 of the Conference of the Parties to the Convention on Biological Diversity, is aimed at catalysing the mainstreaming of biodiversity and health linkages and accelerate efforts towards a biodiversity-inclusive One Health transition. Recognizing the complexity and wide range of interlinkages between biodiversity and health, the action plan defines action areas and activities framed under six elements in line with the specified strategic and supporting objectives: cross-sectoral mainstreaming, sector-specific mainstreaming, education and awareness raising, surveillance and monitoring, research, and capacity-building and funding. Parties and other Governments, at all levels, relevant organizations and initiatives, indigenous peoples and local communities, women, youth and elderly people, business and civil society organizations, as well as other stakeholders, are encouraged to implement this action plan and to monitor its implementation with reference to the proposed milestones embedded in this action plan as well as indicators stemming from the post-2020 global biodiversity framework. The implementation of this action plan is envisaged to contribute to support the implementation of the post-2020 global biodiversity framework and the achievement of the 2050 Biodiversity Vision of living in harmony with nature, responding to challenges for the health of people, animals, plants, other organisms and our shared environment in a holistic manner.

II. BACKGROUND

2. In decision 14/4, the Conference of the Parties of the Convention on Biological Diversity requested the Executive Secretary, subject to the availability of financial resources, and invited the World Health Organization, in collaboration, as appropriate, with other members of the Inter-agency Liaison Group on

Biodiversity and Health as well as other partners, to develop a draft global action plan to mainstream biodiversity and health linkages into national policies, strategies, programmes and accounts. The action plan has been developed in pursuance of this request and in line with other decisions of the Conference of the Parties of the Convention on Biological Diversity, in particular decisions XII/21, XIII/6, and 14/4.

3. In decision XII/21, the Conference of the Parties recognized the value of the One Health approach to address the cross-cutting issue of biodiversity and human health, as an integrated approach consistent with the ecosystem approach (decision V/6) that takes in consideration the complex relationships between humans, microorganisms, animals, plants, agriculture, wildlife and the environment. In decision XIII/6, the Conference of the Parties welcomed the *State of Knowledge Review on Connecting Global Priorities: Biodiversity and Human Health*[8] and requested a guidance to support the consideration of biodiversity and ecosystem management in the application of the "One Health" approach. A *guidance on integrating biodiversity considerations into One Health approaches*[9] was subsequently adopted in decision 14/4.

III. INTRODUCTION TO A GLOBAL ACTION PLAN FOR BIODIVERSITY AND HEALTH

4. As a fundamental element of sustainable development and as a human right, health has a central place in the 2030 Agenda for Sustainable Development, with Sustainable Development Goal 3 calling on all stakeholders to "ensure healthy lives and promote well-being for all at all ages". In addition to socioeconomic determinants of human health and well-being, the impact of environmental, climate, biodiversity loss, including ecosystem change and degradation, on health is increasingly recognized. Human health ultimately depends upon biodiversity and ecosystem services. Human rights and a healthy planet are mutually dependent. A safe, clean, healthy and sustainable environment is integral to the full enjoyment of a wide range of human rights, including the rights to life, health, food, water and sanitation. To realize our human rights, we must heal, protect and sustainably live on our planet.[10]

5. Biodiversity underpins nature's contributions to people (NCP) that are essential to human health and well-being. As defined by the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES),[11] NCP impact health through, among other things: (a) dietary health, (b) environmental exposure which includes the health risk associated with degradation of environmental quality, (c) exposure to communicable diseases, (d) hazard risk reduction relating to exposure to extreme weather, drought or fire, (e) psychological health as interaction with nature are known to improve mental health, and (f) use of natural compounds in medicinal products and biochemical compounds. Many of nature's contributions to people, including those conveying mental and physical benefits, are essential for human health and well-being. Biodiversity is also integral to key development sectors that modulate health outcomes directly or indirectly, such as pharmacy, biochemistry, biotechnology, agriculture, or tourism.

6. With biodiversity declining faster than at any time in human history, the deterioration in nature's contributions to people threatens a good quality of life.[12] The costs of inaction on biodiversity loss are high and are anticipated to increase.[13] Although the impact of environmental degradation and biodiversity loss on health outcomes is more direct on vulnerable population groups, it affects all people worldwide, as has become even more clear in the light of the COVID-19 pandemic.

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[8] WHO/CBD, Connecting global priorities: biodiversity and human health: a state of knowledge review, 2015, https://www.cbd.int/health/SOK-biodiversity-en.pdf

[9] CBD/SBSTTA/21/9.

[10] Report of the Special Rapporteur on the issue of human rights obligations relating to the enjoyment of a safe, clean, healthy and sustainable environment, Human rights depend on a healthy biosphere, A/75/161 and annex on good practices, 2020.

[11] IPBES, Global Assessment on Biodiversity and Ecosystem Services, Chapter 2.3. Status and Trends - Nature's Contributions to People (NCP), May 2019, https://www.ipbes.net/sites/default/files/ipbes_global_assessment_chapter_2_3_ncp_unedited_31may.pdf

[12] Ibid.

[13] Organisation for Economic Co-operation and Development (OECD), Biodiversity: Finance and the Economic and Business Case for Action, May 2019, https://www.oecd.org/environment/resources/biodiversity/G7-report-Biodiversity-Finance-and-the-Economic-and-Business-Case-for-Action.pdf

7. Emerging infectious diseases (e.g. Ebola virus disease, HIV/AIDS, Monkeypox, SARS, MERS, COVID-19) highlight the complex linkages among biodiversity, global environmental change and human health,[14] and the critical need for integrated, transdisciplinary approaches such as One Health among other holistic approaches to address the intricate linkages between the health of all people, animals, plants and other organisms, and our shared environment. As highlighted in the IPBES Workshop Report on Biodiversity and Pandemics, almost all pandemics, and the majority of emerging infectious diseases (EIDs), are caused by wildlife-origin pathogens, and pandemics risk is increasing rapidly, driven by exponentially increasing anthropogenic changes, with more than five new diseases emerging in people every year.[15] The COVID-19 pandemic also shed light on the importance of nature for people, as people sought increasingly the outdoors and nature during the pandemic in order to keep themselves mentally and physically healthy.

8. One Health, among other holistic approaches such as EcoHealth and Planetary Health,[16] recognizes that human health is intimately connected to the health of the planet, all living beings, ecosystems, our shared environment, and relevant systemic drivers. While there is no universal definition, One Health is defined by the World Health Organization (WHO) as "an approach to designing and implementing programmes, policies, legislation and research in which multiple sectors communicate and work together to achieve better public health outcomes" and by the United Nations Environment Programme (UNEP) as "a cross-cutting and systemic approach to health based on the fact that human health and animal health are interdependent and linked to the health of the ecosystems in which they co-exist". As biodiversity conservation, ecosystem dynamics, and socioeconomic drivers of human activities impacting biodiversity and ecosystems, have often received less attention in One Health approaches than human-animal interconnections, it is critical to further integrate the full range of biodiversity and health linkages and relevant systemic drivers through a transdisciplinary approach.

9. Over the last decade, the multiplicity and complexity of linkages between biodiversity and human health have been increasingly recognized, as reflected in the findings of the *State of Knowledge Review on Connecting Global Priorities: Biodiversity and Human Health.*[17] The action plan builds on resources and reports developed by the Secretariat of the Convention, WHO, the Inter-agency Liaison Group on biodiversity and health and other partners over the last years, including the Guidance on integrating biodiversity considerations into One Health approaches. The action plan supports a "biodiversity-inclusive One Health transition" identified in the fifth edition of the *Global Biodiversity Outlook*[18] as part of the eight areas of transition that may be needed to achieve living in harmony with nature by 2050 and takes the WHO *Global Strategy on Health, Environment and Climate Change*[19] into consideration. With regard to the agenda on mainstreaming biodiversity and health linkages, the action plan complements the long-term

[14] As highlighted in CBD/SBSTTA-SBI-SS/2/INF/1, with regard to links between biodiversity and infectious diseases, higher biodiversity may be expected to increase the *hazard* of emerging infectious diseases, because host diversity (for example of wild mammals) is correlated with the diversity of pathogens (organisms that cause disease). However, this relationship is not necessarily predictive of disease risk since some event is needed to convert a hazard into a risk of pathogen emergence. Such risk factors include encroachment into natural habitats and contact with wildlife. Also, paradoxically, greater host diversity may actually decrease risk of zoonotic pathogen spillover by reducing the prevalence of pathogens among a diversity of host species ("dilution effect" - though this is not always the case). Thus, efforts to minimize biodiversity loss can also reduce disease risk, mostly by reducing contact between humans and wildlife and limiting introduction of exotic species, even if these efforts maintain areas of high disease hazard through the diversity of pathogens.

[15] IPBES Workshop Report on Biodiversity and Pandemics, 27-31 July 2020, https://www.ipbes.net/pandemics

[16] EcoHealth and Planetary Health are presented as other holistic approaches to health in the *Guidance on integrating biodiversity considerations into One Health approaches,* CBD/SBSTTA/21/9. The Action plan builds on the value of the One Health approach, which has been recognized in the guidance and former decisions of the Conference of the Parties, while acknowledging other holistic approaches.

[17] WHO/CBD, Connecting global priorities: biodiversity and human health: a state of knowledge review, 2015, https://www.cbd.int/health/SOK-biodiversity-en.pdf

[18] *Global Biodiversity Outlook*, fifth edition, Secretariat of the Convention on Biological Diversity, 2020, https://www.cbd.int/gbo5

[19] WHO Global Strategy on Health, Environment and Climate Change, WHO, 2020, https://apps.who.int/iris/bitstream/handle/10665/331959/9789240000377-eng.pdf?ua=1

approach to mainstreaming biodiversity and its related action plan for the long-term approach to mainstreaming biodiversity,[20] noting that mainstreaming of biodiversity within and across sectors is crucial in the promotion of an integrated approach to health.

