



# THE BIODIVERSITY-INCLUSIVE ONE HEALTH TRANSITION

## Summary of the transition

Managing ecosystems, including agricultural and urban ecosystems, as well as the use of wildlife, through an integrated approach, to promote healthy ecosystems and healthy people. This transition recognizes the full range of linkages between biodiversity and all aspects of human health, and addresses the common drivers of biodiversity loss, disease risk and ill-health.

## Rationale and background

The links between biodiversity and human health are varied, and occur at various spatial and temporal scales. At a planetary scale, ecosystems and biodiversity play a critical role in determining the state of the Earth System, regulating its material and energy flows, and its responses to abrupt and gradual change.<sup>1</sup> Ecosystems, including food production systems, depend on a great diversity of organisms: primary producers, herbivores, carnivores, decomposers, pollinators, and pathogens. Services provided by ecosystems include food, clean air, and both the quantity and quality of fresh water, medicines, spiritual and cultural values, climate regulation, pest and disease regulation, and disaster risk reduction – each of which has a fundamental influence on human health, both mental and physical.<sup>2</sup> At a more intimate level, the human microbiota – the symbiotic microbial communities present in the gut, respiratory and urogenital tracts and on skin – contribute to nutrition, can help regulate the immune system and prevent infections.<sup>3</sup> Biodiversity is thus a key environmental determinant of human health, and the conservation and sustainable use of biodiversity can benefit human health by maintaining ecosystem services and options for the future.<sup>4</sup>

The COVID-19 pandemic has further highlighted the importance of the relationship between people and nature. While the relationship between biodiversity and infectious disease is complex (Box 22.6), it is clear that the loss and degradation of biodiversity undermines the web of life and increases the risk of disease spillover from wildlife to people. Responses to the current pandemic provide a unique

opportunity for transformative change as a global community.<sup>5</sup>

Outbreaks of zoonotic diseases are increasing over time.<sup>6</sup> The risk of future pandemics could be reduced through a more integrated, cross-sectoral and inclusive One Health<sup>7</sup> approach that builds the health and resilience of people and the planet, both contributing to and benefitting from, the 2030 Agenda for Sustainable Development.

There are significant strategic opportunities to integrate the full range of biodiversity-health interlinkages<sup>8</sup> in the application of One Health approaches in a more systematic, comprehensive and coordinated manner. This would not only promote a sustainable, healthy and just recovery from the COVID-19 pandemic<sup>9</sup> but would also serve broader health objectives beyond the simple absence of diseases, entail a greater focus on prevention, and strengthen the resilience of social, ecological and economic systems. Such an approach would address the common drivers of biodiversity loss, climate change, ill-health and increased pandemic risk. Ultimately, these aims would need to be supported by fundamental shifts in political economy, accountability and governance.<sup>10</sup>

Essential principles of a biodiversity-inclusive approach to One Health<sup>11</sup> are that it should: consider all dimensions of health and human well-being; enhance resilience of socio-ecological systems to prioritize prevention; apply the ecosystem approach;<sup>12</sup> be participatory and inclusive; be cross-sectoral, multinational, and transdisciplinary; operate across spatial and temporal scales; and promote social justice and gender equality.



### Box 22.6. Biodiversity and emerging infectious diseases.<sup>13</sup>

Approximately two-thirds of known human infectious diseases are shared with animals, and the majority of recently-emerging diseases are associated with wildlife. Vector-borne diseases also account for a large share of endemic diseases. Higher biodiversity may be expected to increase the *hazard* of emerging infectious diseases, because host diversity (for example of wild mammals) is correlated with the diversity of pathogens (organisms that cause disease). However, this relationship is not necessarily predictive of disease *risk* since some event is needed to convert a hazard into a risk of pathogen emergence. Such *risk factors* include encroachment into natural habitats and contact with wildlife. Also, paradoxically, greater host diversity may actually decrease risk of zoonotic pathogen spillover by reducing the prevalence of pathogens among a diversity of host species (though this is not always the case). Thus, efforts to minimize biodiversity loss can also reduce disease risk, mostly by reducing contact between humans and wildlife and limiting introduction of exotic species, even if these efforts maintain areas of high disease hazard through the diversity of pathogens.<sup>14</sup>

