Global Challenges Foundation

Ecological Collapse

Ecosystems form the living fabric of the planet, regulating the climate, providing food and water, and maintaining the conditions that make human life possible. Since the mid-1950s, many of these systems have been pushed beyond safe limits. Concentrations of greenhouse gases, the loss of forests and biodiversity and the decline of the marine ecosystem health are accelerating, eroding the stability of the Earth system on which societies depend.

What is the risk?

These systems can tolerate some impact from human use and recover after a period of time with minimal negative effects — an attribute generally known as resilience. However, when pressure exceeds critical thresholds, or tipping points, sudden and radical disruption can occur. These tipping points may trigger cascading effects that spread through the climate, the biosphere and human systems. Beyond such thresholds, soil fertility, freshwater supplies and biodiversity can collapse and severely undermine agriculture and the habitability of large regions on Earth[1].

What is at stake?

Historical and current examples reveal the fragile balance between humans and ecosystems[2]. The Aral sea, for example, was once the world's fourth largest lake. However, it shrank by 90 per cent due to large-scale irrigation projects, devastating regional livelihoods by causing significant environmental, economical and public health problems[3].

In today's interconnected world, local crises and ecological disruptions can cascade far beyond their origin, disrupting food systems, driving migration and fueling political instability. Scientists warn that crossing multiple Earth system thresholds could lead to the rapid collapse of most ecosystems across the planet[4] compromising the biosphere's ability to to support human life.

In 2009, researchers identified nine interconnected planetary boundaries that define a safe operating space for humanity. Recent assessment shows that seven of these have now been exceeded[5]. Crossing the limits of these boundaries — including land-system change and the use of certain fertilisers — signals that we are operating outside the stable conditions that allow civilisations and nature to thrive. The longer these pressures continue, the greater the likelihood of triggering large-scale, potentially irreversible shifts in the global ecological system.[6]

What are the driving forces behind risk levels?

Human activities from greenhouse gas emissions and resource exploitation are severely degrading ecosystems worldwide. While climate change intensifies impacts, such as forest fires[7], coral loss[8] and melting ice[9], human

The *Global Catastrophic Risks Report* by the Global Challenges Foundation is a publication that analyses the greatest threats to humanity's future. The purpose of the report is to raise awareness of these dangers and to encourage international cooperation to prevent them. It also highlights the need for stronger global institutions and innovative governance models to effectively address these complex challenges.

Read the full report here.

activities, such as forestry, agriculture, mining, and infrastructure, continue to be critical drivers of ecosystem change. Limiting land clearance and ecosystem conversion is essential to prevent further biodiversity loss and ecosystem collapse.

The drivers behind the interconnected crises of ecosystem degradation and climate change are deeply intertwined. The continued burning of coal, oil and gas coupled with deforestation and the depletion of peatlands and coastal wetlands continue to erode natural carbon sinks. Patterns of growth, trade and finance reinforce norms and behaviors that slow down transition, while inequality and political inaction amplify environmental stress. High-income countries and emission-heavy industries bear the largest responsibility for mitigating emissions and accelerating the transition towards sustainable pathways, while those least responsible experience the most severe impacts from both climate change and ecological collapses.

What is being done to govern the global catastrophic risk of ecological collapse and where are there gaps?

Contemporary ecological risks are increasingly global in scale, scope, and impact with strong levels of interconnection not only across national borders, but across continents. Action to address risks, however, needs to be taken at both global and national levels. The environment is a classic global common good: everyone benefits from its protection, but when some overexploit or pollute it, the consequences and costs are shared by everyone.

Since the establishment of the United Nations Environment Program (UNEP) in 1972, international environmental agreements such as the Paris Agreement on Climate Change, the Convention on Biological Diversity, as well as frameworks on ozone depletion, hazardous waste and desertification, have been the main legal instruments for collective action. However, despite this proliferation of treaties and targets, implementation has lagged far behind ambition. Of the hundreds of global environment and sustainable development targets agreed by countries, only about a tenth have been achieved[10].

