



Biodiversity Q&A: Understanding a powerful new investment theme

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As biodiversity becomes an increasingly important part of the global agenda – and of investment strategies – we tackle 10 of the most fundamental questions around the topic: What is biodiversity, why does it matter, and how might it affect investment decisions?

What is biodiversity?

Biodiversity is the variability of all living organisms from all sources, spanning all ecosystems across land and sea.¹ It encompasses the characteristics of living systems and includes everything from the diversity within a species to the diversity between species, and of the ecosystems in which they live.²

Human life and a healthy planet depend entirely on the complex interactions between living organisms in nature – interactions that sustain crops, provide clean drinking water, decompose waste, help to regulate the climate and more. We call these benefits ‘ecosystem services’. They are estimated to be worth more than \$150trn annually.³

The importance of biodiversity lies in how the activities of and interdependencies between living organisms enable ecosystems to function and consequently provide ecosystem services.⁴ Simply put, the more intact biodiversity is, the more

resilient things like food and water supply, erosion and flood control or carbon storage can be.

Biodiversity loss therefore has deeply damaging ramifications, not only through species decline but from the degradation of ecosystems and, ultimately, an undermining of the quantity, quality, and resilience of the goods and services that nature provides.

What is the current state of biodiversity and what is driving biodiversity loss?

Biodiversity on earth is deteriorating at an alarming rate, faster than any time in human history – and this can be predominantly traced back to human-induced changes.⁵

Human activity has been found to be responsible for severely altering around 66% of marine ecosystems and 75% of terrestrial ecosystems – as well as for the loss of 85% of wetlands.⁶ One million species currently face extinction, according to the United Nations (UN).

There are five direct drivers, also called pressures, which are responsible for biodiversity loss:⁷

- **Land and sea use change:** Habitat destruction and disturbance, land and soil degradation, deforestation, ecosystem conversion, etc.
- **Direct exploitation:** Excessive resource extraction like overfishing, overlogging, the over-extraction of freshwater, etc.

- **Climate change:** Global warming can disrupt ecosystems and intensify species decline
- **Pollution:** Of air, water, and soil in various forms, including plastic, nutrient, and chemical pollution
- **Invasive alien species:** The entry of non-native plants, animals and other organisms through agricultural production, tourism, global trade, etc.

Because these drivers interact with one another, a single economic activity can have knock-on effects that could trigger multiple drivers.⁸ Therefore we cannot effectively tackle the biodiversity crisis without addressing all of them.

How is biodiversity linked to climate change?

Biodiversity loss and climate change are interconnected systemic risks – it is impossible to address one without reference to the other. Climate change is one of the drivers of biodiversity loss and will likely overtake land use change to become the largest contributor beyond 2050.⁹ At the same time, nature and biodiversity can provide valuable climate change adaptation and mitigation solutions, for instance acting as carbon sinks and natural buffers against extreme weather events. Land and marine ecosystems absorb more than half of man-made carbon emissions.¹⁰ The relationship between them is such that negative impacts from one could hamper our ability to combat the other.

One useful example to understand these circular links might be wildfires in California, where rising temperatures have made vast areas of vegetation more flammable, releasing huge amounts of stored carbon dioxide into the atmosphere – meanwhile removing a potential natural source of carbon capture. As the ecosystem degrades, so does its adaptive capacity. Reversing biodiversity loss through well-managed regrowth, however, could help to restore biodiversity and important climate co-benefits.¹¹

What are the economic implications of biodiversity loss? How might this affect investors?

Over half of global GDP depends on high-functioning biodiversity¹² and ecosystems degradation costs the global economy more than \$5trn each year in the form of lost ecosystem services.¹³ Biodiversity loss also poses economic risks linked to major fluctuations in raw material costs and disruptions to operations and supply chains. The World Bank estimates that the collapse of three ecosystem services alone – wild pollination, timber supply and fish supply – would cost 2.3% of global GDP by 2030.¹⁴

For investors, it is becoming increasingly important to consider how biodiversity loss might impact long-term portfolio sustainability – namely in the form of business and market disruptions, reputational and regulatory risks, and potentially lower returns. Therefore, integrating biodiversity considerations into investment activities, including prioritising biodiversity-friendly investments, may be key to managing these risks and contributing to positive social and environmental outcomes.

What sectors contribute the most to biodiversity loss and which are most at risk?

Biodiversity loss is relevant to all sectors. All parts of the economy have some degree of dependency on nature and generate impacts through their activities. However, for the agriculture, forestry and fishing, mining, and manufacturing sectors, these dynamics are the most acute.

Unsurprisingly, primary-sector activities are arguably the most confronted by the need for greater sustainability in the use of natural resources. Cultivation and extraction are inherently resource-intensive and prone to exerting significant pressures on the environment.

