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# Biodiversity in the Balance

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How Nature Poses Investment Risks and Opportunities

Biodiversity is gaining prominence in fundamental investment analysis across asset classes, based on a deeper understanding of its importance as a potentially material issue for investors. By using a coherent analytical approach, we believe it's possible to incorporate nature-related risks and opportunities in research and investment processes that support the efforts of capital allocators to harvest meaningful returns over the long term.

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# Why Nature Matters for Businesses and Investors

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What should investors know about biodiversity, and how should they factor such knowledge into their investment decisions?

Businesses around the world and their stakeholders are increasingly facing challenges created by the growing pressure on Earth's life-sustaining and business-enabling resources and processes.

This paper provides a comprehensive survey of biodiversity for investors. Our report defines biodiversity and presents the scale of its global economic impact. We discuss the regulatory frameworks that are pushing biodiversity onto the global investment agenda as well as the nature-related business and investment risks that deserve closer attention.

The growing focus on biodiversity will also create economic and investment opportunities. We illustrate this through case studies and provide a conceptual framework to help investors map out biodiversity risk across sectors and companies. Finally, we discuss what we're doing at AB to begin incorporating biodiversity considerations across the firm.

With a greater understanding of the key issues, we believe investors will be better prepared to evaluate, integrate and engage on biodiversity in their investment processes.

## Acknowledgment

The authors wish to thank **Max Lulavy**, Environmental Research Associate, for his invaluable contribution to this research.

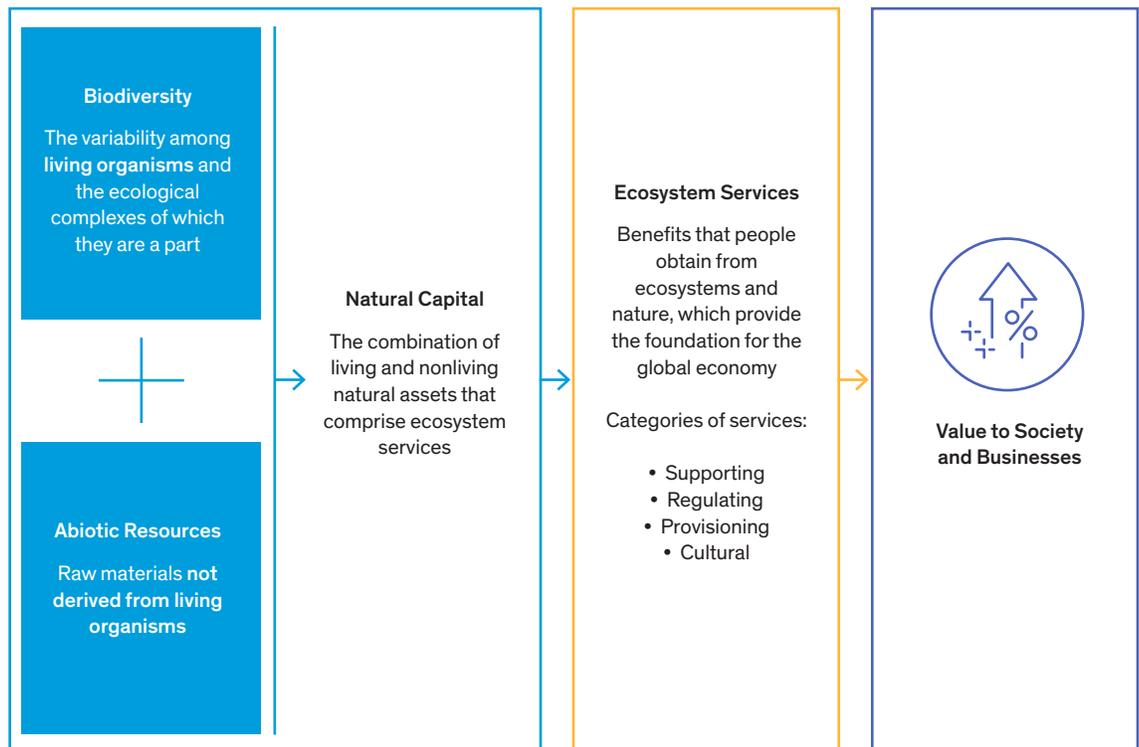
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From South Africa's endangered black rhinoceros to the shrinking Amazon rainforest, threats to the variability of life on Earth are mounting. Protecting biodiversity—animals, plants and other living organisms, and the ecosystems they are part of—is vital to maintain the health of our planet and the products, services and economic activity that sustain our daily life. Yet until recently, biodiversity hasn't ranked highly among investors' priorities.

This may seem surprising, given biodiversity's importance as the living component of the natural world. Together with abiotic resources—the nonliving components of the natural world, such as land, water, air and minerals—biodiversity comprises natural capital, the world's stock of natural assets. Natural capital provides the building blocks that enable ecosystem services—the positive benefits that societies and economies derive from nature—to sustain life and create wealth (*Display 1*).

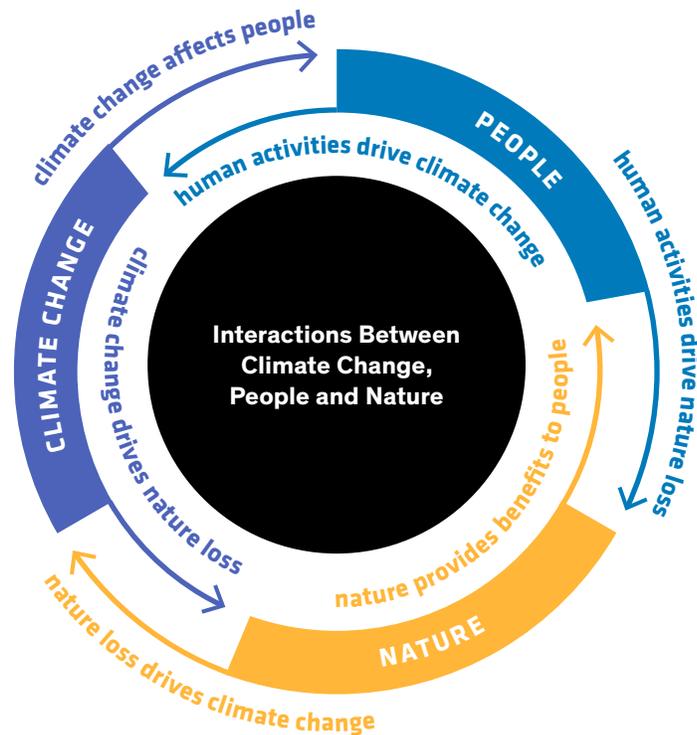
## DISPLAY 1: BIODIVERSITY AND NATURE

The Building Blocks That Sustain Life and Economic Activity



Source: [Integrating Biodiversity into Natural Capital Assessments](#), Capitals Coalition and Cambridge Conservation Initiative, 2020; Biodiversity Resource Guide, AllianceBernstein (AB), August 2022.

## DISPLAY 2: NATURE AND CLIMATE CHANGE ARE DEEPLY INTERCONNECTED



For illustrative purposes only.

Source: "[What Are Nature-Based Solutions?](#)," *World Wildlife* (Summer 2022).

For many years, governments and investors have focused mainly on the material impacts of climate change, with little consideration for the role of the natural world. But now there is a growing recognition of the high degree of interconnectivity and myriad feedback loops between climate change, people and nature (*Display 2*).

