

# Biodiversity measurement approaches

A practitioner's guide for financial institutions

5th  
edition



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# 1. Financial institutions assessing biodiversity impacts and dependencies

Financial institutions (FIs) are looking for ways to assess their impacts on biodiversity and dependencies on ecosystem services through their finance and investment activities. The aim of this guide on biodiversity measurement approaches is to inform FIs and assist them in understanding the methodologies and tools currently available on the market.

## EU Business & Biodiversity Platform

Banks, investors, insurers and impact funds defined the need and format for this guide, as part of the 'sharing practices' activities of the [Finance & Biodiversity Community](#) (F&B Community) under the [EU Business & Biodiversity \(EU B&B\) Platform](#). By involving the [Workstream Methods](#), also part of the EU B&B Platform, this guide aligns with and builds on its report series [Assessment of biodiversity measurement approaches](#) (EU B&B).

The Assessment of biodiversity measurement approaches series gathers and assesses the input delivered by tool developers and leading practitioners. The report series provides more in-depth information on the specific characteristics of the methodological approaches and provides detailed guidance on how to select suitable measurement approaches and tools for both companies and FIs.

## Finance for Biodiversity Foundation and Pledge

The [Finance for Biodiversity \(FfB\) Foundation](#) is a network of financial institutions supporting a call to action and collaboration to reverse nature loss in this decade. Central to this initiative is the [Finance for Biodiversity \(FfB\) Pledge](#),

a public commitment from 200 financial institutions representing €23 trillion in assets under management across 28 countries. FfB Pledge signatories expressed the need for a clear overview of biodiversity measurement approaches, particularly to support the implementation of their commitment '3. Assessing impact'. This guide is a revised edition of the 2024 Guide on measurement approaches and serves as an annex to the 'Assessing impact' section of the FfB Pledge's more generic [Guidance to the Pledge](#) document.

## Reading the guide

This guide begins with a set of practical recommendations for FIs. This is followed by the thirteen measurement approaches included in this guide and a description of the criteria used to assess them (Chapter 3). The criteria are aligned with those from the report series [Assessment of biodiversity measurement approaches](#). Chapter 4 maps the measurement approaches against these criteria. This is followed by Chapter 5, which provides a description of each measurement approach. Case studies demonstrating how FIs have used these measurement approaches are included in Chapter 6. Chapter 7 outlines the types of data sources and models available to support biodiversity measurement approaches, as well as data innovations and emerging data

initiatives. Chapter 8 is dedicated to measuring biodiversity impacts in marine environment, as most of the measurement approaches described in this guide do not yet cover the marine realm extensively. Finally, Chapter 9 describes the next steps.

This is the fifth edition of the guide, published in June 2026.

## 2. Practical recommendations for financial institutions

This guide offers an overview of the main tools available to FIs for assessing biodiversity impacts and dependencies. The guide is designed to align with current frameworks, standards and initiatives in the field of biodiversity impact and dependency assessment. Before introducing these tools in Chapter 3, this chapter addresses an important market gap: the need for practical, step-by-step guidance on conducting biodiversity impact assessments tailored to the objectives and asset classes in scope.

### 2.1 The need for tailored guidance and decision trees for biodiversity impact assessments

As the landscape of biodiversity measurement tools and methodologies rapidly expands, FIs are increasingly challenged to understand which measurement approach is more appropriate depending on the purpose, the asset class being targeted, and other relevant considerations. For example, what does a comprehensive impact assessment look like for a listed equity portfolio seeking to report under TNFD or ESRS E4, compared to one aiming to reduce exposure to high-impact sectors or to set science-based targets for nature? The scale and approach of the assessment should vary depending on these and other criteria. As such, there is a need to develop practical, step-by-step guidance to support FIs in conducting biodiversity impact assessments tailored to elements such as:

- **Asset class** – e.g., listed equities, corporate bonds, corporate loans, sovereign debt, etc.
- **Purpose of the assessment** – e.g., regulatory and voluntary reporting, target setting, investment and lending decision-making, engagement, etc.

Emerging initiatives are beginning to provide greater clarity on this need. For example, the recently launched [PBAF Finance and Nature Toolbox](#), a practical resource to select appropriate tools based on different stages of the investment or lending process. Building on these efforts, further guidance and decision trees are needed to define the *steps for conducting impact assessments adapted to the asset class being targeted*. This guidance would provide financial institutions the confidence to identify the most appropriate pathway for their needs, ensuring assessments are both consistent and robust.

The following case illustrates a possible step-by-step process for assessing biodiversity impacts within portfolios comprising *equities and corporate fixed-income instruments*, applicable to both pre-investment (e.g., issuer selection) and holding (e.g., monitoring) phases. Note that the sequence of steps is illustrative and not prescriptive.

Each step is split into a “Basic assessment” and an “Advanced assessment” pathway. The Basic pathway is designed as a simpler impact assessment process for FIs with more limited internal capacity, data availability or tooling, helping them to perform a minimum, yet decision-useful, biodiversity impact assessment.

The Advanced pathway is aimed at institutions with greater resources, data access and technical expertise, and focuses on more granular assessments to align more closely with best practice and nature-related disclosure frameworks.

#### Step 1: Exposure to high-impact sectors and drivers of biodiversity loss

FIs should begin by identifying **sectors** within their portfolios that are associated with significant impacts on biodiversity. This screening should be applied across all portfolios, ensuring that sectors with limited financial exposure are also considered. Following the assessment, prioritising sectors that combine high financial exposure with high biodiversity impact provides a strategic foundation for informed decision-making. The following are the different assessments that FIs can conduct as part of the screening of sectors and associated drivers of loss:

##### *Basic assessment (minimum recommended assessment)*

- **Sector-level screening** to identify sectors with the highest direct (Scope 1) and value chain (Scope 3) impacts on biodiversity, based on the IPBES drivers of loss. Optionally, a country- or region-level lens can also be applied to prioritise sectors based on exposure to high-biodiversity or high-risk geographies.

### Advanced assessment (complementary)

- **Economic activity-level screening** to deepen the sectoral screening by pinpointing specific economic activities with the highest biodiversity impacts (e.g., cereal crop production within the agriculture sector, or coal mining within the extractive industries).
- **Impact driver-level assessment** to provide a refined understanding of biodiversity impacts by disaggregating the five IPBES drivers (e.g., breaking down pollution into air, soil, and water pollution; or even into the specific pollutants), helping FIs assess their relative magnitude.
- **Thematic-level assessment** to analyse specific material themes or issues (e.g., deforestation when forestry is a material sector, or water risk when agriculture is material), directly linked to the key drivers of biodiversity loss identified. This often involves using specialised tools or datasets.

## Step 2: Location-specific assessments and exposure to sensitive locations

*Steps 2 and 3 can be conducted in parallel or in either sequence, as appropriate*

Building on the material sectors and drivers identified in Step 1, FIs should assess *the spatial dimension* of their exposure by evaluating links to biodiversity-sensitive locations.<sup>1</sup> This step is essential for determining which issuers operate in or near areas critical for biodiversity, allowing FIs to better understand the location-based risk profile of their portfolios.

### Basic assessment

- **High-level or proxy-based assessment** (i.e., if no location data available). A proxy-based approach can be used when no location-specific data is available—for example, by identifying issuers headquartered or incorporated in countries or regions with a high share of sensitive areas. Although not ideal, this proxy offers a starting point for FIs lacking spatially explicit data to consider the relevance of location in biodiversity assessments. Since nature-related risks and opportunities are inherently location-dependent, FIs are encouraged to explore alternative approaches and metrics that incorporate spatial dimensions into their biodiversity assessments.

### Advanced assessment

- **Location-specific assessment** (i.e., if location data available). Where location-specific data is available (e.g., geographic coordinates, site-level information), a binary mapping screen should first be conducted to identify whether issuer operational sites overlap with sensitive locations. If an overlap is indicated, a detailed assessment should then be undertaken—such as overlaying issuer operational sites with sensitive locations and analysing additional contextual information, including the type of sensitive area, associated economic activities, relevant impact drivers, and other influencing variables.

## Step 3: Company-level assessment

*Steps 2 and 3 can be conducted in parallel or in either sequence, as appropriate*

Building on the outputs from Steps 1 and 2, FIs can conduct more detailed assessments of individual issuers—especially

those operating in or near sensitive locations and involved in high-impact sectors or economic activities. These assessments can begin with a foundational issuer-level impact assessment and be progressively complemented with more advanced approaches, such as examining value chains, production processes, or linking pressures to observable changes in the state of nature.

### Basic assessment

- The **issuer-level assessment** identifies companies with high potential biodiversity impacts, especially those operating in or near sensitive locations—see also the [Assessment of the biodiversity impacts and dependencies of globally listed companies](#) (FfB Foundation, 2024).

### Advanced assessment

- **Economic activity / production process-level assessment**, identifying which business operations or specific production processes are the source of major impacts.
- **Commodity-level assessment**, examining high-impact commodities companies are exposed to.
- **Value chain-level assessment**, evaluating downstream and upstream biodiversity impacts.
- **Impact driver-level assessment**, providing a refined understanding of biodiversity impacts by disaggregating the five IPBES drivers of loss, using empirical or modelled data.
- **Integrated/impact pathway assessment**, linking impacts (negative and positive) exerted by issuers to changes in the state of nature (SoN).

<sup>1</sup> Sensitive locations are defined as areas important for biodiversity, areas of high ecosystem integrity, areas of rapid decline in ecosystem integrity, areas of high physical water risks and/or areas of importance for ecosystem service provision including benefits to Indigenous peoples and local communities (IP&LCs). Further guidance on the tools and data to identify and assess sensitive locations is provided in the TNFD's [LEAP approach \(component L4\)](#).

## 2.2 Assessing contributions to positive biodiversity impact

As FIs move beyond simply mitigating biodiversity risks toward actively contributing to positive biodiversity outcomes, they increasingly seek tools that support their decision making and communication. They seek tools that can help:

- 1 Identify and select relevant projects (mapping opportunities);
- 2 Report on biodiversity performance at different levels, such as institutional, portfolio and site levels, among others; and
- 3 Support strategic decision making, target setting and disclosure aligned with regulatory frameworks.

This section is intended to inform the reader in selecting and applying these tools in their own practice.

Rather than focusing solely on assessing harm, the goal is to understand how financial flows can support the recovery and preservation of biodiversity. Assessing these contributions is an evolving process, one that benefits from the latest tools, data, and insights. Together with members, the EU Finance and Biodiversity (F&B) Community and the Finance for Biodiversity (FfB) Foundation jointly explored five types of tools selected for their practical relevance:

- **Life Cycle Assessment (LCA) frameworks** – LCA models biodiversity impact across the value chain, helping identify strategies to reduce negative impacts. Two LCA frameworks were explored: one [integrating the Biodiversity Footprint for Financial Institutions \(BFFI\)](#) (see p. 41) and another combining LCA with an [impact valuation model](#) to better capture biodiversity costs of agrifood practices such as overfishing or plastic pollution.
- **Biodiversity assessment tools** – These tools evaluate the current state and trends of biodiversity, often at regional or global scales. The [Biodiversity Intactness Index \(BII\)](#) was explored and newly added to this guide.
- **Ecosystem Services Valuation Database (ESVD)** – [ESVD](#) quantifies the economic value of ecosystem services using observed data. Unlike natural capital valuation models which stimulate asset values and future risks, these databases focus on current service flows.
- **Natural Capital Valuation (NCV) model** – The [NCV model](#) estimates the financial value of biodiversity and ecosystem assets, often incorporating future scenarios and risk assessments.
- **Economic modelling and simulation tools** – This type of [tool](#) assess the macroeconomic impact of biodiversity loss by integrating science-based scenarios with financial data, often using complex [equilibrium models](#), to inform policy and recovery strategies.
- **Robust biodiversity data, valuation frameworks, and natural capital models** underpinned by scientific rigor and transparent methods support due diligence, risk analysis, and the identification of positive biodiversity outcomes.
- **Translating ecological impacts into monetary terms** through ecosystem services valuation databases and economic modelling and simulation tools facilitates the integration of biodiversity into financial planning, reporting, decision-making and stakeholder engagement with ecosystem improvement beneficiaries.

Scaling biodiversity finance requires continuous methodological innovation, cross-sector collaboration, and capacity-building. These efforts help financial institutions operationalise the goals of the Global Biodiversity Framework, particularly Targets 14, 15, 18 and 19, to align financial flows with biodiversity goals and to monitor and disclose biodiversity-related risks and dependencies.

The following insights highlight key lessons from a detailed review of these tools:

- **No single tool or method is sufficient on its own;** combining complementary approaches, such as Life Cycle Assessment (LCA) frameworks with location-specific tools, enables financial institutions to comprehensively assess impacts across levels (project, landscape, portfolio, sector and global), map biodiversity-related risks, and identify opportunities.
- **Clear purpose-setting and stakeholder engagement** are crucial to ensure biodiversity assessment tools deliver meaningful, actionable insights aligned with investment decision-making. This includes addressing specific challenges like marine biodiversity data gaps and ecosystem complexity.

# 3. Measurement approaches and assessment criteria

## 3.1 Selected approaches

Based on considerations within the F&B Community, this guide includes only biodiversity measurement approaches that:

- 1 Are relevant to, and are currently explored or used by, the financial sector;
- 2 Integrate or address the direct main drivers of biodiversity loss identified by [IPBES \(2019\)](#) or provide insight into potential nature-related risks;
- 3 Are considered to have a sound technical foundation and reflect current scientific understanding.

The following list includes the thirteen tools assessed in this guide. The majority of these tools have multiple applications and can be used for different purposes, including supporting investor engagement programs, portfolio management strategies, and other investor decision-making processes. Please note that the information presented in chapters 4, 5 and 6 has been provided directly by the tool developers<sup>2</sup>.

The tools are presented in alphabetical order.

- **BFFI** – Biodiversity Footprint for Financial Institutions (CREM and PRé Sustainability, together with ASN Bank)
- **BIA-GBS** – Biodiversity Impact Analytics – Global Biodiversity Score (CDC Biodiversité and Carbon4 Finance)
- **BIAT** – Biodiversity Impact Assessment Tool (ISS ESG)
- **BII** – Biodiversity Intactness Index (Natural History Museum)
- **BRF** – Biodiversity Risk Filter (WWF)
- **CBF** – Corporate Biodiversity Footprint (Iceberg Data Lab)
- **ENCORE** (new 2024 version) – Exploring Natural Capital Opportunities, Risks and Exposure (Global Canopy, UNEP-FI and UNEP-WCMC)
- **GBS-FI** – Global Biodiversity Score for Financial Institutions (CDC Biodiversité)
- **GID** – Global Impact Database (Impact Institute)
- **GIST NBS** – GI-GBF, GI-SLA, GI-DIRO (GIST Impact)
- **IBAT** – Integrated Biodiversity Assessment Tool (BirdLife International, Conservation International, IUCN, UNEP-WCMC)
- **MBFM** – Biodiversity Footprint Metrics (MSCI)
- **S&P NBS** – Nature & Biodiversity Solutions (UNEP-WCMC and S&P Global S1)

To support financial institutions in navigating the growing number of tools and methodologies, the [Finance & Nature Toolbox](#) developed by the Partnership for Biodiversity Accounting Financials (PBAF) offers a complementary resource to this guide. It is designed to help users identify which tools are most relevant at different stages of the loan and investment process by linking them to specific questions financial institutions are trying to answer.

## 3.2 Criteria for comparing and selecting

This chapter presents the criteria selected for assessing each tool in a uniform way. The criteria are outlined in the table below and align with those in the report series [Assessment of biodiversity measurement approaches](#) (EU B&B Platform – Workstream Methods). The F&B Community and the FfB Foundation, in collaboration with the tool developers, selected and further refined the criteria for the finance sector. On the next pages, we include links to the sections in Update reports 2 (2019), 3 (2021), 4 (2022), and 5 (2024) of the Assessment of biodiversity measurement approaches in which a more detailed discussion of the criteria can be found.

<sup>2</sup> All information in this report is accurate to the best of the authors' knowledge at the time of writing and/or was provided by the tool developers. Any inaccuracies may be reported for correction; all feedback is appreciated. Measurement approaches undergo continuous development, and this report reflects a snapshot at a specific point in time.

## Criteria for selecting measurement approaches for financial institutions

### Organisational focus area (OFA)

For FIs this is the scope or part of their investment and finance activities they are looking into for measuring the biodiversity impact of that specific part.

Source: [Assessment of biodiversity measurement approaches - Update Report 5, Box 3 and F&B Community](#)

<b>Balance-sheet</b>	All the assets, liabilities and shareholders' equity of a FI at a specific point in time.	<b>Corporate</b>	A commercial or industrial enterprise.
<b>Portfolio</b>	A collection of finance activities or investments.	<b>Project and site</b>	The funding of a long-term infrastructure, industrial project or public services.
<b>Sector</b>	A section of the economy made up of firms or institutions that share the same or a related product or service.	<b>Product or service</b>	This covers the whole value chain as biodiversity measurement tools for products are LCA (Life Cycle Analysis) based.
<b>Index</b>	A method to track or evaluate the price performance of a group of assets in a standardised way, usually stocks, often to use as benchmark.	<b>Supply chain</b>	The upstream part of the value chain.

### Business/finance Application (BA)

The type of application the measurement approach will be used for. The described BAs are based on the overview of BAs performed by the [Workstream Methods](#) and adapted for finance. Source: [Assessment of biodiversity measurement approaches - Update Report 5, Box 2](#)

**BA 1 Assessment of current biodiversity performance** - Material risk assessment; for example, exposure to and management of biodiversity loss at balance sheet, portfolio, sector and/or asset/company level. Due diligence assessment and identifying 'hotspots'.

**BA 2 Assessment of future biodiversity performance** - Scenario-analysis of the biodiversity development of certain portfolios, sector or asset categories, for example as a result of reducing pressures and restorative actions at asset or portfolio level. This may include scenarios on changing policies.

**BA 3 Tracking progress to targets** - Depends on the type of targets set by FIs, companies and governments. For example, 'Net positive impact by 2030'; targets on underlying drivers of biodiversity loss, 'No deforestation and water neutral by 2030'; 'Reverse nature loss in this decade'; keeping within a 'Safe operating space'.

**BA 4 Comparing options / benchmarking** - Comparing the impact of different investment options on biodiversity, such as different forms of benchmarking. For example, 'Best practice average of companies in a region/sector'; 'Best bio-value for money of conservation investment'; 'Commodity/sector risks & opportunities'; 'Best-in-class companies'; 'High opportunity asset categories'.

**BA 5 Assessment / rating of biodiversity performance by third parties, using external data** - Third party assessment by rating agency or data provider based on biodiversity criteria and populated with external data (in the absence of company data). For example, for comparing (listed) company biodiversity performance across a sector.

**BA 6 Certification by third parties** - Third party certification based on auditing of a clearly established methodological approach.

**BA 7 Screening and assessment of biodiversity risks and opportunities** - Identifying biodiversity risks and opportunities for investing in restoration, conservation or other actions from the Mitigation and Conservation Hierarchies.

## Asset category

Category of assets owned or managed by FIs. Source: *F&B Community*

<b>Corporate loans</b>	Debt-based funding arrangement between a FI such as a bank and a company.	<b>Mortgages and real estate</b>	Debt-based instrument, secured by the collateral of specified real estate property, that the borrower is obliged to pay back with a predetermined set of payments.
<b>Sustainability linked loans</b>	Corporate loans of where the interest margin is linked to the improvement of the borrower's ESG score or to the improvement on tailored sustainability KPIs.	<b>Impact funds</b>	Fund with a goal to implement investments that generate a measurable, beneficial environmental (and/or social) impact, in addition to a financial return.
<b>Listed equity shares</b>	Company shares listed on a stock exchange.	<b>Green bonds</b>	Debt-based security to fund projects that aim to have a positive impact on climate and/or the environment.
<b>Private equity</b>	"Alternative investment" funds in which private companies are bought and managed before being sold for profit.	<b>Project finance</b>	Debt-based funding arrangement of long-term infrastructure, industrial projects, and public services using a non-recourse or limited recourse financial structure.
<b>Corporate bonds</b>	Debt-based securities issued by publicly held corporations to raise money for expansion or other business needs.	<b>Commodity trade</b>	Trade or purchase of primary goods, such as raw or partly refined materials from the agriculture, energy or metals sector.
<b>Sovereign bonds</b>	Debt-based securities issued by a government of a specific country.		

## Maturity level

The maturity level of a measurement approach is based on the number of FIs it has been applied to (Source: *Assessment of biodiversity measurement approaches - Update Report 4*, p. 26). Like the fourth edition, the definitions of the maturity levels in this fifth edition of the guide are slightly more stringent than in earlier versions.

<b>Mature</b>	The approach has been applied to the specific OFA, BA or asset class by at least 5 distinct FIs.
<b>Emerging</b>	The approach has been applied to the specific OFA, BA or asset class by 1 to 4 distinct FIs.
<b>Potential</b>	The tool has not been applied yet to the specific OFA, BA or asset category, but tool developers claim that the tool can be applied.

## Impact drivers

Direct human influence on the environment (i.e., direct drivers, also referred to as impact drivers) that impacts biodiversity, including both ecosystems and species, frequently involves overlaps with other direct drivers. These impact drivers also feed back into indirect drivers (i.e., socio-economic and demographic trends, technological development, culture and government). Source: *IPBES*.

<b>Land use change</b>	Human influence on terrestrial habitats, including the conversion of land cover (deforestation or mining), the changes in (agro-) ecosystem management (intensification or forest harvesting) or the changes in the spatial configuration of the landscape (fragmentation of habitats).	<b>Sea use change</b>	Human occupation and alteration of marine habitats, e.g., through wind farms, aquaculture, and shipping routes.
		<b>Climate change</b>	Changes in climate and weather patterns impacting in-situ ecosystem functioning and causing the migration of species and entire ecosystems. This may threaten as many as one in six species at the global level, and will have impacts on all biomes.

**Pollution** Deposition of substances into the environment (air, water, soil) is a driver of ecosystem change throughout all biomes, with particularly devastating direct effects on freshwater and marine habitats. This includes eutrophication, acidification, ecotoxicity, and ozone formation, but also the effects of noise, light and disturbance.

**Direct exploitation** Anthropogenic exploitation of wildlife, leading to biodiversity loss and extinctions. This includes overfishing, harvesting of species for medicinal use and pet trade, as well as water usage.

**Invasive species** Exotic or 'alien' species in terrestrial and aquatic ecosystems, disrupting the ecological functioning of natural systems by out-competing local and indigenous species for natural resources, with negative implications for biodiversity at local and regional scales and causing significant economic damage.

**Other pressures** Various additional pressures, such as fauna collisions and electrocutions, droughts, hunting, erosion, and pesticide use, among others.

## Coverage

Biodiversity measurement tools can either focus on negative impacts on biodiversity or on the associated societal dependencies (i.e., the services provided by ecosystems and species). Source: [Assessment of biodiversity measurement approaches - Update Report 5, under section 3.3.4.3.](#)

**Negative impacts (on ecosystems and species)** Direct negative impact from human activities on species and habitats through the impact drivers described above. A measurement approach that focuses on negative impacts translates the environmental pressures associated with an activity (e.g., GHG emissions, pollution, etc.) into the effects that these pressures have on species and ecosystems.

**Positive impacts (on ecosystems and species)** Direct positive impact from human activities on species and ecosystems. This could be achieved through management actions (e.g., restoration, enhancement) that improve the state of biodiversity, or through actions that reduce or avoid negative impacts on biodiversity (e.g., improvement of protection status, pressure reduction).

**Dependencies (on ecosystem services)** Services provided by ecosystems and species that society benefits from and depends upon, like clean air, water, climate adaptation and pollination. A measurement tool that takes into account dependencies is able to translate the interactions with biodiversity into consequences for FIs, businesses and the society overall. Thus, FIs that are highly dependent on ecosystem services should prioritise nurturing these interactions.

## Scope

The boundaries of what is included when measuring impacts and dependencies. Source: [Assessment of biodiversity measurement approaches - Update Report 5, under section 3.3.4.2.](#)

**Scope 1** Impacts generated in the area controlled by the entity and other impacts directly caused by the entity during the assessed period.

**Scope 2** Impacts resulting from non-fuel energy (electricity, steam, heat and cold) generation for site-level use, including impacts resulting from land use changes, fragmentation, etc.

**Scope 3 upstream** Impacts which are a consequence of the activities of the company but occur from sources not owned or controlled by the company, upstream (supply chain) of its activities.

**Scope 3 downstream** Impacts which are a consequence of the activities of the company but occur from sources not owned or controlled by the company, downstream (consumption and waste) of its activities.

## Metric

Biodiversity is the biological diversity of life on Earth: diversity of ecosystems, diversity of species and genetic diversity. Biodiversity metrics measure different elements (like species, ecosystem intactness, ecosystem benefits) and can be used to answer different questions. Source: [Assessment of biodiversity measurement approaches - Update Report 4](#), pp. 46-52.

<b>MSA (Mean Species Abundance)</b>	Measures 'intactness'. MSA compares the actual abundance of native species in a given ecosystem to their (estimated) abundance if the ecosystem were in an undisturbed state. All species are valued equally, threatened or not. An MSA value of 100% indicates that the biodiversity of this ecosystem is the same as at its original state and has not been affected by human activities.	<b>STAR (Species Threat Abatement and Restoration)</b>	Measures risk of extinction of species. STAR is the sum of the risks of extinction of species weighted by their threat status. Presence of threatened species is an indication that the ecosystem is under pressure. This can be useful to identify the conservation actions with the highest potential to prevent species extinction.
<b>PDF (Potentially Disappeared Fraction)</b>	Measures 'intactness'. PDF shows the percentage of species lost in a specific area due to environmental pressures in 1 m <sup>2</sup> (land) or in 1 m <sup>3</sup> (water) over a period of one year. It does not measure decline in individual species' populations. All species are weighted equally; based on regressions between the intensity of each pressure and their impacts on species persistence.	<b>BII (Biodiversity Intactness Index)</b>	Summarises the change in ecological communities in response to human pressures. It estimates the percentage of the original number of species that remain and their abundance in any given area, despite human impacts.
		<b>Aggregate index</b>	A composite index based on several parameters.
		<b>Monetary value</b>	Sum of the economic value of ecosystem services, such as timber production, fresh drinking water supply, carbon sequestration, recreation and tourism, and others. It helps communicate and raise awareness of the benefits that nature provides to society.

## Type of data

The type of data that is commonly used as input data for the tool. Source: [Assessment of biodiversity measurement approaches - Update Report 5](#), under section 3.3.6.

<b>State of nature data</b>	Data derived from empirical ecological surveys and mapping, such as species counts or population estimates and distribution, directly linked to the underlying assets being assessed. When impact drivers (e.g., land-use change, pollution, resource extraction) are understood and quantified in terms of how they drive changes in the state of nature, they help construct and tracing the so-called impact pathways.	<b>All these types of data can be:</b>	
<b>Pressures, resources and emissions data</b>	Data related to emissions and extraction of resources such as raw materials, water, land use and land conversion.	<b>U - User-derived data</b>	U - Inputs based directly on measurements conducted by the assessed company. These measurements can relate to biodiversity state but also to impact drivers or inventory data. User-collected data on inventories can thus be associated with modelling of biodiversity state.
<b>Economic quantification of activities data</b>	The amount of material the organisation assessed extracts, produces, purchases or finances, e.g., the amount of cotton used for producing a T-shirt, or the amount a FI invests in a company.	<b>E - Externally collected data</b>	E - Data derived from external (sometimes global) datasets and not from direct measurements by the assessed company (e.g., sector averages). Externally collected data can nonetheless include biodiversity state data, e.g., based on species distribution maps from the IUCN (or IBAT).
		<b>M - Modelled data</b>	M - Estimated or interpreted and usually aggregated data, e.g., data related to potential economic growth. This can be both user-derived (e.g., own modelling of m <sup>3</sup> of water consumed) or externally collected (e.g., use of the average MSA of a given cell on GLOBIO's grid).

## Effort

Required level of expertise, costs, and time investment needed for applying each approach. Source: *Assessment of biodiversity measurement approaches - Update Report 5, under section 3.3.7.*

<b>Accessibility</b>	Accessibility relates to 'open source' or 'commercial' tools. Note: Although a tool and all its technical information is made publicly available, external support from the tool developer could be required. This is made clear in 'required expertise'.	<b>Cost for hiring</b>	Costs for hiring external expertise, for the first measurement. H (high, i.e., exceeding 20 working days), M (moderate, i.e., between 5 and 20 working days) or L (low, i.e., less than 5 working days).
<b>Required expertise</b>	Required expertise refers to the type of technical and knowledge skills that are needed to apply the measurement approach – this is either available within the institution (INT), or needs to be hired (EXT). Some tool developers offer training allowing the company to apply the tool themselves in future iterations (indicated with EXT – T).	<b>Other costs</b>	Other costs, including necessary investments in license fees, necessary training and the purchasing of data from data providers. This excludes time investment by the FI itself. H (high, i.e., more than 10k), M (moderate, i.e., between 4 and 10k) or L (low, i.e., less than 4k).
		<b>Efforts</b>	Time investment by the FI itself, for the first measurement (effort for follow-up monitoring can be lower). H (high, i.e., more than 30 working days), M (moderate, i.e., between 10 and 30 working days) and L (low, i.e., less than 10 working days).

# 4. Overview of measurement approaches

Table 1: Maturity levels of approaches per organisational focus area, business application and asset category

	BFFI	BIA-GBS	BIAT	BII	BRF	CBF	ENCORE	GBS-FI	GID	GIST NBS	IBAT	MBFM	S&P NBS
<b>Organisational focus area</b>													
Balance sheet	●	●	●	●	●	●	●	●	●	●	●	●	●
Portfolio	●	●	●	●	●	●	●	●	●	●	●	●	●
Sector	●	●	●	●	●	1	●	●	●	●	●	●	●
Index	●	●	●	●	●	●	●	●	●	●	●	●	●
Corporate	●	●	●	●	●	●	●	●	●	●	●	●	●
Project or site	●	●	●	●	●	●	●	●	●	●	●	●	●
Product or service	●	●	●	●	●	●	●	●	●	●	●	●	●
Supply chain	●	●	●	●	●	2	●	●	●	●	●	●	●
<b>Business/finance application</b>													
BA 1: Assessment of current biodiversity performance	●	●	●	●	●	●	●	●	●	●	●	●	●
BA 2: Assessment of future biodiversity performance	●	●	●	●	●	●	●	●	●	●	●	●	●
BA 3: Tracking progress to targets	●	●	●	●	●	●	●	●	●	●	●	●	●
BA 4: Comparing options / benchmarking	●	●	●	●	●	●	●	●	●	●	●	●	●
BA 5: Assessment / rating of biodiversity performance by third parties	●	●	●	●	●	●	●	●	●	●	●	●	●
BA 6: Certification by third parties	●	●	●	●	●	●	●	●	●	●	●	●	●
BA 7: Screening and assessment of biodiversity risks and opportunities	●	●	●	●	●	●	●	●	●	●	●	●	●
<b>Asset category</b>													
Corporate loans	●	●	●	●	●	3	●	●	●	●	●	●	●
Sustainability linked loans	●	●	●	●	●	3	●	●	●	●	●	●	●
Listed equity shares	●	●	●	●	●	3	●	●	●	●	●	●	●
Private equity	●	●	●	●	●	3	●	●	●	●	●	●	●
Corporate bonds	●	●	●	●	●	3	●	●	●	●	●	●	●
Sovereign bonds	●	●	●	●	●	3	●	●	●	●	●	●	●
Mortgages and real estate	●	●	●	●	●	3	●	●	●	●	●	●	●
Impact funds	●	●	●	●	●	3	●	●	●	●	●	●	●
Green bonds	●	●	●	●	●	3	●	●	●	●	●	●	●
Project finance	●	●	●	●	●	3	●	●	●	●	●	●	●
Commodity trade	●	●	●	●	●	3	●	●	●	●	●	●	●

**Legend Maturity levels**  
 ● Potential: 0 times applied  
 ● Emerging: 1-4 times applied  
 ● Mature: 5-more times applied

1 Sector level focus  
 2 As long as location and sector information are provided  
 3 Mature: if site location is known

**Table 2: Impact drivers, coverage, scope, metric, data type and effort needed per approach**

	BFFI	BIA-GBS	BIAT	BII	BRF	CBF	ENCORE	GBS-FI	GID	GIST NBS	IBAT	MBFM	S&P NBS
<b>Impact driver</b>													
Land use change	●	●	●	●	●	●	●	●	●	●	●	●	●
Sea use change			●	●	●	●	●	●	●	●	●	●	●
Direct exploitation		●	●	●	●	●	●	●	●	●	●	●	●
Climate change	●	●	●	●	●	●	●	●	●	●	●	●	●
Pollution	●	●	●	●	●	●	●	●	●	●	●	●	●
Invasive species			●	●	●	●	●	●	●	●	●	●	●
<b>Coverage</b>													
Negative impacts	●	●	●	●	●	●	●	●	●	●	●	●	●
Positive impacts	●			●	●	1	●	●	●	●	●	●	●
Dependencies	●	●	●	●	●	●	●	●	●	●	●	●	●
<b>Scope</b>													
Scope 1	●	●	●	●	●	2	●	●	●	●	●	●	●
Scope 2	●	●	●	●	●	2	●	●	●	●	●	●	●
Scope 3 upstream	●	●	●	●	●	2	●	●	●	●	●	●	●
Scope 3 downstream		3	●	●	●	2	4	●	●	●	●	●	●
<b>Metric</b>													
MSA	Possible	●	●				●	●	●	●	●	●	●
PDF	●		●						●	●	●	●	●
STAR							●		●	●	●	●	●
Aggregate index		●		●			●	●	●	●	●	●	●
Monetary value	Possible								●	●	●	●	●
BII <sup>5</sup>				●									
<b>Data type</b>													
State of nature data	M				M	E	M	M	U	U / M	E / M	E	E / M
Pressures, resources and emissions data	U / E / M <sup>6</sup>	E / M	U / E / M	U / E / M	E	E	U / E / M	E	U / E / M	U / E / M	U / E / M	E / M	U / E / M
Economic quantification of activities data	U / E / M	U / E / M	U / E / M	U	U	U	U / E / M	M	U / E / M	U / E / M	U / E / M	E / M	U / E / M
<b>Effort</b>													
Accessibility	OS with support	Commercial	Commercial	OS / Commercial	OS with support	Commercial	Commercial	OS with support	Commercial	Commercial	Commercial	Commercial	Commercial
Required expertise	EXT-T	EXT-T	EXT-T	INT / EXT-T	INT / EXT-T	EXT-T	EXT-T	EXT-T	EXT-T	EXT-T	INT / EXT-T	INT / EXT-T	EXT-T
Costs for hiring	M - H	L	L	L	L - M	L	L	L	L	L - M	L	M	
Other costs	L	H	H	L - M - H	L	H	L	H	H	M - H	L - H	L	
Efforts	M - H	L	L	L	L - M - H	L	L	L	L	L - M - H	L - M	L	L - M - H

<sup>1</sup> Covered by upcoming modules - ACT  
<sup>2</sup> Based on user data input  
<sup>3</sup> Downstream impacts computed for climate-change related pressures only in BIA-GBS  
<sup>4</sup> Mainly use-phasing and processing  
<sup>5</sup> The BII is considered both a tool and a metric. As a metric, it measures the extent to which original biodiversity remains  
<sup>6</sup> All, based on the data available from the FI or corporate

Table 3: Aspects covered per impact driver per approach

	BFFI	BIA-GBS	BIAT	BII	BRF	CBF	ENCORE	GBS-FI	GID	GIST NBS	IBAT	MBFM	S&P NBS
<b>Land / sea use change</b>													
Land use change / land transformation		●	●	●	●	●	●	●	●	●	●	●	●
Land occupation		●	●	●	●	●	●	●	●	●	●	●	●
Land use change in river and wetland catchments	●		●			1	●	●	●	●			
Encroachment	●		●		Indirect	●	●	●	●	●	●	●	●
Fragmentation	●		●		●	●	●	●	●	●	●	●	●
Wetland conversion	●		●			●	●	●	●	●	●	●	●
Sea use change		●		●		●		●					
<b>Direct exploitation</b>													
Water use	●	●	●			●	●	●	●	●	●	●	●
Other resource use (e.g., fish, wild caught animals/plants)	●	●				●	●	2	●	In progress	●	●	●
<b>Climate change</b>													
Effects of climate change on freshwater ecosystems	●	●	●	●			●		●	●			
Effects of climate change on terrestrial ecosystems	●	●	●	●	Indirect		●	●	●	●	●	●	●
Effects of climate change on marine ecosystems										In progress			
Hydrological disturbance due to climate change	●		●				●	●		●			●
<b>Pollution</b>													
Terrestrial acidification	●	●		●			●	●	●	●			●
Terrestrial eutrophication	●		3	●		●	●	●	●	●			
Freshwater eutrophication	●	●	●	●		●	●	●	●	●			●
Marine eutrophication	●	●		●		●	●	●	●	●			●
Terrestrial ecotoxicity	●	●	●	●		●	●	●	●	●			●
Freshwater ecotoxicity	●	●	●	●		4	●	●	●	●			●
Marine ecotoxicity	●	●	●	●		5	●	●	●	●	Plastic pollution in progress		●
Photochemical ozone formation	●	●		●		●	●	●	●	●	In progress		●
Non-GHG air pollution	●	●		●		●	●	●	●	●			●
Solid waste	●	●		●		5	●	●	●	●			●
Noise, light and disturbance	●	●		●		●	●	●	●	●			●
Atmospheric nitrogen deposition	●	●	6	●	Indirect	●	●	●	●	●			●
Nutrient emissions to water	●	●	7	●		●	●	●	●	●			●
<b>Invasive species</b>													
Alien invasive species	●	●		●	Indirect	●	●	●	●	●	●		●
<b>Other pressures</b>													
Various	●	●		●		●	●	●	●	●			●
Fauna collisions and electrocutions	●	●		●		●	●	●	●	●			●
Droughts	●	●		●		●	●	●	●	●			●
Hunting/fishing	●	●		●		●	●	●	●	●			●
Erosion	●	●		●		●	●	●	●	●			●
Ecotoxicity	●	●	●		●	●	●	●	●	●			●

Legend Realms

- Freshwater
- Terrestrial
- Marine

1 Only river  
 2 Overfishing  
 3 Atmospheric nitrogen deposition  
 4 Upcoming  
 5 Plastic pollution - upcoming  
 6 Terrestrial (covered through encroachn  
 7 Freshwater eutrophication

# 5. Information per measurement approach

## 5.1 BFFI - Biodiversity Footprint Financial Institutions

The **Biodiversity Footprint Financial Institutions (BFFI)** provides a biodiversity footprint of the 1) economic activities in which an FI invests and 2) the products or services offered by a corporate. The methodology allows calculation of the environmental pressures and the biodiversity impact of investments within an investment portfolio, at the level of a portfolio, an asset class, a company, or a project. For the calculation of environmental pressures and biodiversity impact of products and services, this is possible at the level of the life cycle, project or site.

