



World Health Organization
REGIONAL OFFICE FOR Europe



HEALTH AND TERRESTRIAL ECOSYSTEMS

POLICY BRIEF



Key messages

Taking action on one SDG gets results in others: health runs through every SDG.



ENSURE HEALTHY LIVES AND PROMOTE WELL-BEING FOR ALL AT ALL AGES.



PROTECT, RESTORE AND PROMOTE SUSTAINABLE USE OF TERRESTRIAL ECOSYSTEMS, SUSTAINABLY MANAGE FORESTS, COMBAT DESERTIFICATION, AND HALT AND REVERSE LAND DEGRADATION AND HALT BIODIVERSITY LOSS.

Biodiversity, ecosystems and the services that they deliver are essential for all life on Earth (1). One of the key barriers to effectively protecting natural assets is ignorance about the services they deliver (2).

- Healthy ecosystems produce multiple benefits for all communities, such as clean air and water, nutritious food, raw materials and medicines (3). Overall, poor people, women, children and indigenous groups are particularly dependent on ecosystem services or harmed by their degradation (1).
- Biodiversity continues to be lost at an accelerating rate, largely through human activities (4). "This loss is a direct result of human activity and constitutes a direct threat to human well-being in all regions of the world" (Professor Settele, commenting on the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) Report, 2019 (5)).
- The challenges faced by the WHO European Region are increasingly systemic, complex, interdependent and uncertain. They require innovative and pioneering transformative system solutions and coalitions between government institutions, businesses and civil society so that economic performance, environmental quality and human well-being are enhanced through reduced use of natural resources (6). "Through 'transformative change', nature can still be conserved, restored and used sustainably – this is also key to meeting most other global goals. By transformative change, we mean a fundamental, system-wide reorganization across technological, economic and social factors, including paradigms, goals and values" (Sir Robert Watson, Chair of the IPBES (5)).



Health and terrestrial ecosystems: the connections



The linkages between biodiversity, ecosystem services and human health are complex, and environmental changes caused by human actions can affect human health through a number of pathways (7).

Natural ecosystems can be considered in four service areas: support services such as soil formation, pollination and nutrient cycling; provision services, which provide goods or services such as raw materials for construction and energy, food, water, timber, fibre, medicinal compounds and genetic resources; regulating services, which directly or indirectly affect health through climate, floods and water quality; and cultural services, which cover recreation and the aesthetic enjoyment and fulfilment that nature provides. Each of these affects human health and well-being, from basic functions such as nutrient cycling, provision of food and shelter, and regulation of water quality through to the spiritual and recreational components. Taken together, these not only link directly with physical and mental health but also support broader aspects of human well-being such as earning an income and having a cultural identity (1).



The term planetary health covers a new multidisciplinary approach to understanding the interconnections between environmental and human health. It envisions a planet that nourishes and sustains the diversity of life with which we coexist and on which we depend.



Global megatrends are expected to affect the longer-term environmental outlook for the WHO European Region. These trends include climate change, demographic change, increasing urbanization, global competition for resources and the implications of an increasingly multipolar world (6). Already, 75% of the European population lives in urban settings (8).

The Region is projected to suffer major environmental impacts, such as a significant loss of biodiversity and ecosystem services, climate change impacts on coastal and agricultural systems, further human health impacts from air pollution and exposure to chemicals and increasing water stress, particularly in southern Europe and central Asia (6).

Progress has been mixed in attempts to preserve and sustainably use terrestrial systems and to protect biodiversity (3). Human use of all ecosystem services is growing rapidly. The Millennium Ecosystem Assessment in 2005 stated that “There is established but incomplete evidence that changes being made in ecosystems are increasing the likelihood of nonlinear and potentially high-impact, abrupt changes in physical and biological systems that have important consequences for human well-being” (1). Human health and well-being are critically dependent on a safe and enabling environment, supported by mitigation of climate change (Sustainable Development Goal (SDG) 13) and sustainable protection and use of marine and terrestrial ecosystems (SDG 14 and SDG 15) (7).