Consequently, biodiversity is gaining prominence in fundamental investment analysis across asset classes, based on a deeper understanding of its importance as a potentially material risk and opportunity for investors. Nature-related risks are defined by the Taskforce on Nature-related Financial Disclosures (TNFD) as the potential short- and long-term threats posed to an organization linked to its direct, upstream, and downstream dependencies and impact on nature.<sup>1</sup>

With resources becoming scarcer, the human population growing and regulatory activity increasing, investors must be able to make informed judgments about how companies are exposed to the causes and effects of biodiversity loss—and to the opportunities that may arise from attempting to mitigate this loss.

Depending on how these risks are managed, they could hurt portfolio valuations or be the basis for new investment opportunities. By using a coherent analytical approach, we believe it's possible to invest in a way that's more aligned with biodiversity and that supports the efforts of capital allocators to harvest meaningful returns over the long term.

What, then, should investors know about biodiversity, and how should they factor such knowledge into their investment decisions?

<sup>1</sup> [Recommendations of the Taskforce on Nature-related Financial Disclosures](#) (London, UK: TNFD Secretariat, September 2023): 33.

## Economic Problem Today, Existential Threat Tomorrow

According to the American Museum of Natural History, the term *biodiversity* refers to “the variety of life on Earth at all its levels, from genes to ecosystems,” and can encompass “the evolutionary, ecological and cultural processes that sustain life.”<sup>2</sup>

Such a broad, abstract definition seems far removed from the everyday concerns of businesses and investing. But increasingly, businesses around the world and their stakeholders are facing challenges created by the growing pressure on Earth’s life-sustaining and business-enabling resources and processes.

These challenges can affect different businesses in different ways. In some cases, risks stem from the physical degradation of ecosystems—such as a food

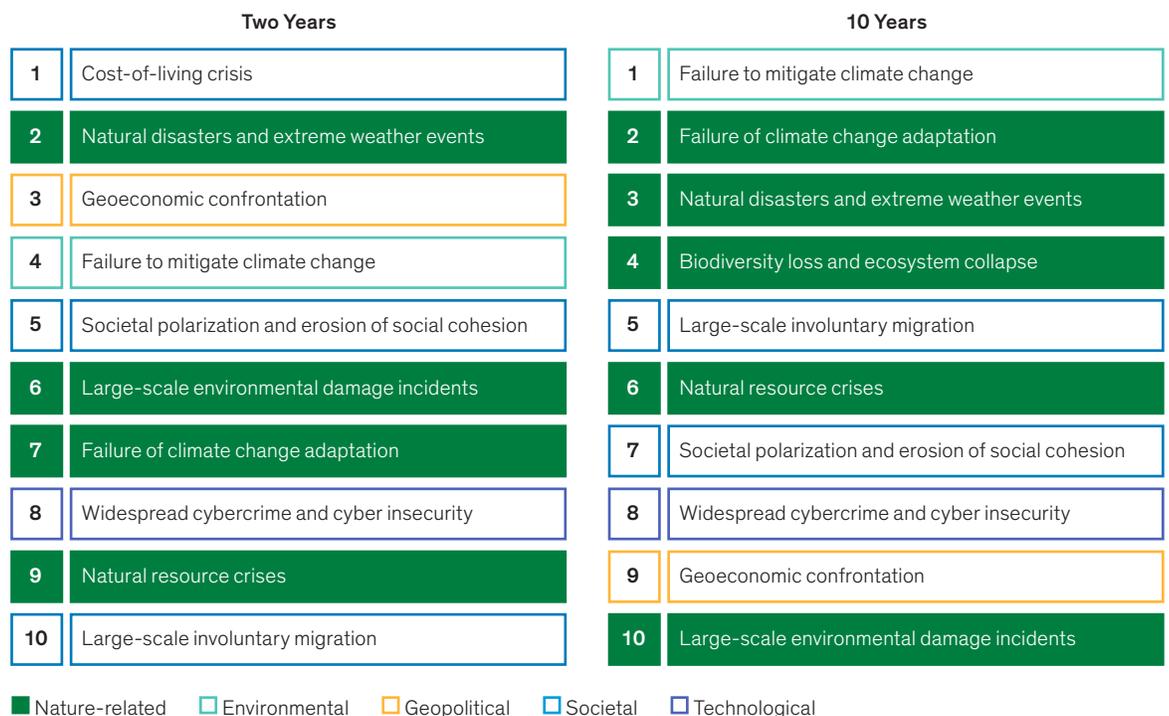
company that depends on healthy soils to ensure long-term sourcing of ingredients for its products.

In others, pressure may come from regulations designed to protect biodiversity, as in the case of a North American dredging company facing regulatory demands to minimize the impact of its operations on biodiversity—demands that could make projects less profitable or even completely uneconomic.

These are local, specific examples of an increasingly frequent worldwide phenomenon. At a global level, the threats to biodiversity present a daunting challenge. The World Economic Forum’s *Global Risks Report 2023*—which surveyed more than 1,000 thought leaders from academia, business, government, civil society and other areas—ranked nature- and environment-related risks among the most severe risks facing the world in the short term and especially over the next decade (*Display 3*).

### DISPLAY 3: NATURE-RELATED RISKS LOOM AS BIGGEST CHALLENGE

Top Short- and Long-Term Global Risks of Concern Ranked in Severity



Source: [Global Risks Report 2023](#), World Economic Forum, January 2023, and AB

<sup>2</sup> “What Is Biodiversity?” American Museum of Natural History, Center for Biodiversity Conservation, accessed December 12, 2023.



Without...action, there will be a further acceleration in the global rate of species extinction, which is already at least tens to hundreds of times higher than it has averaged over the past 10 million years.”

—Global Biodiversity Framework

The economic implications of these nature-related issues are huge. For example, between 1997 and 2011, the loss of ecosystem services (the benefits that ecosystems provide to society and business) was assessed at between US\$4 trillion and US\$20 trillion annually due to changes in land use alone. Added to this are the following annual cost estimates from various sources:<sup>3</sup>

- US\$44 trillion for economic output moderately or highly dependent on nature
- Between US\$6 trillion and US\$11 trillion for land degradation
- US\$217 billion for the drop in agricultural output caused by a worldwide loss of pollinators
- US\$200 billion for oceanic degradation

In what may serve as a graphic illustration of the “tragedy of the commons,”<sup>4</sup> governments globally in 2019 spent US\$274 billion to US\$542 billion in subsidies that created nature loss in agriculture, forestry and fisheries.<sup>5</sup> In Australia, for example, federal and state governments are providing or plan to provide a total of A\$8.3 billion (US\$5.3 billion) in assistance to fossil fuel companies through a range of projects and capital spending. The largest project identified is the Northern Territory Government’s A\$3.8 billion purchase of gas from the offshore Blacktip project, owned by Italy-based multinational Eni.<sup>6</sup>

But perhaps the starkest statistic is this: up to one-third of the pharmaceuticals in use today were originally found in or derived from plants and other natural sources. For a world still

emerging from a pandemic, the implications for social well-being and the sustainability of human health and life run deep.

Biodiversity, then, is more than a broad, abstract concept or a challenging issue for individual companies, investors and the global economy. It is, quite simply, the world’s life support system, the foundation from which nearly all goods and services are produced.

### **Biodiversity: Why Now for Investors?**

As investors have gained a clearer understanding of climate risks, they have also begun to appreciate the risks associated with biodiversity.

