Investing in a Biodiversity-Integrated Manner

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Executive summary

This white paper was conceptualized based on discussions with the members of the Forum’s Biodiversity Finance Learning Coalition, which established the need to demystify current biodiversity finance practices and explore the works in progress that are generating interest among the investment community. Accordingly, this report:

- Summarizes the investor community’s (asset owners and asset managers) approaches to biodiversity and nature-related risks and opportunities
- Highlights the challenges in integrating biodiversity risks in investment decision-making
- Recommends ways to use currently available tools for risk management and to leverage investment opportunities in nature-positive business models.

Key findings

- There is little guidance on how biodiversity could be quantified and best integrated into investment decision-making. Asset managers are seeking tangible, quantifiable biodiversity metrics or proxies to reasonably represent investment risks and opportunities.
- Multiple industry and investor coalitions are working to build science-backed knowledge repositories, market tools and metrics, and reporting frameworks.
- However, the International Union for Conservation of Nature (IUCN) has criticized efforts to date as “not appropriate for the purpose for which they are being deployed.” Investors need to embrace the concepts of societal and ecological thresholds and how the costs and benefits are allocated across society and generations.

Recommendations

- Investors/asset managers could leverage the available biodiversity-inclusive environmental, social and governance (ESG) metrics and scores along with biodiversity impact measures — accounting for both dependency and impact on nature, which means that biodiversity is part of a wider ecosystem, to build a future-ready portfolio.
- Portfolio analyses through a biodiversity (risk + impact) lens will provide a realistic view of long-term portfolio risks and opportunities.
- Tilting equity portfolios away from “risky” companies will not address the problem. More and better stewardship is necessary, with companies and policy advocacy focussing on governments.
- Innovative real asset (including blended finance) investments for nature-based solutions to climate, ecosystems and biodiversity challenges are a key part of the solution. Asset owners should look to allocate capital in this area while asset managers should look to develop new investment opportunities.
- While gaps remain, there is no time to lose.

No doubt, realization is growing that mere policy nudges and incremental approaches are just not enough to finance a common future. Efforts to mainstream ESG and nature-related issues ought to be such that best practices can be viewed as the “common sense approach” to investments and portfolio management. In fact, profits with purpose and investing in a nature-positive way ought to be the twin bedrocks of all financial transactions. There are pathways to building nature-positive portfolios through financial innovation integrating emerging tools to measure biodiversity risks. As such, investors are encouraged to thoughtfully consider progress in science-based metrics to measure biodiversity risk as they upgrade their approaches to nature-positive investing.
Navigating the biodiversity noise and related alphabet soup
Investors, who manage trillions of dollars, have found a new catchword – biodiversity. Whether a pandemic-realization or a response to increasing references to the need to preserve biological diversity globally as a survival imperative, talk about biodiversity has gained ground in the financial services industry in general and among investors, asset owners and asset managers in particular.

Despite this growing awareness and interest, there is limited guidance on incorporating biodiversity risks and opportunities into the investing and financing decision-making process. According to a recent survey, while 84% of the asset managers and asset owners who responded were very concerned by biodiversity loss, 91% did not have any biodiversity-related targets. This growing interest has not necessarily translated into investment action, as investors are still looking for something more tangible to capture biodiversity impacts in a way that their forward-looking assumptions and numbers reflect.

The proliferation of sustainability reporting standards that have gone along with this movement has created an alphabet soup of environmental, social and governance (ESG) disclosure. Additionally, the flood of ESG scores and ratings shows divergence and low correlation, resulting in a lack of reliable data.

This, in turn, has led to confusion surrounding ESG integration for investors and asset managers while providing scope for companies to greenwash their sustainability reports through the selective disclosure of metrics.

The creation of the International Sustainability Standards Board (ISSB) aims to help address this challenge but the ISSB proposal only focuses on financially material climate issues, which is not sufficient to address the systemic biodiversity risks humanity faces.

Biodiversity adds an additional layer of complexity. Asset managers have not been able to quantify the complex web of natural ecosystems and the biodiversity factors within those systems or find proxies for them. Carbon emissions and greenhouse gasses are good alternatives for measuring climate, but biodiversity is too complex to narrow down to a single option. Moreover, biodiversity concerns are part of ecosystems and are thus everywhere. Yet they are also location-specific, varying widely depending on weather, soil, water and type of ecosystem, like a forest, wetland, dryland, grassland or coral reef, and other uses, like agriculture and plantation.

