

Living nature – State of the field and bases for action

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Abstract

This document represents a highly distilled, updated synthesis of the state of living nature and its trends in the past few decades and the next 30-50 years. On those bases, it identifies paths for action for a better future for nature and people, and discusses implications for the Summit of the Future and related initiatives.

This document represents a highly distilled synthesis of the state of living nature (Box 1), and its trends in the past few decades and the next 30-50 years. In providing references, I have given priority to reviews and high-level reports that summarize a large number of primary articles.

This document has been prepared in my individual capacity, based on my scientific expertise and experience in the environmental science-policy interface (Box 2).

Box 1. A word on wording

This document uses the term “living nature” to refer to all life on Earth. It encompasses animals, plants, fungi, microorganisms at all levels from ecosystems, to species, to populations, to genetic varieties. Humans, because of our phylogenetic continuity and constant interactions with other organisms, and because of our deep imprint on them, are also an inextricable part of this living fabric.

This choice of terminology is preferred over “biodiversity” following recent developments in the scientific [1, 2] and science-policy interface [3] literature, because “living nature” better reflects the fact that the fabric of life is everywhere, from remote pristine forests and mountain peaks, to urban gardens and the microbiome inside the human body, it also highlights the lack of separation between people and the rest of the living on the planet, and the idea that life on Earth is an integral part of the safety net that supports human life. The COVID-19 pandemic was perhaps the most compelling example that our entanglement with the rest of the living world is not simply a metaphor.

Box 2. Recent developments in the international science-policy interface

In 2019, The Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES), produced its Global Assessment [3]. Since then, there have been partial updates in some fields, but it

remains the most updated and heavily science-referenced stock-take at the global scale.

The Global Assessment was a milestone in presenting overwhelming evidence not only of the unprecedented crisis of non-human life on Earth, but also of its importance for a flourishing human life.

In 2020, the UN Convention on Biological Diversity (CBD) declared that none of its 2020 Aichi Targets for the decade 2011-2020 had been fully achieved, and only 6 out of 20 showed some degree of progress (GB5 2020).

In late 2022, the successor of the Aichi Biodiversity Targets, the Kunming-Montreal Global Biodiversity Framework (GBF) was adopted by the CBD Parties. The GBF is complementary to, and supportive of the 2030 Agenda for Sustainable Development and its goals (SDGs). It has now entered the implementation phase.

What we know

. Virtually all the indicators of living nature (e.g. number of species, area and integrity of ecosystems, size of populations, genetic diversity) have declined at the global scale over the past 50 years [1, 3].

. While species number is by no means the only important indicator of the state of life on Earth, it is widely used because of its relative ease of assessment and communicability. Based on the % of animal and plant species threatened with extinction in groups assessed in the IUCN Red List, a total of at least 1 million species is estimated to be at risk [3]. While natural extinctions have always existed, the present overall rate is at least tens to hundreds of times higher, indeed higher than the average over the past 10 million years.

. Local breeds and varieties of domesticated animals and plants are disappearing [1, 3], in a process strongly driven by global markets. This increases the vulnerability of the world food system as a whole to climate change, pests and pathogens.

. Human activities are unintentionally modifying the evolutionary process of wild organisms, from viruses to mammals [4, 5]. This phenomenon is fast and widespread.

. However serious the current and impending threat of climatic change is, it is far from being the single most important cause of decline in living nature. Over the past decades, land and coastal use has been the most important direct cause worldwide, followed closely by direct exploitation (hunting, fishing, selective logging), with pollution, climate change and invasive alien species having a prominent but less important role [1, 3, 6]. Climate change is expected to strongly increase its incidence in the coming decades.

. The impacts on living nature are increasingly felt very far from the points where the demand for an activity ultimately originates [7-9]. These telecoupled impacts have escalated in the past five decades with the explosive growth of international trade, travel and communications [10]. The geographic distance between demand point and impact point makes internalization and public awareness of the environmental and social costs difficult.

. While the drivers above need to be urgently tackled, it is clear that what propels them is a combination of social, economic, cultural, political, governance factors, many of them originated in places quite distant from those where the impact is felt. Prominent among those factors are diets, energy and manufactured goods production and consumption styles, trade regulations and incentive and subsidy structures [1, 3, 14-16].

. A very significant proportion of the planet's biodiversity is under the stewardship of Indigenous Peoples and local communities [17].

. Living nature is essential for a human flourishing life; it is humanity's life support system. Almost every pressing issue for humanity, from food, to health, to climate and water regulation, to sense of identity, is inextricably linked to biodiversity. Most of nature's contributions to people have declined worldwide in the past five decades, and the vast majority of them do not have satisfactory substitutes [3, 18].

. Because of the deep human dependence on non-human living nature, further deterioration of it will hinder the achievement of most targets of Sustainable Development Goals 1 (poverty), 2 (hunger), 3 (health), 6 (water), 11 (cities) 13 (climate), 14 (oceans) and 15 (land) [1, 3]. Indirectly, it can affect virtually all the SDGs.

. Climate change, deterioration of nature, desertification and systemic human inequality are inextricably linked. This is not only because they are symptoms of a particular model of appropriation of nature and human work. It is also because climate change and the decline of living nature often exacerbate each other's effects: as global warming increases so do the risks of species extinction or fast deterioration of some terrestrial and marine ecosystems, and large-scale loss of carbon-rich ecosystems directly contributes to the greenhouse effect [19]. In addition, some measures to tackle one of these global challenges can have powerful synergistic positive effects on the others (e.g. carefully applied Nature Based Solutions [15, 16]. On the other hand, some short-sighted measures to tackle one of them will compromise solutions with respect to the others. A case in point is the deployment of biological carbon capture and storage plantations over large surfaces to tackle climate change, with their potential negative effects on all the other dimensions [15, 16, 19].