A milestone in this process occurred at the United Nations (UN) Climate Change Conference in Glasgow in 2021 (COP26), when delegates made a formal declaration on forests and land use. This was followed by the UN’s 15th Conference of the Parties to the Convention on Biological Diversity (COP15)<sup>7</sup> held in Montreal in December 2022. COP15 launched the Global Biodiversity Framework, which consists of four goals and 23 targets to be achieved by 2030. The framework, adopted by 188 countries, has been compared with the 2015 Paris Agreement, which was a breakthrough in securing international efforts to address climate change.

Among the framework’s goals are effective conservation and management of at least 30% of the world’s lands, inland waters, coastal areas and oceans by 2030; the mobilization of more than US\$200 billion a year in biodiversity-related funding from public and private sources; and a requirement for large companies and financial institutions to “monitor, assess and transparently disclose their risks, dependencies and impacts on biodiversity, including with requirements for all large as well as transnational companies and financial institutions along their operations, supply and value chains, and portfolios” (see “Global Biodiversity Framework: Key Goals for 2030,” page 5).

The framework’s relevance for investors and their portfolios was reaffirmed at COP15 when a group of financial institutions launched Nature Action 100. This initiative, which borrows heavily from the Climate Action 100+ collaborative engagement launched in 2017, seeks to help investors drive urgent action on the nature-related risks and dependencies in the companies they hold.<sup>8</sup>

<sup>3</sup> S. Díaz et al., eds., [Global Assessment Report on Biodiversity and Ecosystem Services](#) (Bonn, Germany: Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services, 2019); D. J. Newman and G. M. Cragg, “[Natural Products as Sources of New Drugs over the 30 Years from 1981 to 2010](#),” *Journal of Natural Products* 75, no. 2 (February 8, 2012); Helmholtz Association of German Research Centres, “[Economic Value of Insect Pollination Worldwide Estimated at US\\$217 Billion](#),” press release, September 15, 2008; [The Economic Importance of Biodiversity: Threats and Opportunities](#), J.P. Morgan Asset Management, May 2022; Andrew Deutz et al., [Financing Nature: Closing the Global Biodiversity Financing Gap](#), Paulson Institute, The Nature Conservancy and Cornell Atkinson Center for Sustainability, 2020.

<sup>4</sup> The economic principle that unfettered access by individuals to an economic resource may lead to its destruction.

<sup>5</sup> [Financing Nature: Closing the Global Biodiversity Financing Gap](#), 12.

<sup>6</sup> Rod Campbell, Eliza Littleton and Alia Armistead, [Fossil Fuel Subsidies in Australia: Federal and State Government Assistance to Fossil Fuel Producers and Major Users 2020-21](#), The Australia Institute, April 2021.

<sup>7</sup> There are separate UN Conferences of the Parties (COPs) for climate and biodiversity. The numbering reflects how many events have taken place. To date, there have been more climate COPs than biodiversity COPs.

<sup>8</sup> [natureaction100.org](#)



## Global Biodiversity Framework: Key Goals for 2030

- Ensure effective conservation and management of at least 30% of the world's lands, inland waters, coastal areas and oceans, with an emphasis on areas of particular importance for biodiversity and ecosystem functioning and services
- Begin or complete restoration of at least 30% of degraded terrestrial areas, inland waters, and coastal and marine ecosystems
- Reduce to near zero the loss of areas of high biodiversity importance, including ecosystems of high ecological integrity
- Cut global food waste in half and significantly reduce overconsumption and waste generation
- Reduce by half both excess nutrients and the overall risk posed by pesticides and highly hazardous chemicals
- Progressively phase out or reform subsidies that harm biodiversity by at least US\$500 billion per year, while scaling up positive incentives for biodiversity conservation and sustainable use
- Mobilize at least US\$200 billion per year in domestic and international biodiversity-related funding from all sources—public and private
- Increase international financial flows from developed to developing countries—in particular, least-developed countries, small island developing states, and countries with economies in transition—to at least US\$20 billion a year by 2025, and to at least US\$30 billion a year by 2030
- Prevent the introduction of priority invasive alien species and reduce by at least half the introduction and establishment of other known or potential invasive alien species, and eradicate or control invasive alien species on islands and other priority sites
- Require large and transnational companies and financial institutions to monitor, assess and transparently disclose their risks, dependencies and impacts on biodiversity through their operations, supply and value chains, and portfolios

Source: Convention on Biological Diversity, “COP15: Nations Adopt Four Goals, 23 Targets for 2030 in Landmark UN Biodiversity Agreement,” press release, December 19, 2022.

According to the TNFD, nature is “a core and strategic risk management issue alongside climate change. It needs to be brought into the strategy, risk management and capital allocation decisions of business and finance, with fully integrated climate and nature considerations.”<sup>9</sup> The TNFD, like the Taskforce on Climate-related Financial Disclosures, is a framework for reporting entities to manage and disclose their biodiversity-related risks, opportunities, impacts and dependencies. The TNFD released its final recommendations in September 2023.

In June 2023, the push to slow biodiversity loss moved beyond land-based actions to embrace oceans. The UN's 193 member states adopted the High Seas Treaty,<sup>10</sup>

a landmark legally binding agreement that extends marine environmental protections beyond national jurisdictions. Under the treaty, a new organization will bring two-thirds of the world's ocean under protection for the first time, managing conservation, establishing marine protected areas, and issuing rules for high-seas commercial operations.

As 2030 approaches, the pressure for investors to engage on nature-related risks—fueled by regulatory developments and the continuing degradation of natural systems—is almost certain to grow.

But there will be incentives, too.

<sup>9</sup> [Recommendations of the Taskforce on Nature-related Financial Disclosures](#), 8.

<sup>10</sup> Formally known as the [Agreement Under the United Nations Convention on the Law of the Sea on the Conservation and Sustainable Use of Marine Biological Diversity of Areas Beyond National Jurisdiction](#).

## Biodiversity in the Context of Nature-Related Risks

Before looking at biodiversity from an investment perspective, it helps to understand its role in the ecosystem and the broad spectrum of nature-related risks.

Biodiversity, as the word implies, refers to living things in all their variety and interconnections. But even though it encompasses so much, it's part of a bigger system. As noted earlier, biodiversity is one of two foundation stones in an elaborate ecological structure; the other is abiotic resources, or nonliving natural materials that are derived from the physical environment rather than living organisms. Together, these comprise natural capital—the assets that underpin ecosystem services, which are the benefits that ecosystems provide to society and business.

