

Chapter 15

European Nature and Health Network Initiatives



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Abstract Attention to the importance of nature and human health linkages has increased in the past years, both in science and in policy. While knowledge about and recognition of the importance of nature and human health linkages are increasing rapidly, challenges still remain. Among them are building bridges between relevant but often still somewhat disconnected sectors and topics. There is a need to bring together researchers in the fields of health sciences, ecology, social sciences, sustainability sciences and other interdisciplinary sciences, as well as for cooperation between governments, companies and citizens. In this chapter, we introduce European networking initiatives aimed at building such bridges.

Keywords European network · Nature health · Knowledge management · Community building · Transdisciplinarity · Integrative framework

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Highlights

- Attention to the importance of nature and health linkages has increased.
- There is a need to build bridges between the nature and health sectors, and science, policy and practice.
- This chapter describes international/European and national nature and health network initiatives.
- Strengthened inter-network collaboration through capacity building, mainstreaming and integration is needed.
- More structural support is required to encourage better integration.

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15.1 Introduction

Attention to the importance of nature and human health linkages has increased in the past ten years, both in science and in policy. This relates to health benefits from nature-based health-care solutions, such as reducing stress, improving children's immune systems, and reducing the impact from environmental pollution or climate change. This also relates to health risks, such as pollen allergies or infectious diseases transmitted by ticks and mosquitoes. While knowledge about and recognition of the importance of nature and human health linkages are increasing rapidly, challenges still remain. Among them are building bridges between relevant, but often still rather disconnected, sectors and topics. There is a need to connect researchers in the fields of health sciences, ecology, social sciences, sustainability sciences and other interdisciplinary sciences, as well as for cooperation with governments, companies and citizens. This need is expressed by both health and nature sectors, and is considered crucial by many for facilitating integrated and practice-oriented approaches. In this chapter, we introduce European networking initiatives aimed at building such bridges.

The comprehensive State of Knowledge Review Report on Biodiversity and Human Health (WHO and CBD Secretariat 2015) opens with a double and mutually reinforcing message on cooperation: one from the Convention on Biological Diversity (CBD) Secretariat that “all sectors, policymakers, scientists, educators, communities and citizens alike can – and must – contribute to the development of common solutions to the common threats that we face”. The other message is from the World Health Organization (WHO), acknowledging the WHO's awareness of the growing body of evidence that biodiversity loss is a risk to human health, stating “protecting public health from these risks lies outside of the traditional roles of the health sector” and that “it relies on working with partners engaged in conservation, and the sustainable use and management of natural resources”.

In December 2017, the CBD's Subsidiary Body on Scientific, Technical and Technological Advice (SBSTTA) stated recommendations for health and biodiversity at its 21st meeting. It concluded with formally recommending promoting dialogue among ministries and agencies responsible for, among others, the sectors involved with health, environment, pollution, agriculture, urban planning, climate change adaptation and disaster risk reduction in order to foster integrated approaches. In 2018 this was accorded by the member states of CBD (CBD 2018).

In 2017, an expert consultation took place in the context of the Regional Assessment for Europe and Central Asia for the intergovernmental science-policy Platform on Biodiversity and Ecosystem Services (IPBES 2018). The expert panel included people with a wide range of expertise linked to biodiversity in Europe, such as food and nutrition, medicinal resources and infectious disease. The panel was, among other things, asked to assign importance to a number of possible key messages for policy makers regarding the nature-health theme. Survey results revealed that 97% of the expert panel considered ‘integrated approaches to nature and health both in and between science, policy and practice’ very important in such

a key message. Moreover, 91% even considered this message regarding integrated approaches to be very important. Whilst the expert panel had to rate a number of other possible key messages for policy makers regarding the nature-health theme as well (such as the need for research on the human immune system), the need for integrated approaches ranked highest.

In this chapter, we introduce first several relevant international/European and then several national nature and health network initiatives that have the ambition to foster building bridges between nature and health both within and between science, policy and practice. The initiatives present themselves and their main activities, complemented with a self-assessment of what works well and what the challenges are. In this way this chapter provides an overview of initiatives that can offer inspiration to people and groups that have similar ambitions. Finally, we draw some conclusions, summarize challenges, and make suggestions for next steps involved in facilitating further networking, capacity building and integration. Although the purposes of these initiatives vary, all the described initiatives have in common that synthesising both nature- and health-related information, as well as facilitating discussion between experts and practitioners from both nature- and health-related sectors, forms a core part of their main activities.

15.2 International/European Initiatives

15.2.1 ESP Thematic Working Group Ecosystem Services and Public Health

15.2.1.1 Introduction

The Ecosystem Service Partnership (ESP) is an independent non-governmental worldwide network for enhancing the science, policy and practice of ecosystem services for conservation and sustainable development. Part of the work is organized in thematic working groups (TWGs). One of these TWGs is related to health. This TWG was set up in January 2013 to facilitate dialogue between scientists and stakeholders on the connections between ecosystems and human health. In its work, the Public Health TWG helps to build the evidence base on the linkages between ecosystems and human health, and to support communication of key messages to scientists, policy makers and stakeholders. It refers to several international initiatives and work programmes that embrace ecosystem approaches to health. The ESP TWG aims to support these by collating data and expertise, and contributing to the continuing development of conceptual frameworks for ecosystem approaches to health.

15.2.1.2 Main Activities

The main activities have been the organization of special sessions at ESP conferences (one in 2013 and one in 2016) and the organization of a survey.

Ecosystem Services and Human Health – Awareness and Attitudes Survey

The aim of this survey was to gain a clearer view of where and how human health perspectives are addressed by people working in the field of ecosystem services research, policy and practice (what we call the ‘ecosystem services community’). We hoped to gauge the degree of awareness and interest in the topic, and to better understand the needs of those who aim to address links between ecosystems and human health within their fields of work. We also wanted to gain information on the main opportunities and barriers/needs and challenges. In Box 15.1, we present some highlights from the results. In light of nature-health collaboration initiatives, these findings suggest that the vast majority of the ecosystem services community would welcome collaboration with health experts, to inform politicians and through those collaborations maximize ecosystem benefits.

When asked about factors that act as barriers to interdisciplinary research on ecosystems and health, in particular collaboration barriers such as disciplinary differences and lack of mutual understanding were mentioned. Further, lack of awareness about ecosystem–health linkages, lack of scientific understanding of ecosystem–health linkages and lack of resources stand out. When asked about factors that act as opportunities for interdisciplinary research on ecosystems and health in their own area of work, a wide range of examples was mentioned, of which specifically ecosystem-relevant topics, concepts or practices as a sub-group stand out. Topical examples are the influence of urban green infrastructure on health, climate change mitigation and linking ecosystem services with food security; conceptual examples are ecological public health and valuation.

2016 European ESP Conference Session: Health as an Integrating Concept in Ecosystem Services and Nature-based Solutions

The main activity in 2016 concerned the organization of a session at the European ESP-conference. The session was very well attended and included both a diversity of presentations, mainly from on-going research projects, and group discussion. We highlight some issues from the group discussion.

Box 15.1: Some Respondent Highlights of the Ecosystem Services and Human Health – Awareness and Attitudes Survey

- 83% disagreed with the statement “human health is not relevant to my current work on ecosystem services” (including 36% strongly disagreeing).
- Over 50% indicated that “information about ecosystem–human health links is difficult to find”, whereas human health seems to be relevant to most respondents.
- 96% agreed that “policy and practice on ecosystem services should account for human health aspects”.
- 97% agreed that “the ecosystem services community should seek to develop/strengthen links to the health community”.

Part of the discussion concerned the characteristics of ecosystem services related to health: quality of green spaces in relation to health and how people are exposed to different types of nature. Further, an overview of specific ecosystem services and disservices relevant to health were discussed. Apart from green space, the role of both food and perception were discussed.

Part of the discussion concerned issues important for research and mainstreaming. Dealing with complexity was at the core of the discussion about research challenges. In addition, the work could be well related to the health sector, both in terms of indicators and research methods, but also in terms of needs: what kind of information is needed for uptake in the health-care sector?