### Description and steps

#### The BFFI consists of four steps:

The first step is creating an overview of the economic activities in which the FI invests or which the corporate undertakes. This step includes:

- A 'definition' of the activities of a company: what is the company producing? In what sectors is the company active? And where does production take place or is the turnover generated?
- A selection of the investments included in the assessment (all major investments) for the FIs. Recently this step was completely automated by linking data from a number of data providers with revenue data on listed companies to the BFFI software tool, which allows the assessment of large indices.

In the second step, the environmental impact of the economic activities of the company or projects is assessed. The environmental data in the EXIOBASE input/output-database is used to assess what land use, water use, emissions, etc. (pressures) are linked to the economic activities, unless more accurate data (like company data) is

available. EXIOBASE takes into account worldwide trade flows between countries and between sectors. It is also possible to use other input data, such as other input/output-tables (e.g., EORA), LCA databases (e.g., Ecoinvent, World Food Database, Agrifootprint Database), or specific on-site data (currently done for assessing specific projects for impact investors).

In the third step, the ReCiPe model (see text box p. 55) is used to calculate the environmental pressures on a midpoint level (e.g., climate change resulting from CO<sub>2</sub> emissions) and to calculate the resulting impact on ecosystem quality or biodiversity (endpoint level). This latter step is based on science-based 'pressure-response' relations (e.g., the effect of a 1 degree temperature rise on biodiversity).

This results in an impact on terrestrial, freshwater and marine biodiversity. The unit used to express the impact on biodiversity is PDF.ha.yr, the Potentially Disappeared Fraction of species (see p. 8) multiplied with the area (in hectare for terrestrial, or cubic meter for aquatic biodiversity) and duration of the loss (in year). The result is

then used to calculate the biodiversity footprint in m<sup>2</sup> per € invested (for each investment category) and the total footprint in m<sup>2</sup> for all investments.

In this process, ReCiPe covers the following stressors (sometimes referred to as midpoints):

- For terrestrial ecosystem quality: Climate change, Photochemical ozone formation, Acidification, Ecotoxicity, Water scarcity, Land use occupation, Land use change
- For freshwater ecosystem quality: Climate change, Eutrophication, Ecotoxicity, Water scarcity
- For marine ecosystem quality: Ecotoxicity, Eutrophication

In the fourth step, a qualitative analysis is used to guide the interpretation and the use of the footprint results, looking at (among others) the limitations of the data and the footprinting methodology and their potential influence on the footprint results. The combined quantitative and qualitative analyses are used to decide on follow-up actions, like zooming in on impact hotspots, engagement with companies, and/or establishing/changing investment criteria. For the qualitative analyses, the guidelines

elucidated in Berger et al., 2018<sup>3</sup> are suggested. Some of these include identification of factors not captured by the quantitative analysis, reflection on excluded environmental pressures and impact categories and possible adjustment of the quantitative results along with a reflection on the mechanisms that led to the changes.

### Organisations and reviewers

The EXIOBASE database is compiled by NTNU, TNO, SERI, Universiteit Leiden, WU, and 2.-0 LCA Consultants.

ReCiPe was developed in 2008 by RIVM, CML, PRé Sustainability and the Radboud University Nijmegen on behalf of the Dutch Ministry of Infrastructure and the Environment. In 2016, the ReCiPe method was revised thoroughly. New versions of both the model and the background report were published, developed by RIVM and Radboud University Nijmegen. The release of ReCiPe-2016 was published in scientific literature ([ReCiPe2016: a harmonized life cycle impact assessment method at midpoint and endpoint level](#)).

### Current stage of development

The BFFI is ready to be used by companies and FIs that want to assess their impact on biodiversity.

The method is continuously being developed. The following updates are scheduled:

- Updating the EXIOBASE data with newer versions
- Updating the impact assessment method in accordance with the latest scientific development
- Improving the assessment of dependencies
- Adding more asset classes and specific project finance categories

### Transparency of method

The method is fully transparent because the databases used (EXIOBASE, ecoinvent and ReCiPe) are publicly available.

The EXIOBASE database is provided free of charge to users under a CC-BY-SA (Creative Commons Attribution Share-Alike) license. The ecoinvent database is available with a license fee. The ReCiPe model documentation is available online. The BFFI methodology is explained in the reports.

### What is the main purpose of this tool?

The methodology is suitable for the following applications:

- Calculating the footprint of a financial asset portfolio, an asset class, a company or a project.
- Development of an engagement policy and investment criteria based on insights in the main drivers behind the impact.
- Use as a scoping step: to identify biodiversity impact hotspots on a portfolio level, enabling FIs to zoom in on a selection of loans and investments.
- Use the footprint to develop a “no net loss or net gain” policy and track progress.

The methodology has been used to assess projects developed by impact investors which require site-specific data. This has proven to work well, especially as there is a benefit in assessing the portfolio in the same way as a specific investment in an area.

The BFFI method is used for assessing the biodiversity footprint of organisations, and as such belongs to the suite of biodiversity footprinting tools. Although first developed for a financial institution, i.e., the ASN bank, the BFFI method can also be used for companies to determine

their biodiversity footprint. By assessing the impact of a company's operations in specific sectors and geographies, the method gives insight into the biodiversity hotspots of their operations.

### What does it measure?

The BFFI method measures potential biodiversity loss in PDF.ha.yr for scope 1 (impact of the company through direct operations), scope 2 (impact of the energy companies the company sources its energy from) and scope 3 (upstream, towards suppliers and sub-suppliers, and downstream, towards the use and end-of-life phase) pressures. A number of case studies have been accompanied with a dependencies study based on ENCORE. Although ENCORE is not part of BFFI, the tool could partially use some of the same data and principles.

All pressures that contribute to biodiversity loss can be reported individually. The pressures for which this is possible are:

- Freshwater ecotoxicity
- Freshwater eutrophication
- Global warming, Freshwater ecosystems
- Global warming, Terrestrial ecosystems
- Land use
- Marine ecotoxicity
- Marine eutrophication
- Ozone formation, Terrestrial ecosystems
- Terrestrial acidification
- Terrestrial ecotoxicity
- Water consumption, Aquatic ecosystems
- Water consumption, Terrestrial ecosystem

<sup>3</sup> Berger, J.; Goedkoop, M.J.; Broer, W; Nozeman, R; Grosscurt, C.D.; Bertram, M., Cachia, F.; Common ground in biodiversity footprint methodologies for the financial sector, Paris, 3 October, 2018.

### What input data are needed?

Revenue data when the analysis is done at portfolio level. The sectors and regions wherein the revenue is accrued is also needed.

Purchasing data or physical data when the analysis is conducted at company level. Detailed material and natural resource inputs and emissions if case-specific products or projects are analysed.

### What other tools are most complementary to this tool?

For a more complete picture of corporates' impacts on biodiversity, BFFI could be complemented with geolocated data on endangered species or habitats (e.g., through IBAT) if asset locations are known. The WWF Biodiversity Risk Filter is used to assess risks associated with certain ecosystem services.

### How can the tool be used for TNFD reporting?

BFFI can be used for the Locate, Evaluate and Assess modules of the LEAP framework prescribed by the TNFD. The tool can help locate where in the world and value chain impacts and dependencies can take place, as well as evaluate them by quantification, which results in insights in the potential hotspots in a portfolio. These can form the basis for assessing the risks and opportunities. The outputs can be used to report in line with a selection of indicators prescribed by TNFD.

### Main strengths and limitations

#### Strengths:

- Scientifically well underpinned.
- Use of open-source database and methodologies (no black box calculations).

- The EXIOBASE input/output-model shows trade flows between countries and sectors and therefore allows for a geographical identification of impact hotspots on a country level.
- Location/region-specific data can be used when available.
- Covers most drivers for biodiversity loss, including pollution.
- Supported by a range of stakeholders (including government, knowledge institutes and NGOs) after stakeholder consultations.
- Scalable to be used by other banks or financial institutions.
- The complementary qualitative analysis guides correct interpretation and use.

#### Limitations:

- Since the approach for FIs with large portfolios is often based on sector averages, revenue and models, it currently represents potential rather than actual biodiversity footprint.
- EXIOBASE data is based on sector averages, and thus not company-specific. This weakness can be addressed by using other LCA databases or by collecting additional data.
- Land-use related impacts are biased to temperate regions which means that land-use related impacts will be less accurate for tropical regions.
- Inclusion of location-specific characteristics is limited, limiting the methodology's fitness for use on a project level. For projects, alternative approaches are being included in the methodology. On a portfolio level, with the aim of identifying biodiversity impact hotspots, this limitation is acceptable.
- Not all drivers of biodiversity loss are covered by the ReCiPe methodology. For example, the introduction of

invasive species is not yet covered, and overexploitation is not yet fully covered (overexploitation of fish species was integrated in 2020). This limitation is addressed by the complementary qualitative analysis, which elaborates on the significance of this limitation for the analysis and what it means for the interpretation of results.

### What are the costs?

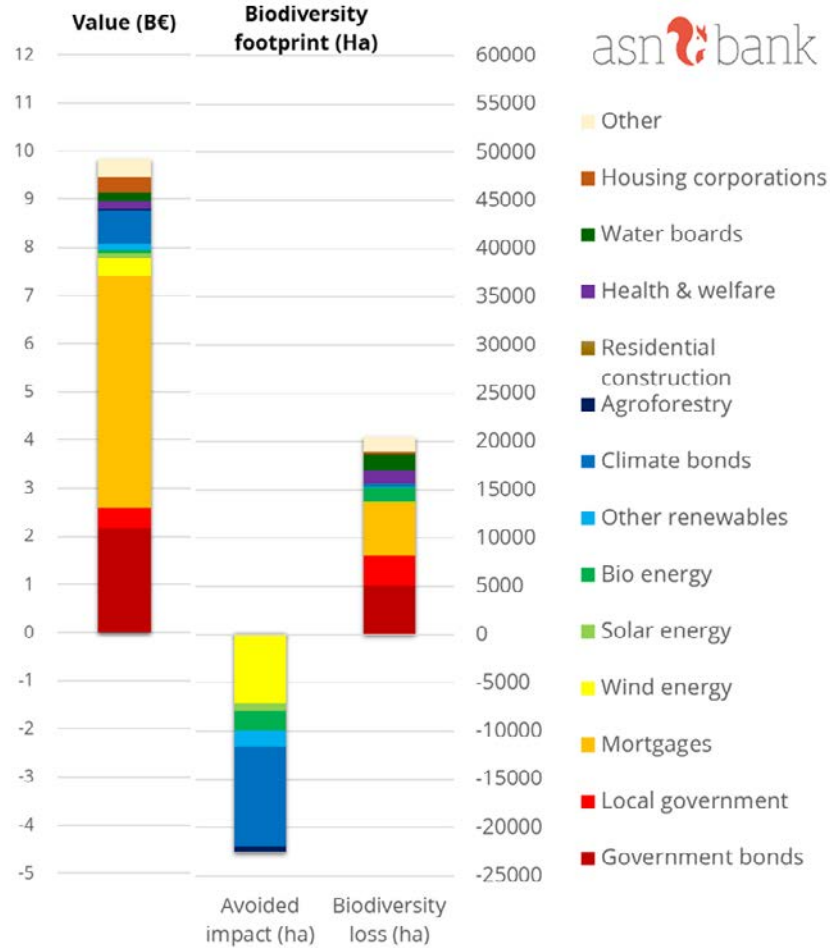
Costs are dependent on the size of the project and the level of detail needed.

Costs for the tool are related to software, input data, and consultancy hours (when applicable).

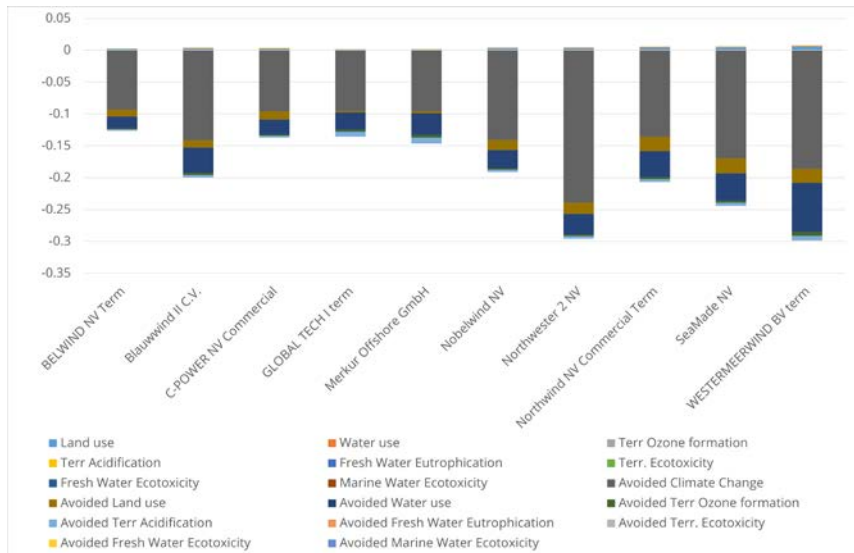
- **Software:** LCA software, for example SimaPro, is needed to model the impacts. This type of software comes with [different license options](#), starting at €6,100 for the annual subscription.
- **Input data:** Financial input data can be either already available at the FI or is commercially available via data providers. This comes with a license fee. Physical data is to be collected by the companies that want to do a biodiversity assessment, this can be complemented with sector averages to fill data gaps especially in the value chain.

**Expertise and knowledge:** If the FI or corporate has the capacity and expertise to do the impact calculations themselves, EXIOBASE data is available for free, as well as the ReCiPe model. Ecoinvent data can be purchased with a license. If capacity and expertise is not available internally, external consultants (PRé Sustainability or other consultants trained in BFFI) can be contracted. For this, costs are dependent on the consultancy firm, size and complexity of the project, and the level of detail needed for the results.

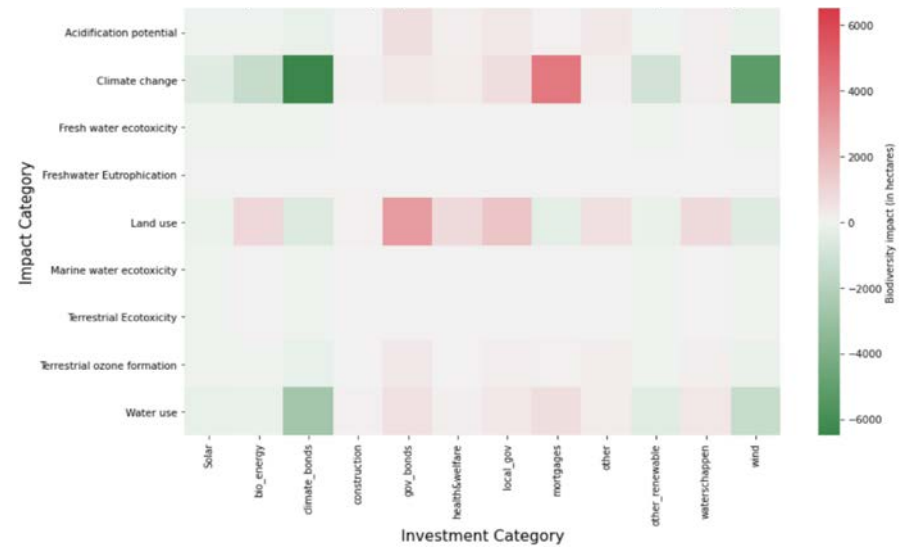
Total value and total biodiversity impacts at portfolio level



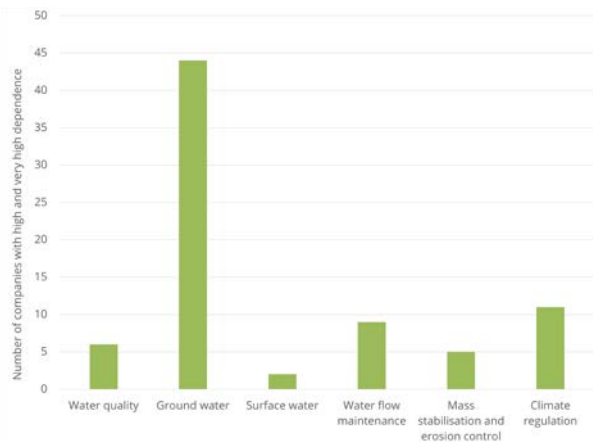
### Biodiversity impact by drivers of loss, per project in m² per invested euro



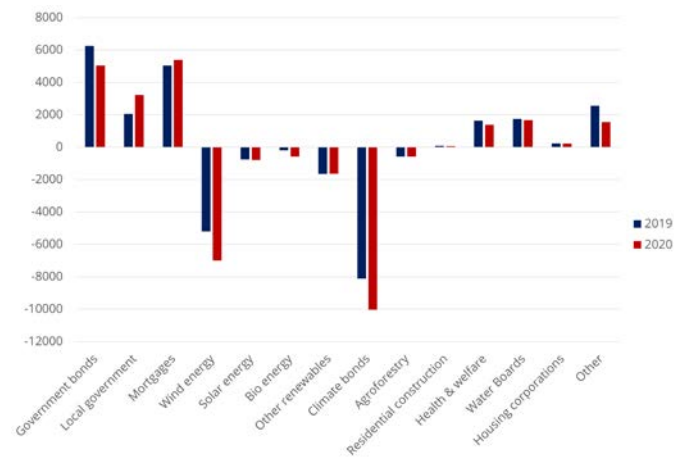
### Heatmap for biodiversity impact at balance level, linking investment categories to impact categories (drivers of biodiversity loss)



### Number of companies in a portfolio with high and very high dependencies on specific ecosystem services



### Net biodiversity impacts in hectares per investment category per year for 2019 vs 2020



## 5.2 BIA-GBS - Biodiversity Impact Analytics – Global Biodiversity Score

**Biodiversity Impact Analytics – Global Biodiversity Score (BIA-GBS) measures the biodiversity impact of companies as well as their dependencies to ecosystemic services. Investors can identify areas of high biodiversity impacts and dependencies in their portfolios and use biodiversity impact data for decision-making and to engage with key stakeholders. By offering large-scale biodiversity data (~7 000 entities), BIA-GBS™ supports the transition of the financial sector to align with international targets and reduce the impact from multiple pressures on biodiversity.**

### Description and steps

BIA-GBS uses the Global Biodiversity Score, a corporate Biodiversity Footprint Assessment tool which links economic activity to pressures on biodiversity and translates these pressures into biodiversity impacts, using scientific knowledge. In BIA-GBS, the GBS is computed with two climate databases of Carbon4 Finance (C4F). First, Climate Risk Impact Screening (CRIS) assesses the exposure of listed assets to climate physical risk. It provides a breakdown of the issuers' economic activity by sector and country. Then, Carbon Impact Analytics (CIA) provides assessments of GHG emissions over the whole value chain. CIA uses bottom-up data collected by C4F's analysts. In BIA-GBS, CIA is used to refine results for climate-change related pressures.

### Organisations and reviewers

BIA-GBS is co-owned by Carbon4 Finance and CDC Biodiversité. CDC Biodiversité is working with a scientific review committee with representatives of BRGM, UNEP WCMC, Universidad Iberoamericana, PBL, MNHN, Senckenberg, INRA, National University of Singapore and FAO.

### Current stage of development

The database is currently running and used by FIs. Carbon4 Finance and CDC Biodiversité regularly update the database and methodology to fulfil the needs of the clients.

In terms of next developments, the database aims at further developing the following:

- Impacts on marine ecosystems - several integration options are currently being studied. In the GBS, an 'overfishing' module has been developed to measure the contribution of companies to the overexploitation of resources.
- Additional geolocalised land use data, based on satellite data from the European Space Agency, to improve the Land Use impact factors.

Finally, in the long term, continuous improvement of top-down methods and exploration of the development of bottom-up modules.

### Transparency of method

The [BIA-GBS methodology documentation](#) is publicly available online. The [launch event](#) of the BIA-GBS explains further details of the methodology. Carbon4 Finance has a dedicated [webpage](#), and CDC Biodiversité provides all publications via this [weblink](#).

### What is the main purpose of this tool?

BIA-GBS is suitable for calculating the footprint of a financial asset portfolio and indices composed of listed equity and/or corporate and sovereign bonds. BIA-GBS also measures the dependencies of companies and portfolios on ecosystem services. BIA-GBS can be used for risk management, regulatory reporting (e.g., related to Article 29 of French climate law), voluntary reporting, engagement with companies and exclusion policies at a sectoral level.

BIA-GBS is a biodiversity footprinting tool, providing a quantitative estimation of companies' impact and dependence on biodiversity. It uses financial data as well as physical flow data related to GHG provided by Carbon4 Finance's CIA database.

### What does it measure?

BIA-GBS provides an estimate of the biodiversity footprint of portfolios or indices considering the full value chain of underlying companies. As BIA-GBS relies on the GBS methodology, it comes with the same concepts and limitations 'as' GBS and GBS-FI. The impacts of pressures caused by specific economic activities on ecosystems are quantified using the GLOBIO model.

The impacts of pressures caused by specific economic activities on ecosystems are quantified, relying on the GLOBIO model which is based on pressure-impact relationships. BIA-GBS covers the following pressures on biodiversity:

- Land use
- Overexploitation of resources
- Climate change
- Pollution

The impacts related to these pressures can be broken down into sub-pressures and ecosystems (for terrestrial and aquatic ecosystems).

BIA-GBS also measures the dependencies of companies and portfolios on ecosystem services. The list of 21 ecosystem services in the ENCORE database is used. Two dependency scores are available in BIA-GBS: one average dependency score that measures the average dependency of a corporate or a portfolio on all ecosystem services; one critical dependency score that provides the share of a company or of a portfolio that is critically dependent, i.e., not substitutable, on at least one ecosystem service. BIA-GBS measures both Scope 1 (direct operations) dependencies and Scope 3 upstream (upstream value chain) dependencies.

The granularity and accuracy of ESG data are pivotal elements in providing a robust understanding of an entity's or portfolio's biodiversity footprint. The BIA-GBS database offers a comprehensive and detailed dataset designed to assess biodiversity impacts and dependencies at multiple levels, below is the detail of the granularity and accuracy of the data provided through BIA-GBS:

- Concerning the dependency part of the methodology: 44 datapoints at entity level + 44 datapoints at instrument level + 44 datapoints at portfolio level = 132 datapoints provided in total
- Concerning the Impact part of the methodology: 60 datapoints at entity level + 37 datapoints at instrument level + 37 datapoints at portfolio level = 134 datapoints provided in total

The indicators available at entity and portfolio level are the following:

- Biodiversity Footprint in MSA.km2 (for the 4 terrestrial/aquatic/freshwater and dynamic/static combinations)
- Monetary intensity (by EVIC as well as turnover for corporates)
- Biodiversity by pressure (6 terrestrial pressures and 7 aquatic pressures)
- Biodiversity by scopes
- Portfolio performance against a benchmark
- Aggregate impact (in MSAppb\*)
- Two dependency scores (critical and average) on 21 ecosystem services (Scope 1 & Scope 3 upstream)

### What input data are needed?

BIA-GBS is an integrated solution meaning that data needed from FIs is minimal; they just need to characterise their portfolio or index with identification numbers for underlying companies (e.g., ISIN number) and financial exposure for each asset. For climate-change related pressures, the GHG emission data reported by the company and/or calculated by Carbon4 Finance are used (if available). The turnover is also directly reported by companies. Geographical or sectoral breakdown of turnover is assessed through other externally collected sources.

### What other tools are most complementary to this tool?

For a more complete picture of corporates' impacts on biodiversity, BIA-GBS could be complemented with geolocated data on endangered species or habitats (e.g., using IUCN Red List of Threatened Species, Key Biodiversity Areas, Protected Areas, STAR) if asset locations are known. For enhanced precision on ecosystem services, the aggregated scores provided by BIA-GBS, based on qualitative evaluations could be complemented by quantitative metrics tailored to each ecosystem service.

### How can the tool be used for TNFD reporting?

BIA-GBS is well-suited to align with the LEAP framework of the TNFD as it can be used for most phases of this framework.

BIA-GBS can be used for the "Locate" phase as a tool for screening sectoral impacts and dependencies across the entire value chain. It can inform the "Evaluate" phase as its output is a precise measurement of biodiversity impacts and dependencies of an asset or a portfolio. BIA-GBS can also inform the "Assess" phase by providing useful information on which the risk and opportunity analysis can be based. The results of all previous phases, obtained partially or entirely through BIA-GBS, can be the foundation of the answer to the "Prepare" phase.

BIA-GBS was used in a TNFD pilot, which assessed the tool's ability to respond according to the LEAP approach at company level and at portfolio level for the "Agriculture and fisheries" sector. The pilot presentation webinar is available [here](#) and the detailed case study is available in this [publication](#). The conclusions expressed can be applied to the GBS-FI as well.

## Main strengths and limitations

### Strengths:

- Good coverage on all the investment indices, assessment of sovereign bonds.
- Covers all industry sectors and their potential impact on terrestrial and aquatic biodiversity.
- Covers all countries. Biodiversity impacts are related to specific geographies (EXIOBASE divides the world into 49 regions for this).
- Company-specific data is collected for climate change pressures with great precision.
- Allows to assess both impact and dependency risk exposure of companies, thus addressing the topic of double materiality.
- Provides 2 dependency scores for more accuracy, one critical dependency score and one average dependency score, at 3 levels: portfolio, instrument and entity level.
- Temporality is considered in the database thanks to differentiation between static (e.g., land occupation) and dynamic (e.g., land conversion) impacts.
- Ready-to-use database with macro and micro views.
- Quantitative (and scientifically robust) link between pressures and impacts.
- Scientifically well underpinned (best available knowledge and tools e.g., GLOBIO, EXIOBASE).
- Covers most drivers of biodiversity loss (Direct exploitation, Land use, Pollution, Climate change) including ecotoxicity.
- Compatible with international objectives and frameworks: The MSA can be calculated on a global scale (e.g., the global level in 2010 was 68%). Therefore, it is possible to assess company trajectories and their compatibility with a level of remaining biodiversity. One could for instance assess the compatibility with the targets of the CBD (e.g., +5% biodiversity integrity in 2030). BIA-GBS can be used for TNFD reporting, Article 29 among others.

- Biodiversity input data (MSA, pressure-impact relationships) based on extensive meta-analysis which allows for adding new studies continuously.

### Limitations:

- Since the approach is partially based on sector averages and financial data, the impacts could be over/under-estimated at company level.
- Except for climate-change related pressures, impacts are based on activity averages, and thus not company-specific—although the sectoral x geographical split is company-specific. Considering the data used, the intra-sectoral comparisons have substantial limits.
- Kindly refer to GBS limitations.

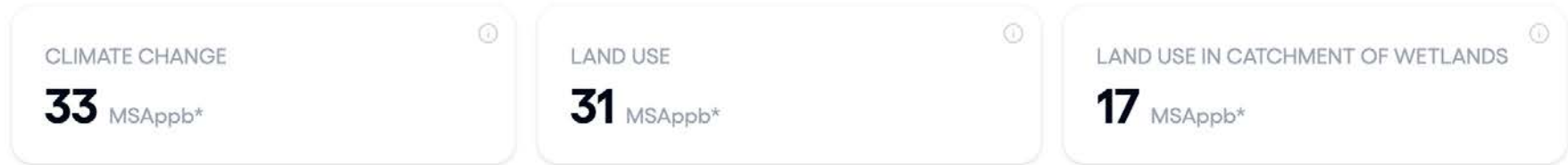
### What are the costs?

The time/effort required to calculate the impact is minimal, but the dataset is commercial. This means that FIs have to pay an annual fee to access it. The costs consist in the access to the database in the form of a subscription as well as the support from an analyst. The dataset is available directly, without the need for technical or knowledge skills. The time investment needed by the FI itself is low (less than ten days), as the outputs will be provided fully computed and usable. The fees include 2 hours of onboarding to better use the data and the support throughout the subscription by a dedicated analyst.



### Most important pressures - Financed Normalized Score

MSAppb\*



#### Explanation

Pressures with the highest contribution to the **Portfolio Financed Normalized Score** expressed in MSAppb\* to allow for comparison.

The normalized score financed by the portfolio corresponds to the sum of financed normalized scores of each instrument of the portfolio. The financed impacts of each instrument are calculated using the **Impact Attribution Intensity**. Impact figures have been fully normalized to aggregate terrestrial, aquatic, static and dynamic impacts, thus expressed in MSAppb\*.

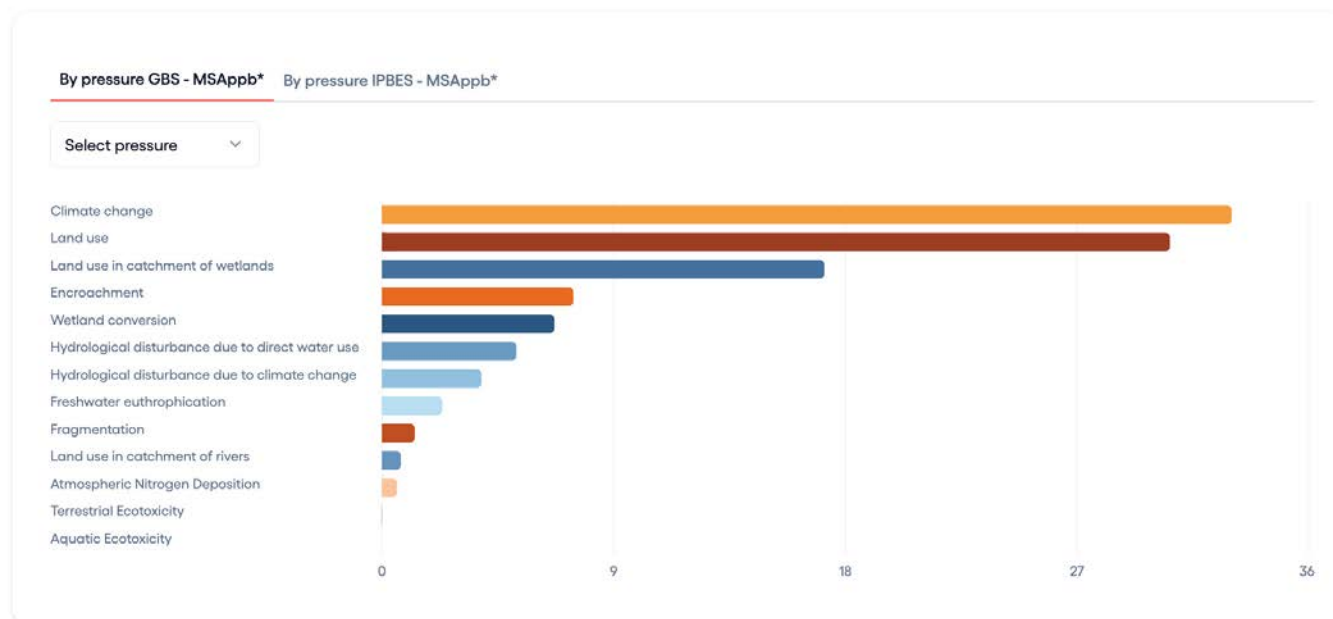
Please refer to the methodology section at the top of the page for a more detailed explanation of the **MSAppb\* metric**, the **pressures** covered by BIA-GBS, and how the **normalized score financed by the portfolio** is calculated.

We offer the possibility to display impacts at pressure level as defined by the IPBES (i.e., Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services).

Besides, extra contents on pressures were added to the entity and portfolio pages (see 'About the GBS pressures' section). This ready-to-use scientific material can help you to better understand BIA-GBS data and how the different pressures are integrated in our approach.

We made available definitions for each pressure complemented with a process diagram explaining the cause-and-effect relationships underlying the impacts on biodiversity.

## Financed Normalized score



### Explanation

Detailed breakdown of the **Financed Normalized Score** by pressure for the whole portfolio or for a given compartment - a combination of biodiversity realm (Terrestrial / Aquatic) and accounting category (e.g. Aquatic / Dynamic) - expressed in MSAppb\*.

Please refer to the methodology section at the top of the page for a more detailed explanation of the **MSAppb\* metric**, the **pressures** covered by BIA-GBS, and how the **normalized score financed by the portfolio** is calculated.

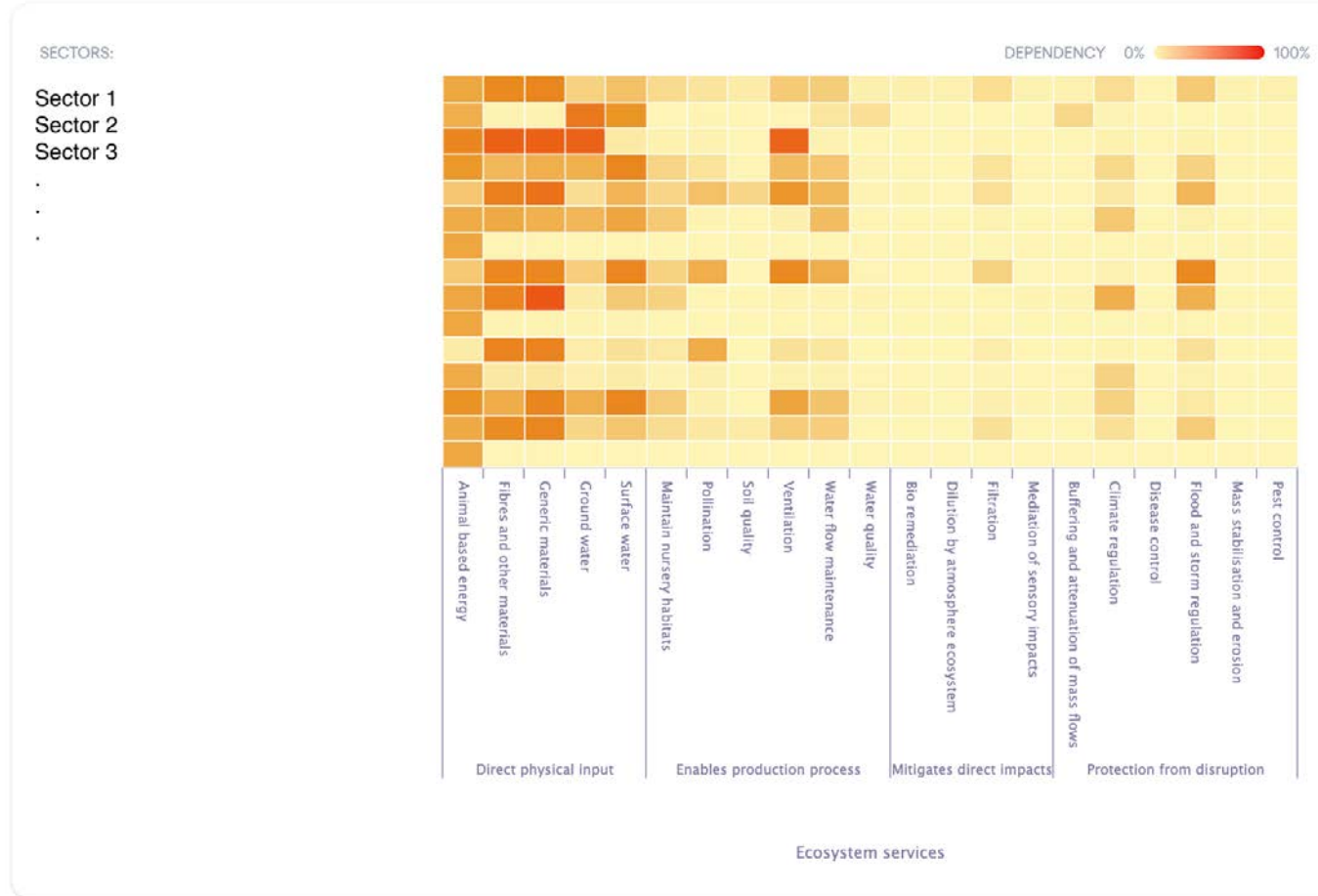
### About the GBS pressures

## Summary of portfolio dependencies on ecosystem services

Source: GBS 1.4.8, 04/2025, Carbon4 Finance

### Top 15 Corporate and Financial Institution sectors by Average Dependency Score

Per ecosystem service - Scope 1



#### Explanation

Corporate and Financial Institution Average Dependency Score - Scope 1 for each of the 21 ecosystem services by sector (NACE classification) in which the corporates and financial institutions are active. The 15 sectors with the highest investment share of the portfolio are shown. These dependency scores relate to the corporates' and financial institutions' direct activities and are calculated as the weighted average of the Average Dependency Score - Scope 1 per ecosystem service of each corporate and financial institution's instrument of the portfolio, weighted by the instrument's investment share within the respective asset classes.

## 5.3 BIAT – Biodiversity Impact Assessment Tool

ISS ESG' Biodiversity Impact Assessment Tool (BIAT) quantifies the potential impact of corporate activities on biodiversity based on life-cycle impact assessment methodology. Conveying biodiversity loss with both PDF and MSA, the BIAT is complemented by an ecosystem services dependency assessment which enables investors to understand the impact and dependency risk exposure of investments.

### Description and steps

The BIAT aims to assess drivers of biodiversity loss and thus models the impact of corporate operations by considering a set of environmental pressures on species and habitats, taking into account inputs and outputs in the entire value chain. It leverages a bottom-up assessment of a company's business activities in different geographical locations, applies Life Cycle Impact Assessment (LCIA) methodology (IMPACT World+), and incorporates recognized databases such as EXIOBASE. In addition, biodiversity-relevant data sets and tools such as Science Based Target Network Materiality Tool, and ISS ESG's proprietary biodiversity performance data are used to refine the data on company and industry level.

The BIAT's output flows from a multiple-step process: 1) Economic Activity Identification & Supply Chain Modelling, 2) Upstream and Downstream Impact Assessment, 3) Species Richness Assessment, 4) Species Abundance Assessment, and 5) Refinement and Normalization. Outputs are described quantitatively with the biodiversity metrics Potentially Disappeared Fraction of species (PDF), and Mean Species Abundance (MSA).

Along with the biodiversity impact assessment, the solution comprises a separate dependency assessment which links businesses and their economic activities to 22 ecosystem

services within 3 overarching groups (provisioning, regulating & maintaining, and cultural). Ecosystem services and materiality grades are derived from ENCORE and CICES (Common International Classification of Ecosystem Services). Outputs also include a company's revenue exposure to specific ecosystem services and the level of intensity of each dependency.

### Organisations and reviewers

The Biodiversity Impact Assessment Tool was developed in collaboration between ISS ESG and Quantis, a renowned environmental sustainability consultancy.

### Current stage of development

The first version of the BIAT was launched in September 2022 and was extended by the dependencies assessment in September 2023. The dataset is available for +17,000 issuers (as of April 2025) and is accessible for use by FIs through ISS ESG's client platforms, including a comprehensive Portfolio Report.

### Transparency of method

A short description of the methodology is publicly accessible on ISS ESG's [website](#). Clients have access to a comprehensive methodology document, additional relevant materials and onboarding training sessions.