Ecosystem services can be grouped into four categories:<sup>11</sup> the regulation of natural ecosystem processes, such as

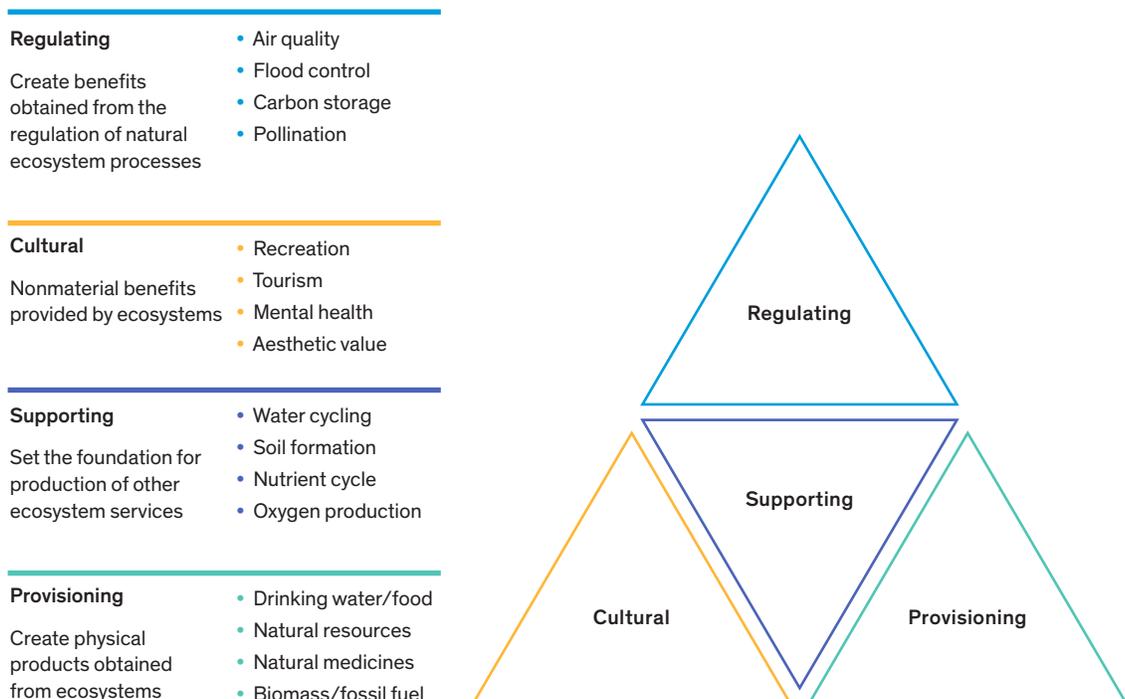
air quality and pollination; the provisioning of physical products, including drinking water and food; the cultural or nonmaterial benefits that arise from a harmonious relationship between people and their environments; and, most importantly, the supporting infrastructure of oxygen production, water and nutrient cycles, and soil formation. These supportive ecosystem services are the results of millions of years of development and make all other ecosystem services possible (*Display 4*).

The categories are interconnected. For example, a decline in pollination in the Regulating category will affect food production in the Provisioning category.

The idea of interconnectedness is important when considering the drivers of biodiversity loss. Changing land use (such as [deforestation](#) and sea use) has been one of the largest threats to biodiversity. According to the World Wildlife Fund, land conversion is the main reason

## DISPLAY 4: HOW ECOSYSTEM SERVICES BENEFIT BUSINESS AND SOCIETY

Four Distinct but Overlapping Categories

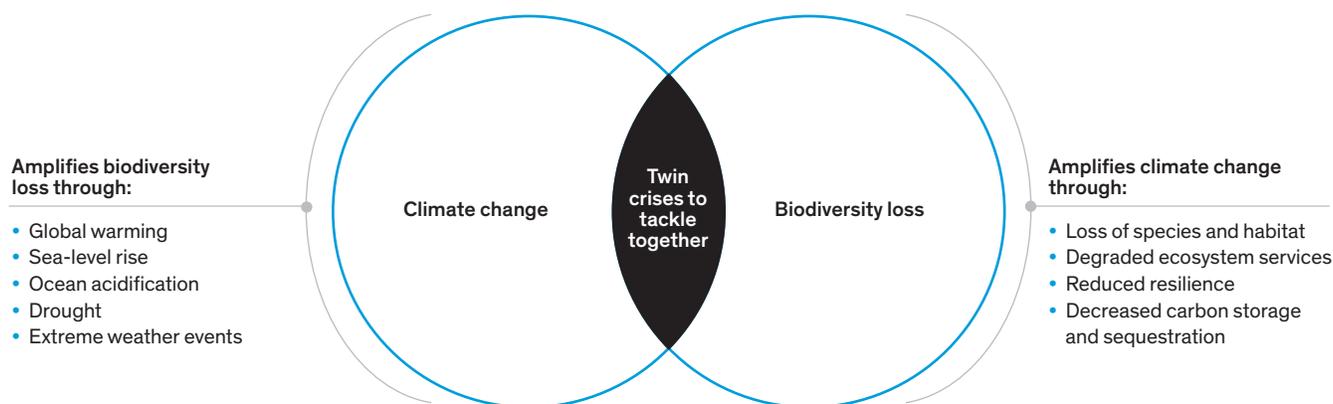


**Source:** Millennium Ecosystem Assessment, “Ecosystems and Their Services,” in *Ecosystems and Human Well-Being: A Framework for Assessment* (Washington, DC: Island Press, 2003).

<sup>11</sup> AB follows the classification method established by the Millennium Ecosystem Assessment; see “[Ecosystems and Their Services](#)” in *Ecosystems and Human Well-Being: A Framework for Assessment* (Washington, DC: Island Press, 2003).

## DISPLAY 5: DOUBLE TROUBLE—CLIMATE CHANGE AND BIODIVERSITY LOSS

Highly Interrelated and Likely Compounding



**Source:** S. Díaz et al., eds., [Global Assessment Report on Biodiversity and Ecosystem Services](#) (Bonn, Germany: Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services, 2019); Bronson W. Griscom et al., [“Natural Climate Solutions,”](#) *PNAS* 114, no. 44 (October 16, 2017): 11645–11650.

for a 69% decline in wildlife populations (mammals, birds, amphibians, reptiles and fish) since 1970.<sup>12</sup>

But deforestation not only affects wildlife; it also impinges on climate. The Amazon rainforest, for example, currently absorbs 30% less CO<sub>2</sub> than it did in the 1990s due to deforestation to make way for cattle farms.<sup>13</sup> Deforestation reduces the forest’s capacity to store and release moisture into the atmosphere. This reduction in moisture from the Amazon has major implications for the global hydrological cycle<sup>14</sup>—the processes of rain, evaporation, freezing and melting around the world—which in turn negatively affects more species’ habitats and changes the global climate. Deforesting a further 20% of the Amazon could release more than 90 billion tonnes of CO<sub>2</sub> into the atmosphere—2.5 times more than annual global fossil fuel emissions.<sup>15</sup>

There is a silver lining, because interconnectedness works both ways: tackling climate change and biodiversity loss in tandem can lead to twin wins. Steps taken to reduce deforestation in the Amazon, for

example, may help to mitigate the speed and severity of climate change by creating additional carbon sinks for growing carbon flows. The National Academy of Sciences in the US underlined the connection between nature and climate when it estimated that, in a below-2-degrees-Celsius warming scenario, nature-based solutions such as green infrastructure and carbon sequestration and storage could carry out 37% of necessary carbon mitigation between now and 2030 and 20% between now and 2050.<sup>16</sup>

In other words, tackling biodiversity loss and climate change is one route to resolving two systemic issues (*Display 5*).

Similarly, in our view, awareness of the links between biodiversity and climate risks may help investors develop valuable insights and investable opportunities for their portfolios through carbon credits, agricultural solutions, ecotourism, water management and green infrastructure, to name just a few.

<sup>12</sup> R. E. A. Almond et al., eds., [Living Planet Report 2022: Building a Nature-Positive Society](#) (Gland, Switzerland: World Wide Fund for Nature, 2022): 4.

<sup>13</sup> [“Amazon Deforestation and Climate Change,”](#) video, *National Geographic*, accessed November 20, 2023.