10. The action plan also takes into account the preparatory documents of the special virtual session of the Subsidiary Body on Scientific, Technical and Technological Advice and the Subsidiary Body on Implementation convened in December 2020 to discuss interlinkages between biodiversity and health, the One Health approach, and the response to COVID-19 and pandemics.[21] It also builds on the IPBES *Workshop Report on Biodiversity and Pandemics,*[22] the findings of the report by UNEP on *Preventing the next pandemic - Zoonotic diseases and how to break the chain of transmission*[23] and the publication entitled *The COVID-19 challenge: Zoonotic diseases and wildlife. Collaborative Partnership on Sustainable Wildlife Management's four guiding principles to reduce risk from zoonotic diseases*[24] developed by the Members of the Collaborative Partnership on Sustainable Wildlife Management (CPW) and the Food and Agriculture Organization of the United Nations (FAO). The Action plan also supports the 'Build Back Better' agenda, which includes economic recovery by protecting nature and thus protecting health, in line with the *WHO Manifesto for a Healthy Recovery from COVID-19*[25] with particular attention to the first prescription to *Protect and Preserve the Source of Human health: Nature*.

11. In the context of the COVID-19 pandemic and the "build back better" agenda, there is a growing momentum on environmental components of One Health, as illustrated by the joining of UNEP to the Tripartite consisting of WHO, the World Organisation for Animal Health (OIE) and FAO, as well as the creation of a One Health High Level Expert Council.[26] Given the evolving landscape and building on this momentum, the Secretariat of the Convention on Biological diversity will continue to facilitate awareness of biodiversity and health linkages and work closely with its partners, including WHO and through the Inter-agency Liaison Group on Biodiversity and Health, as well as UNEP, with a view to contributing to those ongoing initiatives and promoting a biodiversity-inclusive One Health approach, while seeking synergies and ensuring there is no duplication of work. By recognizing the value of One Health as part of the post-2020 biodiversity framework and through this action plan, the Parties to the Convention on Biological Diversity have an opportunity to reinforce the importance of the biodiversity components of One Health and accelerate the achievement of a biodiversity-inclusive One Health transition in the next decade.

12. Achieving a biodiversity-inclusive One Health transition that remains economically sustainable for populations in developing countries; fully supports human health, all living beings, ecosystems and relevant systemic drivers; and addresses the common drivers of biodiversity loss, habitats disruption, disease risk, and health impacts will enable a virtuous cycle. A One Health transition can play a critical and catalytic role in reducing the loss and degradation of biodiversity, restoring healthy ecosystems, enhancing the health, well-being and livelihood of all living beings, including humans, animals and plants, and preventing future pandemics.

IV. STRATEGIC OBJECTIVES AND RATIONALE OF THE ACTION PLAN

13. The *main and overall objective* of the action plan is to support Parties and other Governments, at all levels, relevant organizations and initiatives, indigenous peoples and local communities, women, youth

[20] CBD/SBI/3/13and CBD/SBI/3/13/Add.1.

[21] CBD/SBSSTA-SBI-SS/2/2 and CBD/SBSTTA-SBI-SS/2/INF/1.

[22] IPBES Workshop Report on Biodiversity and Pandemics, 27-31 July 2020, https://www.ipbes.net/pandemics

[23] UNEP, Preventing the next pandemic - Zoonotic diseases and how to break the chain of transmission, July 2020, https://www.unep.org/resources/report/preventing-future-zoonotic-disease-outbreaks-protecting-environment-animals-and

[24] FAO, The COVID-19 challenge: Zoonotic diseases and wildlife. Collaborative Partnership on Sustainable Wildlife Management's four guiding principles to reduce risk from zoonotic diseases, 2020, http://www.fao.org/3/cb1163en/CB1163EN.pdf

[25] WHO, WHO Manifesto for a healthy recovery from COVID-19, 2020, https://www.who.int/docs/default-source/climate-change/who-manifesto-for-a-healthy-and-green-post-covid-recovery.pdf?sfvrsn=f32ecfa7_8

[26] https://news.un.org/en/story/2021/02/1084982

and elderly people, business and civil society organizations, as well as other stakeholders, in (a) mainstreaming biodiversity and health linkages into policies, strategies, programmes and accounts at all levels, and (b) accelerating and upscaling efforts towards a One Health approach to the conservation of biodiversity and the promotion of health, in line with the *Guidance on integrating biodiversity considerations into One Health approaches*.[27]

14. The *rationale* of the action plan is to achieve health and well-being for all, in harmony with nature, and to respond to challenges that threaten the health of the planet and people animals, plants, other organisms, and our shared environment in a holistic manner by 2030 and within the post-2020 global biodiversity framework.

15. The action plan is articulated through the following strategic *operational objectives*:

(a) To mainstream[28] health, well-being and biodiversity linkages in cross-sectoral plans, in the development and implementation of health, biodiversity and environment-related policies and in the work and practices of relevant ministries or agencies, with a view to contributing to human health and biodiversity recovery and achieving co-benefits;

(b) To mainstream biodiversity and health linkages through sector-specific plans, including in the health sector, with a view to reducing the common drivers of biodiversity loss and health impacts and thus promoting the conservation and sustainable use of biodiversity alongside human well-being and animal welfare;

(c) To promote education, increase awareness and improve the understanding of biodiversity and health linkages, including among the general public and non-State actors, and leverage the role of indigenous peoples and local communities in holding traditional knowledge alongside scientific knowledge, with the aim of catalysing transformative and behavioural change at all levels.

16. The implementation of the aforementioned strategic *operational objectives* will enable and be reinforced by the following strategic *supporting objectives*:

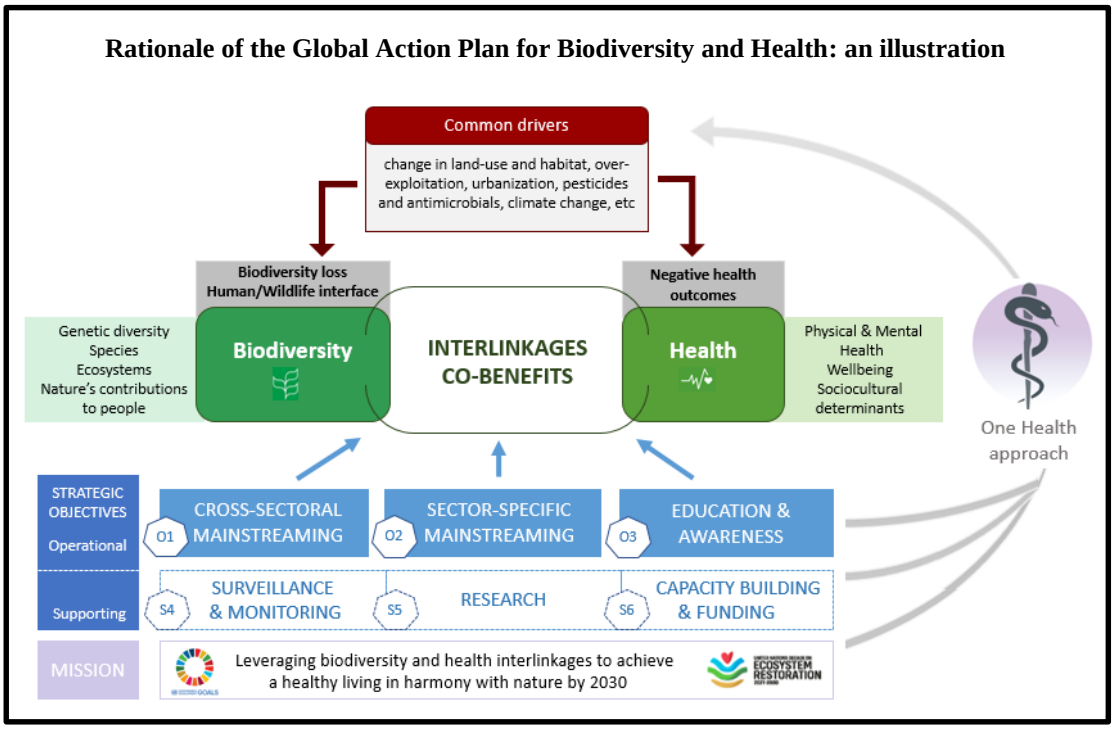
(a) To strengthen planning and surveillance, through information sharing and knowledge management, to address health threats, including the risk of pathogen spillover and pandemics, and prevent diseases, through a biodiversity-inclusive One health approach among other holistic approaches;

(b) To consolidate scientific research to further investigate the full range of linkages between biodiversity and health, particularly the complex trophic relations within ecosystems, the role of pathogens, vectors, hosts and predators, in line with a biodiversity-inclusive One Health approach among other holistic approaches;

(c) To support capacity-building and ensure allocation of predictable and sustainable funding to policies and programmes promoting biodiversity and health linkages and One Health approaches, with investments aiming to reverse unsustainable anthropogenic consumption and exploitation patterns and promote nature-based solutions.

[27] CBD/SBSTTA/21/9.

[28] Following the narrative of the long-term approach to biodiversity mainstreaming and its complementary action plan (CBD/SBI/3/13 and CBD/SBI/3/13/Add.1), and CBD's definition of mainstreaming (glossary).