### What is the main purpose of this tool?

The BIAT quantifies the biodiversity impact of corporates and allows investors to calculate the biodiversity footprint of portfolios. The data set includes aggregated factors for PDF and MSA on a company basis which will help investors to disclose on and understand the biodiversity risks and impacts of their investment portfolios.

### What does it measure?

To allow for granular analysis and a better understanding of the impact, the full solution includes more than +650 underlying factors (data on impacts per sector, region and environmental impact categories, ecosystem services). The final MSA and PDF indicators can be used to identify the industry leaders and laggards as related to biodiversity impact.

As part of the assessment, 10 environmental impact indicators from IMPACT World+ are considered: Climate Change, Marine Acidification, Fresh Water Acidification, Terrestrial Acidification, Freshwater Eutrophication, Marine Eutrophication, Freshwater Ecotoxicity, Water Availability, Land Transformation, and Land Occupation.

The dependency assessment allows users to assess risk exposure of companies by identifying revenue exposure to specific ecosystem services, and the level of intensity of that dependency.

Together, the biodiversity impact assessment, and the ecosystem services dependency assessment address the topic of double materiality, allowing users to assess both the impact and dependency related risk exposure of companies.

### What input data are needed?

The model is built on financial data in companies' balance sheets, paired with geographical breakdown of revenues as well as EXIOBASE data on activities, and modelled with associated resources (inputs) and emissions (outputs). Internal and external data at the industry, country, and company level is used to refine the model.

### How can the tool be used for TNFD reporting?

In addition to the assessment of impact (MSA and PDF metrics) and dependencies (Ecosystem Services dataset), the BIAT portfolio report provides a selection of Additional Disclosure Metrics for FIs.

### Main strengths and limitations

#### Strengths:

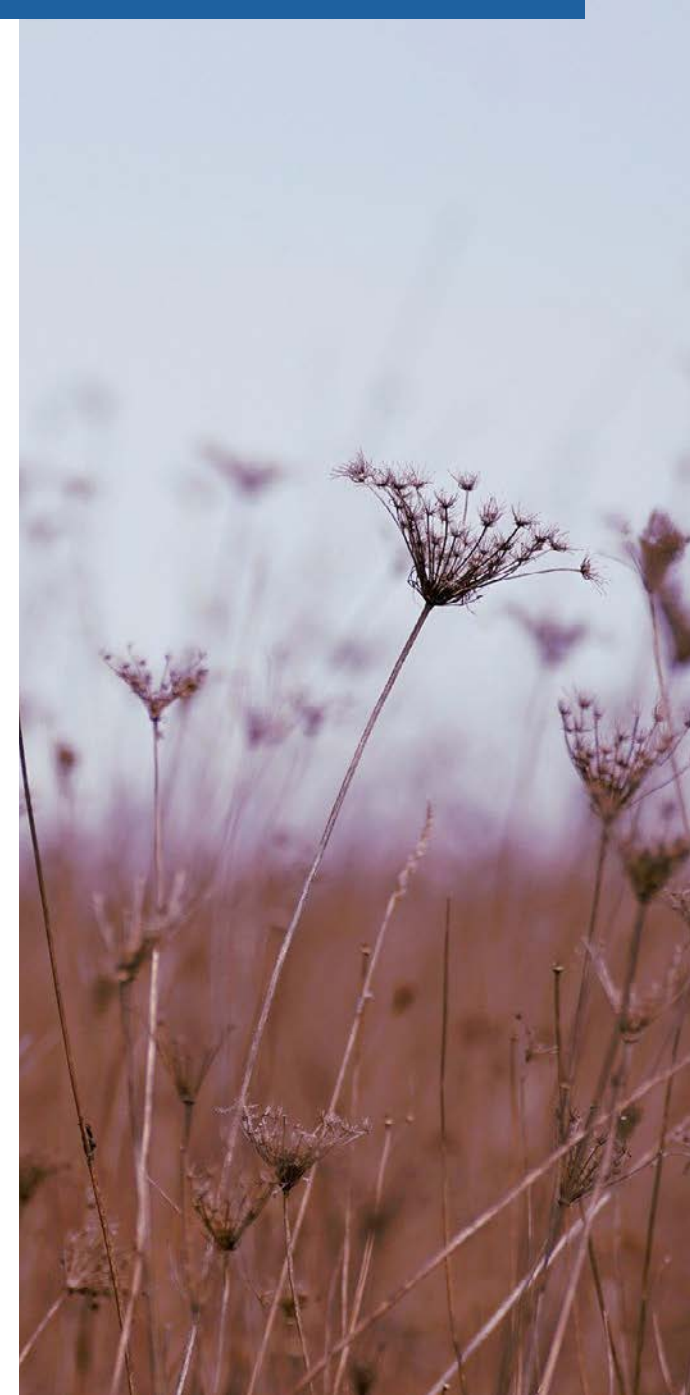
- Top level outputs (i.e., absolute and relative impacts, decile rank, biodiversity impact classification) as well as 650+ granular underlying factors (e.g., per impact indicator, activity, country) allow for multiple applications and detailed insights.
- The solution allows users to assess both impact and dependency risk exposure of companies, thus *addressing the topic of double materiality*.
- A Portfolio Report supports comprehensive understanding and analysis of the data.
- The methodology comprises a refinement step that allows addressing drivers of biodiversity loss which are not fully addressed by LCIA methodology and incorporates company performance.

#### Limitations:

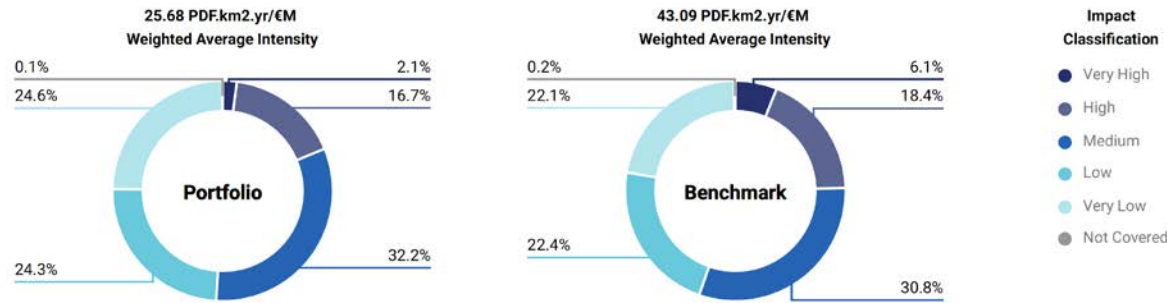
- The tool is built on various proxies and assumptions based on sectoral impacts, thus providing a potential rather than actual biodiversity footprint.
- Some environmental pressures are partially covered due to lack of availability e.g., invasive species and water use.

### What are the costs?

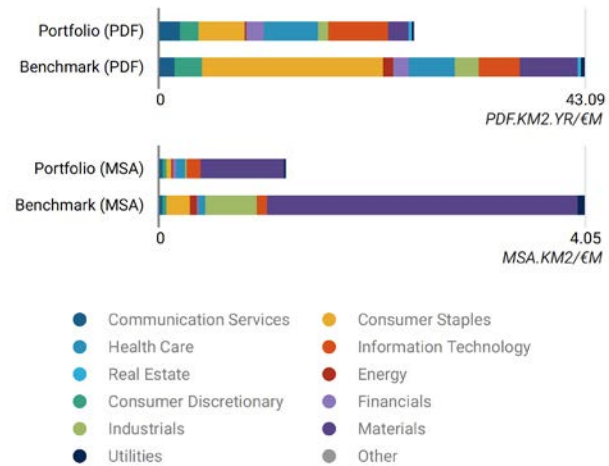
The cost will depend on the use case. The subscription to the BIAT includes access to the database (via the DataDesk platform or feed) as well as the reporting functionality. As part of the onboarding process, methodological documentations and training sessions are provided.



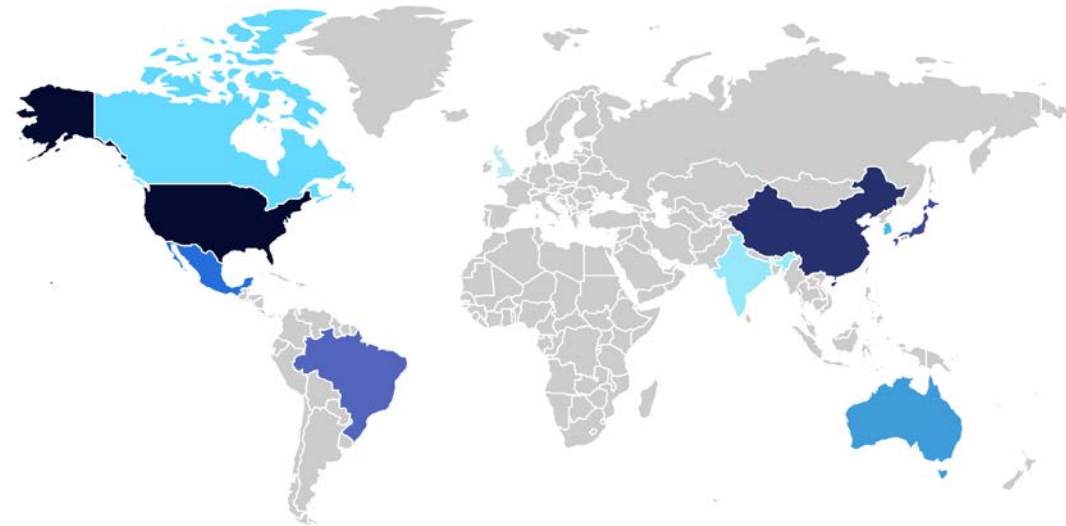
### Impact Classification



### Intensity Breakdown per GICS Sectors



### Breakdown of Impact per Region (Top 10)



## 5.4 BII - Biodiversity Intactness Index

The [Biodiversity Intactness Index \(BII\)](#) is a science-led metric of ecosystem health. Powered by the Natural History Museum's (NHM) PREDICTS database and global land-use data, BII measures the percentage of original biodiversity remaining. BII is extensively peer-reviewed; trusted by scientists, governments, businesses, and listed as a component indicator in the UNCBD Global Biodiversity Framework.

The BII provides spatial estimates of ecosystem health, expressed as the percentage of original biodiversity remaining. As an entirely model-based index, it is consistent, comparable, and as such is one of the most investor-grade datasets of its kind. Users can access the raw BII data by contacting the NHM directly to discuss data licensing agreements or bespoke reporting analysis options. BII is also available via selected third-party providers under approved commercial arrangements. Access includes options for global datasets, portfolio-level screening, or high-resolution custom outputs depending on user needs.

### Organisations and reviewers

Developed by the Natural History Museum (London), in collaboration with leading biodiversity modellers and land-use scientists. The methodology has undergone extensive peer review (40+ publications) in the world's leading scientific journals and is a component indicator in the Kunming-Montreal Global Biodiversity Framework (GBF). The methodology and data have featured in extensive policy reports, including the IPBES Global Assessment Report, the Dasgupta Review on the Economics of Biodiversity, and the Bending the Curve Framework.

### Current stage of development

Fully operational, with ongoing updates to spatial, temporal, and land-use data. Versioning is transparent. Local, regional, national, and global applications are already in use across government, finance, and conservation.

### Transparency of method

BII is built on openly published peer-reviewed methods developed by the Biodiversity Futures Lab (BFL), at the NHM; co-lead by Prof Andy Purvis and Dr Adriana De Palma. The full modelling approach, underlying assumptions, and input data (e.g., PREDICTS) are publicly accessible and documented in scientific journals and via the NHM. Fully transparent methodologies are also available direct through third party vendors of the BII.

### Main purpose of tool

- 1 Government and Policy: BII enables national and subnational governments to assess the condition of biodiversity over time and space. It supports reporting against global targets such as the Kunming-Montreal Global Biodiversity Framework (GBF), where it is included as a component indicator. Governments use BII for setting national biodiversity baselines, monitoring progress towards 30by30, identifying spatial priorities, tracking ecosystem degradation or recovery, and informing land-use and conservation planning.
- 2 Academia and Conservation: For researchers and conservation organisations, BII provides a scientifically robust measure of biodiversity intactness across ecosystems and landscapes. It is widely used in academic literature to model and project future biodiversity trends, evaluate the effectiveness of conservation interventions, and explore relationships between biodiversity and ecosystem services. Conservation practitioners use BII

to prioritise areas for restoration, measure progress, and communicate evidence-based impact to stakeholders.

- 3 Private Sector (Finance and Business): BII is increasingly used by financial institutions, corporates, and advisory firms to understand biodiversity condition in locations where they operate or invest. As a spatially explicit measure of ecosystem health, BII aligns with the 'state' component of the TNFD's LEAP framework and supports risk assessment, disclosure, and portfolio screening. It can inform double materiality analysis, identify exposure to degraded ecosystems, support nature-positive strategies, and help define science-aligned targets across assets, sectors, and supply chains. BII does not rely on voluntary disclosures, making it especially valuable for upstream screening and system-level risk assessment.

### What does it measure?

BII models the average abundance of originally present (native) species in a given area, relative to an undisturbed baseline. Crucially, it accounts not only for overall abundance but also for the *composition* of species communities; retaining sensitivity to the dominance of widespread generalists over locally characteristic species. This dual focus distinguishes BII from metrics that consider only abundance or species richness. The metric incorporates the cumulative impact of key pressures including land-use change and intensity, the age of vegetation, and human population density, amongst others.

BII is generated using three main categories of input data:

- 1 Biological and ecological data: Drawn from the Natural History Museum's PREDICTS database, which contains empirical >6 million field data observations on species abundance and occurrence across >50,000 sites and >60,000 species, as of May 2025. This includes site-level metadata such as habitat type, land-use intensity, and sampling method.
- 2 Land-use and land-cover data: Includes world-leading harmonised global land-use datasets, vegetation age, and land-use intensity classifications.
- 3 Other explanatory geospatial drivers: Includes human population density, road density, time since land-use conversion, and other spatial variables shown to influence biodiversity responses.

### What input data are needed?

BII does not require users to submit species data or conduct field surveys. It is pre-modelled using empirical biodiversity data (from PREDICTS) and global geospatial drivers (e.g., land use, human pressure).

To apply BII, users typically need to provide:

- Location data (e.g., asset coordinates, supply chain footprints, or project boundaries)
- Temporal context (e.g., specific years or periods of interest)
- Optionally, custom overlays (e.g., land tenure, commodity use, conservation status) to support bespoke insights or additional analysis.

BII can then be used to assess ecosystem condition, track trends over time, and compare areas of interest against global or regional benchmarks; without requiring proprietary ecological input data from the user.

### What other tools are most complementary to this tool?

BII is best complemented by datasets that provide species-specific information (e.g., rarity, extinction risk) and those that quantify explicit pressures or dependencies (e.g., land-use change, commodity exposure, pollution risk). While BII offers an evidence-based assessment of ecosystem condition, it does not capture all dimensions of biodiversity value or vulnerability. Integrating BII with these complementary datasets enables a fuller picture of biodiversity risk, relevance, and response potential.

### How can the tool be used for TNFD reporting?

BII directly supports multiple components of the TNFD's LEAP framework by providing a robust, spatially explicit measure of ecosystem condition. It is particularly relevant for financial institutions and corporates assessing nature-related risks and impacts across portfolios, supply chains, or operational sites.

- **Locate:** BII enables users to identify the ecological condition of areas where they have assets, investments, or sourcing activities. It supports screening of large asset lists, country exposures, or supply chain geographies using consistent, global data. It can also help identify priority geographies based on ecosystem degradation or improvement trends.
- **Evaluate:** BII informs the "state" variable in the state-pressure-response-impact model, enabling evaluation of the health of terrestrial ecosystems in areas of interest. It can be used to compare the condition of different sites or regions, track trends over time, and evaluate exposure to degraded or recovering ecosystems; helping define risk or opportunity.
- **Assess:** BII can be integrated with pressure and dependency datasets to assess double materiality. For

example, degraded BII values in areas of dependency may signal increased operational, reputational, or regulatory risk. BII can also contribute to scenario testing, target setting, or transition plan development by indicating ecosystem condition baselines and trajectories.

- **Prepare:** BII provides a science-aligned, policy-linked basis for disclosures under TNFD, aligned with the Global Biodiversity Framework. It can be used to justify actions, targets, or mitigation strategies by showing evidence of ecosystem condition and trend. Its compatibility with portfolio- or geography-wide assessments supports consistent, auditable reporting.

### Main strengths and limitations

#### Strengths:

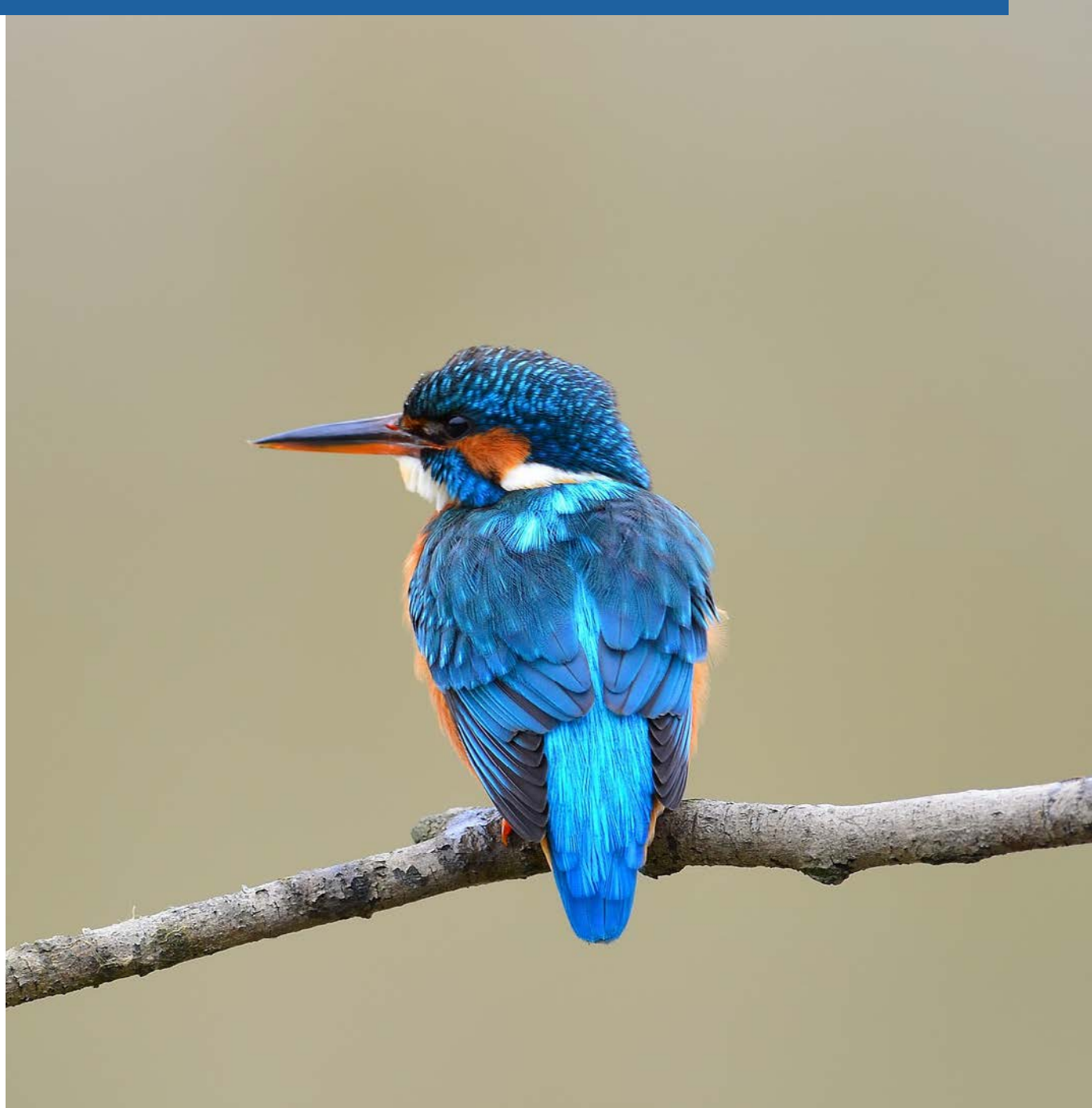
- Empirically grounded and highly peer-reviewed, with one of the world's most comprehensive biodiversity response databases (PREDICTS).
- Exceptionally geographically (>50,000 unique sites) and taxonomically (>60,000 unique species) representative.
- Model-based: allows retrospective analysis and future projections under scenario conditions when interrogated by someone with appropriate expertise; can also be used for risk assessment when screening biodiversity credits.
- Built on land-use (not land-cover), capturing how humans utilise land; key to understanding biodiversity outcomes.
- Globally consistent yet scalable: can be aggregated or disaggregated from local to global levels.
- Delivers a single, intuitive output, % biodiversity remaining, suitable for non-specialist use.
- Applicable across government, academic, and private sectors.
- Requires no proprietary or company-reported data.
- Fully aligned with the Global Biodiversity Framework and TNFD's LEAP framework.

**Limitations:**

- Like all modelled biodiversity data, BII is a proxy for field-based monitoring and may simplify complex ecological dynamics.
- Pressure-specific drivers (e.g., agriculture vs infrastructure) cannot be fully disaggregated.
- Does not directly account for species extinction or rare species population dynamics.
- Currently limited to terrestrial ecosystems; marine and freshwater coverage not available.

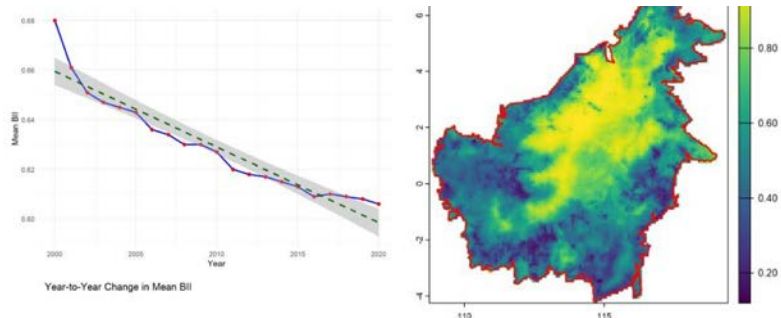
**What are the costs?**

BII global datasets are freely accessible for non-commercial use. Commercial use (e.g., financial/corporate risk assessments, disclosures, integration into platforms or portfolio tools) requires a license. Fees are tiered based on user type and scope. Custom assessments are subject to commercial terms and conditions. Contact NHM directly for more information: [biodiversityfutureexplorer@nhm.ac.uk](mailto:biodiversityfutureexplorer@nhm.ac.uk)

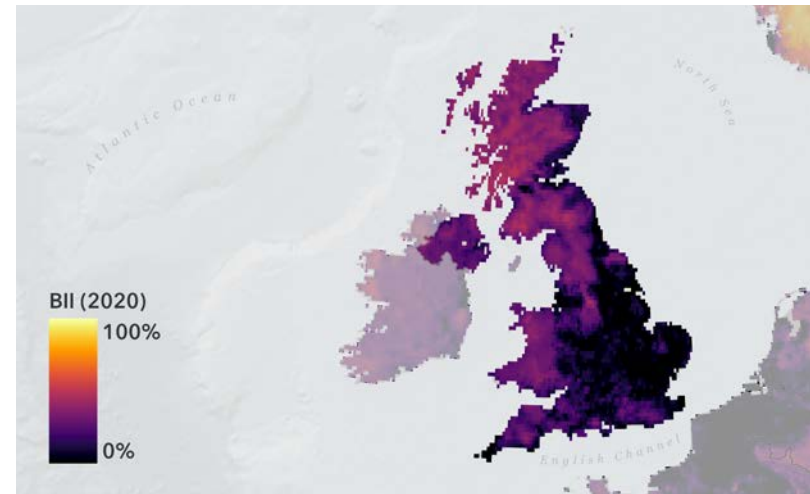


Output visuals BII

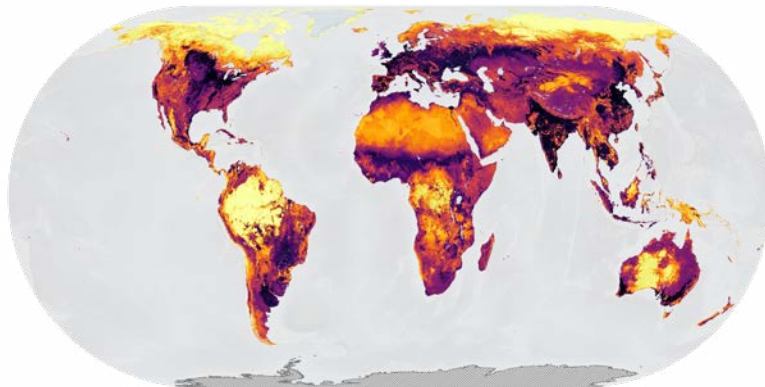
Mean and spatial variation in the Biodiversity Intactness Index (BII) across Borneo between 2000 and 2020.



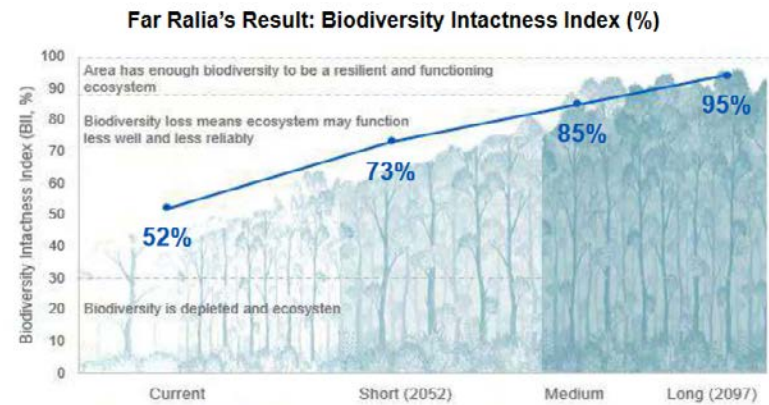
Biodiversity Intactness Index (BII) across the United Kingdom in 2020.



Global distribution of the Biodiversity Intactness Index (BII) in 2020.



Modelled Biodiversity Intactness Index (BII) trajectory under a restoration scenario at Far Ralia, Cairngorms, Scotland. These results were part of a wider pilot study with ABRDN asset management.



## 5.5 BRF – Biodiversity Risk Filter

The [WWF Biodiversity Risk Filter \(BRF\)](#) is a free-of-charge, web-based, spatially explicit corporate- and portfolio-level screening and prioritisation tool for biodiversity-related risks. It allows companies to understand and assess the biodiversity-related risks of their operational locations and their suppliers and to prepare an appropriate response plan. By the same logic, financial institutions can assess biodiversity-related risks for all companies in a given portfolio.

The current version of the WWF BRF tool consists of three key modules: the Inform Module, which provides an overview of the industry-specific dependencies on ecosystem services and impacts on biodiversity; the Explore Module, which is a collection of spatially explicit maps of the importance and local integrity of biodiversity; and the Assess Module, which contains a tailored physical and reputational risk assessment for which users need to input location-specific company and/or supply chain data alongside its corresponding industry sector and business importance. A fourth module, the Respond Module, is currently under development. This will support users in identifying suitable actions to respond to the identified risks.

### Organisations and reviewers

Developed by the World Wide Fund for Nature (WWF), the Biodiversity Risk Filter is informed by an extensive range of global coverage scientific data that are peer reviewed and sourced from world leading and reputable institutions known for their expertise in environmental and climate science. [WWF BRF tool data source and methodology](#) are explicitly informed through our documentations that are publicly accessible.

These data also undergo regular updates and reviews to ensure its relevance and accuracy, and is typically under the update frequency of 2 years.

The Risk Filter team and the associated collaborators at WWF, which consists of experts in water and biodiversity risk assessments, continuously reviews and assesses the quality of the data used. This expert oversight helps to maintain high standards of data integrity and reliability. The team also engages with various stakeholders, including scientific communities, industry experts, and local organisations, to ensure the data reflects ground realities and is comprehensive in its coverage of biodiversity risks.

### Current stage of development

The suite is fully operational and continuously updated. The additional accompanied Adaptation, Conservation, and Transformation (ACT) tool, specifically developed to address positive impact and opportunity in biodiversity, is currently under development and to be expected in 2025/2026.

### Transparency of method

The suite primarily uses publicly available and peer-reviewed data sources. Extensive documentations on data sources and methodologies are provided on the website and publicly accessible to maintain transparency. Further information on methodology, data and guidance can be found [here](#).

### Main purpose of the tool

The WWF Biodiversity Risk Filter (BRF) is a corporate and portfolio-level risk screening and prioritisation tool to help identify risks and opportunities across company operations

and value chains in various biodiversity key impacts and dependencies, supporting enhanced business resilience and sustainable practices.

It is however important to note that the tools are NOT meant as:

- Comprehensive modelling tools that capture nature in all facets at site level or that provides highly granular or near-real time information at local scale.
- Footprint assessment tools that provide biodiversity & water impact scores across corporate spheres of influence.

### What does it measure?

The WWF BRF measures various physical and reputational risks with an extensive number of risk indicators and metrics. Under the physical risks, there are the risk category of Provisioning Services, Regulating & Supporting Services – Enabling, Regulating Services – Mitigating, Cultural Services, and Pressures on Biodiversity, while the Reputational risk includes the category of Environmental Factors, Socioeconomic Factors, and Additional Reputational Factors.

For more information on the WWF BRF – risk indicators and metrics, please see the [methodology document](#), specifically on [BRF Indicator Documentation](#) and [BRF Indicator Summary](#).

### What input data are needed?

Required inputs include location (coordinates or address), industry classification of sites, and the business importance of sites.

### What other tools are most complementary to this tool?

The Water Risk Filter (WRF) that is also under WWF Risk Filter Suite is best to complement the Biodiversity Risk Filter. The WWF Risk Filter Suite (including WRF and BRF) also aligns well with other tools like IBAT, ENCORE and REPRISK.

### How can the tool be used for TNFD reporting?

With regards to how WWF Risk Filter Suite (incl. BRF) can support TNFD reporting, we have published the [Technical Guide: How the WWF Risk Filter Suite can support the Taskforce on Nature-related Financial Disclosures \(TNFD\)](#).

### Main strengths and limitations

#### Strengths:

- The WWF BRF tool is freely accessible, and account spatially explicit biodiversity related risks based on user-specific inputs, i.e., site locations of their supply chain (either based on geographical latitude and longitude coordinates or location address).
- The WWF BRF tool is currently covering a total 33 risk indicators that are supported by over 50 science-based dataset with global coverage at a relatively fine spatial resolution, i.e., Hydroshed level 7. Regular data update is also expected with a high frequency of 1-2 years.
- The WWF BRF tool enables companies to systematically identify and prioritise biodiversity-related risks across their entire operations and value chains. This strategic approach helps in aligning biodiversity management with business goals.

- Guidance on Opportunities (upcoming in the accompanied ACT tool): beyond merely identifying risks, the BRF tool also highlights opportunities for companies to enhance their environmental stewardship.
- Support for Sustainable Practices: By providing insights into the dependencies and impacts on biodiversity, the tool encourages companies to adopt more sustainable practices. This can lead to long-term benefits such as increased resilience and sustainability of business operations.
- Currently the tool supports and is in the alignment of reporting standards and targets like SBTN, TNFD, and EU-ESRS.

#### Limitations:

- Like most risk assessment tools, it measures potential risk instead of actual risks.
- The tool provides a risk score rather than a monetary valuation of risks.
- Limited data for supply chain assessment.
- Other limitations inherent to WWF RFS modelling principles:
  - a. Applying this methodology at scale requires workarounds.
  - b. Point-in-time assessment.
  - c. Point location as site input (instead of polygons such as arable farming boundary or linear infrastructures such as railway lines).
  - d. Spatial granularity of assessment units differs, and aggregated/ standardised to HydroSHED Level 7.
  - e. Level of abstraction, all risk variables are translated into risk scores of 1 to 5.
  - f. Robustness of data: despite our best possible effort to select only the most up-to-date, reputable, global and mostly freely available data sets to assess each indicator, due to data availability of global data sets, some proxy data had to be included.

- g. Error of omission: the current set of indicators have been carefully selected to try to achieve a balance between completeness, usefulness for the user and data availability. However, there are more aspects to biodiversity risk that could be included in the tool. The explanations of the different indicators contain disclaimers if other data sets were considered but were not available or are planned to be included in future iterations of the tool. As new data becomes available and the inclusion of more data becomes necessary, indicators/data sets may be added or removed.
- h. Gap in trade-offs. Interrelations, trade-offs and feedback loops between different ecosystems and the services they provide are currently not considered.
- i. Industry materiality and the importance and integrity of biodiversity as key drivers of results. Results are sensitive to a) the industry materiality rating linked to companies' industry classification; and b) the thresholds of converging spatial biodiversity data into a score of 1 to 5.
- j. Natural resources are sourced from surrounding areas. For provisioning services, such as timber availability, it is assumed that natural resources are sourced directly from the surrounding area. This may or may not be the case.

### What are the costs?

The WWF BRF tool is free to use and easily accessible online through the [WWF Risk Filter Suite platform](#).

For the access module where users can assess risks of their specific business site or portfolio location, a free login account/ registration is required.

For licensing please refer to our documentation of [Terms of Use](#).

Figure 1. Map view of the risk assessment: where each circle represents the user business site locations with the corresponding risk level (colour). Users could switch to various different biodiversity risk aspects/ layers.

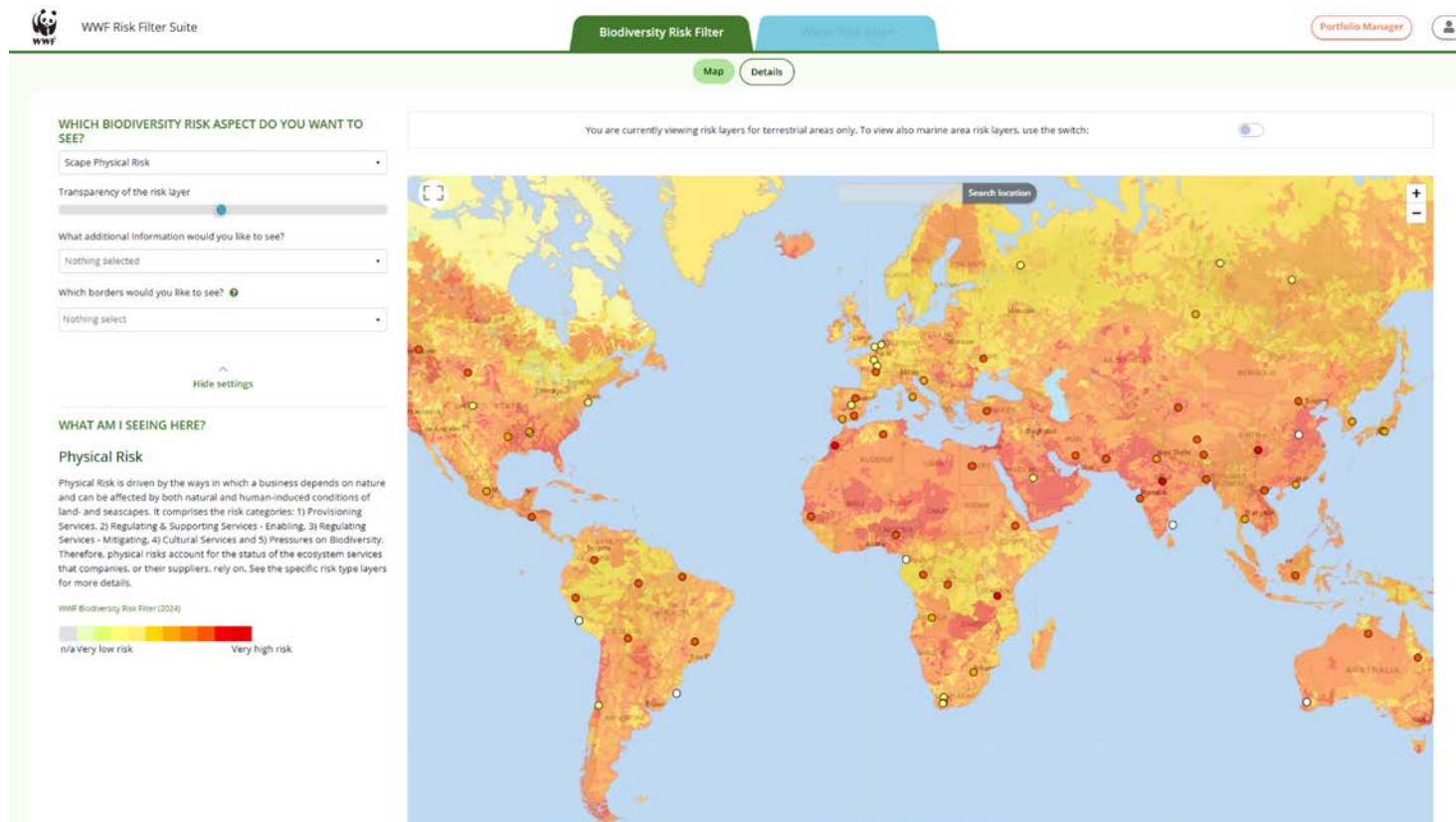
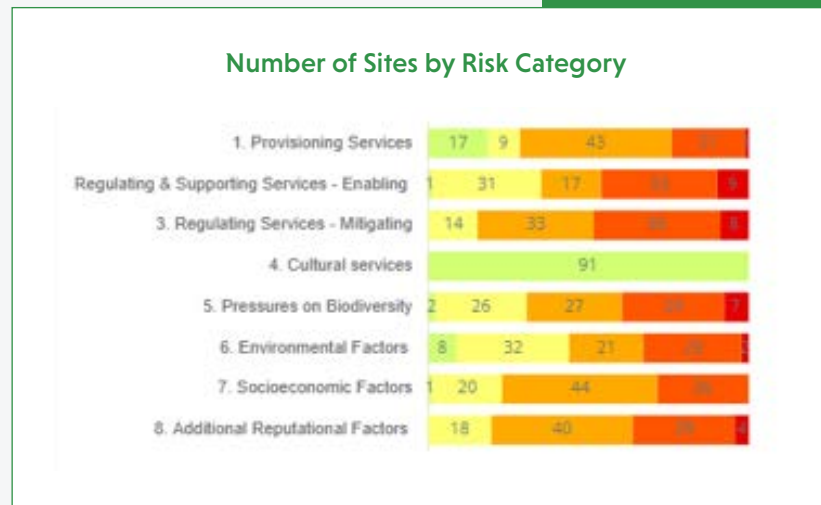
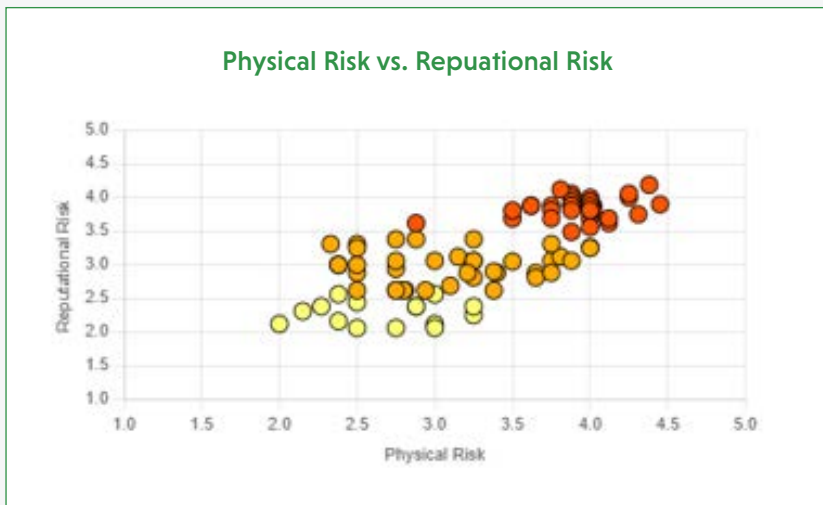
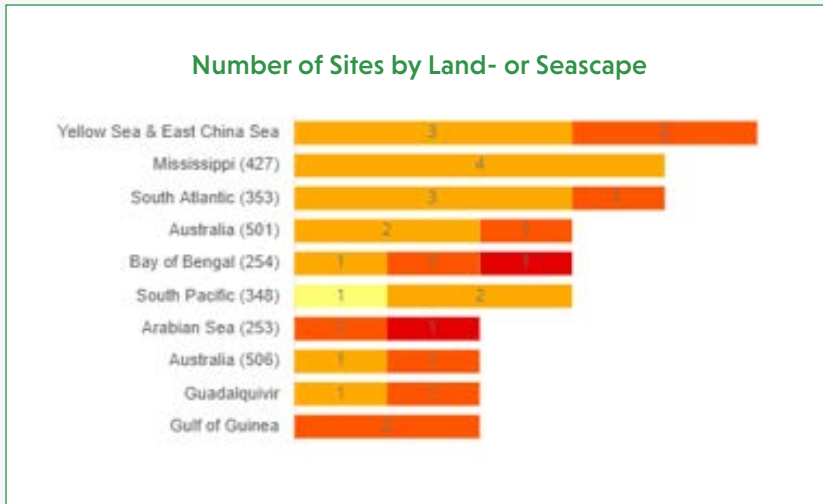


Figure 2. Detailed view of the risk assessment, this includes various output charts/ visual such as the visual for Number of sites by land- or seascape, Number of Sites by risk type, Physical risk vs. Reputational risk, and Number of sites by risk category.



