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Biodiversity Loss – introducing the next environmental crisis

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Executive summary

Ubiquitous nature, unsustainable use of natural capital has market-wide implications. With expectations of increased regulatory and consumer pressure on this topic, this paper is relevant for all investors.

- Biodiversity reflects the variety of life on Earth across all habitats - oceans, forests and grasslands to name a few. Healthy ecosystems are vital to continued economic growth, as everything we consume, and all company activity, depends on natural resources at some stage of production.
- Unsustainable use of our natural resources is leading to a 'mass extinction' event. Placing a financial value on biodiversity is increasingly becoming an area of focus or investors.
- Historically, policies and regulation to address this failure have been ineffective, but there are clear signals that this is starting to change, with policy responses at global, regional and national levels.
- From an investment perspective, companies are looking at nature-based solutions (NbS) as a market-based contribution to improving biodiversity. Although historically undervalued, it's anticipated that the market for carbon offsets, and especially NbS within the voluntary carbon market, will significantly increase in value over the next 25 years.
- Natural capital (of which biodiversity is one important component) can't be optimally valued and thus integrated into corporate, government and individual decision making without the full alignment of government policy, regulation, financial flows and market behaviour.

The next great environmental crisis

Biodiversity loss is a key global risk. It is a classic example of market failure – driven primarily by companies making unsustainable use of ecosystem services through their activity. After climate change, it's considered to be the next great environmental crisis. In fact, those twin threats are intrinsically interlinked.

In the first of a series of papers, we take a closer look at one of the most undervalued components of natural capital, the impact of biodiversity loss, and the rapidly changing regulatory and policy landscape.

It's recommended that, this paper should be read alongside our **second paper discussing why this issue is so relevant to investors** and the decisions they make. Paper three will discuss the challenges of data and measuring natural capital.

The scale of biodiversity loss

Accelerated by increasing global economic activity, statistics on biodiversity loss make for sombre reading. Earth Overshoot Day, which marks the date when humanity's demand for ecological resources and services each year exceeds what the Earth can regenerate. We've overshot every year since 1970. 2019 saw the earliest ever overshoot day occurring on 26 of July, while in 2021 it was on the 29 July [ix].

The importance of biodiversity cannot be overstated. The Convention on Biological Diversity (CBD) defines it as "the variability among living organisms from all sources, including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems". In short, biodiversity supports everything we need to survive.

This includes, for example:

