

A young girl with dark hair, wearing a yellow and white striped sweater and red pants, stands in a lush forest filled with green ferns. She is holding binoculars to her eyes, looking upwards. The background shows tall trees and dappled sunlight filtering through the canopy.

Waking up to nature – the biodiversity imperative in financial services

Exploring the pivotal role of financial services
in helping to solve the biodiversity crisis



in collaboration with **EarthKnowledge**
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Executive summary

Financial services are embedded within nature, not external to it.

Our global civilization rests on the goods and services provided by nature, known as ecosystem services, with the biosphere¹ providing air, food, water and raw materials, alongside regulating services such as climate regulation, pest and pathogen control and flood protection. These ecosystem services are essential and irreplaceable, with estimates indicating as much as half of global GDP (US\$44t) is moderately or highly dependent on them.² Not only does nature underpin human livelihoods, prosperity and wellbeing, but the ecosystem services it provides have significant economic value and present material financial risks if degraded.

Biodiversity risks are as serious as climate change risks for our civilization.

Biodiversity plays a critical role in the delivery of ecosystem services, with high levels of biodiversity providing resilience to shocks. Thus, biodiversity risks have a number of common characteristics with climate change. Both are far reaching in breadth and magnitude and contain tipping points beyond which it may be impossible to recover. And they are uncertain yet also foreseeable, with an impact that will be determined by our short-term actions. While there is recognition in both

scientific and policymaking circles that climate change and biodiversity loss are interconnected, in practice they are largely addressed in their own domains.

We must build resilience and strive for a sustainable future.

Recent global shocks, including those from climate and zoonotic diseases, are characteristics of a more volatile Earth system. To avoid more turbulence for our global society and deliver on the Sustainable Development Goals, we must act at pace and scale and work toward a low carbon, “nature positive”, and sustainable future.

The financial system has a great responsibility for what the future will be like.

The financial system wields great power, in that it directly influences which activities are financed and insured, the price at which such activities are economically viable, and the extent to which legacy activities are able to continue. Financial services must now exercise that power with great responsibility and reorient capital flows away from activities with a detrimental impact on biodiversity and toward those which are “nature positive”, thereby ensuring financial services deliver positive real-world outcomes as well as positive economic impacts.

Biodiversity risk is a material financial risk for financial services.

While the return on investment is far from assured, a failure to act at pace and scale will come at a cost. Biodiversity loss is a material financial risk for the financial services industry.

We expect it to manifest as market, credit, reputational, regulatory, supply chain, operational, employee engagement and underwriting risk.

These four immediate actions, as part of a holistic biodiversity strategy, would help financial services firms to play their part in helping solve this crisis:

1

Include biodiversity and “nature positive” outcomes in sustainable finance strategy

Publicly commit to playing an active role in delivering nature positive outcomes and embed into strategy and governance alongside climate change.

2

Act now to engage with companies

Firms should use their influence to engage with companies on priority biodiversity issues, such as deforestation, and leverage stewardship and engagement mechanisms established through efforts to date on climate change. Understand the biodiversity risks in your lending, insurance and investment portfolios and work with stakeholders to prioritize and overcome these. Add new biodiversity expertise, as needed, to existing best practices for carbon and climate change to accelerate execution. Use global biodiversity frameworks and targets to determine where red lines should be drawn if improvements cannot be evidenced.

3

Advocate at the policy level for appropriate regulation

Like climate, robust regulation that protects ecosystems will be essential for achieving global objectives. Collaborating and engaging on biodiversity at the policy level will help to accelerate the evolution of this regulation. Design a communication plan that feeds the information learned into the organization.

4

Develop methodologies to measure, manage and report on progress

Data, tools and methodologies are nascent to measure and manage against biodiversity objectives. Firms should begin to explore and develop solutions appropriate for them and draw appropriate parallels to efforts to date on climate change. Consider how to augment existing risk models with new biodiversity data sets, and new tools such as land mapping and planning tools.

¹ Defining the biosphere as the 20km thick layer in which life on the surface of the planet exists.

² Nature Risk Rising: Why the Crisis Engulfing Nature Matters for Business and the Economy., World Economic Forum New Nature Economy Report January 2020, see here http://www3.weforum.org/docs/WEF_New_Nature_Economy_Report_2020.pdf

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We are seeing an awakening across the financial sector in terms of changes that need to be made to protect nature and biodiversity, and awareness of sustainable finance is rising. The general public are also galvanised around the issue and younger generations are latching on to this agenda - they want their values to be reflected in their investments. The choice facing us is simple – to try and protect our short-term fragile gains at the expense of our planet, or to invest fully in safeguarding our future.



Dr. Susanne Schmitt
Nature and Spatial Finance Lead, World Wildlife Fund

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Biodiversity and climate change impacts and loss are two of the most important challenges and risks for humanity. The white paper recognizes that these issues are intertwined, and that they share underlying direct and indirect drivers, and that they can have cascading and complex effects that impact people’s good quality of life and compromise societal goals. Understanding and addressing the changes in biodiversity and climate change are key to meaningful solutions that will define humanity and our planet in the coming decades. Financial services are already embedded with nature, and the financial services community can have a direct effect on getting to solutions that also have a lasting impact.



Dr. Don Wuebbles
Earth Knowledge, Director of Climate Science, and University of Illinois, Emeritus Professor

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The natural systems that supply the oxygen we breathe and food we eat are on the verge of breakdown, driven by short-term thinking and a chronic undervaluing of nature. We can turn this around, if we prioritize long-term public, environmental and economic health and invest in our natural capital.

In a nature-positive economy, forests, peatlands, mangroves and agricultural land will become a net sink for carbon dioxide, rather than a source of emissions -- and our returns will flow in the form of good jobs, stronger public health, cleaner air and water, healthier diets, emissions reductions and greater resilience to the impacts of climate change.

We cannot deliver this promise of a healthier, more resilient zero-carbon world unless deforestation is quickly stopped in its tracks and reversed. The global financial system plays a critical enabling role here and I look forward to financial institutions committing now to eradicating agricultural commodity-driven deforestation within their portfolios by 2025 and, over the course of this decisive decade, investing in nature positive economies with the same enthusiasm they have shown for net zero.



Nigel Topping
High Level Champion for Climate Action at COP26

Introduction

Nature underpins human livelihoods, prosperity, and wellbeing. The United Nations Environment Programme Finance Initiative (UNEP-FI) found that 13 of the 18 sectors that comprise the FTSE 100, and represent US\$1.6t in market capitalization, are associated with production processes that have high or very high material dependence on nature. Biodiversity – the diversity within species, among species, and of ecosystems – strengthens nature’s resiliency, productivity, and adaptability.

However, human activity is degrading nature and accelerating biodiversity loss at rates and scales unprecedented in our planet’s history, with material financial consequences. The 2021 World Economic Forum (WEF) Global Risk Report³ highlights that biodiversity-loss poses an existential threat to humanity. It continues to be one of the most likely and impactful global risks of the decade, with anticipated adverse implications on financial stability as a consequence.

Businesses and financial institutions depend on and impact biodiversity through their operational activities, supply chains, financing, underwriting and investment decisions. However, valuing the impact on biodiversity remains a scarce practice across the financial services sector. A survey undertaken by Credit Suisse and Responsible Investor⁴ found only 28% of investors have

assessed the impact of their investments on biodiversity. The loss of biodiversity is a risk therefore which is not being appropriately identified, assessed, or managed by financial institutions.



As a result, financial institutions’ commitments to biodiversity action remains limited, with most firms lacking a strategy to address these issues. Financial institutions have an opportunity to work toward being nature positive, in line with global goals, scientific consensus and anticipated regulatory expectations. These are driven by the UN’s Post-2020 Global Biodiversity Framework,⁵ which aims to develop plans to achieve nature positive outcomes, thereby avoiding material financial losses and allowing firms to meet their fiduciary duty.

The conservation, sustainable use, and restoration of biodiversity remains an untapped financial opportunity for the financial services sector. Promisingly, a growing number of mainstream investment firms are allocating capital to preserving and enhancing natural assets. There is an increasing range of nature-orientated products, such as natural capital funds and green bonds, aimed at biodiversity and sustainable land-use.

Another large growth area for financing is in nature-based solutions, which, if deployed effectively, can safeguard biodiversity and deliver greenhouse gas emission reductions in line with the Paris Agreement – both cost-effectively and at scale. There is an immense biodiversity finance gap, estimated to be US\$800b per annum.⁶ Investment will need to triple in real terms by 2030 and increase four-fold by 2050 if the world is to meet its climate change, biodiversity and land degradation targets.⁷

Despite the significant potential risks of financial instability, financial institutions continue to finance nature loss. In 2019, the world’s largest investment banks provided an estimated US\$2.6t of loans and underwriting services linked to the destruction of nature.⁸

The financial services sector is uniquely placed in its financing, investing, and underwriting role to be a driver for good and to safeguard, restore and protect the natural world for decades to come. This paper explores the risks and opportunities facing the financial services sector, outlines the network of initiatives and frameworks at the industry’s disposal, and provides tangible steps that your business can take now to accelerate positive change.

Urgent action is needed to avoid further ecosystem destruction, protect and conserve biodiversity, prevent major economic losses and sustainably harness the financial opportunities of our most precious asset, nature.

