Background paper for the Regional capacity-building workshop on Biodiversity and Health for the WHO European region.[1]

23-25 October 2017

Helsinki, Finland

[1] This draft background paper has been compiled by the World Health Organization and Secretariat for the Convention on Biological Diversity, in collaboration with the WHO Regional office for Europe.

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Context

In 2012, the World Health Organization and the CBD Secretariat embarked on an unprecedented joint collaborative endeavour aimed at engaging the health and biodiversity sectors worldwide, with a particular focus on developing countries, where concerted action is most urgently needed, in order to build capacity, and promote action to jointly protect biodiversity and promote human health in the context of sustainable development. The initial series of regional capacity-building workshops jointly convened by these organizations, in collaboration with national and regional country partners, were held for the Americas in Manaus, Brazil in September 2012 and for Africa in Maputo, Mozambique in April 2013. Country representatives from the biodiversity and health sectors from a combined total of some 50 countries, and a number of relevant organizations, regional experts and representatives of indigenous and local communities, gathered to survey some of the critical linkages at the biodiversity-health nexus and their relevance to the Strategic Plan and its Aichi Biodiversity Targets and to discuss the need to further mainstream biodiversity in public health strategies and to incorporate public health considerations in biodiversity strategies. Participants agreed upon an initial broad set of conclusions which were further revised and adapted in light of the issues identified in the State of Knowledge Review, in the broader context of the implementation of the Strategic Plan for Biodiversity 2011–2020 and the 2030 agenda for sustainable development.

Like other workshops that have preceded it, the Helsinki regional capacity-building workshop on biodiversity and health for the European Region, jointly convened by CBD Secretariat and WHO, is also benefitting from the technical support of the relevant WHO regional office.

More broadly, the WHO Regional Office for Europe supports the implementation of the UN convention on biodiversity (CBD), and the specific collaboration between the CBD and WHO on biodiversity and health (formalized by the establishment of a joint work programme on biodiversity and health in 2012). In particular by contributing evidence on the broader linkages between natural environments and health, and more specifically as part of the work streams on climate change and urban green spaces in the WHO European region. Further information about the European Environment and Health Process and related information on activities of the WHO Regional Office for Europe are contained in the Annex to this document.

Executive Summary and Focus of the Workshop

Evidence of the impacts of global environmental changes on ecosystems and people is increasingly well established, and reflects a renewed cognizance of the pressing need to protect the planet's ecological and climatic systems.[2] Increasingly unsustainable practices are placing pressure on natural resources to meet the demands of our economies and the needs of a rapidly growing global population, resulting in soil, water and air pollution, increased

[2] WHO and CBD, (2015) Connecting Global Priorities: Biodiversity and Human Health, a state of knowledge review. Available from www.cbd.int/health/stateofknowledge (check link); and Whitmee et al (2015) http://www.thelancet.com/commissions/planetary-health

greenhouse gas emissions, deforestation and land use change, expanded urban areas, the introduction of invasive species, and inadequately planned development of water and land resources to meet food and energy needs. These changes are having both direct and indirect impacts on our climate, ecosystems and biological diversity, and in turn on human health.

More than ever, the pursuit of public health at all levels demands careful attention to the processes of environmental change worldwide. Health is a basic human right and one of the fundamental indicators of sustainable development. We rely on healthy ecosystems to support healthy communities and societies. Biodiversity and well-functioning ecosystems provide goods and services essential for human health. These include nutrition and food security, clean air and fresh water, protection from coastal storms and inland flooding, medicines, cultural and spiritual referents, and contributions to local livelihoods and economic development. They also help to limit disease and stabilize the climate. Health policies need to recognize these essential contributions.

The goal of this workshop is to support efforts to reflect health issues in National Biodiversity Strategies and Action Plans (NBSAPs) and to develop or update action plans in the health sector that take into account health and biodiversity linkages at the national and regional levels, each as a contribution to the Strategic Plan for Biodiversity 2011-2020, its related Aichi Biodiversity Targets and the Sustainable Development Goals. It also seeks to build capacity to integrate information on the ecosystems services upon which health, livelihoods and well-being depend. More specifically, this workshop will provide a forum for Parties and experts from the health and biodiversity sectors to:

(a) Discuss mainstreaming of biodiversity-health linkages into the environment and public health policies, plans and projects;
(b) Strengthen national capacities on biodiversity and human health inter-linkages;
(c) Provide a forum for the exchange of best practices and lessons learned for the integration of biodiversity and health linkages in the WHO European region;
(d) Identify capacity needs and/or opportunities for the implementation of the Strategic Plan 2011-2020, the Sustainable Development Goals and related health in the European region and related public health processes;
(e) Promote the integration of human health and biodiversity linkages into national health strategies and national biodiversity strategies and action plans (NBSAPs), national health strategies and other relevant national reporting instruments.

In particular, this workshop is aimed at supporting the implementation of decisions XII/21 and XIII/6[3] of the Conference of the Parties (COP), by which the COP requested the Executive Secretary to organize, in collaboration with Parties and other relevant organizations, additional capacity-building workshops on the interlinkages between biodiversity and human health under the joint work programme between the Secretariat and the WHO.

The Strategic Plan for Biodiversity 2011-2020, adopted at the 10th Conference of the Parties, has provided the foundation for strengthened collaboration between the CBD Secretariat and World Health Organization.

[3] **Please see Decision XIII/6:** https://www.cbd.int/health/cop-13-dec-06-en.pdf

The Strategic Plan for Biodiversity 2011-2020 at the biodiversity and health nexus

The Strategic Plan for Biodiversity 2011–2020 and its twenty Aichi Targets provide an agreed overarching framework for action on biodiversity, and a foundation for sustainable development for all stakeholders, including agencies across the United Nations (UN) system. The Strategic Plan was adopted at the tenth meeting of the Conference of the Parties to the Convention on Biological Diversity and has been recognized or supported by the governing bodies of other biodiversity-related conventions, including the Convention on International Trade in Endangered Species of Wild Fauna and Flora, the Convention on the Conservation of Migratory Species of Wild Animals, the Convention on Wetlands of International Importance, the International Treaty on Plant Genetic Resources for Food and Agriculture, the World Heritage Convention, as well as the UN General Assembly.

The vision of this Strategic Plan is seeks to ensure that by 2050 biodiversity is valued, conserved, restored and wisely used, maintaining ecosystem services, sustaining a healthy planet and delivering benefits essential for all people.

Its mission is to ensure a coherent implementation of the Convention on Biological Diversity and achievement of its three objectives by promoting effective and urgent action to halt the loss of biodiversity in order to ensure that by 2020 ecosystems are resilient and continue to provide essential services, thereby securing the planet's variety of life, and contributing to human wellbeing, and poverty eradication. To ensure this, pressures on biodiversity are reduced, ecosystems are restored, biological resources are sustainably used and benefits arising out of utilization of genetic resources are shared in a fair and equitable manner; adequate financial resources are provided, capacities are enhanced, biodiversity issues and values mainstreamed, appropriate policies are effectively implemented, and decision-making is based on sound science and the precautionary approach.