V. PRINCIPLES OF THE ACTION PLAN

17. The action plan is based on six guiding principles adapted from the *Guidance on integrating biodiversity considerations into One Health approaches,*[29] as follows:

(a) *A rights-based approach*: A safe, clean, healthy and sustainable environment is integral to the full enjoyment of a wide range of human rights, including the rights to life, health, food, water and sanitation. The right to a healthy environment has a vital role to play in protecting ecosystems and biodiversity[30]. The WHO Constitution enshrines that the highest attainable standard of health is a fundamental right of every human being. The implementation of the action plan employs a rights-based approach empowering individuals and communities to actively participate in the development of solutions and activities;

(b) *A holistic consideration of the health of all people, as well as of animals, plants and other organisms*. The action plan encompasses the full range of sociocultural and environmental determinants of health, including food security, food safety and nutrition, water quantity and quality, clean air, infectious and non-communicable diseases status, social support networks and culture, in line with WHO's definition of health as "a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity". As highlighted by WHO,[31] clean air, stable climate, adequate water, sanitation and hygiene, safe use of chemicals, protection from radiation, healthy and safe workplaces, sound agricultural practices, health-supportive cities and built environments, and a preserved nature are all prerequisites for good health;

(c) *An application of the ecosystem approach* to promote conservation, recovery and sustainable use of biodiversity and ecosystem services in an equitable way, recognizing that people are an integral component of ecosystems. The ecosystem approach is based on the application of scientific

[29] CBD/SBSTTA/21/9.

[30] Report of the Special Rapporteur on the issue of human rights obligations relating to the enjoyment of a safe, clean, healthy and sustainable environment, Human rights depend on a healthy biosphere, A/75/161 and annex on good practices, 2020.

[31] https://www.who.int/health-topics/environmental-health#tab=tab_1

evidence on levels of biological integrity of the ecosystems which encompass the essential processes, functions and interactions among organisms and their environment;

(d) *An engagement that relies on participation and inclusiveness*, through an effective involvement of all stakeholders with participation of indigenous peoples and local communities, women, youth and elderly people. The integration of a gender perspective and an appropriate representation, particularly of women and girls who have a differentiated and fundamental role in the maintenance of family health, should be ensured, alongside a full and effective participation of indigenous peoples and local communities, recognizing the value of health-related traditional knowledge;

(e) *A cross-sectoral, multinational, and transdisciplinary collaboration*. Managing complex socio-ecological systems and addressing the drivers of biodiversity loss that have a clear link with health require a cross-sectoral, multinational, and transdisciplinary collaboration. The establishment of broad-based partnerships across sectors, the formation of relevant bodies within governments, the creation of networks along the research-to-delivery continuum in ways that support the sharing of information, data, samples, and experience, are essential for surveillance and policy action;

(f) *A flexible approach with due consideration of local contexts and specificities.* A flexible approach is needed to address the circumstances and needs of local communities, and ensure an effective implementation that supports good health and living in harmony with nature. While the action plan provides an overall framework and objectives to further mainstream biodiversity and health linkages, its strength will lie in the commitment from stakeholders at all levels. Although Parties will apply the action plan on a voluntary basis in a flexible manner according to their national conditions, a gender approach must be included as part of the considerations of local contexts and specificities.

VI. KEY ELEMENTS OF THE ACTION PLAN

18. For each of the action plan's objectives, specific action areas and activities are provided below. The suggested activities are primarily directed to the Parties and other Governments, to be undertaken as appropriate and on a voluntary basis. Parties and other Governments are invited to involve, as appropriate and at all levels of government, relevant organizations and initiatives, indigenous peoples and local communities, women, youth and elderly people, business and civil society organizations, as well as other stakeholders.

19. Within the mandate and objectives of the Convention of Biological Diversity, the Secretariat will work closely with its partners, including academia, biodiversity and health experts, international and United Nations organizations, regional bodies and organizations, existing and newly-established cross-sectoral initiatives, experts and inter-agency liaison groups, to support countries in implementing the action plan. The Secretariat will implement activities in line with the decisions from the Conference of the Parties, provide and disseminate policy guidance, necessary documentation and evidence, as appropriate, and will ensure that duplication with existing organizations and initiatives is avoided. The Secretariat will leverage opportunities for synergies and ensure activities related to biodiversity and health linkages are coherent and mutually supportive of activities undertaken by partners, multilateral organizations, and the different sectors they convene.

20. The action plan should be implemented mindful of the International Health Regulations and in a manner consistent with WHO's leading role including its function to stimulate and advance work to eradicate epidemic, endemic and other diseases.[32]

21. The strategic elements responding to the *operational and supporting* objectives and corresponding actions areas/activities are presented as follows.

[32] WHO Constitution, paragraph (g), https://www.who.int/governance/eb/who_constitution_en.pdf

ELEMENT 1: CROSS-SECTORAL MAINSTREAMING OF BIODIVERSITY AND HEALTH LINKAGES IN HEALTH, BIODIVERSITY AND ENVIRONMENT-RELATED POLICIES

Strategic objective

To protect human, animal, plant and environmental health by mainstreaming biodiversity and health linkages in the development and implementation of health, biodiversity and environment- related policies,[33] and in the work and practices of governments through a whole-of-government approach involving all relevant ministries, agencies, and institutions.

Rationale

Ensuring the conservation of biodiversity, making sure that its use is sustainable and without risk to health, and limiting the health risks from biodiversity loss, including ecosystem degradation and destruction, is imperative for the continued functioning of ecosystems at all scales and the delivery of ecosystem services that are essential for health and well-being. Mainstreaming biodiversity and health linkages in respective health, biodiversity and environment-related policies, including in the implementation of agricultural, forest, marine, and land-use policies, and promoting mutually reinforcing policy action enables greater co-benefits. There is a potential to better mainstream the full range of biodiversity and health linkages across policies, relevant platforms and responsible authorities, including relevant Ministries agencies, and institutions.

Action area 1.1. Protect human, animal, plant and environmental health by promoting biodiversity and health linkages in the work and practices of Ministries, agencies and institutions responsible for biodiversity and health dimensions

Activities

1.1.1. Based on the national context, define specific entry-points to help set out the mainstreaming of biodiversity and health linkages in relevant policies and practices of ministries, agencies and institutions, as appropriate;

1.1.2. Promote and facilitate dialogue between Ministries, agencies and relevant bodies responsible for biodiversity and those responsible for health and other relevant sectors, across all levels of government;

1.1.3. Ensure that agencies and stakeholders responsible for biodiversity conservation are included in cross-sectoral One health national coordination mechanisms, and work to ensure structural and policy improvements bring sectors together;

1.1.4. Ensure that civil society, indigenous peoples and local communities, women, youth and the elderly are effectively involved in national dialogues and coordination mechanisms related to biodiversity and health, recognizing their unique contribution and active role to the conservation and mainstreaming of biodiversity;

1.1.5. Promote the recognition of linkages between biodiversity and health in global instruments, platforms, fora and relevant international processes through interministerial collaboration and within the mandate and remit of each organization or convention, especially those with a focus on environmental and/or health issues.

[33] Following the narrative of the action plan for the long-term approach to biodiversity mainstreaming, CBD/SBI/3/13/Add.1, especially strategy area I - Mainstreaming biodiversity across government and its policies.

Action area 1.2. Protect human, animal, plant and environmental health by promoting biodiversity and health linkages in the development and implementation of health, biodiversity, environment, forest and other related policies

Activities

1.2.1. Consider relevant biodiversity and health linkages[34] in developing and updating national policies and programmes, strategies, plans, and accounts, including private health sector plans, national public health and environmental health policies, national biodiversity strategies and action plans (NBSAPs) and sustainable development and poverty eradication strategies;

1.2.2. Take into consideration biodiversity and health linkages in environmental impact assessments, risk assessments including for the use of living modified organisms (LMOs),[35] national ecosystem assessments, non-monetary valuation of ecosystem services, as well as in health impact assessments, and in the evaluation of trade-offs;

1.2.3. Mainstream biodiversity considerations and biodiversity-health linkages in health policies, recognizing the importance of ecosystems for human health and animal welfare, including for the development of medicines, biotechnology and nutritious food;

1.2.4. Increase nature-based solutions for health and access to green and blue spaces within built landscapes, to improve the health and quality of life, and promote the co-benefits for biodiversity and health arising from dietary patterns and healthy diets;

1.2.5. Identify any unintended and undesirable negative impacts of biodiversity conservation measures on health and of health interventions on biodiversity (e.g. risk of medicine residues in freshwater systems) and define specific entry-points to help evaluate, monitor and mitigate undesirable impacts.

Implementation milestones for monitoring purpose by 2030:

(a) Collaboration among Ministries, agencies and stakeholders responsible for biodiversity and health related issues is effective and implemented through dedicated coordination mechanisms or dialogue;

(b) One Health coordination mechanisms or initiatives include appropriate representation from Ministries, agencies and stakeholders committed to the sustainable use and conservation of biodiversity;

(c) Biodiversity and health linkages and One Health approaches are considered and included in national biodiversity strategies and action plans, in national environmental and health strategies and action plans.

ELEMENT 2: SECTOR-SPECIFIC MAINSTREAMING OF BIODIVERSITY AND HEALTH LINKAGES

Strategic objective

To mainstream biodiversity and health linkages within specific sectors, by leveraging common interests and co-benefits.[36]

Rationale

Biodiversity loss, ecosystem degradation and negative health outcomes share many common drivers, including deforestation and forest degradation and other changes in land-/sea-use and habitats

[34] Appendix 1 provides an overview of some of interlinkages between biodiversity and health, and opportunities for integration.

[35] In line with the Guidance on risk assessment of living modified organisms and monitoring in the context of risk assessment, UNEP/CBD/BS/COP-MOP/8/8/Add.1.