## ESG landscape

### Standards by
- Sustainability Accounting Standards Board (SASB)
- Global Reporting Initiative (GRI)
- International Integrated Reporting Council (IIRC)
- International Sustainability Standards Board (ISSBEFRAG)
- Science Based Targets Initiative (SBTI)
- Science Based Targets Network (SBTN)

### Frameworks by
- Carbon Disclosure Project (CDP)
- International Finance Corporation Performance Standards (IFC PS)
- United Nations Global Compact
- World Business Council for Sustainable Development (WBCSD)
- Equator Principles
- Principles for Responsible Investment (PRI)
- Task Force on Climate-Related Financial Disclosures (TCFD)
- Taskforce on Nature-related Financial Disclosures (TNFD)
1.1 Biodiversity risks cannot be overemphasized for investors

Biodiversity underpins nature and the ecosystem services it provides and which people and businesses directly or indirectly depend on. Therefore, any loss of biodiversity is a material risk for investments in these businesses. According to the World Economic Forum Nature Risk Rising: Why the Crisis Engulfing Nature Matters for Business and the Economy report, over 50% of the world’s gross domestic product is moderately or highly dependent on ecosystem services. Furthermore, the Forum ranked biodiversity loss in the top three global risks in terms of likelihood and impact in its Global Risks Report 2022.

Biodiversity loss could pose risks for investors that could manifest in the form of transition, physical and litigation risks for assets where they are invested. Whatever the risk form, biodiversity risks are “green swans”. Investors are increasingly aware that the preservation of their capital is, at the very least, a function of biodiversity, which is essential to the success of the underlying portfolio of invested assets.

Failing to include nature-related concerns (risks and impacts) in capital allocations has misfired in all directions, exposing the financial sector. In fact, “biosphere integrity” (the rate of biodiversity loss) is among four of the nine planetary boundaries that have been breached. Despite this grim side of capitalism, not all is lost. Investors can still turn the situation in their favour by leveraging the growing availability of information and financial innovations.

State of biodiversity funding & needs

- Around $824 billion is needed to protect and restore nature compared to the $140 billion spent on biodiversity each year globally.
- The share of international climate finance in favour of biodiversity and ecosystems is estimated at less than 2%.
- A survey by ShareAction of 75 of the world’s largest asset managers found that 86% made no reference to ecosystem protection, natural capital or biodiversity in their policies.

1.2 Investors can spin the biodiversity story in everyone’s favour

Given that the investor community is at various stages of integrating ESG factors in their decision-making, considering biodiversity factors within the E of ESG will make investments more downside-resilient and future-ready. Biodiversity issues also need to be accounted for under social issues because people and communities need to believe that protecting biodiversity makes more economic sense than ecosystem destruction does. On the one hand, as stewards, asset managers and asset owners ought to generate sustainable returns. On the other hand, as owners and deployers of capital, they have the power to make enterprises adopt environmentally and socially responsible business practices. In fact, the investment industry has a far greater role to play in enabling the systemic transformation to sustainability. Plausible steps could include:

- Considering increased references to biodiversity in ESG frameworks and with data providers while building the ESG materiality matrix
- Leveraging biodiversity impact measurement tools and using a mix of them as applicable
- Constructing a portfolio integrating biodiversity risks and using investor influence with companies, governments and market standard-setters
- Exploring nature-positive investments and related financial innovations
- Creating portfolios that address the sustainable management of entire ecosystems or landscapes.
Considering biodiversity risks through ESG frameworks and ratings
Given the growing importance of nature-related risks, ESG frameworks have expanded to include new areas, including biodiversity. Some frameworks, such as those of the Sustainability Accounting Standards Board (SASB), Global Reporting Initiative (GRI) and the Natural Capital Protocol, provide guidance on biodiversity from materiality and impact perspectives, respectively, while others require checking a box to be biodiversity-compliant. The regulatory requirements of biodiversity-related disclosures and the likelihood of nature-related disclosures becoming mandatory soon could partly explain this surge in the inclusion of biodiversity in ESG frameworks.

- Partnership for Biodiversity Accounting Financials (PBAF). The PBAF Standard was developed in 2020 and enables financial institutions to assess and disclose the impacts and dependencies of loans and investments on biodiversity.

- The Global Reporting Initiative (GRI) has joined forces with the European Financial Reporting Advisory Group (EFRAG) on the technical work for their respective new biodiversity standards. EFRAG is scheduled to release a draft European Union standard while GRI aims to release the GRI Biodiversity Standard in the second half of 2022.