. The estimated potential for biological carbon storage of some initiatives is unrealistically high [16]. Furthermore, long-term biological carbon sequestration in tree plantations is risky in a context of climate change, with its increased risks of drought, fire and pests. This means that over-reliance on carbon sequestration without emphasis on reduction of fossil fuel emissions is a dangerous route.

. Under the majority of plausible scenarios, especially under "business as usual" ones, living nature is projected to decline sharply towards the end of the 21st century [3, 20]. However, scenarios that include unprecedentedly ambitious and coordinated efforts, implemented urgently, result in a reversal of the declining trends in nature associated with land conversion and at the same time provide food for a growing human population. Under such scenarios, which demand food-system transformation (sustainable intensification, plant-based diets, trade rules, reduction of food waste), landscape restoration and spatial planning, the majority, but not all biodiversity losses could be avoided, while providing food for a growing human population [21].

What needs to happen

. The evidence is compelling that, without timely action, the fast deterioration of living nature will continue in the next decades, with widespread consequences for most dimensions of human wellbeing [10, 18, 23].

. Like in the case of climate change, slowing down and to some degree reversing these trends ("bending the

biodiversity curve”) is still physically possible, but only with fast transformative change [20, 21], starting without delay [15, 16, 21].

Mainstream living nature

. Focusing only on the protection of the very small fraction of the planet that remains as pristine ecosystems (“wildernesses”) will fall way short.

. Whether the “30 x 30” commitment reached at CBD COP15 will deliver enough positive outcomes will depend on how it is implemented, in terms of where, how and with whose involvement.

. Nature-based solutions and biodiversity and carbon offsets, while powerful tools when carefully designed and implemented [15, 16], do not have the capacity to sequester carbon in enough magnitude, speed and safety to fully compensate for fossil fuel emissions. Therefore, they should not be mistaken as substitutes for strong reduction of such emissions [16].

. On the basis of the fast-accumulating evidence of the benefits for human health of a frequent, close contact with living nature suggest that easy and frequent access to living nature should be considered a right of all persons of present and future generations, to be taken into account in urban and rural planning and legislation.

. Networks of interconnected multifunctional landscapes and waterscapes, for nature protection and sustainable use, including the whole gradient between large wilderness spaces and highly humanized production spaces, with interspersed wild patches within production and dwelling landscapes, are a promising way to integrate international targets (e.g. those in the GBF) with local geographies, perspectives and rights [16, 24].

. Living nature needs to be incorporated into decisions made in all sectors (mainstreamed), from the economy and industry, to urban planning, to infrastructure and energy development, to the core of legislation beyond environmental legislation.

. Because the impact on the climate system and living nature extend much beyond where the demands originate, a more sustainable and fairer future demands that global nature footprint of countries and corporations (as opposite to domestic only as is the norm at the moment) should be monitored, and policy instruments designed on that basis.

Transition from reports & declarations to actions

. While many questions remain unanswered (Box 3), the convergent evidence already amassed by the scientific

community is more than enough to start making accelerated steps towards such change.

. In this respect, there is progress in terms of international instruments and implementation plans increasingly considering key issues related to living nature, and setting some quantitative milestones (e.g. Biodiversity COP15 and Climate COP28). This progress would be adequate if we had 100 or more years to act. Clearly, we do not. Just as in the case of climate change, what is needed, rather than just a set of incremental changes, is exponential change. All scenarios available show no stabilization or reversal of nature decline curves without it.

Implications for the Summit of the Future and related initiatives

. To date, the scope of the Summit of the Future and its planned outcome document “A pact for the Future” make no explicit mention of living nature (or similar concepts, such as biodiversity), except for a brief mention in the Beyond GDP Policy Brief. Considering how crucial the issue is for the future of humanity, this is a serious gap that needs to be addressed. Indeed, living nature could be considered as a one of the cross-cutting themes across most priority areas identified in view of the Summit.

. While there are good historical reasons for having three different major conventions related to the environment (UNCCD, UNFCCC, CBD), this does not favor concerted action, or the realization of the links between the elements by wider society. Stronger links, perhaps initially around specific themes, are in order, urgently.

. Proliferation of reports, high-level meetings (including COPs) and the setting of international targets around the themes of living nature and climate has not resulted in enough action. This has understandably led to widespread skepticism. Perhaps one way to revert this would be to identify what has worked (i.e. the key actions/processes that have led to threshold progress) and learn from them for future meetings, instruments and actions.

Box 3. Remaining and emerging risks and unknowns

. Deep sea mining, noise pollution and light pollution. These are emerging, still poorly known but in principle highly concerning disruptors of living nature. Plastic pollution is already widely acknowledged as widespread, but its impacts on life are still not well understood.

- . Non-linear interactions between large-scale ecosystems and climate change.
- . How the structure and dynamics of ecosystems favor or hinder the spread of (new) pathogens transmissible to humans.
- . How the structure and dynamics of ecosystems confer resilience (or not) in the face of climate change (spotlight on adaptation, rather than mitigation).
- . How to best monitor and communicate global footprints of countries and corporations on living nature. And how to design and implement instruments to make them accountable for them.

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