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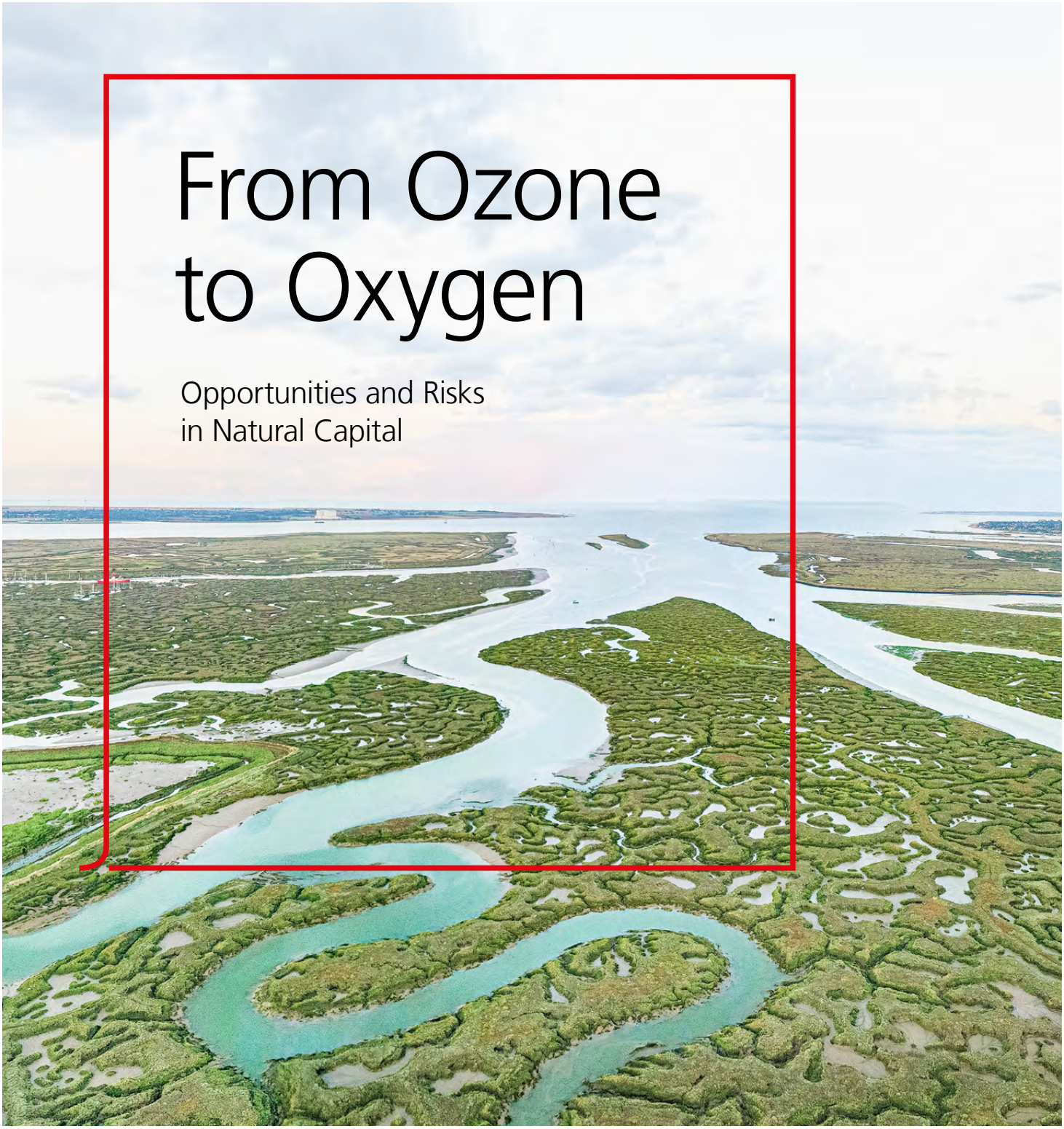
The Institute
UBS Sustainability and Impact Institute

From Ozone to Oxygen

Opportunities and Risks in Natural Capital



Mike Ryan
Head of the UBS Sustainability and Impact Institute

Dear Reader,

Throughout human history, there has been at least some level of awareness of our impact upon the planet's ecosystem. But for much of that existence this recognition was limited to the local or even the personal level – and almost always centered narrowly upon the interests of our own species. It wasn't until the early 1960s that the concept of the "Anthropocene" was born and with it a deeper appreciation for just how profoundly human activity was altering and ultimately disrupting the natural system.

While Earth Day drew global attention to the threats posed by air and water pollution, biodiversity loss, deforestation, degradation of soil and habitat destruction, it was the discovery of a "hole" in the ozone layer that finally captured the world's attention and prompted leaders to act. The success of the Montreal Protocol in both arresting this breach in the ozone layer and then working toward reversing its effects, demonstrated the power of collective action in addressing the earth's most pressing needs.

But this success also came at a price.

Although it was a truly heady moment for the environmental movement, it also tended to oversimply the steps necessary for tackling some of the planet's most complex problems. By focusing upon a single measurable variable or metric, it likely diverted attention away from a broader system-wide approach to addressing issues such as climate change. We therefore need to think differently as we seek to preserve the natural capital base upon which our future – and the future of every other species on this planet – critically depends.

At UBS we understand that climate and nature are deeply intertwined. As in the financial world, where assets exist that give rise to flows of revenue, nature consists of stocks of environmental assets that give rise to associated flows of

benefits to people and the economy. Biodiversity is an essential characteristic of nature that is critical to maintaining the quality, resilience and quantity of ecosystem assets and the provision of ecosystem services that business and society rely upon.

Thus, we recognize that it is important to understand the challenges and the opportunities arising from climate and nature to determine the best courses of action that now need to be taken to help protect this bounty and ensure the planet's future legacy.

Natural capital and biodiversity loss is expressed most directly in SDGs 14 and 15 ("Life below water" and "Life on Land", respectively). However, it is also linked to others, such as SDG 13 "Climate Action" and SDG 2 "Zero Hunger."

Our commitment to the Principles for Responsible Banking (the PRB) and our participation in the Taskforce on Nature-related Financial Disclosures (the TNFD) and Banking for Impact (the BFI) demonstrate our desire to achieve positive impacts and reduce potentially adverse impacts on biodiversity and natural capital.

We are also committed to playing an active role in creating new, global standards that will enable investors, corportations and financial intermediaries alike to support natural capital and manage nature-related risks and opportunities.

In this publication, we have asked sustainability experts from all across UBS to share their thoughts on the various aspects that we need to consider if we are to preserve and regenerate the earth's limited stock of natural capital. They have highlighted different areas, from policy innovations needed, to developing frameworks, to the role that investors and the private sector can play to improve our collective response to the impending challenges linked to natural capital. It is our hope that you will find these reflections both insightful and impactful.

Mike Ryan

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Introduction

Veronica Weisser

History suggests that human beings have found it difficult to look beyond the narrow perspective of our own interests. There may be many reasons for this, and the problem is likely exacerbated by our tendency to run out of bandwidth when it comes to wide-ranging, complicated issues. The reality is that our species is "hardwired" for simple problem solving. We therefore find it harder to identify and then act upon more complex challenges – even though they may prove pivotal to our society.

This does not bode well for one of the most difficult challenges of all, that of natural capital depletion. By its very nature, it's complicated. It features case-by-case differences in localities, environmental and economic influences, formidable data intricacies, and national and international legislation, as well as thousands of actors and potential change agents.

Yet our stock of natural capital is being eroded at ever faster rates, reinforcing the need for urgent action. But what should that action look like and how do we make sure that our efforts are effective?

We believe this particular challenge can best be tackled by recognizing it as the next most important phase in the process of humanity's drive to address ecological and social disasters. That drive began by focusing on narrow issues and players, and widened in later phases to address ever more complex and sophisticated ambitions.

The focus of this paper is to explore that evolutionary journey. It will assess the lessons learned so far, informed by our own views and insights, as well as those of eminent experts in the field. It will then seek to offer a vision of how we believe the third phase in that journey – the restoration and preservation of the earth's supply of natural capital – could ultimately play out.

Along the way we will explore some of the ramifications for investors and public policy makers, and suggest possible ways to approach this most complex of challenges.

Making sense of complexity

A useful way of thinking about the evolution of global action in environmental sustainability is to delineate three distinct phases in a broader process. On this journey, advances in scientific knowledge meet with the mobilization of critical change agents within society to drive the path of future outcomes.

We explore the past efforts to address the narrow and well-defined issue of the hole in the ozone layer as the first phase, and the progress being made to solve the broader and more complex issue of climate change in phase two. We then look at how those learnings could inform the third phase, the urgent need to restore the world's supply of natural capital.

The depletion of the earth's natural capital is yet more complex and represents a "system of systems failure." Taking insights from phases one and two, this report describes a pathway along which public corporate and private capital can be potentially mobilized to drive the regeneration of natural capital.

Framing the challenge

Let's start by thinking about why natural capital matters. It matters because of the way that every species and organism on this planet interacts. The ecosystems in which they operate support everything in nature that we as humans need to survive: from oxygen, to water, to food, to shelter, and even through to medicines and technology. Hence the term "natural capital."

Its broad and complex nature has already been well documented and ably defined by numerous academic studies, including the acclaimed Dasgupta Review on the Economics of Biodiversity in 2021.

When it comes to the future of environmental sustainability, a useful way of thinking about where we are now and where we need to go next is to think about the journey we are on as three distinct phases in a broader process. A journey where advances in scientific knowledge meet with the mobilization of critical change agents within society to drive the path of future outcomes.

First initiatives in Ozone and Climate

The "hole in the ozone layer," discovered in 1985, represents the first phase in the process of restoring the world's supply of natural capital. This layer of ozone is vital for protecting our planet from the sun's ultraviolet B (or UVB) rays. Falling levels of ozone were found to be mostly caused by the overuse of chlorofluorocarbons (CFCs). In this phase, the goal was to do whatever was necessary in a short space of time to "close the hole."