[36] Following the narrative of the action plan for the long-term approach to biodiversity mainstreaming, CBD/SBI/3/13/Add.1, especially strategy area II - Integrate nature and biodiversity into business models, operations and practices of key economic sectors, including the financial sector.

overexploitation (including overharvesting, overfishing), unsustainable food production practices, unsustainable consumption of natural resources including excessive consumption of wildlife, water management processes, unsustainable urbanization, inappropriate use of pesticides and antimicrobials, invasive alien species, pollution, climate change, as well as underlying factors such as trade, travel, migration, population growth, and social inequality, among others. Leveraging and mainstreaming biodiversity and health linkages within and across sectors, is essential to catalyse a One Health transition. In addition, the health sector[37] can contribute to mainstreaming biodiversity by recognizing nature's contribution to human mental and physical health, and promoting biodiversity resilient and environmentally sustainable practices.

Action area 2.1. Mainstream biodiversity and health linkages through specific sectoral policies

Activities

2.1.1. Among sectors prioritized for mainstreaming biodiversity - agriculture, forests, fisheries and aquaculture, tourism, energy and mining, infrastructure, manufacturing and processing, and health[38] - the following sectors have a particularly important role to play in mainstreaming biodiversity and health linkages, by leveraging specific entry-points:

2.1.2. Infrastructure

2.1.2.1. Leverage the important role of biodiversity in providing physiological and health benefits, in particular the beneficial role of native plants and vegetation, in urban planning and development;

2.1.2.2. Improve biodiversity friendly, rich green and blue spaces in urban areas to better contribute to the health benefits they provide, and promote urban farming, forest stands and single trees;

2.1.2.3. In water supply and sanitation policies and programmes, including the planning and design of water-related infrastructure, consider the role of terrestrial and inland water ecosystems as "green and blue spaces" in regulating the quantity, quality and supply of freshwater and flood regulation.

2.1.3. Food systems

2.1.3.1. Enable a sustainable transformation of food systems, by leveraging agroecology, biodiversity and associated biodiversity for food and agriculture[39] and the use of integrated pest management to reduce the need for chemical pesticides and herbicides;[40]

2.1.3.2. Promote the diversity and sustainable use of wild foods, local crops and livestock, fisheries, including from marine and inland water sources, while ensuring the implementation of adequate sanitary controls for the consumption of wild meat;

2.1.3.3. With consideration of local characteristics, promote the use of effective tools and technologies, to contribute to sustainable production, food security and reduce the use of inappropriate antibiotics, pesticides and other chemical inputs;[41]

2.1.3.4. Promote the recognition of traditional, national, and local food cultures and provide information on the nutritional value of diverse foods;

2.1.3.5. Limit telecoupling and promote policies that address increasing disparity, food security and access, food excess and waste, including through information sharing and public awareness activities.

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[37] Health has been identified as one of the areas for mainstreaming biodiversity within and across sectors, in line with decisions XIII/3 and 14/3.

[38] In line with decisions XIII/3 and 14/3.

[39] FAO, *The State of the World's biodiversity for food and agriculture*, 2019, http://www.fao.org/3/CA3129EN/ca3129en.pdf

[40] In line with WHO, Guidance on mainstreaming biodiversity for nutrition and health, 2020, https://www.who.int/publications/i/item/guidance-mainstreaming-biodiversity-for-nutrition-and-health

[41] Noting the relevance of the programme of work on agricultural biodiversity (decision V/5), and of the international initiative on pollinators (decision VIII/23 B).

Action area 2.2. Mainstream biodiversity and health linkages in ecosystem, wildlife and land/sea use management, as well as in the context of climate change and pollution

Activities

2.2.1. Land and sea use planning, and ecosystem management

2.2.1.1. Promote One Health approaches to the management of ecosystems, associated human settlements and livestock, and minimize unnecessary disturbance to natural ecosystems;

2.2.1.2. Promote measures to halt or reduce deforestation and degradation of terrestrial, freshwater, coastal and marine aquatic ecosystems, reduce overexploitation and encroachment into natural habitats;

2.2.1.3. Encourage land reform efforts and enforcement of regulations that avoid human encroachment, while ensuring access for indigenous and other local communities, and sustainable, inclusive land use;

2.2.1.4. Increase the conservation and protection of areas of importance for biodiversity and ecosystem services, including those provided by natural regulation and resistance to pathogens that local animal communities have developed through coevolution with these pathogens,[42] especially around or near intact ecosystems[43] and potential hotspots of disease emergence;

2.2.1.5. Consider human, plant and wildlife health when carrying out ecosystem restoration and mitigation activities, in particular in areas of habitat fragmentation and environmental degradation and within human settlements where there may be increased contact with wildlife.

2.2.2. Wildlife management

2.2.2.1. Ensure all exploitation, including harvesting, hunting, fishing, trading and using of wild species is regulated and ensure practices, including in communities that depend on such practices for their livelihood, are legal, sustainable and safe;

2.2.2.2. Enhance the sustainable management of wild meat at the source and improve the regulation of markets selling wild and domesticated animals through improved hygiene practices, while refraining from measures which would negatively affect local communities who depend on wildlife;[44]

2.2.2.3. Recognize wildlife health in the design, resourcing, and operations of national biodiversity and health programmes and the contribution of wildlife health to One health strategies;[45]

2.2.2.4. Promote the understanding of disease processes in wildlife populations and develop appropriate strategies to prevent, manage and control wildlife diseases;

2.2.2.5. Reduce pressures on wildlife including capture, transport, and contact with unfamiliar animals in farms and markets, and consequently reduce the risk of zoonotic disease outbreak;

2.2.2.6. Develop approaches for the prevention, control and management of invasive alien species to address biological invasions of pathogenic agents, to improve risk analysis and identify potential "sleeper" alien species that are likely to become more invasive as a result of climate change or other anthropogenic factors.

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[42] In the natural areas where pathogens are found among wild host populations, the long history of coevolution between these pathogens and their hosts may have brought some natural resistance to these pathogens on wild populations, which may be used to cure human populations from these pathogens, as reflected in Beans et al., Studying immunity to zoonotic diseases in the natural host — keeping it real, Nature reviews immunology, 2013, https://www.nature.com/articles/nri3551

[43] Hotspots for pathogen spillover are generally the environments just around or near intact ecosystems, the risk within these intact ecosystems themselves are less because of lower human activity, as reflected in Gibb R. et al, Zoonotic host diversity increases in human-dominated ecosystems, Nature, 2020, https://www.nature.com/articles/s41586-020-2562-8

[44] In line with OIE, WHO, UNEP Interim guidance, Reducing public health risks associated with the sale of live wild animals of mammalian species in traditional food markets, April 2021, https://www.oie.int/fileadmin/Home/MM/OIE-WHO-UNEP_Guidance_for_traditional_food_markets.pdf

[45] In line with OIE wildlife health framework "Protecting wildlife health to achieve One health", concept note, 2021, https://rr-asia.oie.int/wp-content/uploads/2021/01/wildlifehealth_conceptnote_final.pdf

2.2.3. Climate change

2.2.3.1. Prioritize nature-based resilient solutions and measures that jointly contribute to health and well-being, ensure the safety and security of vulnerable populations, and promote the conservation of biodiversity and vulnerable ecosystems;

2.2.3.2. Promote joint actions between climate change and biodiversity plans and strategies, considering that climate change mitigation and adaptation measures impact biodiversity and health (both positive and negative).

2.2.4. Pollution

2.2.4.1. Develop coherent multi-sectoral research and policies across sectors for preventing air, soil, water pollutions, as well as chemical pollutants including developmental neurotoxicants, endocrine disruptors, novel insecticides, chemical herbicides, heavy metals and pharmaceutical wastes;

2.2.4.2. Raise global awareness of the importance of pollution to mobilize the resources and re-enforce national and international regulations that are needed to effectively confront pollution to prevent harm to people, biodiversity and ecosystem services.[46]

Action area 2.3. Mainstream biodiversity in the health sector

Activities

2.3.1. Encourage health supply chains, health care facilities,[47] businesses and the pharmaceutical sector, including for veterinarian purposes, to actively transition towards sustainable technologies and practices;

2.3.2. Promote the sustainable use, management and trade of plants and animals used in traditional medicine, as well as the integration and sharing of knowledge and experiences, based on prior and informed consent, and the fair and equitable sharing of benefits between traditional medical practitioners and the broader medical community;

2.3.3. Identify medicinal products with negative impacts on biodiversity, both for human and for veterinary uses, in order to target risk management, and avoid the overuse of antimicrobial agents[48] in human medicine, veterinary practice, plant breeding and agricultural use;

2.3.4. Avoid the unsustainable use of threatened wild animals and plants for prescriptions for medicinal uses,[49] and wherever possible, use alternative, sustainable sources for medicinal use;

2.3.5. Promote environmental surveillance through routine assessment including antimicrobial resistance screening in some specific environments, to identify contamination hotspots and emissions;

2.3.6. Enhance the sustainability of all streams of waste in the health sector by conducting a life cycle impact assessment in regulatory approval and incentivizing the reduction of impact of products and disposal practices.

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[46] In line with the recommendations of the Lancet Commission on pollution and health, Vol. 391, Issue 10119, 2018, https://doi.org/10.1016/S0140-6736(17)32345-0

[47] In line with WHO Guidance for Climate Resilient and Environmentally Sustainable Health Care Facilities, WHO, 2020, https://www.who.int/publications/i/item/9789240012226

[48] In line with WHO Global action plan on antimicrobial resistance, WHO, 2015, https://apps.who.int/iris/bitstream/handle/10665/193736/9789241509763_eng.pdf?sequence=1, FAO-WHO, Codex of Practice to Minimize and Contain Antimicrobial Resistance, 2005 and Guidelines for Risk Analysis of Foodborne Antimicrobial Resistance, 2011, http://www.fao.org/fao-who-codexalimentarius/thematic-areas/antimicrobial-resistance/en/ and OIE Strategy on Antimicrobial resistance and the prudent use of antimicrobials, November 2016, https://www.oie.int/fileadmin/Home/eng/Media_Center/docs/pdf/PortailAMR/EN_OIE-AMRstrategy.pdf

[49] In line with the sustainable trade strategies established through other global instruments such as the Convention on International Trade in Endangered Species of Wild Fauna and Flora.