The challenge is huge. Where once, local environmental degradation was often an obvious and easy to understand cause of ill health, today’s global changes to the biosphere, many of them still not fully studied and understood, pose a completely novel challenge for policy-making and interventions (1).

The term planetary health covers a new multidisciplinary approach to understanding the interconnections between environmental and human health. It calls for exceptional action that respects planetary boundaries (the quantitative boundaries within which humanity can continue to develop and thrive (9)) and does not destabilize planetary systems beyond critical tipping points (10).

It looks for responses to critical threats, “to human health and wellbeing; threats to the sustainability of our civilisation, and threats to the natural and human-made systems that support us” (11). It envisions a planet “that nourishes and sustains the diversity of life with which we coexist and on which we depend” (11). Key measures towards SDG 15 targets specifically promote potential benefits for SDG 3 targets (e.g. 3.4, 3.9 3b and 3d).

Facts and figures

Ecosystems and biodiversity



- // The IPBES Report (5) stated that “around 1 million animal and plant species are now threatened with extinction, many within decades, more than ever before in human history”. The Report also outlined that
 - // the average abundance of native species in most major land-based habitats has fallen by at least 20%, mostly since 1900;
 - // more than 40% of amphibian species, almost 33% of reef-forming corals and more than a third of all marine mammals are threatened;
 - // although the picture is less clear for insect species, available evidence supports a tentative estimate of 10% being threatened; and
 - // at least 680 vertebrate species had been driven to extinction since the 16th century and more than 9% of all domesticated breeds of mammals used for food and agriculture had become extinct by 2016, with at least 1000 more breeds still threatened.
- // “Approximately 60% (15 out of 24) of the ecosystem services examined... are being degraded or used unsustainably” (1). The State of the World’s Biodiversity for Food and Agriculture, a 2019 report from the Food and Agriculture Organization of the United Nations, noted a debilitating loss of soil biodiversity, forests, grasslands, coral reefs, mangroves, seagrass beds and genetic diversity in crop and livestock species (12).
- // Since 1993, the Red List Index has declined from 0.82 to 0.74 globally (4). The Red List Index measures changes in species extinction risk and includes more than 20 000 animal and plant species, showing an increasing risk as species decline. The State of the World’s Biodiversity report in February 2019 found that 63% of plants, 11% of birds and 5% of fish and fungi were in decline (12).
- // As of January 2018, on average, 44% of global key biodiversity areas (KBAs) for freshwater, 47% for terrestrial and 48% for mountain were covered by protected areas (4).
- // The 2014 Global Biodiversity Outlook projected that out of 53 target elements of the Aichi biodiversity targets within the current Strategic Plan for Biodiversity 2011–2020, only five were on track to be reached by 2020 (4).
- // For 200 million people, degrading coastal mangrove ecosystems weakens the protection of their livelihoods and food security from storm surges and rising sea levels (13).



Food production



- Production of food has severe impacts on global biodiversity, accounting for about 60% of terrestrial biodiversity loss (4).
- About one third of soils is moderately to highly degraded; additionally, water extraction for agriculture and other uses, as well as pollution, threatens freshwater ecosystems (4).
- Humans are dependent on just three crops – rice, wheat and maize – for nearly half of plant-based calories, and this lack of diversity makes us more vulnerable (14). Globally, three out of four crops producing fruits or seeds for human food use depend, at least in part, on pollinators, yet 40% of invertebrate pollinator species, particularly bees and butterflies, and 17% of vertebrate pollinators, such as bats and birds, are threatened with extinction (12,15).
- Collated data from 91 countries show that many species that are indirectly involved in food production, such as birds that eat crop pests and mangrove trees that help to purify water, are less abundant than in the past (12).
- Land degradation adversely affects around 3.2 billion people and threatens the livelihoods of over 1 billion people globally (16). Approximately 20% of the earth's vegetated surface has become less productive (12). Between 1998 and 2003, up to 2.4 billion hectares of land showed declining productivity, affecting 19% of cropland, 16% of forestland, 19% of grassland and 28% of rangeland (4). Globally, an estimated 2 billion hectares, equivalent to 17% of all biologically productive land, could benefit from restoration.
- In 2016, the estimated number of undernourished people worldwide was 815 million; an increase from 777 million in 2015; although this is a reduction from the estimate of 900 million in 2000, this reversal of downward trend is observed most notably in situations of conflict combined with droughts, floods environmental degradation and loss of biodiversity (17).
- Micronutrient malnutrition affects as many as 2 billion people, typically caused by a lack of access to food of sufficient variety and quality (13).
- While net annual forest area loss was 7.3 million hectares in 2000, it fell to 3.3 million hectares in 2015. In 2015, forests covered about 4 billion hectares, 31% of the world's land area (16). The most dramatic declines occur in Latin America, south-eastern Asia and sub-Saharan Africa.



