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Biodiversity & Business: What Every MBA Needs to Know

Executive Summary

Nature is an important contributor to the global economy. The World Economic Forum (WEF) estimates that over half of global GDP—more than $44 trillion— is "moderately or highly dependent on nature and its services."[1] Many industries depend on inputs derived directly from nature—particularly the agriculture, food and beverage, construction, forestry, and pharmaceutical industries—while all of global society benefits from nature's valuable "ecosystem services", which include pollination, water filtration, erosion control, flood protection, and coastal protection. The benefits derived from biodiversity and ecosystem services are significant but are consistently undervalued.

"Without biodiversity and ecosystem services, our economy cannot thrive."

- Nicolas Moreau, CEO, HSBC Global Asset Management

Finance for Biodiversity statement, 2020 - https://www.financeforbiodiversity.org/pledges/hsbc-global-asset-management/, CEO, Bloomberg L.P.

With an estimated 1 million species at risk of extinction today, biodiversity loss and ecosystem collapse ranks as the fourth highest 10-year risk to the global economy in WEF's 2023 Global Risks Report.[2] Nature-related risks for businesses include operational, regulatory, and reputational risks, and there is new pressure from regulators, consumers, and investors to disclose and manage nature-related risks and impacts. As stakeholders increase their awareness of biodiversity risks, business leaders need to understand both the risks and the opportunities inherent in biodiversity. Companies have opportunities to realize value by managing their biodiversity impacts, as well as by investing in growth industries like regenerative agriculture, ecosystem restoration, and biodiversity data and analytics applications.

The Issue

Natural systems underpin every aspect of our lives, from the food we eat to the clothes we wear and materials we build with. The World Economic Forum (WEF) estimates that over half of global GDP—or, $44 trillion in 2020 (a figure higher today)—is "moderately or highly dependent on nature and its services."[3] Construction ($4 trillion), agriculture ($2.5 trillion) and the food and beverage industry ($1.4 trillion) are the three largest industries that depend most on nature, extracting resources directly from forests, land, or oceans.[4] The pharmaceutical industry also relies heavily on nature; 80% of all medicines come from plants or have been inspired by natural products.[5] Further, nature contributes valuable "ecosystem services" to the global economy, which include pollination, water filtration, erosion control, flood protection, and coastal protection.[6] Natural ecosystems also create tourism value; coral reefs, for instance, generate approximately $36 billion per year for the global tourism industry.[7]

Defining the sector

Biodiversity – The variety of species and organisms found in a given area (also known as biological diversity).

Nature – All components of the natural world, including everything from soil, forests, air, water, geology, and all living organisms.

Natural capital – The world's stock of renewable and non-renewable natural assets, including ecosystems, water, geology, etc. that yield a flow of benefits to people.

Ecosystem services – Direct and indirect benefits people obtain from natural capital stocks. Direct benefits include, for example, food, fuel, minerals, and medicinal resources. Indirect benefits include flood protection, crop pollination, removal of CO_2, and other pollutants from the atmosphere, and water filtration, to name a few.

Today, many natural systems are in crisis. Biodiversity loss and ecosystem collapse ranks as the fourth highest 10-year risk to the global economy in WEF's 2023 Global Risks Report.[8] Since 1970, there has been a 68% drop in mammal, bird, fish, reptile, and amphibian populations globally.[9] Nearly 1 million species (of an estimated 8.1 million species total) are currently at risk of extinction.[10]

