



Our Future in the Anthropocene Biosphere: Global Sustainability and Resilient Societies^[1]

Humanity is now the dominant force of change on planet Earth. This new reality is changing the dynamics of the Earth system. Earth is moving rapidly away from a stable climate, a rich diversity of species and a resilient biosphere into a new geological epoch referred to as the Anthropocene. Scientists and society are only just beginning to fully comprehend the profoundness of this new reality. We now know that society needs to be viewed and governed as part of the biosphere, the thin sphere around the planet which supports all life on Earth. Currently this is not the case. Depending on the collective actions humanity takes now, future conditions could be either beneficial or hostile for human life and well-being in the Anthropocene biosphere. Whether humanity has the collective wisdom to navigate the Anthropocene to sustain a liveable biosphere for generations to come, and for the rest of life with which we share the planet, is the most formidable challenge facing our species.

Humanity is embedded in the biosphere

Earth has a biosphere, a wafer-thin veil around Earth where life flourishes at its surface. It is the only place we know where a complex web of life exists. We humans have emerged and evolved within the biosphere and are dependent on a favourable climate, clean water, food and the numerous other services and contributions that the biosphere provides. Our economies, societies and cultures are part of it. It is our home.

The Anthropocene biosphere

The dynamic interplay between the living biosphere and the broader Earth system (such as the climate system and the water cycle) has evolved into a resilient biosphere. Since the 1950s, there has been an accelerating expansion of human activities into an interconnected globalized world operating at high speeds with hyper-efficiency in several dimensions. This major acceleration has been supported by a resilient biosphere and a hospitable climate. Now the situation has changed. The cumulative human culture

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has become a global force shaping the operation and future of the biosphere and the broader Earth system at all levels. Climate change and loss of biodiversity are symptoms of the situation, they interact, and interact with social, economic, technological, and cultural development in complex ways. Nature and society are truly intertwined in a single, coevolving biosphere in interaction with the broader Earth system. In the Anthropocene, humanity is confronted with increasing turbulence driven by the intertwined dynamics of people and planet. This is becoming the new normal.

Biosphere resilience

Over the last three million years the average mean temperature on Earth has never exceeded 2°C above (inter-glacial) or 6°C below (deep ice age) the pre-industrial temperature on Earth (14°C). Already now at 1.2°C warming, we appear to be moving out of the stable and accommodating Holocene environment of the last 11,000 years with predictable seasons that allowed agriculture and, later, civilizations to develop. Already within the coming 50 years one to three billion people are projected to experience living conditions that are outside of the climate conditions, which have served civilizations well over the past 6,000 years. Climate change impacts are hitting people harder and sooner than envisioned, even a decade ago. This is especially true for extreme events like heatwaves, droughts, wildfires, floods, storms and variations in their frequency, magnitude and duration. Climate events interact with economic, social, and geopolitical events, creating systemic risks and shocks that spill over multiple sectors and create synchronous challenges rapidly moving across countries and regions.

Climate stabilization is critical for human wellbeing and prosperity. Human expansion on the urbanized planet is seriously challenging stores of ice and critical carbon sinks of soils, biomes and the ocean. There are increasing signs that sub-systems of planet Earth vital to regulate the state of the planet as a whole may cross tipping points. The fabric of nature and its diversity generates fundamental services to humanity, provides insurance to shocks and surprises, to tipping points and regime shifts, and makes development possible in the face of change. Much of the Earth's biosphere has been converted into simplified ecosystems for the production of a few harvestable species with subsequent widespread loss of biodiversity. Interconnected and simplified systems are vulnerable to change, they have lost resilience. Resilience refers to the capacity of a system to persist with change, to learn and cultivate the capacity to continue to develop with ever changing environments. Biodiversity performs critical roles for the resilience of economies, societies and cultures in the coevolution of nature and society.

