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Item 4.1 of the provisional agenda*

BIODIVERSITY AND HUMAN HEALTH

Note by the Executive Secretary

INTRODUCTION

1. The Conference of the Parties, at its ninth, tenth and eleventh meetings, called for and welcomed the strengthening of cooperation with the World Health Organization (WHO) and other relevant organizations, on issues at the nexus of biodiversity and human health. At its twelfth meeting, the Conference of the Parties, in decision XII/21, welcomed progress in the preparation of the *State of Knowledge Review: Connecting Global Priorities: Biodiversity and Human Health* (para. 6), and requested the Executive Secretary to finalize the review. The Conference of the Parties also emphasized the relevance of the linkages between biodiversity and human health for the post-2015 United Nations development agenda and the sustainable development goals, and, in this context, invited Parties and other relevant stakeholders to consider the information in the *State of Knowledge Review* to identify opportunities for mutually supporting implementation of national biodiversity strategies and action plans and national strategies, plans and programmes for human health (para. 7). Further, the Conference of the Parties requested the Executive Secretary to prepare a report on the implications of the findings of the *State of Knowledge Review* and to report on this task to the Subsidiary Body on Scientific Technical and Technological Advice for its consideration prior to the thirteenth meeting of the Conference of the Parties (para. 9(a) and (h)).

2. The process for the development of the *State of Knowledge Review* has been described in previous documents made available to the Subsidiary Body on Scientific, Technical and Technological Advice (UNEP/CBD/SBSTTA/18/17) and to the Conference of the Parties (UNEP/CBD/COP/12/21).

3. A Summary of the *State of Knowledge Review*, with key messages, was launched jointly with the World Health Organization, at the 14th World Congress on Public Health held in Kolkata, India, on 13 February 2015. The final full report was released at a session dedicated to biodiversity and human health held in Brussels, Belgium, on 4 June 2015 during Green Week. The full report was also made available on that date on the websites of the Convention on Biological Diversity and the World Health Organization.¹

* UNEP/CBD/SBSTTA/19/1.

¹ Available from <http://www.cbd.int/health/stateofknowledge> and <http://www.who.int/globalchange/publications/biodiversity-human-health/en/>.

4. The summary of the *State of Knowledge Review* is reproduced as document UNEP/CBD/SBSTTA/19/6/Add.1. The present report, in section II, considers the implications of the *State of Knowledge Review*.

5. The Executive Secretary also contributed, as a member of the Science Panel, to *Safeguarding human health in the Anthropocene epoch: report of The Rockefeller Foundation–Lancet Commission on planetary health*, published in *The Lancet* and launched on 16 July 2015.²

6. Drawing upon the *State of Knowledge Review*, as well as the aforementioned report on planetary health and relevant reports of the World Health Organization, the United Nations Environment Programme, in collaboration with the World Health Organization and the Secretariat of the Convention on Biological Diversity, is preparing a global thematic report *Healthy Environment - Healthy People* which will be presented to the second meeting of the United Nations Environment Assembly in May 2016.

7. The Conference of the Parties, in decision XII/21, also requested the Executive Secretary to report to the Subsidiary Body on two additional tasks: (a) building upon the findings of the *State of Knowledge Review*, to prepare a synthesis of available information on the interlinkages between biodiversity and emerging infectious diseases such as the Ebola virus (para. 9(f)); and (b) to promote further research on the relationship between biodiversity and disease outbreak (para. 9(g)). These tasks will be pursued in collaboration with partners once the necessary resources become available.

8. Further to paragraph 9(d) of decision XII/21, the Secretariat of the Convention and the World Health Organization have signed a memorandum of understanding.³ The memorandum envisages the joint establishment of a liaison group which will further strengthen collaboration on the interlinkages between biodiversity and health with other relevant organizations as requested in paragraph 9(e) of the decision. However, no additional capacity-building workshops have been organized, as also requested in paragraph 9(d), due to lack of necessary resources.

