Health in the Global Environmental Agenda:

A policy guide

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Executive Summary

Nearly 25% of global deaths are attributed to economic decisions affecting the environment, but stakeholders from the health community are mostly unaware of—or not visible within—discussions and negotiations on global environmental policies. Little institutional capacity exists to address the environmental determinants of health outcomes and health inequities. A first step toward cohesive, comprehensive policies that protect both people and the planet is building that connection.

This is an insider's landscape view to bringing health into the global environmental agenda. It is a technical guide on sustainable development focused on the health–environment nexus, written with the perspective that a microphone within the negotiations is more powerful than a megaphone at its margins.

Global governance hinges on the language embedded in its treaties. Policies change when language changes, terms are added, or issues are adopted. This work requires informed engagement and strategic entry points in global debates and decision-making bodies. Environmental treaties do not typically contain health provisions, which is a window of opportunity.

The world in 2022 faces:

- A triple planetary crisis of environmental degradation in the form of biodiversity loss, climate change, and pollution.
- A Triple Billion global health burden of people lacking access to health care, needing enhanced protection from health emergencies, and falling behind health and well-being metrics.

These issues are inherently linked but remain legally and institutionally distinct. It is not enough to simply include "health considerations" in environmental decisions or for the health sector to merely attend a policy event. The health community must engage with—and be called upon to inform—global environmental processes. There is significant, unrealized value in the contributions from health stakeholders to driving and achieving strong global environmental agreements.

The merger between global environmental and health governance is not only intuitive—it is necessary. Decisions made in multilateral environmental agreements (MEAs) must be relevant to health policy and should not compete with public health objectives, negatively impact health, or widen health inequities. Sound environmental policy-making can improve and expedite positive health outcomes.

Concrete opportunities exist to bring health experts with technical and diverse knowledge into targeted environmental policy discussions. This guide dissects the decision-making bodies, issues, and implementation frameworks of key MEAs using a health lens. Its purpose is to facilitate common understanding and build a bridge between the health and environmental sectors in global policy-making on sustainable development.

Written jointly by health and environmental policy experts, this document reviews and analyzes the global governance landscape for biodiversity, climate change, pollution, and food systems, with a view to informing policy and events beginning in 2022. This guide connects disciplines and expands expertise beyond traditional spheres and silos of work. In that way, it contributes to thinking at the true "nexus" of health and environment.

Key Findings

Operationalizing integrated health–environment objectives into global policy and national work has been a long-standing challenge, but overlapping agendas and synergistic strategies are not out of reach. Across United Nations (UN) environmental agreements and organizations, there is value for those at the health–environment nexus in considering the following:

Environmental governance is health governance

Environmental agents can transform the footprint of health and health systems and change health outcomes.

Speaking the same language

Health professionals need to understand the architecture of global environmental agreements before they can influence how to change and enhance them.

Health science and environmental policy must interface

Data and decisions need to connect more clearly. The environmental science–policy interface needs the evidence-based experience of the health sector, and terminology must be harmonized.

Health actors are expert stakeholders

Most decision-making does not happen at the annual conferences. Health actors and organizations should participate in relevant intersessional bodies where substantive issues are discussed and prioritized, and health technical expertise is sorely needed.

National implementation is global implementation

A binding global treaty is only effective if countries fulfill its mandate. Health data is an important indicator for monitoring the effectiveness of environmental regimes.

Health considerations must inform planning

Guidelines on issues such as air and water quality, diet, and pollution should be reflected in environmental assessments and influence national plans for climate change, biodiversity, and other issues.

Health–Environment Nexus: The case for connection

1.0 The Purpose of this Guide: This guide seeks to facilitate a common understanding and build a bridge between the health and environmental sectors on global environmental governance. The guide focuses on four main areas: biodiversity, climate change, pollution, and food systems. It aims to achieve multi-sectoral engagement and to advance multi-sectoral health governance by examining and explaining the frameworks of key global environmental agreements through a health lens. It provides conceptual links and technical input on health concepts that can be used to de-silo internal expertise.

2.0 Multi-Sectoral Health Governance: A clean environment and intact ecosystems are essential for the health and well-being of humans and all other living organisms, but the human impact on the environment has created a series of negative effects. Health governance models generally view public health outcomes as being achieved solely through the health sector. However, health sector policies cannot comprehensively address all elements that determine human health, while non-health institutions and sectors are unfit to manage the externalities they produce. A more effective model would include health and non-health actors in public health decision making and implementation, and the adoption of a holistic perspective.

3.0 The Policy Shift into the Health–Environment Nexus: Acknowledgement of the health–environment nexus is growing, as is evident across organizations and forums. At a high level, leaders have signalled an interest in shifting global activities toward integrated and cross-disciplinary work at the health nexus. Across the UN system, MEAs, and international environmental organizations, there are opportunities to advance dialogue and action to build this nexus. Moreover, adoption of the human right to a healthy environment is a step forward to advancing the Sustainable Development Goals (SDGs) and building common agendas.

4.0 The Way Forward: Provisions in global agreements on biodiversity, climate change, pollution, and food systems influence health outcomes and health equity, and can transform the footprint of health systems. Decisions in these MEAs can contribute to reducing disease burdens. Health participation means informed engagement at the heart of debate in both global health and global environmental forums. Health data should inform national plans across MEAs and be informed by environmental science–policy bodies.

Health–Environment Nexus: The global landscape view

An informed landscape view of global environmental governance lays the foundation for action in the health community to advance planetary health and achieve the SDGs. The umbrella of interconnected environmental crises included here—biodiversity loss, climate change, and pollution—are priorities in the global environmental community, while food system transformation is a leading issue on both environmental and health agendas. Here are key points.

KEY MESSAGES ON BIODIVERSITY GOVERNANCE

The integration of biodiversity–health governance began over 2 decades ago. Over time, inter-agency collaboration resulted in health considerations peppered into over 20 elements under the CBD on substantive issues as well as strategy and implementation. Decisions

by parties in 2022 at the 15th UN Biodiversity Conference of the Parties (COP 15) could influence whether this work advances into broader action. Adoption of the post-2020 global biodiversity framework with health targets, as drafted, may change the governance landscape for global health.

The framework is set up to be reinforced by a draft global action plan on biodiversity and health, also posed to be adopted. Such a plan will stimulate evidence and capacity building for addressing the health–environment nexus on many issues. It is essentially a global (Planetary) health strategy that complements and reinforces One Health approaches taking root across the UN. Yet there is still an opportunity to expand references to health in this action plan to make them more relevant to the work of the health sector and, importantly, to target disease burden. Several issue areas could benefit from technical health expertise, such as biotechnology, mental health, and women's health.

Despite the global health system's focus on preventative medicine, the draft global action plan on biodiversity and health does not acknowledge that intact, healthy ecosystems are a determinant of health and healthcare for 80% of the global population who rely on traditional medicine and knowledge. Loss of biodiversity and loss of Traditional Knowledge are issues of public and global health and health equity. The draft also lacks two fundamental public health elements: it does not reference the health of children, despite the CBD's aims to protect future generations, and it does not link biodiversity to nutrition as a component of food system transformation. To adequately steer the next decade of work at the biodiversity–health nexus, parties must incorporate these elements into decisions as part of the CBD's 2050 Vision for "Living in Harmony with Nature"—to be agreed in 2022.

KEY MESSAGES ON CLIMATE CHANGE GOVERNANCE

The integration of climate–health governance began with Intergovernmental Panel on Climate Change recommendations in 1990. However, there is a widening gap between the expanding presence of health stakeholders at global climate events and the formal uptake of their messages in negotiations. Strategic engagement within the UNFCCC negotiations is key to improving the uptake of health issues.

In addition, an important area needing advancement is assisting developing countries in preparing vulnerability assessments and formulating and implementing adaptation plans. More plans must be developed, and the quality of their health component must be strengthened. Specifically, much work is needed to engage with ministries of health and use newly developed World Health Organization (WHO) criteria to advance plans—known as health NAPs (HNAPs)—for health sector resilience. This is a very promising area for joint ministerial work.

On the mitigation side of the equation (that is, cutting actual emissions), the health sector can support advancements in reducing greenhouse gas (GHG) emissions, especially short-lived climate pollutants (SLCPs), which do not stay in the atmosphere for a long time but significantly contribute to warming. Increased attention is needed on methane and black carbon, as well as support for the Global Methane Pledge and adoption of the WHO Air Pollution Guidelines at the national level.

The UNFCCC does not contain health provisions, but there are multiple entry points in the negotiations beyond adaptation and mitigation where health input can be introduced or informed. Future negotiations will greatly impact food governance, addressing loss and damage, and emergency preparedness. Strong decisions that maximize health outcomes will require technical input from health experts in all these areas.

KEY MESSAGES ON POLLUTION GOVERNANCE

A unique aspect of pollution governance is that these international agreements are equally concerned with protecting human health and the environment. Engagement between sectors on pollution policy-making is founded on effective multistakeholder collaboration. But even this has not been enough to ward off a "silent pandemic" of children born "pre-polluted" or the "toxic trespass" of dozens to hundreds of chemicals randomly found in bloodstreams from exposure in day-to-day lives. A priority for the health sector should be raising awareness of the importance of the environmentally sound management of chemicals and wastes.

Maximizing and expediting health outcomes should be a renewed goal in chemicals governance. Several institutional changes could support this, including addressing gaps in partially regulated pollutants (e.g., lead), shifting to class-based listing of pollutants rather than individual listings, taking a circular economy approach, and considering a potential new science-policy mechanism on chemicals and waste for aggregating knowledge and providing it to decision-makers.

Reducing pollution in the health sector is also a priority. Pharmaceutical pollutants and pollution from medical waste take a great toll on the health of our ecosystems but are not currently sufficiently governed under the chemicals conventions. Clearly, this is an area for action.

KEY MESSAGES ON FOOD SYSTEM GOVERNANCE

Most MEAs are relevant to agriculture and impact food policy and food-related health outcomes. Decisions under these agreements should positively influence dietary health. Synergies in approaches, terminology, and goals are fundamentally important to improving global food system governance and addressing global malnutrition. There is room to harmonize these efforts. Policy guidance on food systems and nutrition developed under the CFS is adopted under an intergovernmental policy process and can be used to inform work across MEAs.

An essential area for progress is ensuring that nutrition—and especially food security—is not interpreted narrowly in discussions and negotiations. Nutrition language under the MEAs must comprehensively address malnutrition in all its forms, as well as the relationship between nutrition and biodiversity and traditional food culture.

Box ES1. Selected MEAs and intergovernmental bodies

- World Health Assembly (WHA)
- Convention on Biological Diversity (CBD)
- Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)
- Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES)
- UN Framework Convention on Climate Change (UNFCCC)
- The Minamata Convention on Mercury
- The BRS conventions—the Stockholm Convention on Persistent Organic Pollutants (POPs), the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal, and the Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade.
- UN Committee on World Food Security (CFS)

Figure ES1. Architecture of MEAs and science-policy bodies in the UN system

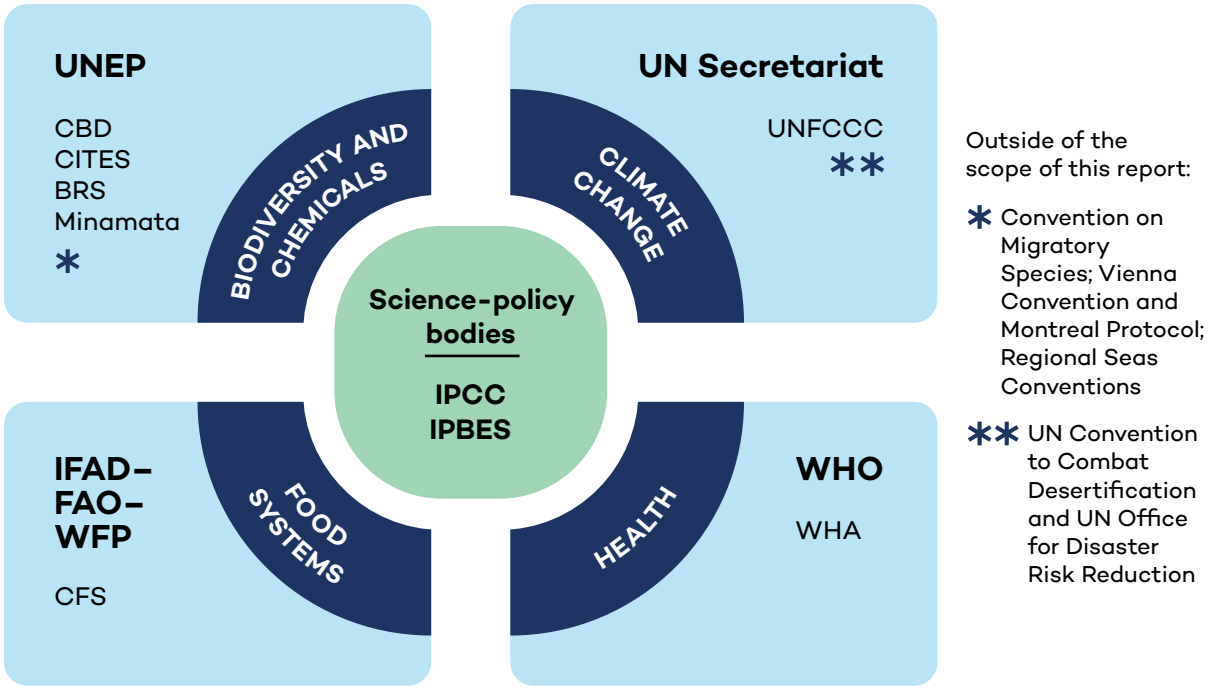


Table ES1. Key Entry Points: Health sector engagement in global environmental governance

MEA	CBD	IPBES	CITES	UNFCCC	BRS	Minamata	CFS
Year in force	1993	2012	1975	1994	1992 (B), 2004 (R &S)	2017	1974
Parties/members	196	137	183	197	188 (B), 164 (R), 184 (S)	135	133
Attendance	up to 8,000	800	1,700	>20,000	1,700	1,000	>1,600
Topic	**Biodiversity**			**Climate Change**	**Pollution**		**Food Systems**
Objective	Biodiversity: conservation, sustainable use, access, and benefit sharing	Science–policy evidence on biodiversity and ecosystems	Trade of wildlife and species survival	Stabilization of GHGs	Reducing risks from chemicals and waste	Protecting human health from anthropogenic mercury pollution	Food security and nutrition for all
Public health issues influenced by policies on this topic	Medicines, clean air and water, nutrition, infectious disease, mental health, pollution exposure, biotechnology, genetics, Traditional Knowledge		Emerging infectious disease and zoonoses	Heat stress, food and water security, respiratory disease and other non-communicable disease, infectious disease, nutrition, emergencies, trauma	Developmental disorders; neurological disorders; endocrine disruption; lung, skin, and eye disease; contaminated breast milk	Neurological and musculoskeletal disorders, vision impairment, congenital disorders	Malnutrition, food security, non-communicable disease (esp. diabetes, cardiovascular disease), obesity, stunting, wasting, anemia, biotechnology
Ministries negotiating	Environment, foreign affairs	Environment, foreign affairs	Environment, foreign affairs, trade	Environment, foreign affairs, finance	Environment; also agriculture, industry, health, customs/borders, energy, transportation		Agriculture, foreign affairs
Health ministers in attendance	?	?	No (?)	Yes; ~ 12% of parties (COP 26)	Yes	Yes	Yes; ~ 6% of members (CFS 49)
Negotiations: key focal areas for health issues (2022–2023)	Post-2020 global biodiversity framework; draft global action plan on biodiversity and health	Nexus assessment (biodiversity, water, food, health)	Consideration of an animal health surveillance mechanism	National communications; clean and efficient energy; future of Koronivia Joint Work on Agriculture (KJWA); SLCPs; non-economic losses	Class-based listing of chemicals; potential new science-policy mechanism for addressing chemicals and waste; pharmaceutical pollution, medical instruments and medical waste; plastic pollution		Gender and malnutrition; inequalities; food safety
Negotiations: key entry point for technical participation on health	Subsidiary Body for Scientific, Technical, and Technological Advice (SBSTTA), Working Group Article 8(j)	Plenary; representation on the Multidisciplinary Panel of Experts	Standing Committee	Subsidiary Body for Scientific and Technological Advice (SBSTA); Nairobi work programme (NWP); KJWA; Glasgow-Sharm el-Sheik Work Programme; Expert Group on non-Economic Losses and the Santiago Network	Basel - Expert working group, Plastic Waste Partnership; Rotterdam & Stockholm - Chemical Review Committees	Ad hoc expert groups	Plenary; Civil Society Mechanism; Private Sector Mechanism
National-level assessments and plans	National biodiversity strategies and action plans (NBSAPs), biodiversity impact assessmements	-	-	Nationally determined contributions (NDC)s, National Adaptation Plans (NAPs), Health National Adaptation Plans, Water Safety Plans	National implementation plans and national action plans		-
Global health guidelines important to the MEA	WHO Traditional Medicine Strategy, Akwé-Kon Guidelines	-	WHO guidance on the sale of live wild animals	WHO Global Air Quality Guidelines; WHO Guidelines for Drinking Water Quality	Numerous		WHO Global Action Plan for the Prevention and Control of Non-communicable Diseases, 2013-2020

Key Recommendations

Health

- Planetary Health, One Health, and the socioecological determinants of health must become common vocabulary.
- Increase environmental actor awareness and participation in WHA meetings.
- Reference "women's health" as a component to gender considerations.
- A convention on pandemics should include and align with biodiversity MEAs.
- Evidence from the IPCC and IPBES should inform health sector planning.
- Strengthen reporting and actions on mental health outcomes in NAPs and national biodiversity strategies and action plans (NBSAPs).
- Incorporate biodiversity themes into global strategies on mental health.
- Increase awareness of the WHO's Traditional Medicine Strategy.

Biodiversity

- Increase health stakeholder participation in CBD negotiating bodies.
- The draft global action plan on biodiversity and health must reference the health of children.
- Advisory from the CBD on food system transformation in the draft global action plan on biodiversity and health must include strong linkages between biodiversity and nutrition.
- Adopt the post-2020 global biodiversity framework, ensuring it contains robust and relevant health targets, and adopt the draft global action plan on biodiversity and health.
- Strengthen health sector input to biosafety and biotechnology discussions under the CBD, especially on Digital Sequence Information (DSI) and synthetic biology.
- NBSAPs should include health values, risks, impacts, and metrics and be reviewed by a health ministry.
- Deepen the evaluation of health in biodiversity impact assessments, for instance, drawing on the Akwé-Kon guidelines (specifically, Articles 43, 44, 50).
- Consider a potential wildlife disease surveillance mechanism for traded species as a safeguard to human health as a new requirement under CITES.
- Add a health expert to the IPBES Multidisciplinary Expert Panel (MEP).

Climate Change

- Increase health sector visibility in negotiations through lobbying (months in advance), engaging in constituted bodies, statements in negotiations, and submissions to the UNFCCC Secretariat.
- Increase the presence of health ministers. Whereas 81 ministries of health (out of 95 respondents) designate a focal point for health and climate change, only 24 countries (12% of parties) sent a representative to COP 26.
- Increase national training on climate change policies. Approximately seven countries report that their ministry of health received training on health in UNFCCC negotiations.
- Improve national implementation of WHO's Global Air Quality Guidelines, particularly for the 77 countries with no reporting. Focus on broadening the pollutants covered and reducing long-term exposure to pollutants.
- Increase attention on SLCPs, including, as a stand-alone reduction target in NDCs, through development of National SLCP Action Plans, and by supporting the Global Methane Pledge.
- NDCs and NAPs can be used to detail health co-benefits of mitigation. Only 16% of countries (of 95 assessed) have assessed the health benefits of national climate mitigation policies.
- Formalize cross-sectoral collaboration at the national level on mitigation. Few agreements are established between ministries of health and ministries of water, sanitation and hygiene (32%); energy (20%); agriculture (19%); transportation sector (17%); and urban development and housing (14%).
- Strengthen national-level training for low- and middle-income countries on adaptation assessments. Only eight of these countries reported receiving training on climate change and health for vulnerability and adaptation assessments.
- Assist developing countries in formulating and implementing NAPs and HNAPs. In 2020, more than 80% of developing countries were still forming their first NAP, while criteria for HNAPs were only established in 2021. Development of HNAPs can be a concrete activity for joint health–environment ministerial work.
- Boost the quality of health information in NAPs and HNAPs, including: the links between vulnerabilities and response actions; on addressing vulnerable sub-populations; consistency of diseases assessed; and on financial planning for health needs.
- Health stakeholders should inform the party-driven work that informs the UNFCCC, namely NDCs, Adaptation Communications, NAPs, National Communications, and Biennial Transparency Reports.
- The 2023 Global Stocktake is an opportunity to assess progress on addressing health outcomes, impacts to the health sector, and financing for resilience.
- Prioritize health metrics for measuring progress on the Global Goal on Adaptation in the Glasgow-Sharm el-Sheikh Work Programme.

- Support adoption of a permanent framework for agriculture under the UNFCCC.
- Define the term "food production" under the UNFCCC to encompass both dietary quantity and quality.
- Strengthen discussion on malnutrition under the KJWA and/or its predecessor body.
- Enhance national and adaptation planning for water resources and consider links to the WHO Guidelines on Drinking Water Quality and incorporation of water safety plans. Only three health ministries reported receiving training on climate-resilient water safety plans.
- Health stakeholders should inform the Expert Group on Non-Economic Losses, the Santiago Network, and the Glasgow Dialogue.
- Increase alignment of national health systems to adaptation and mitigation goals. Only 52 countries (26% of parties) have pledged ministerial commitment to reforming their national health sector to be climate-resilient, sustainable, and/or low carbon.
- Include health indicators in Glasgow Financial Alliance for Net Zero's (GFANZ) decision-making rubric and align investments for decarbonization pathways to co-deliver for both healthy people and a healthy planet.

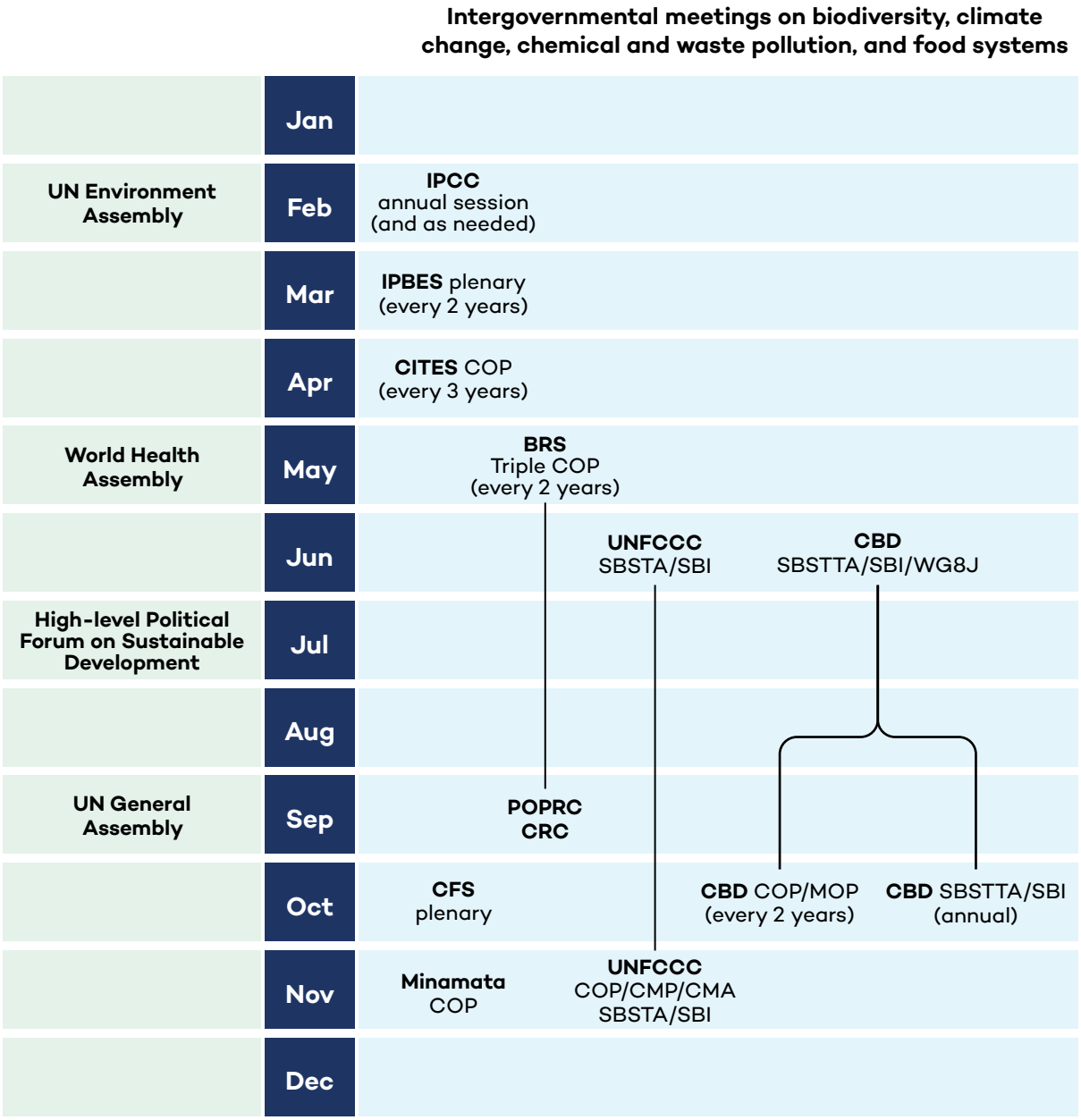
Pollution

- Increase awareness of chemicals governance.
- Strengthen targeted, coordinated statements and strategic informal negotiations at chemicals meetings.
- Support establishing a science–policy body on chemicals and wastes for advancing knowledge and delivering evidence to decision-makers.
- Amend the global regulation of chemicals to class-based rather than individual listings to expedite health outcomes and reduce health risks.
- Formalize intergovernmental commitments to address pharmaceutical pollutants.
- Increase attention to pollution from medical waste and its incineration under the Stockholm Convention and the Plastic Waste Partnership.
- Revise threshold setting for chemicals exposure to be inclusive of all consumers by gender, age, or diet. Some are based on a middle-aged adult male, which is both narrow and vague.