Action area 2.4. Mainstream biodiversity in economic stimulus measures that can also contribute to the enhancement of health[50]

Activities

2.4.1. Set biodiversity spending targets for COVID-19 stimulus measures and recovery plans in all economic sectors, including by maintaining or enhancing support for developing countries to safeguard their biodiversity;

2.4.2. Screen and monitor stimulus measures for their biodiversity impacts to ensure they are aligned with long-term policy goals for biodiversity and sustainability, and contribute to better health outcomes and/or the mainstreaming of biodiversity-health linkages;

2.4.3. Employ green public procurement (e.g. the use of certified timber and timber products) to support companies and producers that meet biodiversity criteria and fiscal policies to reward biodiversity positive outcomes;

2.4.4. Promote jobs and income support for biodiversity conservation, health, sustainable use and restoration to stimulate economic recovery as well as in research, including in the field of One Health;

2.4.5. Promote a resource-circular bioeconomy, based on the efficient and sustainable management of biodiversity and biomass to generate new products, processes and value-added services based on knowledge and innovation.

Implementation milestones for monitoring purpose by 2030:

(a) Biodiversity and health linkages are recognized in sector-specific policies, with a view to promoting better health outcomes alongside the sustainable use and conservation of biodiversity;

(b) The health sector follows biodiversity-inclusive sustainable practices and implements policies to limit potential adverse effect on biodiversity;

(c) Funding is allocated to biodiversity protection and restoration programmes and activities providing health benefits.

ELEMENT 3: EDUCATION AND AWARENESS ON HEALTH-BIODIVERSITY LINKAGES

Strategic objective

To improve awareness and understanding of biodiversity and health linkages to catalyse transformative and behavioural change at all levels, including through educational programmes.

Rationale

A common narrative and vision are needed to raise the issue of biodiversity and health linkages in the global agenda. While linkages between biodiversity and health are multiple and complex, clear messages which present the current policy approaches to health, biodiversity and the environment are needed for decision- and policymakers, as well as the general public. Communication messages to policymakers and the general public should also reflect on situations where goals of biodiversity conservation and health might be in contractions, with a view to providing guidance and recommendations on potential trade-offs and synergies. Aligning messages and developing advocacy tools will catalyse a transformative change at all levels.

Action area 3.1. Define key messages and advocacy tools on biodiversity and health interlinkages and co-benefits, and building on traditional knowledge

Activities

3.1.1. Promote and disseminate advocacy tools, best practices and examples of policies that maximize biodiversity and health co-benefits, building upon the key messages provided in appendix 3 and

[50] Further proposals for recovery measures are provided in appendix 2.

highlighting the unique contributions and experiences from indigenous peoples and local communities, women, youth and the elderly;

3.1.2. Demonstrate through case studies how conservation policies can result in multiple health benefits and improved resilience for ecosystems and our shared environment;

3.1.3. Leverage biodiversity and health linkages to instil behavioural change towards sustainable consumption, including in the context of the 'Build Back Better' agenda and the need for a healthy recovery from COVID-19;

3.1.4. Support campaigns and activities to engage stakeholders in the promotion of biodiversity and health linkages and One Health approaches, including through World Days,[51] multilateral fora and associated communication networks;

3.1.5. Communicate on health risks arising from the cost of inaction and continued ecosystem degradation and loss, including deforestation, and wildlife exploitation or trade.

Action area 3.2. Raise awareness among general public and non-State actors

Activities

3.2.1. Engage the education sector, especially at the primary and secondary levels, and empower citizen scientists to gain knowledge and invest in their own communities, with a view to internalizing biodiversity and health linkages and generating a multiplying impact;

3.2.2. Include educational programmes on One health and biodiversity-health linkages in national education curricula and national biodiversity strategies and action plans, and support citizen projects promoting biodiversity-health linkages;

3.2.3. Introduce biodiversity and health interlinkages into the curricula of healthcare and animal welfare professionals as part of life-long learning and skills development;

3.2.4. Encourage network-building activities, including through conferences, dissemination of information on biodiversity-health linkages through public databases, web portals, social media and information networks that facilitate access to all relevant stakeholders;

3.2.5. Promote global advocacy efforts for mainstreaming biodiversity and health linkages into the sustainable development agenda, the post-2020 global biodiversity framework, the United Nations Decade on Ecosystem Restoration, and all areas to which biodiversity and health linkages can contribute, building on existing messages developed in appendix 3;

3.2.6. Raise the awareness of the private sector and encourage non-State actors to contribute to broader initiatives led by partners including, such as the CBD Action Agenda "Reversing Biodiversity Loss and Promoting Positive Gains to 2030",[52] among other initiatives,[53] with a view to instilling a transformative change to catalyse a healthy living in harmony with nature.

Implementation milestones for monitoring purpose by 2030:

(a) Communication materials and tools promoting the understanding of biodiversity and health linkages are developed and adapted to the national context, building on key messages;

[51] Including World Wildlife Day (3 March), World Health Day (7 April), International Day of Biological Diversity (22 May), World Environment Day (5 June), World Environmental Health Day (26 September), World Mental Health Day (10 October) and World Antibiotic Awareness Week (18-24 November).

[52] An agenda for action, Reversing Biodiversity Loss and Promoting Positive Gains to 2030, https://www.cbd.int/action-agenda/

[53] Note for example the Call to Action on the Berlin Principles on One Health, https://oneworldonehealth.wcs.org/About-Us/Mission/The-2019-Berlin-Principles-on-One-Health.aspx, as well as other relevant frameworks and documents that deliver precise recommendations, listed in CBD/SBSTTA/24/INF/25.

(b) Key messages on biodiversity and health linkages are defined and incorporated in national biodiversity strategies and action plans, in health strategies and action plans;

(c) Education programmes on biodiversity and health linkages are incorporated in national biodiversity strategies and action plans, in health strategies and action plans;

(d) Non-state actors from various countries pledge to commitments on biodiversity and health under Action Agenda "Reversing Biodiversity Loss and Promoting Positive Gains to 2030".[54]

ELEMENT 4: SURVEILLANCE AND MONITORING TO ADDRESS HEALTH THREATS

Supporting objective

To strengthen planning, surveillance and mitigation efforts to address health threats, including the risk of vector-borne diseases, foodborne diseases, neglected tropical diseases, plant and animal diseases, zoonotic pathogen spillover, outbreaks, epidemics, and pandemics of zoonotic origin, through One Health approaches and the rapid international sharing of information, data, sample.

Rationale

Reinforcing planning and surveillance of biodiversity, including on wildlife habitats and zoonotic pathogen spillover risk is instrumental to better assess and address health threats and disease risks. Zoonotic disease and pandemics risk can be reduced, mostly by preserving wild species that work as reservoirs for viruses, by reducing contact between humans, their livestock, and wildlife, and also by limiting the introduction of invasive alien species.

Action area 4.1. Reinforce surveillance and monitoring systems through cross-sectoral collaboration, in line with One Health approaches

Activities

4.1.1. Strengthen cross-sectoral and trans-disciplinary surveillance of essential components of pandemics preparedness, including on emerging infectious pathogens and diseases, vector-borne diseases, neglected tropical diseases, transboundary animal diseases, zoonotic pathogen spillover risk, alien species, plants and habitats of wildlife;

4.1.2. Promote community-based surveillance, with particular attention to people who have contact with wildlife, livestock and farmed animals;

4.1.3. Monitor wildlife population resilience and maintain wildlife surveillance for high-risk pathogens, especially where there is a large diversity of viral strains in wildlife with significant potential for spillover to people;

4.1.4. Increase surveillance of wildlife disease events, emerging/resurging and exacerbating communicable and non-communicable disease threats, including water-borne, vector-borne, food-borne diseases and transboundary animal diseases;

4.1.5. Promote prompt and clear, timely, and publicly accessible information sharing and systematic collection, analysis, interpretation and dissemination of data on health;

4.1.6. Enable the timely sharing of pathogens, specimens, sequence information and relevant meta data which are essential for the rapid development of medical biotechnology, diagnostic assays, therapeutic interventions, vaccine development and prophylactic measures;[55]

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[54] https://www.cbd.int/action-agenda/

[55] In line with the Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization and the International Health Regulations, see WHO/CBD, Questions and Answers, Implementation of the Nagoya Protocol in the context of human and animal health, food safety: Access to pathogens and fair and equitable sharing of benefits, Living document, May 2018, https://www.who.int/influenza/pip/QA_NP_Public_Health.pdf?ua=1

4.1.7. Ensure the use of early warning systems for eventual invasions, by alien species, including through E-DNA analysis and monitoring, and warning systems such as the WAHIS and WAHIS-Wild developed by the World Organisation for Animal Health (OIE), the Global Outbreak Alert and Response Network-(GOARN) developed by the World Health Organization (WHO), and the implementation of International Health Regulations (IHR);

4.1.8. Foster effective and efficient collaboration among experts,[56] to provide cross-sectoral scientific guidance, contribute to disease surveillance programmes, assess and discuss potential trade-offs.[57]

Implementation milestones for monitoring purpose by 2030:

(a) Cross-sectoral and transdisciplinary efforts on surveillance and monitoring are strengthened, through effective collaboration, reporting or information sharing systems;

(b) Proportion of potential hotspots of disease emergence that are under strict protection regime;

(c) Disease alerts are detected and reported through surveillance systems, including the OIE-led "World Animal Health Information System" WAHIS and WAHIS–Wild and under the International Health Regulations (IHRs), as appropriate and in line with a "plan–do–check–act" (PDCA) cycle approach.