II. IMPLICATIONS OF KEY FINDINGS OF THE STATE OF KNOWLEDGE REVIEW, CONNECTING GLOBAL PRIORITIES: BIODIVERSITY AND HUMAN HEALTH

The State of Knowledge Review

9. The *State of Knowledge Review* was prepared by the Secretariat and the World Health Organization in collaboration with a multidisciplinary group of over 100 experts drawn from the health, biodiversity and related sectors and disciplines. Other key partners include Bioversity International, COHAB Initiative, DIVERSITAS, EcoHealth Alliance, Fundação Oswaldo Cruz (FIOCRUZ), Platform for Agrobiodiversity Research, United Nations University-Institute for Advanced Studies, and Wildlife Conservation Society, Health & Ecosystems: Analysis of Linkages (HEAL), among others. The *State of Knowledge Review* was also informed by the outcomes of two regional workshops on the interlinkages between biodiversity and human health: for Latin America and the Caribbean region, Manaus, Brazil, in September 2012; and for the African region, in Maputo, Mozambique, in April 2013.⁴

10. The *State of Knowledge Review* is aimed at policy-makers, practitioners and researchers working in the fields of biodiversity conservation, public health, development, agriculture and other relevant

² Available at: <http://press.thelancet.com/PHCommission.pdf>.

³ Available at : <https://www.cbd.int/doc/agreements/agmt-who-2015-07-23-mou-en-web-en.pdf>.

⁴ Reports and further information on the workshops held in Manaus, Brazil and Maputo, Mozambique are respectively available at: <https://www.cbd.int/health/workshop/americas> and <https://www.cbd.int/health/workshop/africa>. A peer-reviewed article drawing on the experiences of the CBD and WHO-led regional capacity-building workshops on biodiversity and human health, entitled “From Manaus to Maputo: toward a public health and biodiversity framework” prepared by the Secretariat, the WHO and the Pan American health Organization in the journal *EcoHealth* in September 2014. The full article is available at: <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC4111881/>.

sectors. It comprises three main parts: Part I introduces the concepts of biodiversity and health, social and environmental determinants of health, biodiversity and ecosystem services; and provides a broad overview of the different ways in which biodiversity and health are linked. It also considers common drivers of change that impact both global public health and biodiversity, and calls for the systematic use of integrative approaches, such as One Health, Ecohealth, and the ecosystem approach, which attempt to unite different but complementary fields. Part II provides a comprehensive review of scientific evidence at the biodiversity-health nexus. Part III examines key cross-cutting themes at the intersection of biodiversity and health. The final chapter examines complementary tools and identifies additional elements to support coherent policy development on biodiversity and health, and to support the implementation of the Strategic Plan for Biodiversity 2011-2020, the Sustainable Development Goals and the post-2015 development agenda.

11. The *State of Knowledge Review* examines health-biodiversity linkages in the context of the broad definition of health adopted by the World Health Organization: “a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity.”⁵

12. The review notes that biodiversity and human health are interlinked in various ways:

(a) Firstly, biodiversity gives rise to health benefits. For example, a variety of species and genotypes provide nutrients and medicines. Biodiversity also underpins ecosystem functioning, which provides services such as water and air purification, pest and disease control, and pollination. However, it can also be a source of pathogens, leading to negative health outcomes;

(b) Secondly, drivers of change affect both biodiversity and health in parallel. For example, air and water pollution can lead to biodiversity loss and have direct impacts on health;

(c) A third type of interaction arises from the impacts of health sector interventions on biodiversity and of biodiversity-related interventions on human health. For example, the use of pharmaceuticals may lead to the release of active ingredients in the environment and damage species and ecosystems, which in turn may have negative knock-on effects on human health. Protected areas or hunting bans could deny access of local communities to bushmeat and other wild sources of food and medicines with negative impacts on health. Positive interactions of this type are also possible; for example, the establishment of protected areas may protect water supplies with positive health benefits.

13. The *State of Knowledge review* analyses the importance of these linkages in a number of areas of relevance to public health. Key messages are provided for the following areas in the summary which should be consulted for further information (UNEP/CBD/SBSTTA/19/6/Add.1):

- (a) Water and air quality;
- (b) Food production and nutrition;
- (c) Microbial diversity and non-communicable diseases;
- (d) Infectious diseases;
- (e) The development of pharmaceuticals;
- (f) Traditional medicine;
- (g) Mental, physical and cultural well-being;
- (h) Impacts of pharmaceutical products on biodiversity, and consequences for health;
- (i) Climate change and disaster risk- reduction.

