



SEEING THE WOOD FOR THE TREES

**A PRAGMATIC APPROACH TO BIODIVERSITY
FOR INVESTORS AND ISSUERS**

“The greater the biodiversity, the more secure will be all life on Earth.”

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EXECUTIVE SUMMARY

- Biodiversity is mobile, silent, and invisible. Identifying, quantifying and tracing impacts on biodiversity is complex. Often, harms to biodiversity only become visible when already severe.
- The direct links between company operations, products, or services and biodiversity are often hard to trace, but over time the environmental impacts of our economic activities can alter the biodiversity that underpins the economy.
- Investors need a practical approach for addressing biodiversity as an integral part of their investment process.
- We propose a pragmatic approach that differentiates between:
 - **Idiosyncratic risks:** companies and assets with specific biodiversity-related risks that need to be addressed at the company- or asset-level.
 - **Systemic risks:** companies and assets whose economic activities contribute to biodiversity-related systemic risk that need to be addressed from an environmental impact perspective.
- We believe that segregating risk and impact assessments can help companies and investors deploy their resources effectively.
- It will be each individual company's and investor's choice as to whether they look at biodiversity purely through a financial materiality lens, or to adopt a broader scope that addresses systemic environmental issues, which will require a focus on the environmental impacts of their activities or investments.

BIODIVERSITY AND THE ECONOMY

Biodiversity is the cornerstone of global economic stability, underpinning essential ecosystem services such as pollination, water purification and climate regulation. There have been various attempts to quantify the financial value of biodiversity, none of which are perfect and all of which surely underestimate the true amount. Nonetheless, one recent study estimated that nearly half of global GDP is moderately or highly dependent on nature¹. Yet the bedrock of our natural world is eroding. It is estimated that biodiversity has decreased to beyond ‘safe limits’ across nearly 60% of the world’s land surface², and species are disappearing faster than at any other time in human history.³ As more species are lost, the intricate web of interactions within the ecosystem is disrupted, leading to a cascade of negative effects.⁴ The loss of pollinators, for example, affects plant reproduction, which in turn impacts herbivores and the predators that rely on them. The loss of a keystone species can cause an entire ecosystem to collapse, leading to rapid and cascading impacts on the stability and resilience of our natural world.

Biodiversity loss has a profound impact on both local and global economies. The World Bank estimates that biodiversity loss could reduce global GDP by \$2.7 trillion⁵ annually by 2030, with the equivalent of a quarter of annual GDP being ‘lost’ today because of unsustainable business practices across sectors such as agriculture, energy and fisheries⁶. The drivers of biodiversity loss differ across ecosystems and geographies. Climate change is a key driver, as rising temperatures and extreme weather events lead to changes in habitats, migration of species and changes in breeding or flowering. Other dominant drivers are tied to economic activities such as changes in land and sea use, proliferation of invasive species, pollution and direct exploitation of organisms⁷.

In response to the growing recognition of both our economic and financial dependency on biodiversity and the impact of human activities on biodiversity loss, a growing number of frameworks and approaches are calling on businesses to disclose their dependencies and impacts on biodiversity, and to progressively reduce negative and increase positive impacts. More companies are responding in varying ways, ranging from setting targets to protect and restore habitats, to seeking to reduce negative environmental impacts. However, many are struggling to develop effective responses due to the complexity of the topic and the costs of addressing it. Risks of greenwashing are also high; many companies continue to view biodiversity through the lens of public affairs rather than as a core operational issue, and the lack of common standards for biodiversity projects or credits can lead to low-quality investments by corporates.

For investors with large, diversified portfolios, the challenge is even greater: many seek to manage the financial risks of biodiversity loss for their investments, while others also strive to address the impacts of their investments on biodiversity as part of dealing with systemic risks arising from biodiversity loss.

Regulators are also increasingly recognising the critical economic value of biodiversity and the systemic risks posed by its decline. We expect a shift from voluntary biodiversity-related disclosure frameworks towards some mandatory disclosures in the medium term, with the introduction of mandatory disclosures in many markets.

¹ Jan 2020, World Economic Forum, Nature Risk Rising: Why the crisis engulfing nature matters for business and the economy, [wwf-g20-open-letter-to-the-g20sfwg-2025-june 1 1 1.pdf](https://www.weforum.org/publications/nature-risk-rising-why-the-crisis-engulfing-nature-matters-for-business-and-the-economy)

² July 2016, Science, ‘Has land use pushed terrestrial biodiversity beyond the planetary boundary? A global assessment

³ Feb 2021, The Economics of Biodiversity The Dasgupta Review: Headline Messages.

⁴ See the IUCN Red List: <https://www.iucnredlist.org/>

⁵ June 2021, World Bank Group, The Economic Case for Nature.

⁶ Dec 2024, IPBES, Thematic Assessment Report on the Interlinkages among Biodiversity, Water, Food and Health of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services.

⁷ Kunming-Montreal Global Biodiversity Framework, <https://www.cbd.int/doc/decisions/cop-15/cop-15-dec-04-en.pdf>

ECONOMIC DEPENDENCIES ON BIODIVERSITY

Biodiversity’s absence from the boardroom is partly because only a few economic activities have a direct dependency on biodiversity, and, whilst many companies have indirect dependencies on the functional benefits derived from biodiversity, these are hard to map directly to business operations, products, or services.

As most ecosystem services are treated as public goods, companies without well-understood dependencies on biodiversity lack economic incentives to safeguard them, which leads to overexploitation and chronic underinvestment. Often, the ecosystem services on which a company depends are not within its direct control. This also points to some of the ‘free rider’ challenges for corporate action on biodiversity; companies may only be able to deliver positive outcomes in collaboration with other companies and government policy.

Figure 1: Examples of direct ecosystem services derived from biodiversity and their economic implications

Ecosystem service linked to biodiversity	Economic activities supported
Pollination	Agriculture, food production
Water purification	Utilities, public health
Fisheries	Food, employment, trade/export
Medicinal properties	Drug development, healthcare
Soil regulation	Food production, emissions reduction
Nature-based recreation and leisure	Travel, employment, conservation
Storm and flood regulation	Insurance provision/risk transfer

The decline of ecosystem services driven by biodiversity loss can have far-reaching negative economic and financial impacts. This includes higher operational costs and decreased yields, leading to risks such as increased default rates, falling asset values, market volatility, insured losses and inflationary shocks – all of which can materially impact corporate performance and investment returns. Wider economic risks can be exacerbated by the dynamic nature of ecosystems, which can progress rapidly from stability to collapse⁸. Pressures on biodiversity increase the risk of ‘ecosystem tipping points’ in the Amazon, boreal forests, coral reefs, mangroves and peatlands. Crossing any of these tipping points could trigger significant disruptions to global economies and capital markets, with material implications for long term investment stability.