15.2.1.3 What Works Well

What works well is occasionally bringing together a diversity of experts interested in both ecosystem services and the links with human health. This helps to mainstream the health perspective in the field of ecosystem services and to discuss opportunities and challenges. Obviously, this seems to work best at ESP conferences. What also works quite well is collecting information about bridge-building challenges in the survey discussed here.

15.2.1.4 Main Challenges

The main challenges seem to be keeping momentum and activities alive in the TWG. This is based on voluntary work from the initiating experts, who often lack time and resources to work for the TWG and to participate in all international ESP conferences. Getting regular inputs from other experts interested in the theme and the TWG is not straightforward and needs more work.

Contact information: <https://www.es-partnership.org/community/workings-groups/thematic-working-groups/twg-9-ecosystem-services-public-health/>

15.2.2 Network for Evaluation of One Health

15.2.2.1 Introduction

One Health aims to bring together a collection of expertise, stemming mainly from the human and animal health fields, but over time broadening its perspective to the environment (Keune and Assmuth 2018). Zinsstag et al. (2011) propose One Health as an approach aimed at tackling complex patterns of global change, in which the inextricable interconnection of humans, pet animals, livestock and wildlife with their social and ecological environment is evident, and requires integrated approaches to human and animal health and their respective social and environmental contexts. The WHO – CBD State of Knowledge Review on Biodiversity and Health

(2015) proposes One Health as an overarching framework for integrated efforts, while also recognising and relating to other relevant approaches such as EcoHealth. Earlier a tripartite collaboration between FAO, OIE and WHO (2010) proposed a similar integrated effort also labeled ‘One Health’. Wallace et al. (2015) extended the perspective of One Health to include the socio-economic perspective more clearly, in what they term ‘Structural One Health’. They criticize the earlier One Health concept for omitting to address fundamental structural political and economic causes underlying collapsing health ecologies. Consequently, a One Health approach to address global health challenges such as malnutrition, disease emergence and biodiversity loss should accept that complex issues require a participatory and interdisciplinary process. The Network for Evaluation of One Health (NEOH) was an international network funded by the European Cooperation for Science and Technology (COST) from 2014 to 2018 with the aim to enable quantitative and qualitative evaluations of One Health activities and to further the evidence base by developing and applying a science-based evaluation protocol in a community of experts. While several One Health initiatives have been implemented across Europe, so far there has been no standardized methodology for the systematic evaluation of One Health activities and, more specifically, there have been only a few studies that measured the added value of One Health. The NEOH addressed this gap.

15.2.2.2 Main Activities

The Network’s driving activity was the production of a handbook for evaluation of One Health and the validation of its content by applying it to a suite of international case studies. The full handbook is available as open access here: <https://www.wageningenacademic.com/doi/book/10.3920/978-90-8686-875-9> and most case studies are published in a special issue in *Frontiers* journal entitled “Concepts and experiences in framing, integration and evaluation of One Health and EcoHealth”: <https://www.frontiersin.org/research-topics/5479/concepts-and-experiences-in-framing-integration-and-evaluation-of-one-health-and-ecohealth>. The case studies conducted, and other published studies, are compared in a meta-study for the purpose of international comparison and reflection on the value of One Health. Finally, NEOH considered stakeholder engagement important to assess needs and to promote informed decision-making and resource allocation in One Health, and to facilitate training, learning and capacity building for evaluation of integrated approaches to health (e.g. training schools, workshops, short-term scientific missions and conference grants).

The Network was organized into four working groups who frequently exchanged information with a wider group of experts contributing to different tasks. WG1 was responsible for the development of the overall evaluation framework and the development of the handbook. WG2 applied the evaluation framework, protocol and index developed to different One Health initiatives. WG3 conducted a meta-study of the available case studies. WG4 was in charge of dissemination and stakeholder engagement.

15.2.2.3 What Worked Well

There was a focus on ensuring a friendly and integrative attitude in the Network, with adaptive leadership. By bringing together researchers, practitioners, decision-makers and other stakeholders from different fields with an interest in One Health and evaluation, and offering opportunities for knowledge, exchange and sharing with a clear task and purpose, NEOH managed to create a dynamic learning organization. By engaging a wide range of people with similar interests, but different (disciplinary) backgrounds, expertise, levels of seniority and professional roles, many different perspectives and skill-sets came together in an enabling environment. This contributed substantially to the innovation of methods and integration of existing knowledge, and resulted in enthusiastic participation and a good range of outputs and products.

15.2.2.4 Main Challenges

Given the large membership of the Network, which was spread across a number of countries, and the many opportunities to get involved, there was a risk that participants did not feel ownership of NEOH. Consequently, strong communication and pro-active engagement of participants was critical to ensure that the work was integrative and effective, and not just an assembly of individual tasks. Another major challenge was the risk of collaborating mainly with existing contacts who already buy into the One Health concept instead of recruiting people who have not yet engaged with One Health. Because of this, there was a dominance of animal health professionals in the Network. To mitigate this imbalance, NEOH interacted with other integrated health networks globally to promote wider engagement, conceptual and practical advances, and shaping of a joint agenda. As part of these activities, it formed closer ties with the EcoHealth community. ‘EcoHealth’ encompasses an “ecosystem approach to health”: the biological, physical, social and economic environments and their relation to human health (Keune and Assmuth 2018). EcoHealth can be characterized by interdisciplinarity (e.g. health science, veterinary science, ecology, social science) and transdisciplinarity (collaboration with non-academic practice experts and stakeholders). Apart from the collaborative angle, the equity perspective was essential in EcoHealth (Lebel 2003). Later a more sophisticated set of EcoHealth principles was developed (Charron 2012). As a follow-up of the NEOH COST-Action, as well as an answer to the need for a European network, as was expressed during the 2016 European OneHealth/EcoHealth workshop in Brussels (see Sect. 15.2.3), NEOH has become the European Chapter of the Ecohealth International Trust and is now called Network for Ecohealth and One Health.

Contact information: <http://neoh.onehealthglobal.net/> and http://www.cost.eu/COST_Actions/tdp/TD1404 and <https://www.ecohealthinternational.org/regional-chapters/europe/>

15.2.3 European One Health/Ecohealth Workshop

15.2.3.1 Introduction

The European OneHealth/EcoHealth (OH/EH) workshop took place in 2016 in Brussels (Keune et al. 2017). The organization was coordinated by the Belgian Community of Practice Biodiversity and Health (see also below), and involved a diversity of organizations, including NEOH, CBD and WHO. The workshop aimed at facilitating reflection and exchange, mapping future avenues and supporting collaboration of working on the linkages of biodiversity and human health, or linkages within an OH framework. The general objective of the workshop was to foster collaboration between OH/EH and related concepts and communities that endeavor to combine ecosystem, animal and human health, and to build bridges between science, policy and practice active in the domain of nature and health.

Given the similarities in their objectives to create synergies between health benefits for humans, animals and the environment, the OH and EH concepts appear to be supported by converging communities, working towards a shift from narrow and restricted frameworks towards systems approaches. The two approaches have different origins: EH stems more from a sustainable health action research perspective, and OH more from a human and animal health expert collaboration perspective. Still, the two approaches are united in emphasising “a holistic understanding of health beyond the purely biomedical” and championing “systems thinking as a way of achieving a greater understanding of health problems, and both espouse inter- and trans-disciplinary research and collaborative participation” (Keune et al. 2017).

15.2.3.2 Main Activities

Over 100 experts from different professional backgrounds (science, policy and practice) and different fields of expertise contributed to the workshop. They included natural scientists, animal and human health scientists, as well as social scientists, policy representatives from national governments and the EU, and experts working in Europe, but also in other regions in the world. The workshop programme featured a combination of specific topics and generic integrative sessions. In the topical sessions, participants exchanged experiences and views from their fields and projects, whilst exposing the arguments for and possible ways to apply the One Health perspective in their areas of expertise. Such a broad range of issues was selected in order to reflect the diversity of thematic areas presented in the CBD–WHO *State of Knowledge Review* as well as the cross-sectoral and interdisciplinary challenges faced by the OH community.