³ The Global Risks Report 2021: 16th Edition, World Economic Forum website, see here <https://www.weforum.org/reports/the-global-risks-report-2021>

⁴ Unearthing investor action on biodiversity, Credit Suisse website, see here <https://www.credit-suisse.com/media/assets/microsite/docs/responsibleinvesting/unearthing-investor-action-on-biodiversity.pdf>, accessed January 2021

⁵ Convention on Biological Diversity. First Draft of the Post-2020 Global Biodiversity Framework, website, see here <https://www.cbd.int/doc/c/abb5/591f/2e46096d3f0330b08ce87a45/wg2020-03-03-en.pdf>, accessed 5 July 2021

⁶ Organization for Economic Cooperation and Development, A Comprehensive Overview of Global Biodiversity Finance, website, see here <https://www.oecd.org/environment/resources/biodiversity/report-a-comprehensive-overview-of-global-biodiversity-finance.pdf>, accessed April 2020

⁷ Mulder, I., Blin, A., Adams, J., Hartmann, T., Carreira, D., Schauer, M., Simonetti, M. (2021). UN environment programme. Retrieved from State of Finance for Nature: Tripling investments in nature-based solutions by 2030, see here <https://www.unep.org/resources/state-finance-nature>

⁸ Environmental Risk Outlook 2021: Biodiversity risk is the new ESG elephant in the room, Clisby, R., & Nichols, W., see here <https://www.maplecroft.com/insights/analysis/biodiversity-risk-is-the-new-esg-elephant-in-the-room/>, 10 June 2021

Chapter 1 - The wakeup call

The summer of 2021 saw devastating floods in Germany, deadly mudslides in India, and wildfires across the US, Canada, Turkey and Greece to name a few. “All of this was predicted in climate science decades ago. We only had to wait for the actual emergence in the last 15 to 20 years,” said John P. Holdren, President Obama’s Chief Science and Technology Advisor.⁹

At the same time, the world continued to deal with the global pandemic, resulting in widespread lockdowns, a race against the clock to develop and roll out effective vaccines and the worst global economic recession since World War II.¹⁰ The origins of the pandemic, suspected to be rooted in the destruction of natural habitats and exploitation of wildlife, has brought the consequences of biodiversity loss into

sharp focus. In fact, both the increased frequency of disease outbreaks and wildfire susceptibility has been linked to biodiversity loss.¹¹ It is clear that the events of 2020 and 2021 are not one-off acute events but instead symptoms of a wider societal issue.

Human health, wellbeing, and economic prosperity are all dependent on biodiversity. Biodiversity loss undermines ecosystem services, such as the provision of clean water, food, and climate regulation. This threatens society and businesses that depend on these services, and in turn investors and insurers that rely on a well-functioning economy. The ongoing decline of biodiversity therefore poses a systemic risk for businesses, society, and the global economy.

Human activity is altering the Earth’s climate and ecosystems and driving nature loss

Over the past 50 years, our world has been transformed by a significant increase in global trade, product consumption, human population growth and urbanization. The human population has doubled in size, the global economy has grown fourfold, and global trade has grown tenfold, together driving up the global demand for energy and materials.¹² People living in cities now account for an estimated half of the global population.¹³ At the same time, the proportion of the world’s population living in absolute poverty (the extreme poverty threshold currently

US\$1.90 per day) has fallen from nearly 60% in 1950 to less than 10% today.¹⁴ We have made huge advancements in modern medicine: in 1950, life expectancy at birth was 46; today it is approaching 73.¹⁵

These remarkable achievements, however, have come at a great price. Nature is currently being degraded at an unprecedented rate and scale in the history of our planet. Today, humans extract more natural resources from the Earth and produce more waste than ever before. Since

1970, the rate of human extraction of natural resources has outstripped the Earth’s rate of regeneration.¹⁶ To maintain the world’s current living standards with our current economic systems would require an estimated 1.7 Earths.¹⁷

In 2019, the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) published its landmark global assessment of biodiversity and nature. Compiled by 145 scientists from 50 countries, the report made clear the widespread global failure to conserve nature and the need for urgent transformative change to restore and protect nature.

The report’s findings are sobering: three-quarters of the land and two-thirds of the marine environment have been significantly altered by human actions. We have lost half of the world’s forests, half our coral reefs, 85% of wetlands and dammed two-thirds of the world’s main rivers. Biodiversity – the diversity within species, between species and of ecosystems – enables nature to be resilient, productive and adaptable. However, population sizes of mammals, birds, fish, amphibians and reptiles have reduced on average by 68% since 1970.

We are now entering the sixth mass extinction with one million species currently under threat as a result of human activity. Overall trends are deteriorating, with extinction rates increasing sharply in the past century. It is clear that nature is at a crisis point (Figure 1).

Definitions

Biodiversity

Biodiversity is the variability among living organisms from all sources, including terrestrial, marine, and other aquatic ecosystems, and the ecological complexes of which they are a part. This includes variation in genetic, phenotypic, phylogenetic, and functional attributes, as well as changes in abundance and distribution over time and space within and among species, biological communities and ecosystems.¹⁸

Natural capital

Natural capital is the world’s stocks of natural assets, which include geology, soil, air, water and all living things.¹⁹

Ecosystem

An ecosystem is a dynamic complex of plant, animal and micro-organism communities and their non-living environment interacting as a functional unit.²⁰

Ecosystem services

Ecosystem services are the benefits people obtain from ecosystems i.e., the goods and services from natural capital.²¹

Biosphere

The biosphere is the living world; the total area of the Earth that is able to support life.²²

⁹ Summer of disaster: Extreme weather wreaks havoc worldwide as climate change bears down, Pierson, D., Su, A., & Hennessy-Fiske, M., Retrieved from Los Angeles Times, see here <https://www.latimes.com/world-nation/story/2021-07-21/extreme-weather-worldwide-climate-change-disasters>, 21 July 2021

¹⁰ The World Bank. (2020). Global Economic Prospects

¹¹ “Could biodiversity loss have increased Australia’s bushfire threat?” M. W. Hayward, G. W.-F., 2016

¹² Intergovernmental Panel on Biodiversity Ecosystem Services (2019), IPBES Global Assessment Chapter 2. , see here https://ipbes.net/sites/default/files/ipbes_global_assessment_chapter_2_3_ncp_unedited_31may.pdf

¹³ The Economics of Biodiversity: The Dasgupta. Retrieved from [www.gov.uk/official-documents website](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/962785/The_Economics_of_Biodiversity_The_Dasgupta_Review_Full_Report.pdf), see here https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/962785/The_Economics_of_Biodiversity_The_Dasgupta_Review_Full_Report.pdf, February 2021

¹⁴ Global Extreme Poverty, Ortiz-Ospina, M. R., 2019

¹⁵ The World Bank. (2021), see here <https://databank.worldbank.org/home.aspx>

¹⁶ UN Environment. (2019). Global Resources Outlook

¹⁷ Global Footprint Network, Earth Overshoot Day 2018 is August 1. Global Footprint Network: Advancing the Science of Sustainability, see here <https://www.footprintnetwork.org/2018/07/23/earth-overshoot-day-2018-is-august-1-the-earliest-date-since-ecological-overshoot-started-in-the-early-1970s-2/>, 23 July 2021

¹⁸ Intergovernmental Panel on Biodiversity Ecosystem Services (2019), Summary for Policymakers of the IPBES Global Assessment Report on Biodiversity and Ecosystem Services, see here https://ipbes.net/sites/default/files/inline/files/ipbes_global_assessment_report_summary_for_policymakers.pdf

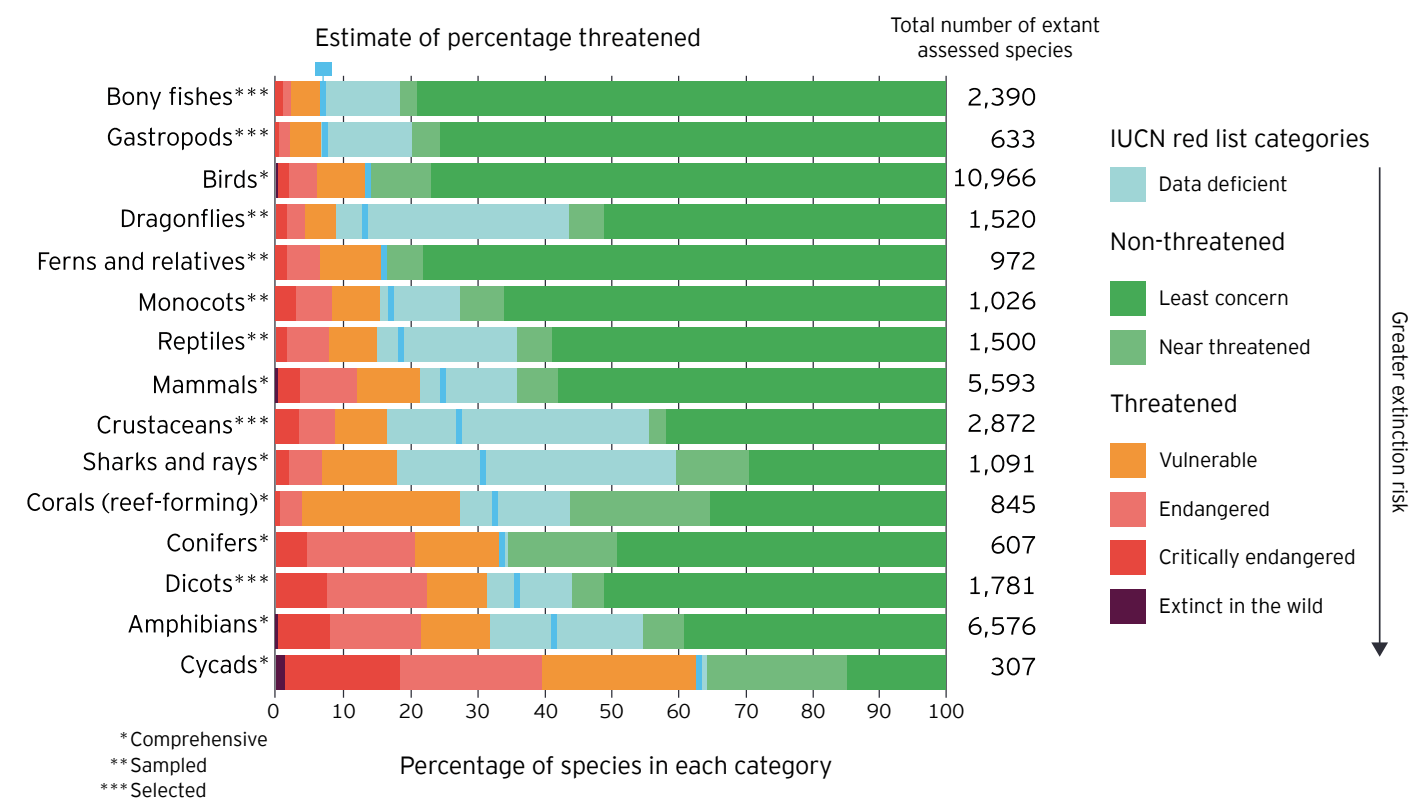
¹⁹ Convention on Biological Diversity (2018). Natural Capital, see here <https://www.cbd.int/business/projects/natcap.shtml>