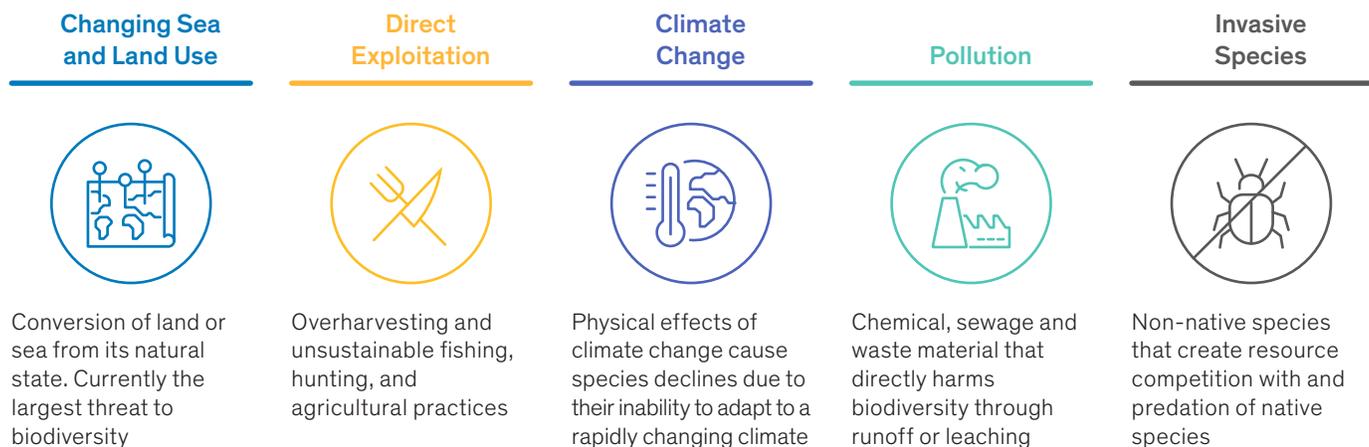
<sup>14</sup> [“Deforestation Triggering Tipping Point in Amazon Hydrological Cycle,”](#) Earth and Environmental System Modeling, Office of Biological and Environmental Research, US Department of Energy, February 28, 2022.

<sup>15</sup> Peter Veit, David Gibbs and Katie Reytar, [“Indigenous Forests Are Some of the Amazon’s Last Carbon Sinks,”](#) World Resources Institute, January 6, 2023.

<sup>16</sup> Bronson W. Griscom et al., [“Natural Climate Solutions,”](#) *PNAS* 114, no. 44 (October 16, 2017): 11645–11650.

## DISPLAY 6: THE TOP FIVE DRIVERS OF BIODIVERSITY LOSS

Ranked by Current Threat Intensity



### Greatest driver

Source: S. Díaz et al., eds., [Global Assessment Report on Biodiversity and Ecosystem Services](#) (Bonn, Germany: Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services, 2019).

The web of risks becomes even more complex when other causes of biodiversity loss are considered. Land- and sea-use change and climate change are only two of the worst drivers. Others include direct exploitation, pollution and invasive species (*Display 6*).

While changing sea and land use is currently ranked as the most destructive cause, these rankings may vary over time, adding another layer of complexity. Failure to abate climate change, for example, may lead to climate becoming the leading cause of biodiversity loss.

### Nature-Related Risks from a Business and Investment Perspective

The next step is to understand how nature-related risks can impinge on businesses and investment portfolios. At AB, we consider biodiversity and climate risks to be systemic—that is, a loss in one area can trigger a chain of losses in other areas, leading to large-scale failures, recovery from which may be uncertain or protracted. Such risks may affect the ability of investment-portfolio

companies to create value over the long term. As with climate risks, we regard these risks as falling into two categories: physical and transition.

Physical risks are direct and can include the impact of climatic or geological events (such as drought or earthquakes) or changes to the ecosystems that organizations depend on to produce goods and services. These changes may include, for example, degradation of soil quality or altered seawater temperatures.

Transition risks arise from a misalignment between an organization's strategic and management approaches to nature and changes in the regulatory, policy or societal landscapes in which it operates. They are less direct than physical risks in that they are typically caused by external developments, especially those aimed at halting or reversing damage to nature. Governmental policy, technological breakthroughs, market changes, litigation and changing consumer preferences can all create transition risks.

With an understanding of nature-related risk and its complexities, investors can take steps toward mapping these risks—and related opportunities—to their portfolios (*Display 7*).

For example, an understanding of ecosystem services sheds light on physical risks and how they might manifest themselves in a company’s operating environment. Changes in air, soil or water quality may result in lower crop or fishery yields or in reduced availability of medicinal and other resources, leading—in varying degrees, depending on the nature of the business—to stranded assets and capital destruction.

Knowledge of the factors driving biodiversity loss—and how governments, regulators, consumers and others are responding—can yield insights into transition risks, which hinge on a company’s willingness or ability to adapt appropriately and quickly enough. These indirect risks take many forms, which investors need to be aware of. They can be exacerbated by changes in consumer

behavior, technology and regulations or governmental policy, which may lead, for example, to more companies holding stranded assets, such as factories that are no longer productive because of water scarcity.

The emergence of a new generation of technologies, products, services and business models designed to mitigate biodiversity risk may pose a competitive threat as customers and suppliers switch their allegiances away from old-generation incumbents. Consumers may react negatively to companies that fail to adapt, potentially causing reputational damage, loss of brand value, and a reduction in sales and profits. Other risks include the likelihood of supply chain disruption and volatility in the price of raw materials as nature-related effects seep through the global economy.

Familiarity with these risks and their interconnectedness should lead to a fuller and more accurate picture of the likely impacts on a company.

## DISPLAY 7: BIODIVERSITY AT THE ISSUER LEVEL—RISKS AND OPPORTUNITIES



**Source:** New Nature Economy Report II, *The Future of Nature and Business*, World Economic Forum and AlphaBeta, 2020, 4; Grant Rudgley and Nina Seega, *Handbook for Nature-related Financial Risks* (Cambridge, UK: University of Cambridge Institute for Sustainability Leadership, March 2021); World Economic Forum, *Nature Risk Rising: Why the Crisis Engulfing Nature Matters for Business and the Economy* (Geneva, Switzerland: WEF and PwC, January 2020).

## Identifying Economic and Investment Opportunities

But the case for investors to engage on nature-related risk does not consist entirely of push factors. There are pull factors, or incentives, too. Mitigation of biodiversity risk presents economic and investment opportunities. According to the World Economic Forum (WEF), 15 nature-positive actions<sup>17</sup> across three socioeconomic sectors—food, land, and ocean use; infrastructure and the built environment; and extractives and energy—could generate up to US\$10.1 trillion in annual business value and create 395 million jobs by 2030.<sup>18</sup>

Together, these sectors represent more than a third of the global economy and up to two-thirds of all jobs and, together with climate change, present risks to nearly 80% of threatened and near-threatened species on the Red List of Threatened Species compiled by the International Union for Conservation of Nature and Natural Resources. According to the WEF, companies in these sectors have a “significant opportunity and responsibility to reverse nature loss.” Energy and extractives could yield more than US\$3.5 trillion in revenues or savings and 87 million jobs, while the comparable figures for infrastructure and the environment would be US\$3 trillion and 117 million, respectively.<sup>19</sup>

But in the WEF’s analysis, the biggest opportunity in financial and job-creation terms would come from food, land and ocean use. According to the WEF, industries in these areas, including their full supply chains, represent about US\$10 trillion or 12% of global GDP and up to 40% of global employment. The opportunity they represent takes various forms—for example, productive and regenerative agriculture, sustainable management of forests, and transparent and sustainable supply chains.<sup>20</sup>

Productive and regenerative agriculture involves changing farming principles and practices to improve

yields while enhancing the health of the surrounding ecosystem. According to the WEF, some large companies are already pursuing regenerative techniques by reducing chemical inputs, using more crop rotation, building up soil health and making their production mix more biodiverse.<sup>21</sup> The next step is to scale up these practices and make them mainstream through farmer education, training and other support measures, as well as through the adoption of key technologies. Just as importantly, government subsidies will need to be repurposed and incentive systems redesigned.