15.2.3.3 What Works Well

It was noted by participants that the wide array of cross-sectoral issues was not common in expert meetings. For example: biodiversity-related issues featured less in discussions of the OH community; and experts that tackle health benefits from nature contact or experience do not often engage with communities focusing on nature-related health risks such as infectious diseases. The more generic sessions on evaluation, social science and education were also appreciated and considered important. Lastly, the largely interactive character of the workshop was welcomed by participants. This facilitated networking, bridge building and joint reflection, as well as creative ‘out of the box’ thinking.

15.2.3.4 Main Challenges

During discussions at the European OH/EH workshop, the need for focused European networks was recognized. This will support implementation of OH/EH concepts, which can benefit from transdisciplinary and iterative processes between policy, science and practice. One should, however, be careful of creating big OH/EH institutions as this could result in building fences rather than creating openness to (new) collaborations. This may be avoided by focusing on open, collaborative networks like Communities of Practice, which are less (institutionally) bound and more flexible, and can be open to newcomers and new ideas and approaches. Such networks should not be limited to scientific experts, but also need to be open to policy experts, local knowledge, practitioners, grass-root organizations and all relevant stakeholders. Specific focused networks could concentrate on, for example, transdisciplinary One Health education, integration of social sciences in OH/EH actions and networks, and on translating research findings on the Environment-Microbiome-Health axis into policy-making. It was also suggested that a European Community of Practice could be initiated in order to support these several concrete networking initiatives, and to help to promote the building of other emerging initiatives. Currently, with NEOH (see Sect. 15.2.2 above), the establishment of such a European OH/EH network is under discussion. A follow-up European OH/EH meeting was organized in September 2018 in Bologna.

Contact information: <http://www.biodiversity.be/health/58>

15.2.4 *Conference Biodiversity and Health in the Face of Climate Change*

15.2.4.1 Introduction

Climate change poses significant challenges to biodiversity and human well-being in Europe. Biodiversity in urban as well as in adjacent rural areas can provide benefits for human health and well-being when nature-based climate change

mitigation and adaptation activities are carried out. On the other hand, climate change can negatively influence human health via the spread of allergenic plants and vector-borne diseases. Both issues were tackled at the *European Conference on “Biodiversity and Health in the Face of Climate Change – Challenges, Opportunities and Evidence Gaps”*, on 27–29 June 2017 in Bonn/Germany. The joint conference was held by the German Federal Agency for Nature Conservation (BfN) and the European Network of Heads of Nature Conservation Agencies (ENCA) in collaboration with the Helmholtz-Centre for Environmental Research (UFZ) / German Centre for Integrative Biodiversity Research (iDiv). The event was co-sponsored by the WHO Regional Office for Europe.

15.2.4.2 Main Activities

The European conference in Bonn brought together 220 experts from science, policy and practice to highlight and discuss the importance of biodiversity’s positive contribution to human health in the face of climate change (Marselle et al. 2018). Indirect negative impacts of climate change on human health (e.g. the spread of allergenic plants or vector-borne diseases) were also discussed. The aim of the conference was to increase knowledge, share experiences and foster nature-based solutions to meet the challenges of climate change and health issues. In this context, health was considered in its physical, psychological and social dimension, including socio-environmental equity.

The latest scientific findings on the impacts of climate change on European biodiversity and links to human health were discussed. In addition, the implementation of nature-based solutions towards health and climate goals were outlined. Interactive sessions focused on case studies of successful demonstration projects and lessons learned. Resulting discussions led to recommendations for creating synergies between ongoing policy processes, scientific programmes and practical implementation. These recommendations were formally adopted by the ENCA network at its plenary session in October 2017.

At the conference, the WHO Regional Office for Europe (2016) launched a publication on “Urban green spaces – a brief for action”, in which experiences from interventions to promote human health by fostering green spaces in urban areas are summarized.

15.2.4.3 What Works Well

The conference incorporated and stimulated close interaction between different scientific disciplines (interdisciplinarity) and between scientists and practitioners (transdisciplinarity) such as from policy institutions. It was attended by participants from more than 30 countries, with diverse professional backgrounds (e.g. biology, psychology, medicine, city planning, economy, law) and working on different levels ranging from local and community levels to the EU level. The conference results were distributed via various channels (e.g. the ENCA network) to reach several

administrative and political spheres as well as different expert networks of scientists and practitioners.

15.2.4.4 Main Challenges

Despite the fact that there are many good examples of nature-based solutions for climate change adaptation and promotion of human health in place, there is still a need to increase both the evidence base as well as the awareness of decision makers and practitioners of biodiversity's contributions for human health and well-being. In addition, the co-benefits of nature-based solutions for climate change adaptation should be highlighted for policy-makers and regional planning authorities. In order to foster the wider application of nature-based solutions for climate change adaptation and promotion of human health, and to deliver positive results, the provision of guidance and the sharing of experiences on the effective design and management of green spaces are key factors.

Contact information: <https://www.ecbcc2017jimdo.com/> and <https://www.bfn.de/en/activities/climate-change-and-biodiversity/events/biodiversity-and-health-in-the-face-of-climate-change.html>

15.2.5 Regional Capacity-Building Workshop on Biodiversity and Human Health for the WHO Europe Region

15.2.5.1 Introduction

The Regional capacity-building workshop on biodiversity and health for the WHO European region, held on 23–25 October 2017 in Helsinki, Finland, was jointly convened by the Secretariat of the CBD and the WHO. It was convened in collaboration with the Ministry of Environment, Housing and Energy and the Ministry of Health and Social Affairs, Finland. The WHO Regional Office for Europe also provided technical input and support through the European Centre for Environment and Health. The objective of the workshop was to build capacity among policy makers in the region and to strengthen collaboration, engagement and policy coherence between national agencies responsible for biodiversity and those responsible for health, its Aichi Biodiversity Targets, and to contribute to enhanced national implementation of the Strategic Plan for Biodiversity 2011–2020, and related Sustainable Development Goals.

It also aimed to assist in mainstreaming biodiversity-health linkages in national biodiversity strategies and action plans and national health strategies, and to contribute to the implementation of global commitments for sustainable development including decision XIII/6, concluded at the 13th Conference of the Parties (COP) to

the Convention.¹ COP Decision XIII/6 considers the implications of the findings of *Connecting Global Priorities: Biodiversity and Human Health, a State of Knowledge Review*, led by CBD and WHO (WHO and CBD 2015), with contributions from over 100 multidisciplinary experts, and is the most comprehensive global policy commitment on biodiversity and health achieved to date.

15.2.5.2 Main Activities

The workshop, aimed at building capacity among policy makers in the region, brought together representatives from ministries responsible for biodiversity and those responsible for health from some 30 countries in the region, as well as a number of relevant organizations, and thematic regional experts. Participants discussed critical linkages at the biodiversity-health nexus and their relevance to the Strategic Plan for Biodiversity 2011–2020 and its Aichi Biodiversity Targets, discussing the need to further mainstream biodiversity and health linkages in public health strategies, and to incorporate public health considerations in biodiversity strategies and better align cross-sectoral policy action. The workshop format featured high-level keynote presentations from both sectors, and a vast array of expert presentations followed by question-and-answer sessions, presentations by country representatives, discussions in smaller working groups, interactive sessions, a guided health walk, as well as an optional field visit at the end of the workshop.

Presentations and group discussions focused on five thematic areas at the biodiversity and health nexus. These included: The human microbiome and the benefits of exposure to microbial diversity in the environment; supporting biodiversity and health for food security and nutrition; zoonotic and vector-borne diseases and One Health; biocultural diversity, mental health and community health; and promoting ecosystem and human health in urban landscapes.

15.2.5.3 What Works Well

The expert presentation provided an overview of the state of the evidence across each of the thematic areas in line with the findings of the State of Knowledge review on Biodiversity and Health, presented case studies and relevant regional and global initiatives that could be leveraged to support the mainstreaming of biodiversity and health linkages across national policies, plans and programmes in the region.