²⁰ Convention on Biological Diversity. Ecosystem Approach, see here <https://www.cbd.int/ecosystem/>, 5 April 2021

²¹ Millenium Ecosystem Assessment. (n.d.), Ecosystems and Human Well-being: A Framework for Assessment, see here <https://www.millenniumassessment.org/en/index.html>

²² The Economics of Biodiversity: The Dasgupta. Retrieved from [www.gov.uk/official-documents website](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/962785/The_Economics_of_Biodiversity_The_Dasgupta_Review_Full_Report.pdf), see here https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/962785/The_Economics_of_Biodiversity_The_Dasgupta_Review_Full_Report.pdf, February 2021

Figure 1: A significant proportion of species are threatened with extinction



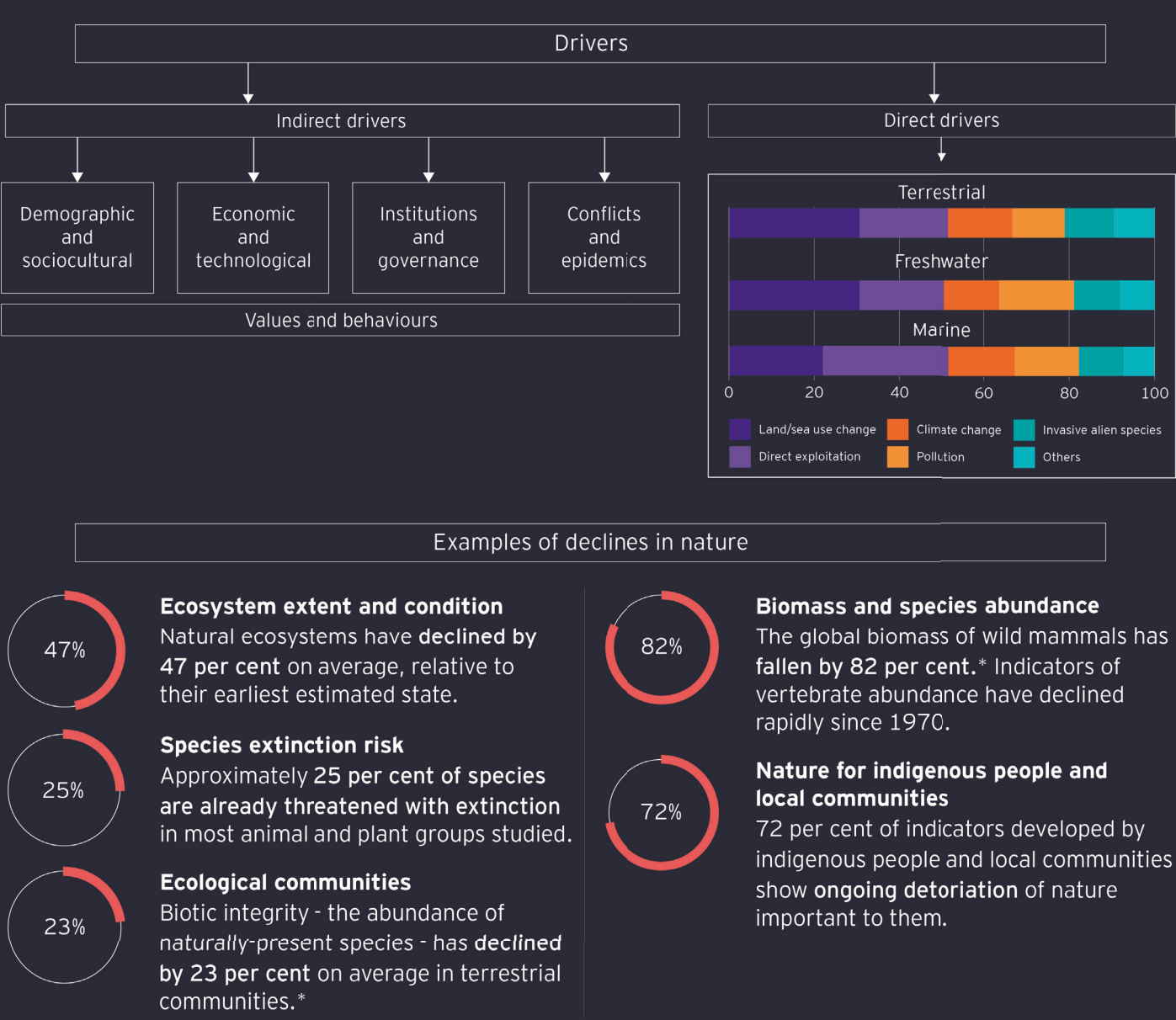
Note: Percentage of species threatened with extinction in taxonomic groups that have been assessed comprehensively, or through a 'sampled' approach, or for which selected subsets have been assessed, by the International Union for Conservation of Nature ("IUCN") Red List of Threatened Species (IPBES, 2019).

Human activity is spurring direct drivers of nature decline including land- and sea-use change, overexploitation of living organisms, climate change, pollution, and invasive alien species. These five direct drivers of nature loss in turn are underpinned by the values and behaviors of individuals, organizations, and society as a whole. These can be characterized as demographic (e.g., rapid human population growth) and sociocultural (e.g., unsustainable consumption and production); economic (e.g., trade) and technological; or related to institutions, governance, conflicts or epidemics (Figure 2).

To date, land-use change has had the most significant impact on terrestrial and freshwater ecosystems globally, while direct exploitation of fish and seafood is the main driver in our oceans.

Nearly 90% of the world's marine fish stocks are now fully exploited, overexploited or depleted.²³ We are now at a point where ecosystems are being driven to the brink of collapse.²⁴

Figure 2: Human activity is driving nature decline



Note: Adapted from IPBES, 2019.

²³ 90% of fish stocks are used up - fisheries subsidies must stop, Kituyi, M. Retrieved from UNCTAD website, see here :<https://unctad.org/news/90-fish-stocks-are-used-fisheries-subsidies-must-stop>, 13 July 2013
²⁴ Intergovernmental Panel on Biodiversity Ecosystem Services (2019), IPBES Global Assessment Chapter 2. , website, see here https://ipbes.net/sites/default/files/ipbes_global_assessment_chapter_2_3_ncp_unedited_31may.pdf

* Since prehistory

The impact of human activities on Earth is now so significant that some scientists believe we are in a new age in Earth's history, termed the Anthropocene. The Anthropocene is characterized by human-driven changes to the Earth's

climate and ecosystems, including global warming, habitat loss, extinctions and changes in the chemical composition of the atmosphere, oceans and soil.

The interconnected crises of biodiversity loss and climate change

Climate change and biodiversity loss are two of the most pressing issues of the Anthropocene. While there is recognition in both scientific and policymaking circles that the two are interconnected, in practice they are largely addressed in their own domains.

This functional separation creates a risk of incompletely identifying, understanding, and dealing with the connections between the two. In the worst case, it may lead to taking actions that inadvertently prevent the solution of one or the other, or both issues. A feature of complex systems is that they have unexpected outcomes and thresholds, but also that the individual parts cannot be managed in isolation from one another.²⁵

Only by considering climate and biodiversity as parts of the same complex adaptive system (Figure 3), including the actions, motivations, and aspirations of people, can solutions be developed that avoid maladaptation and maximize the beneficial outcomes. Seeking such solutions is important if society wants to protect the gains of the last century and expedite the move toward a more sustainable, healthy and equitable world for all. The role of science in addressing the COVID-19 pandemic illustrates how science can inform policy and society for identifying possible solutions.²⁶

Climate change is already adversely impacting species health and distribution: nearly half of threatened land-based flightless mammals and one quarter of birds may have already been negatively affected by climate change. Climate change affects species' distributions directly by shifts in climatic features (e.g., temperatures, extreme weather), the physical environment (e.g., sea-levels, wildfire frequency) and atmospheric greenhouse gas concentrations (Figure 3).

Climate change also has indirect effects on biodiversity by interacting with and exacerbating non-climatic threats; for example, by increasing disease susceptibility and changing the movement patterns of invasive species. Climate change is expected to be a rapidly increasing additional driver of biodiversity loss during the 21st century, both through direct effects and intensifying interactions with other drivers.²⁷

At the same time, changes in biodiversity affect the climate system; for example, through impacts on the nitrogen, carbon and water cycles.²⁸ Protecting and restoring ecosystems can help us reduce the extent of climate change and cope with its impact: nature-based solutions are estimated to be able to provide up to 37% of climate change mitigation required by 2030 to meet the goal of limiting global warming to less than 2°C.²⁹

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The risks associated with biodiversity loss – reductions in the productivity and resilience of ecosystems along supply chains – have significant macroeconomic and financial implications. And yet, these risks continue to be overlooked, or misunderstood. We have collectively failed to engage with Nature sustainably, to the extent that our demands now far exceed its capacity to supply the goods and services we all rely on. Our global financial system is critical to closing the gap between demand and supply, thereby supporting the move to sustainable engagement with Nature.

Operating in a Nature conscious and positive way is a paradigm shift for financial services, which must start with understanding and accepting a simple truth: our economies are embedded within Nature, not external to it. Once firms understand this, and the very great risks of continuing business as usual, they will begin to develop the tools, data, methodologies and most importantly, incentives, needed to deliver both financial profit and positive real world outcomes.