## 5.6 CBF - Corporate Biodiversity Footprint

**The Corporate Biodiversity Footprint (CBF) is designed to assess the annual impact of activities of corporates, FIs, real assets and sovereign entities on global and local biodiversity. This appraisal is based on the impact generated from the products purchased or sold by companies calculated throughout their value chain.**

The CBF models the impact of corporates through five main environmental pressures on species and habitats. These pressures are calculated along the whole value chain of the entity or asset, appraising their processes, products, and supply chains. All pressures are aggregated into scope 1, 2 and 3 according to the definitions and boundaries set forth in the GHG Protocol.

### Organisations and reviewers

The methodology and its ongoing developments are overseen by a scientific committee to ensure the quality and the relevance of the CBF. This committee provides guidance on the key scientific foundations of the methodology, integrates the latest scientific advancements, and ensures alignment with the best available resources and methodologies for assessing biodiversity impacts.

### Current stage of development

**As of 2024, dependency product was updated to include two additional metrics:**

- **ReDES:** Revenue Dependency on Ecosystem Services (ReDES) quantifies this exposure by assessing the share of a company's revenue that is functionally dependent on ecosystem services.
- **AHDS:** This metric provides a condensed view of a company's reliance on ecosystem services (ES), offering an accessible, high-level perspective on exposure to environmental risks.

In 2025, the Invasive Alien Species product was expanded to cover additional sectors in alignment with IPBES recommendations, while the asset map product was enhanced to incorporate corporate assets and evaluate their biodiversity impact.

### Transparency of method

The CBF [methodological guide](#) is available on IDL website as well as some sectoral slides. We also include training session when users are onboarding and access to the ESG support team to answer questions.

### What is the main purpose of this tool?

The purpose of the CBF is to assess the annual impact of a corporate/real asset/Sovereign's activities on global and local biodiversity throughout the value chain.

Additionally, since the CBF is provided across multiple KPIs—including impacts by scope, by pressure, as well as in absolute and relative terms—it serves as a valuable indicator for assessing a company's biodiversity-related risks and identifying their sources. This enables clients to better define exclusion criteria and align their strategies with sustainable finance objectives.

Positive contributions (Reduced Impact and Avoided Impact) of corporates are also available to follow corporates' performance overtime or against a sectoral benchmark.

### What does it measure?

The CBF assesses the annual impact of a corporate/asset/sovereign's activity based on products and assesses their impact on biodiversity throughout the value chain (upstream & downstream). This annual impact also considers the persistence of pressures due to these annual activities across time (time integration). There are no technical limitations to using reported pressure data at company level, only data availability is at stake.

## What input data are needed?

Depends on the data available to be used for the calculation:

- Environmental data reported by companies are considered best.
- If no environmental data are reported, consumption and production data are used to model environmental pressures.
- If only sales are reported, the volumes are modelled using our customised Input/Output.
- When no data is available, a biodiversity footprint is modelled from the sectoral average.

## What other tools are most complementary to this tool?

Tools that gather actual site-specific biodiversity data—biodiversity state, endangered species and others—complement the CBF's datapoints which are based on potential biodiversity impacts modelled through pressure-impact relationships.

## How can the tool be used for TNFD reporting?

The tool has been used in partnership with financial institutions and consultancies for several TNFD Pilots. A public report for one of the pilots is available [here](#).

Further developments and data audit on intermediate datapoints are being carried out to be able to provide TNFD metrics from the TNFD Recommendations by Q4 2024.

## Main strengths and limitations

**Strengths:**

- Coverage: All sectors are covered, including listed and non-public entities. The full universe *IDL Global* encompasses +8500 issuers across all geographies.
- Comprehensiveness: The CBF performs an analysis based on products and assesses their impact throughout the value chain (all scopes) of a corporate, combining

modelled and reported data (data collection from analysts) and other publicly available information.

- Data granularity and quality: more than 2,000 commodities are used to map the activities of companies, and *Data Quality Levels* (DQL) are available for each datapoints to inform on the type of primary data used initially.
- Diversified applications: The tool is suitable for assessing performance at corporate level over multiple asset classes (equity, bonds, Sovereigns) and aggregated financial portfolios, comparing issuers within sectors and for comparing individual incremental impact. It can be used for index creation, portfolio footprint, exclusions, engagement, voluntary or regulatory reporting frameworks.
- Transparent: the methodology and any new developments are supervised by a scientific committee to ensure the quality and the relevance of the CBF.
- Actionable and recognised: The CBF was developed by financial professionals to serve the needs of financial institutions with data solutions that are fit to their constraints (auditability, traceability, scalability).

**Limitations:**

- The CBF currently encompasses terrestrial and freshwater biodiversity; however, marine biodiversity is not yet included.

## What are the costs?

Data access pricing varies based on coverage and the selection of the different climate and biodiversity modules, typically ranging from €20,000 to €120,000. Access to the biodiversity footprint calculator for consultants is available at €5,000 per license.



## Output visuals CBF

The Corporate Biodiversity Footprint (CBF) assessment systematically assesses the footprint of a corporate, a project or an infrastructure through different angles, so that the financial institution can have a direct outlook on the key contributors to the biodiversity footprint across products, pressures and scope.

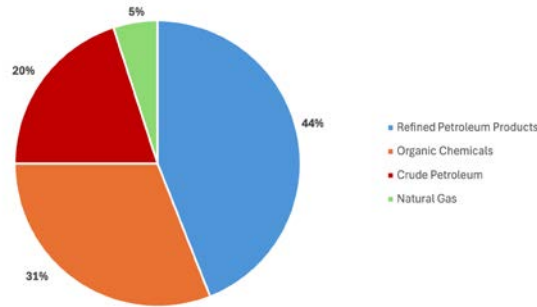
The illustration below is based on the assessment of a listed oil & gas company.

The first graphic displays the breakdown of the biodiversity footprint by the company's main products or services, helping to identify which products pose the greatest biodiversity risk. This is particularly useful when compared to the percentage of sales for each product.

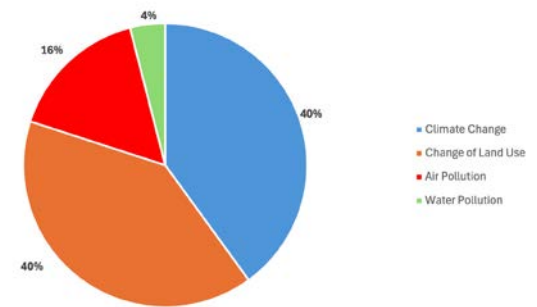
The second graphic illustrates the breakdown of the footprint by major pressures. While land use change is the dominant global pressure on biodiversity, this may vary across sectors and companies. For an Oil & Gas company, for example, climate change pressure—driven largely by the downstream impacts of oil & gas combustion—is also very significant.

The third graphic presents the breakdown of the footprint by scope, highlighting the relative weight of direct versus indirect impacts for each pressure. This is crucial for assessing the materiality of biodiversity risks across the company's value chain.

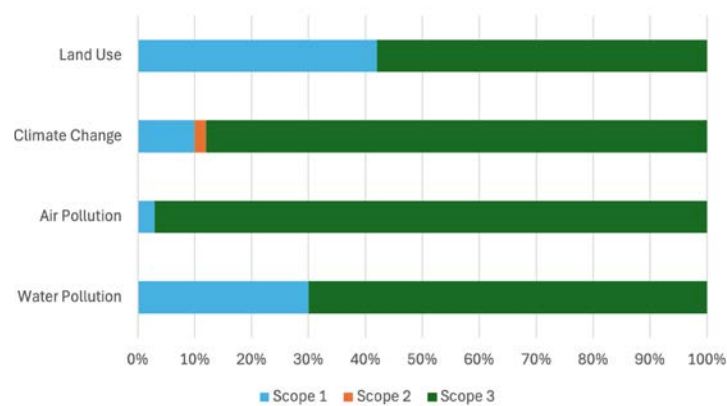
### Distribution of absolute contribution to CBF impact by products



### CBF by pressure



### Distribution of CBF impact by scopes



## 5.7 ENCORE - Exploring Natural Capital Opportunities, Risks and Exposure

Exploring Natural Capital Opportunities, Risks and Exposure (ENCORE) is a free, online tool that helps organisations explore their exposure to nature-related risk and take the first steps to understand their dependencies and impacts on nature. This is presented in the ENCORE Natural Capital Module. ENCORE also contains a Biodiversity Module, which allows users to explore potential alignment of agriculture and mining activities with a nature-positive future.

ENCORE sets out how the economy – sectors, subsectors and activities – depends and impacts on nature. Financial institutions can use data from ENCORE to identify nature-related risks they are exposed to through their lending, underwriting and investment in high-risk industries and sub-industries.

As a sub-section of the tool, the ENCORE Biodiversity Module was developed to help financial institutions explore how to align their investments in the agriculture and mining sectors with important global goals for nature.

With a vision to establish a *global financial system that works for nature and people*, ENCORE is designed to be a useful entry point to nature-related assessment initiatives – such as the risk management and disclosure framework developed by the Taskforce on Nature-related Financial Disclosures (TNFD) – guiding organisations through the early stages of their nature-positive journey, whatever their understanding or prior experience of managing nature-related risks.

### Organisations and reviewers

The ENCORE tool is developed by Global Canopy, UNEP FI and UNEP-WCMC, who together form the ENCORE Partnership, previously known as the Natural Capital Finance Alliance (NCFA).

Global Canopy targets the market forces destroying nature by improving transparency and accountability. They provide innovative open-access data, clear metrics, and actionable insights to leading companies, financial institutions, governments and campaigning organisations worldwide to help them make better decisions about nature, forests and people.

The UN Environment Programme Finance Initiative (UNEP FI) brings together a large network of banks, insurers and investors that collectively catalyse action across the financial system to deliver more sustainable and inclusive global economies.

The UN Environment Programme World Conservation Monitoring Centre (UNEP-WCMC) is a global Centre of excellence on biodiversity and nature's contribution to society and the economy. The Centre operates as a collaboration between the UN Environment Programme and the UK-registered charity WCMC.

### Current stage of development

ENCORE was first launched in 2018. It is maintained and continuously improved by the ENCORE partners. A major set of updates were released in 2024. These were delivered through the Strengthening Understanding and Strategies

of Business to Assess and Integrate Nature (SUSTAIN) project, which aimed to improve, update and validate ENCORE's natural capital knowledge base. This focused on incorporating the latest scientific and empirical research to build ENCORE's knowledge base, and on making improvements to its structure to enhance its usability. The improved knowledge base was released in July 2024.

### Transparency of method

The different sections of the methodology can be accessed through the Data & Methodology tab on the ENCORE [website](#). Registered users can also access and download the knowledge base that underpins the tool.

### What is the main purpose of this tool?

#### 1. Risk management:

- Identify potentially material ecosystem services, natural capital, and pressures for different sectors.
- Identify important mechanisms of change in state that are potentially affecting the portfolio.
- Assess the potential risk of disruption to specific natural capital considerations in specific locations using data in the ENCORE Map section. Sectoral exposure in specific areas can also be investigated.

## 2. Communication and stakeholder engagement:

- ENCORE provides the material needed to effectively communicate the implication of natural capital risks to the portfolio of FIs. This material can inform the next steps FIs wish to take to address these risks.
- By clarifying the links between economic activities and natural capital (be it through dependencies or impacts), ENCORE also helps integrate natural capital into existing risk management frameworks to institutionalise management of natural capital risks.
- ENCORE's biodiversity module can help users identify topics to assess with companies in their agriculture and mining portfolios during engagement discussions.

## 3. Biodiversity target setting and portfolio alignment:

- The ENCORE biodiversity module helps FIs understand how their agriculture and mining portfolios could align with the vision of a nature-positive future, how this might evolve in the future (for mining), the associated biodiversity risks/opportunities, and what actions FIs can take to drive greatest alignment with global biodiversity goals.

### What does it measure?

ENCORE provides information to users on the most pressing potential dependencies and pressures for each economic activity covered by the tool. The improved knowledge base defines ecosystem services based on the System of Environmental-Economic Accounting - Ecosystem Accounting (SEEA-EA), which are:

- Other provisioning services - Animal-based energy
- Biomass provisioning
- Solid waste remediation
- Soil and sediment retention
- Water purification
- Soil quality regulation
- Other regulating and maintenance service - Dilution by atmosphere and ecosystems

- Biological control
- Air Filtration
- Flood control
- Genetic material
- Global climate regulation
- Water supply
- Nursery population and habitat maintenance
- Noise attenuation
- Other regulating and maintenance service - Mediation of sensory impacts (other than noise)
- Local (micro and meso) climate regulation
- Pollination
- Storm mitigation
- Water flow regulation
- Rainfall pattern regulation
- Recreation related services
- Visual amenity services
- Education, scientific and research services
- Spiritual, artistic and symbolic services

The improved ENCORE knowledge base renames "Impact drivers" to "Pressures" for clarity and to be in line with the [Driver-Pressure-State-Impact-Response](#) framework.

The knowledge base assesses the following pressures:

- Disturbances (e.g., noise, light)
- Area of freshwater use
- Emissions of GHG
- Area of seabed use
- Emissions of non-GHG air pollutants
- Other biotic resource extraction (e.g., fish, timber)
- Other abiotic resource extraction
- Emissions of toxic soil and water pollutants
- Emissions of nutrient soil and water pollutants
- Generation and release of solid waste
- Area of land use
- Volume of water use
- Introduction of invasive species

### What input data are needed?

The Natural Capital Module requires users who would like to explore their potential direct dependencies and impacts to select the economic activities they would like to explore.

The Biodiversity Module requires users to either upload a portfolio in CSV format, or – in the case of the agriculture sector – input the country location and cropland/pasture land area of their portfolios. Alternatively, details of turnover can be added instead of hectares of land. For the mining sector, the Biodiversity Module asks users to either upload a portfolio in CSV format, or select company(ies) and country(ies) of interest.

### What other tools are most complementary to this tool?

ENCORE is a first step to understanding and assessing dependencies and impacts. Users are encouraged to delve deeper into their specific contexts, by assessing location-specific data, and other relevant datasets. A complementary tool is the Integrated Biodiversity Assessment Tool (IBAT), which provides geographically explicit information about biodiversity.

### How can the tool be used for TNFD reporting?

ENCORE supports users in the scoping and prioritisation phases. As such, it is one of the most relevant tools for the Locate and Evaluate steps of the Locate-Evaluate-Assess-Prepare (LEAP) approach, specifically L2 and E1-E4. You can find more information on the links between TNFD and ENCORE in a blog post published alongside the TNFD – see [here](#).

## Main strengths and limitations

### Strengths:

- Widely recognised and used tool.
- Recommended by leading corporate frameworks and standards (such as the TNFD, SBTN, and GRI).
- It has been used for macroeconomic analysis and studies worldwide (e.g., the Dutch Central Bank, the French Central Bank, European Central Bank, etc.).
- The knowledge base is backed by scientific literature and reviewed by experts.
- Allows users to identify priorities for further analysis.

### Limitations:

- It does not provide location or company-specific information.
- Further limitations are listed on the ENCORE website's [Limitations](#) page.

## What are the costs?

ENCORE is a free tool, users only need to register to have access to all the functionalities and data.

## Citation

ENCORE is made available under the Creative Commons Attribution-ShareAlike 4.0 International licence (CC BY-SA 4.0). This requires outputs that use ENCORE to be made available under the same licence. It also requires users to ensure that the following citation is always clearly reproduced in any publication or analysis involving the ENCORE materials in any derived form or format:

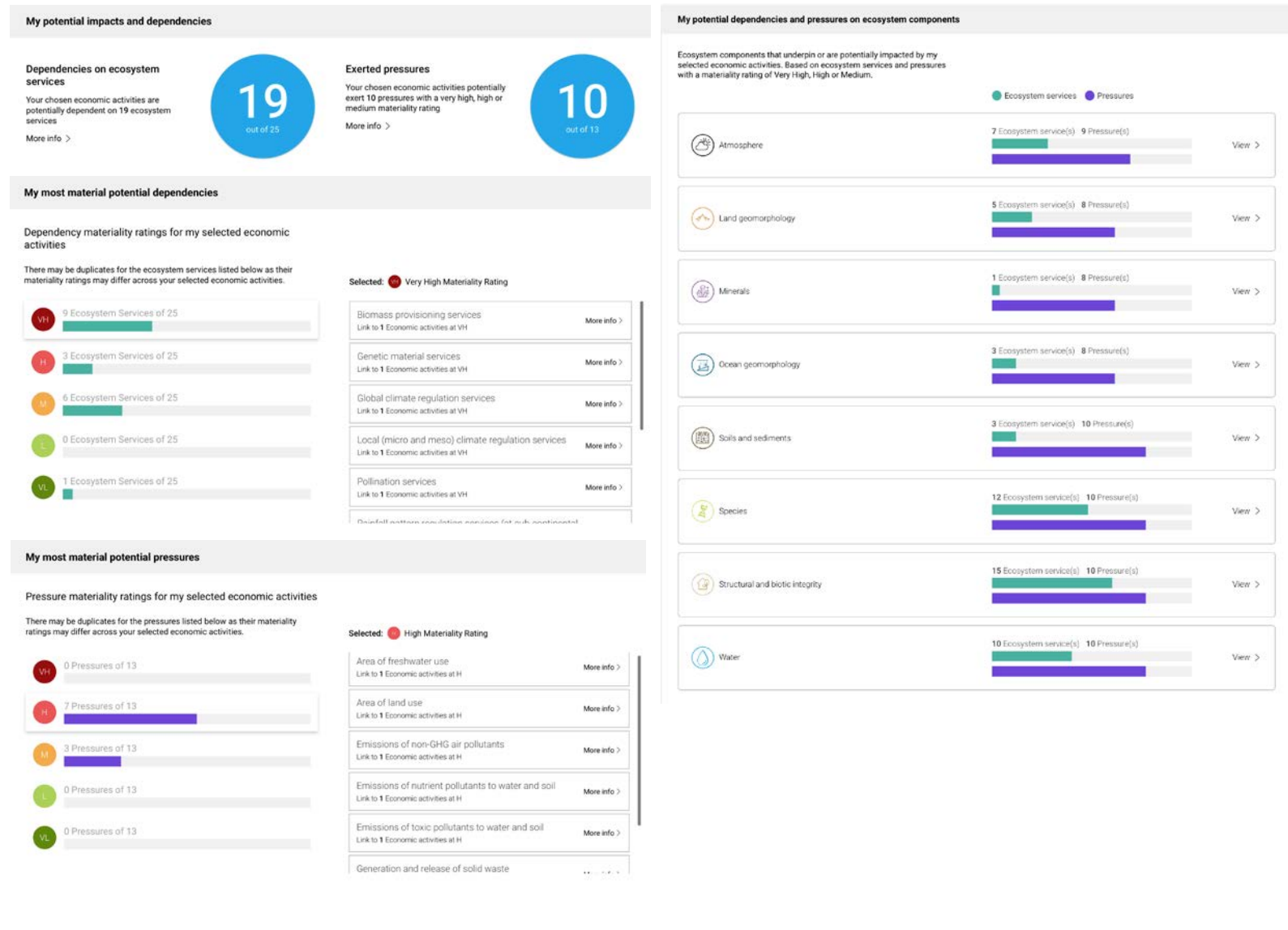
ENCORE Partners (Global Canopy, UNEP FI, and UN-EP-WCMC) (year). ENCORE: Exploring Natural Capital Opportunities, Risks and Exposure. [On-line], [insert month/year of the version downloaded], Cambridge, UK: the ENCORE Partners. Available at: <https://encorenature.org>. DOI: <https://doi.org/10.34892/dz3x-y059>.

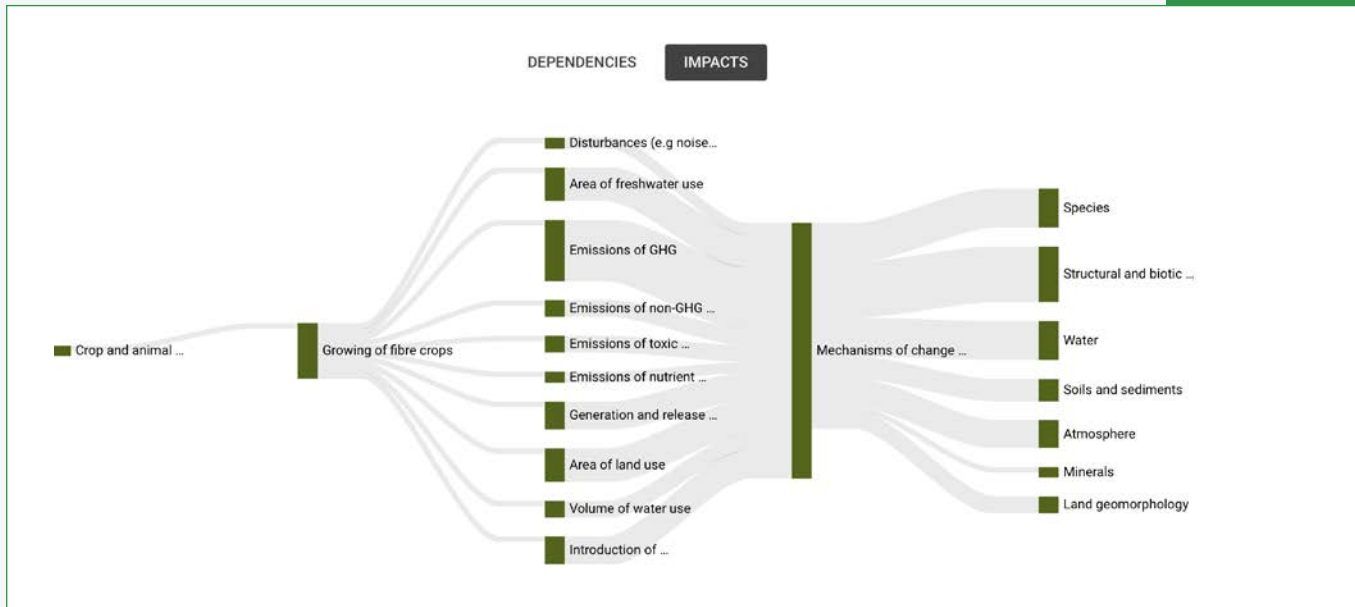
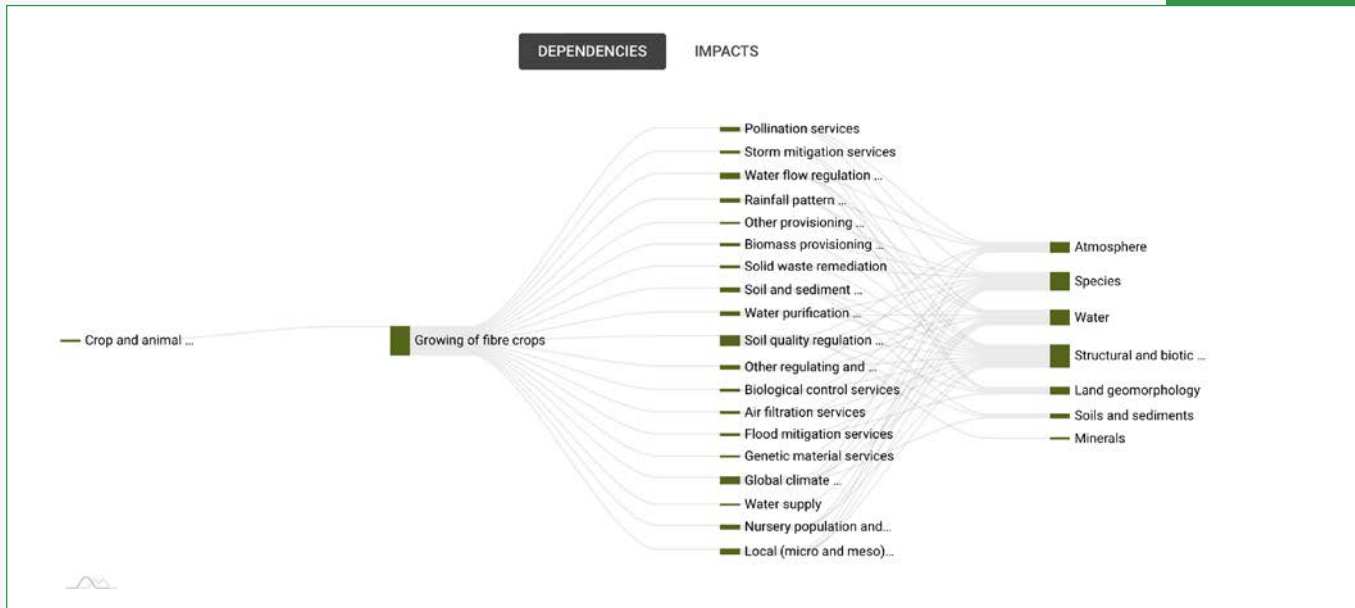


## Output visuals ENCORE

Example of the current Natural Capital module outputs. These are the potential direct dependencies and pressures of the economic activity 'Growing of fibre crops'.

## Overview of Data tab for the ENCORE natural capital module





## 5.8 GBS-FI - Global Biodiversity Score for Financial Institutions

**The Global Biodiversity Score for Financial Institutions (GBS-FI) covers the uses of the GBS for tailor-made solutions for financial institutions, encompassing a wide range of non-listed asset classes. It is a tool based on the GBS, which provides an overall and synthetic vision of the biodiversity impacts and dependencies of economic activities.**

GBS-FI solutions are applications of the GBS methodology to non-listed financial assets, based on data specifically collected for the assets assessed. They can cover a wide range of non-listed assets, through equity and debt: real estate (construction and exploitation of buildings), companies that are not listed on public stock exchanges or even infrastructures. The main difference with listed assets lies in access to the data used for assessing the biodiversity footprint. As public data is not available, data must be collected directly from the financial institution or from the investee. The assessment methods are thus tailored to each need to take into account the specific data availability and the specificity of the assets covered. This tailoring led to developing several approaches to use GBS-FI solutions on non-listed portfolios: Screening, Advanced Screening, and Simplified Biodiversity Footprint Assessment.

### Organisations and reviewers

Just like the BIA-GBS tool, the GBS-FI methodology is developed by a dedicated team in CDC Biodiversité, a subsidiary of the Caisse des Dépôts Group, the French largest public FI. The methodology is periodically reviewed by a scientific committee to guarantee its robustness. The GBS has also developed a Club of Businesses for Positive Biodiversity (B4B+ Club) which acts as a platform for the GBS development (a group of 50+ businesses representing different sectors, including the finance sector).

### Current stage of development

The first GBS-FI analyses were conducted in 2019 for asset managers. Since then, several assessments have been conducted on various asset classes: investments, corporate loans, private equity, real estate loans, etc.

### What is the main purpose of this tool?

The GBS-FI is suitable for calculating the footprint of financial assets, from a single asset to a whole portfolio. Assessments have been conducted on assets ranging from a single investee company to portfolios comprised of hundreds of thousands of lines. These assessments can guide investment decisions and biodiversity roadmaps definition for FI, and also be the basis for engagement policies with investees.

The uses of the assessments are conditioned by the granularity of data used, which determines the precision of results. The GBS-FI can use a mix of data depending on its availability. The difference between BIA-GBS and GBS-FI lies in the type of asset evaluated (BIA-GBS measures only listed assets) and the data used. GBS-FI can assess assets with limited public data, such as companies in private equity or infrastructures.

### What does it measure?

GBS-FI provides an overall and synthetic vision of the biodiversity footprint (measurement in MSA.km<sup>2</sup> of the changes occurring on ecosystem extent and condition) of financial assets (e.g., private equity, corporate loans) considering the full value chain of underlying economic activities (associated

companies businesses). GBS-FI also measures dependencies on biodiversity of the assets. As GBS-FI relies on the GBS methodology, it comes with the same concepts and limitations. It is not intended to replace local indicators which are best suited to local or on-site biodiversity assessments.

The impacts of pressures caused by specific economic activities on ecosystems are quantified, relying on the GLO-BIO model which is based on pressure-impact relationships. The GBS-FI covers the following pressures on biodiversity:

- Land use
- Overexploitation of resources
- Climate change
- Pollution

The impacts related to these pressures can be broken down into sub-pressures and ecosystems (for terrestrial and aquatic ecosystems).

The methodology for measuring dependencies is based on the ENCORE methodology for ecosystem services. GBS-FI provides two types of dependency score for each asset:

- Average dependency score: the average of the dependency score of the asset to each of the 21 ecosystem services covered.
- Critical dependency score: the share of the asset's activity that is critically dependent, i.e., not substitutable, on at least one ecosystem service.

### What input data are needed?

The GBS-FI can work with different datasets listed below, by increasing order of usefulness in terms of the precision that can be expected from the assessments:

- 1 Economic activity data: turnover and purchases by country and industry (of the asset)
- 2 Pressures, resources and emissions data:
  - Commodities, services or refined products extracted or consumed
  - Carbon emissions on scope 1, 2 and 3 (see definition in paragraph 2.2)
  - Land use changes (ideally using GLOBIO's 16 habitat types nomenclature including different use intensity for forests, grasslands, agriculture, etc.)
  - Water withdrawal and consumption by Scope
  - Nitrogen and phosphorous emissions by Scope
- 3 Comprehensive biodiversity direct data: when very detailed ecological monitoring data are available, the Mean Species Abundance can be directly calculated.

The minimal data that can be used by GBS-FI is the amount invested in an asset or an outstanding amount, broken down by sector of activity and country. In that case, the biodiversity footprint assessment is called a screening, as it relies on financial data only.

### How can the tool be used for TNFD reporting?

The GBS-FI can be used for various needs of TNFD reporting. It is especially useful to answer to the LEAP framework of the TNFD, as it can be used for most phases of this framework.

The GBS-FI can be used to inform localised biodiversity stakes during the 'Locate' phase. It includes modules aimed at measuring the level of ecosystem integrity and its speed

of depletion at specific locations, using satellite data. This information can be complemented by additional tools and qualitative analysis. The GBS-FI can entirely answer to the 'Evaluate' phase as its output is a precise measurement of biodiversity impacts and dependencies of an asset or a portfolio of assets. The GBS-FI can inform the 'Assess' phase by providing useful information on which the risk and opportunity analysis can be based. The results of all previous phases, obtained partially or entirely through the GBS-FI, can be the foundation of the answer to the 'Prepare' phase.

### What other tools are most complementary to this tool?

In addition to the biodiversity measurement tool, CDC Biodiversité has developed layers to assess the ecosystem condition in MSA at a local level:

- The MSA Land use layer combines land cover satellite data, the most up-to-date scientific datasets on land-use management practices and pressure-impact relationships from the GLOBIO 3.5 model to map the impacts of land use on biodiversity. The map measures biodiversity in terms of Mean Species Abundance (MSA) for each grid cell, reflecting the remaining biodiversity in that location. The MSA land use layer incorporates a wide range of land management practices and identifies 15 different land use types (notably distinguishing between intensive and extensive agriculture and different types of forestry).
- The freshwater MSA layer for the hydrological disturbance pressure displays the impact of flow alterations induced by human activities on freshwater ecosystems. One map provides those accumulated negative impacts, highlighting highly degraded areas, and another one reflects the periodic biodiversity losses caused by hydrological disturbances.

By identifying areas with high or rapidly declining ecosystem integrity—across both terrestrial and freshwater environments—these layers directly support the TNFD framework by helping organisations locate operations in biodiversity-sensitive zones. They also enable businesses to make informed sourcing decisions, for example when supplier land management practices are unknown or uncertain.

For a more complete picture of corporates' impacts on biodiversity, GBS-FI could be complemented with geolocated data on endangered species or habitats (e.g., through IBAT) if asset locations are known.

### Main strengths and limitations?

#### Strengths:

- Scientifically well underpinned (best available knowledge and tools e.g., GLOBIO, EXIOBASE).
- Quantitative (and scientifically robust) link between pressures and impacts.
- Covers terrestrial and aquatic biodiversity.
- Differentiates past and new impacts.
- Can be spatially explicit.
- Covers most drivers for biodiversity loss.
- Covers all industry sectors and all countries.
- Compatible with site-level data (micro) and international objectives (macro).
- Biodiversity input data (MSA, pressure – impact relationships) based on extensive meta-analysis which continuously allows for adding new studies.
- Will allow for introducing weight factors differentiating ecosystem condition based on protection regime, protected species, etc.

**Limitations:**



- Pressure-impact relationships in the GLOBIO model are biased towards the most studied species and ecosystems.
- Marine biodiversity is not factored in, but work is underway to develop a screening methodology of the impacts on marine biodiversity.
- Invasive species and soil degradation are not factored in yet; overexploitation is factored in only partially.
- Remaining shortcomings in reallocation rules (i.e., linking pressures to economic activities).

**What are the costs?**

GBS-FI costs vary according to the approach chosen:

- Screening: €25-35,000
- Advance screening: €35-45,000
- Simplified Biodiversity Footprint Assessment: €15-30,000 for companies, €15-40,000 for infrastructures (on top of a cost to develop a sector-specific or infrastructure-specific methodology)

A detailed overview of the range of cost and business applications of each approach is provided below.

	BIA-GBS	GBS-FI – Loans and Equity		
				
TYPE OF ASSESSMENT	Screening	Advanced Screening	Simplified Biodiversity Footprint Assessment	
Asset class	Listed corporates (equities and bonds), sovereign bonds	All types of portfolios	Real estate, private companies, project finance	Infrastructure, private companies (Small to mid-caps)
Data collected by the end-user	ISIN and invested amounts	Sector and country of the financing Outstanding or investment amount Turnover, EVIC	Screening data + Less than 20 portfolio-specific physical indicators <sup>(1)</sup> (GHG, land occupation, raw materials...)	Screening data + Less than 100 refined physical indicators (GHG, land occupation, raw materials...)
Cost of the assessment	Subscription with annual fee	~25-35k€	~35-45k€	~15-30k€ / company ~15-40k€ / infrastructure <sup>(2)</sup>
Time required to obtain impacts and dependencies	Immediate (access to a database)		3-5 months <sup>(3)</sup>	
Needs addressed	<ul style="list-style-type: none"> <li>• Identification of hotspots of sectoral impacts and risks: key sectors and/or issuers for further analysis</li> <li>• Ground for engagement with corporates</li> </ul>	<ul style="list-style-type: none"> <li>• Identification of best-in-class players</li> <li>• Monitoring of portfolios' biodiversity performance</li> </ul>	<ul style="list-style-type: none"> <li>• Identification of hotspots of impacts</li> <li>• Definition of action plan for the issuer</li> </ul>	
Business applications			<ul style="list-style-type: none"> <li>Assessment of current biodiversity performance BA 1</li> <li>Assessment of future biodiversity performance BA 2</li> </ul> <p><small>N.B. The Advanced Screening approach provides only a partial response to BAs 1 and 2, while the Simplified Biodiversity Footprint Assessment approach is more suited to addressing these BAs.</small></p>	
			Tracking progress to targets BA 3	
			Comparing options BA 4	
			Assessment / rating of biodiversity performance by third parties, using external data BA 5	
			Screening and assessment of biodiversity risks and opportunities BA 7	

(1) Physical Indicators, or input data Indicators, are the different types of data to be collected. For example, if commodities quantities are collected, each commodity type is considered as a physical indicator. Core indicators number aim to stay below 100 but it may vary based on the use case: more than 3,000 products can be covered by the Global Biodiversity Score and this granularity can prove valuable for assessing some sector.  
 (2) on top of a cost to develop a sector-specific or infrastructure-specific methodology  
 (3) depending on the sector, the amount of data on hand for the assessment and the availability for data collection

Figure 6: Multi-purpose biodiversity assessments provided by the GBS for the financial sector: from databases to tailor-made solutions for various asset classes, data granularities, and ranges of cost. Business applications from Lammerant (2022)

### Overview of the coverage of the assessment

#### CASE STUDY

**Footprint use category:** Corporate and portfolio **Assessment time:** 2018

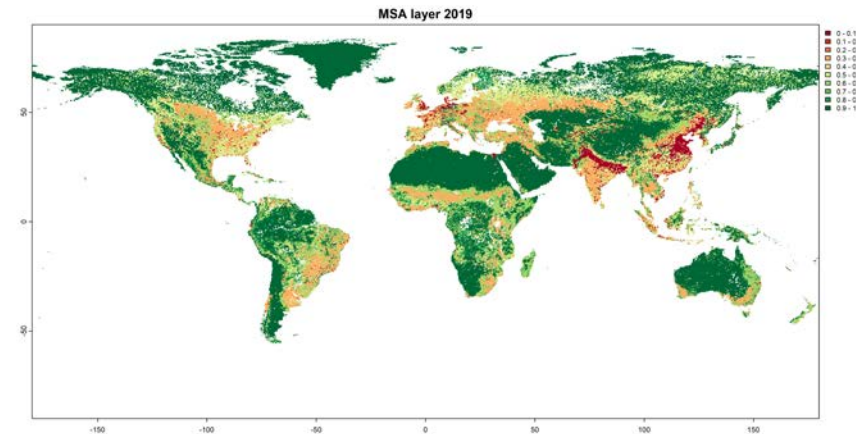
**Business application:** Assessment / rating by and for third parties with external data

#### Perimeter

	LUEFN Pressures	CC Pressure	Aquatic Pressures
Scope 1	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Scope 2	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Scope 3	Tier 1	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	Rest of value chain	<input type="checkbox"/>	<input type="checkbox"/>
	Downstream	<input checked="" type="checkbox"/>	<input type="checkbox"/>

Asset owner     Evaluated companies

### Overview of the MSA Land Use Layer



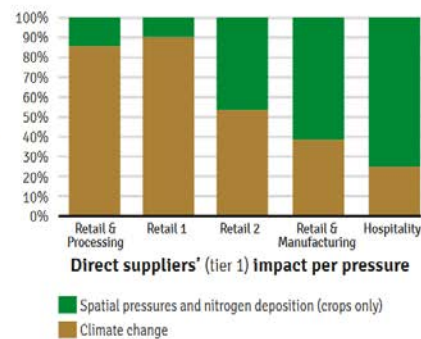
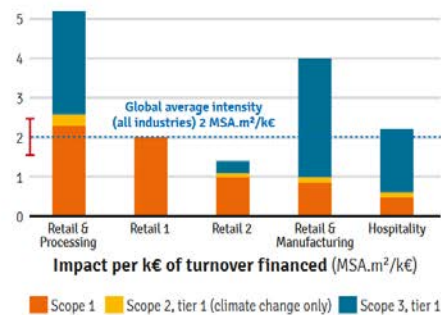
### Overview of the results of the assessment, in absolute impact and in intensity of impact

#### RESULTS

Results for the whole portfolio and for the five most impacting companies

**Total Dynamic footprint**  
**0.057 MSA.km<sup>2</sup>**  
 or about 8 soccer fields

**Total Static footprint**  
**4.8 MSA.km<sup>2</sup>**  
 or about the first ten "arrondissements" of Paris



(source: GBS calculations, November 2018)

## 5.9 **GID – Global Impact Database**

The [Global Impact Database \(GID\) biodiversity model](#) is a quantitative biodiversity impact database, built on 10 years of experience in impact measurement. It is used by organisations to understand, report and act on the impact of their portfolios. It specialises in integrating insights from a variety of data sources, geographic and sector granularity, including emerging economies and the agricultural sector, and an innovative value chain representation.