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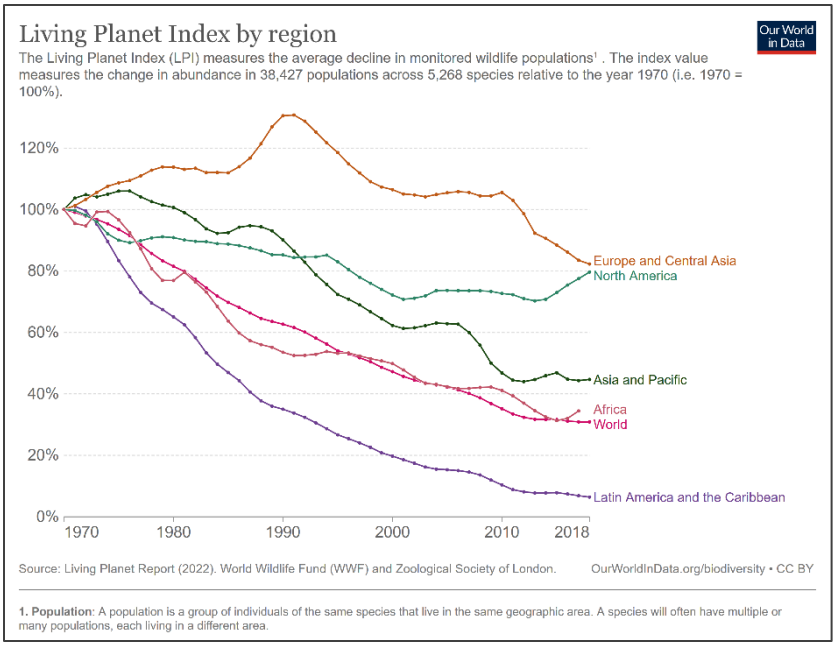
The degradation of ecosystems presents risks for destroying business value, especially in sectors highly dependent on nature and its services. From 1997 to 2011, the global economy lost an estimated annual $4-20 trillion in ecosystem services from land use changes and an annual $6-11 trillion from land degradation.[11]

Protecting nature is only part of the story. A healthy planet must support biodiversity in the form of genetic diversity *within* species, diversity *between* species, and diversity of ecosystems.[12] In healthy ecosystems, plants, animals, soil, and water exist in a complex, balanced system of co-dependencies, so preserving biodiversity is critical for supporting the stability and resilience of ecosystems.



Globally, biodiversity loss has been greatest in the Latin American and Caribbean region, which has lost a staggering 94% of its biodiversity since 1970. During that same time period, North America has lost 33%, Europe and Central Asia have lost 24%, Asia Pacific has lost 45%, and Africa has lost 65% of its biodiversity.[13]

Causes of biodiversity loss

The Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) categorizes five key drivers of biodiversity loss caused by humans: land use and sea use change, overexploitation of natural resources, climate change, pollution, and the spread of invasive species.[14]

- Land use and sea use change. Human activities including agriculture, livestock management, mining, and urbanization have dramatically altered the planetary landscape. Agricultural expansion is the largest type of land use change, with over one third of the planet's land surface being used to grow crops or support livestock.[15] These activities have destroyed habitats and pushed out native animal and plant species. For instance, land use change has led to the loss of pollinator species such as bees, which threatens agricultural production; one in 6 bees is already regionally extinct, and 40% are threatened by extinction.[16]

- Overexploitation of natural resources. The use of natural resources—including plants, animals, fossil fuels, metals, and minerals—has nearly doubled since 1980, with 60 billion tons of raw materials extracted each year from nature.[17] While some of these materials are renewable, many natural systems either can't be replaced or cannot regrow at pace with extraction.

- Climate change. Changes to the global climate, including hotter temperatures, increasing storm severity, and increased frequency of droughts, wildfires, and floods are contributing to biodiversity loss. In many locations, climate change is forcing species to adapt or risk extinction. For example, warming waters have contributed to a loss of 50% of coral reefs in the last 150 years. With 1.5˚C of global warming, it is expected that 70-90% of coral reefs will vanish completely.[18].