Encroachment of human activities into, and destruction of, ecosystems increase the risk of emergence and spread of zoonotic diseases.<sup>15</sup> In particular, deforestation, the degradation and fragmentation of habitats, and the unsustainable expansion of agriculture bring humans and livestock into closer contact with wildlife.<sup>16</sup> Wildlife persisting in human-modified landscapes are more likely to harbour disease.<sup>17</sup>

The health burden of infectious diseases is not limited to humans and domestic species: infectious diseases pose a threat to biodiversity conservation as well. Pathogen spillover can occur from one wild species to another, potentially causing an outbreak if the species or population is susceptible to the pathogen, especially when weakened by other human-induced pressures. For example, Ebola virus has also been recognized as causing severe declines in great ape populations, including the Critically Endangered western lowland gorilla.<sup>18</sup>

One infectious disease - chytrid fungal disease - has contributed to the decline of over 500 amphibian species (6.5% of all described amphibian species), 90 of which are presumed extinct, making *Batrachochytrium dendrobatidis*<sup>19</sup> the most destructive invasive species on record, spread mainly through trade in amphibians.<sup>20</sup> Other important wildlife pathogens are white-nose syndrome (*Pseudogymnoascus destructans*) in bats and West Nile virus (*Flavivirus sp.*) in birds.

## Key components of the transition<sup>21</sup>

**REDUCE DISEASE RISK BY CONSERVING AND RESTORING ECOSYSTEMS.** Halt or reduce deforestation and degradation of terrestrial, freshwater, coastal and marine aquatic ecosystems; reduce overexploitation; halt or reduce encroachment into natural habitats; increase protection of areas of importance for biodiversity and ecosystem services, especially intact or near-intact areas and potential hotspots of disease emergence; subject major developments to integrated health and environmental impact assessments; plan urbanization and linear infrastructure to avoid impacting these areas and to reduce fragmentation (see Land and Forests and Cities and Infrastructure transitions).

**PROMOTE SUSTAINABLE, LEGAL AND SAFE USE OF WILDLIFE.** Reduce overall harvest, trade and use of wildlife while protecting customary sustainable use by indigenous peoples and local communities;<sup>22</sup> combat illegal wildlife trade and restrict trade in endangered species; phase out or ban the trade of high risk species (for example primates, bats, mustelids); regulate wildlife farms, limiting wild-caught animals, avoiding high-risk species and improving animal welfare and veterinary care; improve markets, improving hygiene including for slaughter, avoiding mixing species (also with livestock); improve biosecurity of wildlife trade and control of all potential pathways for invasive alien species; improve routine disease surveillance.

**PROMOTE SUSTAINABLE AND SAFE AGRICULTURE, INCLUDING CROP AND LIVESTOCK PRODUCTION AND AQUACULTURE.** Reform livestock production, decreasing hyper-intensive lots and improving their biosecurity, integrating livestock and crop production; promote silvo-pastoral, agroecological and other innovative approaches to sustainability; manage aquaculture sustainably;<sup>23</sup> maintain and use genetic diversity; reduce overall extent of pasturelands, while

protecting rights of pastoralists including nomadic groups; improve animal welfare, and reduce and regulate live animal trade; end non-essential use of antibiotics as well as pesticides, fertilizers and other nutrient inputs; enhance the microbiomes of soils, plants and animals (see Agriculture transition).