Professor Sir Partha Dasgupta

Frank Ramsey Professor Emeritus, University of Cambridge

²⁵ Retrieved from Complexity Theory: An Overview with Potential Applications for the Social Sciences, Turner, J. R., & Baker, R. M., MDPI, see here <https://www.mdpi.com/2079-8954/7/1/4/htm>, January 2019

²⁶ Intergovernmental Panel on Biodiversity Ecosystem Services (2019), IPBES Global Assessment Chapter 2., see here https://ipbes.net/sites/default/files/ipbes_global_assessment_chapter_2_3_ncp_unedited_31may.pdf

²⁷ Arneeth, A., Shin, Y.-J., Leadley, P., Kolb, M., Oberdorff, T., Saito, O., & Palomo, I., PNAS. Retrieved from Post-2020 biodiversity targets need to embrace climate change, website, see here <https://www.pnas.org/content/pnas/117/49/30882.full.pdf>, July 2020

²⁸ Intergovernmental Panel on Biodiversity Ecosystem Services and IPCC (2021). Biodiversity and Climate Change Workshop Report. Retrieved from IPBES website, see here https://ipbes.net/sites/default/files/2021-06/20210609_workshop_report_embargo_3pm_CEST_10_june_0.pdf

²⁹ The Nature Conservancy, Nature's Make or Break Potential for Climate Change, see here <https://www.nature.org/en-us/what-we-do/our-insights/perspectives/natures-make-or-break-potential-for-climate-change/>, 16 October 2017

Deserts and xeric shrublands

- CC** Dryland area expansion
- CO₂** Increased vegetation cover at desert edges due to enhanced water use efficiency
- LC** Intensification of agriculture expected to enhance degradation, desertification and biodiversity loss

Coral reefs

- CC** More widespread and frequent coral bleaching episoded due to sea warming
- CO₂** Acidification decreases growth rate
- P** Land-borne nutrient loads increases the vulnerability of corals to bleaching
- RE** Protecting fish that graze corals' macroalgal competitors can help the recovery of coral reefs

Deep seas

- CC** Biodiversity negatively impacted by deoxygenation, acidification, decreasing particulate organic carbon flux to the seafloor
- RE** Overexploitation endangers deep sea populations, due to their slow growth rates. Oil, gas and mineral extraction negatively impact habitats and species

Tundra and high mountain habitats

- CC** Biomes move up and polewards and area contracts; potential for large carbon losses due to permafrost melt, longer growing season
- CO₂**
- LC** Increased productivity
- Increasing pressure on local communities (e.g., reindeer herding)

Temperate grasslands

- CC** Vegetation composition shifts (grasslands vs. forbs), depending on temperature and precipitation changes
- CO₂** Higher CO₂ might shift vegetation toward forbs and legumes
- LC** Scenarios differ depending on whether intensification (incl. conversion to cropland) or expansion of rangelands is projected

Mediterranean forests woodlands and scrub

- CC** Biodiversity and productivity vulnerable to more frequent droughts, and changes in wildfire regimes
- CO₂**
- LC** Enhanced photosynthesis and water use efficiency compensates to some degree for detrimental climate change impacts
- Declining precipitation could accelerate agricultural abandonment

Tropical and subtropical savannas and grasslands

- CC** Projected impacts differ between continents, likely because variable interplay of factors that shape savannas
- CO₂** Shift toward woody vegetation, with associated changes in fire regimes (reduced area burnt)
- LC** Pressure of land conversion continues in many scenarios, with continued conversion of savannas to cropland (i.e., Africa), with associated large losses of biodiversity and carbon

Polar seas

- CC** Sea-ice habitat loss and high risk of ice-free arctic summer threaten many species, from low TL (Antarctic krill) to top predators (polar bear, emperor penguin)
- CO₂** Acidification decreases growth rate of calcifying organisms
- RE** Fish production increases in polar seas due to CC, but the expansion of fisheries in the Southern Ocean puts species at risk

Open oceans

- CC** Global decrease in primary production and fish biomass. Poleward range shift of species, local extinctions in the tropics
- CO₂** Acidification decreases growth rates of calcifying organisms
- P** BAU plastic production is exponential and threatens marine foodwebs at all TLs
- RE** Fish demand continues to increase, especially in developing countries. BAU fishing increases the proportion of overexploited species and decreases fish size

Tropical and subtropical dry and humid forests

- CC** Degradation (e.g., reduced plant cover or biomass stocks), increased fire risk; species most vulnerable are those at today's dry end of humid forest region
- CO₂** Fertilization and enhanced water use efficiency compensates to some degree the detrimental climate change impacts
- LC** Unless deforestation is halted, further loss of fractional cover and species diversity; restoration provides opportunity to restore biodiversity and carbon stocks

Temperate and boreal forests and woodlands

- CC** Migration of trees into tundra; at lower latitudes, shift of conifer-dominated vegetation towards deciduous species; increased risk of drought, fire and insect outbreaks
- CO₂** Increased productivity
- LC** Expansion of forested area, e.g., as part of climate mitigation efforts or due to increasing timber demand
- IA** Risk of expansion of invasive alien species considered high for temperate mixed forests, temperate deciduous forests and coniferous cool forests

Costal wetlands

- CC** Habitat loss due to SLR, storm surges and cyclones. Seagrass most affected by temperature rise. Poleward and landward shift of mangroves may displace saltmarshes
- CO₂** Productivity of wetlands vegetation expected to increase
- CD** Resilience of wetlands to SLR reduced by infrastructure barriers, if accommodation space and sediment supply are not managed properly
- P** Increase in N and P discharge increases risks of harmful algal blooms and eutrophication of coastal waters, and subsequent expansion of hypoxic waters

Legend:

- CC** - Climate change
- CO₂** - Concentration
- LC** - Land-use change
- IA** - Invasive alien species
- P** - Pollution
- RE** - Resource extraction
- CD** - Coastal development

Note: Adapted from Arneth et al. 2020. Examples of future projected impacts of climate change (CC) and CO₂ on biodiversity and ecosystem processes, which can interact with other major drivers of change (such as land-use change, resource extraction, and pollution, among others). Examples are given for terrestrial and marine biomes. Impacts of CC and atmospheric CO₂ concentration are bold. BAU = business as usual and/or high-emission scenarios; SLR = sea-level rise; TL = trophic level.³⁰

³⁰ Arneth, A., Shin, Y.-J., Leadley, P., Kolb, M., Oberdorff, T., Saito, O., & Palomo, I., PNAS. Retrieved from Post-2020 biodiversity targets need to embrace climate change, see here <https://www.pnas.org/content/pnas/117/49/30882.full.pdf>, July 2020

The socio-economic case for action

An ecosystem is a dynamic complex of plant, animal and micro-organism communities and their non-living environment interacting as a functional unit.³¹

Ecosystem services - the benefits people obtain from ecosystems - are essential and irreplaceable, with estimates indicating that as much as half of global GDP (US\$44t) is moderately or highly dependent on these.³² A stable environment and planetary health underpins all human livelihoods, prosperity and wellbeing.

The IPBES Global Assessment on Biodiversity and Ecosystem Services identified 18 categories of nature's contribution to people (NCP) that cover a wide range of direct and indirect contributions to humanity. These are categorized into three broader topics³³:

- **Regulation of environmental processes** - regulation of environmental conditions, such as regulation of climate, air, water, and oceans
- **Materials and assistance** - the provision of material goods, such as energy, food, medicines, and raw materials
- **Non-material** - non-material contributions, such as opportunities for learning, inspiration, and spiritual, cultural, and recreational experiences that underpin quality of life

In practice, biodiversity loss can result in a range of detrimental outcomes, including reduced crop yields and fish catches, increased economic losses from flooding and other natural disasters, and the loss of potential new sources of medicine, among other services (Figure 4).

Between US\$235b and US\$577b of annual global food production relies on pollinators,³⁴ and over the past year, global natural disasters exacerbated by climate change produced US\$210b of losses.³⁵ The economic value of intangible benefits of biodiversity, such as cultural services, are also sizeable: the ecotourism market size was valued at US\$180b in 2019 and is anticipated to reach US\$330b by 2027.³⁶

While the benefits derived from biodiversity and ecosystem services are considerable, they are consistently undervalued or unvalued in day-to-day decisions, market prices and economic accounting. Conventional accounting approaches and measures of economic performance (such as GDP) provide a limited view of an economy's health, and generally fail to consider the costs associated with the depreciation of natural capital - the world's stocks of natural assets, which include geology, soil, air, water and all living things. This has led to the call for the concept of natural capital accounting to be applied by businesses to better capture the benefits derived from biodiversity and ecosystem services in day-to-day decision-making processes.

Figure 4: Declining trends of ecosystem services

	Nature's contribution to people	50 year global trend	Directional trend across regions	Selected indicator
Regulation of environmental processes	1. Habitat creation and maintenance			► Extent of suitable habitat ► Biodiversity intactness
	2. Pollination and dispersal of seeds and other propagules			► Pollinator diversity ► Extent of natural habitat in agricultural areas
	3. Regulation of air quality			► Retention and preventedemissions of air pollutants by ecosystems
	4. Regulation of climate			► Prevented emissions and uptake of greenhouse gases by ecosystems
	5. Regulation of ocean acidification			► Capacity to sequester carbon by marine and terrestrial enviroments
	6. Regulation of freshwater quantity, location and timing			► Ecosystem impact on air-surface-ground water partitioning
	7. Regulation of freshwater and coastal water quality			► Extent of ecosystems that filter or add consitituent components to water
	8. Formation, protection and decontamination of soils and sediments			► Soil organic carbon
	9. Regulation of hazards and extreme events			► Ability of ecosystems to absorb and buffer hazards
	10. Regulation of detrimental organisms and biological processes			► Extent of natural habitat in agricultural areas ► Diversity of competent hosts of vector-borne diseases
Materials and assistance	11. Energy			► Extent of agricultural land - potential land for bioenergy production ► Extent of forested land
	12. Food and feed			► Extent of agricultural land - potential land for food and feed production ► Abundanceof marine fish stocks
	13. Materials and assistance			► Extent of agricultural land - potential land for material production ► Extent of forested land
	14. Medicinal, biochemical and genetic resources			► Fraction of species locally known and used medicinally ► Phylogenetic diversity
Non-material	15. Learning and inspiration			► Number of people in close proximity to nature ► Diversity of life from which to learn
	16. Physical and psychological experiences			► Area of natural and traditional landsapes and seascapes
	17. Supporting identities			► Stability of land use and land cover
	18. Maintenance of options			► Species' survival probability ► Phylogenetic diversity

Direction Trend
Across regions: Consistent Variable

Levels of certainty
 Well established Established but incomplete Unresolved

Note: Adapted from IPBES 2019. Nature's capacity to sustain contributions to good “quality of life” for humans have consistently declined globally from 1970 to present in 14 of the 18 ecosystem services.³⁷

³¹ Convention on Biological Diversity. Ecosystem Approach, see here <https://www.cbd.int/ecosystem/>, 5 April 2021