- Pollution. Air, soil, and water pollution degrades ecosystems, directly harms plants and animals, and indirectly affects species through habitat destruction. In the last 40 years, for instance, Europe has lost over 500 million birds due primarily to pesticides and fertilizer use.[19] Marine plastic pollution has increased tenfold in the last 40 years.[20] Presently, 38% of endangered species decline is due to pollution, and over 267 species worldwide are being affected by plastic pollution alone.[21]

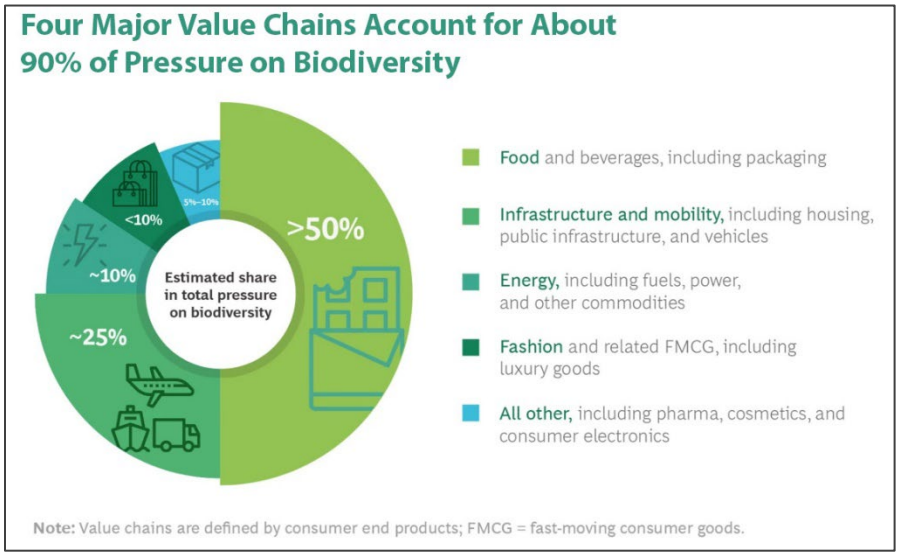
- Spread of invasive species. Invasive plant and animal species compete with native species for resources, leading to extinctions and declining ecosystem function. More than 40% of currently endangered species

are significantly impacted by invasive species[22], and the rate of invasive spread due to increased trade and tourism has been steadily growing in recent decades.[23] It is estimated that invasive species may cost global agriculture $540 billion annually—or more than $100 billion per year in the U.S. alone.[24]

Business drivers

BCG reports that 90% of pressure on biodiversity comes from four major value chains: food and beverages, infrastructure and mobility, energy, and fashion and fast-moving consumer goods.[25] Businesses directly impact biodiversity through their infrastructure, operations, and supply chains. For instance, the growing global demand for meat, especially beef and lamb, has led to the expanding encroachment of grazing land into the Amazon rainforest and other biodiverse habitats. If meat consumption continues to grow unabated, meat production will threaten the habitats of more than 17,000 species by 2050.[26]

In the apparel industry, cotton farming uses only 3% of arable land, but is responsible for 24% of insecticide use and 11% of pesticide spread.[27] Construction of buildings, roads, and infrastructure; expansion of mining and timber production; waste generation; pollution through air and water emissions; and other business operations likewise have impacts on natural ecosystems and their biodiversity.



Source: BCG, "The Biodiversity Crisis Is a Business Crisis," 2021. https://www.bcg.com/publications/2021/biodiversity-loss-business-implications-responses

Business Risks

Biodiversity loss and the degradation of natural capital presents risks for many businesses. While corporate reporting on nature-related impacts and risks is still a fairly nascent discipline, companies should be aware of growing investor, consumer, and regulatory pressures to act.[28]

Operational risks

One in five companies could face operational risks as a result of collapsing ecosystems due to ecological dependency, resource scarcity, or disrupted business operations.[29] Based on a UN Environment Programme assessment, 13 of the 18 sectors that make up the FTSE 100 Index have production processes that are "highly dependent" on nature.[30] Ecosystem degradation poses material risks to businesses through supply chain shocks, rising insurance costs, lower yields, and scarcity or high cost of resources. Agriculture, forestry, food and beverage are especially impacted by ecosystem losses due to the fact that they are heavily dependent on ecosystem services.[31] For instance, an estimated $235-577 billion of annual global food production relies on the direct contribution of pollinators[32]; declining bee populations put this operational value at risk.