⁸ For example, the Aral Sea collapse led to the loss of the Central Asian fishing economy, a large regional decline in agriculture and the replacement of shipping with more costly land-based transport. The loss of Caribbean coral reefs, meanwhile, has led to large losses in tourism and fisheries revenue of at least 40%, and significantly higher coastal protection capital expenditure costs (Global Coral Reef Monitoring Network, 2024)

Figure 2: Ecosystem tipping points and examples of associated economic or financial risks⁹

Ecosystem tipping point	Risk of breach	Examples of associated economic or financial risks
Amazon dieback	High – land use and climate feedback intensifying	<p>Credit risk: industrial production disruptions and rising costs linked to declining hydropower output</p> <p>Market risk: season-wide crop failures impacting agricultural supply chains</p> <p>Underwriting risks: rising insurance claims and production losses linked to severe weather damage</p>
Boreal forest transitions	Moderate - slower shifts than tropical ecosystems	<p>Credit risk: declining asset/property values linked to more severe wildfires and insurance affordability challenges</p> <p>Market risk: permanent supply disruptions could lead to revenue declines for companies in the timber supply chain</p> <p>Underwriting risk: large-scale property and infrastructure damage</p>
Coral reef die-off	Very high – evidence temperature tipping points already exceeded	<p>Credit risk: decline in property values in coastal regions and associated decrease in collateral value for secured loans</p> <p>Market risk: collapse in fisheries production, impacting market value of seafood companies</p> <p>Underwriting risk: increasing insurance claims beyond expected levels with more severe flood and storm damages</p>
Mangrove dieback	Moderate – localised rather than global over the next decade	<p>Credit risk: rising costs for households from storm damage, impairing credit and debt servicing</p> <p>Underwriting risk: rising property losses and insurance claims beyond expected levels</p>
Tropical peatlands collapse	Moderate – drainage and fire risk key pressures in SE Asia	<p>Credit risk: loss of revenues and creditworthiness linked to crop production losses, decline in agricultural land and asset values</p> <p>Market risk: decline in market value of securities linked to government or key commodity producers in agricultural producing regions</p> <p>Underwriting risk: increase in agricultural and health insurance claims beyond expected levels because of more frequent and intense fires</p>

⁹March 2023, UCL Institute for Innovation and Public Purpose, Ecosystem tipping points: Understanding the risks to the economy and the financial system.

THE IMPACT OF ECONOMIC ACTIVITIES ON BIODIVERSITY

Drivers of biodiversity loss are complex and include both direct, such as land use change, water withdrawal, pollution, and indirect, such as demographic, technological, economic and institutional shifts, military conflicts, epidemics, etc.¹⁰.

Direct drivers of biodiversity loss include:

1. **Land use change and habitat conversion** because of agriculture, urbanisation, infrastructure and extractive industries
2. **Pollution of air, soil and water** through industrial emissions, agricultural runoff and plastic waste
3. **Overexploitation of natural resources** caused by demand for timber, overfishing, etc.
4. **Climate change**, which rapidly alters species distribution, disrupts reproduction cycles and leads to an increase in the frequency and intensity of extreme weather events
5. **Invasive species spread** through trade, travel and other economic activities

Indirect drivers of biodiversity loss are typically less obvious but can accumulate significantly over time. For example, rising affluence tends to shift dietary patterns towards higher meat consumption, driving land conversion. Similarly, demographic shifts towards single occupancy households tend to be associated with greater overall consumption and land use change, both of which have detrimental effects on biodiversity.

Over time, all economic activities can have negative impacts on biodiversity, although the impact pathways are more visible for some activities, such as land clearance for agriculture, than others, such as the leakage of plastics into the ocean. Impacts in one ecosystem can also influence others. For example, freshwater biodiversity is heavily affected by fertiliser-driven pollution. At the same time, fertiliser overuse is often incentivised by government policies such as subsidies, intended to support food security and rural livelihoods. These incentives can result in unintended external costs, such as biodiversity loss and increased water treatment expenses for communities and other economic stakeholders.

Additionally, negative impacts on biodiversity are not evenly distributed across the globe. Nearly two-thirds of global biodiversity loss is concentrated in a small group of countries, including Brazil, China, Indonesia, Malaysia, Papua New Guinea, India, Australia and the USA.¹¹ Many of these countries are major producers of agricultural, forest and fisheries products for both domestic and international markets. The economic and social value of these production activities often discourages measures that would support biodiversity, such as expanding protected areas, while penalties for habitat destruction tend to be insignificant.

The contribution of end consumers to biodiversity loss also needs to be considered, alongside the impacts of production. For example, biodiversity impacts linked to global supply chains between 1995 and 2022 have indicated that 80% of global land-use change impacts were associated with increased agrifood exports from Latin America, Africa and Southeast Asia. Conversely, increased agrifood imports to China, the USA, Europe and the Middle East accounted for almost 60% of land use change – despite these regions increasingly reducing domestic impacts on biodiversity through ecological restoration efforts.¹²

The spread of invasive species is another example of this challenge and is typically driven by cross-border trade. Whether ultimate responsibility for associated biodiversity loss sits with the producing country, the importing country, or the end consumer of goods is a complex issue. Whilst regulators historically have focused on producing regions, there is a growing trend towards engaging with importers and buyers.

¹⁰ 2025, UN Environment, Biodiversity Economics

¹¹ Oct 2017, Nature, Vol. 551, pp.364-367, Reductions in Global Biodiversity Loss Predicted from Conservation Spending

¹² Sept 2024, Nature Sustainability, Vol. 7, No. 1512-1524, Biodiversity impacts of recent land use change driven by increases in agri-food imports.

For companies, negative biodiversity impacts often extend beyond their own operations and occur across the value chain. These impacts can arise upstream, such as through raw material sourcing, or downstream, through product use. Consequently, a company's ability to mitigate negative biodiversity impacts across the value chain depends largely on its supply chain complexity and the strength of its relationships with suppliers and customers. For example, commodities such as palm oil have faced heightened regulatory scrutiny and reputational concerns, prompting many firms to rationalise their supply chains and gain clearer visibility on sourcing locations.

As investors become more informed about how companies' impacts on biodiversity, particularly through indirect links, contribute to systemic risks associated with biodiversity loss, the expectations on companies to understand their full value chains and engage proactively with suppliers and customers to identify and manage their negative biodiversity impacts grow. The falling costs and improved access to satellite imagery also makes it easier to monitor changes in land use by external parties. For example, information on changes in forest cover is being used by investors, who increasingly use deforestation risk as a proxy for negative impacts on biodiversity, given the relative ease of monitoring and availability of data.