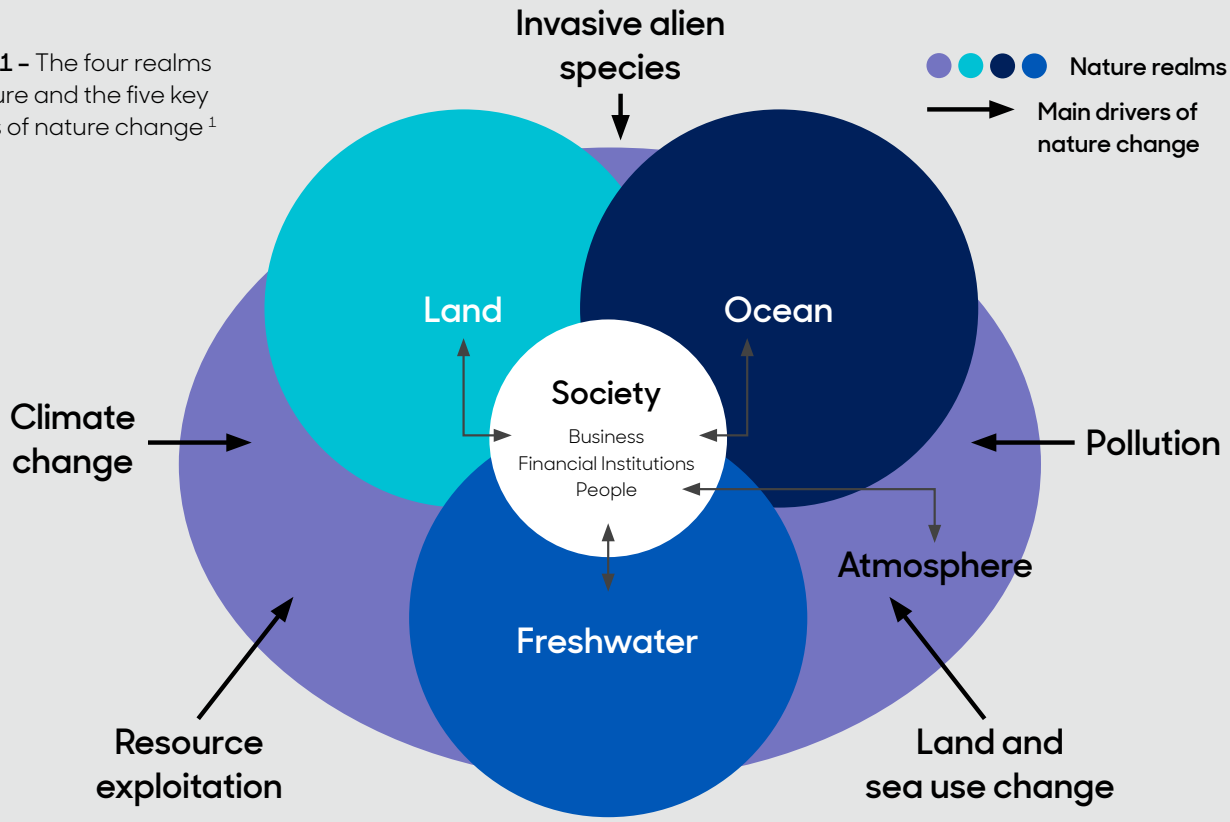
Food production – 75% of the global food crop types rely on animals for their pollination [ii]

Medicine – 70% of cancer drugs are natural or synthetic but inspired by nature [iii]

Carbon sequestration – marine and terrestrial ecosystems sequester 5.6 giga tonnes of carbon per year, more than half of total emissions caused by humans. [iv]

In line with the Taskforce for Nature-related Financial Disclosure (TNFD), we view ecosystems under the four realms on nature (see figure 1) and the biodiversity loss within these realms as being caused by five key drivers. The realms all interact with each other and the drivers for nature change impact on all of the realms.

Figure 1 – The four realms of nature and the five key drivers of nature change [1]



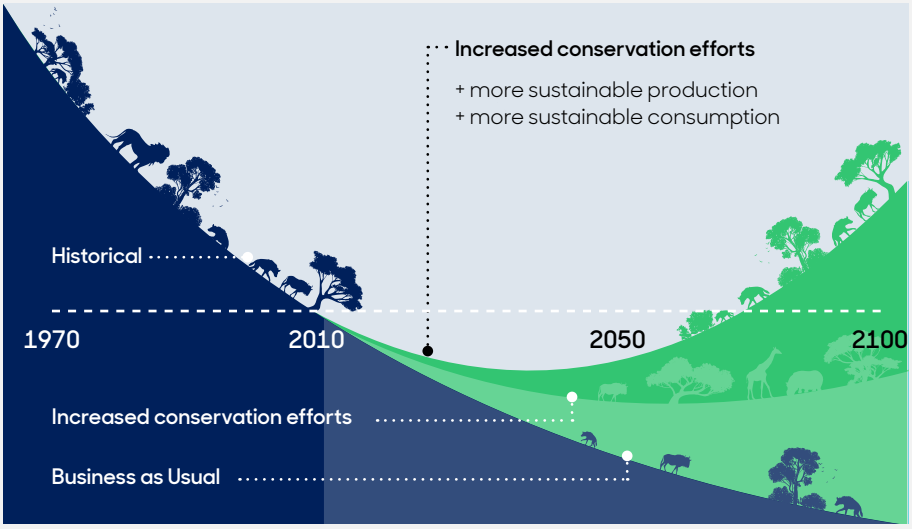
Natural habitats are in great danger. The Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) estimates that humans have significantly altered 75% of the earth's land surface, with 66% of the ocean area experiencing negative impacts due to biodiversity loss [x].