Disclosure & regulatory risk

Companies are facing new requirements to disclose their nature-related risks and impacts. In January 2023, the EU ratified a new Corporate Sustainability Reporting Directive (CSRD) to expand reporting requirements and broaden the types of companies required to report in the 2024 financial year.[33] The new directive requires companies to disclose "double materiality"—that is, both the environmental and social issues that are *financially material to the company* and the *material impact of the company's activities* on society and the environment. The new European Sustainability Reporting Standards (ESRS) will require companies to disclose their impacts on biodiversity and ecosystems.[34]

Many business leaders expect that disclosure is just the beginning of great regulatory action to come. The UN Biodiversity Conference (COP15) in 2022 laid out a new set of goals to "guide global action through 2030 to halt and reverse nature loss." It included 23 targets—including halving food waste and restoring 30% of terrestrial and marine ecosystems by 2030—which will likely require corporate action.

Access to capital
Along with regulators, investors are also taking corporate biodiversity and nature-related risks into consideration. In June 2021, a 40-member Taskforce on Nature-related Financial Disclosures (TNFD) was launched to address financial risk reporting, and included taskforce members from Bank of America, BlackRock, HSBC, and Swiss Re, among other financial services companies. Major lenders are tightening environmental requirements for access to debt, particularly signatories to the Equator Principles, which govern project finance provided by signatory banks, including JP Morgan Chase, Citi, Wells Fargo, and TD Bank.[35] The most recent iteration of the Equator Principles, EP4, includes a biodiversity standard based on the International Finance Corporation's Biodiversity Conservation and Sustainable Management of Living Natural Resources performance standard.[36]

Asset managers are also starting to take a look at biodiversity risks in their portfolios and products. For example, as of June 2023, 140 financial institutions representing over $20 trillion of assets have signed on to the Finance for Biodiversity Pledge to commit to collaborate, engage, assess, set targets and report, by 2024 at the latest, on their biodiversity impacts.[37] A new investor engagement initiative, Nature Action 100, focused on driving "greater corporate ambition and action to reduce biodiversity loss", was launched in 2023. Also in 2023, Moody's Investors Service report identified nine sectors, with an estimated $1.9 trillion in rated debt, that have "high" or "very high" exposures to natural capital risks.[38] Sectors that have heavy impacts on biodiversity, such as mining, oil and gas production, and forestry will likely face increased investor scrutiny in the future.

Liability risk
In some instances, companies face direct liability for their impacts on biodiversity, ecosystems, and wildlife. For example, in the aftermath of the Deepwater Horizon oil spill, BP and its partners have spent a staggering $69 billion to date on fines, cleanup, research, and community restoration activities.[39] In the future, increased disclosure of nature-related risks, combined with increased regulatory attention to biodiversity issues, may present additional liability exposure for companies.

Reputation risk
Shifting consumer trends pose a brand risk to companies that fail to integrate sustainability into their business strategies. In recent years, consumers have demonstrated their willingness to pay for products that tout benefits to nature—such as Rainforest Alliance-Certified coffee brands—and to boycott products known to have a high toll on ecosystems, such as bluefin tuna and palm oil.[40] A 2023 McKinsey & Co. and NielsenIQ study showed that products making environmental or social claims "averaged 28% cumulative growth over the past five-year period, versus 20% for products that made no such claims."[41]