The second phase is represented by climate change: the recognition that the earth's average global surface temperature is increasing due to rising greenhouse gas emissions caused by human activity. The goal during

this phase has been more challenging and has spanned a longer timeframe; the first step being too slow to stop surface temperatures from rising, followed by efforts to stabilize them before a critical threshold is breached.

Similar but different

Efforts to close the hole in the ozone layer and reduce greenhouse gas emissions have led to both gains and losses. The path to achieving progress has been neither simple nor uncontroversial. But the experiences gained can be instructive as we consider what needs to happen during the third phase of the process.

Now, we must keep in mind that the hole in the ozone layer represented a single and fairly straightforward challenge. It was relatively easy to identify, it lent itself well to public awareness and could be tackled through a discrete series of actions. By contrast, the rise and impact of CO_2 emissions is essentially a systems failure issue. Multiple actors, multiple sources and multiple interactions have compounded each other to cause climate change. Consequently, it's been harder to make progress, as the marshalling of resources and level of support required are more expansive and more contentious.

Natural capital as the next urgent challenge

The third phase, addressing the depletion of the earth's natural capital, is more complex yet again. It is essentially a "system of systems failure." Tackling its increased complexity, interconnectedness and feedback loops requires a very different set of responses than the ozone or GHG challenges. Nonetheless, by reviewing and assessing the successes and failures of the ozone and climate efforts, and then applying those learnings to the challenges of regenerating and preserving natural capital, we can hopefully develop a set of approaches that are more direct and strategic.

Look and learn

This report takes insights from the successes and failures of phase one ("ozone") and phase two ("climate") to create a pathway along which public, corporate and private capital can potentially be mobilized to drive the regeneration of natural capital. That pathway is described in phase three: "natural capital."

Keep in mind however, that as the scale of the challenge grows, so too do the number of actors and the scope of their respective roles in helping to craft solutions. The interactions between scientists, governments, corporations, finance, investors and consumers must also evolve. We therefore foresee a number of new directions emerging. This includes the development of a critical shift in civil society's relationship with the "environment" from a relatively passive stance to active engagement. We also expect an "ecosystem" of stakeholders to become active agents, collaborators and initiators of change. This should lead to less emphasis on "processes" and more focus on "outcomes."

1

Ozone – repair and restore

In 1985, three scientists from the British Antarctic Survey discovered and documented abnormally low levels of atmospheric ozone over the Antarctic. (See the British Antarctic Survey website.[1]) This "hole in the ozone layer" captured global attention and galvanized support for immediate action to remedy the damage.

The result was a surprisingly rapid worldwide commitment in the form of the Montreal Protocol to phase out substances known to cause ozone depletion. Adopted on 15 September 1987, the protocol regulated the production and consumption of man-made chemicals referred to as ozone-depleting substances (ODS),[2] mostly chlorofluorocarbons (CFCs). The protocol continued to evolve and was eventually ratified by all 198 countries of the United Nations. Kofi Annan, the UN Secretary-General from 1997 to 2006, hailed the agreement as "perhaps the single most successful international agreement to date."

The clear focus on ozone depletion and its readily identifiable causes led to rapid and highly aligned global environmental action. Although it did not address broader environmental issues, the Montreal Protocol, and the largely successful phasing out of ODS, showed that global multilateral action on environmental issues could be achieved. It illustrated the power of aligning scientific insights with public awareness to mobilize societal action. As a result, it helped to pave the way for tackling a whole host of broader environmental challenges.

1 https://www.bas.ac.uk/data/our-data/publication/the-ozone-layer/
2 List of ozone-depleting substances regulated by the Protocol, source: EPA.gov

2

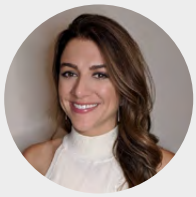
Climate – mitigate change

It is well known that, in the course of the 20th century, a number of climate scientists identified a relationship between greenhouse gas emissions and warming. In 1967, two scientists from the US Weather Service, Syukuro Manabe and Richard Wetherald, were able to develop the first computer-generated "climate model" to forecast how the interplay of increased "greenhouse gases" and the saturation of "carbon sinks"[3] would actually impact temperatures.

Yet despite the unequivocal early understanding of climate scientists, it wasn't until 1992, 25 years after that first climate model was developed, that the world's leaders finally agreed to a series of international environmental agreements at the Rio Earth Summit.[4] It would take almost another quarter century before the Paris Agreement was eventually adopted, on 12 December 2015, by 196 countries (or parties). Its main goal was to limit global warming to 1.5 degrees Celsius compared with pre-industrial levels.

Despite good intentions, the success of efforts to curb greenhouse gas emissions has been limited. Surface temperatures continue to increase, polar ice caps have further receded and ocean levels are still on the rise. Nevertheless, there has been stepwise progress from which we can learn.

3 A carbon sink absorbs more CO_2 than it releases. Examples frequently cited in scientific literature: ancient forests, mangroves, healthy soils, and oceans. Carbon sinks are not static. A change in conditions can turn a carbon sink into a carbon source.
4 See https://www.un.org/en/conferences/environment/rio1992%20



Shara Ticku
C16 Biosciences, UBS Global Visionaries

When is palm oil not palm oil?

What's the problem?

We can find palm oil in almost half of all packaged products on our supermarket shelves[5] – from chocolate spread to soap. Demand is expected to quadruple by 2050 as the population increases.[6] However, its production is driving the destruction of forests and habitats and causing up to 1.5 billion metric tons of CO_2 to be emitted each year.[7,8]

What's the answer?

C16 Biosciences combine nature and biotechnology to produce a clean oil that can be used in place of palm oil or other vegetable oils. They use fermentation – the same process used to make beer, cheese and bread – along with the latest technology to improve a yeast that produces oil. When applied in scale, this approach removes the need for palm plantations, which have been displacing natural forests.

Shara Ticku is a UBS Global Visionary. You can read more about Shara and the work of C16 Bioscenciences here: https://www.ubs.com/global/en/wealth-management/globalvisionaries/gv/2021/shara-ticku.html

5 Roundtable on Sustainable Palm Oil, "A shared vision" (2015), https://rspo.org/publications/download/a3a33428fd77380
6 *Ibid.*
7 Sam Lawson, "Consumer Goods and Deforestation," *Forest Trends* (2014), https://www.forest-trends.org/publications/consumer-goods-and-deforestation/
8 Varsha Vijay, "The Impacts of Oil Palm on Recent Deforestation and Biodiversity Loss" (2016), https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0159668

3

Nature – preserve natural capital

If we wish to take the learnings from the first two phases and apply them to the third, we need to start by understanding our ecosystem services and the benefits that they provide. These essential services are provided by our natural-capital base, which includes the planet's stock of living beings, along with its air, water, soil and geology. Together they provide the foundations upon which the survival of planetary-wide species depends, humans included. The air we breathe, the food and water we consume, the fuel with which we warm ourselves, and the vast array of materials we need to house and clothe ourselves are all part of a limited, and increasingly threatened, natural capital endowment. But all too often we ignore them.

The necessities and luxuries of life all depend on a functioning, interconnected set of ecosystems. If they are badly managed, ecosystems services will degrade, leaving insufficient supplies of natural capital to meet our needs. For instance, polluted air might mean insects cannot pollinate crops effectively. Polluted water could cause a decline in fish stocks. Deforestation leads to soil erosion that triggers loss of both flora and fauna that in turn support other species. The result could be widespread hunger and the loss of livelihoods.

The effects of natural capital depletion are exacerbated by climate change. Which is why we now see greater attention being paid to some of the less obvious ecosystem services. For instance, we now know the role of forests, oceans and peatlands in regulating climate, and the natural flood protection provided by dunes and wetlands. When natural capital is degraded or overexploited the consequences can be catastrophic. Not just in terms of loss of biodiversity, but also in the effects on human populations who suffer poverty, conflict and displacement.

A new page in the playbook

Understanding the successes and failures of interventions into keeping the ozone layer intact, and reducing CO_2 levels to limit global temperature rise could provide learnings concerning the task of protecting and regenerating our stock of natural capital. But first a word of caution. It is unlikely that the playbooks for addressing ozone depletion and climate change can, or should, be followed to the letter. Nature's sheer diversity poses data and methodological challenges, and the issues vary significantly from region to region.

Connectivity and complexity

Climate change and the natural world, or biosphere, are complex and deeply interconnected. Actions taken in relation to climate have an impact on the biosphere, and vice versa. Given the current shortcomings in efforts to mitigate climate change, we believe it would be helpful to consider changes in climate policy approaches in parallel with the development of policies related to natural capital. We are only going to be successful in mitigating and adapting to climate change if we recognize the importance of our role as stewards of natural capital.

Developing science and policy on natural capital: what does "good" look like?

Julie Hudson

Annabel Willder

Despite significant efforts over the years, the fact that GHG emissions and concentrations are continuing to rise seems to suggest a disconnect between science and policy. We cannot make the same mistake when it comes to developing effective natural capital initiatives. Forging better connections must be a priority.

Natural capital requires local, on-the-ground stewardship – an idea that is notably lacking in climate policy. We can leverage best practice in natural capital to improve the implementation of science-based climate policies.

It seems likely that scenario planning and science-based targets are essential for creating frameworks and policies that support nature- and climate-positive solutions. However, what is happening on the ground must also be understood: a substantial data "commons" must now be developed as rapidly as possible.

How can science drive the policy agenda?

CFC removal and the restoration of the ozone layer remain works in progress. Nonetheless, they provide good examples of the power that science has to drive real change and act as a catalyst for coordinated worldwide awareness and action.