[1] TNFD definitions of nature, [online], available at **TNFD's definitions of nature » TNFD**. Accessed on 22.03.2022.

> **" With an area of forest the size of the UK destroyed globally in 2018 alone [xi], biodiversity is depleting faster than at any other time in human history [xii]."**

In terms of species abundance, the world is currently experiencing its 'Sixth Mass Extinction Event, the last of which saw the end of the dinosaurs. According to the Living Planet report (WWF), we have seen an average decline of 68% across tens of thousands of wildlife populations since 1970.[2] One million animal and plant species, or 25% of the total, face extinction vii. This represents an extinction rate 1,000 times higher than the expected background rate without human intervention [viii]. Figure 2 below shows the historical decline in species loss and three potential scenario's, including business as usual, improved conservation and then the third, nature positive scenario with improved conservation, more sustainable production and consumption.

Figure 2: The Scale of Biodiversity Loss



96% of the mass of mammals on earth are livestock reared for food

1/4 of animal and plant species face extinction

68% of wildlife populations globally have been lost since 1970

Source: Ieciere et al, Nature, 2020 DOI: 10.1038/s41586-020-2705-y), Adam Islaam International Institute for Applied Systems Analysis (IIASA), Citi GPS (2021). **Biodiversity:** The Ecosystem at the Heart of Business **https://ir.citi.com/gpsIfLxkvXYpBe%2Blkzx33lDstLbBb6tXWm3K6VxJuEfb9YC5DQcPgnnXAtB26SMWii%2FnpqxQ4TGOxM%3D Ref:** The Economics of Biodiversity: The Dasgupta Review

Markets have failed to put a price on biodiversity loss

For most companies, their economic activity is inherently dependent on the natural resources and 'ecosystem services' (broadly defined as any benefit society derives from nature) that biodiversity provides. As a result, they have substantial direct and indirect impacts on biodiversity loss.

Because our financial systems do not effectively monetise (and hence acknowledge) the value of them within our economy, natural resources and ecosystem services are used 'free of charge' by companies, that benefit economically from their use.

When used beyond their regenerative capacity, the cost is usually borne by society. The impact that governments, firms and individuals have on natural capital and biodiversity is not properly accounted for in decision making. This is, in large part, because these costs represent a 'negative externality' – an effect that is borne by an entity other than the one responsible for the activity in the first place.

[2] WWF Living Planet Report 2020, [Online], available at **Living Planet Report 2020 | Official Site | WWF (panda.org)**. Accessed on 22.03.22022.

US$125 trillion - value ecosystem services provide the global economy each year

US$44 trillion of global GDP is moderately or highly dependent on nature

US$2 to $4.5 trillion the long-run economic cost of biodiversity loss per year

US$51 to 53 billion global expenditure on restoration and protection of biodiversity

US$150-440 billion expenditure that was needed to meet previously set protection and restoration targets

Economic Loss

With this destruction comes economic loss. The scale of the benefits from ecosystem services is estimated at US$125 trillion each year, 1.5 times global GDP. They provide supporting, regulating, provisioning and cultural roles for economies and include natural pollination, heat absorption, and indeed the natural resources that companies rely on as inputs. Moreover, more than half (US$44 trillion) of global GDP is moderately or highly dependent on nature [xiv].

However, the continued provision of ecosystem services depends on the health of ecosystems, meaning that biodiversity loss leads to economic loss of a similarly immense scale. For example, the long-run economic cost of biodiversity loss, based on 2008 figures, is estimated to range between US$2 trillion and US$4.5 trillion per year [xv].