Asthma and allergic rhinitis



- Over 24% of adults living in the WHO European Region suffer from various allergies, including severe asthma, and the proportion of children affected is even higher, at 30–40%, and rising (18). Pollens and spores produced by plants are common allergens, and changes in their production, distribution and allergenicity may lead to increases in allergic diseases.
- Emergency calls for asthma exacerbations among children are significantly associated with springtime pollen concentrations. An increase in the concentration of *Ambrosia* pollen by 10 grains/m³ may increase hospital admissions for respiratory disorders by 25%. Emerging evidence reveals that increases in atmospheric carbon dioxide concentrations may increase the amount of allergenic pollen produced by *Ambrosia* species (19).

- /// In Europe, asthma and allergic rhinitis alone lead to 100 million workdays and school days lost per year. Up to 90% of individuals suffering from allergic diseases receive no or inadequate treatment, and the related avoidable indirect costs are estimated to be €55 billion to €151 billion per year (20).

Climate change



- /// Climate change is expected to lead to an increased frequency and severity of allergic diseases through increases in air pollution (both as a cause and a consequence of climate change), elevated ground-level ozone concentration and extreme weather events such as thunderstorms and wildfires (19,21,22).
- /// Climate change is exacerbating biodiversity loss and, in turn, many of the ecosystems affected, such as oceans and forests, are important carbon sinks (13).
- /// In 2017, climate-related disasters caused acute food insecurity for approximately 39 million people across 23 countries (13).

Priorities for action: what now?

The SDGs are ambitious, and achieving a healthy planet with healthy people requires urgent transformation of the current systems that contribute the most to environmental degradation and societal inequalities (10).

Despite inequalities in income, opportunity and health, the WHO European Region is considered to be comparatively prosperous. However, the Region is vulnerable to political uncertainties and conflicts, and to the effects of environmental stress on people and ecosystems, as seen during the financial crisis in 2008 and in the recent migration crisis. Increasing extreme weather events may pose additional challenges, contributing to the loss of livelihoods, particularly in marginal lands, and to people abandoning their traditional areas (23).