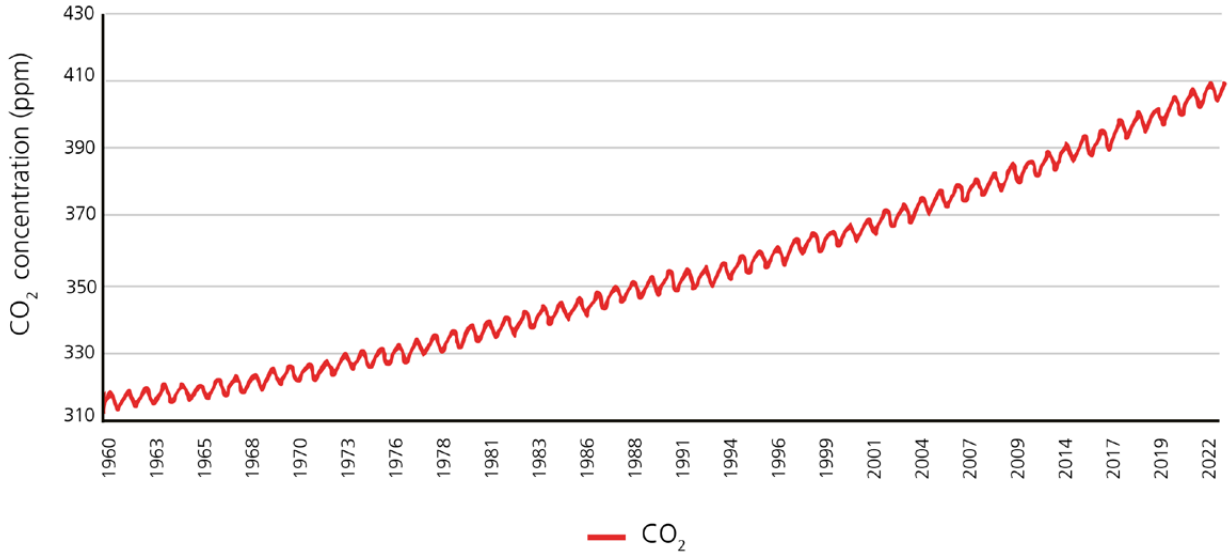
When it comes to mitigating climate change, however, the results have been more mixed. Scientific evidence does not always translate easily into action.

For example, the iconic Keeling Curve clearly shows increasing concentrations of CO_2 at the Mauna Loa Observatory. This suggests scientific evidence alone has not succeeded in driving policy to generate measurable impact. In hindsight, the fact that until fairly recently science was polarized between believers and non-believer hasn't helped matters.

The "hole in the ozone layer" was a compelling idea and a relatively simple concept. So communicating the clear and present dangers it presented was not too difficult. Climate change, by contrast, is a far more complex systemic issue and its implications might actually seem less threatening (at least in the very short term). Linking the threats of climate change to narrowly based scientific measurements (CO_2 concentrations and GHG emissions) masks the real-world complexity of the climate "system." This makes it difficult for the world at large to "own" the problem or see how to respond.

Figure 2.1: No sign of levelling off

Seasonal fluctuations in CO_2 concentration ppm



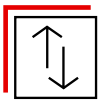
Source: R.F. Keeling, S.J. Walker, S.C. Piper, A.F. Bollenbacher, "Observations to end March 2022," Scripps Institution of Oceanography: Scripps CO_2 Program, https://scrippsco2.ucsd.edu/data/atmospheric_co2/primary_mlo_co2_record.html

By contrast, the science of natural capital is inevitably about the broader ecosystem, as well as individual facets of the system; it incorporates human society through what is known as the "web of life." We think this is why milestones on the science-policy path of natural capital preservation, set out in early documents, tend to be geared toward the broader idea of human well-being within the overall well-being of the biosphere.

Take the UN-driven Millennium Ecosystem Assessment (2001–2005). It aimed to "assess the consequences of ecosystem change for human well-being and the scientific basis for action needed to enhance the conservation and sustainable use of those systems and their contribution to human well-being." It described ecosystem services as:


Supporting


Regulating


Provisioning


Cultural

Collectively, ecosystem services connect the biosphere to all activities of everyday life. So, supporting ecosystem services (such as soil formation) facilitate the delivery of other essential types of services. Provisioning services for example, furnish humans with food, water, and fuel, along with all the materials that human society uses in creative ways (e.g., genetics). Regulating services include air temperature and quality, and water quality. Cultural services cover intangibles such as knowledge systems, aesthetic values and social relations. It's clear that none of these systems can exist in isolation. A compromise to the functioning of one is a threat to all.

Understanding ecosystem services – scientists make the case

Our understanding of the relationships between these essential ecosystem services has been expanded by an impressive body of work developed by scientists and academics.

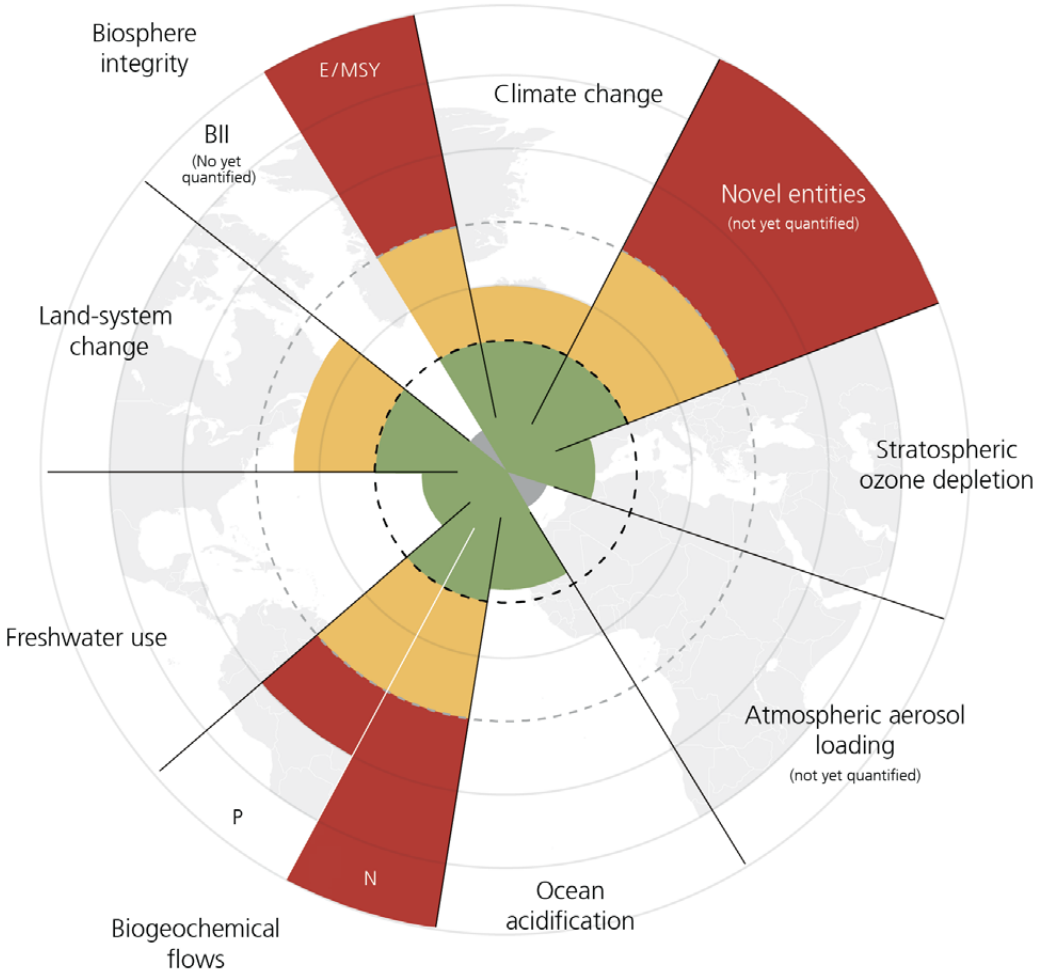
The Economics of Ecosystems and Biodiversity report (TEEB, 2010) was one of the first reports that attempted to provide a better understanding of the economic significance of biodiversity loss. The very first chapter sought to establish the "science basis of the economics of ecosystems and biodiversity."

Almost a decade later, in 2019, the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) Global Assessment Report on Biodiversity and Ecosystem Services was published. Its global, multi-decadal (1970s to 2018/19) review found that the extent of intensifying biodiversity loss was enough to put climate and sustainability goals at risk.

Fast forward another two years and the Economics of Biodiversity: The Dasgupta Review (2021) pleaded for a new economic paradigm: nothing less than the incorporating of natural capital assets into productivity and growth measurement frameworks, such as GDP.

Moving to the present day, the work of the Taskforce on Nature-related Financial Disclosure (the TNFD) (2021 onward) represents the logical next step in this progressive process. It seeks to integrate natural capital considerations into economically material decisions. Or, as the TNFD put it, "incorporate nature-related risk and opportunity analysis into the heart of corporate and financial decision-making."