**CREATE HEALTHY CITIES AND LANDSCAPES.** Promote integrated land use planning to meet multiple needs for biodiversity conservation and the provision of ecosystem services to support human well-being, including the provision of clean water and nutritious food, and disaster risk reduction; provide equitable access to quality green and blue spaces to improve physical, physiological and mental health; use strategic integrated health and environment assessments to maximize benefits and minimize risks of interaction with nature; identify hotspots of high risk of disease emergence; monitor wildlife for high-risk pathogens, especially where there is a large diversity of viral strains in wildlife with significant potential for spillover to people, and monitor people who have contact with wildlife to identify early spillover events (See Land and Forests, Cities and Infrastructure transitions).<sup>24</sup>

**PROMOTE HEALTHY DIETS AS A COMPONENT OF SUSTAINABLE CONSUMPTION.**<sup>25</sup> Promote safe and nutritious foods from diverse crops, livestock and wild sources; lower overall meat consumption, particularly red meat consumption among high meat consumption societies, reducing overconsumption, reducing waste, and reducing luxury consumption of exotic wild species; reduce overall overconsumption and waste of natural resources, raising awareness and promoting behaviour change to support a transition toward healthy and sustainable diets and food safety measures (See Food Systems transition).

These actions are mutually supportive, and also support the 2030 Agenda for Sustainable

Development, including the goals relating to health, equity, and ensuring gender equality. They are underpinned by respect for human rights, including the rights of indigenous peoples, local communities and small farmers;<sup>26</sup> and supported by protecting and reforming, as appropriate, tenure of land and resources, equitable access to resources by poor and marginalized communities, and universal health care.

To be effective, these actions need to be implemented by countries individually and collectively. Cross-sectoral coordination and alignment will be key to success, by exploring synergies, tradeoffs and feedbacks across the full range of issues (beyond a focus on animal and human health alone). Investment is needed to enable proactive assessment, monitoring and surveillance and early warning systems that enable health systems to anticipate, prepare for and respond to public health threats resulting from ecosystem change and to reduce and address risks of disease emergence.

While substantial funding will be needed for effective implementation of a biodiversity-inclusive One Health transition, it would be a small fraction of the costs of the COVID-19 pandemic alone.<sup>27</sup> There is a major opportunity to integrate funding for the One Health transition within COVID-19 stimulus and recovery programmes.

### Progress towards the transition

To date, the One Health approach has been applied mainly to address issues of food safety, the control of zoonoses, and combatting antibiotic resistance, all of which remain important issues. This includes, for example, formalized collaboration between the WHO, OIE and FAO, as well as the World Bank, and a number of countries are applying a One Health approach to these issues. China has taken action to address risks from wildlife consumption for food and related trade.<sup>28</sup> The PREDICT project is one effort to identify where future zoonotic outbreaks could occur by examining samples from a large variety of

vertebrate animals that could serve as reservoirs of human infectious with the goal of identifying where future zoonotic outbreaks could occur.<sup>29</sup>

There is also growing awareness and actions to address threats to human health and to biodiversity in integrated ways.<sup>30</sup> This includes issues related to water quality, waste management, pollution, and climate change. Further, the relationship between human physical and mental health and access to nature and green spaces is increasingly recognized and considered in issues related to urban planning and design (see Cities and Infrastructure transition). However, overall considerably less attention has been paid through One Health approaches to broader aspects of human health beyond control of disease.<sup>31</sup>

### Some linkages with other transitions



**LAND AND FORESTS:** *depends on* maintaining healthy ecosystems to reduce disease risk



**AGRICULTURE:** *depends on* reduced health impacts from pesticide pollution and overuse of antibiotics in livestock, among other unsustainable practices



**FOOD SYSTEMS:** *depends on* the adoption of more nutritious, sustainable diets to improve health



**FRESHWATER:** *depends on* healthy and biodiverse freshwater ecosystems to maintain physical and mental health through provision of clean water as well as environments important for leisure, cultural and spiritual activities



**CITIES AND INFRASTRUCTURE:** *depends on* greater access to urban green spaces to improve mental and physical health, and on improved planning to avoid increased disease risk from infrastructure development in high-biodiversity areas