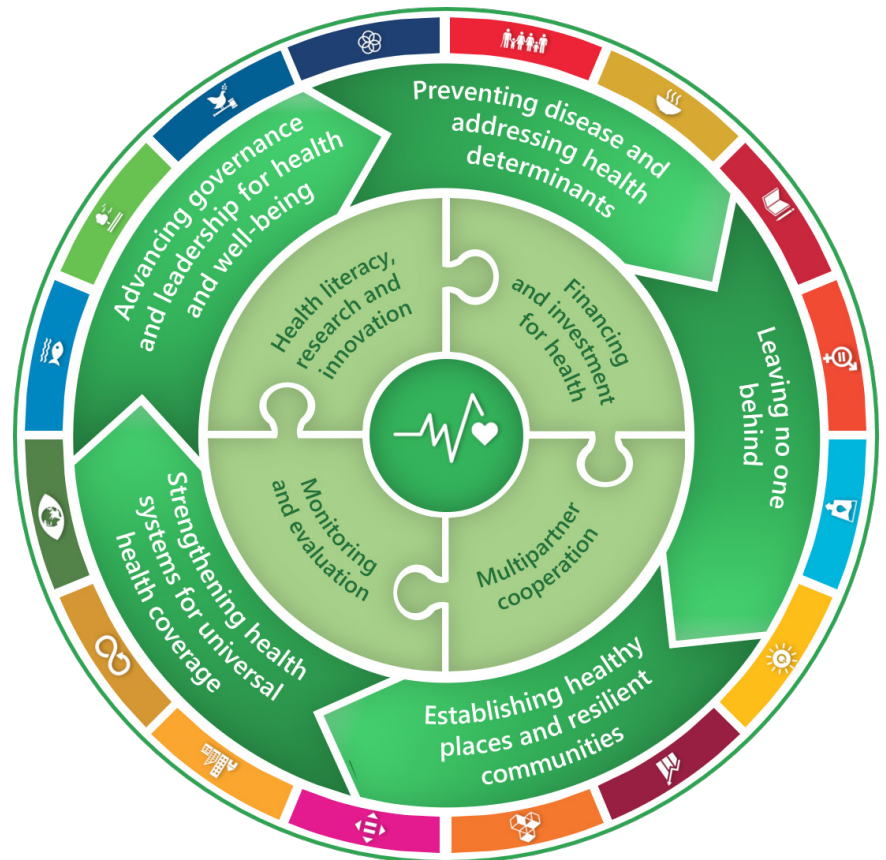
Overall, the WHO European Region is faced by increasingly uncertain challenges, and because of the complexity of ecosystems, considerable time lags may occur between reducing pressures and restoring ecosystem functions. New risks emerge when planetary boundaries are breached: risks for which neither the developed nor the transitional countries of the Region are prepared (6). In terms of solutions, the Region is only in its initial stages of greening its economy: pioneering transformative system solutions where economic performance, environmental quality and human well-being are enhanced through reduced use of natural resources (6). However, the ideas of circular economies and solutions based on renewable biological resources are gaining interest and momentum.

The priorities for the WHO European Region, identified and agreed at the GEO-6 Regional Environmental Information Network Conference in 2015, were climate change, air quality, biodiversity, chemicals and waste, and freshwater, with the additional two thematic areas of coastal, marine and oceans and of land to be considered. In addition, the relationships between the environment and the 2030 Agenda for Sustainable Development (24) and between human health and well-being and the 2030 Agenda were recognized as the two important overarching themes for the Region (6).

Priorities for action are greening the economy and improving air quality for a better environment and human health (6). The pan-European outlook suggests, in particular, the need to halve the use of material resources in western Europe and to stabilize it elsewhere (6).

Member States of the WHO European Region have committed to the 2030 Agenda (24) and to their Roadmap for its implementation (25). The Roadmap proposes ways in which countries can address health and its determinants and make investments for health through evidence-informed policies across sectors. The Roadmap has five strategic directions and four enablers (Fig. 1).

Fig. 1. The strategic directions and enablers of the WHO SDG Roadmap



Advancing governance and leadership for health and well-being



International and national action towards SDG 15, as with all SDGs, requires political will. It also demands cross-sectoral collaboration and partnerships, as increasing policy coherence across these thematic areas could improve the longer-term outlook overall. Strong coalitions between government institutions, businesses and civil society are needed to agree on pathways for tackling different societal risks. Coordination between national and local policy levels will be crucial for the important systems transitions (6).

Health cobenefits are expected from joint action across sectors to manage the Earth's terrestrial (SDG 15) and marine (SDG 14) ecosystems. Examples for pathways helping to break the cycle of poverty include ensuring food and (clean) water security, the provision of clean air and the regulation of climate and climate change (26). Since the early 1990s, the pan-European environmental governance system of international treaties, frameworks, regulations, goals and agreements, including those within the European Union (EU), have contributed to ecological improvements in the 53 Member States of the Region. These initiatives cover air and water quality, chemicals, land and waste management and the protection of species. Most of the improvements have been reached through targeted policy action (6).

To achieve key environmental objectives, however, the Region needs to transform its key systems of production and consumption towards sustainability (27).

Among the key indicators that are unlikely to be achieved by 2020 are reducing land take, improving the status of species of European interest, addressing greenhouse gas emissions from transport, eliminating exceedance of air quality standards in urban areas, protecting marine fish and shellfish in European marine waters and reducing the consumption of animal products (27).