³² Nature Risk Rising: Why the Crisis Engulfing Nature Matters for Business and the Economy, World Economic Forum, January 2020. Retrieved from WEF New Nature Economy Report website, see here http://www3.weforum.org/docs/WEF_New_Nature_Economy_Report_2020.pdf

³³ Arneth, A., Shin, Y.-J., Leadley, P., Kolb, M., Oberdorff, T., Saito, O., & Palomo, I., PNAS. Retrieved from Post-2020 biodiversity targets need to embrace climate change, website, see here <https://www.pnas.org/content/pnas/117/49/30882.full.pdf>, July 2020

³⁴ UN FAO, Why Bees Matter: The importance of bees and other pollinators for food and agriculture, see here <http://www.fao.org/3/i9527en/i9527en.pdf>, 20 May 2018

³⁵ Munich Re, Record hurricane season and major wildfires - The natural disaster figures for 2020, website, see here <https://www.munichre.com/en/company/media-relations/media-information-and-corporate-news/media-information/2021/2020-natural-disasters-balance.html>, 7 January 2021

³⁶ Statistica. (2021). Retrieved from market size of the ecotourism sector worldwide in 2019, with a forecast for 2027, website, see here <https://www.statista.com/statistics/1221034/ecotourism-market-size-global/>

³⁷ Intergovernmental Panel on Biodiversity Ecosystem Services (2019), IPBES Global Assessment Chapter 2. , see here https://ipbes.net/sites/default/files/ipbes_global_assessment_chapter_2_3_ncp_unedited_31may.pdf

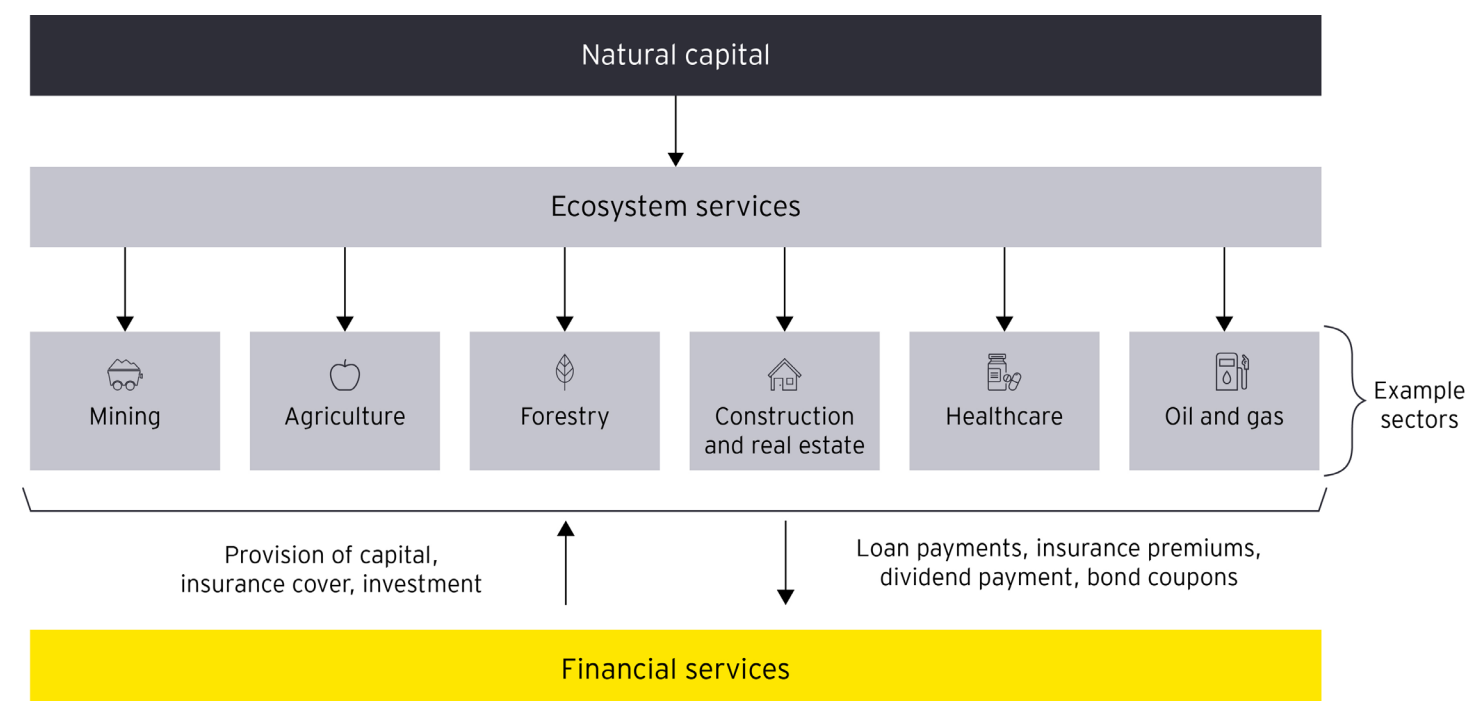
Chapter 2 - Risks and opportunities for financial services

How does the loss of nature translate to losses for financial services?

Financial services are embedded within nature, not external to it.³⁸ The financial services sector provides loans, insurance and investment to firms which are directly reliant on nature and the ecosystem services that nature provides. Financial institutions also rely on nature for their operational activities, for example, through their real estate and supply chains.

Any loss or damage of natural capital, and therefore reduction in nature's capacity to provide ecosystem services, may have negative financial implications for financial services firms, whether in the form of insurance claims, investment losses or an inability to recoup loans. Given the materiality of this risk for multiple sectors of the economy, including financial services, it is unsurprising the WEF lists biodiversity loss among the top five global risks in 2021 in terms of both likelihood and impact.³⁹

Figure 5: Financial services are embedded within nature and not external to it



Source: EY analysis

³⁸ The Economics of Biodiversity: The Dasgupta. Retrieved from [www.gov.uk/official-documents](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/962785/The_Economics_of_Biodiversity_The_Dasgupta_Review_Full_Report.pdf), see here https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/962785/The_Economics_of_Biodiversity_The_Dasgupta_Review_Full_Report.pdf, February 2021

³⁹ The Global Risks Report 2021: 16th Edition. Retrieved from World Economic Forum website, see here <https://www.weforum.org/reports/the-global-risks-report-2021>

How do we understand nature-related risks?

Nature-related risks have a number of common characteristics with climate change in that they:

- ▶ Are far reaching in breadth and magnitude
- ▶ Contain tipping points beyond which it may be impossible to recover
- ▶ Are uncertain yet also foreseeable
- ▶ Have an impact that will at least in part be determined by our short-term actions⁴⁰

The Taskforce on Nature-related Financial Disclosures (TNFD), a new global initiative which aims to provide a framework for organizations to report and act on evolving nature-related risks, follows the conventions of the TCFD by dividing nature-related risks into two primary categories: physical and transition risks. TNFD draws significant parallels from TCFD, providing financial services with an effective platform to frame their thinking on biodiversity. The Taskforce consists of 33 senior executives from financial institutions, corporates and market service providers, including EY.

According to the TNFD, physical risks resulting from nature loss can be categorized as acute, meaning they are event-driven, or chronic and are a result of longer-term changes in the way natural ecosystems function or cease to function. In practice, this could mean damage to physical assets or the loss of ecosystem services necessary for production processes. Examples include local and regional financial losses in the agricultural sector from reduced pollination from insects, and global financial losses in the medicine and technology sectors from reduced genetic biodiversity inhibiting research and development. Between US\$235b and US\$577b of annual global food production relies on pollinators.⁴¹

The TNFD defines transition risks as those risks that will arise from the transition to a nature-positive economy. With several stakeholders calling for the UN's Convention of Biological Diversity to announce the adoption of a global nature net-positive goal by 2030 and the full recovery of nature by 2050⁴² at COP15 in Spring 2022, these risks are looking increasingly likely to materialize. The latest draft goals⁴³ released in July 2021 are consistent with this anticipated direction of travel, suggesting that transition risks such as policy changes, legal developments, and technology change may emerge, with businesses that currently have a negative impact on nature being the most likely to be affected.

For financial services, we expect to see nature-related risks ultimately embedded into a number of existing financial and non-financial risk categories, including credit, underwriting, market, reputational and regulatory risk. Indeed, in many instances nature-related risks are already crystallizing in these categories. For example, studies have shown that the economic impact of Hurricane Katrina was significantly higher than what it would have been had coastal wetlands in the region been preserved.⁴⁴

Nature-related risks are likely to form part of the following material risk categories for financial services:

- ▶ Credit risk - for example, if a company's natural inputs are disrupted by ecosystem failure and the company defaults on a bond or loan
- ▶ Underwriting risk - for example, where the loss of wetlands results in severe flood events downstream, increasing the cost of insurance claims

⁴⁰ PRA SS3/19 Enhancing banks' and insurers' approaches to managing the financial risks from climate change. Retrieved from Bank of England website, see here <https://www.bankofengland.co.uk/-/media/boe/files/prudential-regulation/supervisory-statement/2019/ss319.pdf?la=en&hash=7BA9824BAC5FB313F42C00889D4E3A6104881C44>

⁴¹ UN FAO, Why Bees Matter: The importance of bees and other pollinators for food and agriculture, see here <http://www.fao.org/3/i9527en/i9527en.pdf>, 20 May 2018

⁴² Locke, H., Rockstrom, J., Bakker, P., Bapna, M., Gough, M., Hilty, J., . . . Zurita, P. (2021). A Nature Positive World: The Global Goal for Nature. Retrieved from The Nature Conservancy website, see here https://www.nature.org/content/dam/tnc/nature/en/documents/NaturePositive_GlobalGoalCEO.pdf

⁴³ Convention on Biological Diversity. First Draft of the Post-2020 Global Biodiversity Framework, see here <https://www.cbd.int/doc/c/abb5/591f/2e46096d3f0330b08ce87a45/wg2020-03-03-en.pdf>, 5 July 2021

⁴⁴ Irish, J. L., Sleath, A., Cialone, M. A., Knutson, T. R., & Jensen, R. E., Simulations of Hurricane Katrina (2005) under sea level and climate conditions for 1900. Retrieved from Springer Link website, see here <https://link.springer.com/article/10.1007/s10584-013-1011-1>, 5 December 2013

- ▶ Market risk – for example, where the market value of an investee company is impacted by large scale failure of ecological services, such as loss of pollinators
- ▶ Reputational risk – for example, where a bank’s business and/or share price is impacted by investor, customer and campaigning group action as a result of the bank’s support for ecologically-damaging companies
- ▶ Regulatory risk – for example the implications of changes to law or regulation resulting in a material impact to a specific sector, such as tourism or agriculture

How exposed are financial services?