⁵ Preamble to the Constitution of the World Health Organization as adopted by the International Health Conference, New York, 19-22 June, 1946; signed on 22 July 1946 by the representatives of 61 States (Official Records of the World Health Organization, no. 2, p. 100) and entered into force on 7 April 1948.

Implications of the State of Knowledge Review: opportunities for synergies

14. There are numerous implications of the review for work under the Convention, and for the implementation of the Strategic Plan and the achievement of the Aichi Biodiversity Targets.

15. Recognition of the contributions of biodiversity and related ecosystem services to human health strengthens the rationale for the conservation and sustainable use of biodiversity, and therefore supports the achievement of the Aichi Biodiversity Targets (see also para. 30, below). Information on these linkages should be reflected in communication and public awareness activities under the Convention.

16. Similarly, the identification of drivers of change that are common to biodiversity loss and human health suggests that the biodiversity and health communities could join forces in addressing these drivers. For example, land-use change and ecosystem degradation are the leading drivers of both biodiversity loss and infectious disease emergence. Approximately two thirds of known human infectious diseases are shared with animals, and the majority of recently emerging diseases are associated with wildlife. Ecosystem disturbance and degradation causes loss of biodiversity and is often associated with increased incidence of infectious diseases. Areas of high biodiversity may have large numbers of pathogens, yet biodiversity may serve as a protective factor for preventing transmission, and maintaining ecosystems may help to reduce exposure to infectious agents. While the absolute number of pathogens may be high in areas of high biodiversity, disease transmission to humans is mostly determined by contact and, in some cases, biodiversity may serve to protect against pathogen exposure through host species competition and other regulating functions. Even where causes of these linkages are not always clear, taking action to address ecosystem disturbance and degradation can benefit both health and biodiversity.

17. Other areas where consideration of biodiversity-health interlinkages can help in addressing common drivers of change include:

(a) Air and water pollution affect both human health and biodiversity (for example, through the bioaccumulation of toxins in the food chain, and the effects of eutrophication and algal blooms, as well as their contribution to respiratory diseases). Thus implementing measures to reduce pollution can benefit both;

(b) Climate change and ocean acidification have considerable impacts on biodiversity and human health. It can lead to shifts in species and pathogen range, contribute to the frequency, intensity and impacts associated with extreme weather disasters, and pose threats to agriculture, food and nutrition security;

(c) Prevailing consumption and production patterns are among the underlying causes of biodiversity loss and also compound the global health burden of non-communicable diseases. There are opportunities, for example, to promote dietary choices that are both nutritious, decreasing the incidence of many diseases, and also have a lower environmental footprint.

18. There are also cases in which trade-offs between health and biodiversity agendas could arise. For example, the need to conserve areas containing species vulnerable to extinction through the establishment of conservation areas, could conflict with the needs of local populations to avail themselves of the resources, such as bushmeat or medicinal wild plants that may be critical to the health and nutrition of those who rely upon them. The establishment of conservation areas that restrict access by Indigenous Peoples and local communities to such resources may be counter to the health and well-being of these populations. On the other hand, the unregulated use and trade of these species may result in the depletion of the resources on which people depend. At the same time, increased contact with wildlife and its unsafe handling, consumption and trade can also contribute to disease emergence. Consultation, sharing of knowledge and co-management can help to align objectives and priorities, and allow for the identification of more integrated solutions to reconcile competing biodiversity and health objectives.

19. Considering the full breadth of biodiversity-health linkages could also contribute to the development of innovative solutions that maximize co-benefits. For example, making better use of biodiversity in agricultural systems (including crop diversity and natural enemies of pests) could reduce the need for potentially harmful pesticides. This would not only lower the risk to human health but also help support soil health, curtail pollinator declines (with consequent nutritional benefits), and support biodiversity in general.