Specific examples for priority action include:

- // stepping up policy implementation in the WHO European Region as a whole and in the EU in relevant domains that contribute most to degradation of natural capital, inefficient use of resources, climate change and human health impacts, including energy supply and demand, food production and consumption, transport and mobility and urban infrastructure development (6,27);
- // strengthening implementation and synergies between existing ecosystem-related conventions, policy instruments and programmes, with strong transnational cooperation (6,26);
- // giving highest importance to the wise use and management of natural resources, and introducing the valuation of natural capital and ecosystem services into national accounting systems;
- // developing and implementing innovative financial instruments and enhancing the involvement of business, civil society and citizens in policy-making for environmental protection (6);
- // combating corruption, promoting transparency and developing effective law enforcement, both within and across borders (e.g. in relation to poaching and trafficking) (4); and
- // coordinating action among policy-makers to improve environmental health, including care for relevant diseases such as allergies through approaches such as a European framework on chronic diseases (20).



Preventing disease and addressing health determinants



Whether people are healthy or not is determined by their circumstances and environment. The achievement of SDG 15 is central to improving the determinants of health that come from the environment and which support life, such as energy, food, water, timber, fibre, medicinal compounds and genetic resources, and the regulation of climate and water quality. The targets of SDG 15 (healthy terrestrial ecosystems, stable biodiversity and the sustainable use of resources) involve the physical environment and basic functions for health cobenefits, such as lowered risks from vector- and waterborne diseases as well as noncommunicable diseases, increased food security and better nutrition (1,16).

Specific examples for priority action to prevent disease and address health determinants include:

- /// fully implementing sustainable forest and land management plans;
- /// researching into the prevention and cure of allergic diseases, including improving allergen immunotherapy or developing biotechnological innovations (20);
- /// harmonizing allergology in medical education across disciplines and specialities in the WHO European Region (20);
- /// reducing meat production and consumption substantially to protect terrestrial ecosystems as well as human health, and to support climate change mitigation (28,29);
- /// supporting and upscaling the adoption of sustainable production systems to manage land, trees and forests, crops, livestock and fisheries; and
- /// implementing agro-ecological knowledge to contribute to the protection of biodiversity through reducing or stopping the use of pesticides that have harmful impacts on essential pollinators such as bees (15).



Leaving no one behind



The determination to leave no one behind underlies all the SDGs. In the context of SDG 15, this includes contributing to improving the situation of those who are particularly dependent on environmental services for their livelihoods and well-being and those traditionally viewed as excluded, marginalized or at particular risk of being left behind. Local and indigenous communities, farmers, pastoralists, foresters, fisherfolk and small-scale producers are custodians for large parts of the affected terrestrial ecosystems (4): indigenous peoples inhabit nearly 22% of the Earth's surface, an area containing around 80% of the planet's biodiversity, and up to 75% of agricultural land is family farms. Consequently, engaging local communities, drawing upon traditional knowledge and promoting the inclusion of women and indigenous populations are essential as these groups hold the key to achieving SDG 15 and several other SDGs (4). A consistent enabling environment for producers will require them also to act as custodians of the ecosystems they use for production (4).

Specific examples for priority action on leaving no one behind include:

- /// fostering investments in rural areas that involve small-scale producers, supporting their transition to more sustainable practices;

- // securing tenure over forests, pastures and farmlands for local communities and indigenous peoples;
- // strengthening producers' organizations and indigenous peoples' groups to ensure their access to information, rights, quality input, new technologies and practices, funding and markets (4); and
- // expanding "green" agriculture and economy approaches contributing to the long-term sustainable use of ecosystems and natural resources and to achieving sustainable economic growth (SDG 8).



Establishing healthy places, settings and resilient communities



Protected and restored ecosystems and the biodiversity they support can help to mitigate climate change and provide increased resilience for communities to its impacts, such as floods and landslides. Urban and rural ecosystem services contribute to climate change mitigation and adaptation through providing shade; capturing, filtering and re-using rainwater; and reducing pollution. More vegetation in an urban environment can act as a carbon sink to partially offset urban emissions. Growing evidence shows that physical and mental health can be improved by greater access to green space in urban settings (Box 1) (30). Recent studies in the United Kingdom have linked deprivation and poor health in low-income areas to lower-quality housing, poor education and a poor diet, and to less access to good-quality green spaces (31).