Costa Rica and Colombia have taken a lead in sustainable forest management, tackling climate change and rampant deforestation simultaneously by implementing a carbon tax. The measures have faced little political opposition because they were packaged with other fiscal reforms and used to fund nature conservation (and, in the case of Colombia, the country’s peace process).

The introduction of greater transparency, traceability and collaboration into supply chains potentially makes them more sustainable and legally compliant by making it easier for consumers, regulators and producers to make informed decisions. Experience has shown that public-private partnerships—such as the Tropical Forest Alliance, which has 180 members drawn from the private sector, governments and civil society organizations, and works across Latin America, Africa, China and Southeast Asia—are more effective in this context than isolated corporate commitments.

Examples of new technologies and advanced analytics being used along the value chain include fishery authorities, which can now detect real-time or unreported fishing by looking at a vessel’s speed and course profile. In the forest industries, DNA fingerprinting and mapping can be used to trace and verify the origins of timber products.

<sup>17</sup> Actions taken to restore and regenerate nature, ecosystems and species. Positive outcomes can be measured by quantifying the maintenance and improvement of natural processes, ecosystem services and species over time.

<sup>18</sup> New Nature Economy Report II, [The Future of Nature and Business](#), World Economic Forum and AlphaBeta, 2020, 4.

<sup>19</sup> [The Future of Nature and Business](#), 82.

<sup>20</sup> [The Future of Nature and Business](#), 11.

<sup>21</sup> [The Future of Nature and Business](#), 34.

## DISPLAY 8: THE US\$10 TRILLION UPSIDE OF A POTENTIAL CATASTROPHE

Opportunities from Nature-Positive Actions to 2030			
Sector	Food, Land and Ocean Use	Extractives and Energy	Infrastructure and the Built Environment
<b>Opportunity (USD Trillions)</b>	3,565	3,530	3,015
<b>New Jobs (Millions)</b>	191	87	117
<b>Nature-Positive Actions Needed</b>	<ul style="list-style-type: none"> <li>Ecosystem restoration and avoided land and ocean use expansion</li> <li>Productive and regenerative agriculture</li> <li>Healthy and productive oceans</li> <li>Sustainable management of forests</li> <li>Planet-compatible consumption</li> <li>Transparent and sustainable supply chains</li> </ul>	<ul style="list-style-type: none"> <li>Circular and resource-efficient models of production</li> <li>Nature-positive metals and mineral extraction</li> <li>Sustainable materials supply chains</li> <li>Energy transition away from fossil fuels</li> </ul>	<ul style="list-style-type: none"> <li>Compact built environment</li> <li>Nature-positive infrastructure design</li> <li>Planet-compatible urban utilities</li> <li>Nature as infrastructure</li> <li>Nature-positive connecting infrastructure</li> </ul>

Source: New Nature Economy Report II, [The Future of Nature and Business](#), World Economic Forum and AlphaBeta, 2020.

These initiatives form part of a list drawn up by the WEF that could create “almost US\$3.6 trillion of additional annual revenues or cost savings, while creating 191 million new jobs by 2030” (*Display 8*).

Investors have a role to play in helping to develop these opportunities, and many are already doing so by working with governments and other entities to create innovative funding packages that deliver nature-positive actions (see “Galápagos Bond: A Win-Win for Investors and Biodiversity,” *page 12*).

## Galápagos Bond: A Win-Win for Investors and Biodiversity

In tackling biodiversity loss, emerging-market countries face some of the toughest challenges. Many host the most diverse ecosystems in the world, which are as fragile as they are important—such as the acacia forests of Africa’s Senegal River Basin (which provide ingredients for pharmaceutical treatments for throat and stomach ailments), or the numerous island nations whose coral reefs are home to nearly a quarter of all ocean species, many of which play a key role in the world’s protein intake.

Their challenges are compounded by a lack of adequate resources to combat biodiversity loss—a problem recognized by the COP15 goals, one of which is the need to close the US\$722 billion–US\$967 billion annual financing gap to reverse biodiversity loss by 2030.<sup>1</sup>

In 2023, AB participated in a consortium of private and public

interests to put forth a groundbreaking blended financing deal that featured an innovative mechanism to help solve this financing gap, in the form of a debt-for-nature swap.

Ecuador’s Galápagos Islands are a hotspot of biodiversity, with more endemic species than anywhere on Earth. But the country’s ability to preserve its biodiversity is hampered by political instability and structural economic challenges—including a heavy foreign debt burden, which has been historically expensive to service because of the country’s low credit rating.

When global macroeconomic stresses and a domestic political crisis triggered a fall in the value of Ecuador’s sovereign bonds, an opportunity arose for the government to repurchase a significant volume at a highly discounted rate. This laid the ground for a debt restructuring, which

released funds that could be partially applied to marine conservation.

A large global bank led the bond buyback, purchasing securities with a face value of more than US\$1.6 billion at 40 cents on the dollar—an outlay of US\$644 million.

The purchase was financed by a loan to the government from the proceeds of an issue by a special purpose vehicle, the Galápagos marine conservation-linked bond. The loan and bond buyback reduced the country’s external liabilities by US\$1 billion.

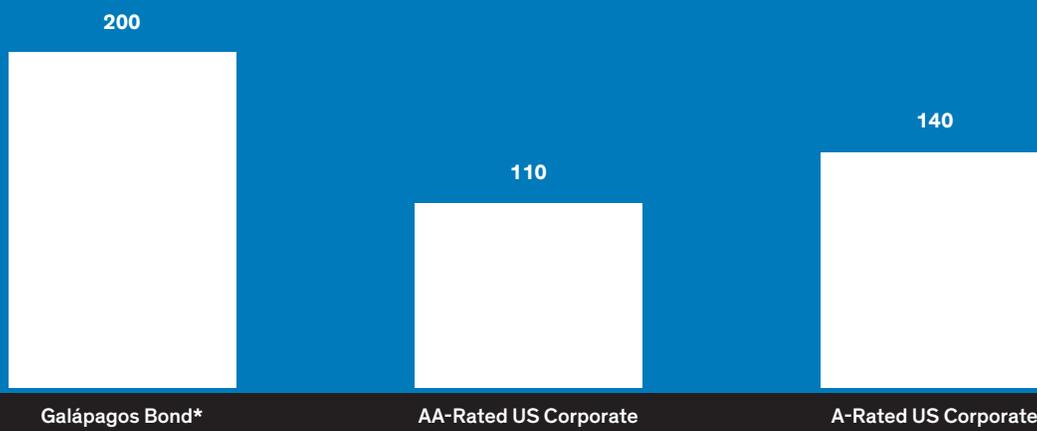
Insurance provided by the US government’s International Development Finance Corporation and the Inter-American Development Bank qualified the loan—and the conservation-linked bonds that it will eventually repay—for an Aa2 credit rating from Moody’s Investors Service. This was much higher than Ecuador’s CCC sovereign bond rating.