20. An emerging but rapidly growing body of research suggests that more attention should be given to the role in human health of microorganisms – the least visible yet the most ubiquitous form of biodiversity on Earth. The interactions of microbes within their complex ecological communities have significant implications for human health that influence both our physiology and susceptibility to disease. The human microbiome (commensal microbial ecosystems present in our gut, respiratory and urinary tracts and on our skin) are in constant dialogue with environmental microbial ecosystems and can contribute to, or modulate, disease risk, in particular non-communicable diseases which have become the leading cause of death worldwide. Some non-communicable diseases (NCDs), including autoimmune diseases, type 1 diabetes, multiple sclerosis, allergic disorders, eczema, asthma, inflammatory bowel diseases and Crohn's disease may be linked to depleted microbial diversity in the human microbiome. Recent research demonstrates that reduced contact of people with the natural environment and biodiversity, and biodiversity loss in the wider environment, may lead to reduced diversity in the human microbiota, which itself can lead to immune dysfunction and NCDs. Antibiotic and antimicrobial use can also alter the composition and function of the human microbiome, and limiting their unnecessary use would provide biodiversity and health benefits. Similarly, beneficial mental health impacts have been associated with greater exposure to microbial diversity. The innovative design of cities and dwellings may increase exposure to the microbial biodiversity that our physiological systems have evolved to expect. This provides a strong medical rationale for increased provision of biodiversity and green spaces in modern cities.

21. Achieving co-benefits such as those outlined in previous paragraphs will require increased communication and coordination among biodiversity and health sectors. It will also be necessary to improve communication and coordination with other sectors such as agriculture, urban development, planning, energy, and finance, as well as to identify and reduce perverse economic incentives.

22. The systematic adoption of risk analysis, vulnerability assessments and integrated impact and strategic assessments that fully integrate biodiversity and human health impacts, including cumulative impacts, are fundamental to the identification of measures, policies, plans and programmes to proactively manage non-communicable and infectious disease risks associated with biodiversity change, wildlife trade and other drivers of disease emergence and ill health, including the socioeconomic and behavioural factors that contribute to these threats. At the same time, the development of common metrics and indicators in the health and biodiversity sectors, coupled with economic valuation tools, will also be needed to support the evaluation of measures and the monitoring of impacts on biodiversity and human health.

23. Supporting policy-relevant scientific information across sectors is equally critical to the identification of coherent and integrated public health and conservation policies, plans and measures, and integrative approaches, such as “One Health”, can make significant contributions to this objective. However, scientific knowledge on biodiversity and human health must also be informed by other disciplines, including the social sciences, and other forms of knowledge, including traditional knowledge. These measures coupled with broad-scale public awareness and capacity-building at the local, subnational and national levels will be instrumental to understanding, disseminating and internalizing the health benefits associated with biodiversity and necessary to the broad-scale behavioural changes required to maximize these benefits.

Implications of the State of Knowledge Review: the context of the post-2015 development agenda

24. Consideration of health-biodiversity linkages can contribute to the mainstreaming of biodiversity in the post-2015 development agenda (in line with decision XI/22). The Sustainable Development Goals and related targets comprise an “integrated and indivisible” set.⁶ Successful implementation of each of Goals and related targets is predicated on the ability of Governments to address dimensions of sustainable development as a whole, including its social, economic and environmental determinants. A universal approach must therefore consider the potential synergies and trade-offs among complementary goals and targets. Thus, consideration of health-biodiversity linkages will be central to a coherent and successful implementation of the agenda and achievement of the Sustainable Development Goals.

25. Consideration of health-biodiversity linkages is of obvious relevance to Goal 3 (Ensure healthy lives and promote well-being for all at all ages) and Goals 14 (Conserve and sustainably use the oceans, seas and marine resources for sustainable development) and 15 (Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss).

26. The relevance of health-biodiversity linkages extends beyond these Goals to several others. For example, conservation strategies to maintain robust populations of terrestrial and marine species are not only a critical biodiversity conservation priority, but would also pay significant public health dividends through continued access to resources used for food, medicines, biomedical discovery and to support livelihoods, and by providing opportunities to alleviate the burden of NCDs. Addressing health-biodiversity linkages will also be critical to the achievement of others goals and targets. For example:

(a) Goal 1 (End poverty in all its forms everywhere): Important elements of this goal are access to natural resources and increasing resilience. Biodiversity and ecosystem services are essential parts of both;⁷

(b) Goal 2 (End hunger, achieve food security and improved nutrition and promote sustainable agriculture): Food and nutritional security is a cornerstone of sustainable development, and health-biodiversity linkages are particularly germane to achieving this goal, as exemplified by targets 2.2, 2.4 and 2.5. Increasing genetic diversity of crops and developing more diverse agroecosystems not only contribute to human nutrition but make ecosystems more resilient to the impacts of climate change;⁸

(c) Goal 6 (water and sanitation): Water ecosystems play a fundamental role in the regulation and provision of water quality. The disruption of freshwater ecosystems, combined with biodiversity loss,

⁶ Draft outcome document of the United Nations summit for the adoption of the post-2015 development agenda. A/69/L.85.