Specific examples for priority measures include:

- // protecting KBAs in order to safeguard critical natural capital and ecosystem functions that enhance the resilience of communities (16);
- // increasing green space in urban settings and improving access (30);
- // increasing biodiversity in urban agriculture to enhance food and nutrition security within urban food systems, which is proven to strengthen the resilience of local food systems in communities facing food security crises (4); and
- // investing in green infrastructure as it will provide both a good financial return and job opportunities that support both people and nature (26).

Achieving these targets is challenging. The EU, for example, will not achieve its key environmental objectives set for 2020 (27) even though Europe and North America have the highest average coverage of protected freshwater, terrestrial and mountain KBAs (at 55%, 63% and 68%, respectively), and the highest annual average growth rates for protected terrestrial and freshwater KBAs. Positive annual net change rates have been registered for the protected forest area for 2010–2017 compared with 2005–2010. The EU will fall short in its environmental objectives particularly in targets measuring the protection of biodiversity and natural capital. In 2018, the European Environment Agency reported trends and outlooks causing more concern than in 2017 for "boosting sustainable, resource-efficient, low-carbon economy", while progress in addressing environment-related threats to human health remained mixed (27).

Box 1. Health benefits of green spaces

“A city of well-connected, attractive green spaces that offer safe opportunities for urban residents for active mobility and sports as well as for stress recovery, recreation and social contact, is likely to be more resilient to extreme environmental events, such as heat waves (due to the mitigation of the urban heat island effect) and extreme rainfall (due to reduced surface run-off). Such a city is also likely to have healthier citizens, reducing demands on health services and contributing to a stronger economy” (30).

Evidence suggests that there is a need for small, local green spaces very close to where people live and spend their day, as well as for large green spaces that offer formal provisions such as playing fields, and opportunities to experience contact with nature and relative solitude (30).

Green spaces in urban environments imply both health benefits as well as challenges and possible negative health effects. Health benefits include:

- // improved mental health and cognitive function
- // reduced cardiovascular morbidity
- // reduced prevalence of type 2 diabetes
- // improved pregnancy outcomes
- // reduced mortality
- // increased social and cultural activity
- // better mental health.

Challenges and possible negative health effects identified include:

- // increased exposure to polluted air
- // risk of allergies and asthma
- // exposure to pesticides and herbicides
- // exposure to disease vectors and zoonotic infections
- // accidental injuries
- // excessive exposure to ultraviolet radiation
- // increased vulnerability to crime.

Overall, the health benefits outweigh potential negative effects and, additionally, most detrimental effects are associated with poorly maintained green spaces. The need for green space and its value for health and well-being are universal. However, those managing and designing urban green space have to be sensitive to local geographical and cultural conditions. Perceptions of green space accessibility and quality, the size of the green space, presence of facilities for certain activities (e.g. fitness trails), the nature of the tree cover and canopy density are important features associated with either health benefits or health hazards.

A geographic information system-based toolkit for assessing green space availability, accessibility and use has been compiled for policy-makers with objective and comparable measures and indicators (30). This can help to ensure health benefits of green space in urban settings and that a green urban environment is an asset for all populations. Harmonized indicators help to evaluate the effects of targeted policy interventions.

In many settings, the costs of maintaining a good-quality green space may remain a challenge. However, in the United Kingdom, for example, it has been estimated that the health system could save £2.1 billion per year through benefits associated with increased physical activity if everyone had access to sufficient green space (31).



Strengthening health systems for universal health coverage



Member States in the WHO European Region have committed to progress towards universal health coverage with the aim of ensuring that all people obtain the high-quality health promotion, disease prevention, curative, rehabilitative and palliative services they need without experiencing financial hardship.