Business Opportunities

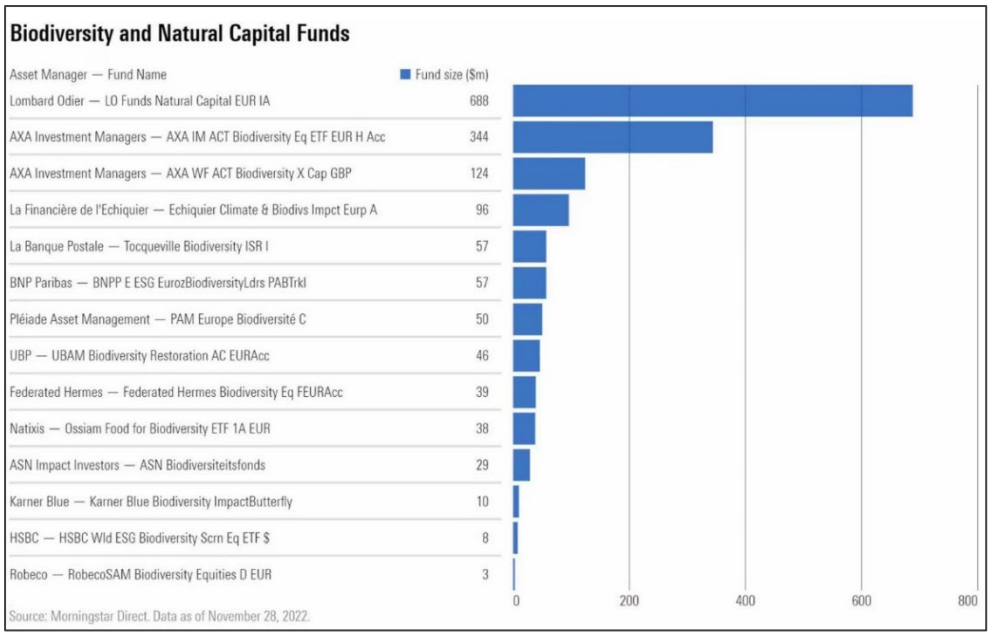
Responding to the biodiversity crisis also provides opportunities for innovative solutions. Many of these are still nascent but likely to grow in the future.

Corporate biodiversity and "nature-positive" strategies
Many companies have begun to measure and manage their impacts on biodiversity. For example, the French retailer Carrefour outlines biodiversity commitments that include sourcing 100% "zero-deforestation" beef from Brazil by 2030. Luxury goods company Hermès ensures that all staff are trained on the company's biodiversity strategy and conducts biodiversity site assessments as part of the group's impact analysis and value chain mapping exercise. Fashion companies LVMH and Kering have committed to sustainable sourcing for lower biodiversity impact. Other companies are pledging not only to mitigate risks but to go further to become "nature positive." In April 2023, for example, Salesforce announced a Nature Positive Strategy to "restore and protect nature."[42] PwC has launched a new Centre for Nature Positive Business to expand its consulting in "nature positive strategy and transformation, nature risk management and reporting, nature technology, data

and measurement, and nature finance and fund management."[43] Companies looking to begin measuring and monitoring biodiversity impacts can start by setting Science-Based Targets for Nature.

Biodiversity-related investment products

Some asset managers are beginning to include biodiversity as an investment theme in their fund offerings. Morningstar lists 14 funds representing $1.6 billion of combined assets with strategies focused on biodiversity (though this is still tiny compared to the more than 1,000 climate funds representing $350 billion in assets globally).[44] AXA Investment Managers has raised $900 million as part of its Climate & Biodiversity impact funds focused on investing to conserve, protect, and restore the natural capital necessary for conservation and biodiversity.[45]



Source: Morningstar, 2023
https://www.morningstar.com/sustainable-investing/asset-managers-start-adopting-policies-around-biodiversity

Regenerative agriculture

Regenerative agriculture—a set of farming practices that minimize soil disruption, rotate and diversify crops, integrate grazing, and employ more precise placement of fertilizers and nutrients—promotes greater soil carbon removal as well as enhanced biodiversity on agricultural lands. Nestlé has announced that it will source 20% of its key ingredients through regenerative agriculture methods by 2025.[46] In other examples, Kellogg's has launched a program to educate farmers in agrobiodiversity, sustainable pest management, and pollinator management techniques as part of its biodiversity initiative[47], and PepsiCo announced a project to spread regenerative farming practices across 7 million acres, equivalent to its entire agricultural footprint.[48] This trend also creates business opportunities for agtech startups supporting regenerative ag, like Rizoma Agro and Carbon Yield.