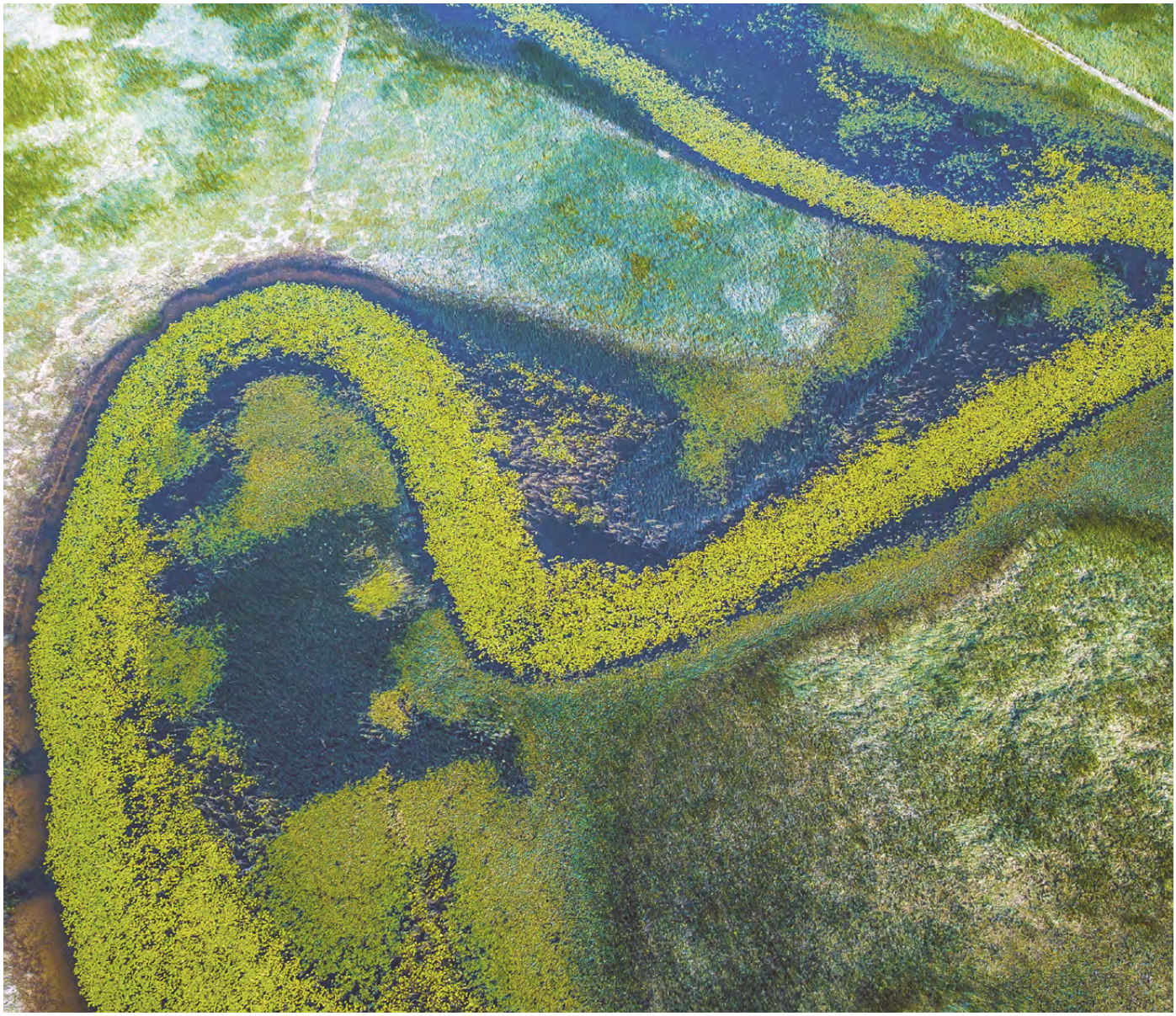
Figure 2.2: Nine planetary boundaries as a measure of biosphere resilience (January 2022 Update)



BII Biodiversity Intactness Index
E/MSY Extinction rate (Extinctions per million species/years)

Below boundary (safe)
In zone of uncertainty (increasing risk)
Beyond zone of uncertainty (high risk)

Source: L. Persson, Carney Almroth, C.D. Collins, S. Cornell, C. de Wit et.al. 2022. "Outside the Safe Operating Space of the Planetary Boundary for Novel Entities," Environ. Sci. Technol., https://doi.org/10.1021/acs.est.1c04158



Two decades of policy making for the planet

The 1992 Rio Earth Summit saw the launch of three key conventions: the United Nations Framework Convention on Climate Change (the UNFCCC), the United Nations Convention to Combat Desertification (the UNCDD), and the Convention on Biological Diversity (the CBD). Of these, the UNFCCC seemed to us to put a greater emphasis on climate science, with the topic of biodiversity positioned more in social terms. The technical experts in biodiversity, convened by the UN ahead of the Earth Summit, focused on "the need to share costs and benefits between developed and developing countries," as well as "ways and means to support innovation by local people."

In general, comparisons of natural capital and climate change tend to frame biodiversity as harder to address and achieve. However, as we highlighted earlier, having a single GHG metric may have hindered rather than helped climate change mitigation efforts despite simplicity vs complexity logic. Why? Because centrally administered accounting systems are not always designed to empower people on the ground. Despite (or perhaps because of) an identifiable metric, it still took two decades to get from COP 1 in Berlin in 1995, to the all-important Paris Agreement achieved at COP 21 in 2015.

When it comes to natural capital, the question is not just **whether** a comparable agreement could be achieved but **what** kind. Developing an effective framework agreement rather than focusing on building a single benchmark measure would be a key accomplishment for governments and regulators – not least because it might also accelerate progress on climate change.

Good policy – what does it look like?

Although the long, slow trajectory of climate negotiations is not encouraging, let's keep in mind the following when we think about effective natural capital frameworks and policies:

The "local" relevance of natural capital and need for community-level stewardship and engagement might turn out to be a more effective negotiating platform than the one global GHG inventory that has guided climate change discussions.

Climate science sceptics held political sway for at least the first decade between COP 1 and COP 21. The sheer breadth of biodiversity science makes "denialism" a less likely problem and the immediacy of natural capital failures in the form of food or potable water shortages).

The wider acceptance of climate science today should help to accelerate the case for faster action related to natural capital.

This is where data and tools will play a critical role.

Data is essential for effective policy

In an ideal world we could hover above the planet and monitor land-use changes, see the drought risks to food production, identify land at risk of desertification through desiccation and spot forests at risk of disappearance due to human activity. We already have the data and technology to do this – Google's (widely disseminated) "Doodle" on Earth Day 2022 is one example. Satellite imagery is becoming increasingly granular and we can use AI as an additional layer to identify some potentially very useful metrics. These include land use change, reductions in biodiversity, water depletion and types of ground cover (e.g., pasture, dense forest, flooded grasslands).[9]

However, despite these impressive new technologies, the overall status of data availability remains relatively poor. For monitoring to be truly effective, more coverage and granularity are needed. But which organizations will look after this data? Strictly speaking such data should be a global "commons" in order to avoid the risk of concentrated ownership and the threat posed by over-exploitation. Some encouraging examples already exist.

The Global Biodiversity Information Facility, is a data commons focused on species diversity. The Global Footprint Network has been implementing ecological footprinting for several years, while specialist organisations such as NatCap Research, provide science-based measurement, mapping and reporting services for carbon offsetting, reforestation, avoided deforestation, agroforestry, plantations, and soils and peatlands. Funding sources include governmental and philanthropic support, blended capital models and commercial service models.

Each of these projects collects data, information and maps that can help us better understand the state of our natural capital. And we need that information to know where to focus regeneration efforts, and how to adjust those efforts if the desired change is not in evidence. Singly and collectively these initiatives provide potentially critical feedback loops that set the direction for the next stage of the journey.

9 UBS, 2022, "Global Sustainability Biodiversity: A Material Business Risk," https://neo.ubs.com/shared/d2Sg6lEA2mR1z


Chris Bessenecker and Jennifer Waugaman
C16 Biosciences, UBS Global Visionaries

Aligning food production systems with nature

Professor David R. Montgomery, Professor of Earth and Space Sciences at the University of Washington, and Nicolette Hahn Niman, J.D., a writer, rancher and former vegetarian, (speakers at a UBS conference), described a process of regenerative agriculture practiced in the USA. The system included elements such as minimal soil disturbance, consistent usage of cover crops and crop rotation combined with traditional animal husbandry. Done right, it may offer a long-run solution to creating more efficient and nature-positive food production processes. The farmers included in the study did not wait for a specific market in nature-based solutions to develop, they simply produced food using nature-based practices. The benefits to them were financial and environmental. They had lower operating costs, and they reduced their agrochemical usage, which led to healthier soil. (Source: https://neo.ubs.com/shared/d2n0wQmtE7cwtRY.)

In Africa, climate change is upending normal pasture growth patterns, leading to shifts in the availability of natural capital assets. Pastoralists (nomadic and semi-nomadic livestock herders) are, on average, losing over a third of their herd every year, which represents roughly USD 3,000 in local market value. And that's not all. Pastoralists can spend hundreds of dollars on scouting to find pasture and substantially more on supplemental feed when pasture can't be found. With approximately 270 million pastoralists across the continent of Africa, this represents billions in expenditures and lost resources, which has a crippling effect on the health and well-being of families and communities that rely on pastoralism for their livelihood.

Chris Bessenecker and Jennifer Waugaman, co-founders of Afriscout, have brought together indigenous farming practices and mobile technology. AfriScout is a mobile subscription service that uses satellite imagery and crowdsourced indigenous knowledge to help pastoralists make more informed and precise grazing decisions that restore rangelands, improve food security and help these guardians of some of the world's most important ecosystems adapt to and fight climate change.

Chris and Jennifer are UBS Global Visionaries. You can read more about them, and the work of Afriscout here:

https://www.ubs.com/global/en/sustainabilityimpact/globalvisionaries/gv/2021/afriscout.html

Led by science – scenario thinking and science-based targets inform policy

Climate science is characterized by long time frames and wide forecast ranges. Unsurprisingly, therefore, scenario analyses have been an integral part of every Intergovernmental Panel on Climate Change (IPCC). As an example, a 2000 Special Report from the IPCC, focused on Scenario Analysis, suggested four narratives representing "different demographic, social, economic, technological, and environmental developments" (none of which necessarily reflected a consensus). For each narrative, several scenarios were drawn out, leading to multiple forecasts (40 in total). It's possible that communicating the messages of those early IPCC reports was hampered by the wide range of plausible futures and the varying degrees of confidence in each scenario.

By contrast, greater certainty in science and a clear focus on the need to restrict the rise in global average temperatures to 1.5 degrees Celsius (vs 2 degrees) certainly seems to have benefited the Paris Agreement. It has also helped to focus companies on what are referred to as "science-based targets."

Getting to science-based targets

The idea of science-based targets for carbon emissions is not a scientifically precise idea. According to the World Resources Institute, "Science-based targets show companies how much and how quickly businesses need to reduce their GHG emissions to prevent the worst impacts of climate change, leading them on a clear path towards decarbonization." The Carbon Trust states the idea slightly differently: "a carbon emissions target is defined as science-based if it is in line with the scale of reductions required to keep global temperature increase below 2°C above pre-industrial temperatures."