In **agri-food**, land-use change is the main driver of biodiversity loss within the sector, namely as large tracts of land are needed for crop cultivation and livestock farming. Agricultural expansion has reached the point where over a third of terrestrial land surface is being used for crops and livestock.¹⁵

In the **mining** sector, water extraction and pollution as well as land-use change are prone to placing significant pressures on biodiversity.¹⁶ For example, mining can be freshwater-intensive, leading to risks for water-scarce areas and processing activities can release toxic compounds into water. Meanwhile, extraction not only alters natural landscapes but necessitates expansion once an area's resources become unexploitable.

Manufacturing spans various value chains, with its impacts differing based on the inputs and outputs involved in manufacturing processes as well as the final products.¹⁷ In textiles for example, upstream land-use change initiated by suppliers of natural fibres may often be the most relevant driver.¹⁸ Meanwhile in chemical manufacturing, water pollution can be particularly harmful in terms of biodiversity degradation.¹⁹

How can we understand and measure a company's impact on biodiversity?

One of the most common ways to try and measure a company's impact on biodiversity is through a biodiversity footprint. There is currently no broadly accepted metric for this²⁰ and there are a number of different tools available.²¹ In many ways, this may reflect the complexity of biodiversity itself as well as the differing needs and applications of the institutions that use them.

At AXA IM, we use a metric called the Corporate Biodiversity Footprint (CBF), developed by Iceberg Data Lab in which we have a shareholding. It aims to estimate the negative impact on biodiversity of a company's economic activities, across its value chain, in a given year. It takes into account the impact from different drivers (e.g. land-use change, climate change, pollution) associated with a company's processes, products, and supply chains.

The CBF is no different to other environmental footprints in that it expresses the estimated environmental impact of a given economic activity. This impact can be positive or negative. For now, the CBF measures only negative impacts, in absolute terms, and expressed spatially in square kilometres (km²) of mean species abundance (MSA) – a recognised proxy for the intactness of biodiversity compared to a pristine, undisturbed state. For example a CBF of -100km² MSA would tell us that the pressures generated by a company's activities during a given year are estimated to have degraded entirely the biodiversity of an area equivalent to 100km².

The CBF can be broken down by scope (1, 2 and 3, as for climate²²) and by pressure, helping to pinpoint a company's greatest levers to act. Developments to expand the CBF's ability to measure positive impacts as well as communicate net impacts will help to provide a more complete picture of a company's full impact on biodiversity.

What is being done to combat biodiversity loss right now?

A growing awareness of threats to biodiversity has propelled greater regulatory and industry efforts over time. Most recently, at the UN biodiversity conference COP15 in December 2022, countries reached a landmark agreement, adopting the Post-2020 Global Biodiversity Framework (GBF) – biodiversity's equivalent to the Paris Agreement on climate change.²³

The GBF provides all stakeholders globally with a roadmap to halt and reverse biodiversity loss by 2030 to achieve a shared

vision for "living in harmony with nature by 2050". It lays out 23 specific targets under four overarching goals. Among the most cited is the GBF's so-called '30 by 30' target: To conserve and protect at least 30% of the world's land and seas by 2030.²⁴ And while expanding protected areas may mostly concern sovereigns, all actors have a role in enforcing sustainable management across the remaining 70%.

As governments work to translate these targets into national strategies and action plans, industry momentum continues to grow. Companies and financial institutions are already starting to assess their impacts on biodiversity and develop initiatives to combat biodiversity loss. While these are still nascent, the GBF is arguably providing additional impetus through several of its targets²⁵ that concern the private sector – calling for the integration of biodiversity across sectors, for the alignment and scaling up of financial flows, and for monitoring, assessment and disclosure.



Does tackling biodiversity require a different approach to climate change?

There are structural differences that make combatting biodiversity loss more complex than climate change. While climate change has a single driver – greenhouse gas (GHG) emissions – biodiversity loss has multiple drivers. Added to that, while the relationship between GHG emissions and global warming is linear, the relationship between the various drivers and biodiversity loss is not. The cause-effect interactions between them are more nuanced as all drivers do not produce the same level of impact and some drivers can compound others.

Biodiversity is also inherently local. As each ecosystem is distinct and each component has a specific role, what is needed for one ecosystem to function may differ from another.²⁶ Accordingly, interventions to halt and reverse biodiversity loss are often site-specific, and biodiversity loss in one location cannot also be readily offset in another, unlike GHG emissions.²⁷

Ultimately, biodiversity loss is multi-faceted and so are the targets, indicators, and solutions deployed to address it. But despite their differences, there is an imperative for biodiversity and climate to be addressed together. With both challenges converging towards 2030 and 2050 milestones, biodiversity will need to be at the heart of any net zero ambition – although this may come with both synergies and trade-offs.²⁸ Critically, much of what is taking shape to combat biodiversity builds upon existing industry standards and regulatory trends around climate, permitting us to mobilise faster.

How does biodiversity align with the UN Sustainable Development Goals?

Biodiversity and the UN Sustainable Development Goals (SDGs) are mutually reinforcing. Any business or investor striving to contribute to the SDGs needs to address biodiversity, and by addressing biodiversity one is, in turn, enabling the SDGs.