Governments at Rio +20 affirmed the importance of the Strategic Plan for Biodiversity 2011–2020 and achieving the Aichi Biodiversity Targets, emphasizing the role that the Strategic Plan plays for the UN system, the international community and civil society worldwide to achieve the world we want. It is primarily implemented by countries through national biodiversity strategies and action plans, with Parties encouraged to set their own national targets within the framework of the Aichi Biodiversity Targets. The UN General Assembly has encouraged Parties and all stakeholders, institutions and organizations concerned to consider the Strategic Plan for Biodiversity 2011–2020 and the Aichi Biodiversity Targets in the elaboration of the 2030 Development Agenda, taking into account the three dimensions of sustainable development.

The Strategic Plan is organized into five strategic goals under which are included 20 headline targets for 2020. The goals and targets comprise both: (i) aspirations for achievement at the global level; and (ii) a flexible framework for the establishment of national targets.

The five Strategic Goals are:
A. Address the underlying causes of biodiversity loss by mainstreaming biodiversity across government and society
B. Reduce the direct pressures on biodiversity and promote sustainable use
C. Improve the status of biodiversity by safeguarding ecosystems, species and genetic diversity

D. Enhance the benefits to all from biodiversity and ecosystem services
E. Enhance implementation through participatory planning, knowledge management and capacity building

The Strategic Plan also includes means of implementation, monitoring, review and evaluation, as well as support mechanisms (strategy for resource mobilization, capacity building, technical and scientific cooperation). Countries' National Biodiversity Strategies and Action Plans (NBSAPs) are a core tool for the implementation of the Strategic Plan 2011-2020, providing an important opportunity to mainstream biodiversity and health linkages in policies, plans and projects.

National Biodiversity Strategies and Action Plans

National Biodiversity Strategies and Action Plans (NBSAPs) are the principal instruments for implementing the Convention at the national level (Article 6). The Convention requires countries to prepare a national biodiversity strategy (or equivalent instrument) and to ensure that this strategy is mainstreamed into the planning and activities of all those sectors whose activities can have an impact (positive and negative) on biodiversity.[4]

To date, a total of 189 of 196 (96%) Parties have developed NBSAPs in line with Article 6. Internal analyses of NBSAPs conducted to date have shown that the integration of biodiversity and health linkages is generally poorly reflected in national action plans.

Aichi target 17, specifically relates to NBSAPs, with the aim that:
"By 2017, each Party has developed, adopted as a policy instrument, and has commenced implementing, an effective, participatory and updated national biodiversity strategy and action plan".[5]

Numerous Aichi biodiversity Targets are directly or indirectly linked to human health outcomes. **Aichi target 14** is the target most directly related:
"By 2020, ecosystems that provide essential services, including services related to water, and contribute to health, livelihoods and well-being, are restored and safeguarded, taking into account the needs of women, indigenous and local communities, and the poor and vulnerable"[6]

While one Target 14 explicitly addresses human health, the others also address important and closely-related components of human well-being including the eradication of poverty, food security and nutrition, availability of water and sanitation, and access to modern energy. (See Table 1)

[4] For further information on NBSAPs see https://www.cbd.int/nbsap/
[5] Further information on Target 17: https://www.cbd.int/doc/strategic-plan/targets/T17-quick-guide-en.pdf
[6] Further information on Target 14: https://www.cbd.int/doc/strategic-plan/targets/T14-quick-guide-en.pdf

Table 1: Health and Biodiversity Interlinkages in support of the Aichi Biodiversity Targets

Health Topic	Health Sector Opportunity	Benefits to Biodiversity (Aichi Targets)
1. Food • Species, varieties and breeds including domesticated and wild components • Diversity of diet • Ecology of production systems • Total demand on resources	Direct • 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* • *Promote sustainable production harvesting and conservation of agricultural biodiversity*	T1 (values of biodiversity) T4 (sustainable production and consumption) T5 (reduce habitat loss) T6 (sustainable harvesting) T7 (sustainable management) T13 (genetic diversity) T14 (ecosystem services)
2. Water • Water quantity • Water quality • Water supply	Direct • Integrate ecosystem management considerations into health policy *Indirect* • *Promote protection of ecosystems that supply water and promote sustainable water use*	T1 (values of biodiversity) T5 (reduce habitat loss) T8 (reduce pollution) T9 (invasive alien species) T11 (protected areas) T14 (ecosystem services)
3. Diseases • Disease source and regulation services • Ecosystem integrity and diversity	Direct • Integrate ecosystem management considerations into health policy *Indirect* • *Promote ecosystem integrity*	T1 (values of biodiversity) T2 (poverty reduction strategies) T5 (reduce habitat loss) T8 (reduce pollution) T9 (invasive alien species) T14 (ecosystem services)
4. Traditional and Modern Medicine • Traditional medicines • Drug development (genetic resources and traditional knowledge) • Chemical/ pharmaceutical accumulation in ecosystems	Direct • Recognize contribution of genetic resources and traditional knowledge to medicine • Recognize and monitor impacts of drug accumulation (human, veterinary and agricultural sources) on ecosystems. *Indirect* • *Protect genetic resources and traditional knowledge and*	T1 (values of biodiversity) T5 (reduce habitat loss) T13 (genetic diversity) T14 (ecosystem services) T16 (Nagoya Protocol) T18 (local/traditional knowledge)

	ensure benefit sharing	
5. Physical, mental and cultural well-being • Physical and mental health • Cultural/spiritual enrichment	Direct • Integrate 'value of nature' into health policy including mental health and non-comm. diseases *Indirect* • *Promote protection of values, species and ecosystems*	T1 (values of biodiversity) T2 (poverty reduction strategies) T11 (protected areas) T12 (preventing extinctions) T13 (genetic diversity) T14 (ecosystem services) T18 (local/traditional knowledge)
6. Adaptation to climate change • Ecosystem resilience • Genetic resources ('options' for adaptation)	*Indirect* • *Promote ecosystem resilience and conservation of genetic resources*	T1 (values of biodiversity) T3 (reduce negative subsidies) T5 (reduce habitat loss) T8 (reduce pollution) T10 (vulnerable ecosystems) T14 (ecosystem services) T15 (ecosystem resilience)

Cross-cutting: Target 17 (national biodiversity strategies and action plans), Target 19 (knowledge, science and technology) and Target 20 (resource mobilization).

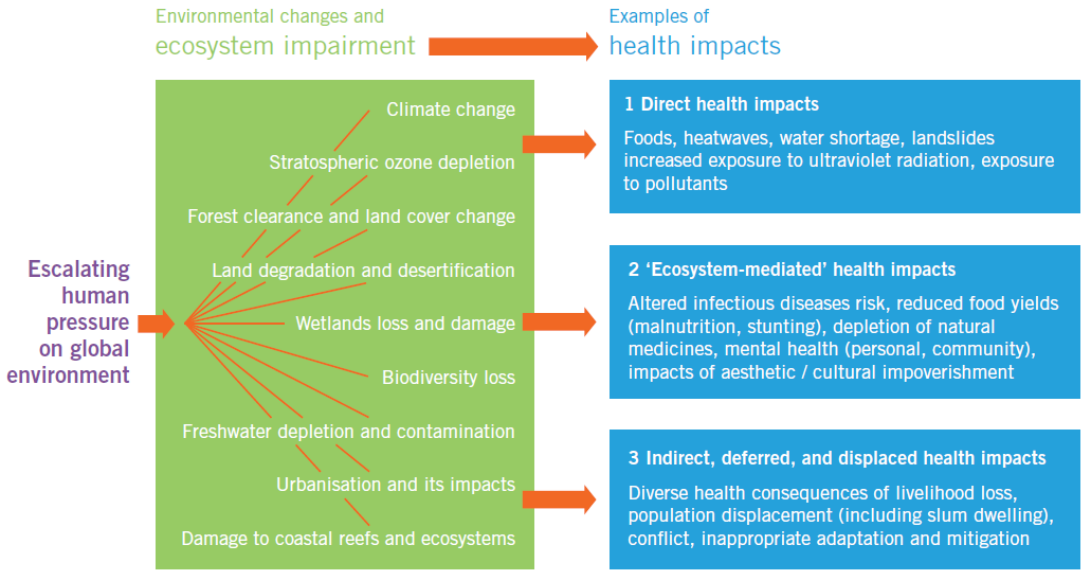
Biodiversity is related to each of these components and these intersections have been demonstrated at length throughout this volume. Biodiversity is addressed explicitly in two of the proposed goals and in several sub-targets including those related to food and water. The proposed goals also recognize the importance of sustainable consumption and production, as well as the importance of gender equality and equity.