A safe-operating space

Our future on our planet will be determined by our ability to keep global warming well-below 2°C and foster the resilience of the living biosphere. Not only will it be critical to curb human-induced climate change, but also to enhance the regenerative capacity of the biosphere, and its diversity, to anticipate and absorb extreme events and support and sustain societal development. Hence, the challenge is broader than climate alone. It is about navigating towards a safe-operating space that depends on maintaining a high

level of biosphere resilience. Obviously, incremental tweaking and marginal adjustments will not suffice, nor will adapting and persisting on old pathways. The Anthropocene reality of rising turbulence calls for systemic transformative changes towards sustainable futures.

Equality and global sustainability

Inequality is on the rise in the world, and needs to be confronted as an integral part of global sustainability. Equality and trust hold communities together, improve collective decision making, and enable nations and regions to evolve along sustainable development trajectories. Enhancing capacities for dealing with shocks and surprises as well as mechanisms for sharing the benefits derived from the planet, represent essential elements in strategies for learning and developing with change in the turbulent times of the Anthropocene. Confronting inequality and advancing wellbeing is becoming increasingly central to sustainability.

Innovations and global sustainability

Emerging technologies, social innovations, broader shifts in cultural repertoires, and a diverse portfolio of human actions in support of a resilient biosphere for all are essential parts of the transformation. Information technology, artificial intelligence, synthetic biology and social innovation will need a deeper focus on intertwined people-planet interactions of the Anthropocene, since that will be necessary to understand and achieve large-scale changes towards global sustainability. Currently, we are facing a rapid and significant repositioning of sustainability as the lens through which innovation, technology and development is driven and achieved. What only a few years ago was seen as an economic burden is today creating new purposes and meanings, shaping values and culture, and is increasingly seen as a key pathway to novelty, competitiveness and progress.

Biosphere stewardship for just and sustainable futures

Despite, or perhaps due to the major challenges outlined above, new narratives of hope for action are rapidly emerging. Seeds of transformative change have grown and are starting to blossom. There are real world insights on the process of governing transformations towards just and sustainable futures from resilience building in local places to global collective action for ocean stewardship. Global sustainability involves shifting excessive, wasteful and imbalanced consumption founded on a fossil-fuel-driven economy into a renewable energy-based economy of low waste and greater circularity within a broader value foundation. Investing in, and sharing of, natural capital is becoming a core strategy of agencies, nations, and private actors. There are numerous activities restoring and enhancing diversity for human health, wellbeing and resilience, in cities, in agriculture, in the ocean. New partnerships and collaboration between science and practice, policy, and business identifying leverage points for

anticipated and deliberate transformational change towards sustainability are gaining ground. The scale and pace of such actions have to rapidly increase and expand to support transformations towards active stewardship of human actions in concert with the biosphere foundation.

Reconnecting development to the biosphere

This is a time when science is needed more than ever. Science provides informed consensus on the facts and trade-offs in times of misinformation and polemics. The planetary and social challenges that confront humanity need governance that mobilizes the best that science has to offer with shared visions for sustainable futures and political will and competence to implement choices that will sustain humanity and the rest of the living world for the next millennium and beyond.

There is scope for changing the course of history onto sustainable pathways. There is an urgent need for people, economies, societies and cultures to actively start governing nature's contributions to wellbeing and building a resilient biosphere for all people and future generations. It is high time to reconnect development to the Earth system foundation through active stewardship of human actions into prosperous futures within planetary boundaries.

[1] This brief statement is extracted from the science-based understanding on the challenges and opportunities of global sustainability presented in the White Paper of the Nobel Prize Summit – Our Future in the Anthropocene Biosphere: Global Sustainability and Resilient Societies. A shortened and updated version of the White Paper is published in the scientific journal *Ambio* (Folke et al. 2021. *Ambio* 50(4) doi10.1007/s13280-021-01544-8). The original version appeared in June 2020 (Folke et al. 2020. *Beijer Discussion Paper 272*, Beijer Institute, Royal Swedish Academy of Sciences). Suggested citation of the brief statement Folke, C. et al. 2021. *Our Future in the Anthropocene Biosphere. White Paper Brief Statement. The Nobel Prize Summit 2021.*