By comparison, this estimate for the cost of climate change is about US$1.7 trillion per year. The economic loss linked to biodiversity loss arises through the principle of 'double materiality'. As ecosystem services degrade, so do the economic activities that depend on them.

More investment required

Clearly, economic activity has driven biodiversity loss to an unprecedented scale -but not enough is being done to address this crisis. The value of annual global expenditure targeted at the restoration and protection of biodiversity and ecosystem services is around US$51-53 billion; a far cry from the US$150-440 billion xvi that the CBD estimates is needed to meet the Aichi Biodiversity Targets.[3]

There is now a substantial case for investors to play an important role in correcting this discrepancy. Biodiversity loss is now widely recognised as among the top long-term risks for stakeholders. In fact in the 2022 World Economic Forums annual risk report biodiversity loss was highlighted as the third highest risk[4]. There's evidence of increasing regulatory interest and engagement on the topic and opportunities for growth and positive acclaim from the market for those who act. Nevertheless, fully closing this gap will be difficult until governments and regulators are able to properly value natural capital and take steps to ensure firms and other actors internalise the costs of their behaviour. More detail on this is provided in our second biodiversity paper '**Biodiversity loss: now impossible for investors to ignore**'.

[3] The Aichi biodiversity targets were established by the UN Convention of Biological Diversity and consist of 20 specific targets to address and mitigate biodiversity loss across the globe.

[4] https://www.weforum.org/agenda/2022/01/global-risks-report-climate-change-covid19.

Biodiversity and Climate Change – the twin crises

Despite the apparent imbalance between addressing climate change and biodiversity they are two sides of the same coin. [xvii] In fact, it can be said the two crises interact via a vicious cycle, wherein the worsening of one, negatively affects the condition of the other. Indeed, studies have found that climate change is responsible for 11–16% of biodiversity loss and is expected to become the dominant driver in the next few decades. [xvii]
The destruction of nature also worsens the climate crisis. A study published in Nature in 2021 cites that the Amazon's ability to act as a carbon sink is in decline, as a result of factors such as deforestation and climate change. Tipping this important biome into a carbon source[5].

Nature-based solutions (NbS)

The relationship between the two crises is clearly illustrated by **Nature-based Solutions (NbS)**.
These recognise that the active protection and restoration of the natural environment can improve biodiversity, as well as play a critical role in tackling climate change. This is because natural systems can act as sinks to remove and store significant volumes of carbon (well-known examples being peatlands, forests, mangroves and sea-grass meadows), while providing vital habitats. The Nature Conservancy estimates that NbS could deliver up to 37% of CO_2 emission reductions by 2030. [xix] By assigning carbon credits and a market value to carbon storage and removal, these systems can partially address the market failure [xx]. Furthermore, the restoration of nature improves the land's ability to adapt to extreme weather events caused by climate change. It therefore provides a solution not just for mitigation, but also adaptation which is critically important.

Nature-based solutions offer the only currently cost effective and scalable carbon sink.

NbS are not new (they have been available since the conception of the offsetting market in the 1980s), but the growing interest and demand is new. Despite receiving negative criticism (as offsets could be used as a licence to keep emitting, or because it can be difficult to prove that the carbon reduction or removal wouldn't have happened without the offset scheme), offsetting and NbS can make an important contribution to reaching net-zero emissions . They also offer a financial incentive to protect vital intact ecosystems and the carbon stored within them and an opportunity for biodiversity net gain. However, if these projects are to mitigate biodiversity restoration they should not play second fiddle to carbon sequestration in projects (which puts the reputation of the market at risk), nor should NbS be used as replacements for emission reductions.

For more on this topic, including the potential pitfalls, see our Thinking Aloud article – Naturally tackling climate change.