**BIODIVERSITY IS THE CORNERSTONE OF GLOBAL
ECONOMIC STABILITY, UNDERPINNING ESSENTIAL
ECOSYSTEM SERVICES SUCH AS POLLINATION, WATER
PURIFICATION AND CLIMATE REGULATION.**

ASSESSING BIODIVERSITY-RELATED RISKS AND IMPACTS

Addressing biodiversity-related risks and impacts requires accounting for the unique characteristics of biodiversity, including:

- **Dynamic nature:** Biodiversity is not an isolated risk. It is deeply embedded in and is interconnected with all aspects of the natural world. Its processes are mobile (such as pollutant dispersion); invisible (such as microbial activity in soil) and silent (for example, carbon sequestration). These characteristics make biodiversity difficult to measure, monitor, and manage using traditional risk frameworks, which are designed for more visible or static risks.
- **Multiple drivers:** Unlike climate change - where emissions are the primary driver of impact - for biodiversity loss multiple drivers such as land use change, pollution and invasive species interact in complex ways. Companies typically report on local biodiversity outcomes, rather than their contribution to the drivers of biodiversity loss.
- **Challenges in measurement:** Unlike carbon emissions, water use, or pollution, which can be assessed through standardised, comparable metrics, impacts on biodiversity are localised and often indirect. This makes it difficult to consistently attribute and quantify them across companies or regions. Additionally, the metrics used by companies to measure impacts, often do not align well to 'state of nature' indicators used by policymakers¹³, thus limiting their usefulness for broader biodiversity assessments.
- **Limited (direct) financial materiality:** Ecosystem services enabled by biodiversity are typically treated as a public good, meaning that degradation of biodiversity rarely results in significant financial repercussions for economic stakeholders.
- **Concentrated dependencies:** Only a small number of industries (e.g. agriculture, forestry, pharmaceuticals) have *direct* material economic dependencies on biodiversity.
- **Challenges in aligning systemic risk to idiosyncratic business risk:** Biodiversity loss contributes to systemic risks, such as climate change or ecosystem collapse, which can affect entire economies and financial systems. These risks are difficult to diversify away from and may emerge rapidly or unexpectedly, making them challenging to manage through traditional business-, asset-, or portfolio-level risk assessment and mitigation. Addressing systemic risk arising from the loss of biodiversity requires minimising the environmental harm caused by economic activities, and, where such localised impacts are unavoidable, offsetting them through the protection and restoration of natural habitats.

¹³ For example, companies typically rely on proxy data such as changes in habitat extent or condition, whereas policymakers usually rely on empirical data such as species population and extinction vulnerability.

RISK ASSESSMENT TOOLS

Several free tools exist to support companies and investors in assessing biodiversity-related risks. Some focus on sectoral risk exposure either from a value chain perspective or from an operational perspective. Others use a location-specific approach.

Sectoral Risk Exposure

Sectoral risk exposure can be assessed using tools leveraging academic research on nature-related risks in operations and supply chains, for example the Science Based Target Network (SBTN) Sector Materiality Tool¹⁴, which lists upstream and downstream nature dependencies by sector; however, it does not address biodiversity explicitly, offering instead, broader considerations, such as ecosystem condition. The ENCORE tool¹⁵ - widely applied by companies undertaking nature risk assessments – has recently been updated with a stronger focus on upstream and downstream biodiversity-related risks and dependencies, but the tool generally focuses on operational sources of risk. Such tools can be used together to help develop a holistic view of operational and value chain sources of material biodiversity-related business risk, if only from a sectoral exposure perspective. Our analysis of risk and impact materiality in this paper, is to some degree, informed by these tools. It is important to caveat that both resources are designed as high-level screening tools providing a foundation for deeper company-level analysis and that alternative approaches are both available and may be preferable. For instance, in our experience, in-depth, bottom up research can offer many of the same insights as these tools, while capturing important nuances that the tools miss.

Location Risk Exposure

Companies in *high-impact, visible* sectors such as mining and agriculture will be familiar with location- or asset-specific environmental risk assessments, typically conducted through project appraisals and environmental impact assessments. This approach is relevant for all entities that own or operate assets with a large physical footprint such as power generation and distribution, construction and transport, where even the perception of high negative environmental impacts can lead to intense media scrutiny, opposition to new developments, permitting restrictions, and disruption to day-to-day operations. To support biodiversity risk assessment, a range of tools are available to help assess negative impacts and develop mitigation plans¹⁶.

Whilst the above tools are freely available and do not, in principle, require specialist expertise in biodiversity or ecology, in practice their complexity, linking production processes, ecosystem services and natural capital assets, can make using such tools challenging for non-specialists. For many companies, a simple materiality assessment will help establish whether the resources for more detailed location risk exposure are needed.

Entity Specific Characteristics

In addition to sectoral and geographical risks, entity- or product-specific characteristics can be an important part of biodiversity risk assessment. For example, so-called ‘forest risk commodities¹⁷’ are linked to deforestation and overall global biodiversity loss, and, therefore, typically have a high biodiversity risk profile. For these sectors, it may be insufficient to rely on sectoral and geographical risk analysis, but product-level assessment may also be considered to establish biodiversity-related risks in the production processes and/or supply chains. Again, the resources required to undertake this level of analysis need to be balanced against the probability and severity of risks.

¹⁴ Science Based Targets Network, Materiality Screening, <https://sciencebasedtargetsnetwork.org/companies/take-action/assess/materiality-screening/>

¹⁵ Exploring Natural Capital Opportunities, Risks and Exposure, <https://www.encorenature.org/en>

¹⁶ We provide an overview of these tools in the Excel appendix file of this report.

¹⁷ Forest risk commodities refer to agricultural products that are significant drivers of deforestation, including cattle, soy, palm oil, cocoa, and timber.

IMPACT ASSESSMENT TOOLS

Applying an impact lens to biodiversity loss also presents a major challenge for companies and investors given the complexity of its underlying drivers. Unlike climate change, the driver of which can be measured through a single comparable metric (tonnes of CO2 equivalent), biodiversity loss results from multiple pressures. These pressures can lead to a wide range of localised outcomes, including a reduction in genetic diversity and species richness and endemism, as well as ecosystem integrity. In practice, this means that attempting to quantify company or asset specific impacts on biodiversity and attributing changes in ecosystem conditions to specific economic activities requires significant time, resources and is often costly.

Understanding *where* negative biodiversity impacts occur within the company's value chain - for example, operations versus product design - helps to focus analysis and mitigation efforts. Where environmental impacts are within a company's direct control, such as those arising from operations, companies can identify and develop strategies to minimise material harm, including setting performance targets at the entity and individual asset levels. Where environmental impacts occur indirectly, such as a result of raw material sourcing (e.g. agricultural feedstocks), or product use (e.g. application and disposal of chemical products by consumers), companies can work with suppliers, review product design from a cradle-to-grave product lifecycle perspective, engage with major clients and consumers, as well as policymakers as appropriate.

Whilst only an approximation of real-world impact, tools such as biodiversity footprints can help companies identify major sources of biodiversity impact through their activities and take action to minimise them over time. Normalising these biodiversity impacts to a single output metric can help companies communicate progress but greater value lies in understanding how the company's wider environmental impacts contribute to biodiversity loss and where it should focus its mitigation efforts. This requires breaking impacts down into their effects on individual drivers of biodiversity loss.

When companies are informed about their main environmental impacts, and, ideally, how these environmental impacts affect biodiversity, they can focus on reducing and minimising them without needing to build deep internal biodiversity expertise or use sophisticated biodiversity assessment tools. In fact, most companies already have a good grasp of their major environmental impacts and by focusing on minimising these, they can indirectly reduce their contribution to the causes of biodiversity loss and, by extension, help to reduce systemic risks to the economy.

CHALLENGES WITH EXISTING BIODIVERSITY FRAMEWORKS

For global companies operating across diverse geographies, and for investors managing diversified portfolios, the task of identifying, measuring, and prioritising biodiversity exposure is often daunting. Biodiversity's complexity is compounded by scientific uncertainty, limited data availability, and countless ecological processes that are not easy to map onto business activities or quantify in financial terms.