All nominated country representatives from both the environment and health sectors were then invited to make presentations based on their national experiences. This provided an opportunity for country representatives to highlight relevant national policy developments, best practices and related cooperation initiatives emphasising, where possible, main outcomes, experience gained and lessons learned.

¹ <https://www.cbd.int/doc/decisions/cop-13/cop-13-dec-06-en.pdf>

Smaller working groups and interactive sessions provided a unique opportunity for cross-sectoral exchange among policy makers at the national and regional levels. Participants identified opportunities and challenges associated with mainstreaming biodiversity and health linkages across sectors, highlighted data gaps and needs, and discussed how to strengthen policy coherence across sectors and global policy commitments in line with the 2030 agenda for sustainable development. Discussions also provided valuable input to supporting implementation on the ground and supporting policy developments. At the global level, for example, insights were discussed in view of the preparation of a biodiversity-inclusive One Health guidance prepared by the CBD-Secretariat in collaboration with the WHO, endorsed by CBD Parties and adopted as Recommendation XXI/3 of the Subsidiary Body on Scientific, Technical and Technological Advice (SBSTTA) that will inform the outcomes of the 14th meeting of the CBD Conference of the Parties.² Regional capacity-building workshops provide unique opportunities to bridge the frequent gaps between scientific findings and both their relevance and application to real-world policy settings, to foster cross-sectoral dialogue, to raise awareness and to strengthen policy engagement.

15.2.5.4 Main Challenges

A number of challenges in supporting biodiversity and health mainstreaming were identified by participants. Examples include:

- The need for additional forums and workshops to support implementation of regional and global policy commitments.
- The need to better integrate understanding of ecological and evolutionary processes that can help societies to manage the complex socio-ecological systems that encompass health systems, food systems and the way societies plan where and how to live.
- The need for more significant investment in preventive measures to reduce the inefficiencies associated with reactive response-driven approaches.
- The need to strengthen mainstreaming by integrating health-biodiversity linkages into national strategies and policies for health and for biodiversity, and in those for agriculture, fisheries and food production, planning, climate change and disaster risk reduction, as well as economy and finance.

Importantly, it was agreed that while more scientific research is always needed, enough is also known to move to action in many areas. There are a number of no-regret measures that could be better harnessed: investing in nature-based solutions such as the integration of biodiverse green spaces in urban development; better control and use of antimicrobials, pesticides and other biocides; addressing together the drivers of ill health and biodiversity loss; and better monitoring of environmental change. In particular, it is essential to raise further awareness among

²<https://www.cbd.int/doc/c/72d6/b5bb/9244e977048688ec45735d2c/sbstta-21-04-en.pdf>

different stakeholders, including policy-makers, and to build capacity on the ground to facilitate implementation and maximise synergies between actions taken across sectors.

Mechanisms and initiatives to support implementation at each the national, sub-national and global level were also identified as necessary both for strengthening the science policy-interface and for maximising policy coherence across sectors and levels of governance. Tools and mechanisms to support both the development and implementation of policies, plans and programmes based on biodiversity-inclusive holistic approaches such as One Health, EcoHealth and Planetary Health are also needed at each of the national, regional and global levels.

Contact information: <https://www.cbd.int/health/european/default.shtml>

The regional capacity-building workshop was made possible thanks to financial support from the European Commission and the Government of Finland (four ministries), and co-operational assistance from Finnish Environment Institute (SYKE). The full report of the regional workshop is available from <https://www.cbd.int/doc/c/ab6d/0fed/3e795d2f62d288b6ee369c31/hbws-2017-01-02-en.pdf>

15.2.6 Coalition of the Willing on Biodiversity and Health

15.2.6.1 Introduction

A potentially interesting collaborative but informal format for networking and capacity building among countries/member states of the CBD and WHO is a ‘Coalition of the Willing on Biodiversity and Health’. Another voluntary and informal initiative is the International Coral Reef Initiative (ICRI) created in 1994 by eight states (Australia, France, Japan, Jamaica, Philippines, Sweden, the UK and the USA) and set up during the first CBD conference of the parties in December 1994. This coalition now brings together more than 60 members. No similar initiative exists at the moment regarding nature and health linkages, but informally a ‘Coalition of the Willing on Biodiversity and Health’ is already considered as a potentially relevant format to enhance the capacity among countries to implement the internationally agreed ambition of putting biodiversity and health recommendations into practice. The Coalition of the Willing on Pollinators, which was established in 2016, can function as a good reference and example, and will be briefly introduced here.

Promote Pollinators – Coalition of the Willing on Pollinators

One of the highlights of the 2016 Conference of the Parties of CBD was the set up and signing of the Declaration on the Coalition of the Willing on Pollinators. Thirteen countries signed the declaration in Cancun, Mexico (CBD COP-13) and

many countries, organizations and businesses want to join. Pollinators play a key role in the conservation of biological diversity, ecosystems, food production and the global economy. The coalition believes that country-led politics can foster policy measures and innovative action on protecting pollinators.

The initiative to form a coalition was taken by the Ministry of Economic affairs of the Netherlands and was warmly welcomed by Anne Larigauderie, Executive Secretary for the Intergovernmental Platform on Biodiversity and Ecosystem Services (IPBES). The Coalition of the Willing on Pollinators believes that country-led politics can foster policy measures and innovative action on protecting pollinators. National pollinator strategies are an important tool for the conservation of pollinators. The coalition is reaching out to new partners with the aim of continuously expanding common efforts and sharing knowledge and innovations.

15.2.6.2 Main Activities

The main aim of the coalition is to share information among countries about how to take action to protect pollinators and their habitats by developing and implementing national pollinator strategies, consistent with the IPBES thematic assessment on pollinators, pollination and food production. The Coalition works by sharing experience and lessons learnt in developing and implementing national pollinator strategies, especially knowledge on new approaches, innovations and best practices. The Coalition also seek collaboration with a broad spectrum of stakeholders, in order to develop research on pollinator conservation and to enhance mutual support and collaboration.

15.2.6.3 What Works Well

The Coalition has a formal character in its aim and focus, and its procedural way of working. Still, it is not a consensus-oriented negotiation organization, as is CBD. In the Coalition, the focus is on mutual exchange, inspiration and learning among countries that share a positive interest in implementing internationally agreed upon recommendations (e.g. from CBD or IPBES).

15.2.6.4 Main Challenges

A crucial challenge is to keep the Coalition functional. Despite the informal practice of the Coalition, this demands some structural support function, secretariat, with sufficient resources.

Contact information: <https://promotepollinators.org/>

15.3 National Initiatives Within Europe

15.3.1 Austria

15.3.1.1 Introduction

The initiative “Biodiversity and health” led by Umweltdachverband (Austrian NGO and environmental umbrella organization) in cooperation with several partners started in 2012.³ The aim of this Austrian project is to raise awareness for the benefits of biodiversity and nature for human health and well-being. By pointing out to the correlations and relationships between biodiversity and health aspects, the attention of decision-makers and the general public is drawn to the intrinsic value of unspoiled ecosystems, landscapes and services they provide for free. The aim is to promote acceptance and commitment for the conservation of biodiversity in order to facilitate achieving the national biodiversity goals along with the Biodiversity Strategy Austria 2020+. Another objective is to bring together the various stakeholders across all relevant sectors in order to enable mutual regard for their interests and to integrate biodiversity conservation in other sectoral policies and networks.

15.3.1.2 Main Activities

A ‘Biodiversity and health’ forum was established in 2015 as a cross-sector platform with the goal of mainstreaming issues of biodiversity conservation into other sectors, including the sense of health promotion. Stakeholders from various fields such as science, nature conservation, health, medicine, psychology, education as well as representatives from authorities participated. The forum meets annually and discusses priorities for cross-sector collaboration and possibilities on how to engage the general public. As an outcome, an action plan has been drafted with active support of the Austrian Federal Ministry for Sustainability and Tourism, and also in coordination with the Austrian Federal Ministry of Labour, Social Affairs, Health and Consumer Protection.

