An Interview with Harvey V. Fineberg

Harvey V. Fineberg
Professor of Health Policy and Management, Emeritus, Harvard T.H. Chan School of Public Health,
Member of the Veolia Institute's Foresight Committee

What major global forces and challenges are reshaping the biodiversity-health nexus today?

First, the relationship and growing interdependence between biodiversity and health – further intensified by climate change and human activities – can be understood as part of what I define as *global mega-challenges*: complex, deeply interconnected issues with far-reaching consequences that require coordinated responses at the global level. Recent international gatherings, such as the 2022 United Nations Biodiversity Conference of the Parties (COP15), which led to the adoption of the Kunming-Montreal Global Biodiversity Framework,[1] illustrate the vital importance of bringing together actors from across the world to jointly define priorities and strategic directions.

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A second major force is the unprecedented impact of human activity on the planet. The speed and scale of environmental change now exceed the adaptive capacity of ecosystems and species, accelerating biodiversity loss and threatening public health. For the first time in Earth's history, a single species is the primary driver of such disruption. This reality underpins the debate over the Anthropocene, a term introduced in the 1980s by Paul Crutzen and Eugene Stoermer to describe a geological age shaped by human influence. Although contested, the underlying reality is clear: human-driven change now outpaces biological adaptation and places ecosystems under extraordinary strain. A clear example lies in modern agricultural practices. Large-scale monoculture narrows genetic diversity and weakens food systems' resilience, while the expansion of livestock and the decline of wildlife – driven by habitat encroachment and practices such as poaching – further destabilize ecosystems. These pressures also significantly increase the likelihood of zoonotic spillover: as humans push deeper into wild environments, pathogens jump more easily from wildlife to humans or livestock, fueling pandemics such as HIV/AIDS and outbreaks such as Ebola.

A third key challenge is the fast-expanding human ability to alter biological evolutionary processes. Humans have evolved to the point where they not only have a profound impact on the environment, but also the technological capacity to have directed evolution, apart from natural evolution. Advances in genomic technology, especially CRISPR,[2] give us unprecedented power to alter genomes, raising the prospect of a form of "neo-evolution".[3] While promising for treating severe diseases, such techniques pose profound ethical risks when applied to engineering human traits. These ethical and biological uncertainties reinforce the need for biodiversity conservation: genomic intervention cannot replace systems shaped over millions of years and call for humility, restraint, and renewed commitment to protecting the living world.

Finally, the rise of artificial intelligence, combined with robotic systems and miniaturization of electronic components, adds another unpredictable layer of influence over humans' experience of life and the ecosystems that sustain it. Combined with the pressures of the Anthropocene, insufficient global cooperation, and expanding genetic manipulation, these forces form a convergence reshaping humanity's relationship with biodiversity. This makes the protection of planetary health not only urgent but essential for the survival of life in all its forms.

How has biodiversity historically shaped medical innovation, and how does it continue to inspire biomedical research today?

Nature has long served as a foundation for medical innovation. Penicillin emerged from Fleming's observation of a fungus inhibiting bacterial growth; quinine and artemisinin, two cornerstone antimalarials, originate from traditional

1 United Nation Environment Programme (2022) - Kunming-Montreal Global Biodiversity Framework | UNEP - UN Environment Programme.

2 CRISPR is a genome editing tool that allows geneticists to cut out targeted DNA sequences. Questions and Answers about CRISPR | Broad Institute.

3 Refers to a new phase of biological evolution in which humans now have the ability and desire to shape evolution through science and technology – Ted-ed (2011) Are we ready for neo-evolution? - Harvey Fineberg | TED-Ed.

plant-based remedies; and digitalis, derived from foxglove, shaped the treatment of heart failure for decades. These examples illustrate how careful observation and extraction of natural compounds have repeatedly advanced medicine.

Given this legacy, it is no surprise that pharmaceutical companies continue to invest in exploring nature as a source of future therapeutics. Today, research programs at the National Institute of Health[4] and within the pharmaceutical industry continue to explore plants, bacteria, fungi, marine organisms, and symbiotic systems such as the human microbiome as promising sources of new therapies, reinforcing that biodiversity – both within and around us – remains an essential reservoir of biomedical discovery.

How does biodiversity shape public health policies and research priorities, and why is health a critical lever in biodiversity strategies?

The main bond between public health policy and biodiversity lies in the One Health approach,[5] which integrates human, animal, plant, and environmental health. This framework shows how environmental degradation and biodiversity loss heighten health risks and must therefore be embedded in policymaking. A second domain of connection concerns nutrition and sustainable agriculture: plant-based diets, resilient food systems, and biodiversity-preserving methods remain crucial to long-term population health. A third area is mental and urban health, where designing cities with green spaces, diverse plant life, and access to nature demonstrably improves well-being. Together, these pillars stress the need to systematically include biodiversity into public health agendas and show that neglecting biodiversity increases epidemiological, nutritional, and psychological vulnerabilities.

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In a broader sense, health plays three distinct but complementary roles in biodiversity protection. First, it acts as a motivator: because people consistently value and respond to health concerns, linking biodiversity to health helps mobilize public attention and support. Second, health functions as an objective, since biodiversity underpins physical, mental, and public health outcomes. Third, health serves as a foundation for policy, providing a legitimate basis for integrating biodiversity across public health, environmental, food, and urban agendas. Together, these roles – motivator, objective, and policy basis – form a coherent rationale for placing health at the core of biodiversity strategies.

In a context of growing skepticism toward science, why is the health-environment nexus a strategic area of research, and how can it contribute to rebuilding public trust?

In today's context of growing public distrust in science and institutions, strengthening the interface between health, the environment, and research is more critical than ever. Scientific leadership cannot operate in isolation: researchers working on biodiversity and environmental health must also engage with society, listen to public concerns and participate in dialogue with diverse audiences. Not all scientists need to be communication experts, but more of them must take part in public exchange, especially in an era shaped by social media and fragmented information flows. Approaching the public first as listeners rather than instructors is essential to rebuilding trust. Mutual understanding between scientists and society is essential to inform research priorities, support effective policies, and foster collective alignment around biodiversity and health challenges.

In short, sustained progress requires scientific excellence as well as public engagement, transparency, and communication that together bridge the gap between scientific knowledge and societal expectations.

4 National Institute of Health (USA).

5 World Health Organization. *One Health*. https://www.who.int/health-topics/one-health#tab=tab_1.

About the author

Harvey V. Fineberg *served as President of the Gordon and Betty Moore Foundation from 2015 to 2026 and is a member of the Veolia Institute's Foresight Committee. He previously served as President of the U.S. National Academy of Medicine (2002-2014), as Dean of the Harvard Chan School of Public Health (1984-1997), and as Provost of Harvard University (1997-2001). He has devoted most of his academic career to health policy and medical decision-making. Dr. Fineberg is the co-author and co-editor of several publications. He holds multiple honorary degrees and has received various awards, including the Henry G. Friesen International Prize in Health Research.*