It's anticipated that the market for carbon offsets will significantly increase in value over the next 25 years. This is driven primarily by business demands to help meet net-zero ambitions. Currently, global carbon pricing is unsustainably low – within both compliance (for example the EU Carbon Trading Scheme) and voluntary (where businesses opt to offset) markets. This is due to oversupply and concerns around whether payments for credits really result in additional reductions in carbon emissions (this issue is even more the case for the voluntary carbon market than the compliance market). However, this surplus is not expected to last, and demand for voluntary carbon credits is expected to increase five to ten-fold over the next decade as more companies adopt net zero climate commitments. Nature-based Solutions, as removal projects rather than reduction are likely to attract an even greater premium.

A report by Trove Research and UCLA suggests that growth in demand should see voluntary carbon credit prices rise to US$20-50/$tCO_2e$ (metric tonnes of CO_2 equivalent) by 2030. This aligns to our own research into carbon pricing through our climate-change scenario work (albeit into the compliance market). Specifically, it's clear that as we utilise the easier-to-achieve reduction and removal projects, the average carbon price is expected to rise. As projects within the voluntary market become more in demand, and focus on removal, this is also likely to catalyse their value. With a further increase in demand expected by 2040 and 2050, carbon credit prices within the voluntary market would rise by more than US$50/$tCO_2e$. If governments successfully reduce emissions through domestic policies, fewer carbon credits will be available to businesses through the voluntary market. This would increase carbon credit prices further, potentially reaching US$100/$tCO_2e$ [xxi].

[5] **Amazonia as a carbon source** linked to deforestation and climate change, Nature 14 July 2022.

The policy response to biodiversity loss

Recognised at the 2019 G7 meeting as the "next frontier [behind climate change] for financial market policy and regulation", there is movement ifrom policy makers and businesses to address biodiversity loss.[xxii] At least 100 countries now have some form of policy commitment to compensate for biodiversity impacts, [xxiii] but the commitments are rarely translated into regulation. When regulations do exist, they tend to lack enforcement.