- The Sustainability Accounting Standards Board (SASB) and the International Integrated Reporting Council (IIRC) have consolidated to form the Value Reporting Foundation, which has been brought under the fold of the International Sustainability Standards Board (ISSB). ISSB has recently released a draft ESG reporting standard which is likely to provide additional direction on nature-related reporting. Though this only focuses on financial materiality when a broader double-materiality perspective is necessary to truly address sustainability issues.

- The Carbon Disclosure Project (CDP) with the Backing of BNP Asset Management, has announced the development of a corporate biodiversity reporting framework that accelerates action on nature in the private sector.

- The Science Based Targets Network (SBTN) is developing methodologies for cities and companies to set science-based targets for water, land, biodiversity and the ocean.

Corporate disclosures provide part of the information. Investors can supplement it with other data. For example, some ESG data providers and rating agencies have started to incorporate biodiversity-related information into ratings. In terms of engagement, proxy voting and other forms of engagement are available as tools to enforce nature-positive change. Investors could and should use a mix of these (corporate disclosures and relevant ESG scores and ratings plus engagement with portfolio companies) to realize their sustainability mandates.

Guidance from the Taskforce on Nature-related Financial Disclosures (TNFD) that advocates the Locate, Evaluate, Assess, Prepare (LEAP) approach to integrating nature-related risk and opportunity assessment will surely strengthen reporting and disclosures on nature-related risks, which will further reinforce the integration of such considerations in investing.
Measuring and managing biodiversity impact
While reporting frameworks aim to cover biodiversity factors, current corporate reporting of nature-related risks is limited and is not sufficient to gauge biodiversity risks, especially not in a wider ecosystem setting. In light of and despite this, some investors have started experimenting with those biodiversity measurement approaches that are in vogue, such as the biodiversity footprint for financial institutions, corporate biodiversity scores, geospatial tools, etc. (see annex II. List of indicative biodiversity assessment tools and approaches). According to the European Commission, the “measurement approaches using characterisation factors include more or less the same main pressures on biodiversity, identified by the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) as land/sea use change, direct exploitation, invasive alien species, pollution and climate change.”16

Table 1 provides a comparative analysis of the aggregation methods used by those measurement metrics and tools in vogue that are popular among investors.

### Table 1: Comparative analysis of aggregation methods

<table>
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<tr>
<th>Aggregation method</th>
<th>Scores or indices using aggregation method</th>
<th>Essential climate variables</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean species abundance (MSA)</td>
<td>Global Biodiversity Score, Biodiversity Impact Metric (BIM), LIFE</td>
<td>Arithmetic mean of abundance (same weight for all species) Calculated as an aggregation of four impacts: land use, greenhouse gas (GHG) emissions, nitrogen oxide (NOx) emissions and freshwater use</td>
</tr>
<tr>
<td>Potentially disappeared fraction (PDF)</td>
<td>Biodiversity Footprint for Financial Institutions (BFI), Product Biodiversity Footprint (PBF)</td>
<td>Number of species (same weight for all species)</td>
</tr>
<tr>
<td>Risk of extinction unit</td>
<td>Species Threat Rebatement and Recovery (STAR)</td>
<td>Sum of the risks of extinction of species weighted by their threat status</td>
</tr>
<tr>
<td>Biodiversity impact index</td>
<td>LIFE Impact Index</td>
<td>The arithmetic mean of 5 impact indexes considered as “pressures” on biodiversity (water, energy, emissions, waste, area)</td>
</tr>
<tr>
<td>Natural capital value</td>
<td>Environmental Profit &amp; Loss</td>
<td>Sum of the economic value of ecosystem services (i.e. more weight to more valuable services)</td>
</tr>
</tbody>
</table>

**Note:** 1. Five main aggregate “metrics” are currently used to quantitatively aggregate impacts or dependencies: mean species abundance (MSA), potentially disappeared fraction of species (PDF), risk of extinction, aggregate index such as the biodiversity impact index (used by LIFE Key) and monetary value (e.g. euros). A sixth option, used by some measurement approaches, relies on the qualitative aggregation of assessments.

2. Three key sources of characterization factors underpin a number of the methodologies: GLOBIO (Global biodiversity model for policy support), ReCiPe and the International Union for Conservation of Nature (IUCN) Red List.