The challenge that organizations face when trying to implement science-based targets is the uncertain relationship between GHG emissions and warming, the fact that it is a matter of ranges rather than point estimates. The science-based construct can support the development of decarbonization planning ("pathways"). So, in this narrow sense, it adds value, and may support the development of carbon accounting and economics. However, in practical terms, confidently stating that a given pathway, or scale of GHG emissions reductions, will prevent the worst impacts of global warming, is not only unlikely, but also imprudent. This is why organizations such as the Taskforce on Climate-related Financial Disclosures (the TCFD) prioritize scenario analyses, because those allow assumptions to be challenged and extremes to be explored.

The disparity in definitions also suggests a lack of clarity over what science-based targets mean when it comes to potential policy outcomes. There seems to be a tendency to rely on single pathways when what we need is a range of options.

In 2022, the SBTI (the Science Based Target Initiative) developed a net-zero "standard." In time this could lead to some form of standardized reporting and assurance through bodies such as the CDP, the TCFD, the Transition Pathway Initiative and the ISSB.

Corporate disclosure on natural capital

Judson Berkey

The private sector has a leading role to play in ensuring that natural capital is accounted for and included in financial and economic decision making.

Better transparency and better disclosures around natural capital can drive meaningful progress and support nature-positive interventions, programming and solutions.

The Taskforce for Nature-related Financial Disclosures (the TNFD) is an iterative framework. Corporate leaders, the financial sector, investors, governments and civil society all need to play an active role if it is to be successful in protecting natural capital resources.

Tools for transformation

When it comes to driving transformation, governmental mandates are important tools. Just consider for a moment the consequences of a potential ban on the sales of internal combustion engine vehicles.

But despite their reach and potential impact, those mandates can't be the only tool. Market forces are essential, too. This was part of the reasoning behind the creation of the Task Force for Climate-related Financial Disclosures (the TCFD). The rationale was that improved transparency through better disclosure of GHG emissions, along with the associated risks and opportunities to businesses, would help drive change through the repricing of assets to account for these factors.

Transparency as a catalyst for action

The same logic – the need to harness market forces through greater transparency – must be applied to nature but on a bigger scale. According to the World Economic Forum Report Nature Risk Rising (2020),[10] approximately USD 44 trillion of economic value generated (over half of the world's total GDP) is either moderately or highly dependent on nature and its services. Government policies to protect significant parts of the natural environmental (e.g., the effort under the Convention on Biological Diversity to protect 30% of land and oceans) are necessary, but they will not be enough to restore nature loss and ultimately achieve the transition to an economy that has a net neutral impact on nature.

The private sector and market forces also need to be engaged, the financial sector included. Consider this: studies have shown that 42% of the value of French financial institutions' portfolios and 36% of Dutch financial institutions' portfolios come from exposure to companies with high or very high levels of dependency on ecosystems. Compare those figures with the 2021 ECB Climate-related risk and financial stability report,[11] which shows approximately 14% of bank balance sheet exposures are in high-emitting sectors of the economy. Once again, this suggests the likely impacts and dependencies of nature will be broader than those of climate alone.

10 World Economic Forum, Jan. 2020, "Nature Risk Rising: why the Crisis Engulfing Nature Matters for Business and the Economy," https://www.weforum.org/reports/nature-risk-rising-why-the-crisis-engulfing-nature-matters-for-business-and-the-economy

11 The European Central Bank, July 2021, "Climate-related risk and financial stability," https://www.ecb.europa.eu/pub/pdf/other/ecb.climateriskfinancialstability202107~87822fae81.en.pdf

Developing effective disclosure frameworks

The TNFD was launched in 2021. Its objective is to harness and catalyze market forces to direct activity away from nature-negative outcomes and toward more nature-positive ones.

To a large degree, the TNFD has modelled itself on the TCFD. Specifically, it has adopted the same theory of change: greater transparency leads to better accounting for the economic value attached to nature, which in turn helps to improve the allocation of resources. But in some respects, the TNFD's ambition is wider than that of the TCFD. This is partly because of the differences in addressing nature loss versus climate change, but also because the TNFD acknowledges and incorporates the lessons learned along the way since the TCFD's launch in June 2017.

The TNFD has started with a wider scope of initial deliverables than the TCFD. Its aim is to expedite the development of a disclosure framework and provide support for nature-related risk and opportunity management. By contrast, it took the TCFD three years (i.e., until 2020) to release risk management guidance.

We also need to consider the breadth of topics that nature encapsulates, from land use, freshwater and the oceans, through to the air that we breathe. But this raises a challenge. Keep in mind that unlike climate, which is grounded in the single currency of GHG emissions (CO_2e), no such equivalent exists for nature. Furthermore, natural capital is more location specific. So comparing and aggregating risks and opportunities across corporate-wide activities or financial portfolios require a more complicated set of analyses.

The discipline of disclosing for nature is still in its infancy for most corporations and financial firms. Which is why the TNFD is trying to specify not just "what" to disclose, but also to support firms in "how" they do it. It is doing this by building on and accelerating the learning process, supported by various groups that are working with corporations and financial firms. These include the World Business Council on Sustainable Development, the WWF and the UN Environmental Program for Financial Institutions, among others.

TNFD - an iterative approach

The TNFD is also taking an iterative approach to its development. The first "beta framework" was released in March 2022, with several more releases planned between now and the publication of the final version in Q3 2023. This will allow for testing and feedback rounds from corporations and financial institutions. It was noticeable, for instance, that in the initial set of TNFD disclosure recommendations several topics were flagged for further development. These included:

The definition of scenarios	Treatment of value chains (scopes 1, 2 and 3 in TCFD language)	Approaches to metrics and targets	Overall integration of climate and nature analysis


Chad Sarno and Chris Kerr
C16 Biosciences, UBS Global Visionaries

Plant-based diets: a significant opportunity for food producers, on land and at sea

What's the problem?

Humans have been eating fish for thousands of years. We now consume between 200 and 300 different types of sea creatures, compared with roughly 30 types of land animals – but we "harvest" seafood indiscriminately and in a way that would be vilified if we did it on the land.

What's the answer?

The founders of Good Catch asked themselves the question "Can we revolutionize the USD 120 billion seafood industry with plants?" Realizing the impact and business potential, the simple answer was clear. Yes, they believed they could, and they started on their path to realize their global ambitions by making delicious, crave-worthy seafood from plants – offering the seafood experience without harming sea creatures, ensuring everyone wins.

Chad Sarno and Chris Kerr are UBS Global Visionaries and co-founders of Good Catch. You can read more about Chad, Chris and the work of Good Catch here:

https://www.ubs.com/global/en/sustainability-impact/globalvisionaries/gv/2021/good-catch.html?caasID=CAAS-ActivityStream

In some cases, there are natural synergies with work planned by international bodies, such as the work on nature related scenarios by the Network for Greening the Financial System (the NGFS), a group of central banks and supervisors. In other cases, there may be dependencies on global efforts, or initiatives that could provide greater support for nature-focused action.

For example, if the Convention on Biological Diversity (CBD) COP 15 negotiations led to a global policy goal for nature (no net nature loss by 2030 and net nature positive economy by 2050), this could then provide an anchor point for corporate efforts in the same way that corporate climate transition plans are tied to the Paris target of keeping global warming well below the 2 degrees Celsius threshold. While a Paris equivalent for biodiversity is going to be challenging, as evidenced by continuing discussions in COP 15, it would be a critical contribution to frame corporate actions and disclosures.

Transition plans

A key learning from the TCFD that has been applied to the architecture of the TNFD is the idea of transition planning. The TCFD has been very successful in growing the number of its supporters, from some 500 companies with USD 7.1 trillion in market capitalization and USD 100 trillion in financial assets in 2018 to over 2600 firms with USD 25 trillion in market capitalization and USD 194 trillion in financial assets in 2021. But one of the criticisms it faces is that this has still not led to meaningful change within those organizations. This is demonstrated most clearly by the continuing rise in global greenhouse gas emissions.

That's why the update to the TCFD in 2021 was so important. It placed the emphasis squarely on outcomes by including direct recommendations for and guidance on targets and transition plans, as well as disclosures on alignment metrics for financial portfolios. This upgrade of expectations happened in parallel with the rapid growth of outcome-oriented net-zero commitments by countries and companies. Whether this achieves more than the prior focus on risks and opportunities remains to be seen, but certainly the focus on actions to achieve commitments has the potential to drive faster corporate, and ultimately economic, transition.

Beyond risk: the opportunity for actions

From the very start, the TNFD has had the opportunity to adopt an outcomes focus by leveraging the net-zero concept. That is why net nature loss by 2030 and transitioning to a net nature-positive economy by 2050 is part of the CBD COP 15 discussion. The challenge for nature is that those concepts are currently harder to define than for climate, which has a clearly quantified goal (i.e. net zero) and measuring stick (i.e. CO_2e emissions).

Clearly the TNFD still has a lot of work ahead, not least the identification of metrics and measuring tools that can define progress toward goals. Progress will not happen in isolation. The most useful thing corporations and financial firms can do right now is engage in the efforts to define, measure, and manage nature-related risks and opportunities, based on an enhanced understanding of the impacts and dependencies on natural capital. We need to learn by doing, and the TNFD can be part of that process. Ultimate success will depend on the engagement of governments, civil society, individuals, corporations and the financial sector. Just as they have done with climate, the role that investors can play in driving change is a critical one. In the next section we explore how they can do this through the mechanisms of corporate engagement.

Mobilizing investors for natural capital

Francis Condon

Collaborative investor engagement can be an effective approach to achieving the measurable restoration and conservation of natural capital assets. There are number of important developments expected to move this forward over the next two years.