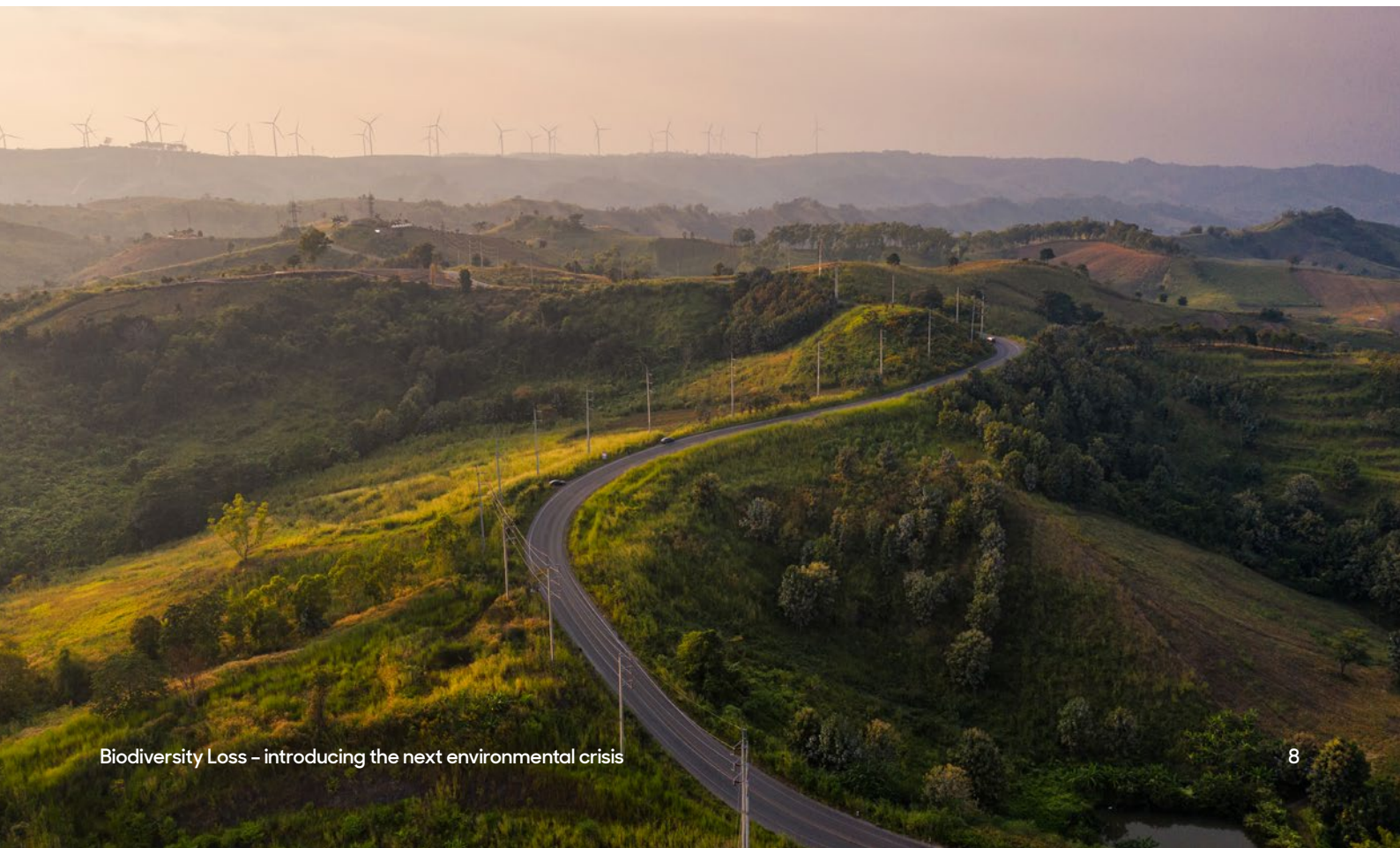
It's a start, but stronger government policy and regulation is needed, not only to price the externality and value of natural capital appropriately, but to give clarity on corporate reporting requirements and incentives for disclosure. This, in turn, will improve data access and lead to better management of biodiversity impacts. [xxiv] We will discuss the data challenge in the third paper in this biodiversity series.

At a global level

The CBD's Conference of the Parties on Biological Diversity, known as COP15 (held across Q4 2021 and Q3 2022 due to delays over COVID-19 restrictions) is anticipated to be to biodiversity what the 2015 'Paris Agreement' was to climate change. With the first phase now over, governments have committed to agree on a global biodiversity framework in 2022 (the Kunming Declaration), with implications for business and finance. The standout proposed global targets in the draft framework were: 1) no net nature loss by 2030 and 2) net gain by 2050.

If the Paris Agreement analogy holds, we can expect a substantial stream of regulation in the following years, giving investors more to consider. But we can also anticipate that action will struggle to match high-level commitments. The new commitments made in the initial phase of COP15 came only a few weeks ahead of the UN Climate Change Conference (COP26), where nature-based solutions (NbS) were a priority area of discussion for governments. [xxv]

One initial standout from the climate change conference was the promise from 120 nations to end and reverse deforestation by 2030. 90% of the worlds remaining forests are in the nations signed up to this commitment. While this is a positive step, some of the signatories are already stating concerns about the implications and concrete actions are yet to be developed. For the second phase of COP15, a lack of binding enforcement mechanisms is something that needs to be addressed. The COP26 commitment also only covers forests, not seas, peatlands, or the many other invaluable ecosystems on our planet.



At a regional level

Following the same trend seen in climate and circular economy regulation the European Union is leading on regional biodiversity regulation. While movement within any region is positive, the most substantial future net loss in biodiversity is likely to come from emerging economies where both economic and population growth is rising the most, and biological diversity is commonly more intact.