**Source:** EU Business & Biodiversity Platform report17

Mean species abundance (MSA), which is calculated as an aggregation of four impacts – land use, greenhouse gas (GHG) emissions, nitrogen oxide (NOx) emissions and freshwater use – is widely used by international bodies such as the IPBES and the Intergovernmental Panel on Climate Change (IPCC), as well as the Organisation for Economic Co-operation and Development (OECD). The MSA data could be adjusted for the size of the company when considering biodiversity impacts. It is important to note that the MSA calculation is based on input-output models that consider the typical characteristics of companies at a sector level. More granular, company-level data can be integrated into the model when that company reports details regarding its business model, production input, etc.

- Some asset managers, including AXA Investment Management, Mirova, BNP ...
Paribas Asset Management and Sycomore Asset Management, have declared the use of MSA models (data models developed by environmental data provider Iceberg DataLab) for their biodiversity impact assessment. Ossiam (an affiliate of Natixis Investment Managers) has used an MSA-based biodiversity-integrated fund focused on the food sector.

- Others, such as Pictet Asset Management, use proprietary models embracing the Planetary Boundaries framework and life cycle analysis approach to quantify the corporate impact on biodiversity loss.

- ENCORE, developed by the Natural Capital Finance Alliance in partnership with the UN Environment Programme World Conservation Monitoring Centre (UNEP-WCMC), is another widely used tool among investors. It aids in assessing portfolio impact on biodiversity and alignment with global biodiversity targets.

- Species Threat of Abatement and Recovery (STAR), developed by IUCN, is another metric used by financial institutions. It measures the contribution that investments can make to reducing species extinction risk.

- The Biodiversity Intactness Index (BII), developed by the Natural History Museum in the United Kingdom, calculates biodiversity loss across a defined area. Federated Hermes is reported to have recently launched a Biodiversity Equity Fund based on BII to identify companies aligned with the preservation and restoration of biodiversity.

There is, however, limited consensus among investment practitioners and those from the natural science world on the effective use of the metrics. One school of thought holds that widely used metrics including MSA and PDF are not appropriate for investment purposes.

While these metrics and approaches are works in progress, it is essential to consider biodiversity risks and impact from the view of arriving at future risk ready portfolios. Ignoring biodiversity and nature-related risks is perilous and the effects will be felt sooner rather than later. Starting with reasonable and science-based assumptions and tools will help build a strong portfolio.
Addressing biodiversity risks in portfolio management
In the foreword to the Dasgupta Review, the inquiry into the economics of biodiversity, naturalist David Attenborough remarks that “like education and health, nature is more than a merely economic good. Nature nurtures and nourishes us, so we will think of assets as durable entities that not only have use value, but may also have intrinsic worth. Once we make that extension, the economics of biodiversity becomes a study in portfolio management.”

**Tackling biodiversity through scenario analysis**

Incorporating biodiversity risks and impact in traditional portfolio risk assessment models, including scenario testing and prioritization scoring and biodiversity risk (and impact) scores based on any or a mix of the above-mentioned measures could be achieved for each investment or portfolio constituent and further be aggregated to calculate an overall portfolio-level biodiversity risk score. This could then be further assessed along likelihood and impact coordinates.

**Revisiting modern portfolio theory**

The investment community could do well to rejig the contours of modern portfolio theory to include nature-related risks and impact as the third dimension. More specifically, asset managers can conceptualize their optimal risk and return opportunities alongside one another through a biodiversity-efficient frontier (see annex I. The broken egg-shell shaped curve), adding a layer of biodiversity risks and impact to an ESG-efficient frontier (assuming they have already considered ESG factors without biodiversity within the E in ESG). A rational and responsible investor will then opt to maximize returns and positive biodiversity impact while minimizing risks and negative impacts.

Typically, in an ideal biodiversity-aligned investment landscape, the investor matrix could appear as shown in Table 2.

<table>
<thead>
<tr>
<th>Biodiversity integration of asset managers</th>
<th>Portfolio risk</th>
<th>Portfolio return</th>
<th>Portfolio impact</th>
<th>Net impact on nature and portfolio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Leaders</td>
<td>Low</td>
<td>High</td>
<td>High positive</td>
<td>- Nature-positive</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>- Better managed risk-return-impact dimensions – value accretive in long run</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>- Future-ready</td>
</tr>
<tr>
<td>Aware/partial adopters</td>
<td>Moderate</td>
<td>Moderate</td>
<td>Moderate</td>
<td>- Nature-positive</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>- Moderate risks but uncovered exposure due to limited integration</td>
</tr>
<tr>
<td>Laggards</td>
<td>Moderate-high</td>
<td>Moderate-high*</td>
<td>High positive</td>
<td>- Nature-positive</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>- Unsustainable/value dilutive beyond short term to medium term (&lt;5 years)</td>
</tr>
</tbody>
</table>

**Note:** 1. Despite the clear benefits, there could be incentives for short-term or money market investors to ignore nature-related risks and impact. In fact, by taking low-moderate risks, short-term investors could end up making opportunistic gains*. This, however, does not apply to a long-term investor. It is pertinent to highlight that long-term investors would do well to incorporate the landscape/ecosystem approach within a realistic timeline, say decades instead of years, to optimize risk-adjusted returns.