### Description and steps

The GID biodiversity model measures the biodiversity impact caused by five main pressures: contribution to climate change, air pollution, water pollution, water use and land occupation.

Emission pressures (contribution to climate change, air pollution and water pollution) and water use are calculated on company or country-sector level using company disclosures and several multi-regional input/output-databases combined. Land occupation is calculated on a country-sector level based on cross-referencing of Geographic Information System (GIS) datasets on biome cover, biodiversity state and crop productivity. GID relies on both ReCiPe and GLOBIO for pressure-impact modelling. Trade data from Global Trade Analysis Project ([GTAP](#)) is used to attribute biodiversity impact across economic activity in different sectors and countries. The GID method attributes impacts on biodiversity to companies based on their responsibility within the value chain. Companies with a higher added value are deemed to have a higher responsibility. In this way, both up- and downstream impacts are covered without double counting. This means that the impact arising from an investment in the electricity

sector will be included in the impact arising from an investment in the coal sector, since they share value chains, but the two can be aggregated without double counting.

Biodiversity loss is measured in hectares of pristine nature-equivalents. Monetized results representing the value of ecosystem services loss are also available, using [True Price monetization factors](#). This presents the value of nature lost in a way that is easy to understand and allows for comparison with financial metrics and other monetized impact metrics.

### Organisations and reviewers

The Impact Institute has developed a standardised approach for organisations to quantify their impacts in a collaboration with Harvard Business School, Singapore University, and Erasmus University Rotterdam, called the [Impact Weighted Account Framework](#). They aim to create a common impact measurement and valuation approach tailored to banks by collaborating with ABN AMRO, Caixa bank, Danske Bank, DBS, UBS, and Harvard Business school in the [Banking for Impact](#) initiative. Impact Institute is a spin-off of [True Price](#), which is a global leader in the field of true cost accounting and true pricing.

GID is based on more than 10 years of experience in impact measurement and builds on True Price's [Natural Capital Methodologies](#), developed in collaboration with Wageningen Economic Research. The development process is subject to a strict internal validation process, assuring internal consistency as well as alignment with external methodologies.

### Current stage of development

The GID Biodiversity model is available for use by FIs. Upcoming developments include:

- The addition of a tool to automate the combination with investment data
- Coverage of new biodiversity pressures
- Extension of company-level data

### Transparency of method

A description of the [GID methodology](#) is available online. [The True Price monetisation factors and Natural Capital methodologies](#) are also available online.

### What is the main purpose of this tool?

GID Biodiversity is a data tool to help FIs quantify and understand the biodiversity impact of investments and portfolios based on exposure to sectors and countries. It can be provided with advisory services and biodiversity training to build self-sufficient internal biodiversity capabilities. It allows users to identify biodiversity drivers at a high-level or to dive into specific portfolio constituents. The model covers a wide range of asset classes. The results are available in monetary units to allow comparison with financial metrics and other monetized impact metrics. The model covers the full value chain (scopes 1, 2 and 3). Results can be aggregated to provide a view on value chain biodiversity impact without overestimating it within portfolios (no double counting).

As a footprinting tool, GID Biodiversity is based on industry averages derived from global input-output (MRIO) databases for trade and value chain data and relies on biodiversity models such as ReCiPe and GLOBIO for emissions data and land occupation metrics. When company reported data and/or revenue data is available, the resulting estimates of potential impact can be further refined. In fact, by integrating the country-sector level approach with more accurate data on pressures and companies' operations, impact results are more closely aligned with actual impacts.

### What does it measure?

The tool measures the current and future yearly biodiversity impacts attributed to an investment, looking at direct, upstream and downstream impact. Results are expressed either in biodiversity-hectares (based on PDF.m<sup>2</sup> or MSA. ha), or in monetary value. The biodiversity impact of the global economy is attributed over value chains. This means that the responsibility of biodiversity loss is shared between value chain participants, where companies and sectors with higher added value are attributed more responsibility. The

methodology avoids double counting, meaning that the attributed impact of all companies sums up to the global biodiversity loss.

Some impacts (solid waste, noise and light disturbance, other natural resource extraction, and alien invasive species) are only measured in a qualitative way.

Individual biodiversity pressures are measured and can be reported separately, either at impact level (e.g., Air pollution) or at the level of the underlying indicators for each impact (e.g., NH<sub>3</sub>, NMVOC, NO<sub>x</sub>, SO<sub>2</sub>, etc.). The output of each pressure can be presented either in monetised or non-monetised units.

The tool also integrates dependencies. The approach used to measure dependencies is based on the ENCORE database and methodology, and evaluates how economic sectors, subsectors, and production processes rely on ecosystem services.

### What input data are needed?

GID Biodiversity impact estimates are mapped to portfolios to measure biodiversity impact. Data on portfolio companies and sectors are required to map to GID. GID can be combined with lending or investment data such as invested amount and clients' revenues to calculate portfolio impact.

If bottom-up data on investments and pressures are available, this can be used to refine estimates (e.g., exposure to specific regions, biomes, crops, sectors, emissions to air and water, water use data, land use data, MSA measurements).

GID can also be used for impact accounting at sector or country level without further data input.

### What other tools are most complementary to this tool?

For a more complete picture of corporates' impacts on biodiversity, GID could be complemented with geolocated data on endangered species or habitats (e.g., through IBAT) if asset locations are known. Furthermore, GID could be complemented with more detailed company data on land use (e.g., for taking into account company specific good practices).

### How can the tool be used for TNFD reporting?

GID Biodiversity allows to identify, quantify, and assess the most material nature-related issues across any investment portfolio, making it possible to apply the TNFD's LEAP (Locate-Evaluate-Assess-Prepare) approach.

Specifically, the tool can be used as a base for Locating and Evaluating key drivers of biodiversity loss across the asset side of any balance sheet provided by a FI. By being asset-agnostic and covering all countries and sectors globally, it allows for scalable analyses of asset portfolios of any kind. Impact Institute's in-house advisory team complements the GID-based analyses with a focus on dependency pathways, on assessing the most material biodiversity impacts that have been scoped, as well as on further deep dives into relevant sectors, regions, or biodiversity pressures.

Finally, Impact Institute provides a complementary suite of reporting and strategic advisory services that support the final steps of the LEAP methodology, focusing on risks and opportunities in connection with the FIs internal processes.

Following the latest publications of the TNFD Recommendations, Impact Institute published a TNFD Case Study detailing how GID can feed into the application of the LEAP methodology for FIs. More information can be requested through [data@impactinstitute.com](mailto:data@impactinstitute.com). Impact Institute is also a member of the TNFD Data Catalyst working group.

## Main strengths and limitations

### Strengths:

- Wide coverage of industry sectors and countries (including wide coverage of emerging markets).
- Crop-specific and spatially-explicit layers available.
- Easy to measure the impact of a portfolio or the impact attributable to an investor or loan provider.
- Can produce biodiversity estimates with limited or extended data input.
- Includes scope 1, 2 & 3 (upstream and downstream) biodiversity impact.
- Double counting is avoided when attributing over the value chain, allowing for aggregation of results.
- Monetisation allows comparison of biodiversity impact with other impacts and financial metrics.
- Combines multiple databases and state of the art models (such as ReCiPe or GLOBIO) to get the best estimates.
- Part of a toolbox for broader impact reporting and impact-weighted accounts, beyond biodiversity impact analysis.

### Limitations:

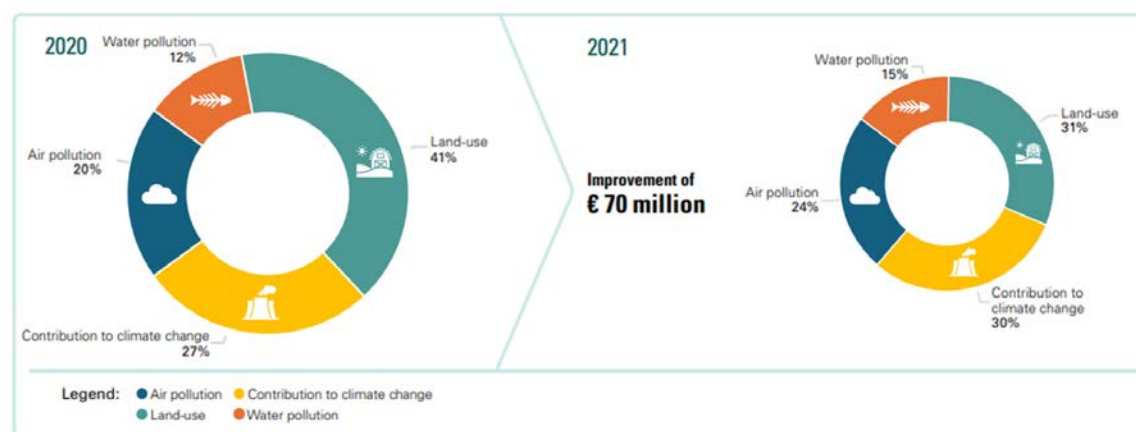
- Represents an estimate of impact rather than actual impact.
- In the current version, pressures that are not considered due to data availability include impact of climate change on marine ecosystems, invasive species and chemicals.
- Some of the limitations of the data provided by third parties will remain in the final estimate.
- Biodiversity loss in the same biome has equal weight, independently of whether species and habitats are more or less endangered and rare.

## What are the costs?

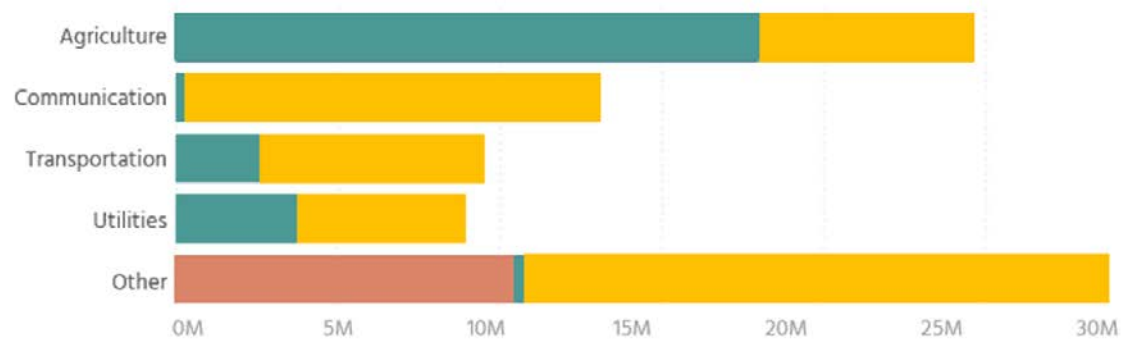
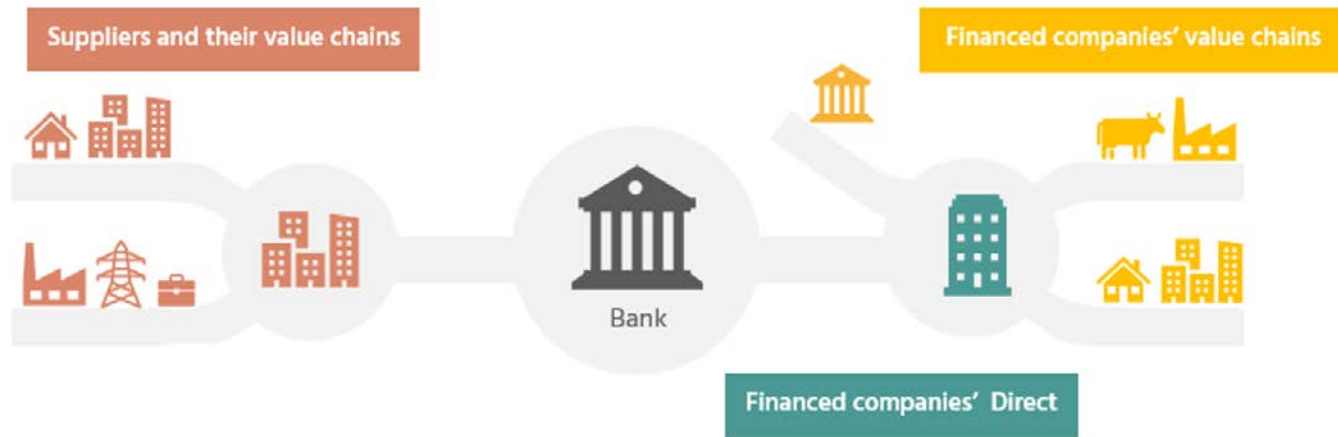
The GID data can be acquired directly or be purchased alongside Impact Institute advisory services or as part of an Impatec subscription. Fees depend on whether additional advisory or data is required (e.g., assistance in analysis and reporting), the amount of data (e.g., number of pressures requested), company size (e.g., AuM), and whether custom additions are required (e.g., enhanced granularity sectors made specifically for a portfolio).

## Output visuals GID

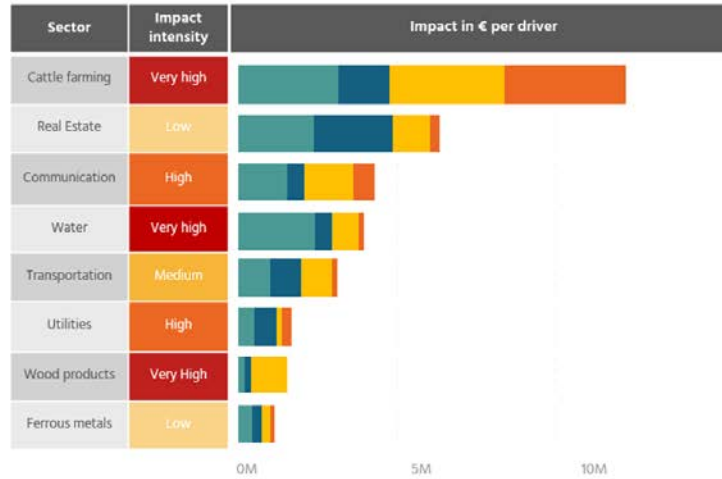
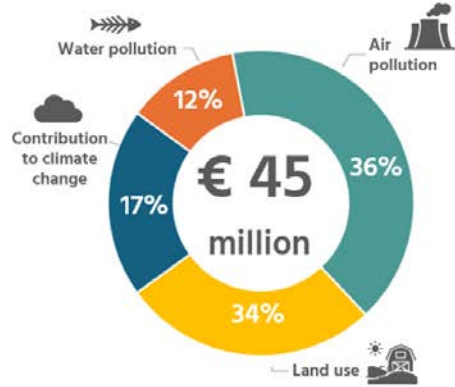
### Biodiversity impact breakdown by pressure: year-to-year comparison



## Impact on biodiversity loss per sector and value chain step

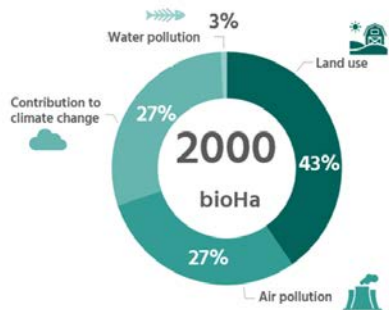


## Biodiversity impact by investment sector and biodiversity pressure – Monetised

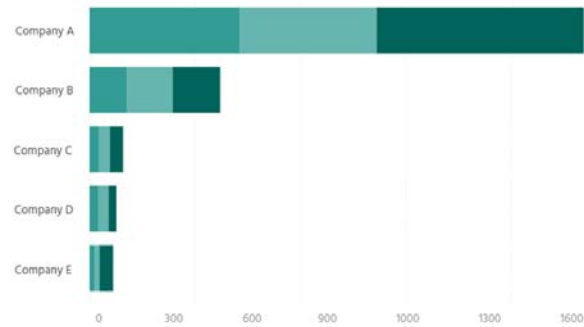


## Biodiversity footprint by company and biodiversity pressure – Non-monetised (bio-hectares)

Attributed footprint (bioHa) impact – portfolio level



Attributed footprint (bioHa) impact per company



## 5.10 GIST Impact Nature & Biodiversity Suite (NBS)

The GIST Nature & Biodiversity Suite (NBS) of tools – Global Biodiversity Footprint, Sensitive Location Assessment, and DIRO Analysis – provide financial institutions with comprehensive, actionable intelligence for nature-positive strategies and actions. Impacts, dependencies, risks, and opportunities are quantified and contextualised in alignment with TNFD, CSRD, SBTN, and all major nature frameworks, from the level of individual assets up to global portfolios.

### GIST Impact Global Biodiversity Footprint (GI-GBF)

The [GI-GBF](#) calculates the biodiversity impacts and trends of a company's direct operations and value chain, using spatially normalized metrics that enable meaningful comparisons across global portfolios. The GI-GBF implements the peer-reviewed LC-IMPACT methodology end-to-end to quantify location specific biodiversity impacts of eight environmental pressures on terrestrial, freshwater, and marine ecosystems. The outputs are expressed in Potentially Disappeared Fraction (PDF) of global species, also known as Species Extinction Risk, as well as Land Conversion Equivalent (km<sup>2</sup>). GIST Impact offers pre-calculated GI-GBF values for over 17,500 public corporates, from 2016 to present, as well as on-demand calculations for any asset type.

The GI-GBF uses company operational data to determine how business activities affect species extinctions. The main strengths of the approach are that it is company-specific, location-specific, based on operationally relevant data, applicable to a broad range of environmental pressures and biomes, intentionally designed for global comparisons, and scientifically transparent and robust. GIST Impact's corporate database represents 98% of investible companies by value, and impacts can likewise be calculated for non-listed assets with minimal inputs.

The inputs to the GI-GBF tool are physical quantities of environmental pressures, such as mass of GHG emissions or pollutants, volume of water consumption, and area of land use. Importantly, these pressures represent operationally relevant metrics that can be actively managed by businesses. The location where these pressures occur is also critical to accurately estimate biodiversity impacts. Exact locations of company operations are used whenever possible, otherwise approximate locations (e.g., country) are determined based on disclosures, third-party sources, or proxy data. The same types of inputs are used for upstream and downstream value chain GI-GBF calculations. Given that company-specific value chain data is generally unavailable, EXIOBASE is used to estimate pressure quantities and locations (country-level) for the value chain based on detailed analysis of corporate business activities and locations.

GI-GBF covers seven major categories of environmental pressures: Land use, GHG emissions, water use, non-GHG air pollutants (multiple), water pollutants (multiple), soil pollutants (multiple), and waste. The biodiversity impact of these pressures is segmented by terrestrial, freshwater, and marine biomes. Qualitative evaluation of additional pressures including invasive species, noise and light disturbances, freshwater use change, ocean seabed use, and resource extraction is provided via the GIST Impact GI-DIRO tool.

A unique benefit of the underlying LC-IMPACT methodology is that the output metric, global PDF, is a measure of species extinction risk. Avoiding extinctions is the fundamental goal of biodiversity preservation efforts, and yet no other broadly adopted footprinting model provides extinction risk as the primary outcome metric. Furthermore, the LC-IMPACT model has been peer-reviewed in its entirety, is cited hundreds of times in scientific biodiversity studies, and is publicly available. GI-GBF also provides end-to-end transparency with access to input pressure data, data sources, data quality flags, geographic apportioning, and extensive documentation.

This means that GI-GBF users can understand biodiversity impacts from the company to portfolio level, pinpointing which pressures and locations are affecting specific ecosystems, tracking performance over time and in comparison to peers and benchmarks. These insights are highly actionable because they directly relate to company operations, and impacts are quantified in terms of species extinction risk, the most important biodiversity outcome.

## Organisations and reviewers

The GI-GBF tool is based on the peer-reviewed, widely cited, open access LC-IMPACT methodology (Veronesi F, Hellweg S, Antón A, et al. LC-IMPACT: A regionalized life cycle damage assessment method. *J Ind Ecol.* 2020; 24: 1201–1219. <https://doi.org/10.1111/jiec.13018>). The authors of LC-IMPACT are broadly recognized as the most prominent and influential LCIA researchers, with over 100,000 scientific citations collectively.

GI-GBF was developed in alignment with TNFD guidance for biodiversity footprinting and was cited as an example methodology in the TNFD Discussion paper on Biodiversity footprinting approaches for financial institutions, December 2023, with example applications for two financial institutions. GI-GBF is also strongly aligned with the Partnership for Biodiversity Accounting Financials (PBAF) Biodiversity Footprinting Standard (2024).

## Current stage of development

The GI-GBF tool is ready and is in active use by financial institution and corporate customers of GIST Impact. Pre-calculated corporate data is available via secure download, API, or the GIST Impact online portal. The impacts of privately held assets can be calculated on-demand via API or in batch.

## Transparency of method

Every aspect of the GI-GBF method is accessible and transparent to users. The LC-IMPACT methodology and sensitivity coefficients, aka characterization factors, are publicly available (<https://www.lc-impact.eu/>). GIST Impact documentation clarifies all model decisions made in implementation of LC-IMPACT, such as the choice of impact horizons and included pressures. All GI-GBF inputs are provided to users, including the physical quantities of

environmental pressures and geographic apportioning of these quantities, as well as source and quality indicators for every data point. Furthermore, disclosed data points can be traced back to specific pages of source reports via online portal or API.

## What is the main purpose of this tool?

The main purpose of the GI-GBF is to calculate the scientifically robust biodiversity impact metrics for a company's operations and value chain that can be aggregated across a portfolio of companies to determine relative or cumulative biodiversity impacts. The tool also helps identify material drivers of biodiversity loss (in alignment with IPBES drivers). In the case of portfolios, the tool can identify which companies, drivers, and geographies are contributing to overall impacts for the purpose of managing impacts and enabling disclosures.

## What does it measure?

The tool measures species extinction risk attributable to the direct operations and value chain of a company. Impacts are segmented by affected ecosystems, environmental pressures, and location. Affected ecosystems include terrestrial, freshwater, and marine biomes. Environmental pressures include land use, water consumption, GHG emissions, non-GHG air pollutants, water pollutants, land pollutants, and hazardous and non-hazardous waste. The location accuracy of pre-calculated impacts is typically country level, with sub-country accuracy coming in 2025. On-demand impact calculations with user-provided data is available at 1 km spatial resolution. Species extinction risk is calculated in terms of global PDF. Impacts are also characterized in terms of Land Conversion Equivalence (km<sup>2</sup>), which is the area of land transformation from natural to urban conditions that would result in an equivalent negative impact on nature as the actual PDF.

## What input data are needed?

For analysis of companies in the GIST Impact corporate database, GI-GBF users simply provide a company identifier, e.g., ISIN, to access detailed impact data for all covered environmental pressures and ecosystems from 2016 to present. A list of company identifiers and corresponding weights can be input to accomplish sector- and portfolio-level analysis.

For on-demand calculations, the minimum data needed for GI-GBF are the pressure quantities (e.g., tonne of GHG, km<sup>2</sup> of land use, kg of pollutant) and location. Impacts can be calculated for one or more pressures, at scales from individual physical locations up to multinational corporates. If pressure data is unavailable for one or more categories, company sector, location, and financial data can be used to estimate values using robust machine learning models derived from our extensive database of disclosed information. Note that data provided for on-demand calculations remain proprietary and are never exposed to other users or used for product development.

## What other tools are most complementary to this tool?

The ENCORE Pressures linkages and materiality ratings offer a useful starting point for users to identify which aspects of a company's operations are commonly associated with environmental pressures. GI-GBF provides quantitative, location specific impact metrics that significantly enhance the qualitative, sector-based information provided by ENCORE.

The GIST Impact Sensitive Location Assessment and Mapping (GI-SLA) and GI-DIRO tools complement GI-GBF impact measurements with a complete view of detailed location analysis, dependencies, impacts, and opportunities aligned with guidance from TNFD, CSRD, SBTN, and other nature frameworks.

## How can the tool be used for TNFD reporting?

As with all components of GIST Impact's Nature and Biodiversity Suite, the GI-GBF is intentionally designed for alignment with TNFD.

In practice, the biodiversity impacts quantified by GI-GBF can be used to support critical steps of the TNFD LEAP process. In the Locate phase, GI-GBF impact metrics are used in step L2 to identify potentially material sectors, value chains, and direct operations. For the Evaluate phase, GI-GBF supports impact quantification in step E3 and impact materiality analysis in step E4. In the Assess phase, the location and ecosystem specificity of GI-GBF is used to identify transition risk mitigation opportunities in step A1, to measure and prioritize the magnitude of these risks in step A3, and to determine the materiality of risks and opportunities in step A4. Impact metrics specific to companies and locations support asset tagging approaches as recommended in TNFD Risk Assessment Methods, Annex 4. The GI-GBF tool is particularly valuable in the Prepare phase for setting actionable nature goals and targets in step P2, given that the GI-GBF output metric of species extinction risk is a primary objective of biodiversity management efforts.

## Main strengths and limitations

### Strengths:

- Based on the widely accepted and credible LC-IMPACT methodology.
- Estimates global Species Extinction Risk (not simply localised impacts) by accounting for geographic distribution of species and ecosystems.
- Impacts are forward-looking, anticipating future effects of current and past actions.
- Quantifies biodiversity impact for terrestrial, freshwater, and marine ecosystems.
- Pressure data inputs and calculated impacts are company and location specific.

- Covers direct operations, upstream, and downstream value chains.
- Covers all industries and locations globally.
- The output metric of PDF is broadly adopted for business applications.
- Required input data is widely disclosed by corporates.
- GIST Impact's database of over 17,000 companies offers global market coverage.

### Limitations:

- Portfolio analysis depends on company disclosed information.
- The methodology does not yet include pressures for invasive species, ocean use, noise and light disturbances, or plastic pollution.
- As with all LCIA footprinting methods, metrics describe aggregate impacts, not effects on particular species.
- Calculated biodiversity impacts from environmental pressures are modeled, not observed. This is comparable to how the climate impacts of an individual company are modeled based on its GHG emissions, not directly measured in climate observations.
- All calculations are dependent on data availability; Impacts for toxicity and land transformation (e.g., deforestation) can be calculated for corporate customers who provide the relevant inputs, though this information is not generally publicly disclosed.

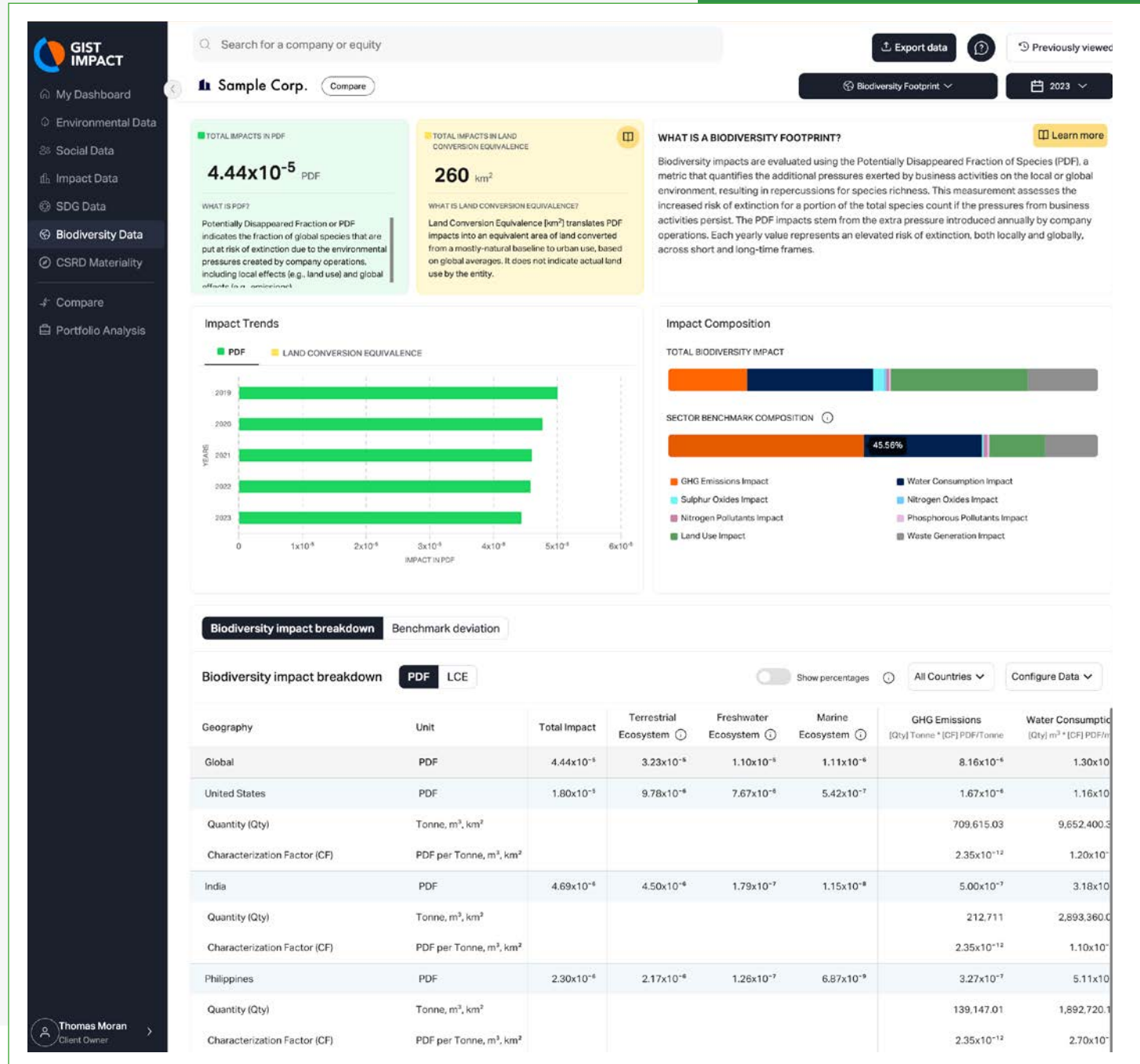
### What are the costs?

Financial Institutions: Annual license includes impact metrics and underlying input data (environmental drivers, geographic apportioning, characterisation factors) for companies in the GIST Impact corporate database; cost varies by portfolio size and packaging with complementary offerings (GI-SLA, GI-DIRO). Cost Level H (> €10,000)

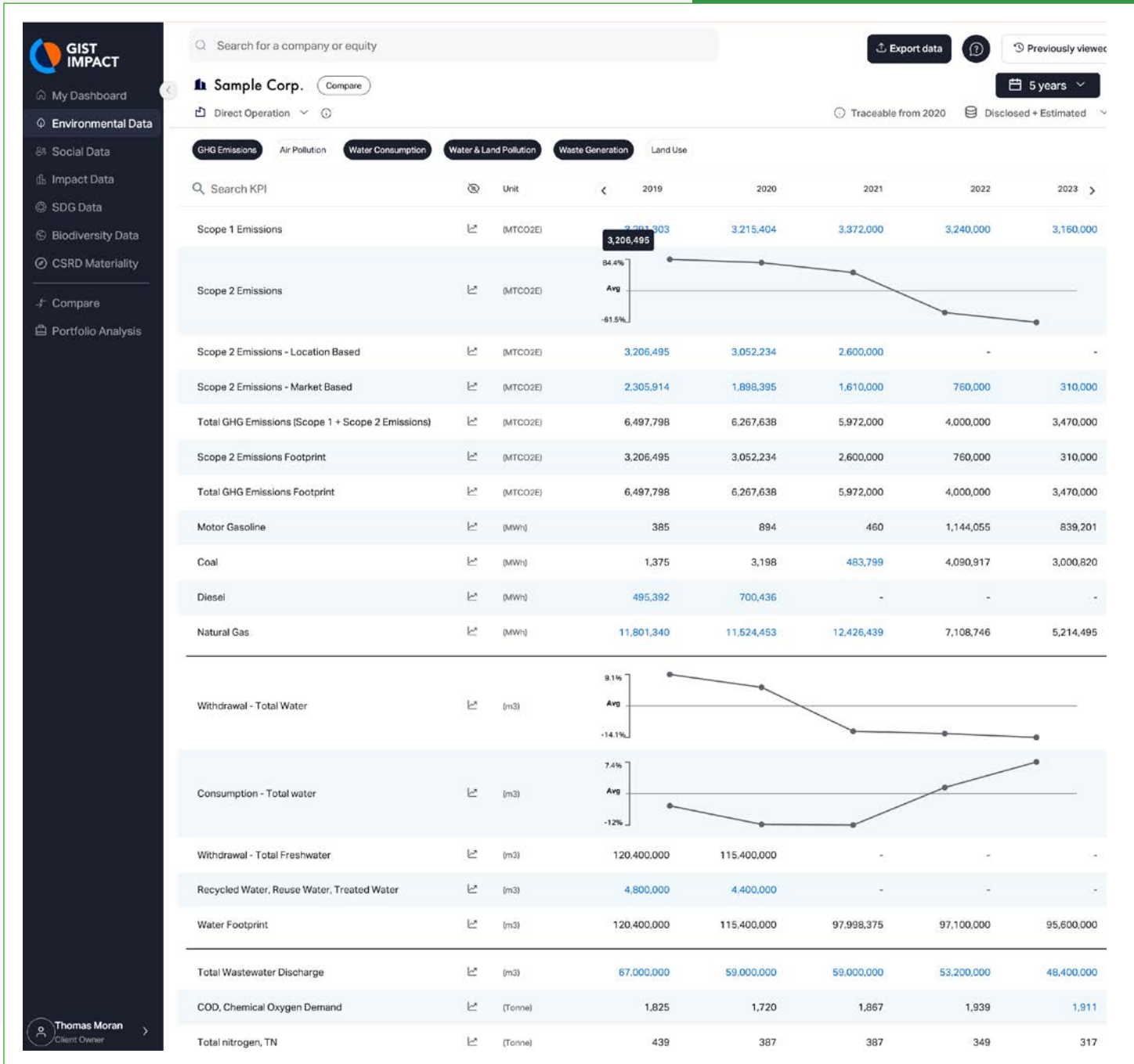
Corporates: Annual license, customer provides input data as available, missing data can be modelled by GIST Impact; cost varies by extent of operations, number of use cases, and number of physical assets to be assessed, as well as by packaging with complementary offerings (GI-SLA, GI-DIRO). Cost Level M (€4,000 to €10,000) to H (> €10,000)

## Output visuals GI-GBF

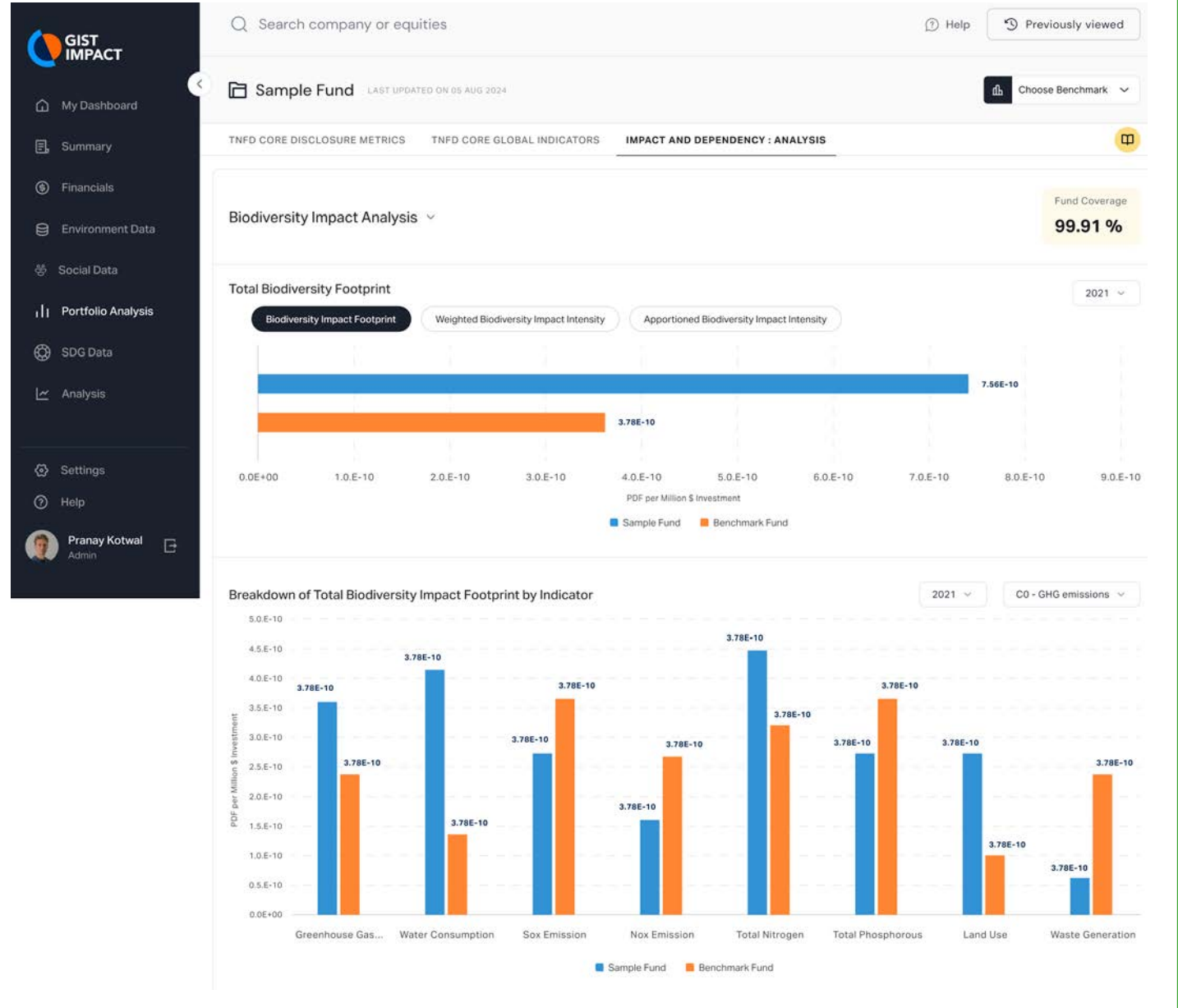
The GI-GBF dashboard company view for a sample company indicating Species Extinction Risk in terms of Global Potentially Disappeared Fraction (PDF) and Land Conversion Equivalent (km<sup>2</sup>) for eight environmental pressures, calculated annually. Impacts are compared to sector benchmarks and segmented by location (country), affected ecosystems, and pressure type. The physical quantities of pressures apportioned to each country are provided along with biodiversity sensitivity values (characterization factors) for each country-pressure combination.