While a number of voluntary and regulatory frameworks have emerged to support wider biodiversity and nature reporting¹⁸, challenges for both companies and investors in applying existing disclosure frameworks include:

- **Materiality challenges** – whilst frameworks such as TNFD encourage disclosure based on financial and non-financial materiality, many firms struggle to link biodiversity risks to financial outcomes. Experience from CSRD reporting has highlighted that many companies operating in high-impact sectors, such as for example chemicals, opt not to disclose biodiversity-related risks on the perception of low financial materiality.

¹⁸ Detailed in Excel Appendix file.

- **Challenges relating to location-specific analysis** – this is a core element of TNFD and other frameworks, but determining local ecosystem conditions and linking them to company activities is often complex and costly. Additionally, the lack of comparable metrics and data across geographies makes comparisons difficult.
- **Limited internal resources and expertise** – the overall complexity of biodiversity assessment (in comparison to other areas of environmental impact) typically requires the acquisition of specialist expertise or other resources, which may be challenging for smaller firms.
- **Comparability of outputs** – this is a key challenge for investors trying to utilise company disclosures in portfolio analysis. Unlike carbon or water, biodiversity lacks simple, well-understood, standardised metrics, and thus limits the usefulness of these disclosures for decision-making. Even where there is a push towards standardised metrics, such as species richness or local habitat condition, these indicators still fail to establish direct links to specific company actions.
- **High costs** – Assessing biodiversity risks and impacts is resource-intensive for both companies and investors, with clear costs but benefits that are difficult to quantify. Given finite resources and multiple competing risks to evaluate, allocating more attention to biodiversity often means diverting it from other priorities. The difficulty and imprecision of assessing biodiversity risks and impacts lead many to focus their efforts elsewhere.

For companies, the cost of detailed location-based mapping of local ecosystems condition is difficult to justify where both financial risks and negative impacts on biodiversity are seen as immaterial or indirect, while the ability to influence biodiversity outcomes is unclear as changes in biodiversity metrics often cannot be linked directly to company actions.

A practical approach would be to collect and disclose site-level biodiversity-related information only for sites where activities cause significant, direct negative impacts on biodiversity. This typically includes activities involving land-use change, major environmental pollution, or activities that affect a company's licence to operate, such as mining, construction, infrastructure development, or oil and gas drilling. In many cases, collection of this data should already be mandated within local regulatory frameworks. However, transparent disclosure to investors and the implementation of mitigation measures aligned with TNFD recommendations can help demonstrate proactive management of biodiversity-related risks and impacts.

For investors, approaching biodiversity from a perspective of biodiversity outcomes (e.g. improving species richness or habitat condition metrics) will result in limited application across investment portfolios.

ADDRESSING BIODIVERSITY-RELATED RISKS AND IMPACTS

For some industries, such as agriculture, forestry, pulp and paper, the biodiversity-related risks to the business arise from direct dependencies on nature. For other sectors, these dependencies are obscured by the complexity of supply chains, where key reliance on biodiversity may be many stages removed from the company.

Building a good understanding of the sources of biodiversity risk and the available options to mitigate these risks is important for both companies and investors. Given the significant resources required to assess biodiversity-related risks and the differing financial materiality of such risks, tailoring the assessment approach to the specific sources of risk helps ensure proportionality and reduces costs. We find that most sources of biodiversity-related risk fall into the following high-level categories:

- **Direct dependencies:** industries whose business models fundamentally rely on nature and biodiversity (e.g., agriculture, forestry, fisheries etc.).
- **Licence to operate** industries whose operations pose significant threats to biodiversity and are subject to heightened societal or regulatory scrutiny (e.g., mining, energy, infrastructure etc.).
- **Indirect dependencies:** sectors that depend on biodiversity via supply chains, sourcing, or downstream impacts (e.g. commodity trading, tourism etc.).

DIRECT DEPENDENCIES

Figure 4: Typical direct dependencies by sector

GICS Sector/Sub-Sector	Transmission channel
Food, Beverage & Tobacco	Partial ecosystem services collapse negatively affecting multiple industries - primary food production and associated activities
Chemicals	Loss of agricultural feedstocks for speciality chemicals
Containers & Packaging	Reduced forest productivity, scarcity in supply of raw materials and supply chain disruption
Paper & Forest Products	Reduced forest productivity, scarcity in supply of forest products and supply chain disruption
Pharmaceuticals, Biotechnology & Life Sciences	Loss of genetic resources for pharmaceutical and biotechnology development
Personal Care Products	Reduced productivity of natural ingredients, supply chain disruption
Apparel, Accessories & Luxury Goods	Reduced productivity of natural ingredients, supply chain disruption
Water Utilities	Degraded watershed health, resulting in higher treatment costs, increased energy use, and capital expenditure

A prime example of direct dependency risks relates to pollinators. In agriculture, around 75% of different crop types depend on biodiversity for pollination. Tropical crops that many lower-income countries rely upon for trade such as coffee, cocoa, soybeans and nuts are partially or fully dependent on pollinators, making their yields particularly vulnerable to biodiversity loss. The volume of agricultural production dependent on pollinators has increased by over 300% in the past 50 years.¹⁹ At the same time, at least 40% of pollinating species face extinction risks²⁰, and producers in many low-to-middle income countries that depend on these crops for trade are particularly exposed to any fall in yields resulting from the loss of pollinators.

In some sectors, companies may be able to manage direct financial risks through diversification or substitution, albeit with higher ongoing operating costs and capex needs. However, for some company activities, such as pollinator-dependent agriculture or drug development, there may be no viable alternatives in the absence of biological resources. As a result, the biodiversity risk profile of a company or an investment is driven by both the nature of its business activities, and other idiosyncratic factors.

‘LICENCE TO OPERATE’ RISKS

Another important lens for biodiversity-related risk is analysing economic activities that by their nature have a high negative impact on the environment and, by extension, biodiversity. These activities often face heightened scrutiny and are exposed to political, reputational, community, regulatory, litigation and other risks, all of which can jeopardise a company’s or an asset’s licence to operate in a particular area.

The mining, energy, construction, engineering and transport industries are prominent examples of this category - given their direct and highly visible impacts on nature. Biodiversity-related risks in these industries are increasingly reflected in higher project costs due to additional specifications aimed at the mitigation of negative environmental impacts, extended project timelines to accommodate mitigation measures, legal and compliance costs, as well as the risk of project overruns or cancellations. These factors can substantially reduce the internal rate of return on projects or investments.

Figure 5: Licence to operate risk by sector

GICS Sector/Sub-Sector	Transmission channel
Construction Materials	Tightening standards leading to higher operating costs, supply chain disruption
Construction & Engineering	Permitting and project constraints, costs of rehabilitation or stranded assets
Diversified Real Estate Activities	Permitting and planning constraints, costs of rehabilitation or litigation challenges against developments
Diversified Metals & Mining	Permitting and project constraints, costs of rehabilitation or stranded assets
Highways & Rail tracks	Additional costs, project overruns or litigation
Marine	Permitting restrictions/stricter fishing quotas, fines and additional operating costs
Marine Ports & Services	Permitting restrictions, fines, additional operating costs
Railroads	Additional costs, project overruns or litigation
Electric Utilities	Additional costs, project overruns or litigation

¹⁹2018, Food and Agriculture Organisation of the United Nations, why bees matter: The importance of bees and other pollinators for food and agriculture.