2. Despite the best efforts, externalities cannot be avoided and the sector weights of a portfolio mix will influence much of risk and impact.

Striving for the optimal nature-positive portfolio mix would imply travelling along the biodiversity-efficient frontier and making a portfolio choice relative to the risk-return-impact appetite of the manager.
Building biodiversity-aligned portfolios
5.1 Integrating double materiality

It is pertinent to account for both dependency and impact on biodiversity in the portfolio building process. Businesses and individuals alike are highly dependent on nature for its ecosystem services and at the same time impact nature through their activities. There is a constant debate about whether the financial services community should account for financially material nature-related factors or adopt the concept of double materiality. Double materiality (also called impact materiality) proposes taking into account financial material factors for investments and the impact of investments on the environment (and society). This goes well with the stakeholder capitalism view.

An efficient system in such a case should adopt the impact materiality concept while harmoniously integrating both dependency and impact on nature. Equally important here is the concept of dynamic materiality – some factors not perceived to be important today may become material in the foreseeable future.

5.2 Building the biodiversity hypothesis

The hypothesis is that with the inclusion of biodiversity risk information in ESG risks, the conclusion investors draw of the risk-adjusted portfolio return relative to that of portfolio combinations based only on financial and non-ESG information will differ significantly. Their investment decisions could be further altered and strengthened (better managed in terms of risk) by including the biodiversity impact of the financially material ESG and biodiversity risks. This is especially relevant for investors with mandates to match long-term liabilities.

Calculating the non-financial material factors \(- E_b S G_I_b \) where

\[ E_b = \text{ESG risks including biodiversity risks} \]
\[ S = \text{Social} \]
\[ G = \text{Governance} \]
\[ I_b = \text{Biodiversity impact} \]

Plotting the risk-return of different portfolio mixes to see how the risk-adjusted return on the Y-axis behaves vis-à-vis the \( E_b S G_I_b \) on the X-axis, the \( E_b S G_I_b \)-efficient frontier shows the highest attainable return for each combined level of ESG and biodiversity risks. A risk-averse and ESG-positive biodiversity-aware investor should choose the portfolio at the point of tangency of the risk-free rate to the biodiversity-efficient frontier. See Figure 1 for a graphical illustration of the investment opportunity set.

**FIGURE 1**

Illustration of the investment opportunity set

Note: 1. Despite the clear benefits, there could be incentives for short-term or money market investors to ignore nature-related risks and impact. In fact, by taking low-moderate risks, short-term investors could end up making opportunistic gains. This, however, does not apply to a long-term investor. It is pertinent to highlight that long-term investors would do well to incorporate the landscape/ecosystem approach within a realistic timeline, say decades instead of years, to optimize risk-adjusted returns.

2. Despite the best efforts, externalities cannot be avoided and the sector weights of a portfolio mix will influence much of risk and impact.
Comparing this with a risk profile without the biodiversity risks and impact might create the illusion of having a portfolio mix with higher or the same long-term return for a lower perceived risk. For example, in Figure 1, investor decisions will change from choosing portfolio mix B to A with the same return profile but lower risk as perceptions of risk and the risk profile change after considering biodiversity risks and impact. The difference in perceived and actual risk is highly likely to affect the generation of sustainable alpha.

Further, it will be interesting to see how this perception of risk changes when an ecosystem approach or the integrated ecosystem approach to investing (especially in the case of infrastructure and real estate development) is adopted. The plausible argument is that resilient systems or landscapes (resilient life support systems built on the interdependence of species and their habitat on the landscape being developed) will bring down risks (caused by weather events, pandemics, climate change, plagues, etc.) and thus reduces costs.

### 5.3 Considering biodiversity as a part of the E in environmental, social and governance (ESG)

Some practitioners will argue against marrying biodiversity risk and impact with risk and return portfolio choices. Considering biodiversity risk and impact provides an alternative and tangible dataset as a reference point for better analysis.