Introduction to the The State of Knowledge Review

Health is an important outcome in the management of natural resources and the environment, but is often left out of environmental assessment and policy processes. Similarly, health actors often neglect the potential to improve health through protection of biodiversity and enhancement of ecosystem services and reduction of environmental risk factors. While the public health community will always face the necessity of responding to the acute health needs of populations, an improved understanding of environment–health linkages has the potential to significantly strengthen capacity to identify and analyze long-term health risks, to encourage participation in policy decisions that have significant health implications and to develop strategies for disease prevention.

Although the links between biodiversity, ecosystem services and human health are complex, we have an increasing understanding of the underlying relationships that modulate health outcomes (some of them are exemplified in figure 1).

Figure 1. Examples of health impacts from environmental changes



Source: WHO, CBD, UNFCCC and UNCCD (2012) Our Planet, Our Health, Our Future

The State of Knowledge Review was the first joint comprehensive attempt by the CBD and WHO to examine the interlinkages between biodiversity and health across a range of the relationships described in figure 1. Specifically, these were examined 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."

The Sate of Knowledge Review notes that biodiversity and human health are interlinked in various ways:

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. 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. 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.

The report 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 (https://www.cbd.int/health/doc/summary-state-knowledge-review-en.pdf).

The thematic areas addressed include:

(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.

Implications of the State of Knowledge Review: opportunities for synergies

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. 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 Table 1). Information on these linkages should be reflected in communication and public awareness activities under the Convention.

Common drivers of biodiversity loss and ill health

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.

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.

Trade-offs

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.

Maximizing co-benefits

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.

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.

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.

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.

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.

Tools and Methods for Assessing Ecosystem Change Effects on Human Health

Now that links between ecosystem change and human disease have been demonstrated in many settings, there is a growing need for new tools and methods to detect such links more comprehensively and to characterize them so as to guide policy development and strategies to alleviate emerging health problems and better understand biodiversity and human health linkages. Two categories of tools are especially valuable.

Analytical tools are needed to improve understanding of the links between ecological change and the emergence of infectious diseases or changes in their patterns. These tools, which are usually applied in combination, include time-series analyses, geographic information systems, and other forms of spatial analyses that use digital mapping, analysis of remotely sensed imagery, spatial statistics, or ecological niche modelling.

Infrastructural tools, such as developments in informatics capabilities. These are extremely important to the application of analytical tools. In addition, informatics capacities for the delivery and deployment of more "upstream" (and therefore anticipatory) health-relevant data from a broad range of key information sources -biodiversity, socio-economic, and medical/public health - are needed to build a comprehensive picture of ecological drivers of human disease.

Institutional Frameworks

Internationally, *Agenda 21* and the *Rio Declaration on Environment and Development* describe a comprehensive approach to ecologically sustainable development that incorporates cross-sector policies, many of which are relevant to human health. These include:

- Integrated action for health, such as a *health impact assessment* of major development projects, policies, and programs, and indicators for health and sustainable development;
- Inclusion of health in sustainable development planning efforts, such as *Agenda 21*, in multilateral trade and environmental agreements, and in poverty reduction strategies;
- Improvement of cross-sector collaboration between different tiers of government, government departments, and NGOs; and
- International capacity-building initiatives that assess health and environmental linkages and use the knowledge gained to create more effective national and regional policy responses to environmental threats.

Workshop preparation and expected workshop outcomes

In preparation for the workshop, participants are invited to consult the key messages available in the Summary of the State of Knowledge Review "**Connecting Global Priorities: Biodiversity and Human Health"** (https://www.cbd.int/health/doc/summary-state-knowledge-review-en.pdf) as well as the related COP decision XIII/6 (https://www.cbd.int/health/cop-13-dec-06-en.pdf).

Participants should work to identify next steps for each of their respective countries and the region as a whole both prior to and during the workshop.

Participants are requested to reflect on the questions below to prepare a five-minute presentation to be delivered at the regional workshop.

1) What joint actions have (or could) the health and biodiversity sectors respectively taken at the national level in order to develop policies and promote activities that try to achieve co-benefits for human health and biodiversity?

2) What would be the key elements for a joint human health and biodiversity action plan? At what scale (local, sub-national, national, regional and global) do you think that this would this be most effective?

3) What is needed, at the national and regional scales, in terms of research, capacity building and information dissemination for joint human health and biodiversity sector actions?

4) What, if any, are the best practices in your country that jointly address human health and biodiversity concerns and opportunities?

5) What collaborative mechanisms/examples currently exist within your country or region for cross-sector human health and biodiversity collaboration? How can we promote further collaboration? What impedes collaborative action?

6) What actions for human health and biodiversity are needed as a matter of urgency (1 year); medium term (2- 5 years); and in the long term (6 – 8 years)?

Expected outcomes

(a) Participants will be acquainted with the contents of key thematic areas addressed in the State of Knowledge Review: *Connecting Global Priorities: Biodiversity and Human Health*;

(b) Participants will be acquainted with relevance of biodiversity and human health to support the implementation of the Strategic Plan for Biodiversity 2011-2020, its Aichi Targets and other global commitments;

(c) Participants are made aware of environment and health processes in the WHO European region

(d) Preliminary actions to be taken by national authorities to mainstream biodiversity and health linkages in national health plans and national biodiversity strategies and action plans are identified;

(e) Building consensus from an iterative cross-sectoral dialogue to strengthen national capacities for sound implementation of the Convention in the health sector and of health in biodiversity and environment-related sectors.