The **EU Biodiversity Strategy for 2030,** will be reflected in and underpin biodiversity and financial policy, to align with the post-2020 global biodiversity framework from COP15. These objectives will be translated into legislation, such as the Habitats Directive, which protects threatened or endemic animal and plant species and certain habitat types. All member states will have to report on this. [xxvi]

The **EU Taxonomy,** is also expected to drive further consideration of biodiversity impacts among investors. It includes thresholds for economic activities to demonstrate that companies held within a fund have made a substantial contribution to one of six environmental objectives and a "no significant harm" requirement for investments that potentially impact on the other five objectives.

As well as protection and restoration of biodiversity and ecosystems, the EU taxonomy includes significant drivers for preventing biodiversity loss: climate mitigation and adaptation, sustainable management and protection of marine and water resources; transition to a circular economy; and pollution prevention and control.

The EU is also proposing a **regulation on deforestation-free products** to curb EU-driven deforestation. The proposal focuses on commodities considered to be most closely linked to EU embodied deforestation (beef, palm oil, soy, wood, cocoa, and coffee) and their related products (such as leather). Failure to comply could result in fines of up to 4% of a company's turnover in an EU country. The regulation currently proposes that companies will have to show that commodities were not grown on any land deforested or degraded after 31 December 2020, even if it is legal to produce there according to producing country law.

The legislation aims to:

The Commission hopes the law will be passed by 2023. Large companies will have a 12-month grace period to comply, with smaller ones given 24 months[xxvii].

Regulation (EU) 2019/2088 of the European Parliament and Council on sustainability-related disclosures in financial services requires market participants to report on:

- the integration of sustainability risks (including biodiversity loss where material)
- the consideration of adverse sustainability impacts (including biodiversity) in their processes
- the provision of related information on financial products (including funds and pension products).

At a national level

At a national level there are pioneer outliers but growing signs of more widespread movement too.

Costa Rica

The best-known pioneer is Costa Rica. The success of its 1998 Biodiversity Law is partially due to its programmes of payments to citizens to protect forests, plant trees, and restore ecosystems. Since the law was put in place, Costa Rica's forests have doubled in size. Flora and fauna thrived, leading to a boom in ecotourism, contributing US$4 billion to the economy[xxviii]. This policy also lead to Costa Rica winning the **Earth Shot prize** in 2021.

China

The 'Grain for Green' programme led to the biggest afforestation project (both in terms of investment and physical scale) ever undertaken. It followed catastrophic flooding in the late 1990s, which was caused by deforestation of land for agriculture in both the Yangtze and Songhua river basins. The floods resulted in 3,600 deaths, left 13.2 million people homeless and caused large economic losses. Grain for Green gave farmers financial compensation to afforest smallholder cropland on sloping lands. By 2017, more than 28 million hectares of farmland had been reforested[xxix] and the programme was effective, not only in flood abatement but also in improving crop yields[xxx].

France

Under Article 29 of the French law on Energy and Climate, financial institutions are required to disclose their biodiversity footprints. Implementation of Article 29 will be sequenced. From 2022, institutions have to disclose how they will identify, prioritise and manage climate and biodiversity risks (covering financial year 2021). From 2023, they will have to expand disclosure to include, among other indicators, the share of outstanding financing aligned with the EU Taxonomy[xxxi].

The lack of biodiversity data and absence of standardised corporate disclosures make these disclosures challenging in practice and illustrates the urgent need for a TNFD framework.

UK

For real assets, there is much anticipation around the Environment Bill 2021-22 for England and Wales (which has faced several delays). The new bill looks to protect nature and improve biodiversity by working with developers on biodiversity net gain. The method for calculating biodiversity net gain will come from **DEFRA's Metric 3.0.** The Environment Bill's mandatory biodiversity net-gain provisions will take effect for the Town and Country Planning Act development (estimated to be in late 2023).

Business initiatives and market

Speaking at **COP15**, Elizabeth Mrema, Executive Secretary of the Secretariat of the Convention on Biological Diversity made it clear that **"business and financial sectors have a central role to play in shifting global financial flows from negative to positive outcomes for nature"**.