⁷ See, in particular, Target 1.4: “By 2030, ensure that all men and women, in particular the poor and the vulnerable, have equal rights to economic resources, as well as access to basic services, [...]” and Target 1.5: “Target 1.5: “By 2030, build the resilience of the poor and those in vulnerable situations and reduce their exposure and vulnerability to climate-related extreme events and other economic, social and environmental shocks and disasters”.

⁸ See, in particular, Target 2.2: “By 2030, end all forms of malnutrition, [...]”; Target 2.3: “By 2030, double the agricultural productivity and incomes of small-scale food producers, in particular women, indigenous peoples, family farmers, pastoralists and fishers, [...]”; and Target 2.4 “By 2030, ensure sustainable food production systems and implement resilient agricultural practices that increase productivity and production, that help maintain ecosystems, that strengthen capacity for adaptation to climate change, extreme weather, drought, flooding and other disasters and that progressively improve land and soil quality.” and Target 2.5: “By 2020, maintain the genetic diversity of seeds, cultivated plants and farmed and domesticated animals and their related wild species, including through soundly managed and diversified seed and plant banks at the national, regional and international levels, and promote access to and fair and equitable sharing of benefits arising from the utilization of genetic resources and associated traditional knowledge, as internationally agreed.”

and invasive species, also contribute to the burden of waterborne, water-related and other infectious diseases;⁹

(d) Goal 11 (cities): Exposure to nature and green spaces in urban environments, contributes to this goal;¹⁰

(e) Goal 13 (climate): Ecosystem-based mitigation and adaptation provide critical opportunities to achieve this goal, most notably target 13.1.¹¹

Implications of the State of Knowledge Review: relevance of existing tools and guidance under the Convention

27. The objective of sustaining a healthy planet to deliver life-sustaining benefits essential for all people, and in particular poor in vulnerable populations, is embedded in both the vision and mission of the Strategic Plan for Biodiversity 2011-2020 (decision X/2). Knowledge and understanding of the intricate connections between human health and biodiversity provides compelling arguments for the implementation of the Aichi Biodiversity Targets.

28. Of particular relevance in this context is Aichi Biodiversity Target 14, which addresses ecosystems and ecosystem services that contribute to human health, livelihoods and well-being, with explicit focus on the needs of women, indigenous peoples and local communities and the poor and vulnerable – groups that tend to be particularly and directly dependent on natural resources. According to the analysis in the fourth edition of the *Global Biodiversity Outlook*, this is one of the targets where least progress has been made to date. Consideration of health-biodiversity linkages is fundamental to achieving the biodiversity objectives set out in this target, and also provides compelling reasons for the health sector to seek integrated and coordinated action to maintain the ecosystem services that sustain life, health and well-being, particularly among resource dependent communities.

29. As noted above (paras. 16 & 17), consideration of health-biodiversity linkages can be helpful in addressing common drivers of biodiversity loss and ill health. Doing so will promote the Aichi Targets of Goal B of Strategic Plan. For example:

(a) Target 5: Reducing land-use change and ecosystem degradation can contribute not only to biodiversity conservation but also to reducing the risk of infectious diseases, and protecting ecosystems that provide vital services;

(b) Target 8: Reduced pollution contributes not only to biodiversity conservation but also to health through improved air and water quality and reduced exposure to chemicals.