Food Systems

- Increase health sector and ministerial participation in the CFS plenary.
- Synergize work on food systems across MEAs.
- MEAs should address malnutrition in all its forms and utilize nutrition terminology that maximizes health outcomes, such as "nutritional security."
- Link CFS policy guidance on food systems to decisions in MEAs.

Figure ES2. Traditional cycle for MEA decision-making



Notes:

Related UN decision-making forums connected with a line.

POPRC - Persistent Organic Pollutants Review Committee (Stockholm Convention)
CRC - Chemicals Review Committee (Rotterdam Convention)

See acronyms list for complete list.

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Abbreviations and Acronyms

2030 Agenda	2030 Agenda for Sustainable Development
BRS conventions	Basel, Rotterdam, Stockholm conventions
CBD	Convention on Biological Diversity
CFS	UN Committee on World Food Security
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
COP	Conference of the Parties
EU	European Union
DSI	digital sequence information
FAO	Food and Agriculture Organization of the UN
GBF	post-2020 global biodiversity framework
GEF	Global Environment Facility
GFANZ	Glasgow Financial Alliance to Net Zero
GHG	greenhouse gas
GMO	genetically modified organism
HLPE	High Level Panel of Experts on Food Security and Nutrition
HNAP	health National Adaptation Plan
ICCM	International Conference on Chemicals Management
IHR	International Health Regulations
IPBES	Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services
IPCC	Intergovernmental Panel on Climate Change
KJWA	Koronivia Joint Work on Agriculture
LMO	living modified organism
MEA	multilateral environmental agreement
NAP	National Adaptation Plan
NBSAP	national biodiversity strategies and action plan
NDC	nationally determined contribution
NWP	Nairobi work programme

PM	particulate matter
POP	persistent organic pollutant
SAICM	Strategic Approach to International Chemicals Management
SBI	Subsidiary Body for Implementation
SBSTA	Subsidiary Body for Scientific and Technological Advice (UNFCCC)
SBSTTA	Subsidiary Body for Scientific, Technical, and Technological Advice (CBD)
SDG	Sustainable Development Goal
SLCP	short-lived climate pollutant
Tripartite	FAO-World Organization for Animal Health-WHO
UN	United Nations
UNDP	UN Development Programme
UNDRR	UN Office for Disaster Risk Reduction
UNEA	UN Environment Assembly
UNEP	UN Environment Programme
UNFCCC	UN Framework Convention on Climate Change
UN HRC	UN Human Rights Council
WHA	World Health Assembly
WHO	World Health Organization
WIM	Warsaw International Mechanism for Loss and Damage

1.0
Introduction:
The health–environment nexus

1.1 The Purpose of This Guide

This guide seeks to facilitate a common understanding and build a bridge between the health and environmental sectors on global environmental governance. The guide focuses on four main areas: biodiversity, climate change, pollution, and food systems. Across agendas, the United Nations (UN) is prioritizing the interconnection of biodiversity loss, climate change, and pollution, as well as integrated approaches to address what the UN Environment Programme (UNEP, 2021) calls a triple planetary crisis. At the same time, food system transformation is a leading issue on both environmental and health agendas because current models accelerate both environmental degradation and the prevalence of diet-related disease. All four areas have profound impacts on human health in acute and chronic ways. This guide aims to achieve multi-sectoral engagement on these issues. It analyzes the frameworks of select global environmental agreements through a health lens, providing conceptual links and technical input on health concepts that can be used to de-silo internal expertise.

The calls for increased cross-sectoral "engagement" at the health–environment nexus are broad.[1] Challenges exist on both sides of the nexus. The health sector cites barriers to broad uptake of health considerations across sectors. The environmental sector has limited technical capacity to adequately consider and frame health issues in its work, though its work impacts health outcomes. Broadly speaking, meaningful participation by either environmental or health actors in each other's decision-making forums is surprisingly lacking. This policy guide intends to investigate more closely what "engagement" means in a practical sense by evaluating entry points within negotiations. It further reviews the presence of health actors and issues in selected multilateral environmental agreements (MEAs).

These concepts can be dense and as daunting as learning a new language. But by placing elements of global health policy, global environmental law, and simplified technical concepts side by side, we offer an opportunity to consider integrating joint ideas and building capacity. With this guide, we hope to enhance discussion at the health–environment nexus.

1.2 Multi-Sectoral Health Governance

A clean environment and intact ecosystems are essential for the health and well-being of humans and all other living organisms. However, the human impact on the environment has created a series of negative effects on the health of the planet, its ecosystems, and humanity through, for example, new exchanges of microbes, air and water pollution, hazardous wastes, and toxic chemicals.

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[1] E.g., a) "Most global environmental agreements…cite threats to health as a major concern" (Article 30, WHO, 2020b); b) the 2021 UN High-level Political Forum on Sustainable Development noted challenges in cross-forum engagement and the need for interlinkages between MEA processes (UN Economic and Social Council, 2021), c) World Economic Forum's (2021) *Trade for Tomorrow: A Collective Call to Action to Make Trade Work For All* (https://www.weforum.org/agenda/2021/09/trade-for-tomorrow-call-to-action-to-make-trade-work-for-all/) ; d) UNEP's (2019) *Global Environment Outlook – GEO-6: Healthy Planet, Healthy People* (https://wedocs.unep.org/handle/20.500.11822/27539); e) the evaluation of the GEF integrated approach from the 60th session in 2021 (see: https://www.thegef.org/sites/default/files/council-meeting-documents/EN_GEF.E.C.60.04.Rev_.01_Evaluation_of_GEF_Integrated%20Approach_for_the_Drivers_of_Environmental_Degradation_0.pdf).

Many integrated health and environmental decisions incorporated into landmark global agreements over the last 50 years have yet to operationalize.[2] One reason for this is that health governance models generally view public health outcomes as being achieved solely through the health sector. However, health sector policies cannot comprehensively address all elements that determine human health (Rasanathan et al., 2018). Moreover, as a whole, institutions and sectors are unfit to manage the externalities they produce—for example, pollution (Dasgupta, 2021). A more effective model would include health and non-health actors in public health decision making and implementation in what is called a multi-sectoral health governance model (Dasgupta, 2021; de Leeuw, 2017).

Many sectoral policies that impact community health and well-being are governed under the global environmental agenda. Yet, most health professionals and other experts are not well connected to these processes (see, for example, World Health Organization [WHO], 2019b). Diverse expertise, such as in public health and epidemiology, is important to inform environmental decision-making bodies (Kohler, 2020). Though there is a new groundswell of interest through organizations like the Wellcome Trust's Climate and Health programme, the Planetary Health Alliance, and Lancet Planetary Health, and in calls to action by the health sector,[3] guidance is needed to channel current momentum and interest on health and environmental issues into meaningful engagement at the nexus of these fields. A key barrier to interdisciplinary work is understanding the language of international environmental law and identifying entry points in the challenging architecture of MEAs. To move forward, major de-siloing needs to occur.

A second reason that health and environmental decisions are not operational is that the adoption of a holistic perspective is slow. Conceptual frameworks that link a healthy environment and healthy people are gaining momentum at the health–environment nexus and include Planetary Health, One Health, and the social and environmental determinants of health (see Box 1). These narratives take a systems approach to health and well-being and connect society to the environment. They should become part of a common vocabulary.

1.3 The Policy Shift Into the Health–Environment Nexus

Acknowledgement of the health–environment nexus is growing, as is evident across organizations and forums. At a high level, leaders have signalled an interest in shifting global activities toward integrated and cross-disciplinary work at the health nexus.

Health themes are emerging in global environmental research and decision making. UNEP began promoting Planetary Health themes in its *Healthy Environment, Healthy People* report in 2016. The Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) decided at its 7th session in 2019 to produce a thematic "nexus" assessment on biodiversity, food, health, and climate. The *Dasgupta Review*, a recent economic analysis on the environment in a national context sponsored by the United Kingdom Treasury, reinforced how declining biodiversity impacts health, well-being, and food provision, including

[2] Including the Stockholm Declaration (1972), the WHO Global Strategy for Health and Environment (1993) (WHA 46.20), and the 2030 Agenda on Sustainable Development (2015).

[3] See, for example, https://healthyclimateletter.net/

by contributing to poverty traps (Dasgupta, 2021). The report also emphasized that neither unhealthy environments nor unhealthy people are good for economies.

Independently, but parallel to work on biodiversity–health interlinkages, health became a formal component to the UN Framework Convention on Climate Change (UNFCCC) work on adaptation (Nairobi work programme) in 2013 (UNFCCC, 2013a). The climate–health nexus continues to expand as an emerging evidence-based field as outlined in the 2017 UNFCCC Secretariat synthesis on *Human Health and Adaptation*. Elite climate scientists and integrative thought leaders now direct the influential Pathfinder Initiative on transformative solutions for a post-carbon society at the London School of Hygiene and Tropical Medicine.[4]

Box 1. Holistic frameworks for multi-sectoral health governance

Planetary Health

The paradigm for global social and economic policies governing human populations and resources has gradually transitioned over the last 5 decades. Initially, these policies encompassed broad but siloed environmental and development topics. Over time, the paradigm came to include less siloed and more comprehensive analyses under the umbrella of "sustainable development." The Planetary Health approach to sustainable development takes this narrative to the next level by comprehensively analyzing the environment and human health interlinkages, from local to global scales, in one development paradigm. The field of Planetary Health is driven by worrisome global health trends, a dramatic decline in natural resources, and increasingly erratic global environmental changes whose effects simultaneously impact the economy, equity, and well-being. Framed by the idea of the Anthropocene era, Planetary Health approaches a) recognize the human role in ecological degradation and the cycle of negative impacts degradation has on human health and b) provide an inherent rationale for cross-disciplinary decision-making on social and economic issues at all scales and regions in both short- and long-term scenarios.

One Health

One Health is a cross-sectoral approach recognizing that humans, animals, and plants, by sharing the same environment, have inherent health interlinkages. Developed by the Wildlife Conservation Society in 2004, this concept has recently catapulted into the limelight due to the COVID-19 pandemic and its presumed zoonotic underpinnings. One Health unites the fields of human and veterinary medicine and the livestock sector on overlapping themes, including food safety, zoonoses, microbiome diversity, and antibiotic resistance. Its aim is to harmonize policies that have impacts on multiple sectors. In 2021, this narrative was recognized across MEAs, the G20, and in the decision to establish a new convention on pandemics.

[4] See https://www.lshtm.ac.uk/research/centres-projects-groups/pathfinder-initiative

Social and Environmental Determinants of Health

The social determinants of health (WHO, 2021j) is now a widely understood concept in public health and clinical medicine. It is an important term largely absent from environmental discourse. The social determinants of health are all the social, non-health reasons a person may be unhealthy or stressed and otherwise not be able to achieve optimum health compared to others in the same society. These include differences in education, urban design and environmental surroundings, and socio-economic status, including gender and forms of discrimination. In a sense, the social determinants are stressors of inequality, disproportionately affecting mental health, exposure to environmental degradation, or access to health care.

As the "determinants of health" concept has broadened to encompass environmental determinants of health, macroscopic issues such as climate change, pollution, and wildlife habitat destruction have come into focus. The quality of air, water, soil, and land and marine ecosystems are all environmental determinants of health.

Together, these socio-ecological determinants of health are key to delivering effective, compassionate, and equitable health care. A child's development is affected by a lack of access to educational resources, a social determinant, in a similar way to how childhood is affected if lacking access to—or a relationship with—green space, an environmental determinant. Both are fundamental to a holistic approach to physical and mental well-being in medicine.

Global health leaders recognize how non-health sectors impact health outcomes and how the implementation of preventative health measures greatly falls outside public health mandates (Rasanathan, 2021). These non-health sectors are strongly linked to the environment, including transportation, energy, water, and agriculture. The landmark *Marmot Reviews* in 2010 and 2020 outlined how non-health factors determine health and drive inequities. The WHO (2021n) estimates that these determinants account for 30–55% of health outcomes.

Integration was a key theme at recent global assemblies. The third UN Environment Assembly (UNEA) in 2017 adopted a resolution on environment and health (UNEA, 2018). This resolution affirmed interlinkages between environment and health; the importance of joint work, including on health inequalities; and the need for a precautionary approach. In 2021, the 74th session of the World Health Assembly (WHA, 2021a) adopted a new resolution on the social determinants of health that put in motion an operational framework to measure, assess, and address these determinants across sectors.

Leaders of the global economy echo these ideas. The September 2021 Declaration of the G20 Health Ministers encourages integration for resilience, multi-sectoral actions on the determinants of health, and, among others, that the centre of a "governance transformation of health" includes principles of sustainability, a holistic vision, and a One Health approach (G20, 2021).

Work to establish a health–environment nexus is in its infancy. Across the UN system, MEAs, and international environmental organizations, there are opportunities to advance dialogue and action to build this nexus.

1.4 Human Right to the Environment

Environmental equity and health equity are linked, but the fields of environment and health law remain distinct (Morin & Blouin, 2019). Few institutions link global environment and global health governance in their provisions.

A "breakthrough moment" occurred in October 2021 when the UN Human Rights Council (HRC) adopted a resolution recognizing the human right to a safe, clean, healthy, and sustainable environment: "sustainable development…and the protection of the environment, including ecosystems, contribute to and promote human well-being and…the enjoyment of the highest attainable standard of physical and mental health" (UN HRC, 2021, pp. 1–2).

A merger between human rights and environmental law could significantly change the governance landscape at the health–environment nexus. The human right to a healthy environment is a huge step forward in advancing the Sustainable Development Goals (SDGs) and building common agendas among MEAs. The potential implications of this right include strengthening environmental laws and policies, improving implementation and enforcement, enhancing public participation in environmental decision-making, addressing environmental and social injustices, and healthier ecosystems (Morgera, 2020; UN HRC, 2018).

Global environmental law experts assert that the application of human rights law would reinforce urgency and more broadly shared prioritization of biodiversity conservation issues. It would also contribute to policy coherence on the SDGs and build alliances across sectors, such as with the health sector (Morgera, 2021). It also invites a fundamental reconsideration of chemicals governance. An ideally "safe, clean, healthy" environment would be one where humans are not exposed to unsafe levels of chemicals. This thinking builds momentum for adopting a circular economy and shifting thinking away from pollution as a necessary by-product of growth, production, and consumption.

Climate change law is likely to also advance in new ways. For one, the UN HRC strengthened the effectiveness of this resolution by appointing a new Special Rapporteur on the promotion and protection of human rights in the context of climate change, who will follow and track progress on climate change and equity across the UN (UN HRC, 2021). The climate change Special Rapporteur will join a growing environmental cohort of environmental Rapporteurs, including on human rights and the environment, on toxics and human rights, and on safe drinking water and sanitation.

Advancements in the field of human rights strengthen the foundation of the health–environment nexus.

2.0
Health Governance Through an Environmental Lens

2.1 World Health Assembly

2.1.1 Scope and Structure

This section analyzes the structure and role of the WHA in relation to global environmental governance.

Global health is embedded in sustainable development ideas. The vision of the 2030 Agenda on Sustainable Development (2030 Agenda), as seen in its preamble and declaration, aligns with several principles emphasized in the 1948 WHO constitution: health is a fundamental human right, essential to peace and security, a common good, and dangerous if inequitably promoted or controlled. **Eleven of the 17 SDGs also directly impact global health** objectives and outcomes, further underlining the interlinkages between the work of the WHO and sustainable development policies (WHO, 2020d).

Box 2. Definition of "health" in the WHO constitution:

"a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity" (WHO, 2020c).[5]

However, the WHO's role in global health governance is complex. In the landscape of global health, it is one of 12 different international health agencies[6] significantly impacting health outcomes worldwide. Despite recent intergovernmental efforts to collaborate for collective action on SDG 3 (health and well-being), as part of the SDG3 Global Action Plan, the architecture of health governance remains fragmented, crowded, and bogged down by overlapping mandates and earmarked funding streams (World Health Summit, 2021). In this context, the WHO is notable in that it is the only UN agency on health that includes—and annually convenes—all 194 UN member states in its governing body, the WHA. The WHO is also the custodial agency for 33 SDG targets, significantly more targets than any of the other 11 agencies. **It plays a comparatively larger role in environmental issues as it is the main health agency overseeing targets directly related to the environment** (water, water pollution/waste, energy, air pollution, infectious and vector-borne disease, and malnutrition). UN Children's Fund (UNICEF) also oversees targets on nutrition and water, and the World Bank tracks land tenure and access to electricity.

The WHO's impact and voice are strong in global policy-making and in national implementation on the health components of environmental issues. The WHO actively engages with the Convention on Biological Diversity (CBD), the UNFCCC, and the chemicals conventions, as well as with a number of other environmental forums and UN

[5] However, this definition of health is contested; more recent definitions recognize that health is not conditioned by the absence of disease but by the ability to live well with diseases (Svalastog et al., 2017).

[6] The other 11 are Vaccine Alliance; Global Financing Facility; Global Fund to Fight AIDS, TB and Malaria; UN Joint Programme on HIV/AIDS; UN Development Programme; UN Population Fund; UN Children's Fund: Unitaid; UN Women; World Bank Group; World Food Program; and WHO.

environmental agencies. It has also held joint work responsibilities with the Food and Agriculture Organization of the UN (FAO) to support the Decade of Action on Nutrition. But the WHO's terms of engagement and types of contributions developed differently within the different MEAs and other international environmental forums. Some of the WHO's work on environmental issues, such as air pollution, antimicrobial resistance, and climate change, is reinforced by WHA resolutions adopted on these themes.

In contrast, **representatives from the MEAs and most environmental organizations do not participate in a recognized way in the work of the WHA**.[7] MEA representatives do not usually attend WHA meetings, and if they do it is under UNEP. The WHO pollution policy offices regularly attend the WHA, such as through the Chemical Safety and Health Unit; however, those from specific intergovernmental chemicals conventions only occasionally attend. For the last half decade, a CBD representative has usually attended. The Executive Secretary of the UNFCCC addressed the WHA on invitation in 2016 but the UNFCCC does not attend the WHA.

The WHA meets annually to adopt resolutions, agreements, and conventions on health policy with the objective of "attainment by all peoples of the highest possible level of health" (WHO, 2020c). In its constitution and rules of procedure, the WHA accepts attendance by the UN specialized agencies, and other UN bodies who have "established effective relations" (WHO, 2020c, Article 70). Current intergovernmental organizations that hold effective relations agreements with the WHO and have a mandate associated with environmental governance include the FAO, the International Fund for Agricultural Development (IFAD), the UN Educational, Scientific, and Cultural Organization (UNESCO), and the World Organisation for Animal Health (OIE). The World Meteorological Organization (with a mandate on weather, climate, and water) attends the WHA as a specialized agency but an agreement is not described in the WHA rules of procedure.

Specialized agencies create reciprocal representation agreements with the WHO in a non-voting capacity. FAO, UNESCO, and OIE sit on the WHA Executive Board, a role that can influence the WHA agenda (WHO, 2020c, pp. 57–81). UN bodies with effective relations may participate in the WHA, committees, subcommittees, and subdivisions in a non-voting capacity (Article 70 and Rule 47). Non-governmental organizations also must establish effective relations to participate in the WHA and committees in a non-voting capacity. Non-state actors—of which there are dozens of medical, pharmaceutical, and health organizations—must meet a set of criteria, one of which is to **"demonstrate a clear benefit to public health"** (Article 50 on Official Relations, WHO, 2020c). **There are no environmental organizations listed under this designation.**

This structure differs from the UNEA, which allows for the participation of specialized agencies, UN bodies, and other intergovernmental organizations, as well as stakeholders from civil society and non-governmental organizations (UNEA, 2016).

The WHA plenary consists of two committees, one on substantive issues (Committee A) and one that manages financial and other arrangements (Committee B). Items introduced in the

[7] See List of Delegates and other Participants under Diverse Documents for archived meetings: https://apps.who.int/gb/index.html

Executive Board—which has representatives from all six WHO regions, specialized agencies, and those UN bodies with effective relations—may be taken up on the agenda, which then may be transferred to Committee A during the WHA plenary. Various informal intersessional workstreams also exist.

Reflecting on the architecture of the health–environment nexus, the WHO (2020b) highlighted the **lack of national advisory bodies on health and environment**, as well as the lack of global bodies serving as repositories for evidence and science–policy interface on many environmental issues. A memorandum of understanding signed between the WHO and the UN Development Programme (UNDP) in 2018 lays the foundation for advancing work on Planetary Health that could aim to fill these institutional gaps (UNDP, 2019).

To begin addressing knowledge gaps at the health–environment nexus, the WHO (2021a), together with other UN bodies, published a compendium of actions and recommendations to address a range of environmental risk factors to health, such as air pollution, unsafe water, climate change, and chemicals.

2.1.2 Nexus of Environment and Health Emergencies

Actions by the WHO could make the health sector more responsive to acute events at the health–environment nexus. Increasing natural hazards and accelerating rates of degradation across ecosystems and ecological scales lead to new, more widespread, and exacerbated disease and injuries. **This prompts strategic reconsideration of the global health response to environmentally induced health emergencies.**

One way this is taking shape is through recent efforts and an agreement to establish an intergovernmental forum to address pandemics. This new convention on pandemics strives to specifically address emergencies of microbial origin (WHA, 2021c). It represents merging agendas across environmental and health bodies. A fundamental component to its work requires engaging member states on the sharing of genetic resources (para. 17, WHA, 2021b), a contentious issue under the CBD (see Section 3.1 on Biodiversity and 4.3 on Biodiversity Technologies in this document). The new convention aims for the "**rapid sharing of samples and genetic sequence data of pathogens** of pandemic and epidemic, or other high-risk, potential… for public health preparedness and response" (WHA, 2021b).

This joint work points to the importance of having the right actors at the table at the onset of planning. Coordination on elements related to the governance of pandemics and emerging infectious disease is increasingly funnelled to the "Tripartite" agencies (the FAO, the OIE, and the WHO, working with UNEP), who are advised by a One Health High Level Expert Panel. **The work of the biodiversity MEAs is extremely relevant**, but these conventions are not present at WHA proceedings on this issue.

Another novel approach to redesigning global health to address environmental determinants is through **reconsidering the concept of international emergencies more generally**. Some health professionals call for the WHO to classify climate change as a health emergency (Harmer et al., 2020). Under current global health governance rules, the International Health Regulations (IHR) (2005), only infectious disease events are considered "public health

emergencies of international concern." Harmer et al. (2020) argue that climate change, tallying higher total mortality compared to recent combined previous pandemics, cannot be considered only a risk factor for health emergencies (its current classification); it warrants equal governance to that of infectious disease. Furthermore, they argue that climate change already satisfies the conditions for a public health emergency since it induces conditions suitable for disease transmission. Classifying environmental threats that are not disease specific, such as climate change, as global public health emergencies would require expanding the definition of "public health emergency" under the IHR 2005.

The 2021 WHA resolution on health emergencies (WHA, 2021b) has synergies with work on emergencies under the UNFCCC to address loss and damage (Warsaw International Mechanism) (see Article 8, Paris Agreement) and provide technical assistance to developing countries on loss and damage (Santiago Network), as well as work under the UN Office for Disaster Risk Reduction (UNDRR) concerning emergency preparedness (Sendai Framework). Among others, this WHA resolution urges member states to bolster efforts to identify public health emergencies, "including any events that may cause a public health emergency of international concern, as well as any health measures implemented in response to those events" (Article 5) and further requests that the Director-General "strengthen the WHO Health Emergencies Programme's capacity to prepare for and respond to both acute and protracted humanitarian crises and health emergencies" (Article 23). Member states are aware that they need to strengthen the IHR (2005) in the context of a new potential convention on pandemics. An agreement to strengthen and further develop targeted IHR amendments in December 2021 may present an opportunity to consider the scope for public health emergencies more broadly (WHA, 2021c).

3.0
Global Environmental Governance Through a Health Lens

The architecture of MEAs can be complicated. The aim of this section is to explain and analyze the governance architectures of biodiversity, climate change, pollution, and food systems. The focus is on building the foundational knowledge of decision-making bodies and entry points for issues relevant to health. The analysis of selected treaties and bodies outlines their general principles and objectives, collaboration among agencies, and operations and implementation.

Informed and strategic engagement in negotiations can lead to meaningful changes in the commitment or agendas of countries and sectors. Sometimes this is done by merely inserting a word or phrase into a decision. There is a great deal of opportunity to consider the health terms, concepts, and metrics that could inform or update various agreements to steer or deliver more meaningful and positive health outcomes.