This shortfall highlights that the problem is not the absence of rules, but rather the inadequacy of the current system itself. Fragmented, weakly enforced and insufficiently integrated, our current system remains largely designed for a past era of smaller, slower and more localised economic activity. Climate, biodiversity and pollution policies are often treated separately, despite their deep interdependence. Many countries also lack reliable systems for data, monitoring and accountability. The distribution of economic and environmental benefits and burdens continue to reflect deep structural inequalities. Efforts are underway to bridge these divides. More than 100 countries now incorporate biodiversity values into their national accounting systems[11] and there is growing recognition by banks, financial institutions and the private sector that planetary stability underpins global prosperity[12]. Still, the pace of progress remains too slow compared to the speed of economic growth and environmental decline.

Bridging this governance gap will require firmer accountability mechanisms, coordinated international financing, redistribution of burdens and benefits, but also adaptive governance and systems capable of learning, responding and evolving with changing ecological realities. This in turn demands confronting the deeper, underlying drivers of ecological collapse, including entrenched inequalities and economic structures that perpetuate unsustainable exploitation. The challenge ahead is not a lack of knowledge or policy but the collective will and institutional transformation needed to act decisively within the time we have left.

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Woman working with traditional hoe in maize field in Malealea, Lesotho.

RISK 2

Nature in global governance

Top-down and bottom-up approaches to adaptation

BY DAVID OBURA

The world faces converging ecological and governance crises. As major biomes near collapse and inequalities grow, powerful nations prioritize short-term economic interests over climate and nature commitments. This article explores how outdated global governance structures exacerbate these pressures and why adaptive, equitable systems are essential to address the interconnected planetary emergency.

The planet faces a profound incongruity. On the one hand, a growing number of major biomes are approaching thresholds of ecological collapse under the pressure of myriad human factors. Increasingly strident voices from civil society, Indigenous and other groups are bearing witness to the lived experience of these crises. And on the other hand, the pull-back in climate, nature and social commitments, instead prioritising short-term economic growth interests by leading countries and corporate actors. This magnifies inequalities as ecosystem services, or benefits from nature, are most important to those with the least material wealth, so ecological collapse hits them hardest while they make the least contribution to global trends.

The multilateral global governance system, cobbled together in response to threats exposed by World War II, has shepherded this situation to the current state. After 80 years, the global governance system is fraying amid growing instability. This system bolstered the world order of the victors — Europe, the United States, Russia (the USSR), and an emerging China — first against a common enemy. After that enemy was defeated, they began competing for dominance amongst themselves. Over time, additional powers have emerged, wanting their seat at the table, and independent civil voices have also grown in strength.

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This plays out in the geo- and domestic political economies of post-colonial and economic dominance. Powerful countries that have depleted or exceeded their own bio-capacities, seek to preserve a global order through maintaining subsidies or importing natural resources from other, less powerful nations. Supplier countries and demographics, locked in unequal agreements have not been able to retain enough wealth. As a result, these countries cannot develop their own resources or strengthen their economies. This leaves them increasingly restless as they try to meet their own growing needs and claim their rights. Biodiversity loss in the global south is a symptom of a world order that is breaking under its own excesses, as are the other two aspects, pollution and climate change, in the triple planetary crisis.

This article explores how the ecological crisis is also a crisis of governance, and how adaptive governance, which embraces continuous learning and responsivity, may best identify ways forward by linking coherently across scales from local to global. First, at global scales, geopolitical power relationships must adapt to new realities of today. Second, at local scales, both nature and people need to thrive, which also means adapting to climate change. Linkages across these scales are addressed in the two reports adopted by the Intergovernmental Platform on Biodiversity and Ecosystem Services (IPBES) in December 2024: the Transformative Change Assessment and the Nexus Assessment[1, 2]. Critically, new global governance must shift what the Transformative Change Assessment called the underlying causes of the current condition – systems of domination over people and of nature, inequalities of wealth and power, and prioritisation of short-term material gain. This is necessary to rebalance the interlinkages between key elements of human lives, most pragmatically synthesised in the sustainability paradigm built on interactions between economy, society and our natural system (Figure 1).