ELEMENT 5: RESEARCH ON BIODIVERSITY AND HEALTH LINKAGES

Supporting objective

To consolidate scientific research and knowledge management to further investigate the full range of linkages between biodiversity and health within the framework of One Health among other holistic approaches, including at the regional and local levels, and taking in consideration the expertise of indigenous peoples and local communities.

Rationale

Scientific research contributes to further explore and understanding the full range of biodiversity and health linkages within the framework of One Health among other holistic approaches. Scientific research plays an essential role in protecting health and conserving biodiversity alongside traditional knowledge - not only in understanding, measuring and assessing change, but also in providing innovative solutions to long standing challenges. Ongoing efforts to conduct environmental and health assessments, to strengthen national monitoring capacities and data collection, to develop interdisciplinary education, training and research programmes are instrumental to inform and support policy action.

Action area 5.1. Strengthen the understanding of the full range of biodiversity and health linkages and support access to scientific evidence, data and good practices, based on the identification of research gaps and needs

Activities

5.1.1. Invest in traditional knowledge systems, research and support universities, research institutes, collaborating centres and other leading research actors including indigenous people and local communities, to increase data, experience, and evidence;

5.1.2. Invest in early warning systems and matching infrastructure that can provide rapid, effective responses to emerging threats, including epidemiological and laboratory capacity, with appropriate data systems;

5.1.3. Invest in research efforts to capture the full breadth of the complex biodiversity and health linkages with the framework of One Health, and when relevant enable gender disaggregated data, including in below research areas:

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[56] Including biologists, microbiologists, ecologists, public health experts including epidemiologists and virologists, veterinarians, health practitioners, social scientists, indigenous peoples and local communities and relevant professionals across disciplines.

[57] McShane T.O et al, Hard choices: Making trade-offs between biodiversity conservation and human well-being, *Biological Conservation*, vol. 144, issue No. 3, p.966–972, 2011, https://doi.org/10.1016/j.biocon.2010.04.038.

5.1.3.1. The contribution of biodiversity rich green and blue spaces in promoting mental and physical health and the contribution of biodiversity for new medicine and food;

5.1.3.2. The linkages between the composition and diversity of the human microbiome, biodiversity in the environment, biodiversity benefits for mental health, and their implications for human settlements;

5.1.3.3. The relationships between hosts populations, pathogens and natural resistance to these pathogens, and coevolution in these systems,[58] biodiversity, ecosystem destruction and degradation;

5.1.3.4. The linkages between regulated and unregulated wildlife markets, trade, and farming, livestock and incidence in zoonotic diseases;

5.1.3.5. The interlinkages between health and sustainable, diverse and healthy diets, diversity of crops, livestock and seafood, soil biodiversity, and associated biodiversity, marine and inland water ecosystems, and the effects of agrochemicals on human health;

5.1.3.6. The significance for health of marine biodiversity and forests, including for food security and food safety, and the consequences of multiple stressors and overexploitation on marine ecosystems (e.g. pathogens, chemicals, plastics and microplastics, climate change and habitat degradation);

5.1.3.7. The linkages between migratory species and human health, including links between migratory behaviour and pathogen dynamics, and the impact of climate change and habitat changes;

5.1.3.8. The linkages between invasive alien species and human health, animal health, plant health and wildlife species, considering that alien species may act as vectors or hosts of pathogens and parasites;

5.1.3.9. The linkages between climate change, biodiversity and human health, including research into soil health and climate change impact on health;

5.1.3.10. Pollution-related research to understand the consequences of pollutions on the interlinkages between biodiversity and health, to control pollution and drive change in pollution policy.

5.1.4. Strengthen international, regional, national and subnational monitoring and surveillance capacities through active surveillance systems that facilitate systematic inputs and data exchange between public health, animal welfare, environment, wildlife and other sectors;

5.1.5. Establish data-sharing platforms between relevant agencies and institutions at the local, subnational and national levels, to establish surveillance mechanisms that gather and disseminate data and facilitate risk assessments to inform decision-making.

Action area 5.2. Promote cross-sectoral collaboration and foster the implementation of One Health approaches among other holistic approaches at local, national, regional and international levels

Activities

5.2.1. Strengthen collaboration among experts,[59] to build comprehensive scientific guidance for policy action and application of One Health approaches, including through innovative knowledge-sharing platforms, digital technologies, tools and data gathering and dissemination methods;

5.2.2. Promote and sustain existing national, regional and international networks and partnerships, joint work programmes, cross-sectoral collaboration on biodiversity and health linkages, to identify and manage health risks posed by ecosystem degradation and biodiversity loss, as well as pandemics risk;

5.2.3. Harness findings, reports and recommendations from global platforms, partnerships and initiatives, including experts and inter-agency liaison groups, which can inform risk analysis and emergence response protocols to improve the science-policy interface;

[58] Beans et al., Studying immunity to zoonotic diseases in the natural host — keeping it real, *Nature Reviews Immunology*, 2013, https://www.nature.com/articles/nri3551.

[59] Including biologists, microbiologists, ecologists, public health experts including epidemiologists and virologists, veterinarians, health practitioners, social scientists, indigenous peoples and local communities and other relevant professionals.

5.2.4. Promote community engagement and stewardship for disease risk reduction and sustainable use of natural resources and expand attention to socioeconomic and behavioural factors.

Implementation milestones for monitoring purpose by 2030:

(a) Funding is allocated to transdisciplinary research on the full range of linkages between biodiversity and health and One Health at the national level;

(b) Increase in number of transdisciplinary research publications and projects on biodiversity and health linkages;

(c) Countries are promoting One Health collaborations, by establishing collaborating centres and joint programmes, participating to international One Health collaborations, and providing funding to One Health project or schemes dedicated to the promotion of biodiversity and health.

ELEMENT 6: CAPACITY-BUILDING AND FUNDING

Supporting objective

To support capacity-building and ensuring allocation of predictable and sustainable funding to policies and programmes promoting biodiversity and health linkages and One Health approaches.

Rationale

Building capacities and mobilizing resources to implement biodiversity and health related policies is key to ensure action and long-lasting impact. Investing at the upstream, in prevention and early warning systems is a priority and less costly than emergency response once an epidemic has emerged.

Action area 6.1. Promote capacity-building at all levels, across disciplines and sectors

Activities

6.1.1. Strengthen the capacity of health, environment, agriculture and other relevant ministries, agencies and organizations to promote biodiversity and health linkages, and One Health approaches;

6.1.2. Drive cooperation and collaboration between sectors to align interventions, develop best management practices, building on existing expertise developed within governments, international and non-governmental organizations, indigenous peoples and local communities, and other stakeholders;

6.1.3. Promote mutual learning and collaborative activities, by leveraging peer-to-peer learning and building on current transdisciplinary training schemes;

6.1.4. Promote collaboration between traditional and scientific knowledge that contribute to enhance the understanding of biodiversity and health linkages and the promotion of One Health approaches, where it is sustainable and there is no risk to human or animal health and well-being;

6.1.5. Develop tools, technology transfer and digital technology to reinforce knowledge sharing, and develop partnerships and alliances that support multi-disciplinary and cross-sectoral approaches;

6.1.6. Enhance technical and scientific cooperation, including South-South cooperation, to strengthen the capacity of developing countries in adopting technologies and developing skills that are key to promoting biodiversity and health linkages.

Action area 6.2. Mobilize predictable and sustainable resources to enable implementation of biodiversity-health related policies

Activities

6.2.1. Develop an investment case-study to help quantifying the positive impact and return on investment from biodiversity-inclusive One Health policies which can be reflected in national accounting practices, provide cost-effectiveness evidence including on the impact of nature’s benefits to human mental and physical health, and identify funding needs with greater granularity;

6.2.2. Consistent with the resource mobilization component of the post-2020 global biodiversity framework,[60] set national targets for domestic resource mobilization, include budget lines for biodiversity and health as part of national biodiversity finance plans and prioritize finances on integrative and co-beneficial actions for other environmental issues, as appropriate;

6.2.3. Consistent with the resource mobilization component of the post-2020 global biodiversity framework,[61] identify gaps in financial sources to secure adequate resources from all sources for programmes and projects related to biodiversity and health linkages and/or One Health approaches;

6.2.4. Leverage direct and indirect biodiversity and health-related international finance as well as private sector investment;

6.2.5. Involve multilateral development banks and development finance institutions in considering or prioritizing investments in biodiversity and health, including in portfolios related to the special green/blue recovery plans;

6.2.6. Scale up investment by governments, public authorities, development banks and others in measures to reduce health threats, provide early warning systems, and invest in health systems as a foundation of societal cohesion and well-being.

Implementation milestones for monitoring purpose by 2030:

(a) Capacities of relevant Ministries, agencies and organizations are strengthened through specific programmes, tools and platforms, and enhanced collaboration mechanisms;

(b) Domestic finance enables the funding of programmes related to biodiversity-health linkages and/or One Health approaches;

(c) Official development assistance and financial assistance enable the funding of projects related to biodiversity-health linkages and/or One Health approaches in developing countries, in particular least developed countries.

VII. MONITORING THE ACTION PLAN PROGRESS

22. Monitoring progress and milestones will be instrumental to assess progress made towards the mainstreaming of biodiversity and health linkages, and to ensure that vulnerable populations most directly dependent on biodiversity are protected from health impacts associated with biodiversity loss and other risk factors, including climate change.

23. The *implementation milestones* suggested for each element in section VI will help to monitor progress towards achieving the strategic *operational or supporting objectives* of the action plan. Based on those proposed *implementation milestones*, it is suggested that countries set their own targets taking into consideration the local context, priority, baseline, and capacity.