The forums discussed here include:

- The CBD
- The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)
- The IPBES
- The UNFCCC
- Chemical conventions that address hazardous substances, with a focus on the Stockholm Convention on Persistent Organic Pollutants (POPs) and the Minamata Convention on Mercury (Minamata)
- The UN CFS

Each section includes a discussion on legal scope, mode of work, and nexus opportunities.

3.1 Biodiversity

"The interactions between people and biodiversity can determine the baseline health status of a community," emphasized the WHO and CBD in their 2015 landmark report on the biodiversity–health nexus (p. 29). In many ways, this was a call to the health community to pay attention to the state and change of ecosystems. One aspect overlooked in public health was how environmental degradation is a fundamental driver of poverty, malnutrition, and infectious and non-communicable diseases. A second overlooked aspect was that downtrends in biodiversity across ecological scales are associated with uptrends in disease incidence across physiological systems.

The COVID-19 pandemic has led to an explosion of interest in the biodiversity–health nexus to better understand and reduce the transmission of zoonotic diseases. This has contributed to new energy and new sectors taking up a biodiversity–health approach and participating in environmental governance.

But the health and biodiversity communities were already forging new beginnings. The São Paulo Declaration on Planetary Health shows the push to instill the value of nature is part of a broad effort to transform individual, community, and global behaviour and policies to foster more comprehensive mental and physical well-being (Myers et al., 2021). At the same time, the CBD (2018a) is in the process of negotiating a new global biodiversity governance framework as a stepping stone toward its 2050 Vision of "living in harmony with nature."

There are more than a half dozen biodiversity-related conventions under the UN, each of which approaches conservation from different ecological scales (gene, species, ecosystem).[8] This section evaluates three core bodies involved in biodiversity governance. The CBD takes a landscape and equity view, aiming for an integrated approach to the management and governance of land, water, and living resources. CITES oversees policy on wildlife using a species approach. The global clearinghouse for science-policy information, which serves all biodiversity agreements, is the IPBES.

This analysis looks at the state of play of integrated biodiversity–health nexus policy work and the uptake of select public health issues in biodiversity negotiations with a view to informing decisions.

3.1.1 Convention on Biological Diversity

3.1.1.1 LEGAL SCOPE OF THE CBD WITH A HEALTH LENS

The decision-making body of the CBD has an exceptionally broad scope of work, reflecting its aim to provide a comprehensive and global approach to conservation and biodiversity. CBD decisions influence all other biodiversity conventions.

The CBD (1992) aims to ensure: 1) the conservation of biological diversity; 2) the sustainable use of the components of biodiversity; and 3) the fair and equitable benefit

[8] For a list of biodiversity-related conventions, see https://www.cbd.int/brc/

sharing arising out of the utilization of genetic resources. These objectives are connected, overlap, and aim to conserve benefits for people for the long term. It is understood that resource extraction largely occurs from megadiverse, developing countries by developed countries, presenting a need to share benefits. The CBD is legally binding, and its decisions are adopted by consensus.

Health is mentioned in two provisions of the convention. The CBD connects well-being to biodiversity by highlighting the importance of conservation and sustainable use "for meeting the food, health and other needs of the human population, for which purpose access to and sharing of both genetic resources and technologies are essential" (paras. 1 and 20, Preamble).

Health is also referenced in relation to the management of risks associated with living modified organisms (LMOs). An LMO has a unique combination of genetic material created through modern technology—for instance, a genetically-engineered food crop. The CBD calls on countries to consider the risks of LMOs to human health (Article 8g).

The CBD's strong focus on agriculture and genetic resources, both of which link to public health fields, provides an additional health connection. Two separate legal protocols under the CBD address the governance of genetic resources: one focuses on the use of biotechnology and genetic material (the Cartagena Protocol) and the second focuses on the distribution of benefits arising from the use of genetic materials, such as benefits to knowledge holders, sovereign states, or the actors who extract and process them (the Nagoya Protocol). Both protocols indirectly reference health with provisions on "taking into account risks to human health" in their activities.

It is essential for capacity building that the health sector understand the brief history of governance on biosafety.[9] One of the most contentious issues in global biodiversity law is the liability for potential harm caused to biodiversity by transboundary movements of LMOs (Tsioumani & Tsioumanis, 2021). The WHO (2014) discusses the potential for modified organisms to do harm to biodiversity, either external or internal to the human body. Debates remain highly politicized and contentious over the level of potential risk of LMOs and the evidence base for risk assessment. Moreover, the Cartagena Protocol has contributed "significantly to the development of most national biotechnology regulatory frameworks, particularly in developing countries" (Tsioumani & Tsioumanis, 2021). See Section 4.3 on Biodiversity Technologies in this document for more on this.

The Cartagena Protocol on Biosafety (2000) allows the CBD to further govern the biosafety of human use of genetic material: "to ensure that the development, handling, transport, use, transfer and release of any living modified organisms are undertaken in a manner that prevents or reduces the risks to biological diversity, also taking into account risks to human health" (para. 2, General Provisions). Notably, the Cartagena Protocol omits the inclusion of pharmaceuticals (Article 5). It also does not take a precautionary approach in cases where adverse effects are determined "not likely" (Article 7); in these cases, it omits the requirement for advance informed agreements between nations.

[9] For an overview on biosafety, see https://www.iisd.org/system/files/2021-05/still-one-earth-biosafety.pdf

The Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization (ABS) (2011) expands the CBD's work on benefits from the utilization[10] of both genetic resources and Traditional Knowledge associated with genetic resources. Its aim is to create incentives to conserve and sustainably use genetic resources. The Nagoya Protocol establishes clarity, rules, and procedures, including on Free, Prior and Informed Consent, and permits for access.

3.1.1.2 MODE OF WORK

The CBD Conference of the Parties (COP) meets every 2 years. In between COPs, inter-sessional negotiations continue in three key groups. Substantive information is supplied to and drafted into recommendations for the COP by the Subsidiary Body for Scientific, Technical and Technological Advice (SBSTTA) and the Subsidiary Body for Implementation (SBI), who also set priorities and agendas. The Working Group on Article 8(j)[11] furthers implementation of the commitments on—and enhances the role and involvement of—Indigenous Peoples and local communities in the CBD. The COP also serves as the meeting of parties for the CBD's Protocols.

Participation: COP events typically draw over 3,000 attendees, and COP 13 in 2016 drew 8,000. Governments tend to rely on their ministries of environment and/or foreign affairs to serve as negotiators at both COPs and intersessional meetings. Participation in negotiations is also open to UN bodies and intergovernmental organizations, civil society organizations, academic institutions, businesses, and the media. Non-party actors have no decision-making power. The United States attends deliberations but notably is not a party to the CBD.

Workstreams: Health and Biodiversity is considered a formal cross-cutting thematic area under the CBD, with emphasis at the individual, community, and biosphere levels. This provides a hook to push for health actions. The CBD (n.d.-a) website emphasizes biodiversity linkages as "integral to development sectors that modulate health outcomes" like pharmacy, biochemistry, agriculture, or tourism. It calls for "strengthening collaboration with the health sector and mainstreaming biodiversity and health linkages into national strategies, policies, programmes, accounts and reporting instruments" in what it calls a "biodiversity-inclusive One Health transition" (CBD, 2021d).

Communication to/from parties: One way that governments translate decisions in the CBD at the national level is by developing National Biodiversity Strategies and Action Plans (NBSAPs). These plans promote the conservation and sustainable use

[10] "Utilization includes research and development on the genetic or biochemical composition of genetic resources, as well as subsequent applications and commercialization. Sharing is subject to mutually agreed terms. Benefits may be monetary or non-monetary such as royalties and the sharing of research results" (Article 2, Nagoya Protocol, 2011).

[11] Article 8 (j), CBD, 1992: "Subject to its national legislation, respect, preserve and maintain knowledge, innovations and practices of indigenous and local communities embodying traditional lifestyles relevant for the conservation and sustainable use of biological diversity and promote their wider application with the approval and involvement of the holders of such knowledge, innovations and practices and encourage the equitable sharing of the benefits arising from the utilization of such knowledge, innovations and practices."

of biodiversity, mainstreaming across sectors, and are ideally developed through a multistakeholder process.

3.1.1.3 GLOBAL HEALTH IN BIODIVERSITY GOVERNANCE

The CBD-WHO Interagency Liaison Group is the main agent behind the biodiversity–health nexus work under the CBD, and its aim is to "enhance cooperation, promote knowledge exchange, and support the implementation of the interlinkages between biodiversity and human health" (CBD, 2021a).[12]

Incremental but progressive and broad integration of health into biodiversity negotiations over the last decade reflects dedicated interagency work. Although health did not have a stand-alone agenda item at the COP until 2014, it has been mentioned in individual items over time (see Table 1). These mentions largely acknowledge the risks to human health or focus on mainstreaming.

COP 12 in 2014 significantly advanced the biodiversity–health agenda through its first resolution on Biodiversity and Human Health (XII/21), which strengthened capacity building and an impetus to continue collaborative work and generation of nexus knowledge. A key advancement was the decision to produce a state of knowledge review on biodiversity–health interlinkages (CBD, 2014a).

CBD COP 13 in 2016 produced a second resolution on Biodiversity and Health (XIII/6), which, for the first time under the CBD, formally recognized the links between biodiversity and human health. Also notable, it identified the bi-directional links to the health sector in terms of the benefits it reaps and the negative impacts it has on biodiversity. The resolution expanded the biodiversity–health nexus policy domain by naming links to food access and nutrition; traditional medicines and biomedical discovery; air and water quality; clothes, heating, and shelter; ecosystem functioning, resilience, and provision of ecosystem services; climate change adaptation; and physical and mental well-being. It also called for including biodiversity–health interlinkages in impact assessments and drew linkages to the UNFCCC and UNDRR (CBD, 2014b). Other COP 13 resolutions drew attention to the links between health and marine pollution, bushmeat, and biological control related to invasive alien species. Notably, resolutions on digital sequence information (DSI), synthetic biology, and Article 8(j) lacked mention of health altogether.

It is worth noting that in contrast to broad and increasing thematic recognition of integrated health–environment topics in COP decisions, **funding does not correspond**. For instance, under the COP 13 resolution on the allocation of resources for national implementation activities under the Global Environment Facility (GEF) (XIII/21), health is only mentioned with regard to LMOs (CBD, 2014a).

[12] See https://www.cbd.int/health/ilg-health/

Table 1. CBD COP decisions 1993–2014 which mention health or health actors

Conservation and Sustainable Use
Agricultural biodiversity (III/11, V/5; VIII/23; IX/1)
Climate change (VIII/30)
Digital Sequence Information (14/20)
Ecosystem restoration (XIII/5)
Global strategy for plant conservation (V/10, VI/19, X/17, XII/15)
Inland water biodiversity (VII/4, X/28)
Invasive alien species (IV/1, V/8, VI/23, VII/13, IX/4; XI/28, XII/16, XII/17, XIII/13)
Island biodiversity (VIII/1, XI/15)
LMOs (II/5)
Marine and coastal biodiversity (VII/22, X/29, XII/23)
Marine debris (XIII/10)
Mining (14/3)
New and emerging issues (XI/11)
Pollinators (XIII/15, 14/6)
Protected areas and other effective area-based conservation measures (X/31, 14/8)
Sustainable use (X/32)
Sustainable use: bushmeat and sustainable wildlife management (XI/25, XII/18, XIII/8, 14/7)
Synthetic biology (XII/24, 14/9)
Tourism (VII/14)
Benefit Sharing
Article 8(j) (VI/10, VII/16, IX/13, 14/12)
Genetic resources and benefit sharing (X/1)
Governance and Implementation
Aichi biodiversity targets (Target 8.2) (VII/30, VIII/15, X/2, XI/3, XII/1, XIII/3)
Communications (XIII/22)
Cooperation with other conventions (IX/27, X/20, XI/6, 14/30)
Financial mechanism (IX/31, XIII/21)
Impact assessments (V/18; VI/7, VIII/28)
Incentive measures (VI/15)
Mainstreaming gender concerns (XII/7)
Millennium Development Goals and SDGs (VII/32)
Post-2020 GBF (14/34)
Poverty eradication (XII/5)
Subnational governments, cities and other local authorities (X/22, XII/9)

At COP 14 in 2018, a third resolution on Health and Biodiversity (14/4) focused on mainstreaming biodiversity. It called for inter-ministerial dialogues, had an explicit link to the WHO's role, and called for donor funding for joint initiatives (CBD, 2018b). Other COP 14 resolutions highlighted health with relation to sustainable wildlife management and wild meat, Article 8(j), synthetic biology, DSI, and linkages to the WHA, further expanding the biodiversity–health nexus domain and reinforcing interagency relationships.

3.1.1.4 NEXUS OPPORTUNITIES

2022 will be a significant year for biodiversity governance. First, One Health approaches have been taken up by a range of UN agencies and international environmental organizations, bringing the importance of biodiversity into numerous conversations. Second, parties are negotiating the framework for the CBD's next decade of work, making it a crucial time for lobbying if issues are going to feature prominently in the decade ahead. Third, in early 2022, negotiations are expected to conclude in the Open-Ended Working Group on Post-2020 Global Biodiversity Framework (GBF) on the process to establish interim targets to 2030 on global biodiversity conservation to follow up on the earlier Aichi targets, which expired in 2020. Finally, a sweeping draft global action plan on biodiversity and health is on the deliberation desk for COP 15 in 2022.

A great deal of work under the CBD could impact the implementation of public health, but much of this work is occurring under the radar of the community of health stakeholders.

3.1.1.4.1 Post-2020 Global Biodiversity Framework

The GBF working group must define what achieving the CBD's 2050 Vision of "living in harmony with nature" means. **This definition is likely to include human health and the health sector.** Draft targets in the GBF highlight health in terms of safeguards to genetic resources; promoting access to green and blue spaces for human well-being; and addressing pollution, nutrition and food security, medicines, livelihoods, air and water quality, climate change and extreme events, and infectious disease outbreaks. These negotiations, which began before the COVID-19 pandemic, have been intensified by pressure on the global biodiversity community to respond to the pandemic. The biodiversity community's response must yield knowledge and conservation policy actions that will prevent future risks and address the disproportionate socio-economic and socio-ecological impacts on underserved groups. This is new territory for the CBD. **The GBF is essentially setting a global health agenda.**

The Kunming Declaration, adopted during part I of the CBD COP 15 in October 2021, sets the foundation to move these elements forward by recognizing that biodiversity underpins human and Planetary Health, acknowledging the risks of biodiversity loss to human health, and committing to using ecosystem-based approaches to promote health and enhance One Health and other holistic approaches.

3.1.1.4.2 Draft Global Action Plan on Biodiversity and Health

The draft global action plan on biodiversity and health has the **potential to significantly elevate awareness of the existing mention of health across a range of CBD decisions and serve as an initial Planetary Health strategy** (CBD, 2021b). Its adoption would be a strong signal to the health community. The proposal recognizes the bi-directional role of the health sector in biodiversity conservation—that it depends on biodiversity for, among others, medicines and technologies but has negative impacts on biodiversity, such as through microbial disturbances. A second novel component addresses the pollutive aspects of medicines, such as pharmaceuticals that leak into the environment. As a whole, the draft plan could solidify a future workstream based on inter-agency work and expertise. Its invitation to the WHO, relevant expert groups, and multilateral initiatives to participate in its implementation, collaborate in a targeted manner, and report its progress to SBSTTA would plant the role of the health sector within the CBD. Lastly, the plan is comprehensive and addresses all three objectives of the CBD.

The action plan contains operational details on surveillance and harmonization of research and knowledge; principles that take a holistic approach to the health of people and the planet; and 2030 milestones for achieving these goals. In line with a multi-sectoral health governance perspective, it further takes a cross-sectoral and sector-specific mainstreaming approach to these linkages, capacity building, and funding. **Adoption of this plan would strengthen a parallel strategy in the WHO**: the Global Strategy on Health, Environment and Climate aims to eliminate the portion of the global disease burden (~25%) caused by unhealthy environments.

Jointly adopted, the GBF and the global action plan commitments could advance the health–environment nexus by building institutional capacity and common agendas. **The conclusion of COP 15 could be a major step forward for the field of Planetary Health and redefining global health governance.**

Technical review by the health community of the CBD's work is and will continue to be important. For instance, there are two glaring omissions in the draft global action plan from the clinical perspective. First, **it lacks reference to the health of "children"** and only mentions "youth" with regard to their engagement in the policy process. Children are arguably the most vulnerable to harm from environmental damage because biodiversity loss interferes with children's normal development (UN HRC, 2018). Moreover, a goal of the CBD is to protect future generations. Second, in its call to the food sector to enable food system transformation (2.1.3.), **it does not identify biodiversity for "nutrition"** despite its intent to mainstream biodiversity and health linkages into agriculture (see Section 3.4 on Food Systems in this document).

3.1.1.4.3 Visibility in CBD Meetings

Despite ongoing liaison between the CBD and WHO, stakeholders from the health community have limited participation in key biodiversity negotiations. Attendance is in part unclear, as the list of government participants in CBD meetings does not specify their ministry.

Health community attendance at the GBF Open-Ended Working Group meetings was strikingly poor:

- First meeting: Ifakara Health Institute (CBD, 2019b)
- Second meeting: none (CBD, 2020b)
- Third meeting (a virtual event of over 1,600 participants): International Federation of Pharmaceutical Manufacturers and Associations (CBD, 2021e)

At SBSTTA 24 Part I in June 2021, three health organizations attended: the WHO, the Foundation for National Institutes of Health, and the International Federation of Pharmaceutical Manufacturers and Associations, among dozens of environmental organizations (CBD, 2021e). The WHO also made strong One Health statements at the International Union for Conservation of Nature's (IUCN) 7th World Conservation Congress in September 2021 (IISD, 2021c). However, it did not attend the GBF working groups according to participants lists.

There is considerable opportunity to raise awareness among the health community of the health–environment nexus work under the CBD.

3.1.1.4.4 National Plans

As of 2021, 193[13] of the CBD's 196 parties have submitted NBSAPs. But, historically, parties struggle with implementation, as reported in a review by the CBD (2011), which states that 87% of parties cited limited financial, human, and technical capacity for implementation. In terms of health, under an NBSAP, parties are to include an outline of the value of biodiversity and ecosystem services in country and their contribution to human well-being, poverty reduction, and socio-economic development. In 2000, the CBD first invited parties to address interrelated socio-economic, cultural, and human health aspects in impact assessments (V/18). In 2010, the CBD specifically called on parties to integrate health into NBSAPs (X/32). In 2018, the CBD (2018b) invited integration of One Health policies, plans or projects, and other holistic approaches into NBSAPs and national plans (14/4). **An analysis of health in NBSAPs could not be found.**

3.1.2 Convention on International Trade in Endangered Species of Wild Fauna and Flora

CITES seeks to ensure that international trade in specimens of wild animals and plants does not threaten their survival. This legally binding treaty was established as a response to growing concerns that over-exploitation of wildlife through international trade was contributing to the rapid decline of many species of plants and animals around the world. As such, it is a tool to prevent biodiversity loss at the species level. CITES regulates both legal and illegal trade in wild species of flora and fauna. The role of the Convention has come into sharper view as a result of the COVID-19 pandemic and the threat both legal and illegal trade pose to human health as a vehicle for the spread of zoonotic diseases (Rosen, 2020).

[13] As of December 2021, parties lacking NBSAPs: Cyprus, Libyan Arab Jamahiriya, and State of Palestine.

Wildlife trade removes species from their original habitat and places them in other ecosystems, other countries, and/or out of natural environments and into households. Biologically, this means the species is extracted from its role in ecological cycles and that it, and its microbiome, will be in contact with its new ecosystem and environment and other species, including humans and new microbes. The new exchanges invite opportunities for unexpected illnesses such as non-endemic infections. Legal trade sustains livelihoods and food security. Sustainable wildlife management can minimize health-related concerns. In contrast, poaching inevitably leads to exchanges that escape control and potentially increase disease transmission.

3.1.2.1 MODE OF WORK

CITES parties regulate wildlife trade through controls and regulations on species listed in the Convention's three Appendices (CITES, 2021). Appendix I lists species endangered due to international trade, permitting such trade only in exceptional circumstances. Appendix II species are those that may become endangered if their trade is not regulated, thus requiring controls aimed at preventing unsustainable use, maintaining ecosystems, and preventing species from entering Appendix I. Appendix III species are subject to domestic regulation by a party requesting the cooperation of other parties to control international trade in these species. Species are added to the appendices based on data from scientists, non-governmental organizations, and relevant state authorities, indicating that a species is impacted by international trade and thus needs regulation.

There are approximately 5,800 fauna species and 30,000 flora species protected under the three CITES appendices. Parties regulate the international trade of CITES species through a system of permits and certificates that confirm that the conditions for authorizing trade are fulfilled, meaning that the trade is legal, sustainable, and traceable in accordance with the Convention. This is required before specimens listed in its appendices are imported, exported, or introduced from the sea. Each party is required to adopt national legislation and to designate two national authorities, namely, a management authority responsible for issuing permits and certificates based on the advice of a scientific authority. These two national authorities also assist with CITES enforcement through cooperation with customs, police, and other appropriate agencies. Parties maintain trade records that are forwarded annually to the CITES Secretariat, thus enabling the compilation of statistical information on the global volume of international trade in an appendix-listed species. **National authorities may perform health inspections, although there are no global standards or requirements under CITES for this.**

3.1.2.2 WILDLIFE TRADE AND PUBLIC HEALTH

Debates within CITES exemplify the challenge of integrating siloed UN mandates. There appears to be some level of division within the Standing Committee and CITES parties as to whether CITES should have a role in stemming future pandemics and risks to public health.

CITES COP 16 highlighted illegal wildlife trade as a threat to human health for the first time in 2013 (Rosen, 2020). At a roundtable on transnational organized wildlife and

forest crime, ministers responded to these findings by recognizing that this crime has vast and far-reaching impacts on not just "species, livelihoods, economies, regional security" but also "in some instances human lives" (CITES, 2013).

When called to address the COVID-19 pandemic, CITES maintained that "matters regarding zoonotic diseases are outside of CITES's mandate, and therefore the CITES Secretariat does not have the competence to make comments regarding the possible links between human consumption of wild animals and COVID-19" (CITES, 2020). This reaffirmed the interpretation of CITES's mandate and capacity as serving a role in addressing biodiversity loss and not public health.

Eventually, CITES's Standing Committee established a working group on the role of CITES in reducing the risk of future zoonotic disease emergence associated with international wildlife trade. The intersessional working group is due to report back to the 74th meeting of the Standing Committee in 2022.

At the 73rd meeting of the Standing Committee, discussion included more immediate precautionary action for health protection through CITES's relationship to law enforcement bodies. Specifically, Israel proposed that the CITES Secretariat send a notification urging parties to implement the WHO (2021g) interim guidance on the sale of wild animals in food markets, which calls on relevant national authorities to strengthen animal health surveillance systems for zoonotic pathogens and to include both domestic and wild animals to prevent risks to human health. Some countries, however, emphasized that the WHO had not concluded that the COVID-19 pandemic had a zoonotic origin.

3.1.2.2.1 Wildlife and Zoonotic Disease

Zoonotic disease constitutes a major factor in infectious disease risk (Cleaveland et al., 2007). It is reported that up to 75% of new and emerging infectious diseases originate in wildlife (Jones et al., 2008). The U.S. National Academy of Medicine considers international trade as one of the six contributing factors to emerging infectious disease risk (Nature, 2011) as a result of close contact between humans and animals and products of animal origin. This is even more problematic given the increase in the volume of trade over the last few decades.

The international legal wildlife trade alone increased 500% in value since 2005 and 2,000% since the 1980s (IPBES, 2020). This is not only unsustainable and a threat to biodiversity conservation, but it is increasingly a vehicle for spreading zoonotic diseases and poses a challenge for disease risk management and public health (Chomel, 2009; Cleaveland et al., 2007; Karesh et al., 2005). Some examples include the Ebola virus in primates, monkeypox in African rodents, and possibly HIV in chimpanzees (Guarner et al., 2004).

Kolby (2020) writes that approximately 200 million live animals are imported to the United States annually, along with pathogens that "hitchhike into the country on legally imported wildlife" and go unnoticed. Like most countries, the United States has no laws specifically requiring disease surveillance for wildlife entering the country, and most wild animal imports are therefore not tested. It is not currently a CITES requirement to have a wildlife disease surveillance mechanism. The U.S. Centers for Disease Control and Prevention

(CDC) regulates the importation of wildlife and wildlife products known to "present a significant public health concern" (Kolby, 2020), focusing primarily on bats, African rodents, and nonhuman primates, but there is not a monitoring mechanism for all species.

3.1.2.2.2 Mitigating Risk of Zoonotic Disease: The role of CITES

According to experts, COVID-19 is "Disease X" and the evidence of a larger problem where humans encroach onto wildlife habitat, and wildlife trade brings zoonotic pathogens around the world. Therefore, policies should be of a precautionary nature to manage the drivers of zoonotic disease risk rather than responding to each individual disease after the fact (Daszak, 2020).

Lieberman (2020) called for countries to consider whether to take a "precautionary, public health-based approach, specifically by working to end all commercial trade in wildlife (particularly birds and mammals) for consumption, and to close all such commercial markets." However, such a widespread ban is unrealistic given the economic impact on livelihoods.