30. Consideration of health-biodiversity linkages can also help to support achievement of other Aichi Biodiversity Targets. For example:

(a) Target 1: The health benefits of biodiversity provide compelling arguments for the conservation and sustainable use of biodiversity, and for this to be advocated by the health sector. These arguments should be included in activities under Target 1 to promote the awareness of values of biodiversity;

(b) Target 11: Protected areas can safeguard key ecosystem services and are repositories of genetic diversity essential to traditional medicine and biomedical discovery. It also contributes to mental health and physical activity and to the broader dimensions of health and well-being, including health of

⁹ See, in particular, Target 6.5 “By 2030, implement integrated water resources management at all levels, including through transboundary cooperation as appropriate” and Target 6.6: “By 2020, protect and restore water-related ecosystems, including mountains, forests, wetlands, rivers, aquifers and lakes”.

¹⁰ See, in particular, Target 11.7: “By 2030, provide universal access to safe, inclusive and accessible, green and public spaces, in particular for women and children, older persons and persons with disabilities”.

¹¹ Target 13.1: “Strengthen resilience and adaptive capacity to climate-related hazards and natural disasters in all countries”.

indigenous peoples and local communities. However, as noted above (para. 18) there may also be trade-offs that need to be taken into account.

(c) Target 13: Genetic resource conservation is vital for future crop and livestock improvements and for biomedical discovery, crop improvements and thus provides added rationale to support this target;

(d) Target 18: Traditional knowledge underpins traditional medicine and supports the broader dimensions of health including cultural and spiritual dimensions, community health and promotes equity.

31. The linkages between biodiversity and human health will also need to be addressed in the implementation of the programmes of work under the Convention, for example, in the thematic work programmes on agricultural biodiversity, forest biodiversity, and marine biodiversity as well as its cross-cutting issues such as protected areas; ecosystem restoration; traditional knowledge, sustainable use, climate change and others.

32. On the other hand, many programmes of work, initiatives and guidance under the Convention provide useful tools for addressing health-biodiversity linkages, maximizing potential co-benefits and minimizing trade-offs. Among these are the following:

- (a) The ecosystem approach (decision V/6);
- (b) Voluntary guidelines on biodiversity-inclusive impact assessment (decision VIII/28);
- (c) Akwé: Kon Voluntary Guidelines for the Conduct of Cultural, Environmental and Social Impact Assessments regarding Developments Proposed to Take Place on, or which are Likely to Impact on, Sacred Sites and on Lands and Waters Traditionally Occupied or used by Indigenous and Local Communities (decision VII/16 F);
- (d) 2015-2020 Gender Plan of Action (decision XII/7);
- (e) The programme of work on agricultural biodiversity (decision V/5) and the international initiative on pollinators (decision VIII/23 B);
- (f) The cross-cutting initiative on biodiversity for food and nutrition (decision VIII/23 A);
- (g) Activities on sustainable wildlife management (decision VII/18 and related decisions);
- (h) Guidance on ecosystem-based approaches to climate-change mitigation and adaptation (decision X/33).

Implications of the State of Knowledge Review: further steps

33. Further to the key messages contained in the summary of the *State of Knowledge review* (UNEP/CBD/SBSTTA/19/6/Add.1) and the foregoing discussion, a number of elements of guidance for Parties are suggested in the draft recommendation provided in section IV.

III. SUGGESTED RECOMMENDATION

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

The Subsidiary Body on Scientific, Technical and Technological Advice,

Recalling decision XII/21,

Welcoming the memorandum of understanding signed between the Secretariat of the Convention on Biological Diversity and the World Health Organization,

Welcoming also the publication by the World Health Organization and the Secretariat of the Convention of *Connecting Global Priorities: Biodiversity and Human Health, a State of Knowledge Review*,

Taking note of the Report of The Rockefeller Foundation-Lancet Commission on Planetary Health, *Safeguarding human health in the Anthropocene epoch*,

Recognizing that biodiversity and human health are interlinked in various ways,

Recognizing also that biodiversity gives rise to benefits for human health, including as a source of foods, nutrition, traditional medicines and biomedical discovery; by underpinning ecosystem functioning and resilience and the provision of essential ecosystem services; and by providing options for adapting to changing needs and circumstances,

Recognizing further that biodiversity may be related to adverse health effects, notably through disease organisms,

Recognizing that a number of drivers of change, such as land-use change, air and water pollution, and invasive alien species, affect both biodiversity and health in parallel,

Recognizing also that health sector interventions can have both positive and negative impacts on biodiversity and that biodiversity-related interventions can have both positive and negative impacts on human health,