GI-GBF environmental pressure data is included for all impact calculations and is available for over 40 indicators from 2016 to present for 17,500 companies. This sample company data illustrates decreasing trends in Scope 2 GHG emissions and Water Withdrawals since 2019, with an increase in Water Consumption during that time. Values in blue are company-disclosed and can be traced to the source page in the disclosure document by clicking the value or making an API call.



The GI-GBF dashboard Portfolio view comparing the biodiversity impact of a sample fund vs. a benchmark reference fund. The top horizontal bar chart indicates total biodiversity impact of the sample fund (blue) which exceeds the impact of the reference fund (orange). The vertical bar charts indicate impacts by pressure type; impacts can be further segmented by geography, sector, ecosystem type, and year.



## Sensitive Location Assessment

GIST Impact's [Sensitive Location Assessment \(GI-SLA\)](#) evaluates local environmental conditions affecting business operations anywhere on the globe. Over 35 TNFD-aligned risk and impact factors include: areas important for biodiversity, ecosystem integrity, water risks, other physical risks, affected communities, land use change, biodiversity sensitivity, and restoration opportunities. These factors are pre-calculated for over 3 million physical assets of companies in the GIST Impact corporate database, and analysis can be performed on demand for any location globally.

Analysis can be performed at a specific point or within a specified boundary. Certain data categories, including TNFD Sensitive Locations and Deforestation, include analysis of a "buffer zone" in proximity to the asset location to ensure complete coverage of non-localized effects. The radius of the buffer zone can be specified by the user or default to recommended sizes based on asset type.

Location analysis poses unique challenges for financial institutions with portfolios that encompass thousands or even millions of physical asset locations, including comparison and ranking of assets, and aggregating metrics at the company, sector, and portfolio level. GIST Impact addresses these needs with normalized scores (0 to 100) for critical metrics, and transparent scoring methodologies. Using these capabilities, GI-SLA can compare groups of locations (e.g., all operational locations for a company) to prioritize risk management and actions.

GIST Impact has pre-calculated SLA metrics for over 10,000 companies in our corporate database, available via secure download, API, or our online portal. On-demand analysis is available via batch processing or online API.

## Organisations and reviewers

To ensure the credibility and transparency of the GI-SLA tool, the underlying data is sourced either in partnerships with leading research organizations, or from broadly-recognized open data sources, with an emphasis on scientifically peer-reviewed methodologies in all cases.

Key data partners include: the [Integrated Biodiversity Assessment Tool \(IBAT\)](#) Alliance; and [The Natural History Museum](#).

Open data sources include: the World Resources Institute [Aqueduct Database](#); the Terra and Aqua combined Moderate Resolution Imaging Spectroradiometer (MODIS) Land Cover Type (MCD12Q1) [Version 6.1 data product](#) maintained by the United States Geological Survey (USGS); World Wildlife Fund (WWF) [Terrestrial Ecoregions of the World](#) (2017); the [IUCN Global Ecosystem Typology](#); and LC-IMPACT.

A complete list of data sources and scientific references is available on request.

## Current stage of development

GI-SLA is in active use by GIST Impact's Corporate and Financial Institution customers. Ongoing development is prioritized by customer needs, with upcoming capabilities to include location-specific ecosystem services dependencies, expanded climate scenario forecasts, uninsurable location indicators, and on-demand satellite tasking for current land imagery.

## What is the main purpose of this tool?

The purpose of the GI-SLA tool is to make it easy to identify the nature and climate risks, impacts, and opportunities that affect business operations at any location on the

globe, enabling companies or portfolio managers to prioritize management actions. This is accomplished by consolidating numerous high quality data sources into a single unified view. Furthermore, the output metrics are designed to facilitate comparisons and aggregations across many locations. This enables a wide range of use cases for financial institutions, including regulatory analysis and disclosures (CSRD), nature strategy development and disclosures (TNFD), and enhanced management processes for nature and climate risks.

## What does it measure?

**GI-SLA data categories include:**

**TNFD Sensitive Locations:** GI-SLA covers all sensitive location categories as defined by TNFD. These include areas important to biodiversity (Key Biodiversity Areas, Protected Areas, and IUCN Red List ranges); areas of high ecosystem integrity and/or rapid decline in ecosystem integrity (Biodiversity Intactness Index, Mean Species Abundance); areas of high physical water risks; and areas of importance for ecosystem service provision to Indigenous Peoples.

**Water Risks and Impacts:** this category includes water stress and variability, water use and depletion, coastal and riverine flood risk, extreme precipitation, drought, and biodiversity sensitivity to water use. Metrics are provided for baseline conditions and projected future conditions per climate scenarios.

**Climate Risks:** this category includes extreme weather, extreme temperatures, droughts, and flooding. Metrics are provided for baseline conditions and projected future conditions per climate scenarios.

**Deforestation and Land Use Change:** this category includes deforestation, urbanization, and agricultural land expansion in proximity to business operation locations.

**Biodiversity Sensitivity:** quantifies the relative sensitivity of local biodiversity, in terms of species extinction risk, to land use, water use, water pollution, land pollution, and air pollution. Sensitivity is segmented by terrestrial, freshwater, and marine biomes.

**Ecosystem Types:** identifies the formal classification and characteristics of surrounding and nearby ecosystems.

**Biodiversity Opportunities:** quantifies localized opportunities for species threat abatement and ecosystem restoration, identifying which actions have the highest potential for positive impacts.

**Affected Populations:** includes population density and trends, and potentially affected Indigenous communities.

### What input data are needed?

For analysis of companies in the GIST Impact corporate database, GI-SLA users simply provide a company identifier, e.g., ISIN, to access SLA metrics for all physical asset locations associated with that company. A list of company identifiers and corresponding weights can be input to accomplish sector- and portfolio-level analysis.

On-demand calculations via batch processing or API require only an address or latitude and longitude coordinates. A location boundary can also be specified. An asset type (sector code) can optionally be provided to take advantage of automated buffer zone settings. Multiple locations can be input for batch processing, with the option to also calculate aggregate metrics for all locations in the company or group.

Note that inputs provided for on-demand calculations are never exposed to other users; only publicly available and third-party sourced asset information is included in our company database.



### What other tools are most complementary to this tool?

The GI-SLA can be used as a stand-alone tool for extensive location-based analysis. It is even more effective when combined with other components of the GIST Nature and Biodiversity Suite. The biodiversity sensitivity metrics from GI-SLA can be combined with GI-GBF to quantify the species extinction risk posed by operations at a given location and to prioritize impact mitigation actions across locations. Incorporated into the GI-DIRO tool, location data is an important component of dependencies, impacts, risks, and opportunities analysis that scales from individual locations up to global portfolios.

The GI-SLA integrates prominent complementary data sources, including IBAT, WRI Aqueduct, and BII. Other geospatial data sources such as the WWF Biodiversity Risk Filter offer additional complementary insights.

### How can the tool be used for TNFD reporting?

The GI-SLA tool supports key steps of the TNFD LEAP process. All categories of TNFD-defined sensitive locations are covered by the tool, enabling rapid and robust assessment of Locate steps Interface with Nature (L3) and Interface with Sensitive Locations (L4), as well as the Financial Institutions core sector disclose metric F1.CO.1, financial exposure to companies with assets or activities in ecologically sensitive locations. The Evaluate phase is supported for Identification of environmental assets (E1), Impact measurement (E3), and Impact materiality (E4). Risks and Opportunities in the Assess phase are explicitly quantified for Risk & Opportunity Identification (A1), and Risk & Opportunity Measurement and Prioritization (A3). For the Prepare phase, Set Goals and Targets (P2) can include GI-SLA metrics, such as the proportion of assets exposed to Key Biodiversity Areas.

### Main strengths and limitations

#### Strengths:

- Consolidates numerous trusted and transparent data sources for nature and climate geospatial data into a single tool.
- Satisfies TNFD guidance for identifying business activity interfaces with ecologically sensitive locations, including core disclosure metric F1.CO.1.
- Covers all categories of sensitive locations as defined by TNFD.
- Includes TNFD-recommended data, including IBAT (KBAs, WDPAs, and Red List Species areas), the Biodiversity Intactness Index (BII), and WRI Aqueduct.
- Applies IBAT guidance for determining how different asset types interface with sensitive locations.
- Available for 10,000+ global corporates as of Q1 2025; expanding to >17,000 corporates in 2025.
- Asset- and company-level scores for level of exposure to sensitive locations.

#### Limitations:

- The pre-calculated corporate database is limited by the accuracy and completeness of asset location data.
- Accuracy of individual data sources is not controlled by GIST Impact; when our extensive QA identifies shortcomings or caveats this is noted in outputs or product documentation.
- Location analysis generally covers terrestrial and freshwater areas, not offshore or marine assets.
- Measurements are point in time, updated as source data permits, with data currency described in documentation and metadata.
- Spatial granularity varies by dataset; data sources have been selected with granularity appropriate to the type of analysis, e.g., droughts tend to affect a broad area and so coarse spatial resolution is acceptable, whereas flood

risk is highly localized and requires highly granular data; spatial resolution details are available on request.

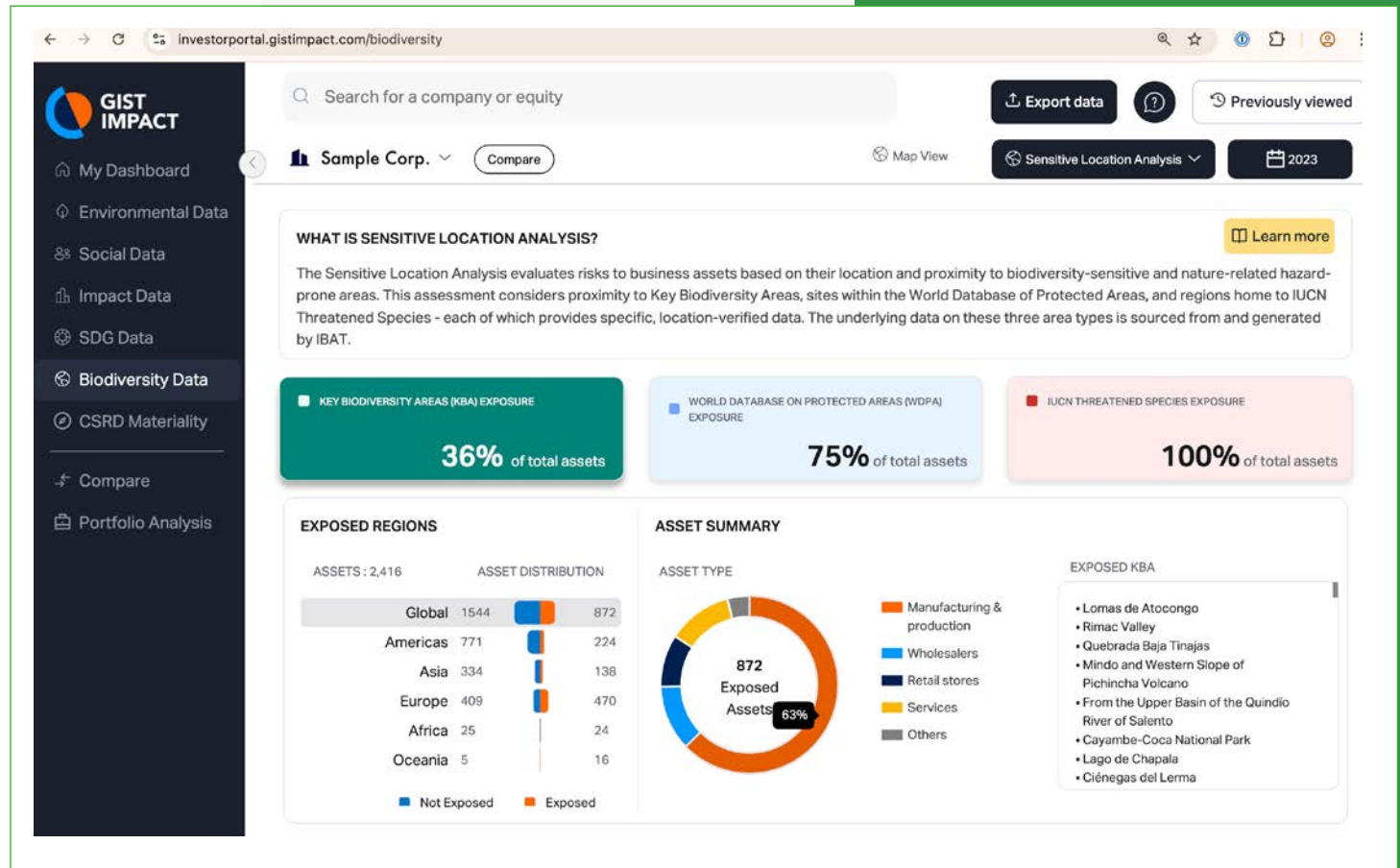
### What are the costs?

Financial Institutions: annual license, includes pre-calculated SLA data for companies in the GIST Corporate database available via secure download, API, or online portal; cost varies by portfolio size, number of use cases, and whether customer has an existing license for IBAT data. Cost Level M (€4,000 to €10,000) to H (> €10,000)

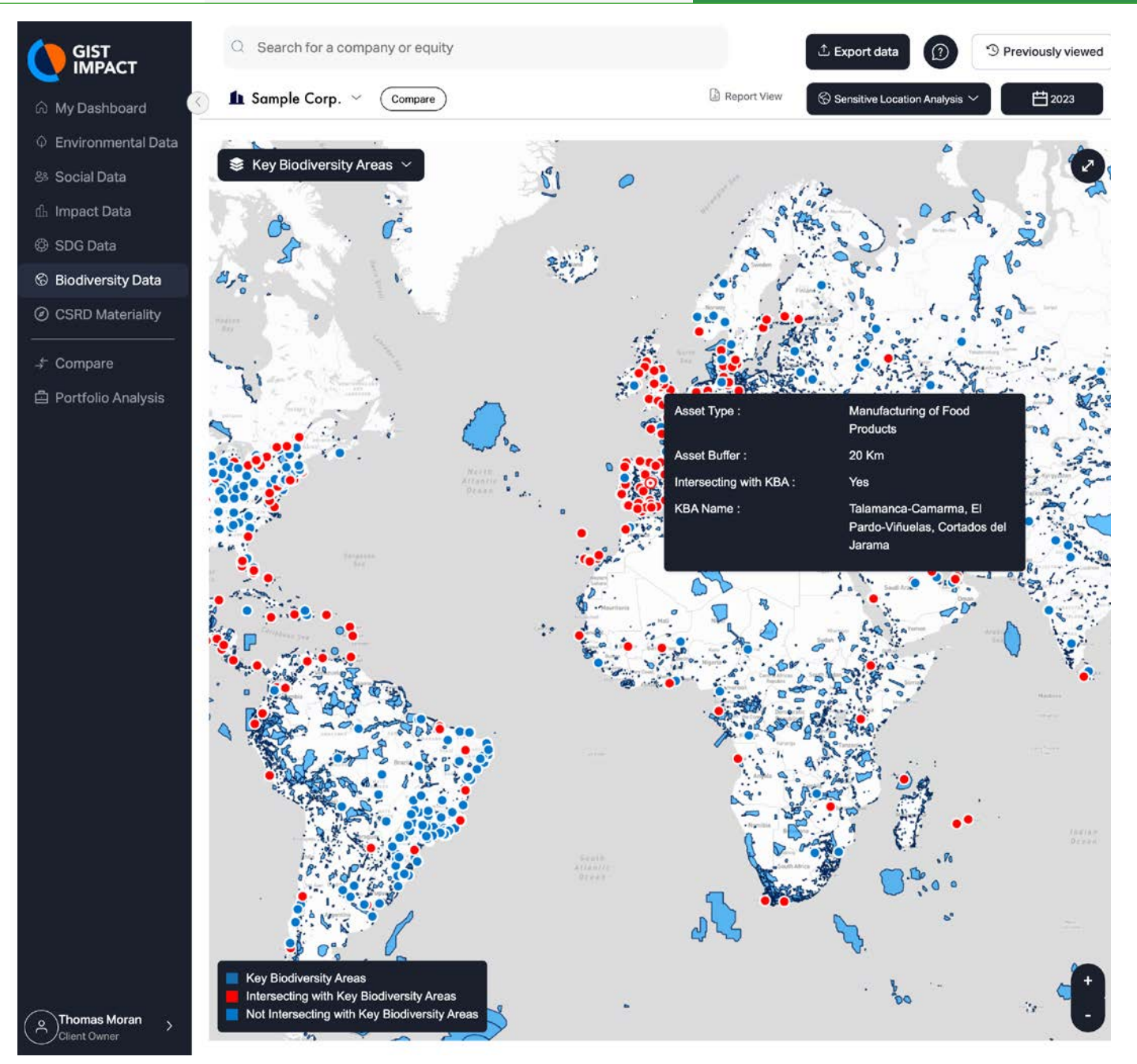
Corporates and privately held assets: annual license, includes on-demand or batch calculation of SLA metrics for user-provided locations; cost varies by number of locations and included attributes; corporate users must have their own IBAT data license if that data is to be accessed. Cost Level L (<€4,000) to M (€4,000 to €10,000), exclusive of IBAT data license.

## Output visuals GI-SLA

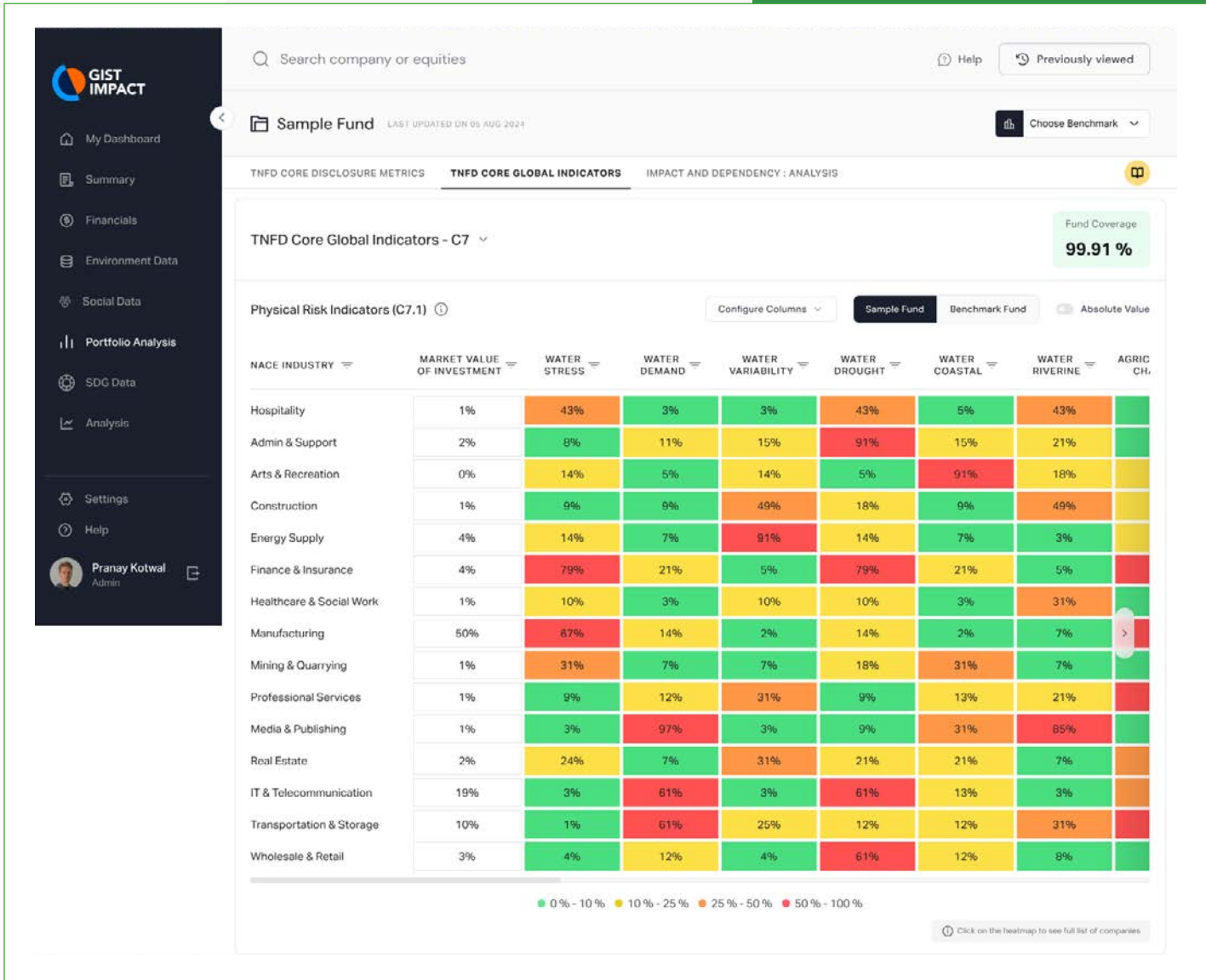
GI-SLA tool analysis includes identification of business assets that are in proximity to ecologically sensitive locations, as defined by TNFD. This company-level analysis dashboard indicates the percentage of operational locations in proximity to Key Biodiversity Areas, Protected Areas, and Red List endangered species, data provided in partnership with IBAT.



The map view of GI-SLA shows company asset locations, with blue polygons indicating Key Biodiversity Areas (KBAs), red circles indicating assets in proximity to KBAs, and blue circles indicating no KBAs in proximity. Note that the radius for determining proximity varies from 1 km to 50 km depending on asset type, following IBAT guidance.



GI-SLA portfolio analysis indicating the percentage of portfolio company assets located in areas of high water risk for various indicators including water stress, water demand, and drought (sample data is notional), segmented by sector.



## GIST Impact DIRO Tool (GI-DIRO)

**GI-DIRO** synthesizes a broad variety of tools and data resources to quantify and contextualise Nature Dependencies, Risks, Impacts, and Opportunities (DIRO) from the level of individual assets up to global portfolios, aligned with TNFD guidance and best practices. Calculations are performed for direct operations and value chains. Financial Institutions use GIST Impact's database of pre-calculated DIRO metrics for over 17,500 companies to perform portfolio analysis and counterparty deep-dives. Corporates apply GI-DIRO on-demand using their own data to build a robust nature strategy and to prepare efficient disclosures.

The relationship between businesses and nature can be characterized by considering nature dependencies, impacts, risks, and opportunities, following the guidance of TNFD and other well-established nature frameworks. A company's dependencies on ecosystem services and other natural resources constitute a supply chain that must be maintained for operational continuity and growth. Every business impacts nature, directly or indirectly, through its own operations and value chain. These factors can manifest risks to the business, such as disruption of highly material dependencies, physical risks due to changing climate, or transition risks associated with negative impacts. Business opportunities can arise from regulatory or commercial transitions, and opportunities to benefit nature can further mitigate risks.

Characterizing, prioritizing, and managing these factors is the essence of the TNFD LEAP process, with Dependencies and Impacts the focus of the Evaluate phase, and Risks and Opportunities the focus of Assess.

The GI-DIRO tool supports a broad range of nature-related use cases and applications by flexibly applying the overarching DIRO framework as individual components or holistically. GIST Impact has pre-calculated GI-DIRO outputs for over 17,500 publicly traded companies, and Financial Institutions can leverage this database via secure download, API, or online platform. Corporate or private holdings can be analysed on-demand in conjunction with the GI-GBF and GI-SLA tools.

### Organisations and reviewers

To ensure the credibility and transparency of the GI-DIRO tool, the underlying data is sourced either in partnerships with leading research organizations, or from broadly-recognized open data sources, with an emphasis on scientifically peer-reviewed methodologies in all cases.

A key data partner for GI-DIRO is Global Canopy, which provides the Forest IQ dataset for detailed deforestation analysis of companies operating in high impact sectors, as well as the ENCORE dataset in partnership with UNEP FI and UNEP-WCMC.

EXIOBASE v3.8.2 is used for value chain estimations when company-provided data is not available.

Value Factors for Natural and Human Capital Impacts, as well as detailed methodologies for all components, are available on request.

### Transparency of method

GI-SLA methodologies are based on publicly available, peer-reviewed processes and data sources. GIST Impact provides customers with end-to-end documentation of all methodologies.



### What is the main purpose of this tool?

The GI-DIRO tool synthesizes the outputs of other GIST Impact tools (GI-GBF, GI-SLA) as well as additional data sources and methods to provide a holistic view of dependencies on ecosystem services, impacts on biodiversity, exposure to physical and transition risks, and opportunities for nature and business. The tool is intended to support an extensive range of use cases and applications, including risk management, nature strategy development, counterparty engagement, nature-positive financial products, and nature-related disclosures including TNFD and CSRD.

### What does it measure?

- **Dependencies on Ecosystem Services (ESS):** ESS Dependency materiality ratings (very low to very high) and detailed descriptions are derived from ENCORE, based on business activities and enhanced with numeric scores that enable aggregation from the company to portfolio level. If a company has multiple business activities they are proportionally represented in the dependency scores. Value chain dependencies are assessed by incorporating disclosed value chain information or EXIOBASE modelled activities.
- **Nature Impacts:** Company-level impact metrics are generated using the GI-GBF tool and transformed into scores relative to specified sector or index benchmarks. Pressures that are not currently covered by GBF are estimated using ENCORE Pressure materiality ratings. For financial institutions, exposure to high impact sectors is also determined by cross-referencing portfolio company sectors with priority sector watch lists defined by TNFD and other guidance.
- **Biophysical Risks:** The GI-SLA tool is used to calculate location-specific environmental metrics for more than 35 categories including water stress, water variability,

temperature variability, drought, flooding, heatwaves, and extreme weather. Analysis of individual locations is aggregated to the company-level, which can be further aggregated for portfolio analysis.

- **Nature Opportunities:** Opportunities are characterized in terms of impact reduction, risk reduction, threat abatement, ecological restoration, and nature-positive actions.
- **Deforestation:** In partnership with Global Canopy, GI-DIRO provides detailed analysis of deforestation exposure, financial materiality, and reporting performance for over 2,000 companies operating in high impact sectors. Furthermore, GI-SLA analysis of over 10,000 companies identifies company operations in proximity to deforestation activity and hotspots.
- **Natural and Human Capital Impacts:** GIST Impact calculates the Natural Capital and Human Capital impacts (USD) of a business based on disclosed financial, social, and environmental data, in alignment with the frameworks and guidance of the Capitals Coalition and the Value Balancing Alliance.

### What input data are needed?

For analysis of companies in the GIST Impact corporate database, GI-DIRO users simply provide a company identifier, e.g., ISIN, to access all data associated with that company. A list of company identifiers and corresponding weights can be input to accomplish sector- and portfolio-level analysis.

Input data needs for on-demand GI-DIRO calculations via batch processing or API depend on which component is assessed. In addition to inputs described for GI-GBF and GI-SLA, company sector(s) are required; value chain information will enhance modelled results; commodity information will enhance deforestation analysis.

### What other tools are most complementary to this tool?

The GI-GBF and GI-SLA tools are designed to complement the additional outputs of this tool, and the other tools described in those sections also apply. Prior ENCORE analysis can be leveraged to contextualize the enhanced outputs of GI-DIRO.

### How can the tool be used for TNFD reporting?

GI-DIRO supports all analytic phases of the TNFD LEAP Framework, including Locate (L1, L2, L3, L4), Evaluate (E1, E2, E3, E4), Assess (A1, A3, A4) and Prepare (P3).

Furthermore, GI-DIRO produces both core sector disclosure metrics recommended by the TNFD Additional Guidance for Financial Institutions v2.0: FI.CO.0 Exposure to sectors, and FI.CO.1 Exposure to Sensitive Locations.

### Current stage of development

All elements of the GI-DIRO tool have been applied by leading global financial institutions including multiple top 20 Asset Managers, Sovereign Wealth Funds, and bespoke impact-oriented wealth managers.

### Main strengths and limitations

#### Strengths:

- Provides a comprehensive view of company- or portfolio-level relationship with nature aligned with the TNFD LEAP Framework.
- The GIST Impact corporate database of 17,500 companies covers approximately 98% of global investible assets.
- All data and analysis are company-specific, with the exception of modelled value chain data.
- Global coverage of terrestrial and freshwater ecosystems, and marine ecosystems for near-shore nutrient pollution impacts.
- Leverages trusted and transparent data sources and methodologies in partnership with globally recognized nature data leaders.

- Metrics are location specific with the exception of company-level dependencies (asset-level dependencies are localized).
- Incorporates the strengths of GI-GBF impact calculations and GI-SLA location analysis, including scientific robustness, broad coverage of environmental pressures and affected biomes, relevant and actionable metrics.

#### Limitations:

- Depends on company disclosed data for portfolio analysis.
- Limited by the accuracy and completeness of data about asset locations and types.
- Supply chain analysis is modelled with EXIOBASE except when value chain data is provided.
- Asset location analysis does not generally include offshore or marine assets.
- The stated limitations of GI-GBF and GI-SLA also apply.

#### What are the costs?

Financial Institutions: Annual license includes pre-calculated GI-DIRO metrics for companies in the GIST Impact corporate database, as well as underlying input data (environmental drivers, geographic apportioning, company business activity details (NACE-4); cost varies by portfolio size, number of use cases, and packaging with complementary offerings (GI-GBF, GI-SLA). Cost Level M (€4,000 to €10,000) to H (> €10,000)

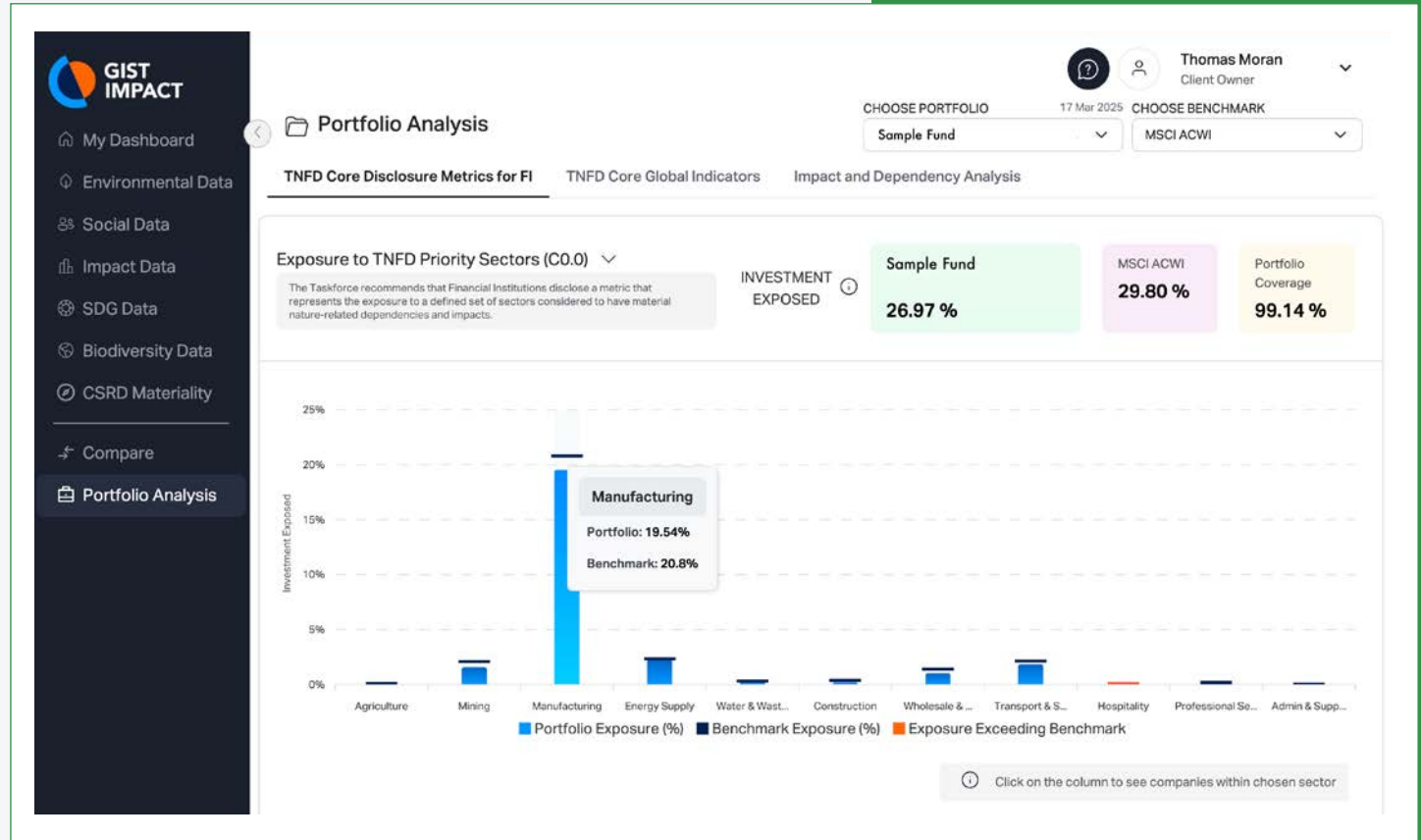
Corporates and Private Holdings: Annual license includes on-demand or batch calculation of GI-DIRO metrics, customer provides input data as available, missing data can be modelled by GIST Impact; cost varies by volume of use cases, extent of operations, and number of assets to be assessed, as well as by packaging with complementary offerings (GBF, GI-SLA). Cost: M (€4,000 to €10,000) to H (> €10,000)



## Output visuals GI-DIRO

The GI-DIRO tool offers a comprehensive assessment of the Dependencies, Impacts, Risks, and Opportunities that characterise a company's or portfolio's relationship with nature, aligned with the TNFD LEAP Evaluation process. This priority sector dashboard view indicates the percentage of a sample fund's companies (by investment value) that operate in priority sectors, per TNFD core sector metric FI.C0.0. Note that the fund has somewhat less exposure than the selected benchmark index, and that over 99% of the fund (by value) is represented in GIST Impact's corporate dataset. The bar charts provide further breakdowns by sector.

This GI-DIRO dashboard view, aligned with PBAF guidance for dependencies analysis, illustrates dependency-impact quadrant analysis of a sample fund. Biodiversity impact increases along the horizontal axis and ecosystem services dependencies increase along the vertical axis, such that high dependency, high impact companies are in the upper right quadrant. Bubble size indicates relative company value in the portfolio.



Portfolio Analysis

CHOOSE PORTFOLIO 17 Mar 2025 CHOOSE BENCHMARK  
 Sample Fund MSCI ACWI

TNFD Core Disclosure Metrics for FI TNFD Core Global Indicators **Impact and Dependency Analysis**

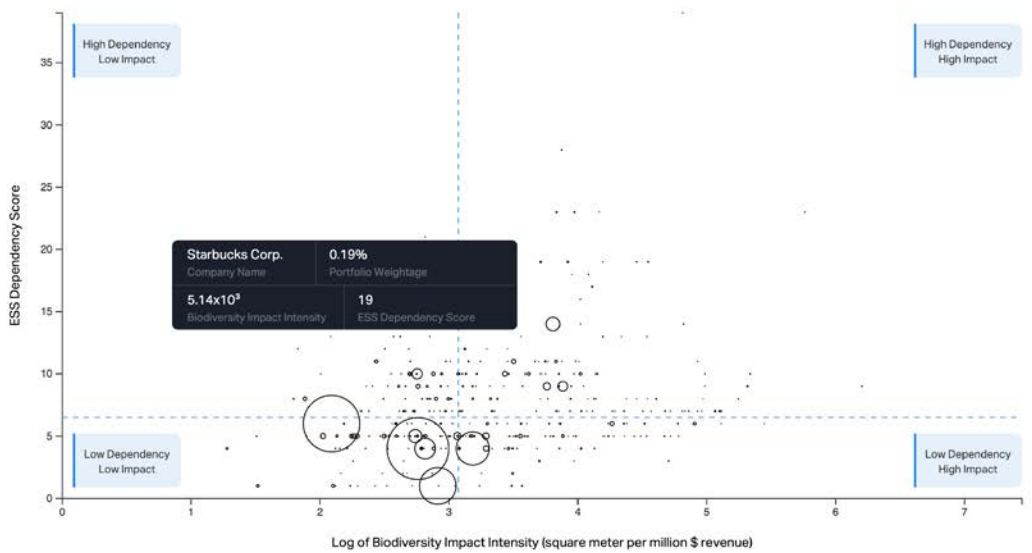
Dependency Analysis

Portfolio Coverage  
**99.14 %**

Impact and Dependency Assessment

Search Companies All

- All
- Top 50 (Investments by Market Value)
- High Dependency, High Impact
- High Dependency, Low Impact
- Low Dependency, Low Impact
- Low Dependency, High Impact



The size of bubbles represent the percentage of total portfolio investment of the constituent.

GIST Impact GI-DIRO metrics for Natural, Human, and Produced Capital measure how companies affect human well-being in monetary terms from 2016 to present, in alignment with TNFD LEAP (E3, E4, A4, P3). This view from the GIST online portal illustrates capital intensity, per \$M USD revenue, for a sample company.