Just as an ESG-efficient frontier serves as a good reference for portfolio selection and management to achieve an optimal ESG risk-adjusted return, adding a layer of biodiversity factors will further strengthen an ESG-efficient frontier. Biodiversity factors could sit within the E in ESG factors while making it a broader risk-positive impact consideration. Biodiversity will then become an additional environmental data set akin to something like GHG emissions, which will make the E component more comprehensive. Scientists (ecologists) supported by the UN Convention on Biodiversity might argue in favour of biodiversity as an overarching factor but as stakeholders await a better measure of biodiversity, its inclusion within the broader E could be a good starting point.

### 5.4 Biodiversity focus in private investments

While the bulk of the focus is on listed investments, there is no better time than now to analyse private investments through the biodiversity risk and impact prism. It will probably be easier for private equity and venture capital firms to integrate ESG and nature-related factors into their investment process given their stage of investment and stronger grip on entities’ management and governance. Moreover, with most investee companies at an early stage in their journeys, they will be far more agile than a multinational conglomerate in redesigning their business models, if required, in a nature-positive way.

Data challenges and the cost of integrating them in a small company’s context might deter many. Nonetheless, the significance of integrating biodiversity risks and impact in building a solid future-ready portfolio cannot be overemphasized.
Maximizing investment opportunities in nature
While considering biodiversity risks and impact, asset managers can leverage emerging investment opportunities in nature-positive avenues. More specifically, there is increasing reference to nature as an asset class. The risk and return characteristics are being defined and refined as new financial structures and instruments emerge. Some recent indicative interventions in this space include:

**Natural asset companies**

To mainstream investments in nature, the Intrinsic Exchange Group (IEG) is championing natural asset companies (NACs) and has partnered with the New York Stock Exchange to list them. NACs seek to address market failures that have resulted in nature being left out of the mainstream economy, leading to a biodiversity financing gap of $600 billion to $800 billion per year.

According to the IEG, the primary purpose of these companies is to maximize ecological performance through the production of ecosystem services (e.g. carbon capture, facilitating pollination, soil fertility, water purification, etc.) on a given landscape to which they have rights and the authority to manage. Investors purchasing shares in a NAC gain exposure to these ecosystem services, with the sale proceeds used to fund the conservation or restoration of landscapes that have been degraded.

NACs are likely to be designed as bespoke instruments based on the underlying asset and the stewardship activities being pursued, providing diversity in terms of risk/return profiles. This concept is, however, awaiting regulatory approvals. It will be interesting to see the uptake in this space.

**Blended finance arrangements**

Using a blended finance approach (public finance used to crowd-in private funds), many projects have been initiated to preserve and regenerate nature. For example, the Coral Reef Fund incorporates public funds that provide grants for capacity building, technical assistance, monitoring and evaluation and private funds that can invest in projects incubated by the public funds. Another example is the Forest Resilience Bond, which has helped crowd-in private investments for forest restoration. Two main segments have been targeted:

- Sustainable land use: a focus on regenerative agriculture, land restoration and sustainable supply chains
- Sustainable oceans: the conservation of marine and aquatic ecosystems, including the development of sustainable seafood supply chains.

Other initiatives include tax incentives, first-loss debt arrangements and innovations in insurance (parametric insurance).

**Ecosystem approach to landscape development**

The question is how to create a generic and practical set of tools that integrates the different components of business, land and biodiversity. Under the umbrella of the UN Decade on Ecosystem Restoration (2021-2030), experts from Commonland, the IUCN Commission on Ecosystem Management, Wetlands International and the Landscape Finance Lab developed the 4 Returns Framework for landscape restoration. This practical set of tools to implement the Ecosystem Approach was agreed upon at the fifth Conference of the Parties to the Convention on Biodiversity. The 4 Returns Framework is a structured method that leads to a clear vision and planning for integrated landscape management and restoration (including biodiversity, carbon and sustainable land use). It connects ecology, community values, business and long-term economic sustainability. The process recognizes finance to fund the transition to landscape restoration and the importance of markets to ensure the long-term security of sustainable enterprises.