Noting that better consideration of health-biodiversity linkages could contribute to improving many aspects of human health, including nutrition, reducing the global burden of infectious as well as non-communicable diseases, improving mental health and well-being,

Noting also that recognition of the health benefits of biodiversity reinforces the rationale for the conservation and sustainable use of biodiversity and thus contributes to the implementation of the Strategic Plan for Biodiversity and to the achievement of the Aichi Biodiversity Targets,

Emphasizing that health-biodiversity linkages are central to the implementation of the post-2015 development agenda and to the achievement of the sustainable development goals,

Recognizing that the health benefits of biodiversity are largely dependent on social dimensions and may be specific to local ecosystems and cultures, that men and women often have different roles in the management of natural resources and that poor and vulnerable communities, and women and children, are often particularly dependent on biodiversity and ecosystems for food, medicines, clean water, and other services,

Highlighting the importance of traditional knowledge as well as conventional scientific knowledge in realizing the health benefits of biodiversity,

Re-emphasizing the value of the “One Health” approach to addressing the cross-cutting issue of biodiversity and human health, as an integrated approach consistent with the ecosystem approach (decision V/6),¹²

1. *Takes note* of the key messages contained in the summary of *Connecting Global Priorities: Biodiversity and Human Health, a State of Knowledge Review* (UNEP/CBD/SBSTTA/6/Add.1);

2. *Encourages* Parties and other Governments making use of the *State of Knowledge Review* and its key messages to promote the understanding of health-biodiversity linkages with a view to maximizing health benefits, addressing trade-offs, and where possible, addressing common drivers for health risks and biodiversity loss;

3. *Invites* Parties and other Governments to make use of the guidance on specific issues below, as appropriate, to achieve the objective stated in paragraph 2 above:

(a) *Water supply and sanitation*: In water supply and sanitation policies and programmes, including the planning and design of water-related infrastructure, take into account the role of terrestrial and freshwater ecosystems as “natural infrastructure” in regulating the quantity, quality and supply of freshwater, protect these ecosystems, and address the drivers of their loss and degradation, including land-use change, pollution and invasive species;

(b) *Agricultural production*: Enhance the use of crop, livestock and associated biodiversity in agricultural ecosystems to contribute to sustainable production increases and to the reduced use of pesticides and other chemical inputs, with benefits for human health and the environment, noting the relevance in this respect of the programme of work on agricultural biodiversity (decision V/5), and of the international initiative on pollinators (decision VIII/23 B);

(c) *Food and nutrition*: Promote the use of crop and livestock diversity, and the sustainable and safe use of wild foods, to contribute to human nutrition and dietary diversity, including by making available information on the nutritional value of diverse foods, with a view to improving human health, and promoting sustainable diets, including through appropriate information and public awareness activities, recognition of traditional, national and local food cultures, and the use of social and economic incentives throughout the supply chain, noting the relevance in this respect of the cross-cutting initiatives on biodiversity for food and nutrition (decision VIII/23 A);

(d) *Human settlements*: In urban planning, design, development and management take into account the potential role of biodiversity, in particular the role of vegetation in improving air quality, and the role of green spaces in promoting psychological and physiological benefits as well as in fostering interchange between environmental microbes and the human microbiome;

(e) *Ecosystem management and infectious diseases*: Promote an integrated (“One Health”) approach to the management of ecosystems, associated human settlements and livestock, minimizing unnecessary disturbance to natural systems and unnecessary contact among humans, livestock and wildlife to reduce the risk of infectious diseases, including zoonotic and vector-borne diseases;

(f) *Mental health and well-being*. Promote opportunities for interactions between people, especially children, and natural environments to promote mental health and encourage physical activity and to support cultural well-being, particularly in urban areas;

(g) *Traditional medicines*. Promote the sustainable use, management and trade of plants and animals used in traditional medicine; protect traditional medical knowledge of indigenous peoples and local communities; and promote safe and culturally sensitive practices, and the integration and sharing of

knowledge and experiences between traditional medical practitioners and the broader medical community;

(h) *Biomedical discovery.* Conserve high biodiversity in terrestrial, freshwater, coastal and marine areas; protect traditional knowledge; and promote access to genetic resources and the fair and equitable sharing of benefits arising from their utilization;