Thematic areas for the Workshop

While content on links between biological diversity and health can be grouped in a variety of ways, we have selected the following division of topics toward a comprehensive approach to this mutually dependent and complex issue:

1. **Microbial diversity and noncommunicable diseases;**
2. **Food and nutrition security;**
3. **Biocultural diversity and mental health;**
4. **Green spaces and urban health**
5. **Zoonotic and vector-borne diseases and One Health;**
6. **Climate change and health**

Microbial diversity and noncommunicable diseases

The global burden of noncommunicable diseases (NCDs) has been widely recognized as a major challenge to global health, and to sustainable development more broadly. NCDs such as heart and lung diseases, cancers, diabetes, obesity, chronic respiratory diseases and other inflammatory conditions are also a significant cause of disability and loss of income. According to the first worldwide report on the state of NCDs, the latter are responsible for more deaths globally than all other causes combined, with almost 80% occurring in low- and middle-income countries.[9] While many lifestyle, genetic and environmental factors combine to contribute to this global health burden, such as exposure to air pollutants, unhealthy diets, and physical inactivity, recent studies have found strong linkages between some NCDs and biodiversity loss at a much finer, less immediately visible, scale: the microbial scale.[10]

The effects of biodiversity loss on environmental and commensal microbiomes, as well as alterations in the composition of microbial communities of the gut and skin have also been associated with various inflammatory conditions, including asthma, allergic and inflammatory bowel diseases, type1 diabetes, and obesity (op cit.). While the complex relationships between microbial communities and the surrounding environment are notably absent from the wording of the sustainable development goals, a growing body of research suggests that they have significant implications for several issues at the biodiversity-health nexus that will be the subject of goals and targets. Further research in this area is critical to a more complete understanding of the complex relationships that occur at the microbial level, including the interactions of microscopic life with the larger physical, biological and built environments, and the resulting impacts on human and planetary health.

Food and nutrition security

One of the greatest challenges facing our planet is the need to feed the 9 billion people expected to inhabit the Earth by 2050. The combination of increasing human populations, rising nutritional demands, ecosystem transformation and wildlife population depletions, and uncertainties associated with climate change (which are likely to increase crop failure in some places) combine to create a perfect storm leaving subsistence populations increasingly vulnerable and may lead to increased reliance on wild foods at times of stress and scarcity. Developing strategies and practices aimed at the sustainable use, management and trade of resources essential for food and nutrition security will be critical to meeting these challenges.

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[9] Alwan, A., (2011). Global Status Report on noncommunicable diseases 2010. World Health Organization.

[10] Rook, G. A. (2013). Regulation of the immune system by biodiversity from the natural environment: An ecosystem service essential to health. Proceedings of the National Academy of Sciences, 110(46), 18360-18367.

Moreover, changing climate patterns, including extreme dry or cold periods and erratic rainfall, as well as other factors such as land degradation and biodiversity loss, can have a direct impact on food availability and nutrition in many parts of the world and lead to increased vulnerability to disease, population displacement and malnutrition. When combined with pre-existing issues associated with global food security, climate change threatens to significantly impede sustainable agricultural improvement efforts that are necessary for sustainable development. In some developing nations, the downstream health impacts of decreased agricultural productivity can be devastating. Biodiversity loss not only affects current food security, nutrition and livelihoods, but the loss of genetic diversity also limits our future options for species to be used in food production.

Changes in the human environment and human behaviour, including changes in diet, unsustainable industrial agricultural practices, and the erosion of agrobiodiversity and traditional food practices in some parts of the world, are also in part responsible for the rising global burden of noncommunicable diseases by contributing to food and nutrition insecurity, excess energy consumption, and micro- and macro-nutrient deficiencies. In addition to undernutrition, micronutrient deficiencies affect roughly 2 billion people globally and disproportionately impact children and pregnant women.11 Conservation strategies to maintain robust populations of terrestrial and marine species, therefore, are not only a critical biodiversity conservation priority, but can also significantly contribute to improved nutrition and food security. With a disproportionate amount of human population growth in coastal areas and the decline of global fish stocks, the interactions between harvested wildlife and human health are also critically important in marine systems, and will only increase in importance.12

Biocultural diversity and mental health

Culture is increasingly seen as a fourth pillar of sustainable development, further encouraged by the 2030 Sustainable Development agenda and the increased attention to cultural issues for sustainability under the SDGs. Aspirational targets under the SDGs speak to the importance of supporting and appreciating cultural diversity, and ensuring participatory justice including universal access to healthy environments regardless of social or cultural identity, particularly for marginalised and vulnerable groups.

The cultural dimensions of health and well-being are increasingly important in European health care. A recent WHO report speaks of "re-engaging public health with the full complexity of subjective, lived experience and opening the door to a more systematic engagement with the cultural contexts of health and well-being" as part of a more "people-centred, whole-of-society" approach to health policy, research and practice.

The relationship between ecosystems, biodiversity and health is particularly affected by cultural perspectives and experiences relating to social interaction and contact with the natural environment. Some groups, communities, or individuals will experience significantly greater benefits than others, in ways that are not always easy to predict or recognise. Conversely, the risks which environmental degradation poses for health outcomes are also spread unevenly across society. This is becoming of growing importance for Europe in the face of the recent changes in regional demographics – an ageing population with lower fertility, increased rates of childlessness, increased urbanisation, and increased immigration.

[11] Wildlife from aquatic and terrestrial ecosystems is a critical source of calories and micronutrients like iron and zinc for more than one billion people in economically developing countries.
[12] www.cbd.int/health/stateofknowledge

This subjective element of the health-biodiversity dynamic has largely been underappreciated and insufficiently addressed in research and policy-making, though it is increasingly seen to be fundamental to understanding how group and individual behaviours affect health risks, health outcomes, and uptake of health services. The refugee crisis in particular has highlighted the need for greater cultural competence of health care policy and practice in European countries; i.e. the degree to which it is attuned to the world views and cultural perspectives of disparate groups, including important relationships with biodiversity and cultural ecosystem services.

Green spaces and urban health

According to several reviews, access to green spaces and nature positively affects mental health, possibly by reducing stress and by providing distraction and distancing people from their everyday activities. In addition, green spaces promote social interaction and cohesion. Conversely, restricted access to green spaces has been associated with negative outcomes. The most relevant health benefits of natural green spaces are improved levels of mental health, physical fitness and cognitive and immune function, as well as lower mortality rates.

The results of a recent systematic review of the health and well-being benefits of biodiverse environments suggest that exposure to biodiverse environments may relate to better health and wellbeing in humans (as most studies showed positive links between biodiversity and good health and wellbeing, but others were inconclusive and few studies also reported inverse relationships).

Urban areas such as parks can also function as biodiversity hotspots with positive impacts on human well-being and quality of life. Well-designed urban green space can also benefit hydrological systems and enhance sustainable urban drainage, help prevent and mitigate flooding and create and extend new habitats for plant and animal species. Modelling studies for urban temperature over the next 70 years project that urban temperature averages may increase more strongly in areas with reduced green cover, and that a 10% increase in green spaces may be associated with a reduction in diseases that is equivalent to an increase of five years of life expectancy. Finally, urban green spaces can help to reduce pollution – it is estimated that trees and shrubs in Greater London remove 229 tons of particulate matter per year, therefore creating savings in the health care sector.

Zoonotic and vector-borne diseases and One Health

Worldwide events, including biodiversity loss and climate change, are associated with increased risk to humans from infectious diseases, including zoonotic and vector-borne diseases. Agricultural expansion into formerly natural areas increases contact among humans, domestic animals and wildlife. One possible result is the greater likelihood of pathogen transfer. Changes to the distribution of disease vectors and to the ecology of existing diseases, can accelerate the spread of invasive species. Disturbance to woodlands through deforestation and subsequent land use change has resulted in the loss of many functions provided by forests, including disease regulation. While forest cover produces diverse pathogens, it also serves to maintain the ecology of such diseases through a greater diversity of hosts, reservoirs, vectors, predators and competitors. These can potentially dilute the effect of any

one pathway that transmits a disease. Some of the mechanisms of disease emergence and resurgence are outlined in Box 1.