Trade in wildlife, though, needs to have a health surveillance mechanism. One proposed pathway is to institute a "clean trade" program in which private industry and government officials work together to implement safer strategies that entail testing either before transport or at the border. This would mean that animal health certificates could accompany wildlife (Kolby, 2020). The involvement of CITES is therefore paramount.

There is also the suggestion to use the CITES Appendices to determine the degree of risk a species poses to human health as a vessel for disease transmission. However, this would require amending the Convention and redefining the purpose of the CITES appendices, which currently ranks as politically unlikely. Borsky et al. (2020) write that CITES's Appendix system reduces the trade of CITES-listed animals, and with that, inadvertently reduces the volume of potential zoonotic diseases traded. Therefore a "hypothetical trade agreement in which there would be trade restrictions on animals with a high risk of passing disease to humans might yield a similarly positive outcome" (Borsky et al., 2020).

While the most appropriate frameworks are being explored, in the short term and lead up to the next meeting of the CITES COP 19 to be held in 2022, a CITES-Tripartite-UNEP task force should be established to consider mechanisms to implement wildlife disease surveillance mechanisms for CITES-listed species that are considered to have a high degree of risk, either as disease source or carrier.

Contributions from the Collaborative Partnership on Wildlife (CPW) in forward-looking discussions on CITES's role should not be overlooked. The CPW, established by the CBD in 2012, convenes the CBD and CITES along with a broad group of 11 other environmental actors and one trade organization on the issue of sustainable wildlife management. While voluntary in nature, the CPW is the only platform so far that brings together MEAs and other relevant organizations that are invested in the issue of wildlife trade and management, and implications for human health. Its four thematic priorities are food security and livelihoods (including bushmeat), human-wildlife conflict, illegal/unsustainable hunting, and partnership coordination and outreach (CBD, n.d.-b). An

entire session was dedicated to the discussion of zoonotic diseases and the One Health approach at its Third Wildlife Forum in 2021. Key messages were that data and narrative on zoonoses and trade are confusing and poorly analyzed; the role of wildlife as a driver of disease is overestimated; and there is a need for collaboration across multiple sectors (IISD, 2021b).

3.1.3 Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services

IPBES is an independent, intergovernmental body. Its aim is to provide evidence-based, objective, and policy-relevant information to decision-makers regarding the planet's biodiversity, ecosystems, and the benefits they provide to people. It largely does this through publication of various assessments, whose selection is decided in the IPBES plenary. The work of IPBES is agreed upon in an intergovernmental process by consensus. IPBES' decisions and assessments serve to inform all biodiversity-related conventions, and the UN system more broadly.

IPBES plenary is its main governing body and includes representatives of member states, non-member states, UN organizations, non-governmental organizations, and others who attend as observers. Few health actors observe negotiations. For instance, of 800 participants at IPBES 8, only one health organization attended (EcoHealth Alliance) (IPBES, 2021). The work of the plenary is supported by an administrative bureau and a scientific and technical Multidisciplinary Expert Panel. The Multidisciplinary Expert Panel is composed of experts in natural and humanitarian sciences but does not include representatives from the health sector.

Notable IPBES assessments for the health–environment nexus include:

- The Global Assessment on Biodiversity and Ecosystem Services highlights broad, worldwide trends in the loss of biodiversity and ecosystem services. It addresses health from the perspective that: "[m]any of nature's contributions to people are essential for human health and their decline thus threatens a good quality of life" (xxvi); nature "improves" both physical and mental health; and acknowledges that "much of health valuation centres on a western approach and worldview" (IPBES, 2019a).
- The nexus assessment (forthcoming in 2023) evaluates the interlinkages among biodiversity, water, food, and health, and policy options (IPBES, 2019b).
- The pandemics report (IPBES, 2020) a response to the COVID-19 pandemic that discusses global governance arrangements for pandemic prevention and examines microbial biodiversity, land-use changes and climate change, wildlife trade, and a One Health approach.

Information on IISD Earth Negotiations Bulletin expert coverage of intergovernmental negotiations on biodiversity is here, on trade in wildlife is here, and on IPBES is here.

3.2 Climate Change

Climate change directly and indirectly impacts human health and affects billions of people. In 2018, the WHO called the Paris Agreement a "fundamental health agreement" (UNFCCC, 2018). It stated that through the anthropogenic drivers of climate change, "we are undermining the environmental determinants of health on which we depend: we undermine water supplies, we undermine our air, we undermine food security" (UNFCCC, 2018). The WHO (2018) also emphasized that meeting the objectives set out in countries' nationally determined contributions (NDCs) under the Paris Agreement could save a million lives per year globally by 2050 just from the co-benefit of reduced air pollution. The message points to how non-health sectors and actors influence health outcomes.

In September 2021, in parallel to the meeting of the UN General Assembly, the health sector orchestrated a simultaneous call to action in over 200 medical journals worldwide, urging decision-makers to advance global climate change deliberations to reduce health risks (Atwoli et al., 2021). The call underlined two key elements: first, that climate change is a major public health threat, and clinicians are on the frontline to address issues arising from the destruction of nature; second, that the medical community urgently supports keeping average global temperature increases below 1.5°C to "halt the destruction of nature, and protect health" (Atwoli et al., 2021). In this milestone collective and public action, high-level medical professionals echo the insights provided by the Intergovernmental Panel on Climate Change (IPCC), which has synthesized climate change and health knowledge since its first assessment report (IPCC, 1990).

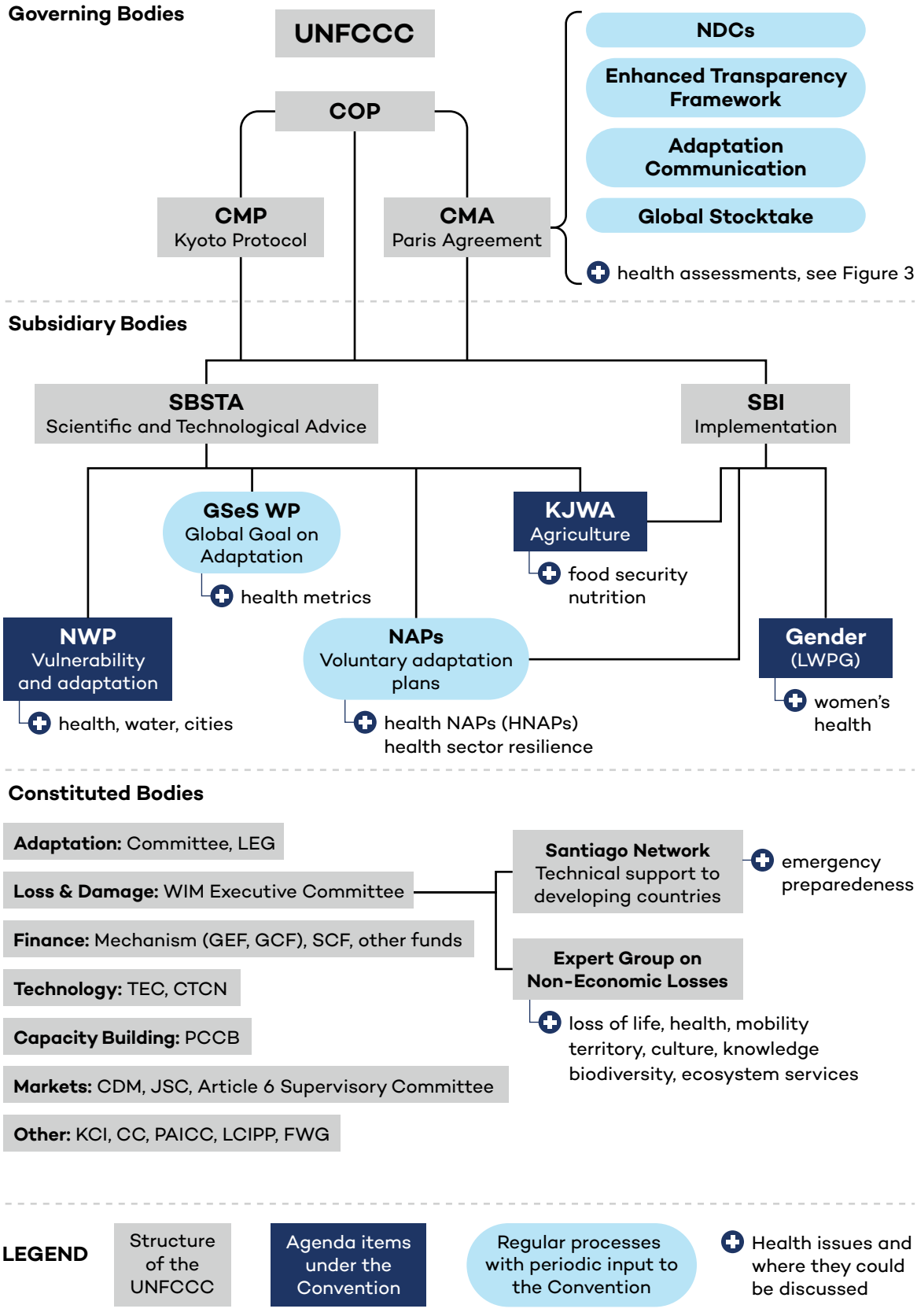
What more can be done under the UNFCCC and its Paris Agreement to achieve health objectives and prevent "catastrophic harm to health that will be impossible to reverse" (Atwoli et al., 2021)? How can health experts engage with the climate community and press the point that the outcome of climate negotiations affects patients around the world in acute and chronic ways? How can climate negotiators utilize a ready and willing health sector to build and crystallize important frameworks for policy and monitoring?

This section introduces the UNFCCC, outlining aspects important to the climate–health nexus with a view to informing policy-making.

3.2.1 UN Framework Convention on Climate Change

The UNFCCC and its treaties are vast and complicated. They are full of legal terms and insider jargon that make this aspect of international environmental law extremely difficult for an outsider to understand and interpret. Climate change has broad-reaching effects, and its drivers and impacts span all sectors, but entry points to engaging in policies are not readily accessible. This analysis aims to summarize essential elements of the climate change governance architecture to provide a basic framework for those outside climate policy circles to understand; in addition, for any expert, it outlines aspects that could—or might be—developed to address human health. It is through these aspects that the health sector might strengthen—or be called upon to contribute—its input so that an international agreement on climate change might better reflect health concerns and advance to improve health outcomes.

Figure 1. UNFCCC through a health lens



Note: See https://unfccc.int/ for more information and acronyms.

3.2.1.1 LEGAL SCOPE OF THE UNFCCC WITH A HEALTH LENS

The UNFCCC (1992) sets out the basic legal framework and principles for international climate change cooperation. The objective of this MEA is "to achieve stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system" (Article 2).

The treaty is not a health agreement. But consideration of human health is linked to the treaty in three ways. It is

- Implied through emphasis on protecting food production in the objective (Article 2)
- Indicated in the specification that adverse effects of climate change include deleterious effects on human health (Article 1.1)
- Indicated in the stipulation that parties shall take climate change considerations into account in their relevant social, economic, and environmental policies and actions to minimize adverse effects on public health (Article 4).

Essentially, these are the legal entry points for shaping considerations on health in the formal negotiations.

In addition, under a workstream on adaptation called the Nairobi work programme (NWP), there is a knowledge portal on health that can be used to share health-related information among parties. In contrast to the legal entry points above, the activities of the NWP are not part of the negotiated text, legally binding outcomes, or party commitments. The NWP was established under the UNFCCC in 2005 as a knowledge-to-action hub on adaptation in developing countries and serves to catalyze the development and dissemination of information and knowledge that can inform and support actions for adaptation at regional, national, and subnational levels (UNFCCC, 2021c). Health was adopted as an agenda item in the NWP in 2013 (UNFCCC COP, 2013a). Notable NWP activities on health include the 10th Focal Point Forum held in 2016 and the synthesis report on *Human Health and Adaptation*, published in 2017.

In general, key commitments for parties set out by the UNFCCC are formulating and implementing plans to mitigate greenhouse gas (GHG) emissions and facilitating adaptation to climate change. The Convention also stipulates that developed countries are to take the lead in combating climate change and are to support developing countries in implementing the Convention through financing, technology transfer, and capacity building.

The UNFCCC is the parent framework to two other agreements, the Kyoto Protocol (1998) and the Paris Agreement (2015).

The Kyoto Protocol—and its Doha Amendment—committed industrialized countries and countries with economies in transition to achieving quantified **emission reduction targets** for a group of six GHGs for the aggregate period of 2008 to 2020 (UNFCCC, 2021b).

Parties adopted the Paris Agreement to strengthen the global response to climate change, including that industrialized countries alone could not solve the climate crisis. The Paris Agreement, which entered into force in 2016, is celebrated for stipulating **global**

warming targets the world ought not to exceed: below 2°C above pre-industrial levels (albeit noting a preference for 1.5°C) (Article 2). In general, parties aim for this target by 1) peaking GHG emissions as soon as possible and 2) achieving balance between anthropogenic sources of emissions and their removal by sinks (Article 4)—an objective now referred to as "net-zero GHG emissions." Parties then assess and report sources and sinks to the UNFCCC through obligatory national assessments called NDCs, which in aggregate intend to achieve the warming target. Parties have discretion over their contributions, but ambition should increase over time, with developed countries taking the lead.

Parties' NDCs are recorded in a public registry maintained by the UNFCCC Secretariat. While all NDCs must address mitigation, they can also address other elements of a country's climate action, key among them adaptation and finance. At the UNFCCC COP 26, delegates agreed that NDCs would be submitted every 5 years and would comprise 10-year plans. New NDCs will be submitted in 2025 and 2030 with end dates of 2035 and 2040, respectively.

The Paris Agreement (2015) strengthened several aspects of the UNFCCC relevant to health. It:

- Strengthened the original definition of adverse effects of climate change under the UNFCCC by **acknowledging the right to health**, the rights of vulnerable groups, and intergenerational equity (Preamble).
- Strengthened work on adaptation, resilience, and low emission development by establishing the **Global Goal on Adaptation** (Article 7.1), which recognizes that "greater levels of mitigation can reduce the need for additional adaptation efforts, and that greater adaptation needs can involve greater adaptation costs" (Article 7.4).
- Enhanced cooperation on averting, minimizing, and **addressing loss and damage** associated with the adverse effects of climate change (Article 8).
- Facilitated **making financial flows consistent** with a pathway toward low-emissions and climate-resilient development (Article 2).
- **Enshrined a Global Stocktake** to track and consider progress on mitigation, adaptation, and support.

COP 26 further strengthened this work by launching a two-year Glasgow-Sharm el-Sheikh Work Programme on the Global Goal on Adaptation (UNFCCC, 2021a). The work programme will be carried out under the subsidiary bodies; draw on a variety of inputs, including Indigenous and local knowledge systems; and include four workshops per year. A core activity is planning, implementation, and communication on adaptation plans. **The work programme creates a new opportunity to consider health sector input and concerns under the UNFCCC.**

Preparations for the inaugural 2023 Global Stocktake begin in 2022, and this process will repeat every 5 years. The outcomes of the Stocktake will inform parties in revising their climate change activities. **The Stocktake could be an opportunity to assess progress**

on addressing health outcomes, impacts to the health sector, and financing for resilience.

3.2.1.2 MODE OF WORK

UNFCCC parties regularly meet for negotiations—annually at a COP and twice per year in subsidiary bodies, the Subsidiary Body for Scientific and Technological Advice (SBSTA) and the SBI. Decisions are adopted at the COP, but agendas and priorities are formed and agreed upon in the subsidiary bodies, where draft decisions are made. The COP also serves as the meeting of the parties to the Kyoto Protocol (CMP) and the Paris Agreement (CMA), with relevant decisions negotiated and adopted under these specific tracks. Decisions are made by consensus.

Participation: UNFCCC COP sessions are high-profile events that typically draw more than 10,000 attendees, with recent conferences featuring more than 20,000 participants (UNFCCC, 2021d). Governments tend to rely on their ministries of environment and/or foreign affairs to serve as negotiators at both COPs and subsidiary body meetings. But participation in negotiations is also open to UN bodies and intergovernmental organizations, civil society organizations, academic institutions, businesses, and the media. Non-party actors have no decision-making power but can engage in different ways, including through lobbying at the global and national levels, engaging with constituted bodies, statements in negotiation sessions, submissions to the UNFCCC Secretariat, and participating in "side events" during UNFCCC meetings. Because climate change is such a complex issue, a wide array of constituted bodies have been established to advance the UNFCCC's thematic work.[14] Some of these have an indefinite mandate; others are time-bound with the possibility of extension.

Workstreams: The COP has launched a number of thematic work programmes, including the Lima Work Programme on Gender; the NWP on impacts, vulnerability, and adaptation to climate change; and the Koronivia Joint Work on Agriculture (KJWA). The UNFCCC also features various processes dedicated to issues such as research and systematic observation, and National Adaptation Plans (NAPs). Constituted bodies and other groups work year-round, organizing workshops and liaising with parties, other stakeholders, and among each other. **Health issues can be taken up in thematic work.**

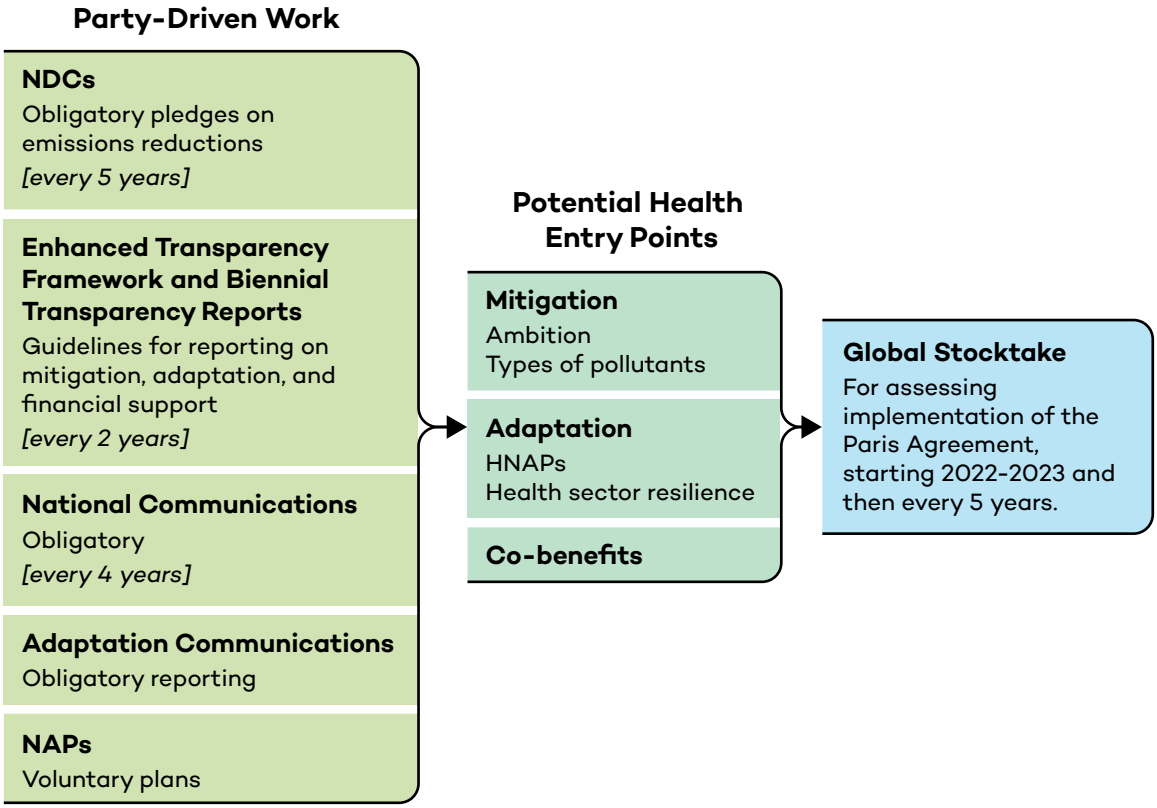
Communication to/from parties: Information on work done at the national level is channelled to the UNFCCC in a number of ways. Some of this party-driven work is mandatory while other communications are voluntary, and there are different forms of reporting under the Convention, the Kyoto Protocol, and the Paris Agreement, with different guidelines also applying to developed and developing countries.[15] The UNFCCC Secretariat and constituted bodies regularly draw on these reports and plans to prepare global synthesis reports on different issues to be shared within and inform

[14] For a list of constituted bodies, see https://unfccc.int/process-and-meetings/bodies/the-big-picture/what-are-governing-process-management-subsidiary-constituted-and-concluded-bodies

[15] See among others: NDCs, Adaptation Communications, NAPs, National Communications, National Inventory Reports, and Biennial Transparency Reports.

negotiating sessions. These **communication channels can be used as opportunities** to strengthen knowledge and information-sharing on health risks, impacts, outcomes, capacities for clinical responses to climate change events, and health sector needs for financial and other support. These, particularly the NDCs and NAPs, can be used to detail health co-benefits of mitigation.

Figure 2. Windows for health in party-driven work under the UNFCCC



3.2.1.3 CLIMATE CHANGE IN GLOBAL HEALTH

The IPCC outlines the growing evidence describing the impacts of climate change on human health for each of its assessment reports published periodically since 1990. Although the WHO has engaged with the issue of climate change for over 2 decades, integration of the topic into global health policy has been incremental.

The 51st session of the WHA (1998) formally recognized climate change as a health threat in a resolution that urged parties to recognize, integrate, and build resilience to the impacts of climate change and ozone depletion. The resolution also requested the UN General Assembly build the evidence and financial base to support addressing the threats to human health.

The 61st WHA (2008) adopted a second resolution on climate change and health, which noted that climate change could jeopardize the achievement of the Millennium Development Goals. The resolution emphasized **adaptation** in a number of ways, such as strengthening the resilience of health systems, engaging the health sector in

the UNFCCC's NWP, urging member states to develop and integrate health measures into climate change adaptation plans, and strengthening the capacity of health actors to monitor and provide technical guidance on health issues.

The 68th WHA (2015) adopted a resolution on air pollution, linking air pollution, non-communicable disease (e.g., lung disease), clean/renewable/efficient energy, and the social determinants of health. It also recognized that meaningful health policy and addressing health inequities requires cross-sectoral approaches, underscoring the role of non-health actors in achieving clean air. The resolution increased the WHO's focus on **mitigation** by underlining the importance of maximizing synergies with the WHA resolution on climate change and the UN agreements on chemicals governance.

In 2021, the WHA formally adopted the WHO global strategy on health, environment and climate change, aimed to provide "a vision and way forward on how the world and its health community need to respond to environmental health risks and challenges until 2030" (WHO, 2020d).

3.2.1.4 NEXUS OPPORTUNITIES

There are a number of opportunities to further incorporate input from the health sector into climate change negotiations to improve environmental governance and health outcomes.

3.2.1.4.1 Visibility at UNFCCC Meetings

There is considerable scope for increasing the visibility of health issues and the impact of health actors at UNFCCC meetings. In spite of its longstanding interest, the health community has not been very visible within global climate change negotiations. In a review of insider summary reports of UNFCCC COP deliberations between 2015 and 2021, there is no mention of an intervention by the WHO in UNFCCC plenaries, while other UN agencies, intergovernmental organizations, and stakeholder constituencies regularly take the floor.[16] In a review of the UNFCCC archive of formal statements delivered at UNFCCC COPs by non-party actors, a search using the term "health" revealed no records. While this does not mean that health actors were not present, it does indicate there is **a gap between the increasing presence of health stakeholders in global climate events and the formal uptake of their messages** and concerns in negotiation sessions. This may be in large part be due to the challenge of understanding and navigating the UNFCCC architecture and identifying appropriate entry points to the climate–health nexus.

There are other ways that the health community's visibility is growing and could continue to expand. An increasing but still small number of countries now include representatives from their ministries of health on the delegations sent to negotiate at UNFCCC meetings. However, this practice **is not regionally balanced or consistently maintained** in party delegations from COP to COP. At COP 25 in 2019, 14 countries included health ministry representatives on their delegation, tallying to 40 health representatives among

[16] See https://enb.iisd.org/negotiations/un-framework-convention-climate-change-unfccc

11,406 government delegates at this event.[17] At COP 26, these numbers increased; however, still, only 12% of UNFCCC parties sent health ministers to the deliberations. A provisional list of COP 26 participants showed 58 representatives from ministries of health across 24 countries out of over 21,500 party delegates (UNFCCC COP, 2021c).[18]

Furthermore, a review of UNFCCC side event archives indicates the health sector and health topic presence has grown and diversified over the past decade. In the last 5 years, the number of COP side events whose title or description implied a focus on human health increased from half a dozen to over a dozen events per conference (among over 200 events per COP session). In the margins of the COP, one-day "health summits," organized by an international network of health organizations, have occurred in parallel to UNFCCC COP negotiations since COP 16 in 2010. These awareness-raising events have recently been supported by COP presidencies. In Glasgow, the COP 26 presidency hosted a 60-event climate–health pavilion on the margins of the negotiations.