This conceptual and practical framework helps stakeholders achieve 4 returns (inspiration, social returns, natural returns, financial returns) for each landscape instead of maximizing the return on investment of each hectare by following five processes (a landscape partnership, shared understanding, a landscape vision and collaborative planning, taking action and monitoring and learning) within a multifunctional landscape (natural, combined and economic zones) and with this transformation taking place over a realistic time period (minimum 20 years). The foundation, in association with partners and stakeholders, has tested the framework in several countries and built investible cases that are in various stages of development and application.
Gaps remain but there is no time to lose
The investment community feels that biodiversity-related reporting has to improve. Unless an international standard is adopted, there will always be scope for conflicting interpretations. Current ESG data and metrics do not cover biodiversity adequately. There is a gap in ESG measurement and reporting specifically for biodiversity impact. Among the “e” factors of ESG, climate change-related data is most heavily reported, whereas biodiversity related-risks or impacts are considered from a do-no-harm approach.27

Frameworks and standard-setters such as GRI, IIRC, SASB, TNFD are ISSB working to harmonize approaches to accounting for the dependency and impact of economic activities on nature. This requires the development of rigorous, dual-materiality and science-based frameworks for nature-related risks. Recent announcements of collaborations among standard-setters will help build harmonized standards for better implementation by market participants. For example, the TNFD has highlighted its effort to build a framework aligned with existing global TCFD baselines and sustainability reporting standards being developed by ISSB.

Without a doubt, there is growing realization that mere policy nudges and incremental approaches are just not enough to finance “our common future”. Efforts to mainstream ESG and nature-related issues ought to be such that best practices can be viewed as a common sense approach to investments and portfolio management. In fact, profits with purpose and investing in a nature-positive way ought to be the twin bedrocks of all financial transactions. As a Native American saying goes: “When the last tree is cut down, the last fish eaten, and the last stream poisoned, you will realize that you cannot eat money.”28

A biodiversity-integrated slate

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<td>Impact-weighted accounting</td>
<td>Competitive moat</td>
<td></td>
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<tr>
<td>Extinction accounting</td>
<td>Resilience</td>
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</tbody>
</table>

Again, when it comes to measuring biodiversity risks and impact, no one tool can be used in isolation to arrive at a comprehensive assessment of biodiversity risks and impact. Given the complexity of biodiversity, one measure may not cover all the aspects effectively. It is necessary to consider multiple measures to arrive at an appropriate decision. In fact, it is critical for the meaningful integration of biodiversity risks to converge with indicators and methodologies.

Further, financial innovations will have to set clear expectations for risk and return considerations in order to entice mainstream investors. Biodiversity-integrated investing is following a similar path as that of impact investing, which has, over the years, graduated to mainstream investing as risk and return characteristics, expectations and impact measurement metrics have become standardized. The caveat, however, is that there is no time to waste with experiments and trying to figure out the best path forward for biodiversity-integrated investing.

In an ideal state, the portfolio manager’s biodiversity-integrated slate will appear as in Figure 2.
American Economist Harry Markowitz developed the Efficient Frontier as part of the Modern Portfolio Theory in 1952, for which he was awarded Nobel Prize in Economics. The theory helps risk-averse investors select a portfolio of investments while optimizing their risks based on an acceptable level of market risk.

The illustration of the efficient frontier curve, also called the broken egg-shell shaped curve, shows different portfolio weights and investment choices with different risk-return trade-offs.

Source: Based on Harry Markowitz’s Efficient Frontier in Modern Portfolio Theory
List of indicative biodiversity assessment tools and approaches

- Mean species abundance (MSA) calculates a company’s biodiversity footprint measured by mean species abundance – the ratio between observed biodiversity and biodiversity in its pristine state. For example, MSA models are being used by CDC Biodiversité (developing the Global Biodiversity Score) and Iceberg Data Lab to factor biodiversity impact.

- Biodiversity Footprint for Financial Institutions developed by ASN Bank, PRé and CREM is based on the life cycle assessment approach and measures the impact of financial institutions on biodiversity. This has now been developed in to the Partnership for Biodiversity Accounting Financials (PBAF) established by ASN Bank at the end of 2019, together with ACTIAM, Triple Jump, Triodos, Robeco and FMO.

- The GLOBIO model developed by PBL Netherlands Environmental Assessment Agency in collaboration with various aids in quantifying global human impacts on biodiversity and ecosystems.

- Sustainable Investment Framework developed as a software-as-a-service tool by KPMG and Cambridge Institute of Sustainable Leadership for portfolio assessment. One of the areas the framework looks at is resource security that measures the preservation of natural resources through efficient and circular use.

- ENCORE, developed by the Natural Capital Finance Alliance in partnership with UN Environment Programme World Conservation Monitoring Centre (UNEP-WCMC), aids financial institutions in assessing portfolio impact on biodiversity in alignment with global biodiversity targets.

- Geospatial tools such as the Integrated Biodiversity Assessment Tool by Global Forest Watch provide a high-level regional environmental impact that might be required to be fitted to the asset level/portfolio level. Some other tools might provide asset or project-level information for integration.