1) Top-down, a new global order – power

It should not be a surprise that a world order designed 80 years ago is being shaken by current challenges. Importantly, there may be positive or negative outcomes from such disruption. A positive outcome would be that the inequalities of the old system are erased, with new and emerging powers across Africa, Asia, Latin America and ocean regions gaining their just share of power in multilateral contexts. Further, the economic system did not recognise the value of nature, nor the rights of those that have stewarded it. Recognising the critical importance of natural capital and Earth system functions across all regions, and transforming the values driving decisions to be consistent with long-term sustainability and stewardship instead of exploitation, are essential foundations for lasting change. There is no doubt that equalising power relationships is a tall order, and resistance to change is demonstrably high. The increasing ferocity and damage of anthropogenically-enhanced, or human-driven, disasters and proximity of multiple ecological collapses — for example, in coral reef, moun-

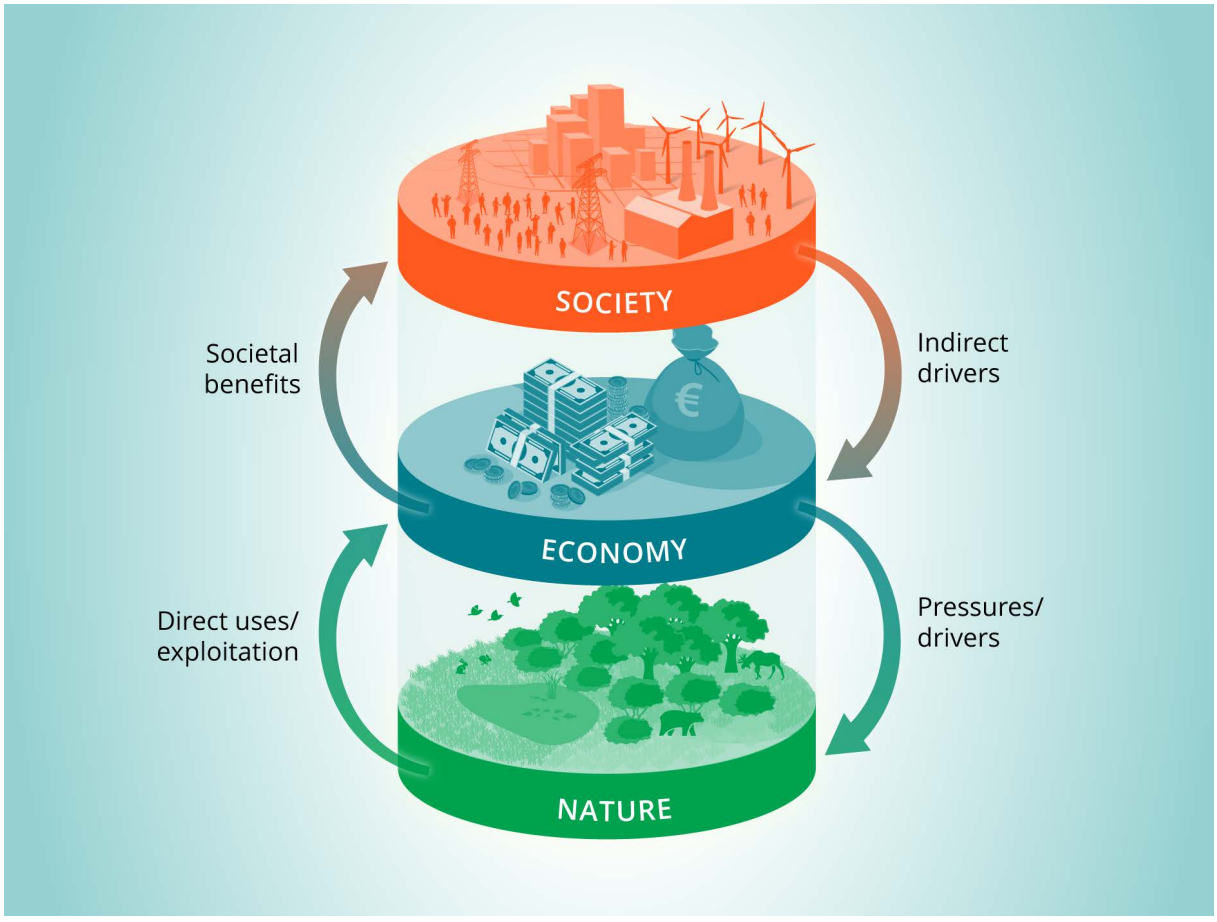

Figure 1. Synthesis figure of top-down and bottom-up elements for adaptive governance to avert ecological collapse across scales from local to global.