At COP 26, the WHO used the UNFCCC's global platform to make strides in national action on climate change. The health sector contributes approximately 5% of GHG emissions (WHO, 2021c) and is vulnerable to extreme weather events that can affect facility structures, power, communication, transport, and water quality, waste management and sanitation—all paramount to health service delivery. In Glasgow, **the WHO took action to formalize and unify goals on reforming national health systems to be more resilient and sustainable and adopt a low-carbon approach**. It organized and collected ministerial commitments to this effect. Under this initiative, 52 countries pledged, to the WHO or the COP 26 presidency, their ministerial commitment to making their national health system climate resilient and/or low carbon. Fifty committed to developing climate-resilient health systems, and 46 committed to a transformation to more sustainable and low-carbon health systems, with 14 adding targets for net-zero emissions before 2050. This initiative is backed by ongoing WHO support for its member states in the form of technical guidance and assistance in accessing financial support processes as part of a broader toolkit for strengthening the response to climate change at the national level. In addition, a follow-up process for implementing the COP 26 Health Initiatives on Climate Resilient and Low Carbon Sustainable Health Systems is underway by the COP 26 presidency team in collaboration with the WHO and other partners. The aim is to scale up finance for the implementation of the initiatives while providing technical support to countries and **creating a community of practice**.

Increased visibility, in the form of informed engagement in the UNFCCC subsidiary body and COP discussions, participation by health ministers in negotiations, side events and health summits, and national commitments are all meaningful ways to advance

[17] Number of members of a health ministry on parties' COP 25 delegations: Antigua and Barbuda, 5; Malawi, 1; Federated States of Micronesia, 1; Netherlands, 1; Nigeria, 4; St. Vincent and the Grenadines, 1; Thailand, 2; Tuvalu, 2; Tanzania, 4; Bangladesh, 2; Belgium, 9; Indonesia, 1; Iraq, 7. See the COP 25 list of participants here: https://unfccc.int/sites/default/files/resource/cp_inf4.pdf

[18] Number of members of a health ministry on parties' COP 26 delegation: Antigua and Barbuda, 2; Belgium, 9; Iran, 1; Iraq, 3; Ireland, 1; Israel, 2; Kenya, 2; Kuwait, 1; Libya, 1; Malawi, 1; Nepal, 1; Romania, 1; São Tomé and Príncipe, 1; Sierra Leone, 1; Sri Lanka, 1; State of Palestine, 1; Sudan, 1; Thailand, 1; Timor-Leste, 2; Turkey, 8; Ukraine, 2; UK, 1; Tanzania, 5; Vietnam, 9.

awareness and support for linked climate change and global health policies, and there are many opportunities to strengthen these contributions.

A WHO review of NDCs submitted up to December 2019 found that although 70% of the 184 submitted NDCs touch upon public health considerations, these references remain vague and are rarely quantified (WHO, 2020b). Yet, both climate change impacts on health and health co-benefits of climate action are extensive and well documented. The **scope for mainstreaming health considerations into climate policy is significant.** Raising awareness on health impacts and benefits could help tip the balance toward more ambitious mitigation and adaptation action, including by highlighting its cost-effectiveness.

There is a range of issues that health actors could target under the UNFCCC to raise attention for the climate–health nexus and push for more ambitious climate action. These include mitigation, adaptation, agriculture, loss and damage, and sustainable finance.

Box 3. A look at national health sector capacity on climate change

- 81 ministries of health (out of 95 respondents) designate a focal point for health and climate change
- Seven countries report that their ministry of health received training on health in UNFCCC negotiations.
- Eight low- and middle-income countries reported receiving training on climate change and health for vulnerability and adaptation assessments.
- 16% of countries (of 95 assessed) have analyzed the health benefits of national climate mitigation policies
- Few agreements are established between ministries of health and ministries of water, sanitation and hygiene (32%); energy (20%); agriculture (19%); transportation sector (17%); and urban development and housing (14%)

Source: WHO, 2021m.

3.2.1.4.2 Mitigation

It is essential for the health community to grasp the core arguments on mitigation—**the heart of the UNFCCC treaties**—which can be used in lobbying for clean air.

Most important is understanding that fossil fuel combustion is not only the main driver of climate change, it also causes air pollution, and few countries implement actions to either reduce emissions or improve air quality. **Mitigation and air quality policies are mutually reinforcing** and together increase the likelihood of achieving the global warming target of 1.5°C and significantly cleaner air.

Box 4. Air pollution: A quick view

- In 2019, 90% of the global population lived where $PM_{2.5}$ concentrations exceeded standards for long-term exposure (WHO, 2021f).
- Global warming increases the presence of other irritants like sand and dust storms and allergens (pollen and moulds).
- Epidemiologists estimate millions of annual emergency room visits for asthma caused by ozone and particulate matter (Anenberg et al., 2018).
- Respiratory inhalers are commonly used by both adults and children worldwide.
- The global cost of fossil fuel air pollution is several trillion USD per year and increasing (Myllyvirta, 2020).

In a pre-COP 26 assessment of national progress on augmenting emissions reductions, **only 22 countries and the European Union (EU)[19] actually increased ambition** in their NDC by the 2021 deadline. Implementation of the *WHO Global Air Quality Guidelines* is also poor. While 117 countries acknowledge the guidelines and may be implementing a minimum of at least one pollutant objective (of six pollutants), **77 countries have no standards** or have shared no information (WHO, 2021l). The air quality standards in play also largely focus on short-term exposures (~ 1 day), which is physiologically less worrisome than long-term exposures over time. Of those countries with standards for short-term exposure to particulate matter (PM), far less than half met the guideline (21% for $PM_{2.5}$ and 46% for PM_{10}), and only seven countries have long-term (~1 year) guidelines on these pollutants.

The health impacts of poor air quality are increasing, and **greater awareness of the prevalence of air pollution is important** (see Box 4). Primary care clinics face multifactorial respiratory disease from pollutant combinations and concentrations that are observed but only partly understood—and where understood, they are barely regulated.

While UNFCCC documents have traditionally been silent on specific mitigation measures countries should pursue to reduce emissions, at COP 26, parties achieved a milestone through the Glasgow Climate Pact. The Pact specifically calls for rapidly scaling up clean power and energy efficiency measures, including by accelerating the phase-down of coal power and phase-out of fossil fuel subsidies (UNFCCC COP, 2021a, Article 20). Thus, it **opens the door for increased attention within the UNFCCC to health impacts from fossil fuels.**

Air pollution, through the alteration of blood chemistry and genetic expression and by induction of chronic inflammation, increases the incidence of cardiovascular and respiratory diseases and premature births and reduces life expectancy. Recent research shows that air pollution associated with the burning of fossil fuels, especially coal, petrol,

[19] This number is as of November 20, 2021 at https://climateactiontracker.org/climate-target-update-tracker/

and diesel, is responsible for one in five deaths globally in 2018, a level significantly higher than previously estimated (Vohra et al., 2021).

Lobbying in mitigation discussions should also focus on reducing emissions of short-lived climate pollutants (SLCPs). SLCPs remain in the atmosphere for a much shorter period of time than carbon dioxide (CO_2) but have **stronger global warming potential** and are also air pollutants. Countries' collective mitigation ambition, as expressed in their NDCs, is not in line with what is required to achieve the objectives of the Paris Agreement, both in terms of temperature goals and GHG neutrality. Some experts point to reducing SLCP emissions as an important way to limit the risk of temperature overshoot (Ross, 2018) (see Box 5).

At the national level, leadership by cities in taking measures to reduce emissions and improve air quality within their jurisdictions will continue to be important to pushing action on global policy and the implementation of multi-sectoral action on mitigation.

Box 5. SLCPs: Key information

- Produced from a range of activities, including fossil fuel production and combustion, agriculture, air conditioning, and cooking fires and include black carbon and methane (Climate and Clean Air Coalition [CACC], 2021).
- Attention to SLCPs as a stand-alone issue remains fairly limited in the UNFCCC.
- Slow near-term global warming and reduce air pollution impacts on health and agriculture (UNEP, 2011) (flagship report).
- CACC, backed by UNEP and WHO, supports the development of National SLCP Action Plans; see plans for Mexico (CCAC et al., 2020) and Bangladesh (CCAC & Bangladesh Ministry of Environment, 2020).
- Few NDCs make reference to policies and actions explicitly aimed at SLCP reduction (Ross et al., 2018).
- 111 countries have signed the Global Methane Pledge to reduce global methane emissions by at least 30% from 2020 levels by 2030 (CACC, n.d.).
- Key resources: 2021 *Global Methane Assessment* report (UNEP & CACC, 2021), European Commission (2020) Methane Strategy, IPCC's forthcoming *Methodology Report on Short-lived Climate Forcers*.

3.2.1.4.3 Adaptation

Climate change will exacerbate existing health challenges and lead to new health risks, particularly for the most vulnerable individuals and communities. **Sound adaptation strategies are essential for reducing vulnerability and addressing and preventing health inequities.** The UNFCCC presents many entry points to engage in adaptation discussions, including the Adaptation Committee and the Least Developed Countries Expert Group.

The principal framework for multistakeholder engagement on adaptation issues is the NWP, which features health as a thematic area. The NWP welcomes the submission of knowledge resources and tools and partnerships to support developing countries in the process of formulating and implementing NAPs. In 2018, SBSTA called for "continuous" engagement on health under the NWP (UNFCCC SBSTA, 2018b), an invitation to expand this work.

Strengthening and expediting NAP formulation and implementation are central to resilience-building. Though they are a core component to developing country adaptation activities under the UNFCCC, 126 out of 154 developing countries are still formulating their first NAPs (UNFCCC, 2020a). As of March 2021, 22 developing countries (of which six are least-developed countries) have completed and submitted their NAPs to the UNFCCC Secretariat. The WHO supports this process by providing guidance on developing more specific HNAPs led by ministries of health as a supplement to a NAP. Criteria for HNAPs was established in 2021, and its uptake could be a concrete activity for joint health–environment ministerial work in 2022. The criteria create multi-sectoral links and take a systems approach, putting into practice larger goals for multi-sectoral health governance.

In addition to increasing the number of NAPs, **the quality of NAPs also warrants attention.** A review of 19 NAPs submitted by the end of 2020 points to a mismatch between the vulnerabilities assessed and corresponding actions for resilience. As well, it shows gaps in identifying specific risks to—and targeted actions for—vulnerable sub-populations (WHO, 2021i). Addressing this mismatch and these gaps will deepen the value of NAPs and improve equity in resilience strategies. In terms of health issues, although a range of health impacts are mentioned across NAPs, there are notable inconsistencies in the diseases assessed at the country level. Public health and clinical responses to these diseases are not comprehensive or are lacking altogether. NAPs most often refer to vector- and waterborne diseases, with zoonoses and mental health receiving the least attention (WHO, 2021i). Health planning for responding to patients suffering from heat stress, respiratory illness, malnutrition, and non-communicable diseases associated with climate changes or events is insufficient. **Financial planning for addressing health vulnerabilities is sorely needed.**

In addition to NAP work under the NWP, NAP Expos organized by the Least Developed Countries Expert Group present another opportunity to engage on and support the NAP process. For example, in 2018, the Least Developed Countries Expert Group jointly hosted its African regional NAP Expo in collaboration with the WHO during the 3rd Inter-ministerial Conference on Health and Environment in Africa.

Technical input from the health community to parties is fundamental in discussion on the means for accounting and assessing the effectiveness of adaptation actions. Future deliberations on the Global Goal on Adaptation will focus on its operationalization and how to measure progress toward its achievement, of which measurement of health outcomes is a component (see Adaptation Committee, 2021a, 2021b). Parties will consider impact and response indicators and cost-benefit analyses for health actions. Avoided costs, Disability Adjusted Life Years Saved (DALYs), or impacts

to human security are under consideration. The 2-year Glasgow-Sharm el-Sheikh Work Programme on the Global Goal on Adaptation, established at COP 26, will provide the structure for discussions on operationalizing this goal.

Making full use of the communication channels established between countries and the **UNFCCC is an ongoing way to maintain and bolster dialogue on climate–health issues**. In particular, the UNFCCC requests that parties submit an Adaptation Communication to outline elements such as their adaptation priorities, plans, actions, and support needs; these communications should be updated periodically and made publicly available in a registry maintained by the UNFCCC Secretariat. The EU's Adaptation Communication, submitted in October 2021, for example, acknowledges the need for "a deeper understanding of the climate-related risks for health and greater capacity to counter them," underscoring the relevance of enhanced engagement on health-adaptation linkages not only in developing but also developed countries (Slovenia & European Commission, 2021). Other countries might draw on this example.

3.2.1.4.4 Agriculture

The agriculture sector contributes approximately 30% of global GHG emissions, while the impacts of climate change adversely affect food security and malnutrition worldwide (Mbow et al., 2019). Negotiations under the UNFCCC must address both of these components. There is great opportunity to strengthen, update, and align the UNFCCC dialogues and terminology on food to meet global goals on food security and malnutrition.

Ensuring that "food production is not threatened" is a central motivation behind the UNFCCC's objective (Article 2, UNFCCC, 1992), and agriculture has gained visibility over the last decade in climate change deliberations. However, discussions on food under the UNFCCC exemplify the patchwork nature of global food governance in that they have historically focused only on hunger.[20] An important legal consideration in this regard is that "food production" remains undefined in the UNFCCC.

Despite its importance to mitigation and adaptation and its reference in the original objective of the Convention, **agriculture did not have a clear place in the UNFCCC architecture until 2017**. A milestone was reached at COP 23 with the establishment of the KJWA, a temporary body whose primary mode of operation is multistakeholder workshops. The KJWA enables SBSTA and the SBI to jointly address issues related to agriculture, taking into consideration the "vulnerabilities of agriculture to climate change and approaches to addressing food security" (para. 1, Decision 4/CP.23, UNFCCC SBSTA, 2018a).

Nutritional health is a new topic for the UNFCCC. **In December 2020, elements of malnutrition in all its forms were discussed for the first time under the KJWA** in a workshop on the socio-economic and food security dimensions of climate change (UNFCCC SBSTA & SBI, 2021b). The content of this forum hinted at links to global

[20] See, for example, these workshop reports from 2014: FCCC/SBSTA/2014 /Inf.2; 2015: 2015/Inf.6 and Inf.7; and 2016: 2016/Inf.5 and Inf.6.

health. An IPCC lead author highlighted the adoption of balanced diets and reductions in food loss and waste as strategies to lower emissions and improve health outcomes and food security. The FAO, the International Panel of Experts on Sustainable Food Systems, and various participants emphasized nutritious diets. Significantly, the workshop referenced the evolution of the food security definition under the UN Committee on World Food Security (CFS) (see Article 12, UNFCCC SBSTA & SBI, 2021b), which encourages a broader understanding of hunger and malnutrition.

The future architecture for agriculture discussions under the UNFCCC is an important issue for 2022. COP 26 intended to advise on this; however, discussion remained limited, and parties instead deferred it to COP 27. In the COP 26 decision on the KJWA, in lieu of a commitment, parties simply recognized the "fundamental priority of safeguarding food security and ending hunger" and noted the "importance of scaling up support to enhance action on safeguarding food and nutrition security and ending hunger" (UNFCCC SBSTA & SBI, 2021a). A range of possible arrangements for an updated KJWA includes establishing a permanent institutional framework on agriculture (Drieux et al., 2021), which would expedite opportunities to address nutritional health. While it is unclear whether parties would converge on any form of "upgrade" to the KJWA, it is fairly likely that they will extend the KJWA's mandate, identifying future thematic areas to address. The inclusion of the term "nutrition" in relation to food production at COP 26 is an important nuance. It sets the stage to advance food discussions under the UNFCCC to better align with the comprehensive terminology contained in SDG 2 (zero hunger, food security, and improved nutrition).

See Section 3.4 on Food Systems in this document for more analyses.

3.2.1.4.5 Loss and Damage

The acute and chronic adverse effects of climate change result in significant loss and damage to society, economies, and environments worldwide. The health community will continue to be the frontline for emergencies related to natural hazards associated with climate change and for a range of humanitarian issues stemming from its more insipid[21] and aggregate impacts (e.g., human migration). For this reason, **the health sector's experience with these challenges can—and should—be called upon to inform the UNFCCC's mechanism for addressing climate change-related loss and damage.**

The UNFCCC established a process to "avert, minimize, and address" losses and damages associated with climate change impacts at COP 19 in 2013 called the Warsaw International Mechanism (WIM) (UNFCCC COP, 2013b). The main objective of the WIM is to drive comprehensive risk management approaches, work across stakeholders, and enhance activity to address loss and damage. The WIM addresses economic losses as well as non-economic losses, the latter of which are those that affect individuals, societies, and the environment (UNFCCC, 2013c). Non-economic health losses that occur can be

[21] E.g., loss of biodiversity, land and forest degradation, glacial retreat and related impacts, ocean acidification, sea level rise, salinization, rising temperatures, and desertification

either direct, such as in the case of an extreme flooding event, or indirect, such as when malnutrition results from climate change-related food shortages.

One area for global health input is on specific themes related to loss and damage. The Paris Agreement invited collaboration and cooperation on several areas relevant to the health sector, including emergency preparedness, risk assessment and management, non-economic losses, and resilience of communities, livelihoods, and ecosystems (Article 8).

There is also room to inform and support the scale of implementation of activities to address loss and damage. In 2019, the Santiago Network was established to catalyze **the technical assistance of relevant organizations for addressing loss and damage at the local, national, and regional levels** in developing countries that are particularly vulnerable to the adverse effects of climate change. Although still in its inception phase, the Santiago Network already has a number of partners that contribute to delivering on its mandate, many of which also address health-related issues. These include the International Federation of Red Cross and Red Crescent Societies, the UNDRR, and the World Food Programme.

The operationalization of the Santiago Network was the subject of intense debate during COP 26. Developing countries are keen to see it become the WIM's "implementation arm," with some floating the idea of creating rapid intervention groups. Others are reluctant to move in this direction, with some pointing to the range of other actors who already work on risk management, early warning systems, and emergency intervention, including through the Sendai Framework for Disaster Risk Reduction under the UNDRR. At COP 26, parties decided on the functions of the Santiago Network and on the modalities for further elaborating the Network's institutional arrangements. The final decision adopted at the conference also urges developed countries to provide funds for its operation and for the provision of technical assistance (UNFCCC COP, 2021b). It established the Glasgow Dialogue to discuss the arrangements for the funding of activities to avert, minimize, and address loss and damage under the SBI until SBI 60 in 2024.

There are also specific expert sub-groups under the WIM's Executive Committee where technical input on health issues is important.[22] **The Expert Group on Non-Economic Losses is where health issues directly fall.** This group serves to address impacts on individuals (e.g., loss of life, health or mobility), society (e.g., loss of territory, cultural heritage, Indigenous or local knowledge, or societal or cultural identity), or the environment (e.g., loss of biodiversity or ecosystem services). A key component to the work of this group is considering means to assess the value of non-economic loss, as described in a 2013 synopsis for decision-makers (UNFCCC, 2013b). The Expert Group on Non-Economic Losses first met in March 2021 to consider the state of knowledge and implementation. The Expert Group's rolling plan of action (as of May 2021) indicates a number of activities, including the possible preparation of a technical guide on "**addressing losses associated with the ecosystems-biodiversity–health nexus at global to local levels**." This report would be a milestone in health-related loss and damage, and its contents are likely to be discussed at the 15th WIM Executive Committee

[22] A helpful summary of this policy-space is found at https://unfccc.int/resource/docs/2013/tp/02.pdf

meeting in April 2022, an event that will also advance discussion on this Committee's plans for participation in the 2023 Global Stocktake.

3.2.1.4.6 Finance for Net-Zero

As the pandemic crisis reminds us, health shapes the economy, and the economy shapes human health. **There is an impetus to use sustainable finance to reshape the economy and drive improved health outcomes.** Current economic principles no longer serve populations and, moreover, are actively harming the most vulnerable people and parts of the planet.

The global financial industry straddles the global environment, health, and development systems and policy architectures. Rapid shifts in this industry create opportunities to redefine, expand, and embed sustainability into social and economic structures in new ways. Through environmental, social, and governance (ESG) tools and value systems (standards to minimize negative externalities and maximize positive ones), the industry is becoming more attuned to environmental demands and more responsive to environmental changes that are urgently required. **The shift from seeing risks in actions for climate change compliance or resilience to understanding that the greatest risks lie in a failure to act** has changed the financial industry.

The launch of the Glasgow Financial Alliance to Net Zero (GFANZ) in April 2021, a UN-convened coalition of approximately 450 financial institutions from 45 countries committed to rapid decarbonization of the economy, is evidence of this shift. This coalition is responsible for USD 130 trillion in private capital and consists of banks, asset managers, asset owners, insurers, financial service providers, and investment consultants. Its main activities include catalyzing sector-specific pathways; transition plans with industry; convergence in financial institution transition plans; aligning portfolio metrics and driving convergence in methodologies; mobilizing private capital; and advocating for net-zero investment policies and commitments.[23]

Health is currently not part of the current rubric of decision making in financial metrics for sustainability. In their report launched at COP 26, GFANZ (2021b) identified the need for sectoral decarbonization pathways to enable the global economy to reach net-zero. Of the current sectoral pathways (agriculture, aluminum, cement, chemicals, coal, commercial and residential real estate, steel and iron, oil and gas, power generation, and transport), none sits within the health sector, though each has connections to it. Health is mentioned once in the report in relation to a workstream on health insurance. The financial industry has not fully recognized the heavy carbon footprint of the health industry, nor has the health industry rooted its own drive to net-zero. But GFANZ's Call to Action to green the financial architecture, price externalities, create incentives, and mobilize capital flows all sit within the nexus point of health and environmental recovery (GFANZ, 2021a).

The coalition is in a unique position to ensure that each of its partners' **investments to achieve net-zero targets also align with and promote wider goals of healthy**

[23] See https://www.gfanzero.com/about/

people and a healthy planet. As a starting point to cross-sectoral engagement, GFANZ could:

- Require partners worldwide to build metrics for ecosystem degradation and monitor supply chain systems that shape health and environment.
- Encourage values-based impact investing at a large scale, geared toward realizing measurable social and environmental co-benefits that drive sustainable growth and long-term enterprise value.

GFANZ, as an umbrella network of seven financial sector initiatives, including the Net Zero Asset Managers and the Net-Zero Insurance Alliance (NZIA), has the capability to chart a path for ethical, economic, and Planetary Health-oriented decisions. Reducing the cost and financial risk of sustainability outcomes could be a game-changer to stimulating the private sector to create new business solutions that focus on positive impacts. In fact, this shift to an impact-based economy is already underway. To truly support this transformation of the finance sector, banks and investors must improve their capacity to understand and analyze impacts and to distribute effectively, equitably, and purposefully.

A system where de-risking is accompanied by investment decisions that use Planetary Health outcomes as performance markers could radically shift performance. This practice has begun with Net Zero Asset Managers, who, through the Task Force for Climate Related Financial Disclosures, work with asset owners to set individual decarbonization goals and targets, ensure voting policies are consistent with net-zero ambitions, and ensure investment solutions focus on climate change mitigation. Part of the Asset Managers' commitment will be to ensure investors de-risk portfolios from climate physical risk, climate transition risk, and climate reputational risk (Task Force for Climate Related Financial Disclosures, 2017).

Going forward, signals from stakeholders are key to realizing the opportunities of sustainable finance. Promoting economic design that supports rather than undermines well-being is the aim of the Well-being Economy Alliance. This means moving away from "tweaking and patching the collateral damage of a growing economy," a model that results in society "celebrating small gains made from addressing gaps" in environmental degradation or equality (Trebeck, 2021). Instead, the focus is on building momentum for the circular economy and, as the Global Ethical Finance Initiative advises, to "replant the whole system" rather than just its inputs (i.e., fossil fuels) (Shaikh, 2021).

Information on IISD Earth Negotiations Bulletin expert coverage on intergovernmental discussion on the UNFCCC is here and on the IPCC is here; a summary of COP 26 deliberations and outcomes is here.

3.3 Pollution

Governance of pollution has the potential for wide-reaching benefits to human health and the environment. Moreover, the architecture of pollution conventions can provide lessons on effective multistakeholder collaboration for other MEAs. The Montreal Protocol on Substances that Deplete the Ozone Layer, for instance, is one of the most successful MEAs in that it has universal participation and has had extensive health and environmental benefits. Since entering into force in 1989, it is estimated to have avoided 250 million cases of skin cancer and 45 million cases of cataracts in the United States alone (Environmental Effects Assessment Panel, 2019) and averted 1°C of warming, with an additional expected 1.5°C to 2°C of averted warming over land areas outside polar regions, and between 3°C and 4°C over the Arctic by 2050 (Environmental Effects Assessment Panel, 2020).

Yet, compared to the governance of climate change and biodiversity, **the chemical pollution arena has often struggled to gain public and financial attention**. Meetings of chemicals COPs typically have smaller attendance, and high-level segments rarely garner the type of engagement seen in the UNFCCC and CBD (i.e., world leaders, celebrities, and press coverage). For example, the joint chemical convention Triple COP in 2019 included just 1,700 participants compared to the 3,800 who attended CBD COP 14 in 2018 or the more than 26,700 who attended UNFCCC COP 25 in 2019.[24] This difference is equally striking when comparing allocations of resources in the GEF. According to a March 2021 report detailing cumulative funding, 4.0 % has been allocated to POPs, and 3.8% has been directed to other projects on chemicals and waste (GEF & World Bank Group, 2021).

Although governance on pollution is often overlooked, the problems it aims to address are vast. Pollution is ubiquitous. Human-made pollutants are found in the air, water, and soil of natural environments and in samples of the human bloodstream. **Every day, humans unknowingly touch, eat, breathe, and drink chemicals that impact their health and the health of ecosystems and other organisms.** An increasing number of chemicals are known to pass through breast milk to newborns (Mead, 2008), and plastics have been found in the blood of unborn fetuses (Ragusa et al, 2021). Furthermore, pollution is interfering with childhood development. According to WHO data, "more than 800 chemicals have been identified as known or suspected disruptors of the normal functioning of human and/or animal endocrine systems, and humans are most sensitive to endocrine disruption during periods of development, including early childhood and puberty" (UN HRC, 2018; WHO, 2017c).