- Net Environmental Contribution developed by Sycomore, Swen Capital and others is used to assess portfolio impact on biodiversity.

- Biodiversity Impact Metric, developed by the Cambridge Institute for Sustainability Leadership (CISL), indicates a business’s impact on biodiversity helping them in managing nature-related supply chain risks. This could be used as a tool by investors in screening and portfolio management.

- Nature Benchmark, developed by the World Benchmarking Alliance, aims to assess the 1,000 most influential companies across 22 industries on their contributions to stable and resilient ecosystems through adequate governance, biodiversity and environmental management while considering social inclusion and community impact.

Note: This is not an exhaustive list of measurement approaches and tools available.
Contributors

Lead author

Ribhu Ranjan Baruah
Project Lead, Biodiversity Finance Initiative
World Economic Forum

Co-authors

World Economic Forum

Katerina Labrousse
Head, Alternative Investments
Shaping the Future of Financial and Monetary Systems

Brightstar Capital

Michael Drexler
Managing Director and Chief Strategy Officer

DWS

Murray Birt
Senior Environmental, Social and Governance Strategist

Francesco Curto
Global Head, Research

Michael Lewis
Head, Environmental, Social and Governance Research

GIC

Shang Thongchie
Managing Director, Enterprise Strategy

Commonland

Willem Ferwerda
Founder and Chief Executive Officer

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https://www.weforum.org/projects/biodiversity-finance-internalize-the-externality
Endnotes

9. Environmental black swans are unusual, hard-to-predict biosphere-related risks that can have a massive impact on the economy. They are quite certain to occur but their timing or form of occurrence is uncertain. Green swans are events caused by climate change and biodiversity loss. They are more predictable than black swans.
12. The current framework focuses on reporting on ecological impacts. "The category addresses management of the company’s impacts on ecosystems and biodiversity through activities including, but not limited to, land use for exploration, natural resource extraction, and cultivation, as well as project development, construction, and siting. The impacts include, but are not limited to, biodiversity loss, habitat destruction, and deforestation at all stages – planning, land acquisition, permitting, development, operations, and site remediation." Source: Value Reporting Foundation; SASB Standards, Materiality Finder, n.d., https://www.sasb.org/standards/materiality-finder/?lang=en-us.
13. ISSB and GRI have agreed to collaborate on creating a comprehensive reporting framework.
15. The recent release of TNFD’s first beta draft of nature-related considerations is a great first step towards nature-related reporting. https://tnfd.global/wp-content/uploads/2022/03/220331-TNFD-framework-beta-v0.1-FINAL.pdf.
18. ENCORE: https://encore.naturalcapitalfinance/en/about
20. Some asset managers have already started recognizing impact as a third dimension. Yet the nature-related impact is under- or unrepresented.
21. According to Investopedia, the efficient frontier is “the set of optimal portfolios that offer the highest expected return for a defined level of risk or the lowest risk for a given level of expected return. Portfolios that lie below the efficient frontier are sub-optimal because they do not provide enough return for the level of risk.” https://www.investopedia.com/terms/e/efficientfrontier.asp#:~:text=The%20Efficient%20Frontier%20is%20the%20set%20of%20risk.
Endnotes


25. Commonland designed the 4 Returns Framework to transform degraded landscapes into thriving ecosystems and communities based on sound business cases and aligned with international policies and guidelines. The tool has been tested since 2014 and brings together farmers, landowners, entrepreneurs, communities, nature organizations and legislators to create real returns on investment for large landscapes of over 100,000 hectares. The goal is for the 4 Returns Frameworks to become the new norm for integrated ecosystem management for investors and governments. See [https://www.commonland.com/about/](https://www.commonland.com/about/).


29. Global Biodiversity Score: [https://www.cdc–biodiversite-fr.translate.goog/gbs/?_x_tr_sl=fr&_x_tr_tl=en&_x_tr_hl=en&_x_tr_pto=sc](https://www.cdc–biodiversite-fr.translate.goog/gbs/?_x_tr_sl=fr&_x_tr_tl=en&_x_tr_hl=en&_x_tr_pto=sc).

30. GLOBIO: [https://www.globio.info/#:~:text=The%20GLOBIO%20model%20is%20developed,impacts%20on%20biodiversity%20and%20ecosystems](https://www.globio.info/#:~:text=The%20GLOBIO%20model%20is%20developed,impacts%20on%20biodiversity%20and%20ecosystems).


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