²⁰ Dec 2022, Environmental Health Perspectives, Volume 130, Issue 12, Pollinator Deficits, Food Consumption, and Consequences for Human Health: A Modelling Study

Independent Energy Producers & Power Traders	Additional costs, project overruns or litigation
Oil & Gas Drilling	Regulatory restrictions on drilling, increased operating costs, litigation
Integrated Oil & Gas	Regulatory restrictions on drilling, increased operating costs and asset stranding, litigation
Tires and rubber	Additional raw material sourcing costs and supply chain restrictions
Homebuilding	Permitting and planning constraints, costs of rehabilitation or litigation
Coal & Consumable Fuels	Permitting and planning constraints, costs of rehabilitation or litigation, stranded asset risks

Licence to operate risk in action: the Cobre Panama mine

The open-pit Cobre Panama mine sits within the highly biodiverse Mesoamerican Biological Corridor, home to a wide range of sensitive or valuable species and habitats. Until its closure following a Supreme Court order in 2023, the mine produced globally significant supplies of copper, gold and silver, and contributed as much as 5% to Panama’s total economic output per year. The court order followed staunch community and NGO protests against the mine’s operation and concerns about long-term ecological damage, threats to wildlife and contamination of water resources. The combination of public demonstrations and coordinated legal action from NGOs arguably led to the Supreme Court ruling, which deemed the previous operating permit unconstitutional. The mine’s operator, Canada’s First Quantum Minerals, has invested heavily in local conservation and reforestation plans in an effort to address concerns, but in the absence of a shift in public sentiment, any reopening of the mine appears unlikely.

INDIRECT DEPENDENCIES

Beyond direct dependencies on biodiversity and ‘licence to operate’ risks, a much broader spectrum of companies faces indirect dependencies on biodiversity. These risks are less visible but can still be significant.

In industries that are not directly dependent on nature, biodiversity risks often emerge as more complex second- or third-order risks within value chains. For example, the speciality chemical and pharmaceutical sectors rely on feedstocks as primary inputs. These feedstocks may be directly dependent on nature – such as genetic materials - or indirectly impacted by local biodiversity influencing their yield and productivity. It is estimated that over 80% of registered medicines are derived from, or inspired by, the natural world.²¹ Notably, it has been estimated that at least one potentially important, undiscovered drug is lost every two years as a direct result of biodiversity decline.²² A vast spectrum of industries may be indirectly exposed to biodiversity risks, from diversified banks and capital markets through commodity trading activities; leisure, recreation and tourism, which rely on healthy ecosystems supporting demand and services; through to real estate, where property valuations can be influenced by the quality of surrounding environment, including biodiversity.

²¹ Convention on Biological Diversity (2021)

²² Nov 2017, Journal of Global Health, Vol. 15, No. 7, Biodiversity, drug discovery, and the future of global health: Introducing the biodiversity to biomedicine consortium, a call to action.

Figure 6: Indirect dependencies by sector

GICS Sector/Sub-Sector	Transmission channel
Airlines	Decreased revenue from tourism/higher operating costs and regulatory/permitting restrictions
Diversified Banks & Capital Markets	Regulatory restrictions, legal and additional operating costs relating to investment and trading
Trading Companies & Distributors	Regulatory restrictions, legal and additional operating costs (e.g. certification requirements)
Hotels, Resorts & Cruise Lines	Decreased revenue from tourism/higher operating costs and regulatory/permitting restrictions
Reinsurance	Degradation of natural sources of protection from extreme weather events, leading to increased claims
Diversified Real Estate Activities	Decline in property values, more severe damages from extreme weather events
Diversified Real Estate Investment Trusts	Decline in property values, more severe damages from extreme weather events
Research & Consulting Services	Loss of valuable information gathered from natural processes or resources (e.g. bioprospecting)

In the banking sector, research by the Network for Greening the Financial System²³ (NGFS) has highlighted that nature degradation including biodiversity loss could have significant macroeconomic implications and failure to account for, mitigate and adapt to these implications could cause risks to financial stability. The report suggests that whilst direct impacts on the sector are currently moderate, transition risks, such as regulatory changes or shifts in societal expectations, could materialise quickly and affect financial institutions disproportionately. Biodiversity loss and associated ecosystem collapse could lead to rapid deterioration in credit health for financial institutions - and represents a systemic risk that should be considered alongside wider sources of risk to financial stability, particularly for systemically important financial institutions.

More generally, given biodiversity underpins critical activities such as the production of food and medicine, the provision of clean water, and protection against diseases, the collapse of biodiversity in a region or in key areas for certain sectors could have material social ramifications, such as unemployment, conflict, migration, illness and starvation. This in turn could create meaningful ripple effects at the level of the overall economy that are not easily linked to biodiversity loss, but are made significantly worse by it.

NEGATIVE ENVIRONMENTAL IMPACTS

The sections above highlight that financially material biodiversity-related business risks are concentrated in a relatively small number of economic activities. However, the majority of biodiversity loss linked to economic activities stems from environmental impacts, such as water withdrawal and wastewater discharge, land and water pollutants, atmospheric emissions and land use change.

²³ NGFS (2022) Nature-related Risks <https://www.ngfs.net/en/what-we-do/nature-related-risks>

Outside of the sectors exposed to “license to operate” risks, these pressures seldom translate into material financial risk at the individual company level, particularly in the absence of sustained policy intervention and effective enforcement. Yet their cumulative impact is substantial. Companies whose activities degrade environmental conditions represent a large share of the global economy and, consequently, of investment portfolios.

Because environmental quality and ecosystem health are public goods, the links between individual economic activities and biodiversity outcomes are often indirect and opaque. As a result, while many companies contribute meaningfully to biodiversity decline in aggregate, few perceive a clear connection between their own operations, products or services and biodiversity loss. This has an important implication for action. This is why, companies and investors who approach biodiversity topic from a systemic risk perspective should seek to mitigate negative environmental impacts across economic activities rather than purely address biodiversity-related risks.

SEGREGATING RISK AND IMPACT ASSESSMENTS CAN HELP COMPANIES AND INVESTORS DEVELOP MORE EFFECTIVE DECISION-RELEVANT FRAMEWORKS.