Through Climate Action 100+ a model already exists to guide investors on how to engage together with companies on biodiversity. There is a learning value through engagement in which investors and companies can improve their understanding of common definitions, and developing assessment tools and methodologies. This supports a dialogue between investors and companies with the aim of improving the practices of managing natural capital.

Science-based targets for nature are currently being developed to help companies establish action-based pathways with the potential to help build an ecosystem of assessing, prioritizing, and measuring corporate actions on natural capital.

In April 2022, Finance for Biodiversity announced a collaborative engagement program, designed to encourage institutional investors to engage with companies and policy makers on nature. Summer 2022 is also expected to see the launch of a further collaborative engagement program: Nature Action 100.

These corporate engagements will be complemented by policy engagement with relevant policy makers and supported by a technical advisory group whose role will be to help identify priority engagements and ensure that actions are guided by the latest science. This important development potentially creates a platform for collaborative engagement between investors and corporations, similar to the Climate Action 100+ collaborative engagement initiative.

Climate Action 100+ a model for natural capital

Climate Action 100+ was launched in December 2017, by a founding group of five investors in conjunction with five regional investor networks. One hundred companies were selected for engagement on the basis of the scale of their contribution to carbon emissions. An additional "plus list" of companies was identified by investors and added to that focus list.

CA100+ has become firmly established and now claims to be "the largest ever global investor engagement initiative on climate change" with 700 investors responsible for over USD 68 trillion in assets under management.[12] Progress is benchmarked so that the impact of engagements can be measured. The fact that CA100+ could connect its aims to the Paris Agreement and build on the recommendations of the TCFD from day one was certainly helpful.

Using the experience of CA100+ for investors to build a collaborative engagement on natural capital suggests the following points should be considered.

- Engagement on natural capital would benefit from a similarly clear goal from an equivalent governmental agreement, such as the Convention on Biodiversity.
- A clear statement of what it is that investors expect companies to do regarding the governance and disclosure aspects of their interactions with natural capital. This can be answered by the work of the TNFD.
- Making the role of government more certain in areas such as conducting environmental reviews and determining protected areas
- A clear rationale for selecting the companies that investors will engage with collaboratively. A systematic way of determining the scale of the interaction of individual firms or sectors with natural capital is important.
- An assessment framework for measuring and benchmarking company performance on natural capital.

12 https://www.climateaction100.org/about/ (reviewed 12 May 2022)

The goal of investor engagement

As the work of CA100+ highlights, the growth in collaborative investor engagements targeting companies that are key to global decarbonization is one of the most significant developments to emerge in the investor space over the last four years. Building on the success of these programs, and developing comparable collaborative engagement strategies for nature, will be a critical tool in moving the needle toward restoring and conserving the planet's stock of natural capital.

So where should investors begin?

A pathway for investor engagement on natural capital

In April 2022, the Finance for Biodiversity Foundation, together with the Finance@Biodiversity Community published its guide to engagement with companies on biodiversity, based on its Why–What–How[13] model. This model outlines the various steps needed when developing investor engagement focused on natural capital, highlighting the need to identify a specific issue or geography. Investors are encouraged to think about the best ways of mitigating risks and leveraging opportunities arising from their focus areas, and to then set engagement goals accordingly. Once they have developed their overall strategy, investors can turn their focus to operationalization – selecting target companies, defining specific engagement requests, and choosing metrics and indicators to measure progress.

While nature-related engagements can build on and develop similar approaches to climate engagements, they will also need to address the additional complexities of benchmarking corporate performance and measuring engagement progress. In this section we delve into these considerations: from the purpose of engagement, through ways in which investors can identify companies to engage with, to frameworks for corporate assessment and the measurement of corporate commitments.

Purposeful engagement

Engaging with the corporations they invest in has emerged as a significant means by which investors have been able to influence companies to improve performance, or value, across a wide range of sustainability topics. But the starting point for any engagement has to be its purpose.

Various frameworks have been designed to guide investor engagements. One such framework[14] recognizes that engagement can bring a variety of benefits, some of which go beyond financial performance. These "additional" benefits include:

- Learning value: the production and dissemination of new ESG-related knowledge
- Communication value: the enhanced exchange of information
- Political value: benefits derived from engagement, for instance, through enhanced executive support for ESG issues

13 Finance for Biodiversity, "Guide on engagement with companies," April 2022
14 Principles for Responsible Investment, 2018, "How ESG engagement creates value for investors and companies," https://www.unpri.org/download?ac=4637

In describing the key reason for natural capital engagement, Finance for Biodiversity argues that, "the economic case for reversing biodiversity loss is clear, but awareness of the magnitude of the problem is still low among companies and knowledge on how to tackle the problem is lacking." This suggests that the learning and communication aspects of engagement are especially relevant to natural capital.

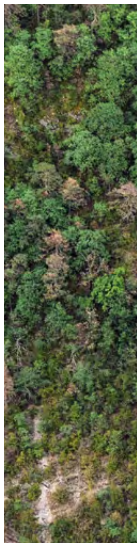
Some of the key areas where we see investors and companies can improve their understanding of natural capital include:

- Common definitions, including a common understanding of accountability: i.e. when there are multiple players along a value chain, who is held responsible?
- Tools and methodologies to assess dependencies and impacts
- Regulatory and disclosure frameworks so that data is reported
- The setting of clear and time-bound engagement objectives, while nevertheless allowing those objectives to be recalibrated when necessary
- Consideration of the greater value-add likely to arise from outcome oriented objectives relative to process-oriented objectives

How to engage effectively? Identifying the right companies

Using the Why–What–How framework directs investors toward:

1. Sectors that are highly dependent on biodiversity, in order to measure and optimise dependencies
2. Sectors with strong potential to mitigate negative impact or create positive impact
3. Sectors lying downstream in the value chain, in order to drive systemic change



The World Benchmarking Alliance (the WBA) meanwhile has identified those companies it will benchmark using the Nature Benchmark Methodology[15] on the basis that they:

- Dominate global production revenues and/or volumes within a particular sector.
- Control globally relevant segments of production and/or service provision.
- Connect (eco)systems globally through subsidiaries and their supply chains.
- Influence global governance processes and institutions.
- Have a global footprint, particularly in developing countries

This still leaves the challenge of creating a manageable engagement. Adopting the WBA approach currently yields a substantially larger list than that of Climate Action 100+, because natural capital does not have the same concentration of corporate actors.

Corporate assessment framework

Under the WBA Nature Benchmark, companies will be assessed across their operations and supply chains on 25 nature indicators and 18 social indicators. The methodology includes indicators such as progress toward a science-based target (such as GHG emissions), a net-zero deforestation objective and water management in water-scarce contexts. Investors will still need to accommodate changes in the methodology, as it also assesses companies on topics still under development by various organizations. These include resource decoupling, circular economy objectives, and mitigation hierarchy. The benchmark will come into use during 2022 and 2023, with an expectation that there will be subsequent updates.

Measuring corporate commitments

The Science Based Targets Network (the SBTN) aims to build on the momentum generated by the Science Based Targets initiative (SBTi) by extending the approach beyond climate to other aspects of nature. This value of this initiative lies in the ecosystem it is helping to build for assessing, prioritizing, measuring, disclosing and acting on nature impacts and dependencies.

By linking to science-based targets, companies can set pathways for action that could be aligned to global policy goals, also science-based. As methodologies mature, more data becomes available and indicators are agreed upon, and progress can then be measured. The current design phase is expected to continue at least through 2022, with first targets potentially being validated thereafter.

The value of this initiative lies (appropriately enough) in the ecosystem it is helping to build: nature-focused, science-based targets. In essence, it is likely this will help companies to take action that aligns with a subset of the goals that then feed into biodiversity-related initiatives embedded in the science-based targets contained in various UN conventions.

15 World Benchmarking Alliance, 2022, "Nature Benchmark Methodology," https://www.worldbenchmarkingalliance.org/research/2022-nature-benchmark-methodology/

Finding the value: reorganizing finance to enable and incentivize fair valuation of natural capital


Julie Hudson and Annabel Willder

Financial sector regulators are likely to take their cue from climate policy when setting milestones for natural capital regulations. We expect to see scenario analysis and stress tests for biodiversity loss.

The idea of stress tests for biodiversity may be less novel for regulators than it appears at first sight – financial systems and ecosystems behave in similar ways under stress.

For natural capital markets to conserve and regenerate the underlying assets, definition, design and ongoing supervision will be crucial, both for the individual assets and the broader natural capital system.