24. In addition, the implementation of the action plan will be monitored against indicators from the draft post-2020 global biodiversity framework, with a view to supporting synergies and avoiding additional monitoring and reporting. Consequently, it is suggested to use selected indicators from the monitoring framework of the post-2020 global biodiversity framework which are relevant for the monitoring of the action plan, once the list of indicators for the post-2020 global biodiversity framework is finalized.

25. As the post-2020 global biodiversity framework is under elaboration, the below suggested indicators could also be used to inform the monitoring framework of the post-2020 global biodiversity framework:

(a) Implementation of International Health Regulations (WHO indicator on Zoonotic Events and the Human-animal Interface, IHR State Party Self-Assessment Annual Report);

[60] A draft strategy is provided in CBD/SBI/3/5.

[61] Ibid.

(b) Effective reporting under of World Animal Health Information System (WAHIS), a database system providing information on some zoonosis and emerging diseases affecting animals & Performance of Veterinary Services (PVS)[62] to assess veterinary services at the national level;

(c) Environmental burden of disease per year (WHO indicator, percentage).

[62] OIE tool for the evaluation of performance of veterinary services, 2019, https://www.oie.int/fileadmin/Home/eng/Support_to_OIE_Members/docs/pdf/2019_PVS_Tool_FINAL.pdf

GLOSSARY

Animal welfare: The physical and mental state of an animal in relation to the conditions in which it lives and dies. The guiding principles which inform the OIE's work on the welfare of terrestrial animals include the 'Five Freedoms' which describe society's expectations for the conditions animals should experience when under human control, namely: freedom from hunger, malnutrition and thirst; freedom from fear and distress; freedom from heat stress or physical discomfort; freedom from pain, injury and disease; and freedom to express normal patterns of behaviour (OIE).

Antimicrobial resistance: Antimicrobial resistance (AMR) threatens the effective prevention and treatment of an ever-increasing range of infections caused by bacteria, parasites, viruses and fungi. AMR occurs when bacteria, viruses, fungi and parasites change over time and no longer respond to medicines making infections harder to treat and increasing the risk of disease spread, severe illness and death. As a result, the medicines become ineffective and infections persist in the body, increasing the risk of spread to others (WHO).

Agricultural biodiversity or **Agrobiodiversity:** Agricultural biodiversity is the biological diversity that sustains key functions, structures and processes of agricultural ecosystems. It includes the variety and variability of animals, plants and micro-organisms, at the genetic, species and ecosystem levels (IPBES).

Determinants of health: Determinants of health include the social and economic environment, the physical environment, and the person's individual characteristics and behaviours. The context of people's lives determines their health, and so, blaming individuals for having poor health or crediting them for good health is inappropriate. Individuals are unlikely to be able to directly control many of the determinants of health (WHO).

Ecosystem services: The benefits people obtain from ecosystems. Ecosystem services can be categorized into supporting, regulating, provisioning and cultural services (Millennium Ecosystem Assessment).

Nature's contributions to people (NCP): 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 (IPBES).

Mainstreaming: Integrating or including actions related to conservation and sustainable use of biodiversity at every stage of the policy, plan, programme and project cycle, regardless whether international organizations, businesses or governments lead the process. In Article 6 (b), the Convention on biological diversity calls upon Parties to "integrate, as far as possible and as appropriate, the conservation and sustainable use of biological diversity into relevant sectoral or cross-sectoral plans, programmes and policies (CBD).

Telecoupling: Telecoupling refers to socioeconomic and environmental interactions over distances. It involves distant exchanges of information, energy and matter (e.g., people, goods, products, capital) at multiple spatial, temporal and organizational scales (IPBES).

Urban biodiversity: the variety and richness of living organisms (including genetic variation) and habitat diversity found in and on the edge of human settlements, which ranges from the rural fringe to the urban core and includes (i) remnants of natural landscapes (e.g. leftovers of primeval forests), (ii) traditional agricultural landscapes (e.g. meadows, areas of arable land), and (iii) urban–industrial landscapes (e.g. city centres, residential areas, industrial parks, railway areas, formal parks and gardens, brownfields). (*Cities and Biodiversity Outlook, Action and Policy*, https://www.cbd.int/doc/health/cbo-action-policy-en.pdf).

Well-being: A perspective on a good life that comprises access to basic resources, freedom and choice, health and physical well-being, good social relationships, security, peace of mind and spiritual experience. Well-being is achieved when individuals and communities can act meaningfully to pursue their goals and can enjoy a good quality of life. The concept of human well-being is used in many western societies and its

variants, together with living in harmony with nature, and living well in balance and harmony with Mother Earth. All these are different perspectives on a good quality of life (IPBES).

Zoonose/Zoonotic disease: A zoonosis is an infectious disease that has jumped from a non-human animal to humans. Zoonotic pathogens may be bacterial, viral or parasitic, or may involve unconventional agents and can spread to humans through direct contact or through food, water or the environment. They represent a major public health problem around the world due to our close relationship with animals in agriculture, as companions and in the natural environment. Zoonoses can also cause disruptions in the production and trade of animal products for food and other uses (WHO).

Appendix 1

INTERLINKAGES BETWEEN BIODIVERSITY AND HEALTH: AN OVERVIEW[63]

Biodiversity and Health Topic	Health Sector Opportunity
Physical, mental and cultural dimensions of health • Microbial Diversity • Physical and mental health • Animal Welfare • Access to nature, including urban blue and green spaces • Cultural/spiritual enrichment	Direct responsibility: • Integrate 'value of nature' into health policy *Indirect responsibility:* • Promote protection of values, species and ecosystems
Water • Water quantity • Water quality • Water supply	Direct responsibility: • Integrate ecosystem management considerations into health policy *Indirect responsibility:* • Promote protection of ecosystems that supply water and promote sustainable water use
Food systems • Species, varieties and breeds including domesticated and wild components • Diversity of diets (both diversity of species and diversity within species, i.e. genetic diversity) • Ecology of production systems • Total demand on resources • Sustainability of offtake, harvesting and trade of species used for food • Changing status of species used for food	Direct responsibility: • Recognize and promote dietary diversity, food cultures and their contribution to good nutrition • Recognize synergies between human health and sustainable use of biodiversity (e.g. moderate consumption of meat) *Indirect responsibility:* • Promote sustainable production harvesting and conservation of agrobiodiversity •Promote sustainable fishing and aquaculture
Diseases • Infectious diseases • Disease source and regulation services • Ecosystem integrity and diversity	Direct responsibility: • Integrate ecosystem management considerations into health policy *Indirect responsibility:* • Promote ecosystem integrity

[63] Adapted from Connecting global priorities: biodiversity and human health: a state of knowledge review, WHO/CBD, 2015, https://www.cbd.int/health/SOK-biodiversity-en.pdf, p.259

Medicines • Traditional medicines • Drug development (genetic resources and traditional knowledge) and pharmaceuticals • Chemical/pharmaceutical accumulation in ecosystems • Sustainability of offtake/harvesting and trade of medicinal species • Changing status of species used for medicine	Direct responsibility: • Recognize contribution of genetic resources and traditional knowledge to medicine *Indirect responsibility:* • Prevent unsustainable exploitation of biodiversity for medicinal use or research that endangers non-pathogenic species and ecosystems and protect traditional knowledge • Ensure benefit-sharing
Adaptation to climate change and disaster risks • Ecosystem resilience • Genetic resources (‘options’ for adaptation) • Shifting reliance to biodiversity with climate change “shocks”	*Indirect responsibility:* • Promote ecosystem resilience and conservation of genetic resources • Decrease vulnerability of people reliant on important food and medicinal species which are likely to be impacted by climate change • Strengthen current vector-borne diseases control efforts to minimize the negative effects of increasing temperatures and changes on weather patterns on the progress made against vector-borne diseases

Appendix 2

EXCERPTS OF CBD/SBSTTA-SBI-SS/2/2, PARAGRAPH 27: OPTIONS TO INTEGRATE BIODIVERSITY CONSIDERATIONS INTO COVID-19 STIMULUS AND RECOVERY MEASURES

1. There are many opportunities for responses to COVID-19, including both short term stimulus measures and longer-term approaches to "build back better" to contribute to sustainable development, and reduce the risk of future pandemics. Recent studies have identified a range of options to integrate biodiversity considerations into such stimulus and recovery measures.

2. These include the following:[64]

(a) *Maintain and strengthen regulations on land use, wildlife trade, and pollution, and ensure that they are effectively enforced*. While the loosening of environmental regulation with a view to speeding up economic recovery may seem politically convenient, over a longer term it would likely be counterproductive given the links between biodiversity loss and pandemic risk. Indeed, such links provide a powerful case for tightening of environmental regulation;

(b) *Ensure that COVID-19 economic recovery measures contribute to and do not compromise biodiversity.* There are a number of options that Governments may wish to consider to ensure that public financial support for stimulus and recovery measures is positive for biodiversity. These may include:

(i) Attaching environmental conditionality to bailouts of companies to drive sustainability improvements, particularly for bailouts in sectors with a large biodiversity footprint such as agriculture, energy and industry;

(ii) Screening (*ex ante*) and monitor (*ex post*) stimulus measures for their biodiversity impacts to ensure they are aligned with long-term policy goals for sustainability;

(iii) Setting biodiversity spending targets for COVID-19 stimulus measures and recovery plans. Some Parties have set targets for recovery measures to contribute to climate goals; similar targets could be envisaged for biodiversity goals;

(iv) Employing public procurement to support companies and producers that meet biodiversity criteria;

(v) Employing fiscal policies (e.g. ecological fiscal transfers) to reward biodiversity positive outcomes when financing subnational governments to balance their budgets;