Extreme events and natural disasters pose high risks to human safety and health; these risks are growing with the increasing effects of climate change and human population pressures on natural systems, such as the regulating services of ecosystems. Specific examples for priority actions for health systems include:

- /// supporting the integrity of terrestrial ecosystems and biodiversity by promoting ecological behaviour that carries benefits for humans as well as for life on land; and
- /// strengthening country capacity for early integrated warning, risk reduction and management of national and global health risks, particularly in developing countries.

The health sector can also be an important driving force to explain the health risks from environmental degradation, raise awareness and urge for action from a health perspective. In practical terms, physicians, for example, can advocate for healthy lifestyles and healthy public policies, bringing together the efforts of medicine, public health and planetary health (32,33). Consequently, they can play an important role in the promotion of healthy lifestyles and the sustainable use of terrestrial ecosystems.

Opportunities for research and innovation



There is a general need to invest in research and development as well as in sociotechnological innovations (e.g. through public–private partnerships), which feature in SDG 17 (Box 2) (6). Continued research areas in the environment and health nexus include understanding how anthropogenic environmental change is affecting human health, through both short-term and direct pathways such as air pollution and long-term and complex pathways such as climate change or biodiversity loss (10). Monitoring and assessing the effects of climate change on terrestrial ecosystems and biodiversity can provide better information and guidance to policy-makers for making appropriate adaptation and mitigation options part of their climate pledges or nationally determined contributions (36), as defined in the Paris Agreement under the United Nations Framework Convention on Climate Change, 2015, which refers to “undertaking and communicating ambitious efforts” (37,38).

Box 2. Innovative solutions for environmental challenges and sustainable consumption and production: a draft declaration

In December 2018, a ministerial meeting in Belgrade produced a draft ministerial declaration, entitled Innovative solutions to pollution in south east and southern Europe, to be put forward for adoption at the United Nation Environment Assembly in 2019. The declaration outlined a joint approach and vision for south-east European countries (34). The final draft declaration in March 2019 pursues the vision of “moving towards sustainable, prosperous and inclusive societies with sustainable consumption and production patterns that prevent and address environmental challenges with innovative solutions”. It highlights the determination to ambitiously scale-up efforts to overcome common environmental challenges, including health-related challenges, in a balanced and integrated manner through identifying and developing innovative solutions by fostering sustainable and efficient resource management; promoting the use and sharing of environmental data and engaging civil society, citizens, indigenous peoples and local communities, private sector, academia and all other relevant stakeholders as appropriate; and taking into account national circumstances. It then outlines suggestions of actions that could be undertaken, basing its recommendations on the 6th Global Environment Outlook, the Global Resource Outlook and the Global Chemicals Outlook (35).

The search for sustainable solutions that are within the planetary boundaries needs to be intensified and the understanding of how these can be implemented improved, to avoid catastrophic consequences for human health and survival (9,10). New approaches towards sustainable development can produce benefits but occasionally can also have potentially adverse effects on terrestrial ecosystems or on human health. One example of possible harmful effects is the construction and operation of on- and off-shore windparks for the provision of renewable energy, which might adversely impact the environment and affect species through construction noise and noise pollution, respectively. Such effects need to be continuously explored and assessed year-round, including increasing understanding of the species that frequent the area of installation, such as marine mammals and sea birds, and possible long-term impacts. Other examples include possible effects of fracking and of bio- and geo-prospecting (discovery and commercialization of new products based on biological resources), which can be linked to the exploitative use of indigenous knowledge for commercial profit and land use and possible relocation of communities.

Most challenging, however, is the need to “rethink our relationship with the planet, combining philosophical, ethical, literary, medical, and other perspectives, ideally creating a positive vision which can energise the so-called Great Transformation of human societies globally, which we so urgently need” (10). Inclusive citizen science describes the participation of the general public in the generation of scientific knowledge, which strengthens science communication and access to scientific knowledge as well as trust. Inclusive citizen science and social innovation programmes can improve the interface between human health and terrestrial ecosystems and lead to greater awareness among the general public of urgent and relevant issues in relation to the environment, life on land and human health (34).