<sup>1</sup> *Financing Nature: Closing the Global Biodiversity Financing Gap*, Paulson Institute, The Nature Conservancy and Cornell Atkinson Center for Sustainability, 2020, 14.

## GALÁPAGOS BOND: STRONG CREDIT, COMPETITIVE YIELD

Credit Spreads (Basis Points)



Historical analysis does not guarantee future results. References to specific securities are presented for illustration purposes only and are not to be considered recommendations by AllianceBernstein L.P.

\*Ticker: GPSBLU. Credit spreads refer to GPSBLU at issuance and ICE BofA US Corporate Index, AA- and A-rated, 10+ years, respectively. As of May 18, 2023 | Source: Bloomberg, Galápagos bond documents, ICE, US International Development Finance Corporation and AB

The rating structure resulted in lower servicing costs. These and other savings are enabling Ecuador to release additional funds to help preserve the Galápagos Islands' unique biodiversity. Under the terms of the agreement, Ecuador will spend more than US\$450 million on marine conservation—a 70% increase from previous spending levels—over the life of the 18.5-year loan.

Satisfied with the transaction's biodiversity objectives and risk-mitigating structure, AB participated in the conservation-linked bond, but only after we had engaged with the banks

involved to agree on a satisfactory return for investors. Our engagement<sup>2</sup> helped secure a yield that was significantly higher than the average yield on bonds issued by US corporates with comparable credit ratings. On the S&P ratings scale, for example, the conservation-linked bond has a rating equivalent to AA. Not only did the bond yield more upon issuance than the AA average, but it also yielded more than lower-rated single-A bonds. This was driven partly by the bond's idiosyncratic features and partly by the illiquidity and early stage of development of the debt-for-nature swap market (*Display*).

Following the transaction's success, AB is engaging with other countries and financial counterparties to assess whether the structure might be replicated elsewhere. This is no light undertaking. Investors must conduct rigorous due diligence on such debt-for-nature swaps, ensuring the viability of the underlying nature projects and the financial and other credentials of the governments involved. (Indeed, we have declined to participate in similar deals that were not as well structured as the Galápagos bond.)

<sup>2</sup> AB engages issuers where it believes the engagement is in the best interests of its clients.

### Implementing Biodiversity Insights at a Portfolio Level

As with climate change, engaging on biodiversity risk requires investors to view security and sector risks and opportunities from a nuanced perspective. Often, the first challenge is knowing where to begin. How can investors break down such a large and complex undertaking into manageable tasks?

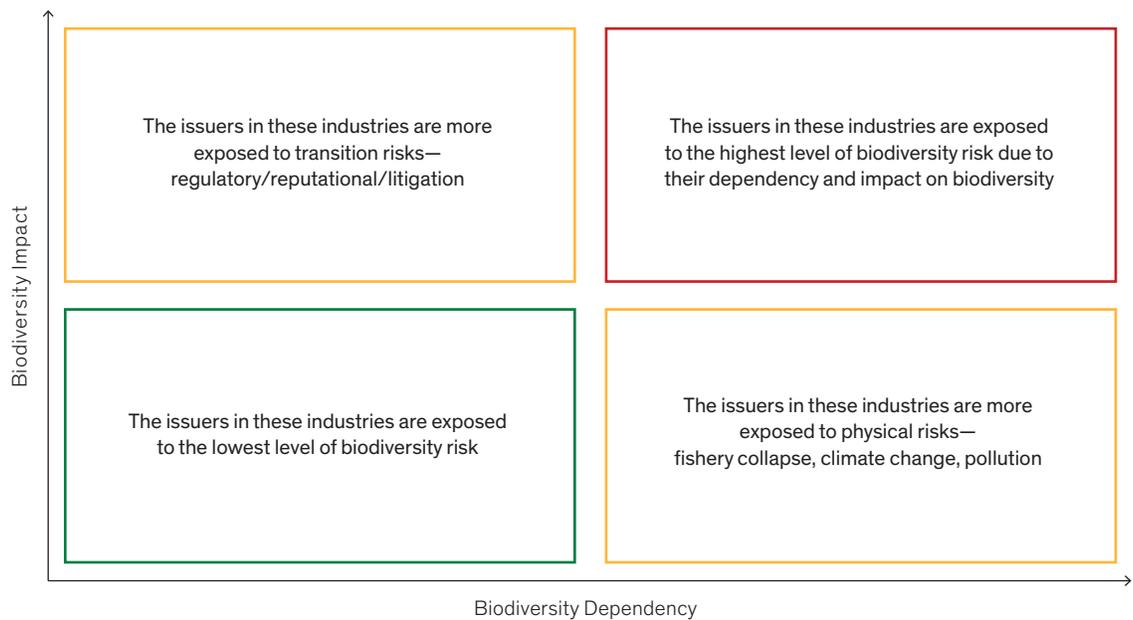
In our experience, a good conceptual starting point is to plot industry sectors along a matrix according to their dependency on ecosystem services (the pharmaceutical industry, for example, relies on the availability of biological materials and genetic resources) and their impact on biodiversity and other natural systems (industries such as mining and agriculture). An industry's position in the matrix can help investors zero in on potential nature-related risks and opportunities (*Display 9*).

Industries in the top right quadrant of the matrix represent the highest level of nature-related risks in terms of both dependency and impact. They may therefore merit close and timely scrutiny. Those in the bottom right quadrant rank high on dependency and low on impact and are most exposed to physical risk (such as deteriorating soil quality or a collapse in fish stocks). High-impact and low-dependency industries in the upper left quadrant are more exposed to transition risks because of their role in degrading natural systems and biodiversity.

Our biodiversity matrix is the first step in mapping nature-related risk, but it is unlikely to provide insights into an industry's entire risk profile. That's because its position on the matrix may differ from one country or region to another, depending on local business and environmental conditions.

### DISPLAY 9: MAPPING BIODIVERSITY RISK AMONG SECTORS AND COMPANIES

Biodiversity Risk Matrix Shows How Dependency and Impact Intersect



Source: *Exploring Natural Capital Opportunities, Risks and Exposure: A Practical Guide for Financial Institutions*, Natural Capital Finance Alliance and UN Environment World Conservation Monitoring Centre, 2018; ENCORE database, 2022.

This nuance underlines the importance of populating the matrix with appropriate data. The investment industry is at an early stage in acquiring expertise relevant to biodiversity and climate change risks. Many nature-related databases and platforms today have been developed with policymakers, conservationists, academics and scientists in mind, and are not an easy fit for investor consumption. Investors, in our view, should consider supplementing in-house research in these areas with perspectives from these stakeholders, as well as company management and specialized third-party data providers. They should also work toward incorporating geospatial data—information related to locations on the Earth’s surface—into their research.

Used appropriately, the matrix can help prioritize not only sectors for research but also issuers, including those that investors may wish to engage with directly to explore issuer-specific biodiversity risks and opportunities. It’s

helped us to map impact and dependency risks that are useful for our own engagement purposes across sectors and industries, including with drinks manufacturer Constellation Brands, alternative energy company Iberdrola and dredging contractor Great Lakes Dredge & Dock Company (GLDD) (*Display 10*).