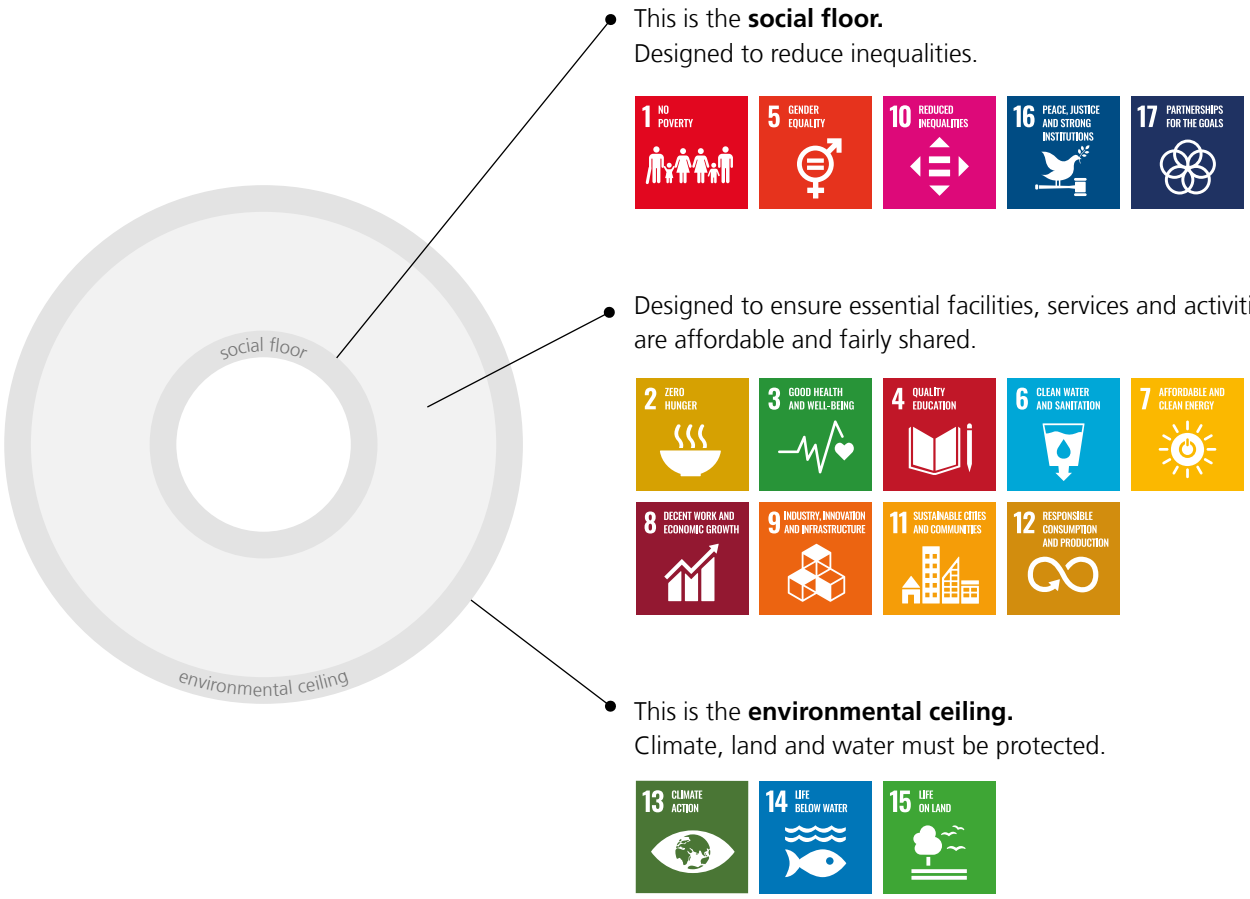
Scenarios, science-based targets and stress tests

The development of climate stress tests for the financial system has been one of the key milestones in climate change regulation. They are the result of collaborative efforts between The Network for Greening the Financial System (the NGFS) and local regulators. As the NGFS noted in its October 2021 update report,[16] more than 31 authorities are conducting or plan to conduct such tests in the future. During 2022 we expect to see key results released from the Bank of England and the ECB, thereby improving the understanding of potential outcomes from transition-risk and physical-risk scenarios.

Considering the path that climate regulation for financial stability took in Europe, we believe a similar trajectory could follow for biodiversity. Given the complexity of natural capital, we need to consider and assess which measurements would be suited to science-based targets for natural capital protection, repair and/or regeneration. Perhaps an even more important question for the newly formed Science Based Targets Network (the SBTN) is "how might such science-based targets account for the interconnectedness of the many systems of natural capital that make up the ecosystem?" If bank regulators start to look at natural capital scenarios, in what terms might those scenarios be couched? We also need to question what stress tests for financial services organizations could, and should, look like.

16 Network for Greening the Financial System, 2021, "Scenarios in Action," https://www.ngfs.net/sites/default/files/media/2021/11/08/scenarios-in-action-a-progress-report-on-global-supervisory-and-central-bank-climate-scenario-exercises.pdf

Figure 5.1: Environmental ceiling and social floor: key to a regenerative relationship with nature



Source: United Nations, www.un.org/sustainabledevelopment; Kate Raworth, *Doughnut Economics: Seven Ways to Think Like a 21st Century Economist,* and UBS Global Research. See also UBS's Sustainability & Impact White Paper, SII, March 2022

As we discussed in Chapter 2, we see natural capital being framed in international policy circles as a hybrid of scientific insight and concern for social good. We also see it positioned as both a local and global issue.

Existing biodiversity frameworks might provide "ready-made" ideas and concepts that could be leveraged by policy and finance. These include ideas mentioned earlier in this paper, such as "keystone" eco-assets, and the categorization of assets as supporting, provisioning, regulating and cultural services (per the Millennium EcoSystem Assessment), with regional variation as appropriate. It is also likely that some of the planetary boundaries defined by science might provide useful benchmarks for measurement. Last but not least, we note that financial systems and the ecosystems of the biosphere are "complex adaptive networks" (Haldane 2009). Hence we think the stress tests traditionally applied in the domain of financial stability might turn out to be well suited to the natural capital challenge. Considering the hybrid thinking embedded in the original UN Convention and the thinking that has followed since, we also think it likely that natural capital policy making could be guided by the ideas embedded in doughnut economics, notably the social floor and the biosphere limit. So, the Sustainable Development Goals could also be relevant as way to approach a complex, system-wide initiative.

Overall, although quantitative targets could be set for some aspects of natural capital, it seems unlikely that environmental "science-based" targets are going to dominate policy making. Because of the relatively heavy focus on the science of global warming in policy discussions, the idea that narrative and qualitative inputs can matter more than data, due to the (now better understood) statistical challenges, might not be sufficiently well recognized. Keep in mind that in climate science, models shift. In other words, something that seems to be an outlier in one context becomes a normality in another, which means model forecasts will change.[17] Cutting a complex story short, the instability of climate models suggests that science-based targets should be flexible, and combined with other inputs.

In a nutshell, we do not think the trajectory established for climate should be rigidly followed, but we do think the key building blocks will echo what went before and are likely to be applied to nature, notably:

- Science-based targets set in relation to specific natural capital indicators (such indicators still to be selected or devised)
- Scenarios, still to be designed
- Eco-asset-specific stress tests, likely to take some time to develop

Perhaps the most important lesson to draw from the climate experience is that over-simplified implementation will lead to further market failure, either in the form of non-delivery of the desired goals or the failure of financial instruments that are intended to support their delivery.

17 Jennifer L. Castle, David F. Hendry, "Econometrics for Modelling Climate Change", *Economics Discussion Papers,* No. 2021 W03 , Nuffield College, Oxford University, https://www.nuffield.ox.ac.uk/economics/Papers/2021/2021-W03_CEJLCDFHOUP21F.pdf

Specialist markets

In theory, almost any eco-asset could be overtly traded. For example, water markets within catchment areas already exist (where an upstream user pays a downstream user to compensate for water extracted: see the Murray–Darling case study). Eco-assets can also be a regulatory requirement, for example quarry sites converted to wetlands as a condition of planning permission for new building development sites. Any trading in food between countries is also an unrecognized trade in eco-assets, hence EU regulatory efforts in respect of deforestation driven by beef, soya or cocoa markets. We also see large volumes of water being traded virtually, through food. The soybean market is a case in point (see "Virtual water embodied in international trade of soybean"). Embedded water is, in effect, traded according to relative regional water abundance. So a family of tradeable natural capital assets might be needed alongside, to help protect and regenerate the natural capital that stands behind this high-volume exchange.

Currently, the most active specialist markets are based on carbon emissions regulation. Since 2000, the development goals have been an integral part of several carbon trading initiatives. In 2003, the WEF and other NGOs launched the Gold Standard, with the EU Emissions Trading System following two years later. The UN Clean Development Mechanism (the CDM) meanwhile enabled developing countries to earn certified emission-reduction (CER) credits, each one equivalent to one metric ton of CO_2. Other formal markets also seem likely to develop in China in the next few years. Experience to date suggests that carbon offsets alone are unlikely to lead to a reduction in absolute emissions.

For carbon-offsetting markets to have the desired impact, a broad-based behavioral shift is also needed. It is possible that harnessing climate to natural capital might broaden the base of influence. Ideas such as the Gold Standard support that point and align with the thinking in our previous white paper: they incorporate impact with intentionality.

Eco-asset trading and investment: the Murray–Darling case study

The drought prone Murray–Darling Basin is Australia's breadbasket and an important natural capital asset. Appropriate water management is vital.

Since the early 2000s, Australia has introduced various measures to mitigate the overuse of water. All water users must have a contract in place, known as a water entitlement. These are permanent rights to a certain volume of water. However, only a percentage of that volume, known as an allocation, may be extracted. Allocations are set based on scientific factors, such as the volume of water in the region and the expected rainfall. In a wet year the allocations are likely to be higher, while in a dry year opening allocations are set much lower, sometimes as low as 2% during a drought. Allocations are announced around June and calculated fortnightly to assess whether and to what extent they can be increased (e.g., following rainfall). Crucially, the rules around water use and allocations vary considerably across the many regions within the basin, reflecting the localized nature of natural capital.

The system is designed to encourage water users to assess the value of water: in a dry year farmers may forego a season of crops to avoid purchasing water in high demand, and sell their annual water entitlement to another business which cannot go without (e.g. farmers of perennial crops or industrial users). Water trading in the Murray–Darling Basin saw a turnover of approximately AUD 7 billion (approximately USD 4.8 billion) in the 2019–20 season. It is a highly sophisticated market with specialist water funds, both private and listed, that can offer investors a source of diversification and a competitive return.

Importantly, this system runs alongside a government-led water recovery plan, which includes water-saving infrastructure investments. Australia's experience suggests that targeted efforts are needed to ensure enough water is available to support healthy river basin ecosystems.

Private capital for natural capital

In carbon trading and pricing there are two clear tracks: "wholesale" regulated markets and voluntary emissions-offsetting markets. They can often have a simultaneous development and focus. It seems likely that a similar dual-track structure could develop for natural capital. However, in light of the emphatically local nature of many eco-assets, it is possible that natural capital markets might (continue to) be more closely aligned to social agendas, such as development. They are also likely to be aligned with politically sensitive sectors, such as food. For example, soil sequestration assets are potentially a specialist market, and could (depending on the regulatory and governance structure) be positioned as "wholesale" or local commons. The problem with wholesale markets, though, is the difficulty of regulating for natural capital across borders. To state the obvious, forests in remote locations are not directly controlled by those market participants potentially leveraging the carbon offset.