Box 1: Mechanisms of Disease Emergence or Resurgence

Ecosystem changes that result from human activities can trigger ecological mechanisms that increase the risk of human disease transmission. Alternatively, they can exacerbate conditions of vulnerability in the human population, such as malnutrition, stress and trauma (in floods and storms, for example), immunosuppression, and respiratory ailments associated with poor air quality. In recognition of these relationships, the *Millennium Ecosystem Assessment* defined the "regulation of infectious diseases" as an ecosystem service.

The reasons for the emergence or re-emergence of some diseases are unknown, but the following mechanisms and examples of underlying drivers have been identified as causes of change or increase in the incidence of many diseases:

Altered habitat, which can lead to changes in the number of vector breeding sites or in disease reservoir host distribution. Three types of drivers are primarily responsible for altered habitat: (1) destruction, conversion, or encroachment of wildlife habitat, particularly through deforestation and reforestation; (2) changes in agricultural land use, including proliferation of both livestock and crops; and (3) changes in the distribution and availability of surface waters, such as through dam construction, irrigation, and stream diversion.

Biodiversity change, including loss of predator species and changes in host population density. The main drivers of biodiversity change are the same as those that alter habitat, in addition to overharvesting (such as overfishing) and invasive species.

Niche invasion or host-shifting by pathogens. The drivers of niche invasion include human migration, international travel and trade, and accidental or intentional introduction of pathogens by humans.

Human-induced genetic changes in disease vectors or pathogens, such as mosquito resistance to pesticides or the emergence of antibiotic-resistant bacteria. The drivers of these changes include pesticide application and the overuse of antibiotics.

Environmental contamination by infectious disease agents, such as fecal contamination of source waters. The drivers of such contamination include (1) lack of sanitation; (2) increased rainfall and runoff, often from impervious surfaces caused by urban sprawl or climate change-related extremes of the hydrologic cycle; and (3) deposition of chemical pollutants, including nutrients and fertilizers.

Climate change and health

The health impacts of climate change in the European Region are wide ranging. Direct impacts result from progressive temperature increases, heat waves, storms, forest fires, floods or droughts. Indirect impacts are mediated through the effects of climate change on ecosystems and productive sectors such as agriculture, the distribution of plant and animal species, and water and food quantity and quality. Yet, depending on the location, climate change may have very different effects on e.g. biodiversity and environmental threats, and therefore also different impacts on health. Just within the WHO European region, differential impacts can be identified in relation to food security, temperatures, natural disaster risk, vector-borne diseases, and water supply. For example, current climate change scenarios make

the northern expansion of tick disease vectors from the south of Europe very likely, and may modify and expand the seasonal activity patterns of pests and plant diseases. Similarly, substantial warming at higher latitudes could lead to the incidence of infectious diseases that are presently limited by low-temperature boundaries. Currently, 77 000 Europeans on average fall sick from vector-borne diseases every year but numbers are predicted to increase as mosquito species are emerging (*Aedes albopictus*) or re-emerging (*Aedes aegypti*) and other vector-borne diseases have been reported as well (such as Dengue fever, Chikungunya, West Nile fever, Lyme disease and Leishmaniasis).

Climate impacts on food security are a particular concern in central Asia, where crop yields could decrease by up to 30%. Fresh water supply is likely to be affected by increasingly variable rainfall patterns. Water stress is expected to increase across central and southern Europe and central Asia with the impacts of climate change. The area in the European Union under high water stress is estimated to increase from 19% in 2007 to 35% by the 2070s.

Vulnerable populations are at higher risk of climate-related hazards: some population groups are more exposed to specific risks or are more vulnerable because of their personal characteristics (such as age, income, education or health status), broader social and environmental contexts, access to resources such as health services or their level of exposure to climate change. Climate-related hazards particularly affect poor populations, for example through reduced crop yields, increased food prices and food insecurity.

It is thus important for the climate change community to recognize that human health and well-being are influenced by the health of local plant and animal communities, and the integrity of the local ecosystems that they form. Climate policies must ensure that the impacts of ecosystem alteration are assessed and reflected in strategies by meaningfully engaging with different sectors, disciplines and local communities.

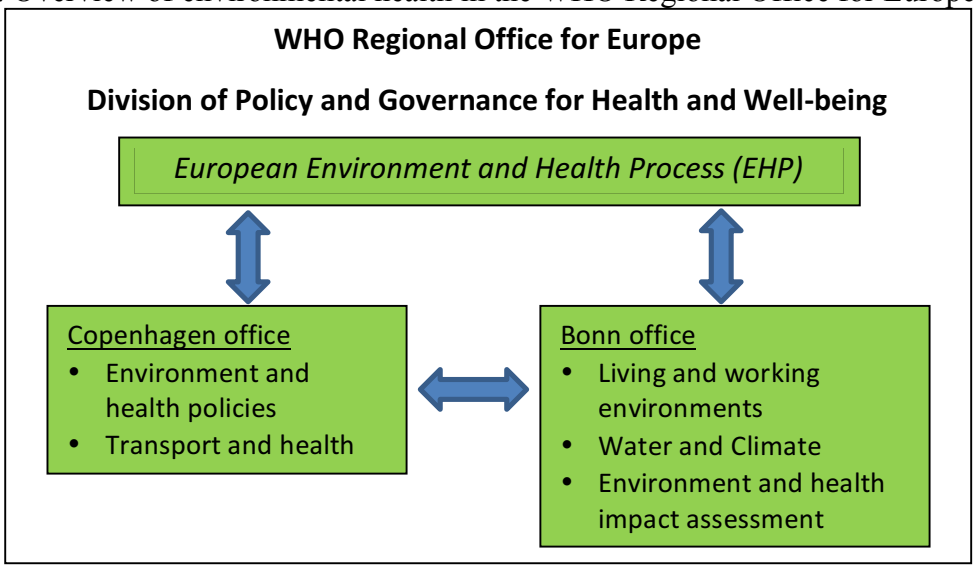
ANNEX - Environment and health in the WHO European Region

STRUCTURE

Within the WHO Regional Office for Europe, the Division on Policy and Governance for Health and Wellbeing is responsible for the work on health and environment.

The coordination and leadership for the area of work is provided from the head office in Copenhagen. The team there provides the secretariat to the European Environment and Health Process (EHP)[13], as well as the work on transport, health and environment and on the engagement of cities and regions in health and environment area of work. The WHO European Centre for Environment and Health in Bonn (ECEH)[14], located in Bonn, Germany, is the centre of excellence covering a wide range of technical areas focusing on the development of knowledge and tools for advancing health and environment policies and supporting Member States and partners in developing and implementing environmental health interventions, projects and policies throughout the Region. Figure 1 shows the overview of environmental health within the WHO Regional Office for Europe.