Another important part of the initiative consists of public relations work in order to encourage the general public to include actions for biodiversity conservation in their daily life. This was realized by producing an animated short video, which explains biodiversity and its benefits for health and well-being (www.youtube.com/watch?v=JWP4EEJ-19k). The message of the short video was designed to be easy to understand. It is suitable for introducing people to the topic and for visualising the multiple associations of biodiversity and health. Furthermore, a book “Good for you and me. How Biodiversity promotes our health” (German) was published to enable a more detailed look at this complex relationship. The book draws attention to vari-

³This contribution has been drafted within the project “BIO.DIV.NOW II – Mainstreaming von Biodiversität erfolgreich umsetzen”, funded by the Austrian Federal Ministry of Sustainability and Tourism and the European Union.

ous aspects, such as the value of species richness for the development of medicinal products, the importance of contact with nature for children and their development, the opportunities to recover and relax in natural areas, and the role of ecosystem services in providing clean air and water. In addition, the initiative participated in an international conference on Landscape and Human Health: Forests, Parks and Green Care (University of Natural Resources and Life Sciences 2017).

In summary, the initiative “Biodiversity and health” contributes in various ways to the facilitation of interdisciplinary communication as well as networking and to the integration of biodiversity protection and connected aspects of health and well-being into other sectoral policies.

15.3.1.3 What Works Well

The forum “Biodiversity and health” fulfills its purpose as a cross-sector platform in order to show and discuss the interlinkages of biodiversity and human health in consideration of all relevant aspects. The participants of the meetings are very eager to find out more about activities in other sectors. For this purpose, the presentation of best practice examples from different stakeholders works well, including in drawing attention to the synergies of biodiversity protection and health promotion.

Collecting measures and relevant requirements for the national action plan on biodiversity and health has also been part of the meetings of the forum. The action plan consists of six action fields and nine targets, and includes 48 recommendations for measures relating to the promotion of biodiversity conservation linked to its various benefits for the health sector as well as other parts of society. The plan has been drafted with input from this multi-sectoral platform and constitutes an important tool for promoting the topic and getting people engaged. It has been presented to Austria’s national biodiversity commission, who is invited to recommend the broad implementation of the action plan. The plan is available online at the following link: www.umweltdachverband.at/inhalt/empfehlungen-fuer-einen-aktionsplan-2020-biodiversitaet-and-gesundheit?ref=137.

15.3.1.4 Main Challenges

Apart from gaining actual recognition for the interlinkages of biodiversity and human health among the various stakeholders, one of the main challenges is to get key players from other sectors to assume responsibility for the integration of biodiversity issues in their own agendas, strategies and fields of action. In order to make sure that biodiversity, ecosystems and the services they provide are protected, real actions need to take place. Biodiversity conservation needs to be acknowledged as a matter of high social importance in all relevant sectors, which is a challenging task.

Contact information: www.umweltdachverband.at/biodiversitaet-und-gesundheit/

15.3.2 Belgium

15.3.2.1 Introduction

Since 2011 the Belgian Community of Practice Biodiversity and Health (COPBH), facilitated by the Belgian Biodiversity Platform, has tried to enhance biodiversity and health-related science, policy and practice in Belgium. The Belgian Biodiversity Platform is a science policy practice interface related to biodiversity issues, and is funded by the Belgian Federal Science Policy Office (BELSPO).

15.3.2.2 Main Activities

Community Building and Networking Events

In 2011, the Belgian Biodiversity Platform organized a Belgian Biodiversity and Health conference (Keune et al. 2013). It was at this event that the COPBH was founded. The COPBH facilitates an online expert registry and newsletter, and some research project initiatives emerged from bigger and smaller meetings of the COPBH. Apart from scientific partners, there is also collaboration with practice organizations, both with policy institutions and NGOs. Recently, connections to the health sector have been strengthened through collaboration with the Faculty of Medicine and Health Sciences and the Province of Antwerp with the launch of the Chair Care and the Natural Living Environment at the University of Antwerp. An advisory expert committee working within the framework of the Belgian Superior Health Council was initiated at the end of 2017, with support from the COPBH. The aim is to better connect to health-care professionals and other relevant groups for collaboration. In 2016 the COPBH coordinated the organization of the European One Health/Ecohealth workshop in Brussels (see Sect. 15.2.3 above). This is another example of how the COPBH tries to enhance international contacts for Belgian experts and practitioners.

The COPBH also inspires research programmes related to health and biodiversity topics, both at a Belgian and an international level. An example is an overview of research needs and gaps, which was produced before the start of a BELSPO research funding programme called BRAIN, in order to inspire research calls regarding biodiversity and health; this overview was included as an addendum in the first BRAIN call where biodiversity and health issues were addressed. In addition, the COPBH works on mainstreaming and awareness raising by giving on-demand introductory presentations, such as in 2017 in the Flemish Parliament, and support with state-of-the-art overviews of scientific knowledge and practice projects. Finally, the COPBH also contributes to Belgian delegations to international processes such as Mapping and Assessment of Ecosystem Services (MAES), IPBES and CBD, focusing mainly on health-related issues.

15.3.2.3 What Works Well

In particular, the networking events and mainstreaming activities seem to work quite well. The presence in international processes seems fruitful in the sense of gaining attention for biodiversity and health at the international level and in other countries, and for support efforts in Belgium: the fact that biodiversity and health is more prominent on the international agenda also creates more interest and legitimacy for the work in Belgium.

15.3.2.4 Main Challenges

Several main challenges stand out. First, active involvement of experts and practitioners in community building is important. Even though there is an interest, clearly shown by the high attendance during events, in daily practice, often there is a lack of time and resources to further commit to such integrated and collaborative efforts. A second and related factor is that funding resources for more collaborative research and practices are still rather limited. There has been improvement over the years, but more interdisciplinary and transdisciplinary projects in particular, both in science and in practice, have a difficult time to find support. Thirdly, and again also related, a big challenge in bridge building is overcoming the divide between a focus on nature-related health benefits and risks. These issues are still treated by separate communities and departments, whilst a more integrated approach would be desirable. A more institutional challenge is the complex policy constellation of Belgium: several nature- and/or health-related policies are either a federal or a regional policy responsibility. To work in an integrated manner is more difficult in such an institutional constellation.

Contact information: <http://www.biodiversity.be/health/>

15.3.3 Finland

15.3.3.1 Introduction

General, professional and scientific discussion on the interlinkages of biodiversity and human health has been very active in Finland over the last years. The positive health effects of biodiversity and nature connection on human health especially have gained a lot of interest. Based on produced information, there is a good reason to believe that better contact with natural environments can enhance the cohesion of families and communities, citizens' health and well-being, prevent diseases and, as a consequence, also reduce national health costs.

Through the better knowledge of health effects from nature, there is also a very strong business case and job creation possibilities. Nature-connected innovations in health-care

systems, well-being tourism and various approaches, such as Healthy Parks – Healthy People, health walks and Green Care, already support this business case.

15.3.3.2 Main Activities

Recently, Finnish scientists have produced results suggesting that biodiversity loss and rising trends of inflammatory diseases – two global megatrends – may be related (von Herzen et al. 2011). There is also scientific evidence supporting the differences in the presence of allergies between the people living in Finnish Karelia and Russian Karelia. According to the results, allergy is more common in Finnish Karelia than in Russian Karelia. People exposed to a greater number of nature contacts and diverse microbiota on the Russian side of the border seem to have more protection from allergic reactions (Hanski et al. 2012, see also the biodiversity hypothesis presented by Haahtela et al. 2013).

The project *Ecosystem Services and Human Health* (2013–2014), financed by the Finnish Cultural Foundation, stimulated national dialogue on biodiversity and human health between environmental and health researchers, experts and decision-makers (Jäppinen et al. 2014). Likewise, the project *Ability to read nature – creating business from green well-being* (Särkkä et al. 2013, available in Finnish only) and the Healthy Parks – Healthy People Finland (HPHPF) programme (Parks and Wildlife Finland 2016) have produced relevant and comprehensive knowledge for the needs of service design, national planning and wider discussion (see Box 15.2).