Ecosystem restoration & protection

While conservation and ecosystem restoration have historically been the provenance of nonprofit organizations, there are new opportunities for companies to realize value in projects that deliver carbon market credits or help them achieve corporate climate goals. So-called "nature based solutions" (NBS) to climate change include a wide range of biological processes to remove CO_2 from the atmosphere, such as reseeding/reforestation, mangrove restoration, and peat bog restoration projects. Many companies seeking to reduce their carbon footprints are investing in NBS projects, with the bonus of enhancing biodiversity at the same time. Apple, for instance, has made a $200 million investment in the Restore Fund, managed by Climate Asset Management, to protect and restore critical ecosystems and provide natural carbon removal solutions.[49] Proctor & Gamble also announced a $100 million investment in NBS projects, including a mangroves protection in the Philippines, forest restoration in Brazil, and reforestation in northern California, as part of the company's 2030 climate goals.[50]

These investments also create innovation opportunities. A German startup called Skyseed is using AI and drone technology to analyze and efficiently reforest damaged areas. Terraformation is a global forestry accelerator that supports early-stage forestry teams to launch, build, and rapidly scale native reforestation projects. Startup Coral Vita is growing and planting new corals which can stimulate reef restoration. Another seed-stage company, Archireef, plans to use 3D-printed terracotta tiles to restore reefs.

Ocean plastic reduction
Strategies to reduce and recover ocean plastic waste help minimize biodiversity losses in ocean and coastal habitats. Social enterprise Bureo, for instance, works with local fishing communities to collect their discarded fishing nets, which are then recycled into consumer products for Patagonia, Yeti, Costa, and Trek Bikes.[51]

Consumer products
Vitro Labs, backed by the venture firm Regeneration.VC, is making lab-grown leather, which could shrink the land use footprint of leather production. Meat alternatives, including both plant-based meat (eg, Beyond Meat) and lab-grown meat (eg, Upside Foods) likewise reduce the amount of land needed for animal grazing. "Circular economy" products reduce the need for new raw materials by using recycled material inputs, while other products use substitutes to reduce the impacts of extraction—for instance, using fast-growing bamboo for flooring instead of hardwood, or substituting bio-based plastics for ones derived from oil.

AI, data, & analytics for biodiversity conservation
Capturing environmental data through remote sensors, drones, and satellites has become an important tool in conservation. Google's Wildlife Insights Initiative, for instance, uses Google's open-sourced machine learning platform to help conservationists share, analyze, and manage camera data in order to more efficiently protect species from extinction. Xilva uses a digital platform and data assessments to catalyze investment for forest regeneration, while Rhions Lab uses wildlife trackers and AI to slow illegal poaching. Startups such as NatureMetrics, Basscamp Research, and WildTechDNA are using rapid DNA-based species identification, essential for accurate wildlife tracking, management, and conservation.

Biodiversity fintech innovation
Several interesting innovations are emerging at the intersection of biodiversity and fintech. ValueNature has developed a biodiversity credit for the voluntary ecological market; each credit represents one unique hectare of land protected for 10 years for a specific project. Treecard offers consumers a credit card that plants trees in biodiversity hot spots. And, Dutch bank Rabobank has piloted a new loan product for farmers, the "Planet Impact Loan", which has an interest discount based on their scores on the Biodiversity Monitor.[52] More innovations are likely as investors look for new ways to finance and recoup value from biodiversity projects.

Takeaways for MBAs

1. The global biodiversity crisis presents tangible risks to businesses and markets, particularly to companies in the agriculture, timber, food and beverage, construction, and pharmaceutical industries.
2. All companies should be aware of increasing scrutiny and impending regulatory disclosure rules around biodiversity and nature-related risks.
3. Some corporations are embracing "nature-positive" business strategies and supporting regenerative agriculture, ecosystem restoration, and nature-based climate solutions. Entrepreneurs see additional opportunities in meeting these needs through advancing new technologies and business models for measuring, monitoring, enhancing, and protecting nature.

Further Reading

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