Figure 1. Overview of environmental health in the WHO Regional Office for Europe



EUROPEAN ENVIRONMENT AND HEALTH PROCESS (EHP)

In the late 1980s, European countries initiated the first ever policy process to eliminate the most significant environmental threats to human health. The European Environment and Health Process (EHP) is a regional intersectoral process and platform for the development and implementation of policies advancing environment, health and well-being in the WHO European Region. The key forum of the European Environment and Health Process (EHP) is the Environment and Health Task Force which meets annually and is made up of nominated

[13] http://www.euro.who.int/en/health-topics/environment-and-health/pages/european-environment-and-health-process-ehp

[14] http://www.euro.who.int/en/about-us/organization/office-locations/who-european-centre-for-environment-and-health-eceh,-bonn,-germany

representatives from the health and environment ministries of all fifty-three Member States in the WHO European Region and from stakeholder organizations. The Task Force is the leading international body for implementation and monitoring of the EHP, and aims to foster collaboration between environment and health sectors, among the Member States and its partners. The stakeholders represented in the Task Force include representatives from institutional members such as UN agencies (UN Economic Commission for Europe, UN Environmental Programme, UN Habitat, UN Framework Convention on Climate Change, the World Meteorological Organization and the UN Development Programme), the European Union represented by the European Commission with the support from the European Environment Agency and other EU institutions, the Organisation for Economic Co-operation and Development (OECD), the International Society for Environmental Epidemiology as well as selected umbrella NGOs.

Since the inception of EHP, environment and health ministers from the WHO European Region have come together periodically in ministerial conferences, coordinated by the WHO Regional Office for Europe, to assess the progress made and renew their commitments (Fig. 2). These conferences are unique, bringing together different sectors to shape European policies and actions on environment and health. The first conference was held in Frankfurt in 1989, followed by Helsinki in 1994 and London in 1999. The fourth conference took place in Budapest in 2004 with the theme "The future for our children."

The Fifth Conference was held in Parma, Italy, on 10-12 March 2010. The Parma Declaration is the first time-bound outcome of the environment and health process. Governments of the 53 European Member States set clear-cut targets to reduce the adverse health impact of environmental threats in the next decade.

Fig. 2. The series of ministerial conferences leading to the Ostrava Declaration of 2017

The Sixth Ministerial Conference on Environment and Health took place in Ostrava, Czech Republic, from 13-15 June 2017. The Ostrava Declaration sets the health and environment priorities in the WHO European Region, provides tools to Member States to develop national portfolios for action, which they committed to develop by the end of 2018, and introduces new institutional arrangements for the European Environment and Health Process from 2018.

THE OSTRAVA DECLARATION

The most recent Ministerial Conference in 2017 resulted in the Ostrava Declaration on Environment and Health[15], which was the product of a long-standing intersectoral collaboration led by the European Environment and Health Task Force.

The Declaration prioritized the following areas:

- improving indoor and outdoor air quality;
- ensuring universal, equitable and sustainable access to safe drinking-water;
- minimizing the adverse effects of chemicals on human health;
- preventing and eliminating adverse environmental and health effects, costs and inequalities related to waste management and contaminated sites;
- strengthening adaptive capacities and resilience to health risks related to climate change and supporting the measures to mitigate climate change;
- supporting the efforts of European cities and regions to become healthier and more inclusive; and
- building the environmental sustainability of health systems.

THE WHO EUROPEAN CENTRE FOR ENVIRONMENT AND HEALTH (ECEH)

Within the WHO Regional Office for Europe, WHO ECEH is the centre of technical and scientific excellence supporting the implementation of the commitments taken by Member States through the series of Ministerial Conferences on Environment and Health and addressing environmental and work-related impacts on health. It provides Member States with state-of-the-art evidence on existing and emerging environmental health risks, and assists them in identifying and implementing policies to protect and promote health. It develops policy advice and international guidelines, methods and tools to inform and support decision-making by governments, health professionals, citizens and other stakeholders.

ECEH provides evidence and support in matters critical to health and environment and engages in partnerships where joint action is needed; supports the articulation of ethical and evidence-based policy positions; provides evidence and supports the norm- and standard-setting by WHO and contributes to shaping research agendas to stimulate the generation, translation and dissemination of valuable knowledge. ECEH aims, in particular, to provide technical support to catalyse change and monitors data in order to assess trends in health.

These activities are crucial for the development of healthy and safe environments and resilient and inclusive communities. In this way, ECEH's work directly supports WHO's strategies for improved and more equitable health and well-being for all people of the WHO European Region and contributes to a global environment and health agenda.

COVERAGE AND PRIORITIES IN THE WHO EUROPEAN REGION

In the early years of the 21st century, the WHO European Region has made notable progress on environment and health issues. Environmental determinants of health account for more

[15] http://www.euro.who.int/en/media-centre/events/events/2017/06/sixth-ministerial-conference-on-environment-and-health/documentation/declaration-of-the-sixth-ministerial-conference-on-environment-and-health

than 15% of the total mortality in the WHO European Region.[16] Much of this burden of disease is unevenly distributed across geographic, demographic, sociocultural and socioeconomic subgroups; it generates large costs, consumes important resources, prevents the attainment of optimal health and well-being, and undermines societal and economic development.

Each year, at least 1.4 million Europeans die prematurely as a consequence of polluted environments. Half of these deaths are due to outdoor and indoor air pollution. Altogether, European citizens lose 50 million years of healthy life annually as a result of environmental risks.[17]

In Europe, environmental risk factors are responsible for around 26% of ischaemic heart disease, 25% of strokes and 17% of cancers. Cardiovascular deaths and diseases from environmental exposures are three times higher in lower–middle-income countries compared to high-income countries.

Air pollution is Europe's leading environmental cause of premature death; it is responsible for more than 620 000 deaths every year from outdoor exposure (e.g. transport, industry, energy production) and indoor exposure (e.g. solid-fuel combustion for heating and cooking, poor ventilation, second-hand tobacco smoke).

Additional environmental factors, such as transport and urban planning, noise, chemical pollution, occupational risks, unsafe water and poor sanitation, and injuries account for further deaths and diseases. Diarrhoeal diseases caused by inadequate drinking-water, toilets and hygiene lead to 14 deaths a day – an unacceptable reality in 21st-century Europe. Road traffic injuries kill 85 000 people per year.

Unsustainable production and consumption, social inequalities, extreme weather events due to climate change, ageing of the population, rapid urbanization, degradation of ecosystems and unprecedented levels of migration further exacerbate environmental impacts on the health of Europeans.

COMMITTING TO IMPROVE HEALTH AND WELLBEING BY IMPROVING ENVIRONMENT AND HEALTH IN EUROPE

Environment-related deaths can be prevented by making health a political choice. As agreed in the Declaration of the Sixth Ministerial Conference on Environment and Health, European countries are expected to develop national portfolios for action on environment and health by 2018. These will be based on their own priorities, selected through intergovernmental consultation and engagement; such priorities will include air quality, chemical safety, climate change, environmentally sustainable health systems, waste management, water, sanitation and hygiene, and cities.

[16] http://www.who.int/quantifying_ehimpacts/publications/preventingdisease.pdf
[17] http://www.euro.who.int/en/media-centre/events/events/2017/06/sixth-ministerial-conference-on-environment-and-health/news/news/news

The 2030 Sustainable Development Agenda

An emerging impetus for the work of the WHO Regional Office for Europe on environment and health is animated by the 2030 Agenda for Sustainable Development[18], in which health and well-being are strongly linked to environmental and work-related factors and represent determinants and enablers of sustainable development. WHO is supporting the Member States of the WHO European Region in implementing the health and environment dimensions of the Sustainable Development Goals (SDGs) (Fig. 2). The SDGs are seen as integrated and indivisible; they cover the economic, environmental and social pillars of sustainable development, with a strong focus on equity expressed by "Leaving no one behind"[19] which is very much aligned with the Health 2020 policy of the WHO Regional Office for Europe.