Market failure regularly arises in carbon markets. A response is underway with the development of further guiderails for credible carbon offsets via a set of core carbon principles (CCPs).[18] For natural capital the risks will be even greater. If markets in natural capital are to function in such a way as to conserve and regenerate the underlying assets, definition, design and ongoing supervision will be crucial, for individual assets and, critically, the broader natural capital system. Some initial efforts are underway, but more work is needed to ensure a robust and credible market.[19]

18 https://icvcm.org/the-core-carbon-principles/
19 Finance for Biodiversity Initiative, 2022, "Launch Of Global Taskforce To Align New 'Nature Markets' With Sustainability Goals," https://www.f4b-initiative.net/post/press-release-launch-of-global-taskforce-to-align-new-nature-markets-with-sustainability-goals

It is also clear that a number of other actions are required to support the mobilization of private capital for natural capital. These include the following.

Opportunities
Investable projects need clear boundaries, scope, roles and responsibilities, performance metrics, and an understanding of the opportunities. To an extent, this may depend on the development of new regulations. We discussed a number of the issues involved in scaling up impact projects in our recent paper "Define. Align. Refine." A more specific focus on the challenges seen in the carbon markets can be found in the Carbon Markets Primer, published by UBS earlier this year.

Risk management
Some farmland investments that were intended to encourage sustainable farming practices and prevent deforestation have proven controversial. They have been seen to contribute to land grabbing, as well as monocropping. Meanwhile, some nature-based solutions measures, such as protected areas and forest plantations, can also lead to displacement, livelihood restrictions, and ensuing cultural impacts on indigenous peoples.

Robust third-party verification
Just as the verification of offset additionality/permanence is needed in the voluntary carbon markets, verification of natural impacts is needed if investors are to feel comfortable incorporating those into their analysis. Offset projects and nature-based solutions overlap, so maturity in the offset market will be good for natural capital. Ideally, verification means biologists/ecologists conduct a thorough review, not just a generic "check-off-the-list" process.

Development of geospatial approaches to monitoring
This can be done by leveraging technologies such as sensors, satellites and artificial intelligence, as well as the "big data" facilitated by such approaches.

Natural capital indices
As systematic disclosures and data become available, indices are likely to be developed to facilitate the measurement of progress, as in the example of CA100+ mentioned above.

Where next from here? Conclusion and outlook

In this paper we have highlighted the increasing complexity and challenges in responding to three major global risks:

1 Ozone depletion

2 Climate change

3 The loss of natural capital

Accelerating natural capital action

The starting point for this journey was the global agreement to eliminate ozone depleting chemicals. As we have highlighted, the focus on one set of chemicals that could be replaced in processes and products has been pretty successful in reducing the damage to the planet's ozone layer.

When it comes to climate change, the world has advanced in its response compared to where it was seven years ago. Since 2015 there have been a government-level agreement (the Paris Agreement), a deeper understanding of scenarios (for example, the IPCC and the IEA), a corporate-disclosure framework (the Taskforce on Climate-related Financial Disclosure), a collaborative investment program (Climate Action 100+), action by financial regulators (the Network for Greening the Financial System) and the development of financial products, such as investment funds and strategies designed specifically to help investors align their portfolios toward a lower-carbon world. But even though large parts of the global economy have reduced their carbon intensity, updates from bodies such as the IPCC show that urgent accelerated action is still needed to prevent the worst impacts of global warming.

The deteriorating condition of the world's natural capital is more complex.

Many learnings can be drawn from the global response to climate change. Indeed, many of the novel approaches that have been developed over the last seven years can also be applied to the area of natural capital. The response to climate change has also highlighted the important role that

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Julie Hudson

the financial sector can play in driving real change when it is equipped with the right data and tools.

However, there are significant differences that must be addressed.

Climate change has its origins in local sources (emissions), which then have an accumulating global impact. Natural-capital challenges, on the other hand, are rooted in global sources (demand) and have accumulating local impact. A new, more comprehensive solution is needed for natural capital. One which looks to incorporate all of nature's diversity into a sustainable, systems-based approach.

Different approaches will be needed to match the diversity of the challenge. In some contexts, this includes local (indigenous) empowerment contributing to the solution. In others, local markets might work more efficiently, while elsewhere international partnerships, with support from supranational agencies, may be needed.

There is an increasing urgency to address loss of nature, particularly in combination with climate, and governments and regulators are starting to put in place policy frameworks to support this. The question is whether efforts to address biodiversity can also be applied to efforts related to climate change, considering the limited success of climate policy to date, the interconnectedness of the two fields and the dependency of GHG mitigation success on a healthy ecosystem.

Furthermore, climate-change discussions often focus on sustainable finance. The missing piece that natural capital might contribute is the importance of the sustainable economy. This implies a need to realign incentives in the real economy, to help finance to flow to the right places. This also raises the possibility of a feedback loop to our narrative of a journey from ozone to climate change to natural capital, in which stewardship of natural capital becomes a central pillar in the success of climate-change policy.

The role of key actors

This paper also addresses the role of a number of key natural capital actors.

Science

Everything starts with the science. For natural capital, the challenge is understanding the composition of ecosystems and habitats and the links between and within these that create the stock and flow of natural capital.

Important actions

More work is needed to map the landscape of natural capital and highlight the links to the global economy. We believe those efforts should build on the body of existing work in this field, including that of the Millennium Ecosystem Assessment, the Economics of Ecosystems and Biodiversity report, the IPBES Global Assessment Report on Biodiversity and Ecosystem Services, and the Economics of Biodiversity: The Dasgupta Review. A clearer understanding of such linkages should clarify what needs to be done next to take pressure off the ecosystem services that support life in the biosphere.

- A continuation of the efforts to design a family of natural-capital metrics that provide a comprehensive overview of the state of natural capital and key areas for action.
- A focus on likely natural capital scenarios and helping to establish "science-based" targets that link natural capital action to expected outcomes.

Investors

Investors can draw from successful models such as Climate Action 100+ for building collaborative engagement platforms. The current state of knowledge about natural capital does not lend itself to the more financially focused corporate engagements, but there are other benefits in terms of learning and communication.

Important actions

- Support the development of collaborative engagement programs.
- Develop objectives, starting with disclosure and moving into risk and opportunity identification, strategy, targets, and reporting on progress.
- Build on the development of the TNFD to encourage companies to participate in its development and adopt and implement it.
- Adapt the work of the TNFD to create a set of investor expectations, engagement objectives and indicators of progress.
- Develop engagement objectives that go beyond disclosure, into the identification of risks and opportunities, natural-capital strategy, corporate level targets and reporting on progress.
- Provide the resources that support the regional networks and connect into the infrastructure and assessment frameworks of other coalitions. In short, investors must behave like an ecosystem: interconnected, and containing informational feedback loops

Government

UBS strongly supports governments' efforts to achieve a global agreement on natural capital as a precursor to much greater involvement from the financial sector.

Important actions

- Furthering government co-ordination on natural capital, aligned with science and taking into account societal stakeholders, preferably in the form of a government-level agreement on the need for urgent and accelerated action to maintain current levels of natural capital.
- Undertaking the research to develop national data sets and methodology for baselines and metrics.
- Providing the institutional and financial support for actions to prevent and remedy adverse impacts on natural capital.

Corporations

The corporate sector has a key role to play in the effective management of natural capital. It differs from their role in climate-change efforts because of the need for multiple natural-capital asset-related targets.

Important actions

- Defining corporate interaction, responsibility and accountability for the state of natural capital.
- Supporting the development of a disclosure framework for clarity, consistency and comparability in corporate reporting on natural capital as well as creating the opportunities to share best practice and drive ambition.
- Corporations need to be involved in developing the TNFD and then adopt and implement its recommendations.

Finance

As a financial services company, UBS regards the guidance it can offer to private wealth in order to contribute toward the funding and development of a more sustainable world as crucial. UBS recognizes the importance of mobilizing and significantly increasing financial resources to conserve nature for all.

Important actions

- Regulatory and behavioral bars must be set higher from the start. In time, carbon project regulation might benefit from the natural capital learning curve.
- Creating an effective and insightful stress-testing approach for natural capital.
- Developing projects that lead to specialist markets. The starting point for natural capital assets is carbon offsets. Impact measurement frames could improve some carbon projects, and inform more complex projects. Keystone eco-assets (global and local) appear to be a clear opportunity for impact.

Where next? The road ahead

Against a backdrop of accelerated depletion in the earth's stock of natural capital, and a reinforced need for rapid action to tackle that loss, our first thought in writing this paper was that this was a challenge that might be tackled by an evolution in humanity's understanding of ecological and social challenges.

However, complex problems are challenging for humans to address; we can see this illustrated by the heavy focus on CO_2 and energy in the context of climate change.

At first sight, this social psychology does not bode well for the highly complex challenge of natural capital depletion, a challenge that is characterized by case-by-case differences in locations, environmental and economic influences, formidable data intricacies, and national and international legislation, not to mention the thousands of actors and potential change agents.

But there is a more positive possibility, and it's this. Arguably, current shortfalls in climate policy can be attributed to failures to see the potential for a diversity of approaches in the context of significant complexity. Which is why the third stage of our journey might offer opportunities to correct earlier failures.

Rather than proposing a clear roadmap for change, we believe that progress will come from embracing a system of feedback loops and signposts. Nature is diverse. That requires a diverse set of approaches and ideas that recognize the complexity and highly location specific demands of nature. There are roles for everyone: from the policymakers who need to agree on key objectives; through corporations that have to re-engineer and re-tool products and production processes to reduce impacts on nature and account for key dependencies; to financiers who must consider the risks and opportunities with regard to assets, based on an enhanced understanding of impacts and dependencies drawn from new data sets and methodologies.

What is needed then is nothing less than a dynamic interconnected ecosystem of ideas. We expect to further expand on these initial views as our thinking, and that of the subject matter experts who help inform us, continues to progress.

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