(i) *Impacts of pharmaceutical products.* Avoid the overuse, and unnecessary routine use, of antibiotic and antimicrobial agents, both in human medicine and veterinary practice, to reduce harm to beneficial and symbiotic microbial diversity and to reduce the risk of antibiotic resistance; better manage the use and disposal of endocrine-disrupting chemicals to prevent harm to people and to biodiversity; and reduce the inappropriate use of non-steroidal anti-inflammatory drugs that threaten wildlife populations;

(j) *Species and habitat conservation:* In implementing policies to protect species and habitats, including protected areas, avoid restricting access to, and customary sustainable use of, wild foods and other essential resources, by local communities, especially poor and resource-dependent communities, including indigenous peoples;

(k) *Ecosystem restoration.* In promoting and carrying out ecosystem restoration activities, assess and minimize the risks of facilitating the re-establishment, near human settlements, of habitat that would harbor agents of infectious diseases;

(l) *Climate change and disaster risk reduction.* In the analysis and implementation of ecosystem-based adaptation, mitigation and disaster risk reduction measures, prioritize measures that jointly contribute to human health and to the conservation of biodiversity and of vulnerable ecosystems, and that support the health, well-being, safety and security of vulnerable human populations, and build resilience;

4. *Encourages* Parties and other Governments, with a view to achieving the objective and to implementing the guidance contained in paragraphs 2 and 3 above:

(a) To facilitate dialogue between agencies responsible for biodiversity and those responsible for health, and also with those responsible for other relevant sectors, across all levels of government;

(b) To ensure due consideration of health-biodiversity linkages in developing and updating relevant national policies, strategies, plans, and accounts including health strategies, national biodiversity strategies and action plans and sustainable development strategies;

(c) To strengthen national monitoring capacities and data collection, including integrated surveillance capacities and early warning systems, that enable health systems to anticipate, prepare for and respond to public health threats resulting from ecosystem degradation;

(d) To consider health-biodiversity linkages in environmental impact assessments, risk assessments and strategic environmental assessments, as well as in health impact assessments, economic valuation and the evaluation of trade-offs;

(e) To evaluate, address and monitor any unintended and undesirable negative impacts of biodiversity interventions on health and of health interventions on biodiversity;

(f) To identify opportunities for and promote healthy lifestyle and consumption choices and behavior changes that would benefit biodiversity and human health, drawing upon information and experience from public health campaigns;

(g) To develop interdisciplinary education, training, capacity-building and research programmes on health-biodiversity linkages, using integrative approaches, at various levels and different spatial and temporal scales;

(h) To consider the need to strengthen the capacity of health ministries and agencies to address health-biodiversity linkages in order to support preventative approaches to health and promote the multiple dimensions of health and well-being.

5. *Encourages* Parties, other Governments and relevant organizations:

(a) To develop integrated metrics, indicators and tools to facilitate the analysis, evaluation, monitoring and integration of biodiversity into health strategies, plans and programmes and vice-versa;

(b) To develop and compile toolkits, including good practice guides, aimed at raising awareness and maximizing co-benefits of biodiversity and health, including in the context of the implementation of the sustainable development goals and the post-2015 development agenda.

6. *Also encourages* Parties, other Governments, relevant organizations and funding agencies to promote and support further research on health-biodiversity linkages, including on the following issues:

(a) The relationships between biodiversity, ecosystem degradation and infectious disease emergence, including the effects of community structure and composition, habitat disturbance and human-wildlife contact, and the implications for land use and ecosystem management;

(b) The linkages between crop, livestock and associated biodiversity in agricultural ecosystems, dietary diversity and health;

(c) The linkages between the composition and diversity of the human microbiome, and biodiversity in the environment and implications for the planning, design, development and management of human settlements;

(d) The significance for health of marine biodiversity.

7. *Requests* the Executive Secretary to collaborate with the World Health Organization and other relevant organizations, to promote and facilitate implementation of the present decision, including through wide dissemination of the *State of Knowledge Review* in languages, the development of toolkits and good practice guides and support to capacity-building, as well as of the tasks set out in paragraph 9 of decision XII/21, subject to the availability of resources.