While the dedicated health goal (SDG 3: Good health and well-being) is central and refers to several environmental determinants of health, health improvement and bridging the equity gap in health is a developmental goal in itself and a target of many other goals. Indeed, environmental determinants of health are directly or indirectly relevant to all SDGs, as shown in Fig. 3.

Fig. 3. Environmental health links to the 2030 SDGs

Source: WHO (2016) Preventing disease through healthy environments. Page 96.

Examples of the interlinkages include

- SDG 2: *Zero hunger* (e.g. through sustainable food production that does not deplete natural resources and eco-systems)

[18] http://www.un.org/sustainabledevelopment/sustainable-development-goals/
[19] https://unstats.un.org/sdgs/report/2016/leaving-no-one-behind

- SDG 4: *Quality education* (e.g. by reducing exposure of children to neurodevelopmental toxins, or providing safe water, sanitation and hygiene services in schools);
- SDG 6: *Clean water and sanitation* (e.g. by providing safe, sustainable and equitable access to water and sanitation services that are protective of health and the environment);
- SDG 11: *Sustainable cities and communities* (which is a priority area for both WHO's Health 2020 policy framework and the Ostrava declaration, and provides linkages with nature and related environmental health determinants on local scale);
- SDG 13: *Climate action* (e.g. by providing a most important context for environmental conditions, eco-system services and linking to the health impacts of adaptation and mitigation);
- SDG 14: *Life below water* (e.g. by reducing chemical contamination of marine species and food chains); and
- SDG 15: *Life on land* (e.g. by land conservation and protection of eco-systems and biodiversity).

Programmatic areas of work

WHO aims to provide a better understanding of how environmental exposures affect health and well-being (by assessing environmental risk factors and their impacts on health), and to generate evidence for sound policy development in key technical areas.

This work is broken down into various programmatic areas. The below table (Tab. 1) shows the diversity of work, which aims at covering the most important environmental health challenges across the European Region.

Table 1. Overview of programmatic areas

PROGRAMMATIC AREAS	OBJECTIVES
AIR QUALITY	• develop methods to quantify health risks of air pollution • support the national implementation of international agreements and policy frameworks on air pollution • provide guidance and technical support to the regular update of the WHO Air Quality Guidelines (AQGs) as a reference tool to help decision-makers across the world in setting standards and goals for air quality management
CHEMICAL SAFETY	• provide technical support and build national capacity to prevent health risks due to inappropriate management of chemicals • broker international agreements on chemical safety and to facilitate adoption and implementation at country level • support national health systems' preparedness and response to chemical-related emergencies
CLIMATE CHANGE	• support national governments in assessing vulnerabilities and impacts of climate change and enhancing disease surveillance for climate-sensitive vector-borne diseases • help Member States to improve national preparedness, planning and response to extreme events • support the national implementation of international agreements on climate change

ECONOMICS OF ENVIRONMENT AND HEALTH	• compile data on the economic costs and benefits of policies on environment and health, and identify their cost–effectiveness • strengthen economic arguments for investing in disease prevention through environmental interventions
ENVIRONMENTAL HEALTH INEQUALITIES	• assess environmental health inequalities within Member States and identify most affected and vulnerable population subgroups • provide advice on suitable interventions to reduce existing inequalities and prevent future inequalities • assist countries in the development of national environmental health inequality assessments
ENVIRONMENTAL NOISE	• review evidence on health effects of noise and support national action to prevent and control exposure to excessive noise • offer technical and policy guidance on noise management for health protection • coordinate the development of the WHO Environmental Noise Guidelines for the European Region
ENVIRONMENTALLY SUSTAINABLE HEALTH SYSTEMS	• offer technical support for national policy development and implementation of activities relating to environmentally sustainable health systems • provide both formal and informal mechanisms for sharing best practice and stimulate discussion and research towards more sustainable and resilient health systems
ENVIRONMENT AND HEALTH IMPACT ASSESSMENT	• develop Health Impact Assessment methodologies and tools for use by national or local authorities and institutions • support Health Impact Assessment implementation through local- and national-level training and capacity building • support the integration of health aspects in international agreements on Strategic Environmental Assessment
TRANSPORT AND HEALTH	• promote active and sustainable transport and prevent and reduce the health effects associated with current transport patterns • assist Member States in considering transport policies' implications for health, the environment and sustainable development, and in defining and managing mobility policies that benefit health • support the national implementation of international agreements and policy frameworks on healthy and sustainable transport
URBAN AND BUILT ENVIRONMENTS	• provide evidence on health risks in urban settings, and review benefits of urban environmental interventions to inform local decision-makers • support national frameworks and intersectoral action aiming to improve the health benefits of urban environments
WASTE MANAGEMENT AND HEALTH	• consolidate the evidence base on health impacts of waste and contaminated sites • provide advice to Member States on effective and efficient measures to protect health and reduce waste-related noxious exposure • support Member States to assess the problem in their countries, and develop policies to remediate existing sites and prevent future contamination
WATER, SANITATION AND HYGIENE	• establish the evidence-base for informed policy-making and the development of WHO Guidelines on water quality • develop technical guidance and tools and provide capacity building on risk-based water quality management and surveillance approaches • support the national implementation of international agreements and policy frameworks on water, sanitation and hygiene
WORKERS` HEALTH	• provide technical and policy support for national implementation of the WHO Global Plan of Action on Workers' Health 2008–2017 • help national governments to strengthen the capacity of national health systems to assess and eliminate risks in the work environment

International legal instruments, agreements and coordination work

The WHO Regional Office for Europe coordinates or supports a range of international legal instruments and multilateral environmental agreements. A selection of these is described below.

Air Quality

- WHO Regional Office for Europe chairs the WHO/UNECE Joint Task Force on the Health Aspects of Air Pollution, established in 1998 within the Convention on Long-Range Transboundary Air Pollution (CLRTAP)[20] to assess the health effects of air pollution and to provide supporting documentation. Members include experts designated by countries that are parties to the Convention.

  The Convention on Long-Range Transboundary Air Pollution was signed in 1979 and entered into force in 1983. As the first regional environmental convention, CLRTAP has been instrumental in the reduction of key harmful pollutants in both Europe and North America.

  The Convention covers most of the countries of the WHO European region. Over the past 30 years, the Convention has been extended by 8 Protocols, focused upon setting strict reduction targets for releases of pollution for the protection of human and environmental health. Each of these Protocols targets pollutants such as sulphur, nitrogen oxide, persistent organic pollutants, volatile organic compounds, ammonia, and toxic heavy metals.
- WHO is the custodian agency of SDG indicator 11.6.2 on air pollution (Annual mean levels of fine particulate matter (e.g. PM2.5 and PM10) in cities (population weighted)).
- The Batumi Action for Cleaner Air,[21] adopted at the Eighth Environment for Europe Ministerial Conference (2016), created a framework for Member States to voluntarily commit to ambitious actions to combat air pollution, in the areas of monitoring, national action programmes, public awareness, capacity-building and policy-making.