(c) *Promote jobs and income support for biodiversity conservation, sustainable use and restoration to stimulate economic recovery.* Activities such as ecosystem restoration, reforestation, invasive alien species management and environmental monitoring and enforcement tend to be labour intensive and quick to implement, because worker-training requirements are relatively low and projects often have minimal planning and procurement requirements. Investing in biodiversity thus creates immediate job opportunities. Basic income and cash transfers could also be used to support conservation;

(d) *Maintain or enhance support for developing countries to safeguard their biodiversity*. Aid finance is needed both in the short term (especially in the light of reduced revenues from nature-based tourism) and in the longer term to scale up efforts to tackle deforestation and other biodiversity loss and illegal wildlife trade and poaching, and thereby reduce pandemic risk;

(e) *Improve incentives for biodiversity conservation:*

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[64] The following list draws in particular on OECD, *Biodiversity and the Economic Response to COVID-19: Ensuring a green and resilient recovery*, OECD Policy Briefs, 28 September 2020, http://www.oecd.org/coronavirus/policy-responses/biodiversity-and-the-economic-response-to-covid-19-ensuring-a-green-and-resilient-recovery-d98b5a09/ and McElwee et al, *Ensuring a Post-COVID Economic Agenda Tackles Global Biodiversity Loss, One Earth,* 2020, https://doi.org/10.1016/j.oneear.2020.09.011 and Global Goal for Nature Group, *COVID-19 Response and Recovery: Nature-Based Solutions for People, Planet and Prosperity*, 2020, https://www.wri.org/news/2020/10/statement-covid-19-response-and-recovery-nature-based-solutions-people-planet-prosperity.

(i) Reform subsidies harmful to biodiversity. Subsidies that are harmful to biodiversity could be redirected to activities that have larger socioeconomic benefits and positive impacts on biodiversity. The link between biodiversity and pandemic risks provides an additional rationale for such as shift;

(ii) Maintain or increase taxes on activities that harm biodiversity. Revenue from biodiversity-relevant taxes and other environment-relevant taxes could be re-directed towards green stimulus measures or used to reduce budget deficits;

(f) *Engage businesses and the finance sector for a biodiversity-positive recovery:*

(i) Require or encourage disclosure by companies of impacts and dependencies on biodiversity and to integrate biodiversity considerations across all areas of business, including risk management;

(ii) Require or encourage national central banks and all public development banks to reorient their strategies, investment patterns, activities and operating modalities to contribute to sustainable development including the conservation and sustainable development;

(g) *Leverage behavioural change towards sustainable consumption*. There may be an opportunity to leverage this moment to promote transformative change. For example, the pandemic has led many people to question what is truly ‘‘essential’’ and this may have shifted what is regarded as necessary and desirable for a dignified and good quality of life. Governments may also consider moving from indicators such as gross national income to more inclusive measures of progress;

Some of these approaches would need to be implemented in the short term to avoid negative impacts of all response measures (e.g. *(a), (b), (d)*) and to leverage biodiversity-positive outcomes from short-term stimulus measures (e.g. *(c)*). Others might be implemented over the medium to longer term (e.g. *(f), (g), (h)*). With a view to promoting a *just transition,* attention will be needed to ensure that measures contribute to reducing inequalities.

Appendix 3

KEY MESSAGES ON MAINSTREAMING BIODIVERSITY AND HEALTH LINKAGES[65]

Biodiversity and the health of all living beings are closely interlinked across a wide range of scales, from the planetary to that of individual human microbiome.

(a) Biodiversity is a key environmental determinant of human health, and the conservation and sustainable use of biodiversity can benefit human health by maintaining ecosystem services and options for the future;

(b) Ecosystems and biodiversity help regulate the planet's material and energy flows, and its responses to abrupt and gradual change. Ecosystems, including food production systems, depend on a great diversity of organisms to provide the necessary services for life, including food, clean air, the quantity and quality of fresh water, medicines, spiritual and cultural values, climate regulation, pest and disease regulation, and disaster risk reduction, each of which are fundamental for human health, both mental and physical;

(c) Human microbiome – the symbiotic microbial communities present in the gut, respiratory and urogenital tracts and on skin – help regulate human health at an individual level, contributing to nutrition, aiding immune system function and preventing infection;

(d) Biodiversity is an important source of genetic resources used for the development of many treatments, vaccines and a range of biotechnology products used in both modern and traditional medicines, as well as agriculture and industry;

(e) Nature and biodiversity contribute to the health of all living beings. Access to nature, forests, indigenous lands and protected areas in the natural environment, and to biodiversity rich green and blue spaces in urban areas, supports human mental and physical health and well-being.

Reducing land-use change, pollution, poor water quality, chemical/waste contamination and causes of ecosystem degradation is an effective way to address biodiversity loss, climate change, and generate positive health and well-being outcomes.

(a) Air pollution poses significant threats to biodiversity, contributes to the economic burden and to the rise in noncommunicable diseases including cardiovascular diseases and cancer, respiratory diseases and chronic obstructive pulmonary diseases;

(b) Direct effects of climate change on health may include stroke and dehydration associated with heatwaves, negative health consequences associated with reduced air quality and the spread of allergens. Effects are also mediated through the impacts on ecosystems and biodiversity. Such effects may include decreased food production and changes in the spread of climate sensitive waterborne and water related, food borne and vector borne diseases;

(c) Overharvesting, habitat alteration, and climate change are among major drivers of declines in commercially important wild plant resources used for food and medicinal purposes. These three drivers pose a threat both to the wild species and to the livelihoods of collectors, who often belong to the poorest social groups;

(d) Loss of genetic diversity, particularly in crop wild relatives, can lead to loss of food security and opportunities to develop more nutritious foods;

(e) There may be synergistic effects of climate change, land-use change, pollution, invasive species and other drivers of change which can amplify impacts on both biodiversity and health.

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[65] Adapted from *Connecting Global Priorities: Biodiversity and Human Health: A State of Knowledge Review*, https://www.cbd.int/health/SOK-biodiversity-en.pdf, CBD/SBSSTA-SBI-SS/2/2, CBD/SBSTTA-SBI-SS/2/INF/1.

One health, among other holistic approaches such as Ecohealth or Planetary health, provides an opportunity to integrate the full range of biodiversity-health linkages.

(a) We can improve our understanding of the complex linkages between biodiversity, ecosystem services, human and animal health and promote co-benefits through more integrated policies and mutually-reinforcing implementation activities, by strengthening collaboration with the health sector and mainstreaming biodiversity and health linkages into national strategies policies;

(b) A coordinated, cross-sectoral approaches as One Health helps to address the common drivers of biodiversity loss, climate change, negative health outcomes and increased pandemics risk;

(c) There are significant strategic opportunities to integrate the full range of biodiversity-health interlinkages in the application of One Health approaches in a more systematic, comprehensive and coordinated manner.

COVID-19 and recovery measures

(a) The COVID-19 pandemic has further highlighted the importance of the relationship between people and nature. While the relationship between biodiversity and infectious disease is complex, it is clear that the loss and degradation of biodiversity undermines the web of life and increases the risk of disease spillover from wildlife to people;

(b) Overall plans for post-COVID-19 recovery, and specifically plans to reduce the risk of future epidemics, need to go further upstream than early detection and control of disease outbreaks, by prioritizing prevention actions rather than reactions to emerging issues;

(c) Biodiversity and conservation efforts at all levels (genes, species, and ecosystems) increase resilience by mitigating the risks to severe disruptions caused by climate change and pathogen spillover that can lead to global pandemics;[66]

(d) Reducing systemic drivers and anthropogenic impacts in emerging disease hotspots could reduce pandemic risk, protect biodiversity and ecosystem services.[67] The COVID-19 pandemic highlighted the health risks arising from the cost of inaction and continued ecosystem degradation and loss;

(e) The risk of future pandemics could also be reduced through a more integrated, cross-sectoral and biodiversity-inclusive One Health approach that builds the health and resilience of people and ecosystems, in line with the 2030 Agenda for Sustainable Development;

(f) There are many opportunities for responses to COVID-19, including both short-term stimulus measures and longer-term approaches to 'build back better', contribute to sustainable development, and reduce the risk of future pandemics.

Key messages from the Workshop on Biodiversity and Pandemics of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services[68]

(a) Pandemics emerge from the microbial diversity found in nature;

(b) Human ecological disruption, and unsustainable consumption drive pandemic risk;

(c) Reducing anthropogenic global environmental change may reduce pandemic risk;

(d) Land-use change, agricultural expansion, and urbanization cause more than 30 per cent of emerging disease events;

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[66] Evans et al, Links Between Ecological Integrity, Emerging Infectious Diseases Originating from Wildlife, and Other Aspects of Human Health - An Overview of the Literature, 2020, https://oxfordinberlin.eu/files/wcslinksbetweenecologicalintegrityandeidsoriginatingfromwildlife1pdf

[67] IPBES Workshop Report on Biodiversity and Pandemics, held virtually on 27-31 July 2020, https://www.ipbes.net/pandemics

[68] IPBES Workshop Report on Biodiversity and Pandemics, Headlines from Executive Summary, 2020, https://ipbes.net/sites/default/files/2020-11/201104_IPBES_Workshop_on_Diversity_and_Pandemics_Executive_Summary_Digital_Version.pdf

(e) The trade and consumption of wildlife is a globally important risk for future pandemics;

(f) Current pandemic preparedness strategies aim to control diseases after they emerge. These strategies often rely on, and can affect, biodiversity;

(g) Escape from the Pandemic Era requires policy options that foster transformative change towards preventing pandemics:

(i) Enabling mechanisms;

(ii) Policies to reduce the role of land-use change in pandemic emergence;

(iii) Policies to reduce pandemic emergence related to the wildlife trade;

(iv) Closing critical knowledge gaps;

(v) Foster a role for all sectors of society to engage in reducing risk of pandemics.

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