[24] See summary reports: https://enb.iisd.org/events/2019-meetings-conferences-parties-basel-rotterdam-and-stockholm-conventions/summary-report; https://enb.iisd.org/events/2018-un-biodiversity-conference/summary-report-13-28-november-2018; https://enb.iisd.org/events/chilemadrid-climate-change-conference-december-2019/summary-report-2-15-december-2019

In 2016, the Special Rapporteur on toxics and human rights, examined the impacts of toxics and pollution on children's rights and testified to the presence of

> a "silent pandemic" of disability and disease associated with exposure to toxics and pollution during childhood, many of which do not manifest themselves for years or decades. Child victims may die prematurely after the age of 5 or be debilitated throughout their lives. Toxic chemicals that interfere with the normal expression of genes, brain development, the function of hormones and other processes necessary for children to grow into healthy adults pervade our economies and persist in our environment (UN HRC, 2016, p. 1-3).

The Special Rapporteur further described that children are

> born "pre-polluted" with numerous contaminants that impact on their rights to survival and development, to be heard, to physical integrity and to the highest attainable standard of health, to name but a few. Representative studies have measured at least dozens, if not hundreds, of toxic and otherwise hazardous chemicals in children before birth through their mother's exposure. Exposure to toxics and pollution (toxics)[25] continues incessantly after birth. While the studies primarily come from certain countries, every child is a victim of this "toxic trespass," in varying degrees (UN HRC, 2016, pp. 3–4).

The scale of the health impact of pollution is striking. Combined indoor air pollution, outdoor air pollution, and water pollution are estimated to cost over **12 million lives per year**.[26] Over 90% of these air pollution deaths are seen in low- and middle-income countries (WHO, 2016b). Furthermore, these numbers do not reflect the extensive morbidity and negative impact on well-being resulting from pollution exposure. In 2021, the WHO estimated that "2 million lives and 53 million disability-adjusted life-years (DALYs) were lost due to exposures to selected chemicals" (see the 2019 addendum to WHO, 2016). These numbers have steadily climbed since the first estimate of losses in 2012. It is widely understood that these data only capture a portion of the chemical exposure disease burden.

While there are **five global conventions that govern hazardous chemicals and wastes**,[27] this section of the report will focus on the two treaties that most explicitly engage with health goals: the 2001 Stockholm Convention on Persistent Organic Pollutants (POPs) and the 2013 Minamata Convention on Mercury. However, the regime complex devoted to the control of hazardous substances has many synergies, and thus

[25] In the present report, "toxics" refers to pollution, toxic chemicals, radioactive substances, explosives, and others.

[26] Of this, 3.8 million a year are lost to household air pollution from indoor cooking (WHO, 2021e), 7 million a year to outdoor air pollution (WHO, 2021c, p.31), 1.8 million from water pollution, and 16% of all deaths in 2015 (Landrigan et al., 2017; Sifferlin, 2017). Air, water, soil, and chemical pollution were responsible in 2016 for 940,000 deaths in children worldwide; two thirds of them were children under the age of 5 (Landrigan et al., 2019).

[27] The Vienna Convention on the Ozone Layer and its Montreal Protocol, the Basel Convention, the Rotterdam Convention, the Stockholm Convention, and the Minamata Convention. Regional treaties are not included.

the first section provides an overview of the landscape of global chemicals management institutions. A number of references will be made to the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal and the Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade.

3.3.1 Legal Scope of Chemicals Conventions with a Health Lens

The texts of the conventions addressing chemical pollution stand out for how they explicitly pinpoint human health concerns as a driving force for their establishment. **The preambles of the Basel, Rotterdam, and Stockholm conventions underscore parties' "determination" to protect human health and the environment** and include explicit operational provisions linked to this concern. In addition, the most recently established convention on chemicals, the Minamata Convention, includes an entire operational article on health aspects, pointing to the primacy of this consideration.

Notable health provisions in these treaties include:

- Minimizing consequences for human health and the environment (Basel, Article 4).
- Protecting human health and the environment from anthropogenic emissions (Article 1, Objective, Minamata).
- Promoting development and implementation of strategies and programs to identify and protect populations at risk, particularly vulnerable populations, including adopting science-based health guidelines, setting targets for reduction, and public education (Article 16, Health Aspects, Minamata)
- Promoting appropriate health care services for prevention, treatment, and care for populations affected (Article 16, Health Aspects, Minamata)
- Establishing and strengthening institutional and health professional capacities for the prevention, diagnosis, treatment, and monitoring of health risks (Article 16, Health Aspects, Minamata)

3.3.1.1 MODE OF WORK

3.3.1.1.1 Approach

While pollution governance has a very broad umbrella, this analysis focuses specifically on the sound management of chemicals and wastes. This issue must be governed globally due to the global flow of chemicals, products, and wastes, as well as the far-reaching impacts of some hazardous effects.

Following the model set by the Montreal Protocol, chemicals conventions consist of a core agreement on an overarching framework, and over time, their scope is expanded by the addition of chemical substances and/or processes based on new scientific information. Nominations for new substances are reviewed through a combination of technical and policy mechanisms that guide parties. **Chemicals may be internationally regulated after their "listing" has been nominated, approved, and adopted by**

an intergovernmental review process within a chemicals convention. Decisions are generally made by consensus, except for some listings that used voting.

Assessment of the risk of chemical substances is important to chemicals governance and entails careful weighing of costs and benefits. **Many hazardous substances present immediate benefits that are often easier to document and value**, given this is the purpose of the product. In contrast, assessing costs is a challenge. It can take years or generations for problems to become evident, but this process precedes nominations for listing. A comprehensive understanding of pollution is not typically an element of basic medical education. In addition, public health responses in this realm are largely reactionary, triggered when a significant number of patients present with common diagnoses in patterns that warrant investigation. Even then, as patterns are identified, it may be challenging to demonstrate causality.

National regulatory agencies are often put in the position of playing catch up. A central difficulty in assessing the health impact of exposure to hazardous chemicals stems from the ever-growing number of chemicals on the market. A 2020 study, based on inventories in only 19 countries and regions, found that over 350,000 chemicals and mixtures of chemicals are registered for production and use (Wang et al., 2020). Few of these have undergone a risk assessment or other review to understand the routes and scales of exposure and potential health impacts.

At the same time, effects that are asynchronous to exposure make it difficult to demonstrate clear causal health links to a substance. The sequence of exposures resulting from pesticides is an example. Pesticides affect the workers who apply it, those living near the application site breathing airborne pesticide drift and using contaminated groundwater, and the—often distant—consumers of the agricultural products containing pesticide residues. The "grasshopper effect," whereby some chemicals are also prone to long-range environmental transport and persistence, is a particular challenge and a serious public health issue. These substances, through repeated cycles of volatilization and deposition, **can be found in very high concentrations in ecosystems far from where they were first employed and released**. Communities in polar latitudes are often subject to some of the highest exposures. Moreover, bioaccumulation of these substances in the food chain is also a challenging health hazard.

Sound chemicals management has long been recognized as an issue that requires broad coordination at the global level. Since 1995, the Inter-Organization Programme for the Sound Management of Chemicals has been tasked with coordinating activities related to toxic chemicals across nine international organizations: UNEP, the WHO, the FAO, the International Labour Organization, the UN Industrial Development Organization, the UN Institute for Training and Research, UNDP, the Organisation for Economic Co-operation and Development, and the World Bank. The sound management of chemicals is also a core goal of a policy framework for chemical safety known as the Strategic Approach to International Chemicals Management (SAICM). SAICM was established in 2006 to ensure "the achievement of the sound management of chemicals throughout their life cycle so that by the year 2020, chemicals are produced and used in ways that minimize significant adverse impacts on the environment and human

health" (SAICM, 2021). This goal is reiterated in the 2030 Agenda under SDG 12 (sustainable consumption and production). SAICM employs a multistakeholder strategy involving both private sector and civil society actors, in addition to governments and intergovernmental organizations. Negotiations under SAICM to set out a post-2020 framework have yet to finalize as a result of COVID-19 pandemic delays.

3.3.1.1.2 Architecture

Since 2008, parties to the Basel, Rotterdam, and Stockholm conventions (BRS conventions) have sought out opportunities for synergies. In 2011 parties adopted decisions under each convention to enhance coordination. This effort streamlined their frameworks, notably in reorganizing the Secretariats and unifying them under a singular Executive Secretary of the BRS conventions. Since 2013, parties to the BRS conventions convene as part of "Triple COPs" made up of a combination of separate and joint decision making (the latter largely for logistics and budgetary issues). The synergies process has also facilitated cooperation among technical bodies under each convention.

Subsidiary bodies provide essential technical guidance to parties of the BRS conventions as well as those of the Minamata Convention on Mercury. This model for information sharing draws on the arrangements of the technical bodies under the Montreal Protocol. Expert working groups under both the Montreal Protocol and the Basel Convention are hosted regularly to report to and guide parties in decision making. Chemical review committees serve the Rotterdam and Stockholm conventions by considering substances nominated by parties for listing. Under the Minamata Convention, ad hoc groups of experts convene to support parties.

In recent years, there have been **growing calls to improve the science–policy interface on matters of hazardous chemicals and wastes**. In 2019, the UN Environment Assembly (UNEA 4) tasked UNEP with undertaking a review of options (Watson, 2020). Potential ways forward are expected to be considered in 2022 at UNEA 5.2. Varied stakeholders have called for the establishment of a "global science-policy body on chemicals and waste" (Wang et al., 2021), which draws on the IPCC and IPBES models. Proponents argue that such a mechanism would allow for the more comprehensive and forward-looking management of chemicals and waste, resulting in reduced risks and improved protection of human health.

In addition, two elements of existing institutional arrangements of the management of chemicals are under reconsideration: 1) shifting away from regulatory approaches that focus on one point in a substance's life cycle toward a cradle-to-grave, circular economy approach[28] and 2) listing chemicals by class rather than individually. These arrangements could greatly impact the effectiveness of the chemicals regimes and thereby contribute to improved health outcomes.

Increasing calls to shift chemicals regulation from a chemical-by-chemical approach to one that regulates chemicals by chemical class are intuitive.

[28] The Minamata Convention is widely heralded for achieving a circular economy transformation by addressing mercury throughout its life cycle, including mining, emissions from coal combustion, a variety of industrial process applications, occurrence in products, and waste considerations.

Narrowly regulating chemicals can create perverse incentives for industry to develop new products based on similar molecules containing only the differences required to escape regulations. This means that notoriously harmful chemicals can persist in our communities, ecosystems, and economies due to gaps in our governance architecture. For example, a single polyfluoroalkyl substance (PFAS) called perfluorooctane sulfonate (PFOS) was first adopted for regulation under the Stockholm Convention in 2009. A subsequent PFAS, perfluorooctanoic acid (PFOA), was adopted in 2019, and a third perfluorohexane sulfonate (PFHxS) is currently proposed for regulation, to be considered at Stockholm COP 10 in 2022.[29] In this scenario, there is a 13-year gap to governing only three of over 4,700 similar chemicals in this one class. It is efficient to create arrangements where the listing of a substance captures relevant, related compounds. Moreover, a clear list of substances subject to phase-out is essential for national regulatory purposes. Varied stakeholders increasingly advocate for shifting to the management of pollution by chemical class (Cousins et al., 2020; Kwiatkowski et al., 2020).

3.3.1.1.3 Actors

The chemicals COPs and expert group meetings include diverse stakeholders, and there is overlap among the actors involved. Many also participate at the International Conference on Chemicals Management (ICCM), a periodic review process convened under SAICM. The WHO will typically participate in proceedings via its Chemical Safety and Health Unit, which also represents the WHO in the Inter-Organization Programme for the Sound Management of Chemicals.

Sound chemicals management often involves engagement by several ministries (environment, agriculture, industry, health, customs/borders, energy, transport). Typically, representatives negotiating at the Stockholm and Minamata conventions are from a national chemicals' regulatory agency. There is some variation as to what ministry may house this agency, but it often falls under the ministry of environment.

Other actors that commonly engage in global negotiations on the sound management of hazardous chemicals and wastes include groups representing sector or technology-specific industries; those vulnerable to exposure (e.g., industrial workers, dentists, fire-fighters); Indigenous Peoples and local communities, such as those affected by mining; victims (e.g., survivors of Minamata Disease); and researchers. In some ways, the notably small global gatherings on the sound management of chemicals and wastes can make it easier for stakeholders from both the private sector and civil society to input deliberations and outcomes. This is also an essential feature of pollution governance since much of the relevant technical knowledge can only be obtained from these stakeholders.

The arenas of global chemicals governance are generally characterized by open and transparent processes within the UN arrangements. However, it is worth noting that, perhaps more than in other MEAs, **the protection of proprietary information on**

[29] For more information, see risk profiles on these chemicals here: PFOS: UNEP/POPS/POPRC.2/17/Add.5; PFOA: UNEP/POPS/POPRC.12/11/Add.2; PFHxS: UNEP/POPS/POPRC.14/2.

commercial substances means that industrial secrecy plays an outsized role in how information about chemicals can enter these processes.

The parity of participation among stakeholders is a concern. Industry groups typically have more resources to engage in technical expert groups and COP meetings and send larger delegations. Civil society groups typically face financial realities that constrain the size of their delegation and may require choosing which meetings (or portions of meetings) to prioritize. **Some of these disparities are countered by strategic alliances among civil society actors.** It is not uncommon at Stockholm and Minamata convention meetings to see coordinated representation from groups, who combine positions. Coordinated representation also enables non-party observers—whose interventions are restricted in length and positioned at the end of deliberation of an agenda item by party rules—to effectively participate in negotiations. Groups well versed in proceedings can effectively deliver impact through formal, targeted statements as well as through strategic informal negotiations with party delegates.

3.3.1.2 NEXUS OPPORTUNITIES

3.3.1.2.1 Participation in Chemicals Governance

Gaps between research and clinical practice regarding chemicals are partly due to **political and socio-economic forces that lead to heavily contested debates over taking a precautionary approach** (Porta & Vandenberg, 2019). These can be striking: for instance, the hesitation to regulate endocrine-disrupting chemicals despite a strong understanding that this would prevent harms. "Decisions about whether to act on [chemicals] and other environmental contaminants should not be driven solely by the available evidence on mechanisms but also by the severity of the consequences if precautionary action is not taken" (Porta and Vandenberg, 2019). As actors who serve as frontline observers to health outcomes from chemical exposures, the health sector can play a stronger role in advocacy for their governance.

There are other gaps in chemicals governance that may surprise the broader health community. **Some substances are only partially regulated because they have not been the focus of a global convention.** For instance, neither Stockholm nor Minamata address lead, even as lead is recognized for its serious neurological damage, accounts for half of pollution deaths, and carries significant morbidity (UNEP, n.d.; WHO, 2016). The end of production of leaded gasoline in 2021 is partly the result of many voluntary projects and partnerships undertaken under SAICM. Patchwork governance on lead means that new energy and advocacy are required to subsequently phase out lead in other products, such as paint. According to SAICM, as of 2020, only 41% of countries have "legally binding controls on lead in paint" (UNEP & Global Alliance to Eliminate Lead Paint, 2020). The work carried out to advance policies on this is, again, an "international, voluntary collaborative initiative" known as the Global Alliance to Eliminate Lead Paint, rather than a formal, comprehensive regime with global participation.

The need for increased health sector engagement in chemicals governance was echoed in ICCM's review of SAICM over several years. The 2015 WHA resolution on the role of the health sector in SAICM led to the development of the 2017 WHO Chemicals

Roadmap, which urges a multi-sectoral approach to improving health outcomes and outlines concrete ideas for enhancing health sector engagement in the management of chemicals (WHO, 2017a). Periodic progress reports on the delivery of this roadmap are delivered at WHAs, with the next planned for 2023.

3.3.1.2.2 Reducing Chemical Pollution in the Health Sector

The health sector needs to consider its own contribution to environmental pollution. One key issue is pharmaceutical pollution. The health sector pays close attention to the pharmacology of drugs for human treatment and patient responses to medicines but pays little attention to the post-human systemic effects of drugs on our environment.

The cumulative outflow of pharmaceutical products in hospital and household water and waste streams is steadily growing (Wöhler et al., 2020). A recent global analysis of these is sobering: **771 active pharmaceuticals have been reported in 75 countries in water and waste streams**; 528 of these were found in surface, ground or drinking water (Eike et al., 2019). Pain medicines, contraceptive hormones, anti-depressants, blood pressure drugs, and antibiotics are a few of the pharmaceutical classes that are increasingly contaminating water supplies and are not captured in current tap water treatment processes. Unknowingly, humans and other organisms may be consuming low-dose cocktails of drugs.

In this context, it is important to note that **none of the chemicals conventions comprehensively addresses pharmaceuticals** and they even exclude them. In an annex on addressing the control of mercury-added products, the Minamata Convention explicitly notes that "vaccines containing thiomersal as preservatives" are excluded. Similarly, the Rotterdam Convention does not address pharmaceuticals (whether human or veterinary drugs) or chemicals used as food additives. The Stockholm Convention specifically exempts the use of certain POPs for pharmaceutical applications.

Efforts to incorporate pharmaceuticals into chemicals governance are incremental and currently focus on awareness raising. In 2015, ICCM 4 participants identified "environmentally persistent pharmaceutical pollutants" as an "emerging policy issue in the SAICM context," which facilitated the collection of information on voluntary initiatives (SAICM Knowledge, n.d.). In 2021, the CBD (2021b) took steps to address the pollutive effect of pharmaceuticals in its draft global action plan on biodiversity and health to be considered for endorsement at CBD COP 15 part II in 2022. The draft proposes addressing:

- The risks of medicine residues in freshwater systems (1.2.5.).
- The development of tools for pollution prevention of neurotoxicants, endocrine disruptors, novel insecticides, chemical herbicides, heavy metals, and pharmaceutical wastes (2.2.4.1.).
- The mobilization of resources to confront pollution to prevent harm to people, biodiversity, and ecosystem services (2.2.4.2.)
- The identification of medicinal products with negative impacts on biodiversity to target risk management and avoid the overuse of antimicrobial agents across sectors (2.3.3.)

- The identification of contamination hotspots of antimicrobial resistance (2.3.5.), among others.

Voluntary initiatives under SAICM and mainstreaming pharmaceutical impacts to biodiversity and health under the CBD are praise-worthy and should be supported and taken up by the health sector. But the scope of this pollution problem warrants more robust, intergovernmental commitments to addressing the impacts and risks of pharmaceuticals for the environment and the potential risks of unintentional human exposure to and consumption of these pollutant drugs.

A second chemical issue in the health sector is medical waste. The COVID-19 pandemic, which is requiring exponentially greater personal protective equipment (i.e., masks, gowns, goggles, and gloves) and other biohazard items worldwide, brought this issue under greater scrutiny. A great deal of this medical waste is comprised of plastic. In 2020, Switzerland nominated the plasticizer UV-328, a key component of these medical items, for inclusion under the Stockholm Convention, where it is currently under review by the POPs Review Committee (IISD, 2021d). In addition to this and other potential listings, strategies to address unintentional POP by-products from medical-grade waste disposal (i.e., biohazard incineration) are also needed.

Information on IISD Earth Negotiations Bulletin expert coverage on the intergovernmental discussion of the:

- Basel Convention on Transboundary Movements of Hazardous Wastes is here.
- Rotterdam Convention on Prior Informed Consent is here.
- Stockholm Convention on Persistent Organic Pollutants is here.
- Minamata Convention on Mercury is here.

3.4 Food Systems

The widest human environmental "footprint" is made in the quest for food, the most fundamental determinant of health. While food is essential for survival, the current global food system is unhealthy, wasteful, and polluted; drives degradation of land and water; and emits greenhouse gases while displaying social inequalities at all scales. Moreover, it causes malnutrition worldwide, a complex economic problem estimated to cost over USD 3.5 trillion per year (Global Panel, 2016).

Most MEAs are relevant to agriculture and feature food prominently. This means **MEAs can and do impact nutrition and the human relationship to food and, ultimately, health.**

Despite ubiquitous, multi-scale interest and investment in food governance, the architecture of the global food policy workspace has historically been vague. There are many voices, agencies, mandates, and decisions that overlap or—intuitively but not formally—link, though this is slowly improving since the adoption of the SDGs. **Food policy is effectively mainstreamed but does not have its own global convention to act as an authoritative "home"** for harnessing and harmonizing knowledge and priorities and steering a comprehensive review of the food value chain. Herein lies a problem in creating global policies on the food system: How can the global community comprehensively address malnutrition, particularly for the 3 billion people suffering from it (International Food Policy Research Institute, 2017)?

Longstanding political battles in the food sector complicate political will: producer versus consumer; natural seed breeding vs genetic biotechnology; acute nutrition (hunger) versus long-term nutrition (dietary quality) needs; monoculture versus polyculture; subsistence agriculture versus multinational corporations; organic versus intensive practice; and subsidies versus non-subsidies, among others. But finding balance and **surmounting political barriers has the potential for enormous health and environmental co-benefit**s.

The CFS—housed by the FAO, the World Food Programme (WFP), and the International Fund for Agriculture Development (IFAD)—strives to meet the many competing interests of food politics, sustainable development, global economy, and food emergencies by serving as a multistakeholder platform for "food security and nutrition for all" (CFS, 2019).

This analysis looks at engagement and decision making on nutritional health within the CFS and across MEAs, with a view to influencing international deliberations on food.

3.4.1 UN Committee on World Food Security

3.4.1.1 LEGAL SCOPE OF THE CFS

The CFS is a forum for intergovernmental negotiation on food, but it is not a treaty decision-making body, and its work is not legally binding. A key component of CFS's work is the development of negotiated, voluntary global policy guidance. The CFS

plenary endorses knowledge products and policy guidance that can be shared nationally by member states who integrate them into strategic plans, as well as globally by UN agencies who disseminate them and MEA parties who introduce them into MEAs. The success of the CFS is largely based on whether the policy guidance is taken up, either by implementing agencies with regional and national offices or within other policy forums, such as MEAs.

CFS's mandate is to coordinate a global approach to food security, promote policy convergence, support and advise countries and regions, coordinate at national and regional levels, promote accountability and share best practices, and develop a global strategic framework for food security and nutrition. In 2015, the CFS's role was formally recognized in the 2030 Agenda, a tacit designation for CFS as a long-sought governance home for nutrition.[30]

A key element of CFS's framework is it hosts broad multistakeholder participation from civil society and the private sector. A second key element is the CFS High Level Panel of Experts on Food Security and Nutrition (HLPE), which was created to provide independent, scientific knowledge-based analyses and advice that addresses the "multidisciplinary complexity" of food security and nutrition (Tiensin, 2021). It operates like a mini-science-policy body, and its outcomes since 2011 include 15 reports and two notes on critical and emerging issues on food security and the COVID-19 pandemic.

The objective of the CFS is to eliminate hunger and malnutrition. Its activities are framed with a strong focus on equality and equity and an approach that is evidence-based, multi-sectoral, and anchored in interlinked social, economic, and environmental sustainability (CFS, 2019). In its vision, the CFS highlights a food-secure world and one working toward the implementation of the progressive realization of the right to adequate food in the context of national food security.[31] CFS members endorsed the use of the FAO Council's *Voluntary Guidelines on the Right to Adequate Food* in 2004.

3.4.1.2 MODE OF WORK

The CFS plenary, its main negotiating body, meets annually. In 2021, CFS 49 included 124 governments and over 1,600 registered virtual participants. The CFS is supported by a Bureau and an Advisory Group, including representatives from UN bodies, international agricultural research institutions, international and regional financial institutions, civil society and the private sector, philanthropic foundations, and prominent individuals. Non-governmental actors are represented through the Civil Society Mechanism and the Private Sector Mechanism, which are engaged in tandem during plenary to ensure balanced representation.

[30] In 2015, the 2030 Agenda reaffirmed CFS's "important role and inclusive nature" regarding the world's determination to "end hunger and to achieve food security as a matter of priority and to end all forms of malnutrition" (Article 24, Declaration) as reflected in targets 2.1 and 2.2. of SDG 2.

[31] The 2002 World Food Summit invited the FAO Council to begin work on drafting voluntary guidelines to the right to adequate food; the *Voluntary Guidelines to Support the Progressive Realization of the Right to Adequate Food in the Context of National Food Security* were adopted by the Council in 2004.

Health and nutrition experts participate in the production of policy guidance. Currently, all 15 experts on the HLPE are from the food security and nutrition fields. But participation by high-level government health officials in plenary is low. For example, at CFS 46 in 2019 (pre-COVID-19), health ministers from only five countries attended (Brazil, Italy, Russia, the United States, and Zambia). At CFS 49 in 2021, eight governments designated a health ministry representative (Brazil, the EU, Finland, Jerusalem, Norway, Pakistan, the Philippines, and Turkey). CFS is usually attended by ministers of agriculture or foreign affairs.