**GIST IMPACT**

- My Dashboard
- Environmental Data
- Social Data
- Impact Data**
- SDG Data
- Biodiversity Data
- CSR Materiality
- Compare
- Portfolio Analysis

Search for a company or equity

Export data | Previously viewed

5 years

Sample Corp. | Compare

Direct Operation

Impact | **Impact Intensity**

Impact intensity is a normalized metric to understand and compare the magnitude of natural, human or social effects relative to a specific activity or output such as revenue or product quantity. For example carbon emissions generated per unit of production, investment, etc.

	Unit	2019	2020	2021	2022	2023
<b>Natural Capital Impacts</b>	USD per USD Mn Rev	-15,000	-15,000	-14,000	-14,000	-13,000
GHG Emissions	USD per USD Mn Rev	-3,300	-3,400	-3,000	-1,900	-1,700
Air Pollution	USD per USD Mn Rev	-360	-350	-330	-760	-570
Water Consumption	USD per USD Mn Rev	-920	-960	-680	-650	-650
Water & Land Pollution	USD per USD Mn Rev	-470	-470	-480	-420	-390
Waste Generation	USD per USD Mn Rev	-5,200	-4,900	-4,600	-5,300	-4,500
Land Use	USD per USD Mn Rev	-4,600	-4,800	-4,400	-5,000	-5,000
<b>Total Human Capital</b>	USD per USD Mn Rev	12,000	11,000	14,000	12,000	13,000
<b>Total Produced Capital</b>	USD per USD Mn Rev	360,000	410,000	460,000	360,000	390,000

## 5.11 IBAT - Integrated Biodiversity Assessment Tool

**Integrated Biodiversity Assessment Tool (IBAT)** is a web-based reporting and mapping tool that provides access to global, authoritative, biodiversity datasets for early-stage impact, risk and opportunity scanning/screening. The IBAT Alliance is formed between four of the world's most authoritative global conservation organisations: BirdLife International, United Nations Environment Programme – World Conservation Monitoring Centre (UNEP-WCMC), the IUCN and Conservation International. Through the platform, users will be able to access the IUCN Red List of Threatened Species™, the World Database on Protected Areas (WDPA) and the World Database of Key Biodiversity Areas (WDKBA). IBAT is an important cost recovery mechanism and subscriptions directly support the update and maintenance of three of the world's most authoritative global biodiversity datasets.

Users can access IBAT either through the web-based interface, reports and GIS downloads or through an API. The following steps may be followed:

- 1 Create login credentials and log in to the [IBAT website](#).
- 2 Upload one or more site (locations) either through the 'sites' tab or 'Data map' tab (IBAT accepts excel/csv, shapefiles, KML and KMZ). Alternatively, a user can upload a project by drawing a point, polygon, or line feature on the data map.
- 3 All the uploaded sites can be viewed under the sites tab. The site page provides an overview of the overlap of each site with sensitive biodiversity areas and species within a 50km buffer.
- 4 For a more granular and detailed information, a user needs to select a specific site or create a portfolio of sites to generate different types of reports or GIS downloads.
- 5 After the reports/GIS are generated, a user can access them either via Pay As You Go model or through an annual subscription.
- 6 IBAT produces outputs in the form of GIS downloads and reports which can be used for multiple purposes including reporting requirements like TNFD, GRI and CSRD.

- 7 In case of API, an API link will allow the user to query data straight into their internal tool/platform. A new Web Feature Service has been implemented, allowing users to integrate data layers into their GIS software directly using a URL.

### Organisations and reviewers

UNEP-WCMC, IUCN, BirdLife International and Conservation International.

Reviewers: The Biodiversity Consultancy (TBC), World Bank, IFC, TNFD, Newcastle University.

### Current stage of development

The tool is developed and fully functioning. However, regular updates to the datasets and features are added periodically.

### Transparency of method

IBAT is based on three of the most globally authoritative datasets, the WDPA, WDKBA and the IUCN Red List of Threatened Species. These are based on scientifically robust

and widely accepted global standards and methodologies which have open public access. For example, the methodologies and processes underpinning species assessments under the [IUCN Red list](#) are publicly available and have been developed by a range of taxonomic experts, researchers, academics, and experts globally. The identification of [KBAs](#) is based on the global standards developed by the IUCN, BirdLife International and other partner organisations which have open access on the IUCN and BirdLife International website.

In addition to these three core datasets, IBAT has two derived datasets: STAR and RWR. The methodologies for the derived datasets have open public access on the IUCN website and scientific journals.

### What is the main purpose of this tool?

The main purpose of the tool can vary depending on the nature of organisations.

Private sector use: The main purpose of the tool is to allow organisations to identify and assess locations which are near

sensitive biodiversity areas and species. This information can be used in various ways including prioritisation of prospective sites, making investment decisions, formulating nature/climate/biodiversity strategy, taking actions to reduce impact at existing sites and reporting against regulations, standards, and frameworks such as TNFD, GRI and CSRD.

**Government use:** Governments can use the IBAT data to track and report progress against global and national goals and targets. With the use of IBAT, governments can formulate National Biodiversity Strategies and Action Plans (NBSAPs) in line with the KM-GBF, to assist with national biodiversity-inclusive spatial planning.

**NGOs/Conservation sector:** The main purpose IBAT here is to assist with conservation planning and action plans. The data can be useful to prioritise areas where conservation actions are most likely to have positive outcome and areas where conservation actions are needed the most.

### What does it measure?

The IBAT houses five different types of datasets, all measuring biodiversity through slightly different metrics and criteria.

The WDPA and WDKBA provides understanding of important areas for species, habitats and conservation, the IUCN Red list of Threatened Species gives the measure of the risk of extinction of species and areas where they are likely to be found. The Rarity-Weighted Richness (RWR) measures the relative importance of an area with respect to the global range of species.

The STAR (Species Threat Abatement and Restoration) metric measures the importance and impact of threat abatement and restoration activities at a particular location on global extinction risk of species.

### What input data are needed?

The data input can be a point feature, line feature or a polygon which can either be uploaded through a shapefile, Excel/CSV, KML and KMZ or can be drawn on the data map.

### What other tools are most complementary to this tool?

Other complimentary tools that can be used along with IBAT include ENCORE, global forest watch, RepRisk.

### How can the tool be used for TNFD reporting?

IBAT recently launched a new report called the [Disclosure Preparation Report \(DPR\)](#). The DPR identifies and prioritises sensitive sites in terms of their importance for biodiversity. The report is particularly relevant for the Taskforce on Nature-related Financial Disclosures (TNFD) recommended disclosure Strategy D and the Locate phase of the TNFD LEAP approach as well as the Global Reporting Initiative (GRI) Disclosure 101-4 'Identification of biodiversity impacts' and Disclosure 101-5 'Locations with biodiversity impacts' within GRI 101: Biodiversity 2024. Sensitive sites are defined as sites where: The area of influence (site + buffer) overlaps with a protected area or Key Biodiversity Area (KBA) and the area of influence (site + buffer) has STAR Threat Abatement and/or STAR Restoration scores exceeding the global median values of 0.01 and 0.003 respectively. Sensitive sites are then given a significance score to aid the prioritisation of sites. Significance scores of high, medium, and low are assigned based on the proximity of the site to a KBA or protected area relative to the appropriate buffer size based on the type of operation and the maximum STAR Threat Abatement and STAR Restoration scores found within the area of influence. This report has also been recently updated in April 2025 to include alignment of its output with the EU Corporate Sustainability Reporting Directive (CSRD) ESRS E4.

### Main strengths and limitations

#### Strengths:

- Provides access to some of the most globally authoritative and widely used biodiversity datasets (WDPA, WDKBA, IUCN Red List of Threatened Species).
- USP: Only platform that provides commercial access for the use of these three datasets and access to STAR at 5km resolution.
- Provides outputs in the form of reports and GIS downloads which can be used for reporting against TNFD, GRI, CSRD, etc.
- Allows users to scan thousands of locations within a span of a few minutes.
- Demos, training and support at no additional cost. Reach out to [ibat@ibat-alliance.org](mailto:ibat@ibat-alliance.org) for any request.
- Serves as a very crucial cost recovery mechanism for the conservation sector as the funds received are donated back to the partner organisations. \$5.5 million re-invested to the datasets over the past 5 years.
- The datasets are updated frequently with the frequency ranging from monthly update to bi-annually.
- Allows users to determine the distance of their location/site to the nearest area of biodiversity importance.
- Allows users to download GIS data which can be uploaded and analysed externally.
- Provides 6 different types of reports specific to different requirements like IFC PS6, TNFD, GRI and CSRD.
- The new web feature service allows users to incorporate the IBAT datasets into a user's existing GIS software as a dynamic layer with real-time updates.
- The tool is a unique alliance of four of the biggest global conservation charities which provides expertise ranging from research, policy, advocacy, and economics.

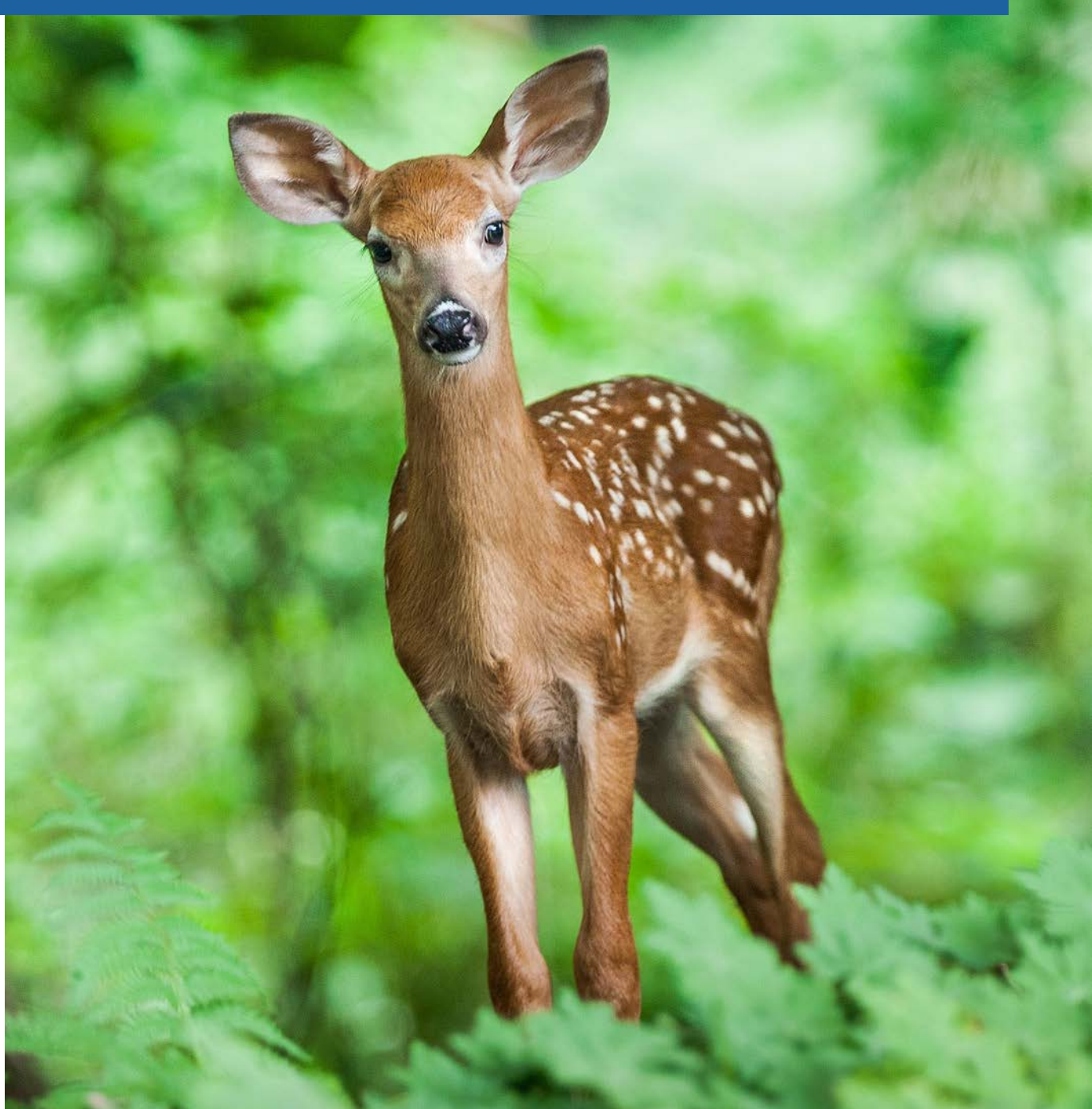
**Limitations:**

- Does not provide dynamic monitoring of the state of biodiversity.
- Difficult to obtain granular information if the user does not have information on location.
- Currently, does not provide a lot of detailed recommendations on actions to be taken specific to the nature of operations on the site.
- Currently, users are unable to track changes in trends in biodiversity historically.
- Currently, does not comprehensively cover the other two components of biodiversity: Ecosystem and genetic diversity.

**What are the costs?**

The IBAT provides access through annual subscriptions and PAYG (Pay As You Go). The annual subscription ranges from \$5,000 to \$35,000. PAYG is structured around the number of downloads and the size of the area scanned.

Subscription fees and PAYG are re-invested into the biodiversity datasets. The annual cost of updating and maintaining these datasets is estimated at \$6.5 million. An additional \$114 million will be needed to reach baselines of data coverage for global biodiversity and conservation knowledge products. The annual cost of maintaining the underlying datasets in IBAT ranges from \$6.5 to \$7 million dollars.



## Disclosure Preparation Report

**Site Area:** 60.8 km<sup>2</sup>

**Buffer distance:** 50 km

**Site type:** Mining

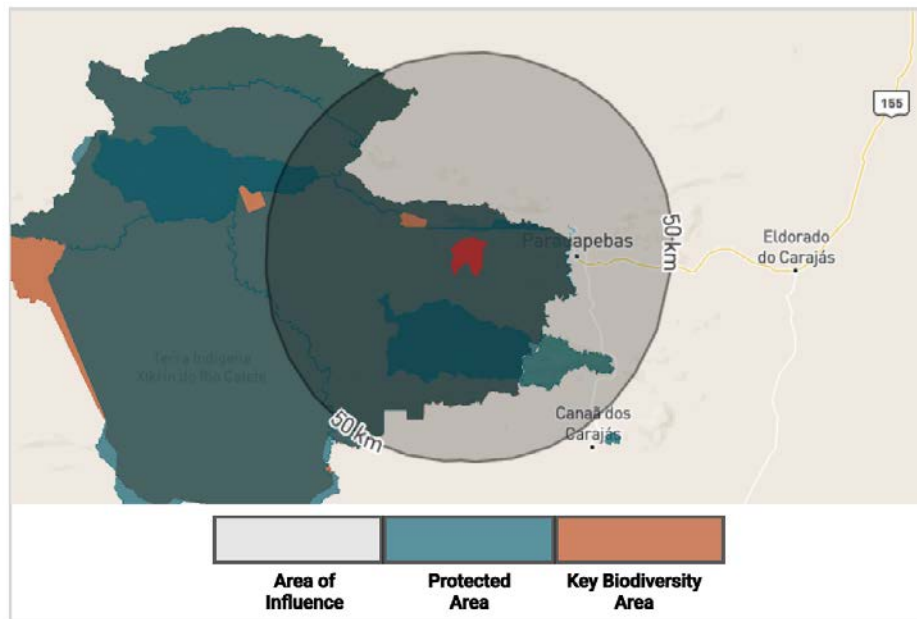
**Operation type:** Upstream

**In or near an ecologically sensitive location:** Yes

**Country:** Brazil

**Distance to nearest Protected Area or KBA:** 0.0 km

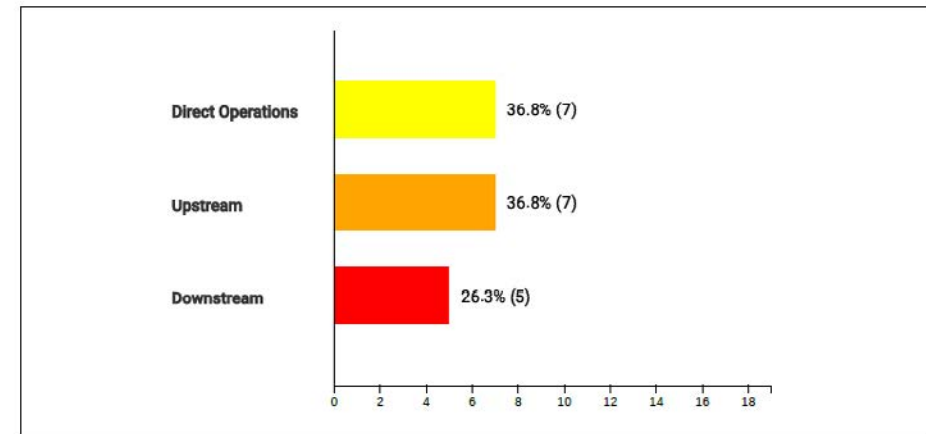
**Area of protected areas and KBAs within the Area of Influence:** 4710.99 km<sup>2</sup>



## Results

### 1. Sites assessed as in or near an ecologically sensitive location

A total of **20** sites were assessed in this report. Overall, **19 sites (95.0%)** were identified as in or near an ecologically sensitive location.



## Multi-site Report

### Overlap with protected areas and Key Biodiversity Areas (KBAs)

The following table shows the number of protected areas and KBAs overlapped by a 10.0 km buffer for each operational site where an overlap occurs.

Site	Area (km <sup>2</sup> )	Protected Areas	KBAs
Bab El Mandeb	7619	2	6
Bale Mountains	10311	8	5
Gaborone	54	0	1
Guéckédou	11831	9	4
Magaliesburg	421	7	1
Mampikony	731	2	2

## PS6 & ESS6 Report

### World Bank Group Biodiversity Risk Screen

#### FREETOWN

- Country: Sierra Leone
- Location: [ 8.3, -13.2 ]
- Created by: Ben Jobson

#### Overlaps with:

<b>Protected Areas</b>	50 km: 3	10 km: 1	1 km: 5	9
World Heritage (WH)	50 km: 0	10 km: 0	1 km: 0	0
<b>Key Biodiversity Areas</b>	50 km: 0	10 km: 0	1 km: 3	3
Alliance for Zero Extinction (AZE)	50 km: 0	10 km: 0	1 km: 0	0
<b>IUCN Red List</b>				58
<b>Critical Habitat</b>				Likely

## Proximity Report

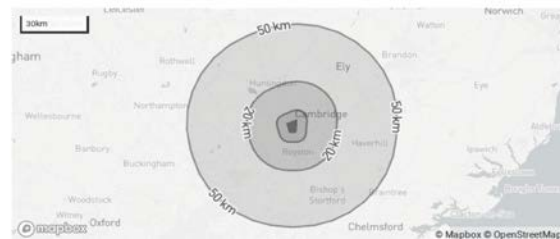
Buffers applied: 5.0 km | 20.0 km | 50.0 km

Generated by: Lewis Youl

Company/Subscriber: IBAT

#### Overlaps with:

Protected Areas	382
Key Biodiversity Areas	5
IUCN Red List	56



### IUCN Red List of Threatened Species

The following threatened species are potentially found within 50km of the area of interest.

For the full IUCN Red List please refer to the associated csv in the report folder.

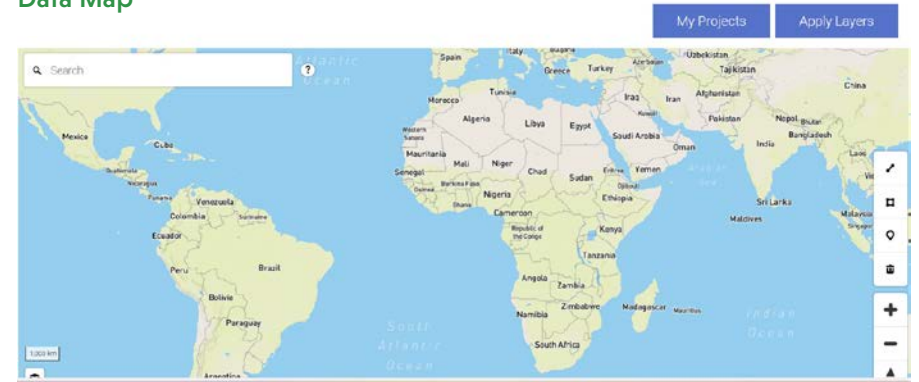
Species name	Common name	IUCN Category	Taxonomic Class
<i>Acipenser sturio</i>	Atlantic sturgeon	CR	Actinopterygii
<i>Aesculus hippocastanum</i>	Horse chestnut	VU	Magnoliopsida
<i>Andreaea frigida</i>	Icy rock-moss	VU	Andreaeopsida
<i>Anguilla anguilla</i>	European eel	CR	Actinopterygii
<i>Anser erythropus</i>	Lesser white-fronted goose	VU	Aves
<i>Astacus astacus</i>	Noble crayfish	VU	Malacostraca
<i>Austropotamobius pallipes</i>	White-clawed crayfish	EN	Malacostraca
<i>Aythya ferina</i>	Common pochard	VU	Aves
<i>Balistes capricus</i>	Gray triggerfish	VU	Actinopterygii
<i>Bovista paludosa</i>	Fen puffball	VU	Agaricomycetes

## Excel Output

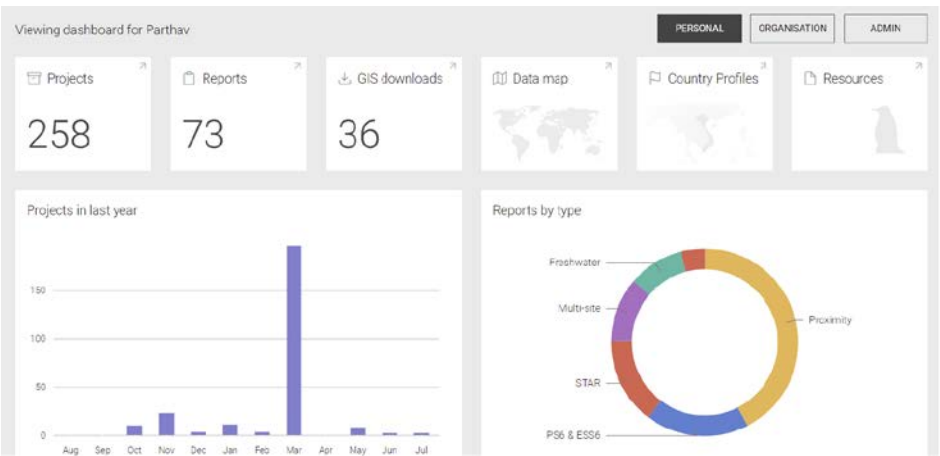
A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
taxonid	kingdomN	phylumNa	classNam	orderNam	familyNam	genusNam	scientificN	commonh	redListCat	populatio	publicatio	assessment	criteria	marineSys
5660	ANIMALIA	CHORDAT	REPTILIA	CROCODY	CROCODY	Mecistops	Mecistops	Slender-sr	CR	decreasing	2014	#####	A2cde+3	FALSE
8005	ANIMALIA	CHORDAT	REPTILIA	TESTUDIN	CHELONII	Eretmoch	Eretmochi	Hawksbill	CR	decreasing	2008	#####	A2bd	TRUE
18175	ANIMALIA	CHORDAT	CHONDRI	RHINOPRI	PRISTIDAE	Pristis	Pristis	pec Smalltootl	CR	decreasing	2013	#####	A2cd	TRUE
20425	ANIMALIA	CHORDAT	MAMMAL	CETARTIO	DELPHINI	Sousa	Sousa	teu Atlantic H	CR	decreasing	2017	#####	A3cd+4cd	TRUE
39374	ANIMALIA	CHORDAT	CHONDRI	CARCHARI	CARCHARI	Carcharhi	Carcharhi	Oceanic V	CR	decreasing	2019	#####	A2bd	TRUE
39385	ANIMALIA	CHORDAT	CHONDRI	CARCHARI	SPHYRNID	Sphyrna	Sphyrna	le Scallop	CR	decreasing	2019	#####	A2bd	TRUE
39386	ANIMALIA	CHORDAT	CHONDRI	CARCHARI	SPHYRNID	Sphyrna	Sphyrna	n Great Han	CR	decreasing	2019	#####	A2bd	TRUE
60180	ANIMALIA	CHORDAT	CHONDRI	RHINOPRI	RHINIDAE	Rhynchob	Rhynchob	African W	CR	decreasing	2019	#####	A2d	TRUE
61417	ANIMALIA	CHORDAT	CHONDRI	SQUATINI	SQUATINI	Squatina	Squatina	z Sawback /	CR	decreasing	2019	#####	A2bcd+3cd	TRUE
61418	ANIMALIA	CHORDAT	CHONDRI	SQUATINI	SQUATINI	Squatina	Squatina	c Smoothba	CR	decreasing	2019	#####	A2bcd+3cd	TRUE
169211	ANIMALIA	ARTHROPI	INSECTA	ODONATA	COENAGR	Pseudagri	Pseudagri	on mascag	CR	unknown	2010	#####	B1ab(ii,iii)	FALSE
182821	ANIMALIA	CHORDAT	ACTINOPT	CYPRINOC	NOTHOBR	Scriptaph	Scriptaph	yosemion e	CR	unknown	2010	#####	B1ab(ii,iii)	FALSE
18584848	ANIMALIA	CHORDAT	CHONDRI	RHINOPRI	PRISTIDAE	Pristis	Pristis	pris Largetootl	CR	decreasing	2013	#####	A2cd	TRUE
22695185	ANIMALIA	CHORDAT	AVES	ACCIPITRI	ACCIPITRI	Necrosyrtr	Necrosyrtr	Hooded V	CR	decreasing	2017	#####	A2acd+3cd	FALSE
1.04E+08	ANIMALIA	CHORDAT	CHONDRI	RHINOPRI	GLAUCOS	Glaucoste	Glaucoste	Blackchin	CR	decreasing	2019	#####	A2d	TRUE
1.4E+08	PLANTAE	TRACHEO	LILIOPSID	POALES	ERIOCAUL	Eriocaul	Eriocaul	on adamesii	CR	decreasing	2020	#####	B2ab(iii)	FALSE
1.48E+08	ANIMALIA	MOLLUSC	BIVALVIA	UNIONO	IRIDINIDA	Pleiodon	Pleiodon	ovatus	CR	decreasing	2020	#####	A2c	FALSE
2475	ANIMALIA	CHORDAT	MAMMAL	CETARTIO	BALAENOI	Balaenopt	Balaenopt	Sei Whale	EN	increasing	2018	#####	A1abd	TRUE

	A	D	E	F	G	H	I	J	O	P	Q	R			
	Site Name	Site Type	Operation Protected Area	Overall Designation	Designation Type	Designation	IUCN Category	Area of PA (km <sup>2</sup> )	Area (km <sup>2</sup> )	Overlap Area (%)	Distance from Site (km)				
37	Poly-Hydro-Downstream	Hydropow	Downstream	5-11-335	National	National	Open Space	Covenar	IV	0.01	0.01	100	14.71		
38	Poly-Mining-Upstream	Mining	Upstream	Lake Gairdner	National	National	National Park	VI	5568.94	326.82	5.87	32.07			
39	Poly-Mining-Upstream	Mining	Upstream	Bon Bon Station	National	National	Conservation Reserve	II	2151.2	2151.2	100	0			
40	Poly-Mining-Downstream	Mining	Downstream	Numatina	National	National	Game Reserve	VI	2431.03	1688.19	49.2	20.02			
41	Poly-Office-Direct	H-H-Offices	Direct	Ope	Baldoyle Bay	Ramsar	Internation	Ramsar Site, Wetland	Not Reported	0			0.81		
42	Poly-Office-Direct	H-H-Offices	Direct	Ope	Baldoyle Bay	SPA	Natura2000	Regional	Special Protection	Area	Not Reported	2.63	2.63	100	0.68
43	Poly-Office-Direct	H-H-Offices	Direct	Ope	South Dublin Bay	Natura2000	Regional	Special Protection	Area	Not Reported	21.93	1.35	6.15	4.35	
44	Poly-Office-Direct	H-H-Offices	Direct	Ope	North Bull Island	Natura2000	Regional	Special Protection	Area	Not Reported	19.43	19.43	100	0.17	
45	Poly-Office-Direct	H-H-Offices	Direct	Ope	Ireland's Eye	SPA	Natura2000	Regional	Special Protection	Area	Not Reported	2.14	1.01	47.28	4.3
46	Poly-Office-Direct	H-H-Offices	Direct	Ope	Baldoyle Bay	SAC	Natura2000	Regional	Special Areas of	Cons	Not Reported	5.33	5.33	100	0.69
47	Poly-Office-Direct	H-H-Offices	Direct	Ope	Howth Head	SAC	Natura2000	Regional	Site of Community	Imp	Not Reported	3.75	1.91	51.09	2.99
48	Poly-Office-Direct	H-H-Offices	Direct	Ope	Malahide Estuary	Natura2000	Regional	Special Areas of	Cons	Not Reported	7.88	0.03	0.38	4.63	
49	Poly-Office-Direct	H-H-Offices	Direct	Ope	North Dublin Bay	Natura2000	Regional	Special Areas of	Cons	Not Reported	14.63	14.63	99.99	0.17	
50	Poly-Office-Direct	H-H-Offices	Direct	Ope	Ireland's Eye	SAC	Natura2000	Regional	Special Areas of	Cons	Not Reported	0.4	0.33	82.85	4.51
51	Poly-Office-Direct	H-H-Offices	Direct	Ope	Blackshill	Dublin	Natura2000	Regional	Special Areas of	Cons	Not Reported	771.86	1.06	0.16	1.81

## Data Map



## Dashboard



## 5.12 MBFM – Biodiversity Footprint Metrics (MSCI)

**MSCI Biodiversity Footprint Metrics are designed to quantify the potential impact of a company's activities on biodiversity.**

**MSCI provides metrics based on Potentially Disappeared Fraction of Species (PDF) and Mean Species Abundance (MSA).**

**To allow a complementary view, MSCI provides data for both these metrics.**

### Description and steps

MSCI ESG Research offers data on two biodiversity footprint metrics to measure the level of biodiversity impact, one based on the Potentially Disappeared Fraction of Species (PDF) and the other based on the Mean Species Abundance (MSA).

The footprint assessment based on PDF takes global species diversity as a proxy for the state of biodiversity and indicates a company's potential contribution to global species extinction due to pressures, where the agent may be a company, activity or asset. MSCI ESG Research calculates the footprint metric based on PDF for direct operations of a company. The PDF metrics assess companies' potential annual biodiversity impacts if pressures persist over the next 100 years.

The footprint assessment based on the MSA takes local terrestrial biodiversity intactness as a proxy for the state of biodiversity. This intactness is decreased by pressures, such as land use for human activities. MSCI ESG Research calculates the footprint metric based on PDF for direct operations of a company. The metric considers the current impact of a company on local biodiversity intactness versus a background state without the company's presence.

The MSCI Biodiversity Footprint Metrics are based on a spatially explicit assessment. MSCI ESG Research quantifies impacts for pressures for known asset locations available in MSCI's GeoSpatial asset location data set. Location- or asset-level values are aggregated at the company level.

MSCI ESG Research also provides underlying data (input data for pressure categories). The MSCI Biodiversity Footprint Metrics can be aggregated to company-, portfolio- and fund-level metrics.

### Organisations and reviewers

Data quality assurance processes and analytical quality controls are conducted on all data prior to publication. The quality assurance process for data used in the MSCI Biodiversity Footprint Metrics includes a combination of system and manual checks, such as system-driven validation rules, exception-based checks, and processes to identify outliers and outdated data.

### Current stage of development

Available.

### Transparency of method

MSCI ESG Research provides a detailed methodology document and underlying input data to its clients.

### What is the main purpose of this tool?

MSCI Biodiversity Footprint Metrics may be used for different purposes.

- **Engagement:** Biodiversity footprint metrics may be used to engage with companies. The metrics could be considered a starting point to mitigate or manage related biodiversity risks. The metrics could be used in combination with a company's risk management practices to address biodiversity impacts.

- **Address regulatory/ reporting pressure:** The metrics may be used to identify companies that might face pressure from biodiversity-related regulations, including reporting requirements on biodiversity impacts. However, the metrics do not constitute any advice to their users about, for example, whether companies with a low or high biodiversity footprint comply with any regulations. The information is provided "as is" and does not constitute legal advice or any binding interpretation. Any approach to comply with regulatory or policy initiatives should be discussed with a user's own legal counsel and/or the relevant authority, as needed.
- **Alignment with (voluntary) reporting frameworks:** The metrics may be used to report against voluntary reporting frameworks such as the Task Force on Nature-related Financial Disclosures (TNFD) framework. While the TNFD does not define specific impact biodiversity metrics, the initiative does recognise the relevance of measuring the level of ecosystem condition and species extinction risk at the company level.
- **Risk management:** The metrics may be used for risk management.
- **Exclusion-based investing:** The metrics may be used for exclusion-based investments to build portfolios with potentially lower biodiversity impacts.

### What does it measure?

The MSCI PDF based biodiversity footprint metric measures a company's potential contribution to a global species extinction. The metric is a unitless fraction which indicates the potential disappearing fraction of species if a company's pressures are ongoing over the next 100 years. MSCI ESG Research also provides the PDF per pressure category and underlying data on pressures. To improve readability of the data, we scale the PDF values by the factor 108 (100,000,000). The scaled value may be interpreted as an upper limit to the potentially disappeared number of species. The highest potential PDF value is now 100 million which corresponds with the estimated number of species on our planet (upper range). A PDF of e.g., 1,000 indicates a company's potential contribution to the extinction of 1,000 species in relation to an estimated number of 100 million species on Earth over the course of the next 100 years.

The MSCI MSA based biodiversity footprint indicates the spatial extent of a company's potential contribution to the degradation of local ecosystem/biodiversity intactness or in other terms: how could a company impact the location specific MSA by the way it uses land?

### What input data are needed?

MSCI ESG Research uses data on different pressure categories (e.g., GHG emissions, water consumption) which rely on both company disclosures and estimation models. MSCI ESG Research has developed models to estimate company land use and water consumption (detailed below in Section 5), given a lack of detailed and consistent company reporting on land use and water consumption across sectors and regions. In addition, MSCI ESG Research uses data on physical assets from its MSCI GeoSpatial

dataset. This dataset comprises externally sourced data (e.g., licensed databases, government sources and open sources) combined with manually collected data, both of which have undergone a quality verification process.

### What other tools are most complementary to this tool?

The MSCI Biodiversity Footprint Metrics are complementary to other metrics part MSCI Nature & Biodiversity Solutions which include 160+ data points as of September 2024. These metrics are designed to help investors integrate biodiversity and nature considerations into investment decisions and to align with disclosure obligations from emerging regulations and voluntary reporting frameworks. E.g., clients may use the MSCI Biodiversity Footprint Metrics in combination with MSCI metrics that assess a company's biodiversity risk management practices or in combination with MSCI biodiversity-sensitive areas screening metrics to assess geographic exposure.

### How can the tool be used for TNFD reporting?

The Biodiversity Footprint Metrics may be used to report against voluntary reporting frameworks such as the Task Force on Nature-related Financial Disclosures (TNFD) framework. While the TNFD does not define specific impact biodiversity metrics, the initiative does recognise the relevance of measuring the level of ecosystem condition and species extinction risk at the company level. For TNFD's Core Disclosure Metric C 5.0 - *Ecosystem condition*, the MSCI MSA based footprint metrics may be used while for C 5.0 - *Species extinction risk* the MSCI PDF based footprint metrics may be used.

### Main strengths and limitations

#### Strengths:

- Spatially explicit (location specific impact of pressures considered).
- Based on academic sound methodologies: LC-Impact/ GLOBIO Model.
- Scope: MSCI Biodiversity Footprint Metrics are calculated for all assessable constituents in the MSCI ACWI Investable Markets Index (IMI).

#### Limitations:

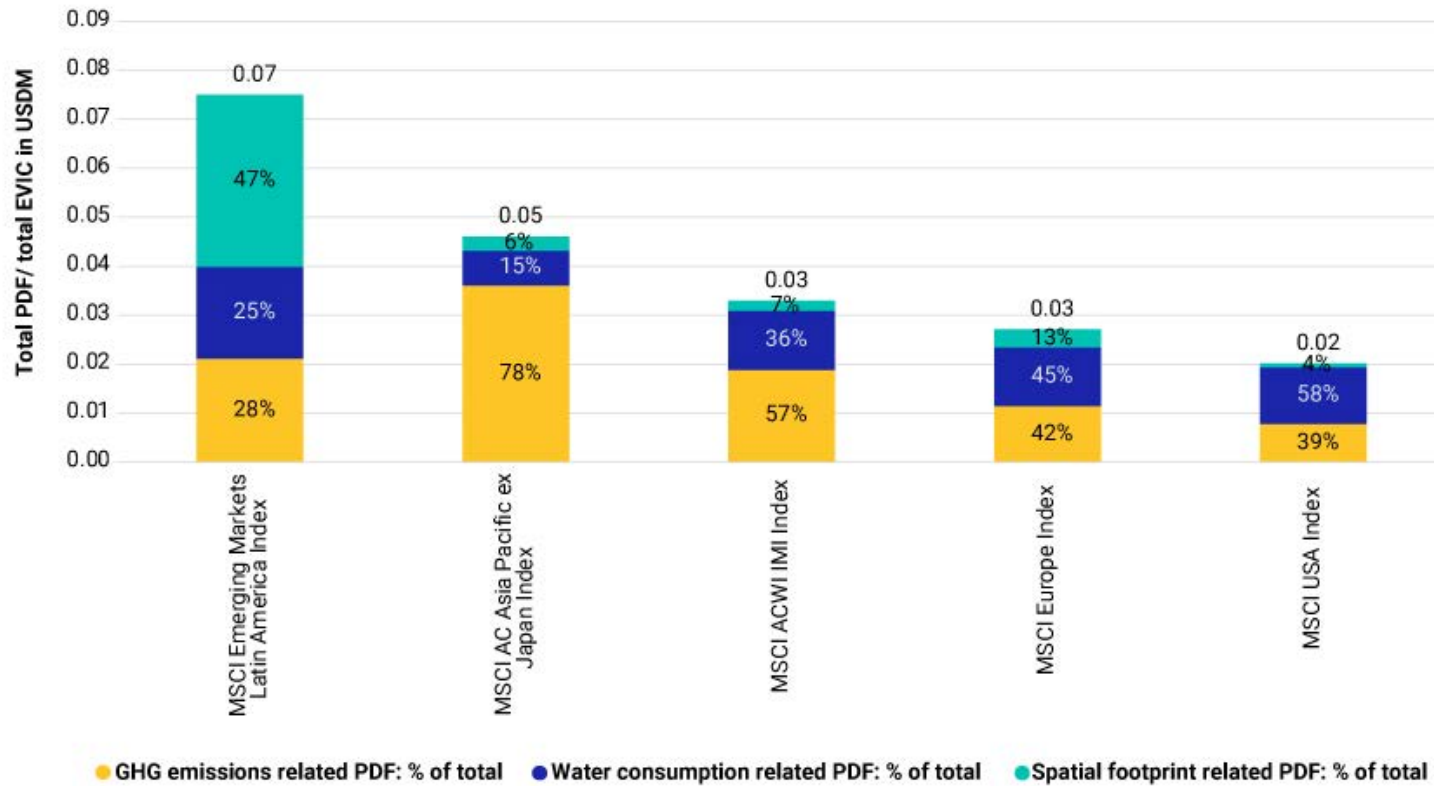
- Scope 3 or supply chain impacts currently not modelled.
- Not all potential pressure categories considered.