The Pan-European WHO-CBD Workshop on Biodiversity and Health for the European Region, held in Helsinki (23–25 October 2017) promoted international dialogue on the subthemes: Human microbiome and exposure to microbial diversity in the environment; Biodiversity, health, food security and nutrition; Zoonotic and vector-borne diseases and One Health; Biocultural diversity and mental health; Promoting ecosystem and human health in urban landscapes; and Biodiversity, health, food security and nutrition (see WHO-CBD Pan-European Workshop on Biodiversity and Health for the European Region, held in Helsinki (23–25 October 2017) <https://www.cbd.int/health/european/default.shtml>).

15.3.3.3 What Works Well

Finland has built a good basis for the future developments on biodiversity and health issues through the analyses, results, policies and practical delivery of policies of the recent activities described above. As a small country Finland also has the advantage that networks of national health and biodiversity experts and administrative sectors are already quite well established. Finland also strongly participates in international discussion, which has been an important part of positive developments in the field of biodiversity and human health. National challenges are often similar between countries, and learning from good practice is globally essential.

Box 15.2: Healthy Parks, Healthy People – Finland

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Parks and Wildlife Finland (PWF) manages all of Finland's national parks, other state-owned protected areas and cultural heritage sites, as well as their hiking services. As the global awareness and evidence on the benefits of diverse nature and outdoor recreation for human health and well-being have significantly increased over the last few years, PWF has been implementing the HPHPF programme since 2010. The programme is a policy example to deal with the spread of chronic illnesses, increasing welfare costs, and securing funding for biodiversity conservation. As such, the overall goal of HPHPF is that Finnish health and well-being is improved by diverse nature. HPHPF consists of three main themes, as well as prioritized measures, to attain these goals by 2025:

1. From nearby nature to national parks

Major cities in Finland can contribute to health by offering well-functioning, continuous green space serving the outdoor recreation requirements of local people. PWF is working with partnership networks between managers of public greenspaces, for example in the cities of Oulu, Kajaani and Helsinki. The focus of the manager networks is to improve the quality, accessibility and awareness of the various sites and communicate them together effectively.

2. Everyone outdoors

Everyone should have equal opportunities to enjoy the green environments. Bold initiatives lower the threshold for engaging in outdoor recreation, making it easy and fun throughout the year. PWF improves the service design of popular protected areas for new customers, e.g. disabled people (see Fig. 15.1a), and experts in the Finnish Adapted Physical Activity Federation.



Fig. 15.1 Facilitating the use of the outdoors for all. (a) Accessible structures and trails for disabled people in Hossa National Park; (b) Family contributing during the Shepherd Weeks

(continued)

Box 15.2 (continued)**3. Communications and cooperation**

Increased knowledge of the connection between biodiversity and health needs to reach key actors and influence decision making. PWF has initiated cooperation with two regional hospital construction projects with the aim of enhancing customer experience and speeding up recovery by introducing strong green space imagery, natural soundscape and materials, as well as new operational models utilising the nearby nature.

Enjoying the outdoors can also contribute to biodiversity. PWF runs national Shepherd Weeks attracting thousands of applicants each year, and so far over 1,500 volunteers (see Fig. 15.1b). During the Shepherd Weeks volunteers on 12 sites contribute to nature conservation and landscape management, taking care of grazing animals. The week in nature helps volunteers in recovery from stress, improving mood and enhancing family ties.

The HPHPF programme continues to inspire PWF and partners in coming up with practical outcomes and new development projects.

In general, and perhaps more so than in most other European countries, the Finnish people are active, outdoor people, for whom nature is an essential part of everyday life and leisure time. This active relationship with nature has improved their social, physical and mental well-being, and the positive relationship towards nature provides a good basis for developing new positive synergies that are based on the natural environment. There is also a good number of private companies that have based their businesses on the positive interconnections between people and nature.

15.3.3.4 Main Challenges

At a national level there is still a need to promote cross-sectoral dialogue, especially between the Ministry of Social Affairs and Health, Ministry of the Environment and the Ministry of Agriculture and Forestry. These ministries and their research and development institutes can make progress through mainstreaming and enhancing national cooperation between governmental and other sectors, including private companies.

There is a need for more detailed scientific evidence on the interlinkages of nature and health, but at the same time, it is very clear that experts, practitioners and decision makers do know enough to act, which means integrating the known positive health effects of nature into national health-care strategies and policies. For instance, Finland could invest in nature-based solutions such as the integration of biodiverse green spaces in urban development, and better control the use of antimicrobials, pesticides and other biocides harmful for human health, and also for biodiversity.

In this regard, Finland could prepare a roadmap on biodiversity and human health, which would assist the preparation of national health and biodiversity policy and action plan. The identified policy and research needs could also be integrated in the updated version of the Finnish National Biodiversity Strategy and Action Plan (NBSAP), and if there is enough political will, it may be possible to develop a separate National Biodiversity and Human Health Strategy and Action Plan for the Post 2020 period.

Contact information: <http://www.metsa.fi/web/en/healthbenefitsfromnational-parks> and <https://www.cbd.int/health/european/default.shtml>

15.3.4 France

15.3.4.1 Introduction

Created in 2008, the Foundation for Research on Biodiversity is a national science-policy platform created by the main French public research establishments working on biodiversity. This platform was joined by Moët Hennessy Louis Vuitton (LVMH) in 2014. In 2018, more than 240 public and private entities (firms, non-governmental organizations, managers or public authorities) have joined the FRB to face biodiversity challenges together.

The core mission of FRB is to generate innovation, promote good scientific projects in association with society and its stakeholders, develop studies, overviews and valuations, and communicate research results.

15.3.4.2 Main Activities

Supporting Research

The answer to a number of biodiversity and health questions requires assembling and combining multiple and heterogeneous data sets, allowing researchers to conduct new analyses that go beyond those related to data published in individual studies or research programmes. To tackle this challenge, FRB firstly promotes a new approach to biodiversity research, fostering better use of existing data from large data sets collected in different locations, on different scales, on different levels of biodiversity (from micro-organisms to ecosystems and landscapes) and through different scientific disciplines, time series, etc. This is made possible thanks to calls for synthesis launched at the synthesis centre *Centre de synthèse et d'analyse sur la biodiversité* (CESAB), which belongs to an international network of similar initiatives.

One project about the relationships between biodiversity and infectious diseases has been funded by FRB in this context, and it was led by Jean-François Guegan (France) working with 11 other scientists from France, the USA, Italy and Mexico.

Bringing together ecologists, public health scientists, veterinarians, modelers and parasitologists working in four different regions of the world, this project addressed three major issues: (1) which life-history characteristics may confer to hosts a better capacity to be ‘good vessels’, (2) how do we quantify the parasites’ capacity to cross species boundaries; and (3) what is the role of biodiversity in transmission of infectious diseases on different spatial scales.

Deliverables were databases, disease modelling, reviews and exploratory articles, actionable public health policy information shared with health-protection agencies and the media; and training of young scientists in this new research.

Systematic Reviews on ‘Resistance to Antibiotics’, ‘Biodiversity and Infectious Diseases’

FRB also promotes several other methods to highlight knowledge gaps or uncertainties on knowledge, the latter often related to the great disparity between experimental protocols. Systematic reviews are one of these approaches. This method aims to promote a more efficient use of knowledge as well as the assessment of scientific uncertainties in order to facilitate decision making, to validate the research results and to favour the development of targeted research programmes that effectively complement the knowledge already acquired.

FRB currently leads or contributes to several systematic reviews or evidence-synthesis works. Funded by the French Ministry of Environment, one addresses how antibiotic resistance in the environment is impacted by changes in practice concerning (1) the use of antibiotics, (2) the management of wastes and (3) the management of the natural environment. The protocol of this review is available on open-access and the review will deliver its final results in early 2019.

In 2003, the French government published its first national agenda for environment and health. The third one, launched in 2015, included for the first time several actions about biodiversity and health, two of which are managed by FRB. The first one was conducted within a group of European experts from the H2020 Eclipse programme of which the FRB is a partner. Experts will address one main issue: what is known about the effects of different types of habitats and certain components of green spaces on mental health and well-being? The results of this work are intended to guide more effectively the decisions to create new urban and peri-urban green spaces, to better inform landscape architects and environmental managers about the most reliable knowledge, and to highlight research gaps. The second one was financed by the French Agency for Biodiversity and will target the positive effects of biodiversity on the prevention and control of infectious diseases affecting humans. The aim of this systematic review is to analyse the scientific knowledge on the link between biodiversity and some infectious diseases in order to identify the

research gaps and validated research results to support public policies and stakeholder actions on the biodiversity and infectious diseases interface.