Although non-member state participation is strong and may appear balanced by the Civil Society Mechanism and the Private Sector Mechanism, **the medical community is absent. At CFS 46, few public health representatives sat among dozens of environmental and agriculture organizations** under the Civil Society Mechanism: the World Public Health Nutrition Association, the World Obesity Federation, Swiss Tropical and Public Health Institute, women's groups, Save the Children, Hunger Free World, CARE, and public health departments from two universities in Canada and the United States. The International Federation for Medical Student Associations (IFMSA), comprised of student doctors prominent at UNFCCC COPs who highlight the role of food and dietary change as important co-benefits to climate mitigation, has not attended a CFS meeting.

The CFS HLPE has produced guidance on a range of food policy issues (among others: responsible investment, land tenure, agroecological approaches, smallholders, climate change). Its overarching guidance includes the *Report on Nutrition and Food Systems* and the *Voluntary Guidelines on Food Systems and Nutrition*, the latter of which is a non-technical guide to approaching the food system in terms of governance, supply chains, equity and equality, and resilience.

Box 6. CFS's definition of food security as contained in its Global Strategic Framework:

"**Food security** exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life (FAO, 1996). The four pillars of food security are availability, access, utilization and stability. The nutritional dimension is integral to the concept of food security and to the work of CFS" (CFS, 2019).

The CFS HLPE 2020 *Building a Global Narrative Towards 2030* provides recommendations on global food governance. Importantly, it discusses the evolving understanding of food security, a concept which is now based on addressing "multiple manifestations of hunger, malnutrition and food-related diseases through coordinated, multisectoral policies and actions" (p. 66).

3.4.1.3 MALNUTRITION AND FOOD POLICY

A key health issue of the global food system is the lack of diversity in crops used and the diet produced. Industrial agricultural models use a handful of crops to provide over 70% of the calories for the global population, and of two dozen edible grains, three (rice, maize, and wheat) produce 60% of world food energy intake (FAO, n.d.). The global approach to dietary nutrition, particularly in high-income countries, has also been too simple, focused on calories, carbohydrates, proteins, and fats rather than viewing diet as a balance of energy and fibre, and micro, macro, and non-nutrients (Johns & Sthapit, 2004). **The loss of biodiversity from the food system has made food nutritionally insecure.**

Nutritionally insecure food leads to complicated public health challenges and wider inequities. For instance, low-income families may only be able to afford high-calorie, low-nutrient, low-fibre food, leading to childhood stunting, obesity, anemia, and other deficiencies, as well as increased likelihood of other and future health and digestive problems, such as diabetes. Figure 1.2 in the *2021 Global Nutrition Report*, entitled "Too many people worldwide are malnourished," shows nine example types of malnourishment, including that 2.2 billion adults are overweight, of whom 772 million are obese, and that 1.2 billion adults have high blood pressure and 538 million are diabetic (Cesare et al., 2021).

The ability of food policies to support clinical work on nutrition is paramount. It is important for policy-makers looking for food system solutions to understand the implications of a nutritionally insecure food system on medicine. Digestive problems, as seen in abdominal symptoms, are among the most commonly presenting patient concerns in primary care and urgent care medicine worldwide. Diet is also a driver of a number of non-communicable diseases, particularly metabolic and cardiovascular disease, and determines the internal microbiome diversity that is known to prevent disease. Treating dietary imbalance and disease depends a great deal on the "food environments" policies create. Anna Lartey of the FAO Food and Nutrition department once described this as "foods available in the spaces around people as they move through their daily lives, and how affordable, convenient and desirable they are "(based on Lartey et al., 2018).

The importance of terminology used in policies on food, nutrition, and agriculture must be emphasized to achieve comprehensive health results. Unless concepts of hunger (food security) and nutrition are used together in policies, as intentionally set out in the design of SDG 2 (end hunger, achieve food security and improved nutrition, and promote sustainable agriculture), dialogue on food systems will not be holistic. The quantity of food produced is independent of the quality and completeness of diet and only together determine improved global malnutrition outcomes. In some respects, this distinction is still siloed by the organization of the UN's SDG custodial agencies. The FAO largely oversees nutrition outcomes related to the quantity of food (undernourishment, food security), while the WHO oversees dietary disease related to the quality and dietary balance of food (diabetes and anemia) for adults, and with UNICEF oversees dietary disease for children under five years. Moreover, the politics of food has historically contributed to favouring the narrow interpretation of "food security"

as a hunger problem— to be resolved with solutions that raise production. But current statistics on malnutrition defy this notion by showing an equally significant prevalence of overnutrition compared to undernutrition diseases.

3.4.1.4 NEXUS OPPORTUNITIES: ADDRESSING MALNUTRITION IN THE MEAs

A key question from the health perspective is: Are agriculture and food policies under conventions on the environment adequately addressing the global burden of malnutrition? This section looks at the influence, or potential influence, of the CBD, IPBES, the UNFCCC, and the IPCC on global food governance.

3.4.1.4.1 Food Policy Under Biodiversity Governance

A holistic approach to food systems has been discussed by the CBD for years but has not been adopted into negotiations. In 2022, there is an opportunity to strengthen the links between agriculture and nutrition, particularly in the draft global action plan on biodiversity and health to be considered for adoption at COP 15 part II.

The preambular text of the CBD (1992) notes biodiversity's "critical importance for meeting the food, health and other needs of the human population" (paras. 1 and 20), which has driven an ongoing programme of work on agricultural biodiversity since 2000.

The framework to advance the integration of biodiversity and nutrition was established over 15 years ago. In 2006, COP 8 proposed and adopted a cross-cutting initiative on biodiversity for food and nutrition based on the rationale of the importance of biodiversity to human diets and health, the link between human and ecosystem health, and shifting research and policy emphasis toward examining issues of food quality and not simply food quantity. The CBD stated "**a diversity of foods from plants and animals remains the preferred choice for human health**" (Annex, CBD, 2006). In its decision, COP 8 agreed to integrate this initiative into its work on agricultural biodiversity; to maintain collaborations with the FAO, the WHO and the UN Standing Committee on Nutrition (UNSCN); to establish a memorandum of understanding between the FAO and the CBD; and urged the integration of biodiversity, food, and nutrition considerations into NBSAPs.

By 2020, the CBD and the WHO had produced a range of work outlining the cultural and scientific rationale for aligning global food policies with where the design of "food environments" needs to go to support healthier patient populations. In 2014, the COP's first resolution on Biodiversity and Health (XII/21) advanced the opportunity for addressing nutrition and food systems at a deeper level. It called for enhanced knowledge by inviting contributions of Traditional Knowledge and customary practices to human health in the context of biodiversity, opening the door to link biodiversity and food traditions. Food traditions, such as ancestral food combinations and eating practices, are behaviours that capture "biodiversity for nutrition" and carry clinical importance for diets and food policy. Food culture is an "underutilized vehicle" for healthy dietary tradition and biodiversity linkages (Johns & Stchapit, 2004) and should be "recognized as a positive motivating force for healthy diets and ecosystems" (Annex, CBD, 2006). These two concepts **target an important gap in medicine—that dietary advice is not a**

one-size-fits-all treatment. In 2015, the CBD recognized several important concepts on the value of "biodiversity for nutrition" to global health (WHO and CBD, 2015, p. 143), including:

- Nutritional differences between species of the same plant and that species are not reflected in dietary guidelines.
- Breeding for higher yields can result in lower nutrition content.
- Changes to atmospheric chemistry affect the biochemical reactions that determine the nutritional content of crops, such as levels of iron and zinc.

More detail emerged in the WHO's (2020a) *Guidance on Mainstreaming Biodiversity for Nutrition and Health*, which includes eight risks to human physiology (p. 8, Box 1).

However, in contrast, the food system transformation concept proposed in the 2021 draft global action plan on biodiversity and health for the food sector is simple and superficial: "biodiversity for food and agriculture" (CBD, 2021b, 2.1.3.). Despite its call to mainstream biodiversity and health linkages in agriculture, the plan falls short of recognizing "biodiversity for nutrition." As such, it sets a course of action on food systems that barely advances active discussion on this issue since 2006. The draft does seek to advance health linkages to the food system in other ways by emphasizing wild foods, food security, and reduced use of inappropriate antibiotics, pesticides, and other chemical inputs in the food system. Biodiversity plays a significant role in food culture and food-related health outcomes. **Advisory from the CBD on food system transformation must include strong linkages between biodiversity and nutrition.** Evidence exists to adequately reflect this in the draft plan and adopt stronger action to improve human health and nutritional outcomes worldwide.

The draft post-2020 global biodiversity framework (GBF) could and should also advance the narrative on food systems. The draft GBF contains general elements with implications for agriculture, including on:

- Reducing pollution, excess nutrients, biocides, and plastic waste (target 6)
- Mainstreaming biodiversity (target 13)
- Redirecting incentives harmful for biodiversity, such as subsidies (target 17).

It also has two stand-alone targets directly addressing food systems:

- Agriculture should be supported through the conservation and sustainable use of ecosystems (target 9).
- Ensuring benefits for people—of nutrition, food security, livelihoods, health and well-being—through sustainable management of wild flora and fauna (target 8).

Part I of CBD COP 15 in October 2021 produced the Kunming Declaration, which contains a provision on aligning financial flows in support of the conservation and sustainable use of biodiversity, and specifically eliminating, phasing out, or reforming subsidies and other incentives that are harmful to biodiversity.

IPBES contributes several comprehensive language formulations around food that are clinically meaningful to addressing malnutrition and could be taken up in other MEAs. Most recently, IPBES 8 in 2021 used the phrase "food and nutrition security" in its meeting report.

The opportunity to use IPBES' contributions to further advance food dialogues is likely in 2023 when IPBES 10 intends to endorse a thematic assessment on the nexus between biodiversity, water, food, and health. Meanwhile, several elements to support healthy food systems can be drawn from the 2019 IPBES Global Assessment, which highlights that "feeding the world in a sustainable manner" entails

- Food systems that ensure adaptive capacity, minimize environmental impacts, eliminate hunger, and contribute to human health and animal welfare.
- Land-use planning and sustainable management of both the supply/producer and the demand/consumer sides of food systems.

The assessment further recognizes the importance of a global food system that

- Uses measures that conserve the diversity of genes, varieties, cultivars, breeds, landraces and species, also contributing to diversified, healthy, and culturally relevant nutrition.
- Promotes low-impact and healthy diets and the localization of food systems (IPBES, 2019c).

3.4.1.4.2 Food Policy Under Climate Change Governance

A conundrum within the legal text of the UNFCCC is that its objective to "ensure that food production is not threatened" contrasts current views that global food production is unsustainable (UN, 2021). Unless "production" is interpreted to be sustainable and is aimed toward meeting the dual goals of nutrition quality and quantity, policies affecting food systems under the UNFCCC will be missing the mark.

This work on food is contained in the KJWA, which is the only agenda item to focus on agriculture and food security in the UNFCCC.

The UNFCCC decision to establish the KJWA was not based on health or nutrition. It stemmed from a series of discussions on enhancing action on mitigation that included reducing emissions and the role of forests and conservation and the need for views on agriculture (UNFCCC COP, 2012, 2/CP.17). The KJWA arose out of the subsequent decision at COP 23 in 2017 to host a series of agriculture workshops (UNFCCC SBSTA, 2018a, 4/CP.23). None of the workshops specifically focused on health or nutrition, a silo that may explain why there were no statements by the WHO—custodian of diet-related SDG targets on stunting, malnutrition, anemia, and mortality from non-communicable diseases—at any of these workshops. Nevertheless, through the KJWA forum, parties agreed "to work together to make sure that agricultural development ensures both increased food security in the face of climate change and a reduction in emissions" (FAO, 2021a).

Current food dialogues under the KJWA, based on FAO event summaries, are considering:

- Livestock's contribution to nutrition, biodiversity and ecosystems, and using livestock as an Entry point to NAPs and NDCs (workshop on livestock) (FAO, 2021b).
- "Unbalanced diets as [a] preventable source of GHG emissions," a systems approach to food, and advocating for policy reform on dietary changes (workshop on socioeconomics and food security) (FAO, 2021c).
- The co-benefits of manure management and biodiversity and reorienting subsidies toward organic farming or agroecology (workshop on nutrient use) (FAO, 2020d).
- Soil micro-biodiversity (soil workshop) (FAO, 2020c).
- Biodiversity as a co-benefit of adaptation and using measurement of the co-benefit to improve adaptation assessments (adaptation workshop) (FAO, 2020b).

The FAO states that the KJWA represents an unprecedented opportunity to drive transformation in agricultural and food production systems and to address the synergies and trade-offs between adaptation, mitigation, agricultural productivity, livelihoods, and nutrition (Drieux et al., 2021). COP decisions that impact the permanence and pathway for **a future KJWA, therefore, could significantly impact global health and malnutrition outcomes.**

NAPs can also be vehicles for driving progress in food discussions under the UNFCCC. Over 80% of NAPs reviewed in 2020 mention food as a climate-sensitive health risk and the issues of malnutrition and foodborne disease (WHO, 2021i). There is significant room to expand the content of NAPs on detailed issues of malnutrition.

The IPCC notes that dietary changes can contribute to achieving global emission reductions targets, that **low-carbon diets tend to be healthier and have smaller land footprints** (see Chapter 6, B.6.2, IPCC, 2019), and that effective policies for dietary change are rare (de Coninck et al., 2018). The forthcoming (2022) IPCC AR6 Working Group II report, references food in several chapters, including as it pertains to the food–energy–water–health nexus in the contexts of water and food security and rural-urban transformation. It also addresses adaptation options for the production and use of food, fibre, and other ecosystem products across scales and regions, including limits and barriers, knowledge systems, and aspects of sustainable development.

3.4.1.4.3 Convergence

The presence of key MEA leaders at CFS 49 set a new tone for global food policy convergence for the plenary. A high-level roundtable calling for synergies between CFS, UNEP, and the Rio Conventions saw the Executive Secretaries of the CBD, the UNFCCC, and the UN Convention to Combat Desertification (UNCCD) highlight complementarity and uptake of CFS guidance. In its first appearance at CFS, the UN Economic and Social Council (ECOSOC) emphasized the importance of ensuring

science- and evidence-based and inclusive dialogue among all key stakeholder groups impacted by food systems. Of note, the World Bank reported it now measures its investments against the CFS *Voluntary Guidelines on Food Security and Nutrition*.

Food policy convergence in major decision-making forums is important, and there are signals that this will continue, including through One Health approaches. The newly formed UN Nutrition—a new interagency coordinating mechanism—also promises to deliver comprehensively, but this remains to be seen. Yet, in this review of the global food policy landscape, the presence of the health sector in key MEAs, particularly clinicians, is neither consistent nor strong. **Primary care medicine, which shoulders the consequences of food policies and shares in the burden of diet-related non-communicable diseases, is not visible.**

Room for action is clear: the CBD's draft action plan on biodiversity and health, the draft post-2020 global biodiversity framework, and the KJWA do not reference the CFS *Voluntary Guidelines on Food Systems and Nutrition*, its recommendations on climate change and food security, on agroecological and other innovative approaches, on land tenure, or any other CFS policy tools.

Information on IISD Earth Negotiations Bulletin expert coverage of intergovernmental discussion on the UN Committee on World Food Security is here.

4.0
Environmental Determinants of Health: A science-policy focus of cross-cutting themes

The previous chapters analyzed biodiversity, climate change, pollution, and food systems, while this section looks at a number of themes that cut across different issues and organizational jurisdictions. Policies under each MEA impact these themes and the health and well-being outcomes corresponding to them. Greater awareness and engagement by both health and non-health actors—and in this sense, a stronger health–environment nexus in each—has great value for people, the planet, and policy coherence.

Gross inequities underlie the need for a new approach to tackling the social and environmental determinants of health. For instance, there is an 18-year difference in lifespan between high- and low-income countries, and 30-55% of health outcomes are determined by non-health factors (WHO, 2021j). Yet the WHO (2020b) laments the persistence of traditional public health risks despite "substantive efforts to reduce environmental risks" (p. 5). A telling gap is related to funding distributions: "10% of global GDP is being spent on health care, but very little goes to [disease and injury] prevention" (WHO, 2020d, p. 6).

This section provides technical knowledge and highlights from current debates on these issues in a manner intended to be accessible to both health and environmental practitioners.

Key science-policy issues discussed here include:

- Water and Water-Related Disease
- Gender and Women's Health
- Biodiversity Technologies
- Ecosystem Integrity and Mental Health
- Ecosystem and Traditional Knowledge Integrity and Medicines

4.1 Water and Water-Related Disease

Water is a determinant of poverty, illness, malnutrition, migration, and conflict and is fundamentally linked to individual, community, and global health. Global decisions in a variety of forums, including all MEAs, impact water and can influence the trends of these determinants. However, no UN agency addresses just water—which remains a resource in critical condition.

According to the IPCC, assessments of water availability, demand, and pollution demonstrate that **climate change threatens water insecurity for 80% of the global population** (Hoegh-Guldberg et al., 2018). The importance of water governance as a matter of global peace and security has led to the issue of climate change impacts on water access reaching debate and discussion at the UN Security Council (2016).

Entry points to discuss water under the UNFCCC are limited, as "water" is mentioned only once on adaptation under the Convention treaty: "develop and elaborate appropriate and integrated plans for coastal zone management, water resources and agriculture, and for the protection and rehabilitation of areas… affected by drought and desertification, as well as floods" (Article 4e). The NWP includes water resources as a key thematic area; however, the uptake of climate-water concerns is strikingly poor. In a 2021 national survey, **only three ministries of health reported receiving training on climate-resilient water safety plans** (WHO, 2021m).

Box 7. Natural hazards caused by climate change impact water

- Storms
- Floods
- Droughts
- Rain variability
- Changes to water ecosystem temperatures (fresh and marine)
- Secondary pollution from industrial accidents, farm nutrient runoff, human waste accidents, soil erosion

Water ecosystems, waterways, and human water systems are in a precarious state. By 2025, UN-Water—an interagency mechanism that coordinates the efforts of UN entities and international organizations working on water and sanitation issues—reports that 1.8 billion people are expected to be living in absolute water scarcity (UN-Water, 2018), which the UNFCCC projected in 2020 will increase to 3.2 billion by 2050 and cause displacement of an estimated 24 million–700 million people. Freshwater is shared across borders between 153 countries (UN Economic Commission for Europe & UN Educational, Scientific and Cultural Organization, 2018) and is essential natural capital to many sectors, including sanitation, wastewater and hygiene, health, agriculture, energy, and industry. This means that competition for water in a future of scarcity and uncertainty will lead to conflict. Resilient water management will depend on risk-based approaches, and as further underlined by UN-

Water (2018), will need to be flexible, entail transboundary mitigation and adaptation, and rely on local leadership.

According to the 2017 updated WHO *Guidelines for Drinking-Water Quality*, "access to safe drinking water is essential to health, a basic human right and a component of effective policy for health protection" (2017b, p. xv); in addition, it states that "all types of supply will be affected" by climate change, which will also affect water safety plans (p. 94). The guidelines also identify safe drinking water as "**one of the most important public health requirements in most emergencies and disasters, along with adequate sanitation"** (p. 100).

Initial national planning frameworks for water resources are underway, as reflected in current NDCs and NAPs that include water-related concerns. In a recent report, UN-Water (2019) noted that over 90% of NDCs include a voluntary adaptation component referring to water and that many of these include fresh water, coastal water, and groundwater as a first priority. Still, UN-Water (2019) stresses the opportunity to enhance planning and identified the following challenges:

- Cross-sectoral water demands and private and public sector tracking mechanisms for water use
- Accounting for water-related mitigation
- Consideration of both mitigation and adaptation interventions
- Including regulation of groundwater and climate-resilient sanitation in governance models
- A need for local-level management groups to coordinate water and adaptation strategies
- A need for green and blue climate bonds to support water initiatives
- Wider adoption of blended grey–green–blue infrastructure.

Another gap is the **importance of incorporating transboundary water cooperation and water, sanitation, and hygiene (WASH)** into national climate change planning, as highlighted in discussions under the Water Convention in 2021 (IISD, 2021a).

Integrated management of water and land resources is critical for water consumption efficiency across sectors. In co-benefit analyses, both UN-Water (2010) and the WHO (2017b) point to the **high returns on investment of water infrastructure for reduced adverse effects to human health and health systems**. Prevention is less expensive than health costs at both the household (from water treatment in the home) and population levels (centralized major water supply infrastructure), and both practices favour the poor.

Considering the increasing incidence of natural hazards and associated emergencies, it is concerning that dozens of new agents of water-transmissible diseases continue to be discovered, re-emerge after dormancy, or geographically expand (WHO, 2003). "**Zoonotic pathogens pose the greatest challenges to ensuring the safety of drinking-water and ambient water, now and in the future**" (WHO, 2017b, p. 122a). In the setting of the ongoing COVID-19 pandemic, it is disconcerting that viruses pass through water and waste systems, persist for long periods in water, and are more difficult to remove due to their small size and reduced

sensitivity to disinfection. Viruses (such as Noroviruses, Hepatitis A and E and Influenza), bacteria (such as Typhoid and Cholera), and amoebas and parasites are all contagious through water. "**Microorganisms can accumulate in sediments and are mobilized when water flow increases**" (WHO, 2017b, p. 123), a particularly worrisome phenomenon when climate predictions advise for worldwide water system disruption and predictions that by 2050 1.6 billion people will live with regular risk of floods (UNFCCC, 2020b).

In light of these issues, coordination and Integrated Water Resources Management (IWRM) across global environmental agencies and organizations is essential, as are water safety plans.

4.2 Gender and Women's Health

Global environmental governance impacts women's health. But women do not have as equal access as men to decision-making processes related to land and resources, including those they traditionally use, manage, and rely on for their livelihoods and well-being. In 2014, the Organisation for Economic Co-operation and Development (2014) found that laws or customary practices of 102 countries still restricted women's rights to secure access to land. The knowledge that women accumulate as primary caregivers, land managers, and resource users is also seldom recognized as important to health and biodiversity outcomes (UN Women, 2020). The **underrepresentation of women in domestic and international governance** is also telling: only 18% of government committees on foreign affairs, defence, finance, and human rights are chaired by women (UN Women, 2021).

Environmental degradation is intimately invasive to women's health. Women face complications of contaminated breastmilk since breastfed infants will be "the final target of persistent organic pollutants (POPs)" (Mead, 2008). Women's jobs as mothers are made more difficult by a food system that results in ~39 million children under 5 years being obese (WHO, 2021e). Mothers spend significant emotional and physical time attempting to secure critical nutritional health and well-being for their families worldwide, not the least because 45% of deaths under 5 years are linked to undernutrition (WHO, 2021e). The mother's role is further challenged because 30% of all women of reproductive age are anemic, a dietary micronutrient deficiency that causes fatigue and weakness, among several other symptoms (WTO, 2021g). In several regions, biodiversity loss forces women and girls to travel further distances to collect water, fuel, and plants for food and medicines, limiting their time and ability for education or generating income.

Disasters and degradation that lead to human migration further interfere with access to health care, particularly for women. In these situations, women cannot access contraception, address sexually transmitted diseases, receive prenatal care, optimize family diet and healthy food consumption, or obtain routine vaccinations or pediatric checkups. The COVID-19 pandemic exposed these disproportionate negative impacts on women in striking ways. UN Women (2021) estimated that the disruption of women's health services during the pandemic resulted in an estimated 1.4 million unintended pregnancies in low- and middle-income countries because 12 million women could not access family planning resources; it is also expected to result in up to 2 million additional cases of female genital mutilation by 2030.

Natural hazards complicate the livelihoods of women in other ways. Researchers find that **early marriage is a coping strategy** used to minimize both the increased risk of violence to unwed females and financial debts resulting from environmental damages (Ahmed et al., 2019).

These issues are not simply gender concerns; they are women's health issues. To improve health outcomes, "women's health" must be included in references to gender.

4.2.1 Biodiversity Policies and Gender

The 2015-2020 CBD Gender Plan of Action encouraged parties to address gender differences in biodiversity policies, including aspects related to health (CBD, 2014c). A workshop on

a post-2020 gender plan of action strengthened recommendations on women's leadership, participation, and access to decision making, and on women's right to, access to, control over, and ownership of resources, including land (CBD, 2019). Work is also underway to incorporate gender-responsive approaches into the CBD post-2020 global biodiversity framework. During negotiations, the CBD Women's Caucus (CBD Women, 2021) called for a stand-alone target on gender equality, which some parties support but it has yet to gain broad backing at formal negotiations. Gender disaggregated data is proposed across a range of research themes in the draft global action plan on biodiversity and health (CBD, 2021b). However, the CBD Women's Caucus emphasizes that proposals to mainstream gender (Element 5) are limited in that they omit the energy and mining sectors which arguably have more severe impacts on biodiversity and health.