The WEF estimates that US\$44t of economic value generation, more than 50% of GDP, is moderately or highly dependent on nature.⁴⁵ The UNEP-FI found that 13 of the 18 sectors that compose the FTSE 100, and represent US\$1.6t in market capitalization, are associated with production processes that have high or very high material dependence on nature.

There is no question that we are economically reliant on nature. But to put it into context, financial institutions incurred US\$2.8t in losses during the 2008 financial crisis,⁴⁶ and the world experienced devastating widespread job losses and unemployment that persisted for a number of years. This pales in comparison to the estimated global losses of US\$4t to US\$20t per year in ecosystem services owing to land-cover change and US\$6t to US\$11t per year from land degradation between 1997 and 2011.⁴⁷

De Nederlandsche Bank assessed the exposure of Dutch financial institutions to material biodiversity-related risks and



found that 36% of assets that they held were exposed.⁴⁸ While this report is specific to the Netherlands, it is indicative of the quantum of the challenge.

The urgent need for financial services to take action

Arguably, of all the sectors in the economy, financial services has the most power to influence human activities and their impact, by virtue of being able to decide which economic activities to support in the form of investments, capital allocation, loans and insurance. Yet in 2019, the world’s largest investment banks provided an estimated US\$2.6t of loans and underwriting services linked to the “destruction of nature”.⁴⁹

A Share Action survey of 70 of the world’s largest global insurers revealed only 10% had publicly available industry-specific investment or engagement guidelines that integrate biodiversity considerations, and only a third engage with companies on biodiversity loss.

In addition, a survey undertaken by Credit Suisse and Responsible Investor found 72% of investors have not assessed the impact of their investments on biodiversity. The Financial Times revealed that 82% of the largest 100 companies in the world make no mention of biodiversity or ecosystems in their annual reports.

The financial services sector is currently enabling nature-negative activities, which ultimately will lead to material financial consequences for themselves and other industries.

⁴⁵ Nature Risk Rising: Why the Crisis Engulfing Nature Matters for Business and the Economy. World Economic Forum, January 2020. Retrieved from WEF New Nature Economy Report, see here http://www3.weforum.org/docs/WEF_New_Nature_Economy_Report_2020.pdf

⁴⁶ IMF, Global Financial Stability Report: Responding to the Financial Crisis and Measuring Systemic Risk., see here https://www.imf.org/-/media/Websites/IMF/imported-flagship-issues/external/pubs/ft/GFSR/2009/01/pdf/_textpdf.ashx, April 2009

⁴⁷ OECD (2019). Biodiversity: Finance and the Economic and Business Case for Action

⁴⁸ De Nederlandsche Bank, Indebted to Nature. Retrieved from DNB website, see here <https://www.dnb.nl/en/actueel/dnb/dnbulletin-2020/indebted-to-nature/>, 18 June 2020

⁴⁹ Verisk Maplecroft. (2021). Environmental Risk Outlook 2021, see here <https://www.sipotra.it/wp-content/uploads/2021/06/Environmental-Risk-Outlook-2021.pdf>

The opportunity

The risks presented by the loss of nature are broad and material, but the size of the opportunities is equally as broad and significant. There is a Sustainable Development Goal financing gap of US\$2.5t.⁵⁰ Seven in 10 savers want investments to consider people and planet,⁵¹ and a total investment of US\$8.1t is required over the next 30 years to successfully tackle climate, biodiversity and land degradation challenges.⁵²

Momentum is growing, with significant design and innovation from an investment vehicle and product proposition perspective within financial services. The list below is non-exhaustive and provides a snapshot of arguably some of the most advanced and interesting opportunities emerging today:

- ▶ The first sovereign blue bond was issued by the Seychelles government in 2018, which is used to help finance the island’s transition to sustainable fisheries and the protection of marine areas.
- ▶ An increasing number of natural capital funds have been launched by asset managers, including the establishment

of HSBC Pollination Climate Asset Management, Lombard Odier aligning its fund offering to a Circular, Lean, Inclusive and Clean economy, and Mirova’s suite of nature-based solutions.

- ▶ The first exchange-traded fund with a specific biodiversity-related strategy was launched by Ossiam in February 2021, which provides exposure to a portfolio of global food stocks optimized to minimize habitat and biodiversity destruction.
- ▶ The Landscape Resilience Fund was launched in June 2021 by South Pole and WWF, with GEF and Chanel as anchor investors, and aims to support the most vulnerable people in rural landscapes to effectively adapt to climate change and land degradation.

This has led to a growing community of investors hungry for nature-based investments that match their strategy, provide an attractive risk-adjusted return, and enhance their reputation. As businesses become more sophisticated in their understanding of nature-based solutions, there will also be a role for financial de-risking products, such as guarantees and insurance, to create increasingly attractive risk-return profiles for large, mainstream investors.⁵³

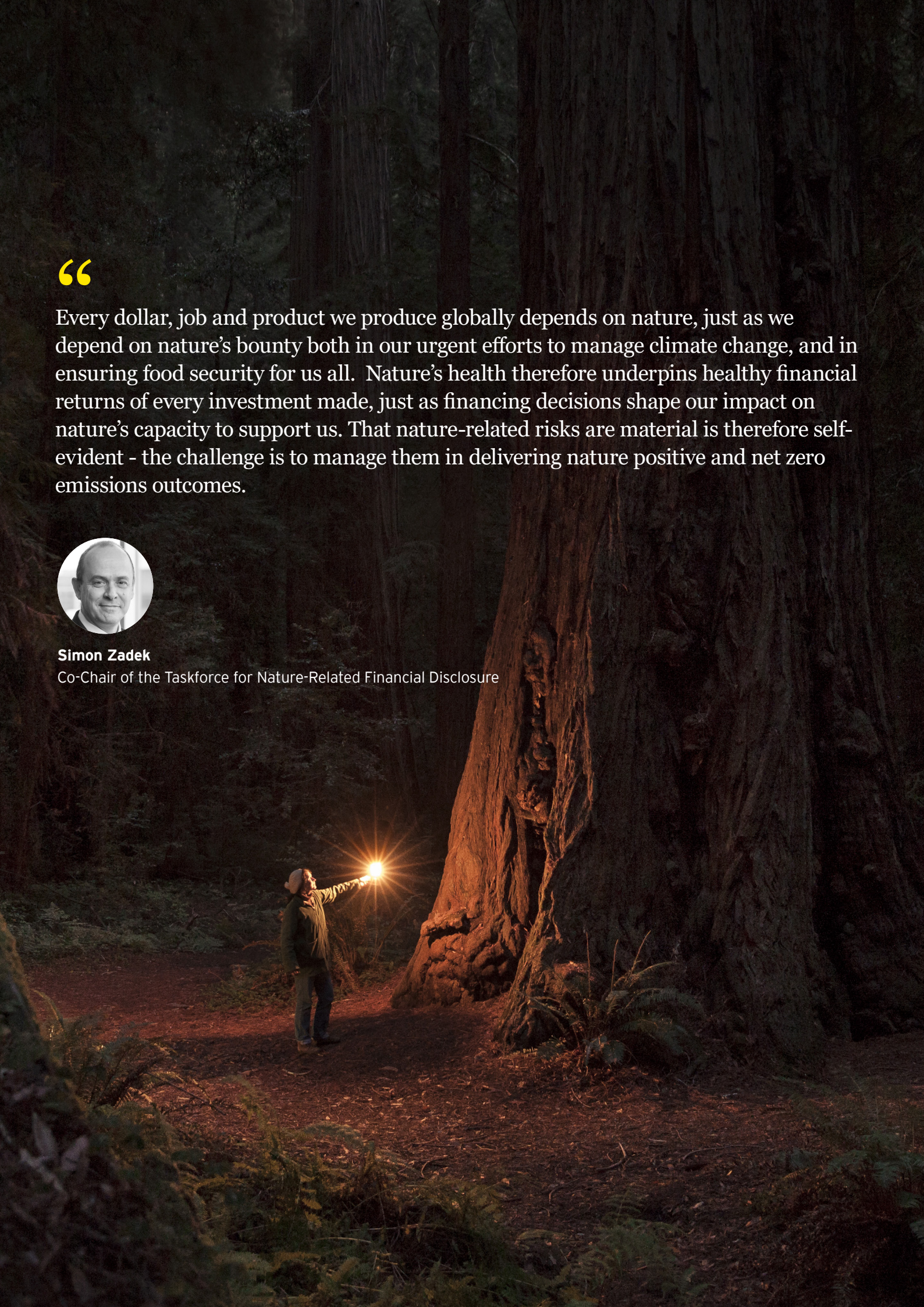
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Every dollar, job and product we produce globally depends on nature, just as we depend on nature’s bounty both in our urgent efforts to manage climate change, and in ensuring food security for us all. Nature’s health therefore underpins healthy financial returns of every investment made, just as financing decisions shape our impact on nature’s capacity to support us. That nature-related risks are material is therefore self-evident - the challenge is to manage them in delivering nature positive and net zero emissions outcomes.