Constellation Brands, which scores high on impacts and dependencies, brews products that rely on freshwater resources, particularly in areas of Mexico that are under high levels of water stress. The US-based company plans to continue its rapid growth but is heavily exposed to the nature-related physical risk of decreasing water availability. AB has engaged with the firm to understand how it’s mitigating these risks so that it can grow sustainably. In 2023, Constellation Brands reported that it had increased its target for water stewardship, planning to restore 5 billion gallons of water withdrawals by 2028, up from its previous target of 1.1 billion gallons.

## DISPLAY 10: IMPLEMENTING MATRIX RISK INSIGHTS AT A COMPANY LEVEL

A Guide to Portfolio Weightings and a Primer for Company Engagement

Company	Business	Region	Impacts	Dependencies
Constellation Brands	Drinks manufacturer	Latin America	Water use	Groundwater
			Water pollutants	Surface water
Iberdrola	Alternative energy producer*	Europe	Terrestrial ecosystem use	Climate regulation
			Marine ecosystem use	
			Disturbances to birds	
Great Lakes Dredge & Dock Co.	Dredging contractor	North America	Terrestrial and marine ecosystem use	No significant dependencies
			Water and freshwater ecosystem use	
			Air and soil pollutants	
			Environmental disturbances	

■ Very High ■ High ■ Significant

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\*Table refers to engagement on company’s wind power business, not its solar energy operations.

Source: AB



The turbine blades of Iberdrola’s wind farms pose a potentially fatal risk to birds. AB has engaged with the Spanish multinational electric utility, which—in line with its goal of achieving a net positive impact on biodiversity by 2030—is making significant progress. Among the most promising steps it has taken is a plan to use artificial intelligence to slow or halt turbine blades as birds approach. The technology is not yet scaled and is still in testing.

Construction and engineering firm GLDD undertakes contracts primarily for the US Army Corps of Engineers (USACE), which typically applies high environmental standards in its projects. Partly because of this, GLDD is aware of biodiversity and nature-related transition risks. But, as a contractor, the company is consistently constrained by the parameters set by clients. For clients other than USACE, broadening the scope of work to include climate-, biodiversity- and nature-related goals could adversely affect a project’s economics.

For example, the risks to GLDD posed by nature became evident when turtles died close to where the company was operating at Brunswick Harbor, Georgia. The project was stalled until the turtle populations had migrated away

from the project site. While the project was only delayed, GLDD is aware that, in some cases, contracts may be completely canceled if impacts worsen, depending on the environmental constraints listed in the contracts. AB is engaging with the company on these issues.

This approach can be used to identify nature-related opportunities as well as risks. For insights into opportunities from sustainable agriculture and water scarcity, for example, see [“From the Ground Up: Sowing the Seeds of Biodiversity Investment”](#) and [“Water Scarcity: Sustainable Investors Address a Growing Scourge,”](#) respectively.

When weighing a company for inclusion in a portfolio, therefore, investors can assess its biodiversity exposures from four perspectives—physical risks, transition risks, opportunities to generate revenues or cost savings through nature-positive actions, and impacts and dependencies on ecosystem services. The matrix is a useful tool, but investors can do more, in our view, to integrate material biodiversity risks and opportunities into their processes and decisions (see “AB’s Approach: Education and Implementation,” *page 18*).



## AB's Approach: Education and Implementation

The matrix is a useful tool, but it's not enough on its own, in our view, to help investors integrate material biodiversity risks and opportunities into their processes and decisions. Our experience with incorporating climate considerations in the investment decision-making process has taught us to think deeply and broadly about climate issues, and we're applying those lessons in our approach to biodiversity.

The key lesson is to engage not just at an investment level, but to educate at a firmwide level, too. Biodiversity loss and climate change are systemic risks—affecting every aspect of society, the economy and people's lives—so it makes sense to think of them strategically, within a business's operating context today and beyond.

As biodiversity loss continues and risk awareness grows, interactions with stakeholders on these issues are likely to become more frequent and intense. To prepare for this, at AB we have established a Biodiversity Working Group to facilitate the flow of specialist knowledge and insights across the business and to coordinate relevant initiatives (*Display*).

Another task for the group is to oversee and guide a strategy for converting our growing knowledge and understanding of biodiversity risk into practical outcomes. The strategy includes:

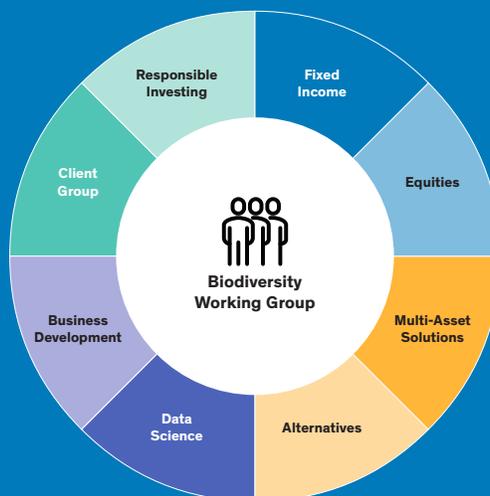
- Education—Executing firmwide training and client training; identifying partners and experts to help develop and execute a curriculum

- Implementation—Integrating biodiversity considerations into the investment process through research and engagement with issuers; sourcing data and identifying appropriate biodiversity metrics, data, tools and targets; leveraging proprietary insights
- Thought Leadership—Publishing research; participating in industry groups and partnering with clients

It's early days, but we're already feeling the benefit of these initiatives. As we learn more about what works for our clients and our firm, we believe the strategic lessons from our framework will also help others who understand the need to engage with biodiversity risk and opportunity.

### AB's BIODIVERSITY WORKING GROUP

Easing the Flow of Knowledge and Insights Across the Business



For illustrative purposes only.

Source: AB

## **Pressure Mounts on Businesses and Investors**

The threats to biodiversity and climate are major themes of our age, representing risks to life and the environment of an almost unprecedented scale and complexity. Biodiversity loss alone could cost the global economy trillions of dollars in the coming years, in addition to trillions more related to climate change.

Complexity adds to the uncertainty and may compound the risks. The interconnectedness within and across ecosystems makes biodiversity risk especially complicated, even before factoring in the propensity of biodiversity loss and climate change to amplify each other's effects.

Investors face an urgent challenge in analyzing and managing these risks and opportunities. As biodiversity loss continues, the risks to companies and investment portfolios increase. And, as governments and regulators respond to biodiversity loss, the pressure on businesses and investors to engage with these issues builds.

## **More Like Ecosystems, Less Like Invasive Species**

For investors and issuers, the countdown to 2030 is well under way.

But the challenge is not insurmountable. Investors can take practical steps to engage with biodiversity risk by understanding its place in the broad ecological structure,

its role in underpinning ecosystem services, and how those services interact with one another in supporting life and economic activity.

From there, investors can develop a framework for assessing companies' biodiversity exposures—not just physical and transition risks, but also the economic and investment opportunities that can arise from actions taken to mitigate biodiversity loss and climate change. And, by applying appropriately designed conceptual frameworks and specialist data, biodiversity risk and opportunities can be calibrated at the sector and individual issuer levels and mapped to investor portfolios with the goal of unlocking better returns.

By using these approaches in an active strategy that combines fundamental research, third-party specialist knowledge, and issuer engagement and stewardship, investors, in our view, stand to achieve meaningful long-term performance while helping to mitigate nature-related business and investment risks.

These actions alone won't solve the biodiversity crisis, but they may help to create a world in which, one day, economies will behave more like ecosystems and less like invasive species.

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