Then, at COP26, over 30 financial institutions, representing US$8.7 trillion of global assets, committed to "best efforts to eliminate forest-risk agricultural commodity-driven deforestation activities at the companies in our investment portfolios and in our financing activities by 2025", focusing on palm oil, soy, cattle products, pulp, and paper[xxxii]. While positive and initially impressive, these institutions represent just a fraction of the US$119.5 trillion of assets under management (by the top 500 asset managers) and require only "best efforts". More collaboration and robust standards are needed.

There are a number of initiatives likely to make some impact in the short to medium term. The recently launched Taskforce on Nature-related Financial Disclosures (TNFD, see Box 1) has generated further interest. As publication of the framework (due for release in 2023) is likely to have a strong impact on affected sectors.

Box 1: Key finance initiatives on biodiversity

The Taskforce on Nature-related Financial Disclosures (TNFD)

The TNFD is the much-anticipated nature and biodiversity counterpart to the Task Force on Climate-related Financial Disclosures (TCFD). Launched on the 10 June 2021, it consists of a mixture of financial institutions and corporates and covers a broad range of global expertise. Building on the framework developed by the TCFD for reporting on climate-related risks, the TNFD will expand the discussion to include all nature-related risks. The TNFD is testing a beta version of the framework with sectors in 2022 and aiming to publish the framework itself in 2023. It's likely that the TNFD and TCFD will eventually be complementary. abrdn is currently a TNFD Forum Member.

One challenge the TNFD will need to overcome is tackling the data issues surrounding a disclosure framework on biodiversity.

We will be watching this area closely in future, reporting on it and encouraging our investee companies to align their reporting to the framework once it is developed.

The Natural Capital Finance Alliance (NCFA)

The NCFA is a finance sector-led initiative enabling banks, investors, and insurers to integrate natural-capital considerations into their risk management processes and decision-making frameworks. The NCFA Secretariat is run jointly by the UNEP Finance Initiative and Global Canopy, and its Steering Committee consists of leading financial institutions and environmental experts.

It has developed several key tools:

- ENCORE for exploring impacts and dependencies of the economy on nature
- The Drought Stress testing tool for incorporating drought scenarios into risk perception
- The Corporate Bonds Water Credit Risk Tool, that integrates water stress into company credit analysis
- And the Soft Commodity Forest-risk Assessment tool, for evaluating exposure to deforestation.

Business for Nature

Business for Nature is a global coalition that brings together business and conservation organizations and forward-thinking companies. To demonstrate and amplify a credible business voice on nature calling for governments to adopt policies to reverse nature loss in this decade.

In 2022 we became signatories to Business for Nature's call to action Nature is everyone's business. Joining more than 1,000 companies with revenues of US$ 4.7 trillion calling on governments to adopt policies now to reverse nature loss this decade.

Summary

We are dependent on nature. But unsustainable economic activity is driving destruction of nature and a species loss event not seen since the demise of the dinosaurs. This in turn has significant economic impacts, while exacerbating climate change.

The economic and social value of biodiversity has not historically been properly accounted for, and this is still the case today. The costs of biodiversity loss are still not priced – and thus internalised – into the decisions of governments, firms, and individuals. This failure lies behind the biodiversity crisis and developing more sustainable approaches is becoming ever-more urgent.

The loss of these resources and services are not just costs to our society but for the businesses whose raw materials and supply chains depend on them.

Increased understanding of the damage caused and the importance to our economy and society is driving demand for better policy and market correction.

But while biodiversity loss has played second fiddle to climate change in the past, there are signs that this is changing and that the two issues are starting to be seen as equally important and inextricably linked.

We are likely to see fast-moving changes within the regulatory landscape, demand from asset owners and in the range of investment solutions offered to them.

We have published a **second paper discussing why this issue is so relevant to investors** and the decisions they make. With a further paper coming on the challenges of measuring natural capital.

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