Simon Zadek
Co-Chair of the Taskforce for Nature-Related Financial Disclosure

⁵⁰ Launch of the 2021 Global Outlook on Financing for Sustainable Development, Gurría, A. Retrieved from OECD website, see here <https://www.oecd.org/about/secretary-general/global-outlook-on-financing-for-sustainable-development.htm>, 9 November 2020
⁵¹ The Department for International Development, Investing in a better world, 2019.
⁵² State of Finance for Nature. Retrieved from UNEP website, see here <https://www.unep.org/news-and-stories/press-release/world-needs-usd-81-trillion-investment-nature-2050-tackle-triple>, May 2021
⁵³ State of Finance for Nature. Retrieved from UNEP website, see here <https://www.unep.org/news-and-stories/press-release/world-needs-usd-81-trillion-investment-nature-2050-tackle-triple>, 27 May 2021



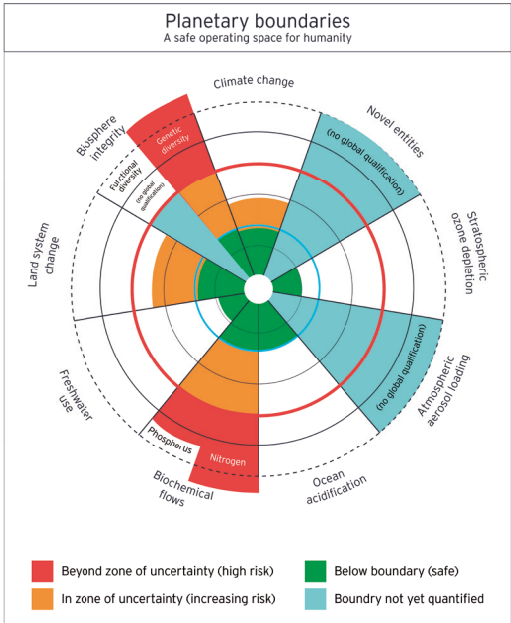
Chapter 3 - Initiatives and frameworks relevant to financial services

Due to the pressing need for action, and the critical role that the financial services industry can play in enabling change, there are an increasing number of biodiversity initiatives which are mobilizing within this sector.

The presence of significant nature-related risks and opportunities for financial services firms necessitates clear international collaboration and ambition, to avoid such risks transposing into material financial impacts and to achieve sustainable economic growth without breaching planetary boundaries.⁵⁴ Planetary boundaries establish a structure that set a safe operating space for humanity with respect to the Earth system, as described in Figure 6.

The scientific community is converging on agreement that human inhabitants must reverse nature loss. Simultaneously, they need to stabilize the Earth's climate through carbon negative initiatives that ultimately reach net zero anthropogenic CO2 emissions, reductions in other greenhouse gas emissions⁵⁶ and a net positive nature state by 2050.⁵⁷

Figure 6: The Earth system's planetary boundaries provide a framing for humanity's safe operating space



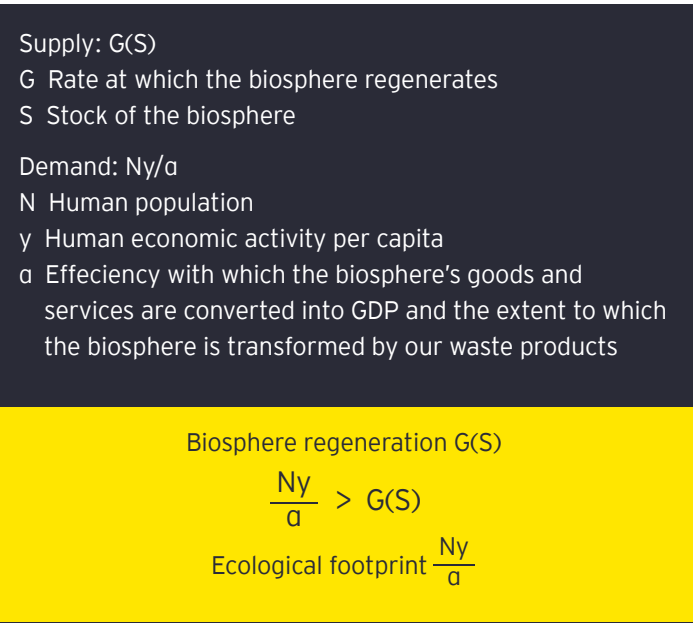
Note: Four of nine planetary boundaries have now been crossed because of human activity. The four are: climate change, loss of biosphere integrity, land-system change and altered biogeochemical cycles (phosphorus and nitrogen). Two of these, climate change and biosphere integrity, are called “core boundaries.” Significantly altering either of these “core boundaries” would drive the Earth system into a new state. Transgressing a boundary increases the risk that human activities could inadvertently drive the Earth system into a much less hospitable state, damaging efforts to reduce poverty and leading to a deterioration of human wellbeing in many parts of the world, including wealthy countries.⁵⁵

The Global Apex Goal for Nature, for example,⁵⁸ calls for there to be at least as much nature on the planet by 2030 as there is today, and for this trend to rise sharply upwards on a path to full nature recovery by 2050. Similar ambitions include the CBD’s “Living in Harmony with Nature by 2050” vision, the European Union’s (EU’s) 2050 vision to “protect, value and appropriately restore” biodiversity and associated ecosystem services in the EU, and the G7’s commitment to protecting at least 30% of global lands and seas by 2030.

The Dasgupta review introduces the concept of the “impact inequality,” a core-building block of the economics of biodiversity, which articulates how our ecological footprint is currently greater than our biosphere’s ability to supply goods and services to meet demand at a sustainable rate. Central to Dasgupta’s recommendations is the need to convert the impact inequality to an impact equality, which is explained further in Figure 7. The Dasgupta review highlights how the value of nature to society is not currently priced into financial markets, leading to a distortion in company value (including financial services).

There appears, however, to be an inability to act on nature loss despite international awareness of the problem. The Aichi targets, for example, were established in the CBD’s Strategic Plan for Biodiversity 2011 to 2020 as a set of global goals aimed at protecting and conserving global biodiversity. Despite 196 nations signing up to the Aichi targets, a recent UN report stated that at the global level none of the 20 Aichi biodiversity targets have been fully achieved,⁶⁰ with six targets partially achieved, and 14 not achieved (Figure 8).

Figure 7: The impact inequality as a core-building block of the economics of biodiversity



Note: There are four ways to transform the impact inequality into an impact equality. They involve finding ways to: (i) reduce per capita global consumption; (ii) lower future global population from what it is today; (iii) increase the efficiency with which the biosphere’s supply of goods and services are converted into global output and returned to the biosphere as waste; and (iv) invest in nature through conservation and restoration to increase our stock of nature and its regenerative rate.⁵⁹

⁵⁴ Planetary Boundaries: Exploring the Safe Operating Space for Humanity, Rockström, J. S., Persson, A., Chapin, F. S., Lambin, E., Lenton, T. M., Scheffer, M., . . . Falke, M., 2009. Retrieved from Ecology and Society website, see here <https://www.ecologyandsociety.org/vol14/iss2/art32/>
⁵⁵ Planetary Boundaries: Guiding human development on a changing planet, Re Steffen et al., 2015. Retrieved from Stockholm Resilience Centre website, see here <https://www.stockholmresilience.org/research/research-news/2015-01-15-planetary-boundaries--an-update.html>
⁵⁶ The net zero goal is consistent with the greenhouse gas emission reduction trajectories presented in the IPCC’s Special Report on 1.5C, that are consistent with limiting global warming to 1.5C of warming
⁵⁷ G7 2030 Nature Compact, website, see here <https://www.consilium.europa.eu/media/50363/g7-2030-nature-compact-pdf-120kb-4-pages-1.pdf>

⁵⁸ A Global Apex Goal for Nature. (2020), website, see here https://d2ouvy59p0dg6k.cloudfront.net/downloads/global_apex_goal_for_nature_statement_final_19_02_20.pdf
⁵⁹ The Economics of Biodiversity: The Dasgupta. Retrieved from www.gov.uk/official-documents website, see here https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/962785/The_Economics_of_Biodiversity_The_Dasgupta_Review_Full_Report.pdf, February 2021
⁶⁰ Convention on Biological Diversity (2020). Global Biodiversity Outlook 5: Summary for Policy Makers. Retrieved from Secretariat of the Convention on Biological Diversity website, see here <https://www.cbd.int/gbo/gbo5/publication/gbo-5-spm-en.pdf>

Figure 8: Very few of the biodiversity-related UN Aichi Targets set a decade ago have been met

Goal	Target	Target element (abbreviated)	Progress towards the Aichi Targets		
			Poor	Moderate	Good
A.Address the underlying drivers	1	1.1 Awareness of biodiversity			
		1.2 Awareness of steps to conserve			
	2	2.1 Biodiversity integrated into poverty reduction			
		2.2 Biodiversity integrated into planning			
		2.3 Biodiversity integrated into accounting			
		2.4 Biodiversity integrated into reporting			
	3	3.1 Harmful subsidies eliminated and reformed			
		3.2 Positive incentives developed and implemented			
	4	4.1 Sustainable production and consumption			
		4.2 Use within safe ecological limits			
B.Reduce direct pressure	5	5.1 Habitat loss at least halved			
		5.2 Degredation and fermentation reduced			
	6	6.1 Fish stocks harvested sustainably		Unknown	
		6.2 Recovery plans for depleted species			
	7	6.3 Fisheries have nc adverse impact			
		7.1 Agriculture is sustainable			
		7.2 Aquaculture is sustainable			
	8	7.3 Forestry is sustainable			
		8.1 Pollution not detrimental			
	9	8.2 Excess nutrients not detrimental			
		9.1 Invasive alien species prioritized			
		9.2 Invasive alien pathways prioritized		Unknown	
		9.3 Invasive species controlled or eradicated			
		9.4 Invasive introduction pathways managed			
	10	10.1 Pressure on coral reefs minimized			
		10.2 Pressure on vulnerable ecosystems minimized			

Note: The failure to meet the Aichi targets has motivated the CBD to develop a Post-2020 Global Biodiversity Framework, which is designed to establish a more mature suite of metrics and targets for measuring biodiversity, and to obtain renewed commitments from government and corporate actors. This framework will be formally launched at the CBD’s delayed and much anticipated COP15 summit, which is expected to be a seminal moment for the future of our planet’s biodiversity.