A PRAGMATIC APPROACH TO BIODIVERSITY FOR INVESTORS AND ISSUERS

The interplay between risks and impacts in relation to biodiversity loss highlights the complexity of this topic, as companies may identify both risks and impacts related to biodiversity, whereas a typical investor is likely to find a wide range of biodiversity-related risks and impacts in their investment portfolios. Segregating risk and impact assessments can help companies and investors develop more effective decision-relevant frameworks:

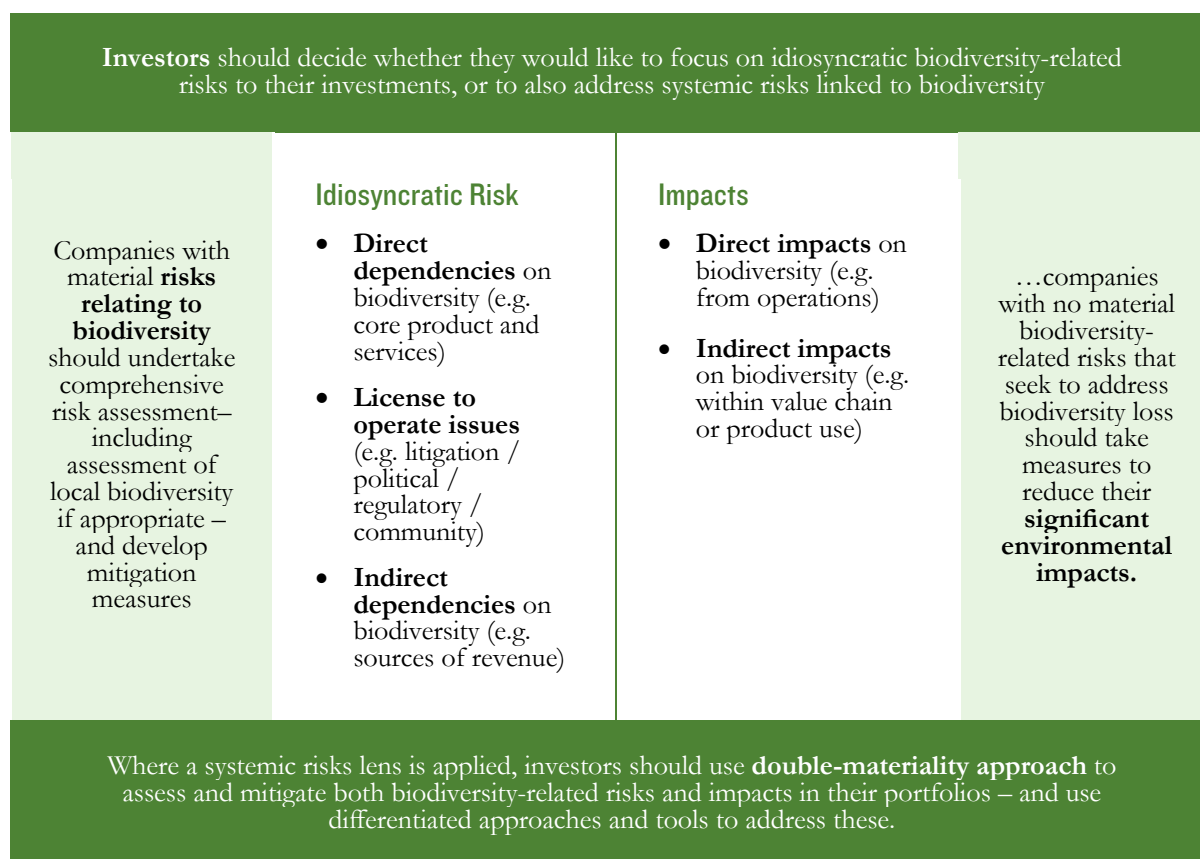
- A focus on risks, where biodiversity loss poses a direct risk to business operations, and their financial materiality can help protect companies' assets and investors' portfolios.
- Systemic risks, however, can only be addressed by reducing environmental harm from companies' operations, products and services that drive biodiversity loss, such as pollution and land use change, or by improving the condition of biodiversity on the ground, through restoration or conservation efforts.

It should be each individual company's and investor's choice as to whether they look at biodiversity purely through a financial materiality lens – which will be limited in scope but serve to mitigate risk at an asset or investment level, or adopt a broader scope that addresses systemic environmental issues, which will require a focus on the environmental impacts of their activities or investments. However, this distinction between risks and impacts is critically important, as it directly influences the choice of mitigation approaches applied by companies and the investment and stewardship strategies employed by investors.

We, therefore, propose a pragmatic approach to help companies and investors address different types of biodiversity-related risks that differentiates between:

- **Idiosyncratic risks:** companies and assets with specific biodiversity-related risks that need to be **addressed at the company or asset-level.**
- **Systemic risks:** companies and assets whose economic activities contribute to biodiversity-related systemic risk that needs to be **addressed from an environmental impact perspective.**

Figure 3: A pragmatic approach to prioritisation of biodiversity-related risks



IDIOSYNCRATIC RISK

Idiosyncratic risk assessment can be achieved by using any combination of the following, as appropriate for each investor and issuer and their respective investment or risk assessment process:

- **Sector analysis** to identify industries/business lines most exposed to biodiversity-related risks. Distinguishing between direct, license to operate, and indirect risks, and establishing transmission channels for major industry/risk types, can help identify segments of the portfolio or assets with most risk exposure.
- **Overlaying geographic and regulatory factors** for higher risk exposures can further aid risk materiality assessment, but the additional insights from this should be significant enough to justify the costs.
- **Company or asset-specific assessment** helps to understand affected operations or products/services, as well as companies’ environmental practices and existing mitigation measures. This may include consideration of location-specific analysis, including proximity to protected or sensitive areas (although we propose that location-based assessments are only warranted where there are either clear and significant sources of biodiversity-related business risk or localised biodiversity impacts directly linked to the economic activities of a company, for example, from mining assets or construction).

- **Integrating findings into risk management frameworks for companies and investment decisions** for investors where high idiosyncratic risks arising from biodiversity issues have been confirmed.
- **For investors, developing a targeted stewardship strategy**, subject to investment style, internal expertise and available resources, can help mitigate identified biodiversity-related risks within the portfolio.

Given the nature of biodiversity risks, many investors would argue that making a separate biodiversity risk assessment is not going to be decision-useful unless tangible biodiversity risks are incorporated into a normal financial modelling framework. These could include commodity price forecasts (e.g. via forward curves) and/or shocks (e.g., recent modelling by the Banque de France has highlighted that biodiversity-related restrictions could raise agricultural prices by up to 12%²⁴) or quantification of specific biodiversity-related costs (e.g., compliance costs for the EU Deforestation Regulation are now projected to be low for most firms, but heavily concentrated in a handful of operating geographies and sectors²⁵). To be useful, these forecasts should be plausible (e.g. in some jurisdictions, the possibility of a material strengthening of biodiversity-related regulation could be low, so it may not be appropriate to invest on the assumption that such regulation will be enacted). There is no right or wrong approach to assessing and integrating biodiversity-related idiosyncratic risks into investment analysis and decision-making, and investors may choose to focus on the most plausible and tangible manifestations of such risks as part of the financial modelling framework.