tain and freshwater supply systems — have catastrophically high socio-economic consequences. These could serve as key triggers to motivate shifts away from top-down exercise of power, hopefully pre-emptively. Importantly, pathways to positive transformations can start from small shifts in views, practices and/or structures that reverse the current underlying causes. Therefore, initial shifts in any of these should be encouraged and accompanied by a strong commitment to go further, not stopping at comfortable but insufficient transitions.

2) Bottom-up, nature-based governance

Recognition is rapidly growing regarding the scope and potential for localised, nature-based and adaptive solutions to emerging challenges. The Nexus Assessment addressed this and the complex and context-dependent feedbacks between five elements: two nature components, biodiversity and climate, and three economic sectors, food, water and health. The assessment synthesised over 70 solutions that demonstrate the potential to enhance co-benefits across sectors and reduce tradeoffs (Figure 2), while recognising nuanced customisation of individual contexts, and with successes aggregating from local to larger scales. The assessment emphasised that a critical enabling factor of governance is that it is inclusive, holistic, equitable, cooperative and adaptive.

Focusing on meeting peoples' needs from nature strengthens their direct experience and connection with the natural world, and thus fosters values of reciprocity and care that are essential for positive transformations[3]. Further, the Nexus Assessment showed how such connectivity with nature and solutions may emerge from any of the five elements it covered (Figure 2). By contrast, consider that IPBES recognises 18 different ways that nature benefits people. Nature-based solutions may emerge from any of the 18 categories, emphasising the immense diversity of adaptive responses that can deliver economic and societal value.

Acknowledging these diverse values will certainly increase estimates of nature's true value by orders of magnitude. Hopefully this will result in more investments, both financial and non-financial, that will protect and enhance nature and its benefits. Local adaptive ap-

Figure 2. Response options. Illustration from IPBES's Nexus assessment.

proaches can help build collective action where actors work together in synergy, rather than in opposition.

Strategies to ensure that nature is healthy everywhere — so that it can provide what people need and sustain itself — can be applied consistently across diverse cultural, human and natural systems around the world[4]. Through a consistent framework, these adaptive approaches may scale up and work together to advance biodiversity, food, health, education, rights and other common goals as well as targets agreed multilaterally, such as the Kunming-Montreal Global Biodiversity Framework, Sustainable Development Goals.

Looking forward

The proliferating risks of ecological collapse and the breakdown of the multilateral order are interlinked consequences of a system unfit for 21st-century challenges. The current crises are direct consequences of limitations in the multilateral order. These crises strain the current system and can only offer poor responses, which creates a vicious cycle of decline. Two primary risks may compromise positive outcomes emerging from the current crises: a) holding on to the old multilateral order by continuing to patch the gaping holes enough to survive, but without shifting power relationships, and b) private-interest actors taking control, whether openly or covertly. In both cases, self-interest may help break down or bolster the old system, reinforcing existing power structures, benefit flows and inequalities.

This article has presented two complementary and necessarily linked adaptive governance approaches. Drawing from IPBES's Transformative Change and Nexus assessments. The strategy is to leverage the breakdown of the current multilateral order to grow the seeds of positive outcomes — to give the best chance of the right top-down and bottom-up solutions to take root, grow and meet in the middle (Figure 1). Importantly, the approaches engage coalitions of actors linked across scales and geographies, and are facilitated by values that promote equity (see GCF's Global Catastrophic Risks Report 2024 on ecological collapse). The mechanisms chosen to address global challenges in the coming years — across the major multilateral and other convening spaces — will provide early signs on whether a transformed new order is taking root and can be nurtured, or if business-as-usual responses will entrench existing interests.

The risk of multiple ecological collapses — both at regional and global scales — should be placed firmly at the centre of global governance discourse. This risk is of greater existential importance than short-term economic or financial concerns. Prioritising ecological risks above economic interests is necessary to motivate adaptive responses needed to prevent ecological collapse.

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