The two are explicitly connected through SDGs 14 and 15, which relate to marine and terrestrial ecosystems. However, biodiversity is also the essential undercurrent to most SDGs for its fundamental role in guaranteeing human wellbeing, a healthy planet, and economic prosperity for all people.²⁹

At its current trajectory, biodiversity loss will undermine progress towards 80% of the SDGs related to poverty, hunger, health, water, cities, climate, as well as oceans and land mentioned above.³⁰ What's more, pathways to achieving SDGs 7, 8, 9 and 12³¹ could have negative – or positive – impacts on biodiversity and therefore hinder – or enable – the achievement of other SDGs.³²

In recognition of this relationship, the GBF is positioned as both a contributor to, and a necessary condition for, the fulfilment of the SDGs.

What potential investment opportunities are presented by the fight against biodiversity loss?

The imperative for new sustainable production and consumption models brings with it a myriad of potential investment opportunities. One way our capital can have an impact is by investing in companies that are providing solutions to biodiversity loss – through alternative products, services and technologies which better preserve and support ecosystems. This could be in areas such as precision or regenerative agriculture, plant-based foods, sustainable packaging, and water treatment.

Fixed income investors can also play a part in protecting biodiversity through impact bonds – bonds where the proceeds are used to tackle environmental or social challenges. The finance raised through green bonds in particular can be used to finance biodiversity-related projects. Sustainability-linked bonds (SLBs) may offer complementary and more widespread potential investment opportunities as this market matures. In many ways, SLBs may be better adapted to the way in which most issuers will have to confront the biodiversity challenge. This will likely be less focused on growing nature-based assets, and more about rethinking business processes, sourcing, and products to minimise negative impacts – all of which can be articulated through target setting and financed through an SLB.

As companies increasingly take biodiversity into account and set biodiversity-related targets, we expect to see more potential investment opportunities arise.

¹ [Global assessment report on the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services](#), IPBES, 2019.

² Article 2 of [The Convention of Biological Diversity](#), 1992.

³ [The Biodiversity Crisis Is a Business Crisis](#), BCG – Boston Consulting Group, March 2021.

⁴ [The Economics of Biodiversity: The Dasgupta Review](#), Dasgupta, P., 2021.

⁵ [Global assessment report on the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services](#), IPBES, 2019.

⁶ [The Biodiversity Crisis Is a Business Crisis](#), BCG – Boston Consulting Group, March 2021.

⁷ [Global assessment report on the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services](#), IPBES, 2019.

⁸ [PBAF Q&A: Introduction to Biodiversity Impact Assessment](#), PBAF, 2022.

⁹ [Global Biodiversity Outlook 5](#), Convention on Biological Diversity, 2020

¹⁰ [Biodiversity and Climate Change](#), IPBES and IPCC, June 2021

¹¹ [California's 2020 Wildfires Negated Years of Emission Cuts](#), Scientific American, October 2022

¹² WEF, 2020

¹³ [The Biodiversity Crisis Is a Business Crisis](#), BCG – Boston Consulting Group, March 2021.

¹⁴ World Bank, 2021

¹⁵ [Global assessment report on the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services](#), IPEBS, 2019.

¹⁶ IPEBS; [Sectoral Materiality Tool](#), Science Based Targets Network, January, 2022..

¹⁷ Biodiversity Mainstreaming in the Manufacturing and Processing Sector, CBD Subsidiary Body on Implementation, 2018.

¹⁸ Based on data from Iceberg Data Lab

¹⁹ Based on data from Iceberg Data Lab. Biodiversity Mainstreaming in the Manufacturing and Processing Sector, CBD Subsidiary Body on Implementation, 2018. IPEBS also discusses the impacts on freshwater biodiversity and water ecosystems.

²⁰ [PBAF Q&A: Introduction to Biodiversity Impact Assessment](#), PBAF, 2022

²¹ They are enumerated in Finance for Biodiversity's [Guide on Biodiversity Measurement Approaches](#).

²² Scope 1 refers to direct impacts from a company's own operations while scopes 2 and 3 covers indirect impacts, whether from supply chains, raw materials use or consumer behaviour.

²³ Also called the [Kunming-Montreal Global Biodiversity Framework](#)

²⁴ Target 3. This deals with area-based conservation. The GBF mentions that conservation and management should be done through systems of protected areas and other effective area-based conservation measures.

²⁵ Targets 14, 15, and 19, although other targets to reduce threats and advocating sustainable use and consumption are also relevant.

²⁶ [The Economics of Biodiversity: The Dasgupta Review](#), Dasgupta, P., 2021.

²⁷ The notion of equivalence is a distinct challenge for biodiversity offsets.

²⁸ [Biodiversity and Climate Change: Workop Report](#), IPCC & IPEBS, 2021.

²⁹ [Kunming-Montreal Global Biodiversity Framework](#).

³⁰ [Global assessment report on the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services](#), IPEBS, 2019.

³¹ Energy, Economic Growth, Industry & Infrastructure, Sustainable Consumption & Production

³² [Global assessment report on the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services](#), IPEBS, 2019.

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