SYSTEMIC RISK

Systemic risk assessment requires identifying sources of significant environmental and biodiversity impacts in investment portfolios or within companies' value chain, which can be achieved by using any combination of the following, as appropriate for each investor's and issuer's respective process:

- **Reviewing business operations and products/services or screening portfolios** for significant environmental impacts. Subject to data availability and internal resources, differentiating between direct and indirect impacts can facilitate a more targeted and proportionate assessment²⁶. However, investors may find that many industries with environmental impacts are socially essential (e.g. food production, mining for transition minerals), meaning that broad exclusions could be counterproductive.
- **Adding geographic analysis** can help prioritise areas with higher biodiversity sensitivity or regulatory exposure; or though, as for idiosyncratic risk, the additional insights from this should be significant enough to justify the costs.
- **More detailed assessments of holdings/assets** with significant environmental impacts or those significantly exposed to sensitive biodiversity areas can help identify existing mitigation or impact reduction measures.
- **For investors, a targeted stewardship strategy** can help reduce environmental harms associated with the operations, products or services of companies and assets identified as "high impact."

The risk and impact assessments can be undertaken using external tools, as described in the previous chapter, but can equally be done effectively using internal tools that many companies and investors already have at their disposal, such as proprietary risk/impact assessment frameworks or internal/external sustainability ratings. These can be supplemented by environmental controversy data and norms-based

²⁴ July 2025, Banque de France Working Paper #1006, Seeds of Inflation: Macro Modelling of Nature-Related Risks through Agricultural Prices

²⁵ 2025, Profundo, Analysis of EUDR Compliance Costs. <https://profundo.nl/projects/analysis-of-eudr-compliance-costs/>

²⁶ see the accompanying Excel appendix file to this report for more detail.

screening. Scalable internal tools that support meaningful risk or impact analysis, as appropriate, are generally preferable to full asset-level location screening, which is often impractical at the portfolio level and adds limited value to investment decision-making.

Companies may find that, in the absence of financially material biodiversity-related risks, an explicit focus on environmental impacts can help frame this issue internally and establish links, as appropriate, with reputational, brand, community relations, employee well-being, and other issues that fall under a corporate social responsibility framework. These may require a different business and governance approach compared to dealing with a financially material business risk.

Finally, disclosures by companies and investors should be proportionate to the risk or, under the systemic risk focused approach, the scale and severity of environmental impacts.

'Where to start?' Focus on key drivers of biodiversity loss

For investors with limited resources or who are just getting started, the focus should be on deploying resources where they will have the greatest impact. For most of the main drivers of biodiversity loss, there are a few sectors that have outsized importance. For example, only a handful of sectors – agriculture, forestry, and mining and energy extraction – are responsible for almost all direct land/sea-use change, which itself is considered the largest of the main drivers of biodiversity loss. Agriculture alone has converted roughly half of Earth's habitable land, with around 80% of this converted land devoted to livestock (either directly or to grow feed). Therefore, focusing only on livestock could be sufficient to address the majority of all land-use change. Close behind land/sea-use change as the second largest driver of biodiversity loss is overexploitation of natural resources. The investible activities directly responsible for this are also relatively concentrated, again led by agriculture, forestry and extractive industries.

There are, of course, indirect impacts on these drivers as well via downstream products and consumers (e.g. fashion is a major source of demand for agricultural goods like cotton and livestock), and this can be an area of consideration where downstream actors can exert significant influence. And as noted, the localised nature of biodiversity risks and impacts means that a sector that has a relatively small impact globally can have a material impact in a certain region. However, as impacts become more indirect or relatively smaller, assessing and addressing them can require more resources. This highlights the importance of devoting resources where the value is greatest.

CHALLENGES AND OPPORTUNITIES FOR BIODIVERSITY IN INVESTMENT STEWARDSHIP

Biodiversity presents a unique challenge for investment stewardship, not least because attributing positive biodiversity ‘outcomes’ to engagement activities is significantly more complex than for engagements focused on climate change or other environmental issues, where drivers of impact can be measured objectively. The systemic nature of many biodiversity risks, coupled with the timescales required for ecological recovery, also means that biodiversity-related stewardship objectives are a more natural fit for investors focused on longer time horizons, portfolio-level risks and managing long-term liabilities, such as insurers or pension schemes.

We believe that successful engagement requires both clarity of focus – whether on risk or impact – and patience, given that most companies are at a relatively early stage of understanding their interactions with nature, including their dependencies, and how they can help protect and preserve nature and biodiversity.

Determining appropriate engagement channels is another critical step in achieving engagement objectives:

For idiosyncratic biodiversity-related risks, direct engagements with the company or asset operator would typically be most effective. In private markets, engaging with a private equity owner or a sponsor could be another useful channel. To inform these engagements, it can help to identify best practices already implemented by a company’s peers that have effectively mitigated similar risks for them, such as changes to procurement practices or supplier targets.

For systemic risks, scale is important, and the engagement approach would depend on the investors’ processes and resources. For example:

- Thematic engagement with companies in high-impact industries can raise awareness of major sources of negative environmental impacts, deepen understanding of company actions and, where possible, share best-practice approaches and solutions to help companies reduce environmental impacts in an effective and economic way. These could be individual or collaborative engagements, based on investor preferences.
- Engaging with sovereign and sub-sovereign debt issuers on biodiversity monitoring and policy development and enforcement may be more effective than engaging with companies in isolation.
- Investors can also engage with capital providers such as bank lenders or large investors, or major customers of companies in high-impact industries, such as, for example, a wholesale or retail purchaser of forest-risk commodities. For example, for many large companies, significant biodiversity impacts occur in the upstream supply chain, such as raw material sourcing. These companies can drive change through procurement policies and monitoring. A focus on value chain actions can be more effective in driving positive outcomes.

The ‘public goods’ nature of biodiversity means that engagement with a range of stakeholders, including policymakers and regulators, may be a more effective mechanism for driving systems-level biodiversity outcomes. This engagement would focus on strengthening environmental policies and enforcement actions and on incentivising biodiversity protection and restoration.

INVESTMENT STRATEGIES WITH BIODIVERSITY OUTCOMES

Finally, investors who are able to go beyond pure risk/return optimisation in their investment objectives and seek to have a positive impact on biodiversity have a growing range of options available to help facilitate more positive biodiversity outcomes, some examples of which are highlighted below:

- **Biodiversity-focused strategies** and biodiversity-labelled funds have grown significantly in the past three years - albeit from a very low base - doubling to \$3.7bn of assets under management, according to research by Morningstar Sustainalytics²⁷. These funds can be broadly categorised into three investment strategies:
 - investing in companies that are seeking to reduce their impact on biodiversity
 - investing in companies that seek to provide solutions to biodiversity loss
 - a combination of the two.

It is worth noting, however, that many such strategies and products rely heavily on excluding ‘worst-in-class’ companies and higher impact sectors rather than on companies seeking to deliver improvements in biodiversity and ecosystem condition. This is primarily due to the constrained universe of biodiversity-positive investments, which has led to outflows and closures of many biodiversity-focused thematic funds in the wider market.