Advocating Biodiversity Conservation and Its Sustainable Use Based on Scientific Results

The Foundation produces documents that synthesize research results for better ownership by public and private decision makers. The latest one was related to the epidemic of Lyme disease in Europe. FRB is also a member of several organizations such as IPBES, the European network Eklipse on science-based decision for biodiversity, the European research network on biodiversity (BiodivERsA) and CDB, all of which deal with Biodiversity and health. At the national level FRB is a member of the National group for Environment and Health and co-leader of the group 'Biodiversity and Health' with the French Ministry of Environment.

15.3.4.3 What Works Well

The networking, at national, European and international levels, is very efficient and several messages related to the preservation of biodiversity have been effectively passed to stakeholders (members of the Foundation's strategic orientation council), to the ministries, within the French delegation for the CBD and IPBES and to the European or international working groups. The first results (CESAB research project) have found a strong echo among stakeholders and are recognized within the scientific community. For more achievements of the project, see: Ezenwa et al. 2015; García-Peña et al. 2016; Suzán et al. 2015.

15.3.4.4 Main Challenges

The first challenge faced by the Foundation is to find money to support research to fill knowledge gaps and contribute to the building of sound evidence bases. The second challenge is to find more effective levers to transform knowledge into relevant action to preserve both biodiversity and the health of humans, animals and plants.

Contact information: <http://www.fondationbiodiversite.fr/fr/> and <http://www.cesab.org/index.php/fr/projets-passes/59-biodis>

15.3.5 Germany

15.3.5.1 Introduction

The *German Federal Agency for Nature Conservation (BfN)* provides the German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU) with professional and scientific assistance in all nature conservation and landscape management issues on the national, European and international levels. In these contexts, the BfN plays a central role as ‘science-policy interface’. In this light, the BfN has been active in the field of biodiversity and health for almost 15 years, in an effort to cover the physical, mental and social dimensions of health (see Job-Hoben et al. 2010).

15.3.5.2 Main Activities

BfN Research and Development Project: ‘Green-Natural-Healthy’

To support the inclusion of health promotion aspects in planning practice, the BfN-funded study ‘Green, natural, healthy’ (Rittel et al. 2014) included information on different user groups and their needs, criteria to determine health-promoting potentials of urban green spaces and a list of good arguments for planners concerning the positive effects of green spaces on human health. These scientific findings support municipalities with helpful arguments to safeguard and enhance the positive benefits of ‘green spaces’ on human health against the background of climate change, demographic change and environmental justice.

Transfer of Results

One prominent example of the transfer of scientific results to decision makers is the national follow-up of the international study ‘The Economics of Ecosystems and Biodiversity’ (TEEB). The ‘Natural Capital Germany – TEEB DE’ report on ‘Ecosystem Services in the City – Protecting Health and Enhancing Quality of Life’ contains comprehensive sections of the current knowledge of the nexus between urban green, human health, climate aspects and social cohesion (Naturkapital Deutschland – TEEB DE 2016).

Communication Related to the Topics of ‘Biodiversity, Health and Climate Change’

One example of BfN’s communication activities is the web portal ‘NatGesIS’ – short for ‘nature conservation and health information system’, a tool for communicating the interlinkages between nature conservation and health. The portal contains

a comprehensive compilation of information about nature-related health courses and treatments, wellness and nature experience with children, as well as specific data on natural resources, health and climate change made available for the scientific community and the public. A second example of BfN's communication activities is a series of events concerning psychological aspects in the communication about nature conservation (regarding topics such as happiness, well-being, nature experience, climate change and mindfulness).

Another example of outreach activities to the general public are hiking events, organized by the BfN every year since 2010. Through this format it is possible to experience the linkages between nature and human well-being personally. In addition to a prominent opening event, local and regional organizers can join in and promote their hiking activities on a central web platform. In 2016, more than 1,600 hiking tours were offered.

15.3.5.3 What Works Well

The health-related activities of the German UN Decade on Biodiversity 2011–2020 contribute to an ongoing networking and communication process in Germany. Next to public relations, newsletters and social media, the UN Decade honors projects and contributions, which work in an exemplary manner to conserve biodiversity. For the years 2017/2018, the UN Decade placed the slogan 'Healthy – With the diversity of nature' at the centre of the competition. The objective is to highlight exemplary engagement shown in four key areas: (1) medicine from nature, (2) recreation areas and activities in nature and outdoors, (3) the healing power of nature, and (4) natural resources as a basis for health. Since the start of the main topic, around 20 projects in this thematic area have been awarded. The conferment of the title 'Official project of the UN Decade on Biodiversity' receives high public attention in the print media, social media and television. To further connect prospective partners from health-care and biodiversity, a special working group has been established. It also serves to present case studies and promotes the development of new ideas. Additionally, a conference on biodiversity and health was held in June 2018 which focused on the health prevention potential of nature.

15.3.5.4 Main Challenges

There is still a need to raise awareness among decision makers and practitioners in the health sector with regard to the contribution of biodiversity and nature to human health. Networks and intensive exchange have to be further established, and joint projects should be initiated.

Contact information: <https://www.bfn.de/> or <http://natgesis.bfn.de/> (in German only) or <https://www.undekade-biologischesvielfalt.de> (in German and English).

15.4 Conclusions

The examples in this overview illustrate the variety of European nature–health network initiatives. This mirrors the emerging international interest in nature–health linkages across Europe; several initiatives are still quite recent. We should note that the contributions are based on self-assessment by key organizers or facilitators of the respective initiatives. We nevertheless hope that these self-reflections are inspiring and will encourage creation of sufficient critical mass in the European region for strengthening these kinds of networking activities, and collaboration and exchange among them, for the sake of further progress. In the rest of this final section, we summarize some of the key findings and describe lessons learned.

15.4.1 *Aims of the Networking Initiatives*

Important aims mentioned are capacity building (mainly knowledge capacity and expert capacity), mainstreaming (across disciplines and sectors between and beyond nature and/or health) and integration. Functional in this respect is strengthening of the evidence/knowledge base regarding nature – health linkages, but also linking existing insights to policy and practice, to the extent it is concluded that there is already sufficient understanding on particular items within the broader nature–health linkages. Regarding integration, this is mentioned in terms of both sectors (i.e. nature and health sectors and other relevant sectors, in science, policy and practice) and content (i.e. regarding both nature-related health risks and benefits), both within specific topical domains (e.g. infectious disease risks), as concerning generic angles, such as social science, evaluation or education. An example of reaping the fruits of a networking capacity is the expert consultation for the IPBES Regional Assessment Europe and Central Asia (IPBES 2018): experts can more easily be contacted and are already aware of ongoing work and important challenges.

15.4.2 *Main Activities and Outputs*

Knowledge generation or facilitation activities are part of the project, such as expert elicitation, knowledge synthesis, development of integrative and evaluative frameworks, and data support.

Network activities are aimed at stimulating dialogue, community building and several other forms of interdisciplinary and transdisciplinary interaction between experts and stakeholders. Other types of events or projects are mentioned, such as hiking events and communication activities through newsletters, books, video and the like. Other achievements include an expert registry, web portals, and guiding material – such as handbooks, policy briefs, best practices, action plans, case studies, innovations and practical solutions.

15.4.3 Conditions

An important condition for successful networking initiatives is the availability of structural resources including supporting infrastructure. Even when informal in character, structural, financial or other, support is important to keep momentum and activities going. Most networks seem to flourish best in an informal setting for exchange and collaboration, but some initiatives also require a more formal element such as development of joint action plans or other forms of recommendations. Another important element is the contribution of network members and experts: without commitment or a sense of ownership, and without a broad range of membership beyond the usual suspects, they may struggle to survive and to reach their goals.