Commitments to act



Governments have signed up to many international treaties, agreements and protocols on restoring and protecting terrestrial ecosystems and biodiversity, and many of them also address impacts on human health.

The three Rio Conventions each recognized the importance of terrestrial ecosystems and sustainable agriculture and forestry for achieving their respective goals

The Convention on Biological Diversity, 1992 (39), which was supported by

- /// the United Nations Decade on Biodiversity 2011–2020 (40)
- /// the 2011–2020 Strategic Plan for Biodiversity and its Aichi Targets (41)
- /// the Nagoya Protocol in 2011 (42); by February 2018, 105 countries had ratified (up from 96 countries in 2017) and 50 countries had shared information on their access and benefit-sharing frameworks
- /// the Seventy-second World Health Assembly in April 2019, which considered the public health implications of implementation of the Nagoya Protocol (43)

The United Nations Framework Convention on Climate Change, 1992 (44), which was supported by the Warsaw Framework for REDD+ in 2014 (45) and the Paris Agreement in 2015 (37)

The United Nations Convention to Combat Desertification, 1996 (46)

Other agreements include

The Sendai Framework for Disaster Risk Reduction 2015–2030 (47)

The United Nations Strategic Plan for Forests 2017–2030 (48)

On a regional level, two WHO European Region commitments contribute to SDG 15 (49)

The Commitment to Act of the Parma Declaration on Environment and Health 2010 (50), adopted by the Fifth Ministerial Conference on Environment and Health

The Ostrava Declaration on Environment and Health Ostrava Declaration 2017 (51), adopted by the Sixth Ministerial Conference on Environment and Health

The Bonn challenge, 2011 (52)

New York Declaration on Forests (53), endorsed the Bonn Challenge and extended it to 2030

2018 HLPF Review of SDGs implementation (4) noted that, as of May 2018, “47 countries have pledged to have more than 160 million hectares of degraded forests and landscapes under active restoration by 2020, with a view to scale up to 350 million hectares by 2030. It is estimated that this could generate \$9 trillion of net benefits, including from new jobs, increased food production and improved ecosystem services; and sequester 1 gigaton of greenhouse gases every year”

Resources

Copernicus Land Monitoring Service: Urban Atlas

The European Urban Atlas provides reliable, intercomparable, high-resolution land-use maps for over 300 large urban zones and their surroundings (54).

EIONET

The European Environment Information and Observation Network is a partnership network of the European Environment Agency and its 39 member and cooperating countries (55).

European Environment Agency

The Agency provides sound, independent information on the environment for those involved in developing, adopting, implementing and evaluating environmental policy, and also for the general public (56).

The Annual Indicator Report Series (AIRS)

This series of annual reports gives an overview of the EU's progress under the Seventh Environment Action Programme, with three key priority objectives – natural capital; resource-efficient, low-carbon economy; and people's health and well-being – and 29 environmental policy objectives (57). The latest report is for 2018 (58).

Key definitions

Circular economy

Aims to redefine growth, focusing on positive society-wide benefits, thus moving beyond the current take–make–waste extractive industrial model. It entails gradually decoupling economic activity from the consumption of finite resources and designing systems to exclude creation of waste. Underpinned by a transition to renewable energy sources, the circular model builds economic, natural and social capital and is based on three principles: design out waste and pollution, keep products and materials in use, and regenerate natural systems (59). Scientific research is needed, however, to ensure that the actual environmental impacts of the circular economy do work toward sustainability (60).

Material, of plant, animal microbial or other origin containing functional units of heredity of actual or potential value. Genetic resources are important to humans because they provide a pool of genetic diversity that has commercial value and may promote food security (39).

Genetic resources

Key biodiversity protected areas

Specific sites that contribute significantly to the global persistence of different taxonomic, ecological and thematic subsets of biodiversity (61).

The “achievement of the highest attainable standard of health, well-being, and equity worldwide through judicious attention to the human systems – political, economic, and social – that shape the future of humanity and the Earth's natural systems that define the safe environmental limits within which humanity can flourish. Put simply, planetary health is the health of human civilization and the state of the natural systems on which it depends” (11).

Planetary health

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