Biodiversity-focused instruments and impactful projects with a stronger focus on measuring biodiversity outcomes - such as blue bonds, nature conservation projects, direct forestry and agriculture projects with biodiversity restoration objectives or the preservation of conservation areas - are also emerging. **Investment in labelled debt instruments targeting biodiversity outcomes mirrors the wider trend in the green, social and sustainable bond market - with supply significantly lagging demand.** Standalone instruments targeting biodiversity outcomes face challenges in achieving scale and liquidity due to the mostly small-scale and fragmented nature of biodiversity-related projects and expenditures undertaken by companies. At the same time, biodiversity has grown in importance as a use of proceeds within wider labelled debt issuance, indicating that both issuers and investors see rising importance of biodiversity as a thematic focus. The materiality of biodiversity to the activities and strategy of the issuer is an important consideration – credible targets focusing on drivers of biodiversity loss such as pesticide use, or land use change are obvious priorities for companies in the food value chain, for example – tying these targets to instruments such as SLBs or sustainability-linked loans could help increase their credibility to investors.

- **Thematic, impact and solutions strategies focused on the main environmental themes** (e.g., carbon, water, pollution, sustainable agriculture, forestry, etc.) are available across private and public asset classes. Given the importance of reducing negative environmental impacts for the protection and restoration of biodiversity, investment strategies that target positive environmental outcomes in a meaningful way can be seen as aligned with biodiversity-focused objectives.

²⁷ Nov 2024, Morningstar, [Slow Progress on Biodiversity But Investors are Paying Attention](#)

- Investment strategies and approaches that focus on positive alignment of portfolios with one or more environmental objectives allow for **investing in companies and assets that take positive steps in minimising their impacts on the environment and biodiversity**. These could be best-in-class strategies with a material weight on environmental KPIs or strategies tilted towards companies with better environmental performance. While, arguably, these strategies are not specifically focused on biodiversity, they do help address the main drivers of biodiversity loss through allocating capital to entities with better environmental practices.

Given the early stages of development of biodiversity as a standalone investment theme, a combination of strategies and asset-class appropriate investment approaches may be desirable to achieve a positive impact on biodiversity through investment.

FOR INVESTORS CONCERNED ABOUT BROADER SYSTEMIC RISKS ARISING FROM BIODIVERSITY LOSS, INCLUDING THE LONG-TERM DEGRADATION OF ECOSYSTEMS THAT UNDERPIN ECONOMIC STABILITY, WE RECOMMEND AN IMPACT-FOCUSED APPROACH WITHIN A DOUBLE MATERIALITY FRAMEWORK.

NEXT FRONTIER FOR IMPACT: NO NET LOSS AND MANAGING WIDER PRESSURES ON BIODIVERSITY

As companies' impacts on biodiversity often extend beyond direct operations into value chains and product use, i.e. factors beyond their direct control which may be unavoidable, there will remain a so-called 'residual impact.' To address this, compensation actions may be required (on a voluntary or regulatory basis). This could entail channelling investment to nature and biodiversity-focused conservation and restoration projects to achieve a nature-positive outcome. Credible projects offer a means for companies to address their wider environmental impacts, which drive pressures on biodiversity.

Biodiversity credits designed to compensate for biodiversity loss, are often associated with construction or infrastructure projects, are expected to have an increasingly important role in the future. They aim to balance unavoidable environmental impacts by investing in conservation or restoration projects elsewhere. Some 42 countries have regulatory biodiversity offset requirements in place, with a further 66 having provisions in place to support voluntary biodiversity offsetting. However, current offset investments are estimated to represent less than 5% of the total funding needed to compensate for the annual impacts of economic development on biodiversity.²⁸

In response to national conservation targets under the Global Biodiversity Framework,²⁹ many more countries are likely to put in place biodiversity credit systems in the next 5 years. These could lead to strong opportunities for landowners as a source of revenue diversification and reliable cash flows from credit contracts. The UK Biodiversity Net Gain regulation, Australia's Nature Repair Law and the EU Nature Restoration Law are some examples of emerging regulation which will drive demand for credits over time.

Investors should be especially mindful of reputational risks associated with investing in companies or projects reliant on low-quality or poorly verified biodiversity credits and the risks of greenwashing that stem from a lack of common standards, with voluntary schemes seeing limited uptake. For companies operating in high-impact, visible sectors (those navigating 'licence to operate' issues described above), engaging proactively with credible compensation projects can be an opportunity to navigate reputational and community engagement issues linked to biodiversity loss. Conversely, for companies where biodiversity loss is less clearly linked to company actions, biodiversity credits or compensation projects may be less relevant, and focusing on reducing wider pressures on biodiversity may be a better approach.

²⁸ Sept 2025, OECD, [Scaling up biodiversity-positive incentives](#)

²⁹ March 2024, Convention on Biological Diversity [Exploration of the biodiversity finance landscape. Note by the Secretariat](#)

Case Study: Ambatovy Mine in Madagascar

The Ambatovy cobalt and nickel mine, one of the largest lateritic nickel mines in the world and one of the largest-ever foreign investments in sub-Saharan Africa is located in the biodiverse eastern rainforests of Madagascar, which face significant deforestation risks, largely due to shifting agriculture.

The mine provides the minerals essential to many transition and modern technologies and processes. Whilst it plays a crucial role in Madagascar's economic development, providing jobs, supporting local businesses, and contributing significantly to government revenues and foreign exchange earnings, it has resulted in the destruction of 2,065 hectares of natural forest, which serve as a vital habitat for globally threatened species, both within the mine's footprint and along a 220km pipeline used to transport materials from the mine to the coast for export.

To compensate for the significantly negative impacts on the rainforest, Ambatovy launched a biodiversity offset programme to “deliver no net loss and preferably a net gain, of biodiversity”. The offset portfolio included protecting four areas through ecological monitoring, establishing community forest management associations and supporting them with the monitoring and enforcement of resource-use restrictions, environmental education programmes and the promotion of alternative income-generating activities in surrounding communities.

A recent study has concluded that Ambatovy's strategy has been successful in delivering no net loss (NNL) of biodiversity, however whilst it has created benefits ecologically, there are questions about the equity of the benefits. Often those benefiting from these offsets were not the same people as those bearing the cost due to restrictions to land access and natural resource use.

CONCLUSION

Addressing biodiversity risks and impacts is a more complex challenge for investors than addressing climate change, reflecting both the inherent complexity of biodiversity and the localised, indirect and cumulative nature of environmental impacts, which can build quietly over time before triggering systemic risks to the global economy.

An idiosyncratic risk and financial materiality focused approach will help investors identify, assess, and protect to some degree their portfolios from biodiversity-related risks, especially where biodiversity poses a direct threat to business operations, supply chains or asset values. This approach is effective for managing specific risk exposures but in diversified portfolios, only a small subset of holdings is likely to face biodiversity risks that are financially material, given the weak direct links between biodiversity loss and individual company activities.

For investors concerned about broader systemic risks arising from biodiversity loss, including the long-term degradation of ecosystems that underpin economic stability, we discuss an impact-focused approach within a double materiality framework. This shifts the emphasis from assessing individual assets to reducing negative environmental impacts of businesses and assets across portfolios, by targeting the underlying drivers of biodiversity loss, such as pollution, land use change and overexploitation of natural resources.

By focusing on these underlying drivers, investors and companies can adopt mitigation strategies that are more accessible, resource-efficient and scalable, avoiding the need for complex, location-specific biodiversity assessments that are often costly and difficult to apply consistently across global portfolios.

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