Several network initiatives mention multi-scale activities, which may also be mutually supportive. For example, it may help local or national initiatives to link to or mention international developments supporting the direction of local propositions. Further, local cultural institutional conditions may promote or hinder the functioning of network initiatives. For example, the complex institutional constellation of Belgium is perceived to be a challenge, whereas the more intensive nature-connectedness of the Finnish lifestyle helps to trigger a positive response to nature–health activities.

15.4.4 Ways Forward

Several network contributions to this chapter mention future plans and needs. Clearly, they support significant capacity building and mainstreaming work, the importance of which is underlined at different occasions and steps. The existence of a diversity of nature–health network initiatives is mainly a strength, and even on an international scale, they all have their own history and context in which they are relevant. More structural support for these initiatives and strengthening inter-network collaboration offers a strong way forward.

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References

- CBD (2018) Decision adopted by the conference of the parties to the convention on biological diversity, 14/4. Health and biodiversity. CBD/COP/DEC/14/4
- Charron DF (ed) (2012) Ecohealth research in practice: innovative applications of an ecosystem approach to health. Springer, Ottawa

- Ezenwa VO, Prieur-Richard A-H, Roche B, Bailly X, Becquart P, García-Peña GE, Hosseini PR, Keesing F, Rizzoli A, Suzán G, Vignuzzi M, Vittecopq M, Mills JN, Guégan J-F (2015) Interdisciplinarity and infectious diseases: an Ebola case study. *PLoS Pathog* 11(8):e1004992. <https://doi.org/10.1371/journal.ppat.1004992>
- García-Peña GE, Garchitorena A, Carolan K, Canard E, Prieur-Richard A-H, Suzán G, Mills JN, Roche B, Guégan J-F (2016) Niche-based host extinction increases prevalence of an environmentally acquired pathogen. *Oikos*. <https://doi.org/10.1111/oik.02700>
- Haahtela T, Holgate S, Pawankar R, Akdis CA, Benjaponpitak S, Caraballo L, Demain J, Portnoy J, von Hertzen L, WAO Special Committee on Climate Change and Biodiversity (2013) The biodiversity hypothesis and allergic disease: world allergy organization position statement. *World Allergy Organ J* 6(1):3. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3646540/#>
- Hanski I, The Karelia Study Group (Leena von Herzen, Nanna Fyhrquist, Kaisa Koskinen, Kaisa Torppa, Tiina Laatikainen, Pii Karisola, Petri Auvinen, Lars Paulin, Mika J. Mäkelä, Erkki Vartiainen, Timo U. Kosunen, Harri Alenius & Tari Haahtela) (2012) Proceedings of the National Academy of Sciences of the United States of America PNAS May 2012. <http://www.pnas.org/content/109/21/8334>
- IPBES (2018) Regional assessment Europe and Central Asia, Chapter 2. <https://www.ipbes.net/assessment-reports/eca>
- Jäppinen J-P, Tyrväinen L, Reinikainen M, Ojala A (eds) (2014) Nature for health and well-being in Finland – results and recommendations from the Argumenta project ecosystem services and human health (2013–2014) (Abstract and Summary). Reports of the Finnish Environment Institute 35/2014. 104 pp. Helsinki. <https://helda.helsinki.fi/handle/10138/153461>
- Job-Hoben B, Pütsch M, Erdmann K-H (2010) Human health protection – a ‘new’ issue area for nature conservation? *Natur und Landschaft* 85(4):137–141
- Keune H, Assmuth T (2018) Framing complexity in environment and human health, In: Oxford research encyclopedia of environmental science. Oxford University Press, New York
- Keune H, Kretsch C, De Blust G, Gilbert M, Flandroy L, Van den Berge K, Versteirt V, Hartig T, De Keersmaecker L, Eggermont H (2013) Science–policy challenges for biodiversity, public health and urbanization: examples from Belgium. *Environ Res Lett* 8(2):025015. <https://doi.org/10.1088/1748-9326/8/2/025015>
- Keune H, Flandroy L, Thys S, De Regge N, Mori M, Antoine-Moussiaux N, Vanhove MP, Rebolledo J, Van Gucht S, Deblauwe I (2017) The need for European OneHealth/EcoHealth networks. *Arch Public Health* 75:64
- Lebel J (2003) Health, an ecosystem approach. International Development Research Centre, Ottawa
- Marselle M, Stadler J, Korn H, Bonn A (2018) Proceedings of the European conference “Biodiversity and health in the face of climate change - challenges, opportunities and evidence gaps”. BfN-Skripten 509. Federal Agency for Nature Conservation, Germany, Bonn. <https://doi.org/10.19217/skr509>
- Naturkapital Deutschland – TEEB DE (2016) In: Kowarik I, Bartz R, Brenck I (eds) Ecosystem services in the city – protecting health and enhancing quality of life. Technische Universität Berlin, Helmholtz-Zentrum für Umweltforschung – UFZ, Berlin/Leipzig. Accessed 6 Feb 2018 at: https://www.ufz.de/export/data/global/190507_TEEB_De_Broschuere_KF_Bericht3_Stadt_engl_web.pdf
- Pan-European Workshop on Biodiversity and Health for the European Region, held in Helsinki (2017.) <https://www.cbd.int/health/european/default.shtml>
- Parks and Wildlife Finland (2016) Healthy parks – healthy people Finland, Health and Wellbeing 2025 programme. <http://www.metsa.fi/web/en>
- Rittel K, Bredow L, Wanka ER, Hokema D, Schuppe G, Wilke T, Nowak D, Heiland S (2014) Green, natural, healthy: The potential of multifunctional urban spaces. Accessed 6 Feb 2018 at: https://www.bfn.de/fileadmin/BfN/service/Dokumente/skripten/Skript371_EN.pdf

- Särkkä S, Kontinen L, Sjöstedt T (eds) (2013) Ability to read nature – creating business from green well-being (in Finnish only). Sitra. 60 pp. Helsinki. <https://www.sitra.fi/julkaisut/luonnonlukutaito-luo-liiketoimintaa-vihreasta-hyvinvoinnista/>
- Suzán G, García-Peña GE, Castro-Arellano I, Rico O, Rubio AV, Tolsá MJ, Rocher B, Hosseini PR, Rizzoli A, Murray KA, Zambrana-Torrel C, Vittecoq M, Bailly X, Aguirre AA, Daszak P, Prieur-Richard A-H, Mills JN, Guegan JF (2015) Metacommunity and phylogenetic structure determine wildlife and zoonotic infections disease patterns in time and space. *Ecol Evol* 5(4):865–873. <https://doi.org/10.1002/ece3.1404>
- University of Natural Resources and Life Sciences, Austrian Research and Training Centre for Forests, Natural Hazards and Landscape & Institute of Landscape Development, Recreation and Conservation Planning, Vienna (eds) (2017). Proceedings of the 3rd international conference on landscape and human health: forests, parks and green care. BFW, Vienna
- von Herzen L, Hanski I, Haahtela T (2011) Natural immunity – biodiversity loss and inflammatory diseases are two global megatrends that might be related. *EMBO Rep* 12:1089–1093. <http://embor.embopress.org/content/12/11/1089>
- Wallace RG, Bergmann L, Kock R, Gilbert M, Hogerwerf L, Wallace R, Holmberg M (2015) The dawn of structural one health: a new science tracking disease emergence along circuits of capital. *Soc Sci Med* 129:68–77
- WHO Regional Office for Europe (2016) Urban green spaces and health: a review of evidence. WHO, Copenhagen. http://www.euro.who.int/__data/assets/pdf_file/0005/321971/Urban-green-spaces-and-health-review-evidence.pdf?ua=1
- World Health Organization and Secretariat of the Convention on Biological Diversity (2015) Connecting global priorities: biodiversity and human health: a state of knowledge review. World Health Organization, Geneva. <https://www.cbd.int/health/SOK-biodiversity-en.pdf>
- Zinsstag J, Schelling E, Walther-Toews D, Tanner M (2011) From “one medicine” to “one health” and systemic approaches to health and well-being. *Prev Vet Med* 101(2011):148–156

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