4.2.2 Climate Change Policies and Gender

The treaty of the UNFCCC does not reference women or gender. However, progress has been made to incorporate a gender perspective into its governance. At COP 7 and COP 18, parties adopted stand-alone decisions on promoting the participation of women in negotiating roles and on enhancing gender balance within the UNFCCC, respectively. Parties reinforced this at COP 20 by establishing the Lima Work Programme on Gender. In 2015, the Paris Agreement recognized the need for gender equality as an overarching principle (para. 11, Preamble) and included gender-responsiveness under adaptation and capacity-building objectives. Parties further adopted a Gender Action Plan at COP 23, which was enhanced and extended in 2019. Broad integration of gender achieved at COP 24 and COP 25 led to every thematic area of negotiations containing at least one reference to gender in its decisions by 2020 and the appointment of 94 national gender and climate focal points by 2021. The trend to strengthen gender considerations in climate policies continued at COP 26, including clarifying the roles of these focal points. However, still, **none of the references or decisions on gender under the UNFCCC highlight women's health**, a noticeable oversight from the public health perspective. Further support of this reference could be generated by expanding evidence on gender-related impacts due to climate change, an area noted to be a research gap. This is also an area ripe for technical health input.[32]

4.2.3 Pollution Policies and Gender

In 2013, parties established the BRS Gender Action Plan, aiming to promote gender equality within the governance of chemical pollutants, as well as in the implications of its decisions. Interestingly, twice as many deaths are attributable to chemical exposure among males than females (see 2019 data addendum, WHO, 2016). This data is largely based on occupational exposure and may not capture the full story. As the conventions expand their scope beyond chemicals used in agriculture and industry to **those used in household and personal care items**, the gender distribution of exposures and impacts may shift. Insight from periodic monitoring of regulated environmental chemicals will also be telling. The Stockholm

[32] The Women's Environment and Development Organization provides a helpful guide on gender equality under the UNFCCC: https://wedo.org/wp-content/uploads/2020/11/2020-Guide-to-Gender-Equality-under-the-UNFCCC.pdf.

Convention's Global Monitoring Plan tracks changes in levels of POPs over time in human tissue (blood and breast milk). Arrangements for a similar effectiveness evaluation of the Minamata Convention are expected to be adopted at COP 4 part II in 2022.

4.2.4 Food System Policies and Gender

The CFS has reinforced policy guidance on gender issues in food security and nutrition for a decade. Currently, the CFS HLPE is developing guidelines on gender equality and women's empowerment in the context of food security and nutrition for endorsement at CFS 50 in 2022. This follows up on the background document and outcomes of the 2017 CFS *Forum on Women's Empowerment in the Context of Food Security and Nutrition*, as well as its 2011 policy recommendations on gender, food security and nutrition.

4.3 Biodiversity Technologies

Emerging biotechnologies under the CBD—biofuels, DSI, geo-engineering, living modified organisms (LMOs), and synthetic biology—have considerable influence on aspects of human health, including human nutrition, medical diagnosis and treatment, and public health strategies, among others. But surprisingly, **the health and medical community is noticeably absent in biodiversity governance debates**. For instance, at the 8th session of the International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA) in 2019—an event where a major decision was anticipated (but collapsed) on the way forward on exchanges of genetic resources and their components (carrying implications for all biodiversity-related conventions on this topic)—of the 600 participants, no health-related UN agencies or ministers of health attended and only one individual non-governmental observer was affiliated to health (nutrition) in their home institution.

Decision-making on biotechnology has enormous implications. The road to the COVID-19 vaccines, for example, involved research on 1.2 million sequences of genetic material from 172 different countries (Maxmen, 2021). Across sectors, the research landscape is massive, and similar to the vaccine situation, genetic material is being, or called to be, shared on various global repositories. These technologies, as has been seen with COVID-19 vaccine development and distribution, will continue to invite questions of access and benefit sharing under the Nagoya Protocol, as well as equity, trust, sovereignty, and security.

Confusion, misunderstanding, and, unfortunately, misinformation cloud decision making in this space. It is ripe for technical experts, with a practical understanding of the field of genetics and its implications for human health, to link and **build capacity within ministries of agriculture and health and bring expertise and informed discussion to negotiations.**

4.3.1 Digital Sequence Information

"Ubiquitous in life-science-related research," DSI is the as-yet undefined phrase used to encapsulate DNA-level genetic material and its derivatives and, essentially, the information of molecular biology and its application under the CBD (CBD, 2020). Establishing definitions and rules for the use, protection, trade, and scope of DSI will have implications in other areas of international law and **will impact the ownership, extraction, transport, handling, and benefits arising from nature's genetic resources** prior to their use by industries. To date, deliberations on how to regulate genetic resources are hamstrung with a significant level of tension.

Although biodiversity policy experts emphasize that the CBD has significantly affected the governance of genetic resources by establishing state sovereignty over genetic resources, they also note this governance is hotly contested (Tsioumani & Tsioumanis, 2021). Tensions are so high that the issue is passed among the biodiversity forums without establishing DSI as a stand-alone agenda item, which would give it a permanent governance home. Simply put, **environmental governance of genetic resources has serious implications for global health and "consensus is out of reach"** (Tsioumani & Tsioumanis, 2021). Leading into CBD COP 15, discussion on DSI is at a stalemate over five possible arrangements for its governance. It is not clear what the health sector thinks of these policy options (CBD, 2021c).

The importance of governance on genetic resources is clearly demonstrated by LMOs,[33] such as enhanced crops. Concrete, potential health risks of genetically modified organisms (GMOs) are identified on the WHO website; Table 2 breaks down the risks.[34] Uncertainties remain worrisome in this field, as indicated by the WHO suggestion to manage risk via both pre-market assessments and periodic review.

The proposed benefits also carry implications for health, including altered nutrient content or the allergenic potential of food, improved crop efficiency, and disease and drought resistance, as well as "enhanced growth characteristics" of animals like fish or the potential to induce plants and animals to intentionally produce pharmaceutically valuable proteins, such as for vaccines (WHO, 2014).

Table 2. Potential risks from modified organisms

Human health	Environment
• Allergic reaction to GM foods • Gene transfer from GM foods to human cells • Gene transfer from GM foods to inhabitant microbes of the digestive tract* • Gene transfer from GMOs to other species ("outcrossing"), which may then be inherited	• GMO "escape," potentially introducing engineered genes to wild populations • Gene persistence after the GMO has been harvested • Impact on non-target organisms (e.g., insects that are not pests) • GMOs with unstable genes • Biodiversity loss • Increased use of chemicals in agriculture

*For which reason the WHO specifically discourages the use of gene transfer technology that involves antibiotic resistance genes.
Source: WHO, 2014.

The Cartagena Protocol on Biosafety (2000) under the CBD seeks to oversee the "movement, transit, handling, and use" of LMOs and LMO products. We use LMOs in daily life, and they play a large role in the food value chain: "vaccines, drugs, food additives, corn and soybean derivatives and other processed foods, cornstarch used for cardboard and adhesives, fuel ethanol for gasoline, vitamins, and yeast-based foods such as beer and bread." The Protocol both recognizes the potential adverse effects to humans from biotechnology and facilitates their safe access. It

- Acknowledges the potential risks and implications of LMOs intentionally introduced into ecosystems and that they may influence human health

[33] "Living modified organism": any living organism that possesses a novel combination of genetic material obtained through the use of modern biotechnology; "Living organism": any biological entity capable of transferring or replicating genetic material, including sterile organisms, viruses, and viroids; "Modern biotechnology": the application of: a) invitro nucleic acid techniques, including recombinant deoxyribonucleic acid (DNA) and direct injection of nucleic acid into cells or organelles, or b) fusion of cells beyond the taxonomic family, that overcome natural physiological reproductive or recombination barriers and that are not techniques used in traditional breeding and selection." See Article 3, Cartagena Protocol on Biosafety.

[34] GMOs and LMOs are conceptually equivalent.

- Elaborates on risk assessment[35]
- Requires notification of the unintentional release of LMOs as well as any knowledge on possible adverse effects to conservation and sustainable use of biological diversity, including the risks to human health
- Invites input from other international forums with competence in the area of risks to human health.

However, one problematic limitation to the governance of biotechnologies under the CBD is that GMO foods are only within the scope of the Cartagena Protocol if they contain LMOs that are "capable of transferring or replicating genetic material." This abstract language invites different interpretations. The field is driven by innovation, so to any practical person or policy-maker, a detail about whether an LMO and/or its parts or derivatives is "capable" is a question for those at the cutting edge of scientific research, not those at a diplomatic conference. At the moment, **progress on governance cannot move forward because gaps in technical understanding and on risks severely paralyze discussion**, and unless these gaps are addressed, meaningful agreement will be difficult.

At the 75th meeting of the WHA in 2022, WHO member states will consider an updated global strategy for food safety. It will address current and emerging challenges, new technologies, and innovative strategies for strengthening food safety systems. A key purpose of the strategy is to support members "to assess the challenges and opportunities linked to the use of new and appropriate technologies in food safety, including the importance of fully realizing the benefits of such technologies by sharing the data generated" (WHA, 2020). If this WHO strategy links to the Cartagena Protocol and work on DSI under the CBD, it is likely to create important safeguards for human health and well-being under policies governing technologies under the CBD.

4.3.2 Synthetic Biology

Synthetic biology, known as "extreme genetic-engineering" (ETC Group, 2007), now includes the systems engineering of molecular biology by 1) design and fabrication of biological components and systems that do not already exist in the natural world and 2) redesign and fabrication of existing biological systems.

The field includes the creation of synthetic viruses, synthetic chromosomes, and microinjection of synthetic chromosomes into bacterial cells.[36] In a 2021 presentation on synthetic biology, UNEP cited market analysis on synthetic biology as projected to grow from USD 6 billion to 62 billion between 2018 and 2026 (Balakrishna, 2021). **This field is advancing so rapidly that it could threaten the concept of biodiversity**, including by creating whole organisms. These organisms would then fall outside the definition of biodiversity governed by the CBD and would be patented entities. The base of creators is also

[35] The risk assessment is to identify and evaluate the possible adverse effects (Article 15), including an identification of any novel genotypic and phenotypic characteristics associated with the living modified organism that may have adverse effects (Annex III).

[36] For additional information on this complicated field, see https://www.un.org/en/sc/1540/documents/Guest%20Speaker%20Presentation%201540%20side%20event%202018.pdf.

expanding so fast that these creators may not know about international rules. The implications for human health are unknown but worrisome.

Although some negotiators and observers consider the application of genetic biocontrol to produce, for example, disease-resistant mosquitoes or modified rodents to address invasive species as beneficial, there is an **overwhelming amount of interest in a precautionary, human rights-based approach to synthetic biology regulation**. Currently, under the CBD, an Ad Hoc Technical Expert Group on Synthetic Biology is producing a review of the current state of knowledge on these externalities.

4.4 Ecosystem Integrity and Mental Health and Well-Being

Mental health is a topic historically marginalized in both health and biodiversity policy. In the CBD, mental health is not clinically defined, nor is its connection to nature fully described in terms of the interconnectedness of the Indigenous worldview.

"There is no health without mental health," states the WHO (2021b). Good mental health has long been associated with access to nature,[37] and yet, it wasn't until 2016 that "mental health and well-being" was prominently added to the CBD agenda (CBD resolution (XIII/6)). It has taken a long time for policy-makers to take in the **dual trends of increasing environmental degradation and frequency of disasters and increasing mental health disease**.[38] At the same time, despite two updates, the WHO Comprehensive Mental Health Action Plan 2013–2030 still does not reference the terms "nature," "biodiversity," or "ecosystems."

From the perspective of Indigenous Peoples, this interconnection is long overdue. Leaders of several Indigenous communities, voicing the opinion of generations of "ongoing stewards of their environments," offer that even current Planetary Health thinking lacks depth on an inner harmony created by, among others, reciprocal relationships, levels of interconnectedness, kinship relationship with non-human beings, and a generational responsibility to the land (Redvers et al., 2020). One powerful concept is considering environments as "uncared for" rather than as degraded. From the reciprocity viewpoint, an uncared-for environment results in poor human health, and that this is a deeper wound to well-being than calculable biochemical changes from, for example, breathing polluted air. These leaders encourage deeper understanding that interconnection goes beyond establishing "external rules" of governance and suggest looking at Planetary Health as a "comprehensive ethical framework" as part of the global solution to environmental degradation.

Mental health features prominently in the global burden of disease worldwide: **379 million people suffer from a diagnosed mental health disorder**.[39] Of this number, 20 million people have schizophrenia, 45 million have bipolar disorder, 50 million have dementia, and 264 million people are affected by depression (WHO, 2019). Worldwide, 700,000 people commit suicide annually, 77% of which are in low- and middle-income countries (WHO, 2021k). Suicide is also the second leading cause of death among 15–29-year-olds (WHO, 2021b). Few people with mental health symptoms or diseases are fortunate enough to receive any care. **For 50% of the global population, the ratio of psychiatrists to people is 1:200,000** (WHO, 2021b). If care is provided, it is often limited, in part because it is difficult to remove what are often longstanding drivers (if they can be accurately identified) or triggers, as they are often embedded into a living situation. In the case where a driver is environmental degradation, timely removal would be impossible, barring geographic relocation. Known or

[37] E.g., depression, anxiety, and behavioural problems, recuperation, and improving profile of non-communicable disease (WHO & CBD, 2015); FAO recognizes observations of the value of forests for psychological stability, vitality, self-esteem, and directed attention capacity (FAO, 2020a).

[38] Between 1990 and 2010 alone, major depressive disorders increased by 37% as cited in Chapter 12 of WHO and CBD, 2015.

[39] These should be taken as underestimates because many individuals with mental health issues do not admit their symptoms in clinical environments or within their social circles.

threatened degradation, such as for communities at risk of and powerless against industrial chemical exposures, can cause anxiety stemming from a situation of "no refuge" (Buell, 1998).

Approaches to mental health need to be preventative, not reactive, and global health and environmental policies need to improve in terms of reducing the negative contribution environmental degradation has on mental health.

It is refreshing to see the integration of biodiversity and mental health in the CBD's draft global action plan on biodiversity and health (2021b). This draft serves as an initial step toward addressing the **psychological importance of biodiversity** by drawing attention to both WHO's (1948) definition of health as a "state of complete physical, mental, and social well-being and not merely the absence of"; as well as elements of IPBES' (n.d.) definition of well-being: "a perspective on a good life that comprises access to basic resources, freedom and choice, health and physical well-being, good social relationships, security, peace of mind and spiritual experience."

The CBD's draft text further specifies that nature impacts "psychological health as interactions with nature are known to improve mental health" and that "many of nature's contributions to people, including those conveying mental and physical benefits, are essential for human health and well-being" (CBD, 2021b, Article 5). By expanding the terminology of human health to include mental health, **the draft recognizes an entire medical field (psychology) for the first time in the CBD.**

The main actions proposed in the draft serve to strengthen the evidence base on the interlinkages between mental health and biodiversity:

- Encouraging the health sector to recognize nature's contribution to human mental and physical health and promote biodiversity-resilient and environmentally sustainable practices
- Promoting biodiversity at mental health events
- Calling for research on the role of green and blue spaces in promoting mental health, as well as the biodiversity benefits for mental health from the human microbiome, and more generally from the environment
- Developing quantitative assessments on the impact of nature's benefits to human mental health to use in national accounting.

In an appendix, the CBD (2021b) further calls attention to key messages on the diversity of organisms as fundamental to—and access to nature as supportive of—human mental health and well-being.

More can be drawn from the 2019 IPBES Global Assessment report, particularly where it describes nature as fundamental to the formation of personal and cultural identity and as an inspiration for creative expression, which are widely known to contribute to a state of good mental health (Brauman et al., 2019).

The CBD and WHO (2015) State of Knowledge Review strongly contributed to building a foundation to bring mental health into CBD deliberations (see Chapter 12). Concepts identified in the review that **could meaningfully enhance existing draft text on mental**

health include the inseparability of nature and culture; cultural diversity as "a means to achieve a more satisfactory intellectual, emotional, moral and spiritual existence"; links between green spaces and social cohesion; "nature-deficit disorder" in children; "biotic integrity[40] and mental health and well-being"; and redefining a "healing environment," such as through the green design of hospitals.[41]

While there has been progress on mental health under the CBD, there is room to further expand this work at the national level in NAPs under the UNFCCC. The UNFCCC indirectly acknowledges the links between environmental change and mental health by including a category on climate-sensitive health risks under mental health in NAPs (WHO, 2021i). The category includes general mental and psychosocial health; effects of extreme weather events; loss of traditional homes and villages; and feelings of uncertainty and helplessness about the future. A recent WHO assessment (2021d) across countries showed that mental health is not broadly reported and that **only one NAP included actions to address mental health.**

Mental health does not organize itself in tidy definitions but by grouping symptoms into a syndrome.[42] Identifying the drivers of a mental health condition is difficult. The social and environmental determinants of health play a large role in these drivers and must be filtered through cultural and other traditional norms. Questions about environmental conditions are rarely part of the standard of care, and language for (Western) clinicians to convey or for patients to respond to these issues within the health system is largely absent. This means there is little capacity to use the health sector to collect routine data on biodiversity–mental health interlinkages. There may be an opportunity to address this **within the scope of CBD NBSAPs** under the section identifying the value of biodiversity and ecosystem services and their contributions to human well-being. This concept is considered by some to be a component of culturally competent medical care (see Chapter 12, WHO & CBD, 2015).

Technical expertise will add value and meaning to policy discussions on this issue at the biodiversity–health nexus.

[40] Species richness, composition, abundance and functional organization, and microbial diversity links to psychology.

[41] As exemplified in IPBES 2019a, Khoo Teck Puat Hospital in Singapore emphasizes the nexus between nature and well-being through the benefits of greenery for healing and livability; see https://www.greenroofs.com/projects/khoo-teck-puat-hospital-ktph/

[42] DSM-V definition: "A mental disorder is a syndrome characterized by clinically significant disturbance in an individual's cognition, emotion regulation, or behavior that reflects a dysfunction in the psychological, biological, or developmental processes underlying mental functioning. Mental disorders are usually associated with significant distress or disability in social, occupational, or other important activities. An expectable or culturally approved response to a common stressor or loss, such as the death of a loved one, is not a mental disorder. Socially deviant behavior (e.g., political, religious, or sexual) and conflicts that are primarily between the individual and society are not mental disorders unless the deviance or conflict results from a dysfunction in the individual, as described above" (American Psychiatric Association, 2013).

4.5 Ecosystem and Traditional Knowledge Integrity and Medicines

The relationship between ecosystems and medicine is significant. Medicine and medical knowledge derive from diverse land and marine species, including plants, animals, and microbes (Chivian & Bernstein, 2008). According to the WHO (2002), more than 80% of the global population relies on traditional and herbal medicine for basic clinical care and wellness. Since half the world's population also lacks access to essential health services (World Bank, 2017), **reliance on largely plant-based Traditional Knowledge may be the only means of healthcare for many people**. Indigenous healers play an essential role in the health of millions of people (WHO, 2013). A UN policy report on biodiversity and Traditional Knowledge described the role of traditional medicine as providing a "critical complementary role" to professionalized medicine in most societies (Unnikrishnan & Suneetha, 2012). Moreover, even countries with established health care systems report common use of traditional medicine for reasons of culture, history, or dissatisfaction with "conventional" healthcare (WHO, 2013). Such clear statistics should give pause to the Western medicine community for considering the **importance of ecosystems and Traditional Knowledge for contemporary public health practice.**

Loss of ecosystem integrity limits access to health maintenance and treatment for most people, restricting communities from governing their own well-being. **There are major ethical concerns for framing biodiversity, a determinant of health for most, as natural capital that can be bought and sold** as an ecosystem service on the global market. This challenge features in debates in all MEAs and is a source of contention across them.

Biodiversity and components of ecosystems form the source of the pharmaceutical and scientific research industry, which in 2020 reached a global market value of nearly USD 1,228 billion (Research and Markets, 2021). However, on its own, **Traditional Knowledge pertaining to health is often "disregarded and undervalued" within primary care medicine** and is marginalized in policies that protect the environment and health (Karunamoorthi et al., 2013). Discussion of environmental governance is incomplete without acknowledging the decline and threat of extinction for Indigenous cultures (known as knowledge holders) worldwide (UN DESA, 2021).[43] The creation and transfer of unique ecological knowledge, including practices that build the human relationship to nature and that might lead to the development of traditional medicine, are also lost or threatened. A vicious cycle occurs where the loss of biodiversity leads to the loss of kinship to—and then stewardship of—the environment as a result of lost knowledge and culture.

Erosion of education that nurtures socio-ecological values is an issue that has been taken up by the Global Youth Biodiversity Network (2021) under the CBD, where they advocate for **strengthening inter-generational bonds as a means to improve community health**. Experts have long raised concerns for lost knowledge and culture, as well as education systems

[43] "The result has been that indigenous cultures today are threatened with extinction in many parts of the world. Due to the fact that they have been excluded from the decision-making and policy frameworks of the nation-states in which they live and have been subjected to processes of domination and discrimination, their cultures have been viewed as being inferior, primitive, irrelevant, something to be eradicated or transformed" (UN DESA, 2021).

that do not recognize the relevance of these practices or compete with and replace them (Battiste, 2010; Unnikrishnan & Suneetha, 2012).

The CBD Local Biodiversity Outlooks underscore the value of the human-nature relationship to addressing crises at the health–environment nexus (see Key Message 2, Forest Peoples Programme, 2020). A few key statistics on this theme from the IPBES (2019a) Global Assessment (p. 353):

- 80,000 plants are identified as medicinal, and 70,000 are used at the global level.
- > 25% of new drugs and > 70% of cancer drugs are derived from natural products.
- 656 flowering plant species are used to treat diabetes.
- > 30,000 new compounds and > 300 patents have been derived from marine species.
- The global market for herbal medicines is USD 83 billion.
- > 25%–50% of the pharmaceutical market (USD 1.1 trillion) is derived from genetic resources.

A 2009 WHA resolution on traditional medicine recognized the importance of its role and urged members states to develop national policies on traditional medicine "as part of comprehensive national health systems" (WHA62.13). The updated WHO Traditional Medicine Strategy 2014–2023 reports a gradual increase in support systems for traditional medicine, but as of 2012, **only 69 of 194 members had a national traditional medicine policy**, and only 73 had national research institutes on traditional medicine (WHO, 2013). At the same time, traditional medicine is grossly absent from "modern" medical education.

The integrity of ecosystems and of Traditional Knowledge is essential to human health and medicine worldwide. Medicine, both traditional and pharmaceutical, and medical research would not exist without biological diversity or human's historical connection to nature. **Protecting Traditional Knowledge of ecosystems is a matter of public and global health.** Biodiversity and Traditional Knowledge loss are issues of health equity.

In the decades leading up to the adoption of the CBD, plant genetic resources were increasingly used for biotechnological research and development. The unauthorized use of knowledge and taking of genetic resources ("biopiracy") gained international attention and remains at the heart of resource debates. The main argument rests on balancing the protection and use of Traditional Knowledge while avoiding its commodification and extraction by the private sector and performing cross-border extraction of resources and knowledge in accordance with cultural protocols. The Nagoya Protocol sets out to address this gap, while the CBD's Working Group on Article 8(j) develops relevant guidelines containing minimum standards for fair and equitable benefit sharing.[44] In reviewing the CBD draft global action plan on biodiversity and health, mention of Traditional Knowledge and of Free, Prior and Informed Consent is lacking alongside references to Traditional Knowledge. To that end, the Indigenous Peoples caucus at SBSTTA 24 read a statement calling on better engagement with the WHO traditional medicine resolution and its strategy. From informal observational data, the health sector has not been visible in these conversations.

[44] See the Mo'otz Kuxtal Guidelines on obtaining the Free, Prior and Informed Consent of Indigenous Peoples and local communities for accessing their knowledge, innovations, and practices: https://www.cbd.int/doc/publications/8j-cbd-mootz-kuxtal-en.pdf

5.0 Conclusions and the Way Forward

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Environmental governance impacts human health. The health sector's growing interest in environmental regimes should be harnessed into effective engagement strategies. A foreign affairs specialist could not arrive at a surgical operating room and participate in the same way a seasoned doctor is not prepared to impact a UN environmental negotiation. Meaningful advancement of environmental governance, with improved and more equitable health outcomes, depends on the thoughtful integration of these two disciplines. Moreover, the integration of these disciplines sets a course to practically achieve the SDGs.

The health sector can assist in driving progress in global environmental governance and cross-sectoral work. As outlined in this document, concrete opportunities exist to bring health actors with technical expertise and diverse knowledge to the table to provide inputs on targeted policy issues across environmental forums. This input includes reconsidering language used in treaties to more accurately represent and address clinical issues and fulfill public health needs.

Greater awareness of cross-cutting environmental determinants of health is important for advancing integrated thinking and policy action at the health–environment nexus. Addressing these themes also underpins the achievement of long-lasting health equity. It is essential that participants in both health and environmental disciplines develop a strong understanding of policies impacting water resources, gender, biotechnologies, mental health, and the integrity of Traditional Knowledge.

Viewing health as a global public good is fundamental to transformational change. In that way, Planetary Health can be a vehicle for achieving the SDGs. Broad recognition of the social and environmental determinants of health—in medicine, policy, and finance—is key to a preventative health approach.

The Way Forward

Provisions in global agreements on biodiversity, climate change, pollution, and food systems influence health outcomes and health equity and can transform the footprint of health systems. Decisions in these MEAs can contribute to reducing disease burdens. The health and well-being of people and the planet depend on cohesive thinking and action at the nexus of health and the environment.

Health provisions are entry points to global environmental regimes. A useful starting point for drawing on existing provisions in multilateral, bilateral, and regional environmental treaties is the Health and Environment Interplay Database.

Health participation should focus on informed engagement aimed at the heart of a debate and the decision-makers involved. Health ministers should attend MEA meetings, and environment ministers should participate in health meetings. There is a "benefit to health" for environmental actors attending WHA meetings.

Health data should inform national plans on health risks, impacts, outcomes, and equity across MEAs. At the same time, work under the IPCC and IPBES should inform planning in the health sector and ministries of health. The precautionary approach is important.

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