Goal	Target	Target element (abbreviated)	Progress towards the Aichi Targets		
			Poor	Moderate	Good
C.Improve biodiversity status	11	11.1 10 per cent of marine areas conserved			
		11.2 17 per cent of terrestrial areas conserved			
		11.3 Areas of importance conserved			
		11.4 Protected areas, ecologically representative			
		11.5 Protected areas, effectively and equitably managed			
		11.6 Protected areas, well-connected and integrated			
	12	12.1 Extinctions prevented			
		12.2 Conservation status of threatened species improved			
	13	13.1 Genetic diversity of cultivated plants maintained			
		13.2 Genetic diversity of farmed animals maintained			
		13.3 Genetic diversity of wild relatives maintained			
		13.4 Genetic diversity of valuable species maintained	Unknown		
		13.5 Genetic erosion minimized			
D.Enhance benefits to all	14	14.1 Ecosystem providing services restoredand safeguarded			
		14.2 Taking account of women, IPLCs and other groups	Unknown		
	15	15.1 Ecosystem resilience enhanced	Unknown		
		15.2 15 per cent of degraded ecosystems restored	Unknown		
	16	16.1 Nagoya Protocol in force			
		16.2 Nagoya Protocol operational			
E.Enhance implementation	17	17.1 NBSAPs developed and updated			
		17.2 NBSAPs adopted as policy instruments			
		17.3 NBSAPs implemented			
	18	18.1 ILK and customary use respected			
		18.2 ILK and customary use integrated	Unknown		
		18.3 IPLCs participate effectively	Unknown		
	19	19.1 Biodiversity science improved and shared			
		19.2 Biodiversity science applied	Unknown		
	20	20.1 Financial resources for Strategic Plan ⁸ increased			

In parallel to the development of global frameworks, there are a number of biodiversity initiatives which are being driven by the financial services industry. In September 2020, a group of 26 financial institutions from around the globe launched the Finance for Biodiversity Pledge committing to protect and restore biodiversity through their finance activities and investments. At the time of writing, the number of Pledge signatories has grown to 55 institutions with collective assets under management of EUR 9t,⁶¹ evidencing the growing recognition of the role that the financial services industry can play in reversing nature loss.

In addition, the Natural Capital Finance Alliance (NCFA) was recently established as a global alliance of financial institutions pioneering tools and best practices to manage natural capital risks and opportunities. Its efforts primarily center on the development of the Exploring Natural Capital Opportunities, Risks and Exposure (ENCORE) tool, which helps financial services firms understand how the economy is exposed to natural capital-related risks.

These initiatives are complemented by a number of reporting frameworks designed to empower financial services firms to identify, measure, monitor and manage biodiversity risk and opportunity. This is the central aim of the TNFD launched in June 2021, with greater levels of disclosure of nature-related information expected to help better understand the scale of the problem and to measure the pace of change.

The measurement of natural capital is still a relatively nascent area, with many of the current biodiversity initiatives not necessarily linked to sound measurement. Various guidelines and standards are being published globally by government and regulatory bodies to try to rectify this

gap, including the United Nations’ System of Environmental Economic Accounting, which is an international statistical standard designed to enable countries to measure their natural capital, and the International Union for Conservation of Nature’s guidelines for planning and monitoring corporate biodiversity performance.⁶²

Understanding the interaction between emerging standards, regulatory expectations and disclosure demands will inevitably be challenging for the financial services industry to navigate. The EU is attempting to simplify this landscape and to “accelerate the natural evolution of natural capital accounting approaches from guidance to standardization” through its Align Project, which aims to develop a generally accepted set of methods, indicators and criteria for corporate biodiversity measurement tools and approaches.

This project is complemented by the Partnership for Biodiversity Accounting Financials (PBAF), which is a partnership of financial institutions working together to explore the opportunities and challenges surrounding the assessment and disclosure of the impact that their lending and investment portfolios have on biodiversity. The Science Based Targets for Nature is expected ultimately to introduce scientific consistency behind any commitments (and subsequent progress against) nature-related targets.

Coordinated efforts underpinned by global objectives, national policy, corporate and investor activity, and individual commitments are necessary to initiate positive change. Financial services firms have a critical role to play in supporting this change as risk management professionals with the capability to reorient capital flows toward nature-positive outcomes.

Example tools to get you started - because what gets measured gets managed

Corporations and financial institutions wishing to achieve a nature-positive position must first measure their material impact on a series of critical indicators that are directly associated with global change conditions with respect to their capital assets, operations, and supply chains. Critical indicators are also important to corporations and financial institutions to determine dependence and vulnerabilities.

An example is Earth Knowledge's indicators that are part of Earth Knowledge's Planetary Intelligence Platform that continually assesses changing Earth systems and categorizes the information in the context of global change and sustainability. Earth Knowledge's platform leverages a “digital twin” of the earth integrating authoritative data and models of the earth's interconnected systems, from the subsurface of the geosphere to the upper altitudes of the atmosphere. The digital twin represents the conditions on the landscapes and seascapes of the planet at many spatial and temporal resolutions. These varying conditions range from approximately 100 years into the past and approximately 100 years into the future.

The Earth Knowledge platform translates scientific data, information, and Earth-systems models into over 300 indicators related to the direct drivers of global change and the commonly described three pillars of sustainability (natural capital, social capital, and economic capital). The indicators help assess global change and sustainability actions and provide a quantitative way to measure impacts and related

potential risks and opportunities at any location on the globe.

Earth Knowledge's direct drivers of global change which lead to biodiversity loss and habitat degradation include climate change, pollution, invasive species and disease, over-exploitation of natural resources, and land and sea conversion. Earth Knowledge focuses on the same five drivers of global change that are used by the IPBES (see Figure 2) in their global assessment of biodiversity and ecosystem services,⁶³ the WWF in their Living Planet Database and Report,⁶⁴ the WEF in their Nature Risk Rising Report,⁶⁵ and which were originally defined by the IUCN in their Standard Lexicon of Biodiversity Conservation.⁶⁶

Earth Knowledge Indicators are structured to identify and forecast both discrete environmental processes and interrelated resulting conditions of global change on biodiversity and other aspects of natural capital.

Each indicator is a composite measure of different conditions aggregated at multiple spatial resolutions at different time periods for specific locations across a landscape or a seascape.

These indicators help companies to understand the nature-related risks that might impact their assets, operations and supply chains. They also enable companies to assess if mitigation measures are leading to environmental improvements or at least are reducing negative impacts.

⁶¹ Finance for Biodiversity Pledge (2021), website, see here <https://www.financeforbiodiversity.org/about-the-pledge/>

⁶² Guidelines for planning and monitoring corporate biodiversity performance, Stephenson, P. J., & Carbone, G., 2021. Retrieved from IUCN website, see here <https://portals.iucn.org/library/>

⁶³ IPBES (2019): Summary for policymakers of the global assessment report on biodiversity and ecosystem services of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services. S. Díaz, J. Settele, E. S. Brondízio E.S., H. T. Ngo, M. Guèze, J. Agard, A. Arneth, P. Balvanera, K. A. Brauman, S. H. M. Butchart, K. M. A. Chan, L. A. Garibaldi, K. Ichii, J. Liu, S. M. Subramanian, G. F. Midgley, P. Miloslavich, Z. Molnár, D. Obura, A. Pfaff, S. Polasky, A. Purvis, J. Razaque, B. Reyers, R. Roy Chowdhury, Y. J. Shin, I. J. Visseren-Hamakers, K. J. Willis, and C. N. Zayas (eds.). IPBES secretariat, Bonn, Germany.

⁶⁴ WWF (2020) Living Planet Report 2020 - Bending the curve of biodiversity loss. Almond, R.E.A., Grooten M. and Petersen, T. (Eds). WWF, Gland, Switzerland.

⁶⁵ World Economic Forum, 2020, Nature Risk Rising: Why the crisis engulfing nature matters for business and the economy, Geneva, Switzerland.

⁶⁶ Salafsky, N., Salzer, D., Stattersfield, A. J., Hilton-Taylor, C., Neugarten, R., et al. (2008). A standard lexicon for biodiversity conservation: Unified classifications of threats and actions. Conservation Biology 22:897-911. doi: 10.1111/j.1523- 1739.2008.00937.

Chapter 4 - Call for action for financial services

Actions must be immediately taken to mitigate the risks from biodiversity collapse, to protect the natural capital which underpins our economy, and to ensure that society's financial capital today is used to build the foundations of a sustainable and just society tomorrow.

A variety of sector specific guidance and a number of frameworks exist and continue to be developed, and the financial services sector will need to collaborate to tackle the complex causes of nature loss. Biodiversity initiatives,

such as the Finance for Biodiversity Pledge and Science Based Targets for Nature, provide a positive starting point for financial institutions to protect and restore biodiversity through their financing activities and investments.

These four immediate actions, as part of a holistic biodiversity strategy, will help financial services firms to play their part in helping to solve this crisis:

1

Include biodiversity and "nature positive" outcomes in sustainable finance strategy

Publicly commit to playing an active role in delivering nature positive outcomes and embed into strategy and governance alongside climate change.

2

Act now to engage with companies

Firms should use their influence to engage with companies on priority biodiversity issues, such as deforestation, and leverage stewardship and engagement mechanisms established through efforts to date on climate change. Understand the biodiversity risks in your lending, insurance and investment portfolios and work with stakeholders to prioritize and overcome these. Add new biodiversity expertise, as needed, to existing best practices for carbon and climate change to accelerate execution. Use global biodiversity frameworks and targets to determine where red lines should be drawn if improvements cannot be evidenced.

3

Advocate at the policy level for appropriate regulation

Like climate, robust regulation that protects ecosystems will be essential for achieving global objectives. Collaborating and engaging on biodiversity at the policy level will help to accelerate the evolution of this regulation. Design a communication plan that feeds the information learned into the organization.

4

Develop methodologies to measure, manage and report on progress

Data, tools and methodologies are nascent to measure and manage against biodiversity objectives. Firms should begin to explore and develop solutions appropriate for them and draw appropriate parallels to efforts to date on climate change. Consider how to augment existing risk models with new biodiversity data sets, and new tools such as land mapping and planning tools.

Our EY and Microsoft strategic partnership is grounded in scientific consistency and underpinned by a deep understanding of financial services and sustainability themes. It brings together the right blend of experience and expertise in this field to help you to deliver on each of the recommendations presented in this paper. We are proud to have collaborated with Earth Knowledge to produce this content. Please connect with the key contacts listed on the next page to learn more about the steps that your business can take today.

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Biodiversity is now a financially material investment risk and is only set to grow further - making a compelling case for it to be on every investor's agenda. Biodiversity is a complex topic, but EY's report sets out practical steps we can action immediately - and we need to, as lives and livelihoods depend on it.



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