Chemical safety

- A WHO road map on the enhancement of health sector engagement in the Strategic Approach to International Chemicals Management (SAICM)[22] has been supported by all WHO Member States, including those of the European Region. Adopted by the First International Conference on Chemicals Management (ICCM1) on 6 February 2006 in Dubai, SAICM is a policy framework to promote chemical safety around the world. The Declaration and Strategy are accompanied by a Global Plan of Action that serves as a working tool and guidance document to support implementation of SAICM and other relevant international instruments and initiatives.
- The WHO Regional Office for Europe supports the implementation of the global legal instrument on mercury, the Minamata Convention (2013)[23]. The convention aims to alleviate health impacts and economic losses caused by mercury-induced neurological

[20] http://www.unece.org/env/lrtap/30anniversary.html
[21] http://www.ccacoalition.org/en/resources/batumi-action-cleaner-air-2016-2021
[22] http://www.saicm.org/
[23] http://www.mercuryconvention.org/

deficits. Experience from previously conducted international projects will be used to develop a harmonized HBM methodology for assessing temporal trends in exposures and evaluating the effectiveness of the Minamata Convention.

WATER, SANITATION AND HYGIENE

- WHO Regional Office for Europe provides, together with UNECE, core secretariat functions to the Protocol on Water and Health[24] to the 1992 Convention on the Protection and Use of Transboundary Watercourses and International Lakes and supports its implementation. The Protocol on Water and Health is the first and only multilateral agreement linking sustainable water management and the prevention, control and reduction of water-related diseases in the European region. The Protocol was adopted in 1999 at the Third Ministerial Conference on Environment and Health in London and entered into force in 2005, becoming legally binding for the ratifying countries. To-date, 26 countries have ratified it, covering about 60% of the population of the WHO European Region. The implementation of the Protocol requires an integrated approach and the alignment of policies and strategies in different sectors, ranging from health protection to environmental management, regional development, investment, infrastructures and education.
- WHO Regional Office for Europe facilitates the regional roll out of global monitoring programmes such as the WHO/UNICEF Joint Monitoring Programme for Water Supply and Sanitation (JMP)[25] and the Global Analysis and Assessment of sanitation and Drinking Water (GLAAS) as the official UN mechanisms to measure progress towards achieving relevant SDG targets (6.1-6.2 and 6a-6b) on water, sanitation and hygiene.

CLIMATE CHANGE

- WHO Regional Office for Europe supports the implementation of the United Nations Framework Convention on Climate Change (UNFCCC) Paris agreement and the work of the UNFCCC through a range of projects and reports on climate change and health, as well as the establishment of a dedicated working group on Health in Climate Change as a part of the European Environment and Health Process (EHP). The Paris Agreement builds upon the Convention and – for the first time – brings all nations into a common cause to undertake ambitious efforts to combat climate change and adapt to its effects, with enhanced support to assist developing countries to do so. The Paris Agreement's central aim is to strengthen the global response to the threat of climate change by keeping a global temperature rise this century well below 2 degrees Celsius above pre-industrial levels and to pursue efforts to limit the temperature increase even further to 1.5 degrees Celsius.

[24] http://www.euro.who.int/en/health-topics/environment-and-health/water-and-sanitation/protocol-on-water-and-health

[25] https://washdata.org/

HEALTH IMPACT ASSESSMENT (HIA) AND HEALTH IN ENVIRONMENTAL ASSESSMENTS (EA)

- WHO Regional Office for Europe works together with the UNECE Secretariat of the Espoo Convention on Environmental Impact Assessment (EIA) in a Transboundary Context[26], and its Protocol on Strategic Environmental Assessment (SEA) to support Member States of WHO and UNECE in integrating health in these assessments and implementing the commitments. The Espoo Convention entered into force in 1997 for bringing together all stakeholders to prevent environmental damage before it occurs, with the Protocol entering into force in 2010. WHO supports this work among others through diverse capacity building activities on HIA implementation and the integration of health into Environmental Assessments for the Member States of the WHO European Region, and participation in the Meeting of the Parties of the Espoo Convention and its Protocol on SEA.

URBAN PLANNING AND TRANSPORT

- WHO Regional Office for Europe, jointly with the United Nations Economic Commission for Europe (UNECE), provides the secretariat to the Transport, Health and Environment Pan-European Programme (THE PEP)[27] . THE PEP is a joint initiative by the WHO Regional Office for Europe and UNECE which streamlines and consolidates their activities on transport, environment and health, and establishes a unique intergovernmental body in which these three sectors are equally represented. By providing a European policy framework, THE PEP facilitates a more effective use of resources and better coordination at the national and international levels. THE PEP especially looks into health impacts of transport and promotes active and sustainable modes of transport. THE PEP work emanates from a series of High Level Meetings on Transport, Health and Environment and adopted the Paris Declaration "City in motion: people first!"[28]. The fifth High Level Meeting is expected to endorse a pan-European Master Plan for Cycling Promotion, currently under preparation.
- WHO Regional Office for Europe has actively contributed to the development of the New Urban Agenda[29] and has emphasized the relevance of work on subnational level to support its implementation. As part of the follow-up to the Ostrava Ministerial Conference, a new working group for collaboration among subnational and local authorities was established. Its mandate is to advance the implementation of the commitments made at the Sixth Ministerial Conference at the subnational level by facilitating the exchange of knowledge and experience, promoting the development of partnerships and enhancing policy coherence and synergy.

GREEN SPACES

[26] http://www.unece.org/index.php?id=36354
[27] https://www.unece.org/thepep/en/welcome.html
[28] https://www.unece.org/transport-health-environment-the-pep/publications/unece-the-pep/2015/paris-declaration-city-in-motion-people-first/docs.html
[29] http://habitat3.org/the-new-urban-agenda/

- WHO has started work on green space already in 2011 in response to the WHO Ministerial Declaration on Environment and Health (2010), which included a commitment by Member States "to provide each child with access […] to green spaces in which to play and undertake physical activity" by 2020. The results of this work have been published by two WHO reports focusing on urban green spaces: urban green spaces and health (WHO Regional Office for Europe 2016)[30], and the impacts and effectiveness of urban green space interventions (WHO Regional Office for Europe 2017a)[31].
- The project on urban green space interventions reviewed 48 European case studies and found that for most of the, the main objectives were reported to be the improvement of urban environments and the promotion of active lifestyle, while equity and health benefits were less often reported as the project goals. For projects reporting environmental conditions as the main objective, biodiversity conservation was one of the top priorities (mentioned by 21 case studies) which is only exceeded by the maximization of area attractiveness (23 case studies). This suggests that biodiversity and the protection of natural habitats are embedded in urban planning and often associated with the development of open natural spaces, linking urban and societal benefits with nature benefits.
- To make the conclusions of the WHO work on urban green spaces more useful to practitioners, WHO has summarized the two reports on urban green spaces in an action brief (*WHO Regional Office for Europe* 2017b)[32] to inform and support urban practitioners and decision-makers involved with the design, planning, development and maintenance of urban green spaces. This action brief emphasizes how natural and biodiverse environments can provide healthy settings for life, and how important nature is for physical, social and mental health and well-being.

[30] http://www.euro.who.int/__data/assets/pdf_file/0005/321971/Urban-green-spaces-and-health-review-evidence.pdf?ua=1

[31] http://www.euro.who.int/__data/assets/pdf_file/0010/337690/FULL-REPORT-for-LLP.pdf?ua=1

[32] http://www.euro.who.int/en/health-topics/environment-and-health/urban-health/publications/2017/urban-green-spaces-a-brief-for-action-2017