### What are the costs?

Commercial licensing. Information not publicly available. Available on request.

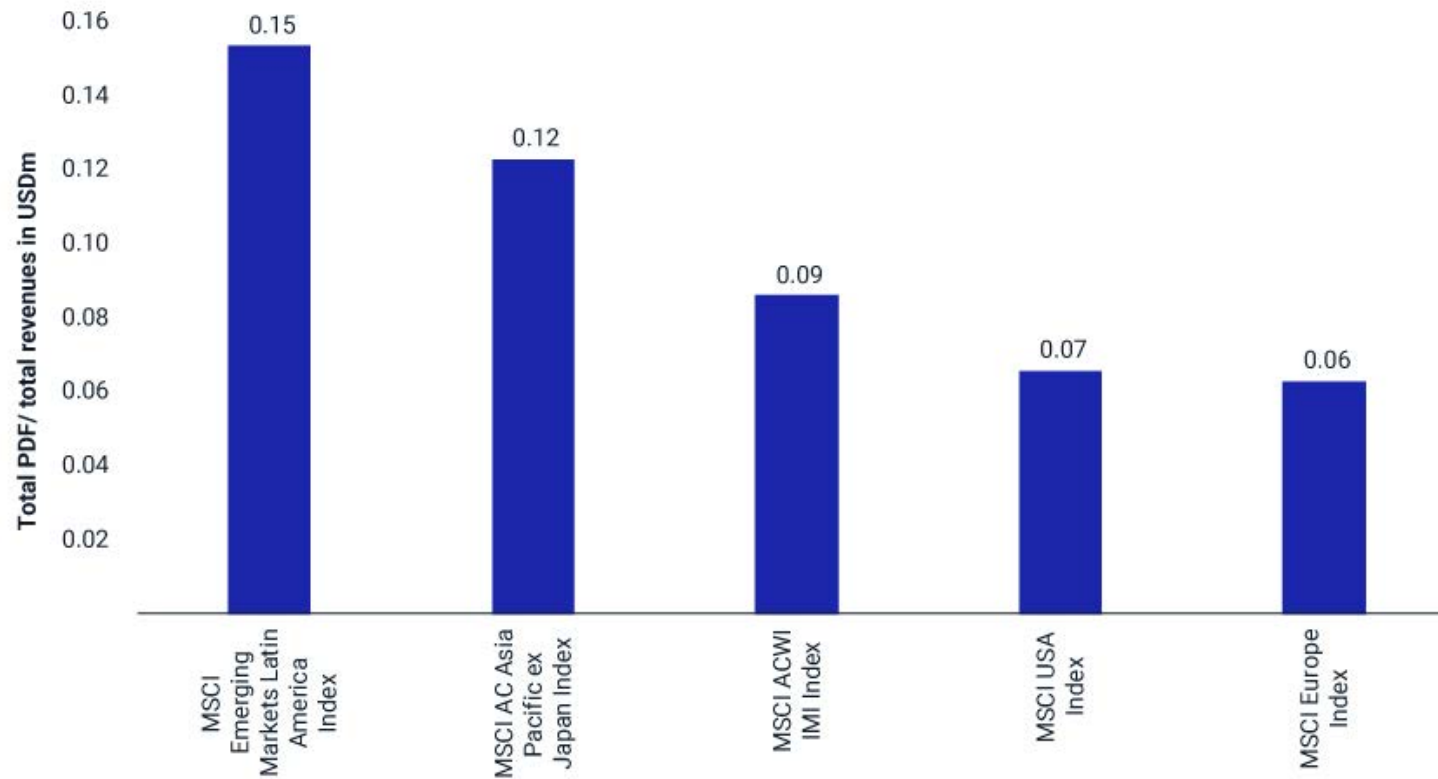
**Exhibit: Total global PDF per enterprise value including cash (EVIC)**

Source: Data as of Sept. 30, 2024. Figure shows the total global PDF of index constituents divided by the total EVIC of index constituents. We excluded constituents from the calculation where no PDF data was available. Source: MSCI ESG Research, See MSCI blog post [here](#).



### Exhibit: Index representation vs. biodiversity footprint by sector

Data as of Sept. 20, 2024. We calculated the average PDF intensity per index by dividing total PDF values (MSCI factor: total global potential species extinction) of index constituents by the total annual revenues of the index constituents. We excluded constituents from the calculation where no PDF data was available. Source: MSCI ESG Research



## 5.13 S&P NBS - Nature & Biodiversity Solutions

The S&P Global Sustainable1 Nature & Biodiversity Solutions assesses nature-related impacts and dependencies across a company's direct operations that can be applied at the asset, company, and portfolio level. The solutions applies the Nature Risk Profile, a new methodology for analysing companies' impacts and dependencies on nature, launched by S&P Global Sustainable1 and the UN Environment Programme World Conservation Monitoring Centre (UNEP-WCMC).

The S&P Global Sustainable1 Nature & Biodiversity Solutions analyse the direct impacts and dependency risks a company has on nature: supports companies, investors, and entities as they seek to understand, manage, and mitigate exposure of companies and investment portfolios to nature-related risks. The methodology is in line with the Taskforce on Nature-related Financial Disclosures (TNFD) LEAP approach and can be leveraged by market participants for more transparent alignment with the TNFD recommendations.

### The solutions provide:

- 130+ metrics to measure impacts and dependencies on nature & biodiversity
- Ecosystem Footprint metrics to measure impact, and Dependency Scores to measure dependencies across 21 Ecosystem Services
- Impact and dependency metrics for 20,000+ public and private companies, as well as self-service platform to assess clients' bespoke asset portfolios
- Leverages database of over 1.6 million assets mapped to corporate owners, based on S&P Global and other third-party datasets
- Overlap with Key Biodiversity Areas (KBA) and Protected Areas (PA) screening metrics and visualisation
- Understand nature risk exposures using maps and results visualisations in desktop-enabled solution

- Multiple delivery channels and workflows:
  - Desktop:* Capital IQ Pro, including Screener, Dashboard, Excel plug-in and Portfolio Analytics tool
  - Data Feed:* Xpressfeed, Snowflake, Workbench, FTP
  - SaaS:* Nature Risk Platform that enables customers to upload proprietary asset information to assess nature-related impacts and dependencies of real assets in their portfolios, operations and supply chains
  - Reporting services:* One-off company or portfolio assessment report

### S&P Global Sustainable1 Nature & Biodiversity Solutions analyse the direct impacts and dependency risks a company has on nature:

- 1 Negative impact of a company on nature and biodiversity
  - *Ecosystem Footprint in hectares equivalent HSA (Highest Significance Area) - ha HSA eq.*
  - Definition: Indicator of the level of nature degradation that measures both the decline in integrity of ecosystem via the Ecosystem Integrity Index, and the relative significance of the ecosystem impacted vis the Ecosystem Significance Index. Local indicator.
  - Scope: Operations (supply-chain to be developed in future versions).
  - Calculation method: Uses asset and company-specific data, but is primarily modelled based on asset/industry physical footprint and location. *Ecosystem Integrity Index – Index 0-1.*

- Definition: Indicator of the level of integrity of ecosystems compared to a natural state, based on its Compositional Integrity (Biodiversity Intactness Index), Structural Integrity (Human Modification Index) and Functional Integrity (Net Primary Productivity Index). Local indicator.
- Scope: Operations (supply-chain to be developed in future versions).
- Calculation method: Uses asset and company-specific data, but is primarily modelled based on asset/industry physical footprint and location.
- Biodiversity Intactness Index BII (*Ecosystem Integrity Composition Index*) – *Index 0-1.*
- Definition: Indicator of the level of biodiversity loss. Specifically measures the decline in number and diversity of native species. Local indicator.
- Scope: Operations (supply-chain to be developed in future versions).
- Calculation method: Uses asset and company-specific data, but is primarily modelled based on asset/industry physical footprint and location.
- IBAT STAR (*Species Significance Index*) – *Absolute and Index 0-1.*
- Definition: Indicator of the importance of a location for biodiversity conservation based on level of threats and density and rarity of species. Local indicator.
- Scope: Operations (supply-chain to be developed in future versions).
- Calculation method: based on business/asset location.

- 2 Business dependency risk on ecosystem services
  - Dependency Risk scores to quantify the level of risks to a company or assets.
  - Definition: Assessment of the level of risk a business process or activity might be exposed to on specific ecosystem services, based on its reliance on 21 ecosystem services and the resilience risk of these services in a specific location.
  - Reliance on ecosystem services via ENCORE and additional company and location-specific assessments where relevant (e.g., water provision, flood and storm protection, etc).
  - Resilience Risk of ecosystem services based on location-specific assessment of ecosystem integrity and additional environmental characteristics where relevant (eg. soil condition).
  - Scope: Operations (supply-chain to be developed in future versions).
  - Calculation method: Modelled according to asset type or sector turnover, and location.
- 3 Company mitigation/management activities with respect to biodiversity
  - ESG score (described above because already used): metric 0-100.
  - Definition: Indicator of the company's own management and priority of the impacts on biodiversity measured on their reporting capacity.
  - Scope: Operations only.
  - Calculation method: at company level (not specific to a location).
- 4 Positive impact of the company on nature over time
  - Annual change in Ecosystem Integrity Index and Species Significance Index.

- Definition: Indicates whether negative impacts on nature and biodiversity have increased or decreased. Will not be available until there is historical data on the impact, i.e. within year 2.
  - Scope: Operations (supply-chain to be developed in future versions).
  - Calculation method: Uses asset and company-specific data, but is primarily modelled based on asset/industry physical footprint and location.
- 5 Company's overlap with key biodiversity areas and protected areas
    - Overlap with Key biodiversity areas (KBAs) / Protected Areas (PAs) – hectares.
    - Definition: Indicates the absolute area of assets overlapping with KBAs/PAs. Not directly related to the impact on biodiversity, however, operating in a place rich in biodiversity increases the likelihood that there could be negative impact on nature and biodiversity.
    - Scope: Operations (supply-chain to be developed in future versions).
    - Calculation method: based on business/asset location.
  - 6 The company's proximity to biodiversity hotspots
    - Key biodiversity areas/protected areas – km, etc.
    - Definition: Indicates the proximity of areas classified as protected. Not directly related to the impact on biodiversity, however, the proximity of a place rich in biodiversity could increase the likelihood that there could be negative spillover effects in these areas, thus having an impact on biodiversity. Tends to be higher in areas with more advanced environmental regimes (developed countries) than in areas that actually have higher densities of biodiversity (tropics, etc.). Local indicator.

- Scope: Operations. Could include supply chain if we link supply chains to businesses e.g., via Panjiva data.
- Calculation method: based on business/asset location.

**Coverage:**

1.6+ million assets linked to corporate entities and ultimate parent entities. 20,000+ companies representing over 98% of global market capitalisation

**Partnership/ history:**

Robust, science-based, and open-source nature risk assessment methodology, developed in partnership with UNEP-WCMC

**Organisations and reviewers**

Developed in partnership with UNEP-WCMC.

**Current stage of development**

Completed, Asset Level, Company Level and Portfolio Level, Direct Operations, Terrestrial Biome. Supply chain, Country level and Marine ecosystem, Deforestation and Freshwater ecosystem and risk mitigation, integrated in future versions.

**Transparency of method**

- The Nature Risk Profile is publicly available and open-source.
- All indicators are sourced from peer-reviewed science and their methodologies are publicly available.
- UNEP-WCMC co-developed the ENCORE Tool and framework in partnership with Global Canopy and the UNEP Finance Initiative (UNEP FI); is a trusted knowledge hub on nature and biodiversity, curating and contributing to leading datasets including IBAT Alliance, Nature Map Initiative, UN Biodiversity Lab, among others.

### What is the main purpose of this tool?

S&P Global's Nature & Biodiversity Solutions apply the Nature Risk Profile methodology by combining essential sustainability intelligence on corporate entities and their assets with geospatial datasets on nature and biodiversity.

With the aim to learn from and guide clients towards a better understanding of nature-related risks and opportunities while test-driving the TNFD's framework.

### What does it measure?

Nature and Biodiversity risk data can help investors, Banks and other clients

- Understand your company's impact and dependencies on nature
- Prepare for disclosure mandated by regulation
- Measure portfolio performance against an index
- Manage risk and disclose nature-related performance based on recommendations by the TNFD Framework
- Understand the performance of peers and compare to a benchmark

### What input data are needed?

Solution requires a company name (or index) for an investment portfolio analysis, or information of asset portfolio for bespoke analysis.

### What other tools are most complementary to this tool?

ESG Score Raw data company commitments data, Climonomics Physical Risk tool, Commodity Insights Energy Transition Tracker, Mobility IHS emissions Data, Net Zero Commitment Tracker, and more.

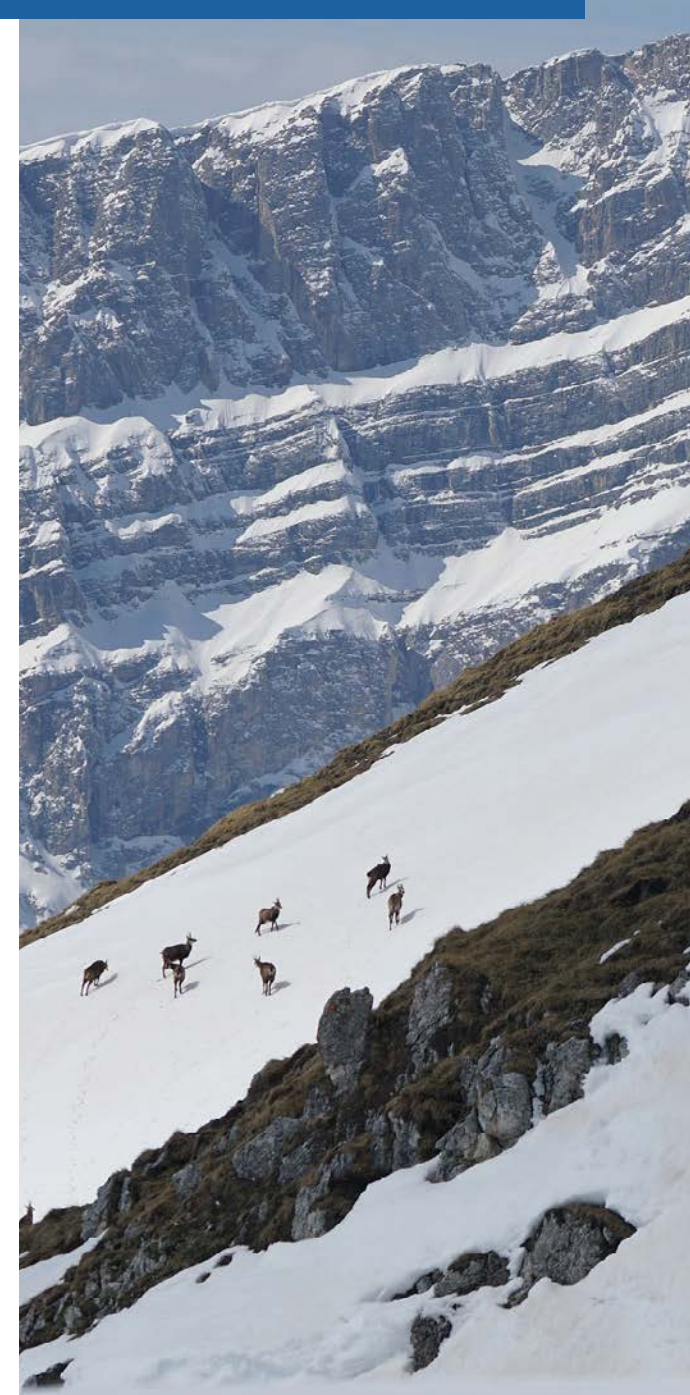
### How can the tool be used for TNFD reporting?

Follow TNFD recommendation and bespoke solutions for [TNFD mapping](#).

### Main strengths and limitations

#### Strengths:

- **Company report:** Companies can use this service to assess and report the nature-related risks of their operations.
- **Portfolio assessment:** Financial institutions can assess and report the nature-related impacts and dependencies of their portfolios through an end-to-end assessment.
- **Dataset:** Access curated & comprehensive Nature & Biodiversity data intelligence and analytics services to efficiently assess company operations & investment portfolios.
- **TNFD Aligned Metrics:** Understand impacts and dependencies on nature in line with TNFD recommendations.
- **Broad Data Coverage:** Impact and dependency metrics for >20,000 public and private companies.
- **Extensive Asset Level Data:** Over 1.6M assets mapped to corporate owners.
- **Open-Source Methodology:** Built on the Nature Risk Profile methodology, informed by a Knowledge Community of >200 market participants.
- **Specialist Analyst Support:** Experienced analyst program management and delivery.



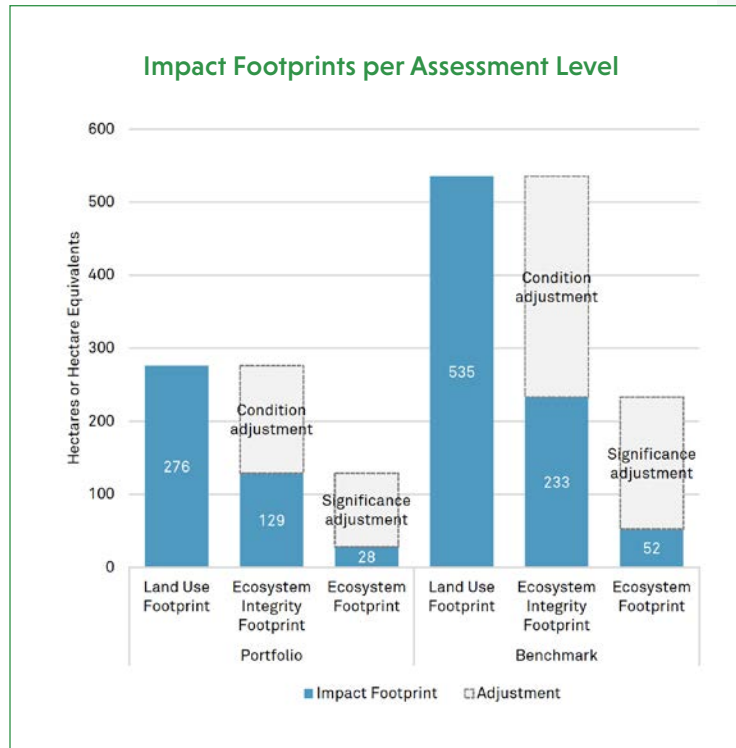
## Output visuals S&P NBS

### Limitations:

- Supply Chain data yet to be integrated in future release.
- S1 TNFD Advisory services may be required in addition to solution.

### What are the costs?

Reach out to [S1\\_ESGspecialists@spglobal.com](mailto:S1_ESGspecialists@spglobal.com) for more details.



### Ecosystem Integrity impact versus significance adjustment comparison

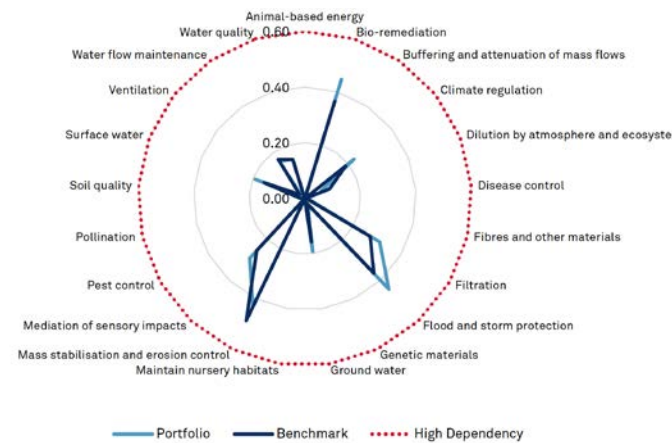
The grids below show the portfolio and benchmark land-use weighted exposure to different levels of Ecosystem Integrity Impact (EI) and Ecosystem Significance (ES) adjustments. The distribution of adjustments have been split into quintiles, based on the full Sustainable1 universe of 17,000+ companies. The lower left corner of each grid represents exposure to companies with both ES and EI adjustments at the company level among the lowest 20% of the universe, while the upper right corner represents highest 20%. For reference, the quintile cut-offs are shown in the right-hand table.

		Portfolio				
		1st Quintile	2nd Quintile	3rd Quintile	4th Quintile	5th Quintile
Ecosystem Integrity	5th Quintile	1.3%	0.0%	0.5%	0.1%	0.1%
	4th Quintile	0.1%	0.3%	0.1%	0.4%	0.0%
	3rd Quintile	0.0%	0.0%	0.0%	0.3%	0.0%
	2nd Quintile	1.0%	0.0%	1.5%	0.6%	0.0%
	1st Quintile	4.8%	1.3%	15.9%	22.7%	48.8%
		1st Quintile	2nd Quintile	3rd Quintile	4th Quintile	5th Quintile
		Ecosystem Significance				

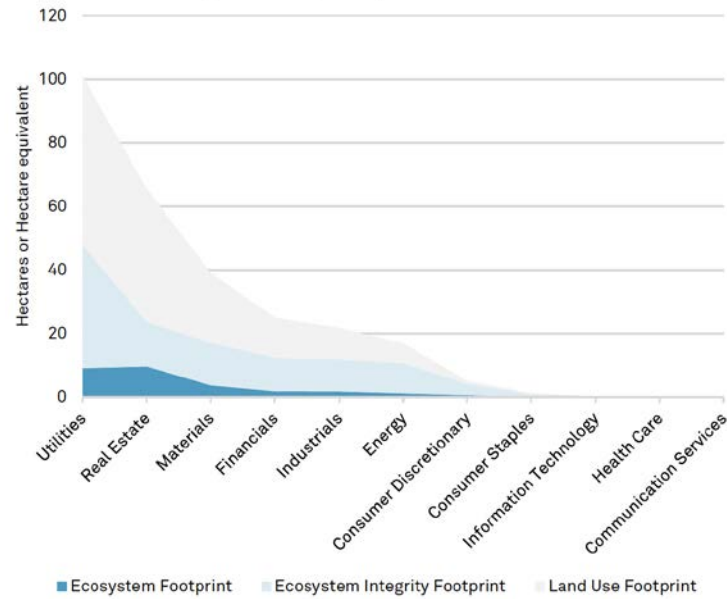
Quintile	Eco-Integrity Impact	Ecosystem Significance
1st	0 to 0.76	0 to 0.08
2nd	0.76 to 0.81	0.08 to 0.1
3rd	0.81 to 0.82	0.1 to 0.13
4th	0.82 to 0.86	0.13 to 0.19
5th	0.86 to 1	0.19 to 1

		Benchmark				
		1st Quintile	2nd Quintile	3rd Quintile	4th Quintile	5th Quintile
Ecosystem Integrity	5th Quintile	1.1%	0.0%	0.0%	0.3%	0.0%
	4th Quintile	0.7%	0.1%	0.3%	0.2%	0.4%
	3rd Quintile	0.1%	0.0%	0.0%	0.4%	0.8%
	2nd Quintile	0.9%	0.5%	0.2%	0.3%	0.3%
	1st Quintile	3.9%	0.5%	2.9%	18.0%	67.8%
		1st Quintile	2nd Quintile	3rd Quintile	4th Quintile	5th Quintile
		Ecosystem Significance				

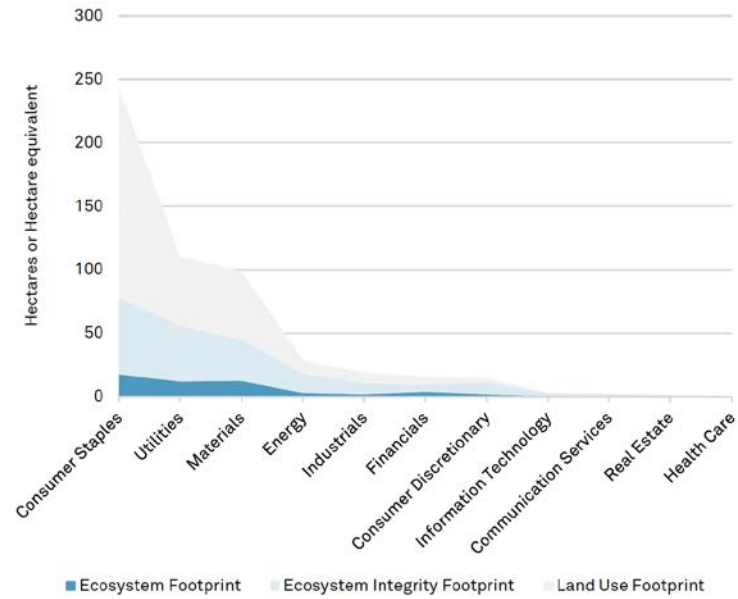
### Ecosystem Service Dependency



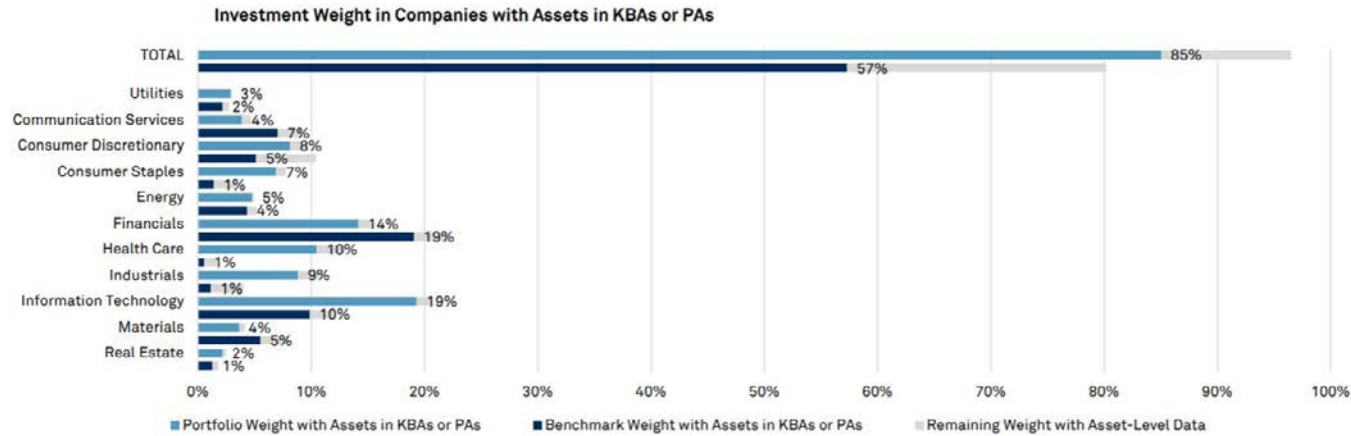
Portfolio Ecosystem Footprint by Sector



Benchmark Ecosystem Footprint by Sector



## Investment Weight in Companies with Assets in KBAs or PAs



## Dependency by Sector

	TOTAL	Communications Services	Consumer Discretionary	Consumer Staples	Energy	Financials	Health Care	Industrials	Information Technology	Materials	Real Estate	Utilities
<b>PROVISIONING</b>												
Animal-based energy	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fibres and other materials	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Genetic materials	0.02	0.00	0.00	0.02	0.00	0.00	0.15	0.00	0.00	0.01	0.00	0.00
Ground water	0.19	0.11	0.18	0.24	0.18	0.18	0.17	0.17	0.21	0.23	0.11	0.35
Surface water	0.19	0.11	0.18	0.24	0.18	0.18	0.17	0.17	0.21	0.23	0.11	0.35
<b>REGULATORY &amp; MAINTENANCE</b>												
Bio-remediation	0.45	0.50	0.45	0.45	0.41	0.40	0.46	0.44	0.50	0.35	0.51	0.34
Buffering and attenuation of mass flows	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Climate regulation	0.23	0.05	0.26	0.20	0.53	0.20	0.13	0.28	0.18	0.40	0.13	0.52
Dilution by atmosphere and ecosystems	0.06	0.00	0.06	0.10	0.01	0.01	0.10	0.12	0.03	0.12	0.00	0.00
Disease control	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Filtration	0.31	0.25	0.27	0.38	0.40	0.25	0.38	0.33	0.30	0.29	0.30	0.23
Flood and storm protection	0.44	0.32	0.49	0.48	0.55	0.40	0.37	0.50	0.45	0.43	0.46	0.49
Maintain nursery habitats	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mass stabilisation and erosion control	0.43	0.49	0.43	0.43	0.28	0.46	0.40	0.43	0.47	0.36	0.50	0.36
Mediation of sensory impacts	0.29	0.32	0.36	0.20	0.06	0.29	0.29	0.36	0.35	0.22	0.41	0.02
Pest control	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pollination	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Soil quality	0.01	0.00	0.00	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ventilation	0.01	0.00	0.02	0.01	0.01	0.00	0.01	0.05	0.00	0.06	0.00	0.00
Water flow maintenance	0.16	0.03	0.10	0.29	0.16	0.08	0.29	0.25	0.07	0.37	0.04	0.30
Water quality	0.15	0.02	0.09	0.26	0.34	0.06	0.24	0.21	0.06	0.30	0.03	0.23
<b>COMPOSITE</b>												
Aggregate	0.66	0.59	0.65	0.69	0.68	0.62	0.68	0.68	0.66	0.68	0.65	0.68

## 6. Case studies

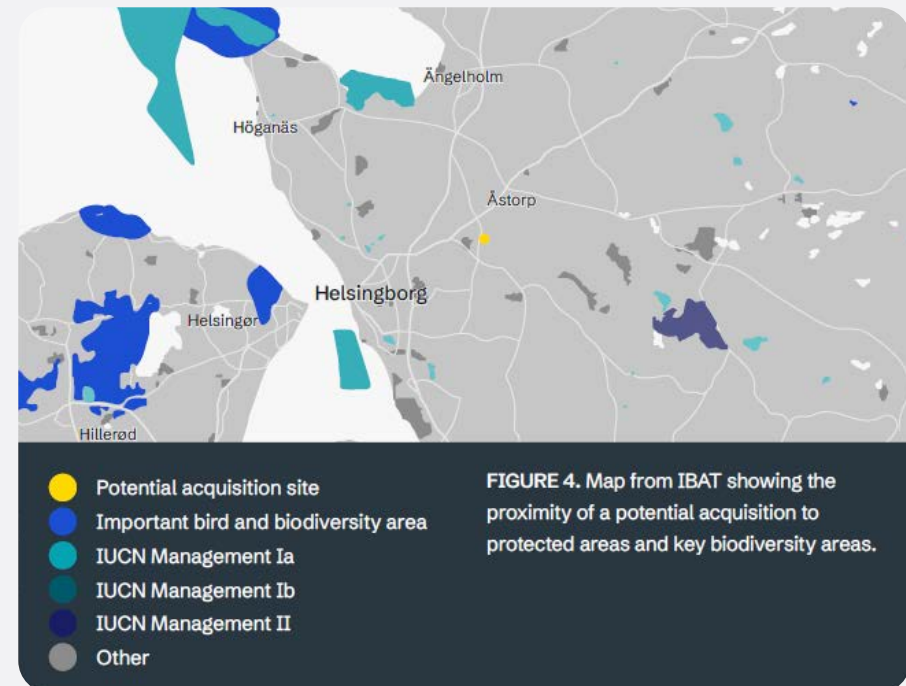
The case studies in this chapter show how and why FIs have used some of the measurement approaches described in this guide.

### Aviva Investors: Navigating nature, opportunities for the investor for tomorrow

Nature has been at the forefront for Aviva Investors. With biodiversity and deforestation identified as potential key risk and opportunity, the organisation started using IBAT as a biodiversity risk screening tool. This enabled Aviva Investors to better understand the nature-related impacts and dependencies associated with their private market investments.

Aviva Investors has utilised IBAT to conduct initial assessments of potential exposure to biodiversity-important areas, thereby helping to identify potential risks for further investigation. The private markets team has applied IBAT in the assessment of prospective acquisitions in real estate and infrastructure equity, as well as for screening their existing real estate holdings, development projects, and infrastructure assets. To date, IBAT has been used to assess over 450 assets, with a total capital value exceeding £11.9 million.

An example of the IBAT analysis is shown in figure 4. The outputs of the analysis in the map (figure 4) went to the Aviva Investors Global Investment Committee along with other environmental, social and governance (ESG) due diligence information. Since the acquisition site is not within 1km of any key biodiversity areas, protected areas, or threatened species, no additional action was taken. In the event Aviva Investors acquires a development site in close proximity to key biodiversity areas or protected areas, the team can engage with development teams, landscapers and ecologists to mitigate the impact on the local ecosystem.



## LFDE's use of BIA-GBS

In 2021, La Financière de l'Echiquier (LFDE) subscribed to the BIA-GBS database aiming for two objectives: to be able to measure the impact of its portfolios on biodiversity, and to provide quantitative information to investment teams for their investment decisions, especially for LFDE's impact fund '[Echiquier Climate & Biodiversity Impact Europe](#)'. LFDE selected BIA-GBS because of the robustness of the methodology based on the expertise of CDC Biodiversité, the online platform, and the complementarity and consistency with climate data.

LFDE is satisfied with the coverage rates of BIA-GBS, ranging between 18% to almost 100% depending on portfolios' strategies (average of 67% for all LFDE holdings). In 2022, LFDE released its first [Climate and Biodiversity Report](#). Using BIA-GBS, the organisation was able to report on the biodiversity footprint of all its funds. The tool has comprehensive and illustrative measurements for clients. BIA-GBS was found to be an interesting tool for portfolio managers to understand sectoral impacts on biodiversity.

At present, the main limit of BIA-GBS (and other footprinting tools) is the absence of bottom-up analysis, which prevents FIs from comparing competitors on their real impacts or identifying positive impacts and thus companies providing solutions to biodiversity loss.

In conclusion, BIA-GBS can be used for estimating portfolio impact, monitoring, and screening biodiversity risks, and training portfolio managers. However, it is too early to use it in an investment process for stock picking. LFDE is currently experimenting with combining the BIA-GBS results with qualitative data used in an internal and proprietary scoring.

## Biodiversity footprint at portfolio company level with GBS-FI by France Invest

In 2023, the members of the biodiversity working group of France Invest's Sustainability Commission wanted to go further in integrating biodiversity-related issues by launching a pilot study on measuring the biodiversity footprint. The objective was to assess the feasibility of measuring the biodiversity footprint for the private equity sector by developing a methodology that is accessible to SMEs and can be replicated on the scale of a portfolio of several dozen companies. Four Private equity managers chose to work together with CDC Biodiversité on this innovative project and tested the GBS on four of their portfolio companies from the energy, cosmetics and agrifood sectors.

The GBS methodology was used to translate the activity data from each of the pilot study participants into one main result: the quantification of the total impacts on biodiversity generated by all their activities expressed in MSA.m<sup>2</sup>. These results were used to identify hotspots of impacts along the whole value chain of the companies assessed, and thus action levers that could contribute to reducing their biodiversity footprint.

This pilot study has made it possible to determine a course of action for measuring the biodiversity footprint of non-listed portfolios. Private Equity managers can use biodiversity assessments made on their portfolios using GBS-FI to feed regulatory reporting which require the disclosure of impacts and dependencies on biodiversity. This reporting can be based on both screenings of entire portfolios and deep dives on a handful of priority companies: those with high biodiversity risks but also characteristics that make the exercise feasible.

For more details on this case study, please see [GUIDE BIODIVERSITE 2024 ENG P30 \(franceinvest.eu\)](#) from page 13 and [Bridging finance and nature: the role of the Global Biodiversity Score | CDC Biodiversité \(cdc-biodiversite.fr\)](#) section 3.3.

## HSBC using CBF to create a biodiversity-screened index

In 2021, HSBC [launched](#) the Euronext ESG Biodiversity-screened Index, the world's first broad-based biodiversity screened equity index. The aim of the Biodiversity-screened Index is to allow investors to consider the impact on natural capital in their trading and investment decisions. It provides a benchmark for investors as to which stocks to include in their portfolios and which to exclude, based on how a company's overall activities impact nature.

The Euronext ESG Biodiversity-screened Index has been constructed following a broad and encompassing screening approach, starting from the Euronext World Index (1500 companies) and consisting of the following methodological steps (full rulebook available [here](#), under 'Theme indices'): 1) financial screening (exclusion of small companies), 2) SRI screenings (exclusion of companies involved in controversial activities), 3) ESG screening (exclusion of companies with a high ESG risk score), and 4) biodiversity screening. For this last screening step, the CBF approach was used to identify and exclude the 33% highest-impact companies per sector, based on the relative impact score (expressed in km<sup>2</sup>.MSA/MEUR invested). HSBC chose to use the CBF approach because it covers companies' full value chain and is based on the MSA metric. Of the retained companies, the 500 biggest capitalisations are included in the World Biodiversity-screened Index.

The index is updated quarterly, with biodiversity scores being updated annually. Compared to the Euronext World Index, the Biodiversity-screened index has a 53% lower weighted CBF intensity, and a 53% lower weighted GHG intensity. Furthermore, ESG Risk is considered 14% lower. Economic performance of the index portfolio over time does not deviate much from that of the total world index.

## European Investment Bank's project finance application of the BFFI

In 2023, the European Investment Bank (EIB) pilot-tested the Biodiversity Footprinting for Financial Institutions (BFFI) method, carried out by PRé Sustainability and reflected by the Partnership for Biodiversity Accounting Financials (PBAF). This arose out of the bank's need to assess both [biodiversity dependency and impact risks](#) at project level.

A conceptual flowchart was developed to distinguish five types of assessments based on the available time and resources, or the outcomes achievable within those constraints.

The method was applied to four case studies of infrastructure projects in different locations and industries with diverse characteristics: an agriculture site in sub-Saharan Africa, an offshore wind park in the EU, a hydroelectric power plant in sub-Saharan Africa and a mining and processing plant in the EU. The flowchart developed was used to showcase each type of assessment illustrating what types of data are necessary for completing different types of biodiversity footprints. This showed that a full assessment which requires weeks of time, investment in LCA software and advanced footprinting knowledge can give the most detailed results, which can be used for in-depth analysis of root causes, scenario analysis and inclusion of positive impact. Regarding data, it was found that site-level Environmental Impact Assessments give a limited amount of data – usually scope 1 and scope 2 data and are typically described in a quantitative manner.

Following PRé Sustainability's assessment of using the BFFI, the recommendations for the European Investment Bank are to determine the intended use of the results of the footprint, analyse relevant impacts to include, choose an assessment level based on data availability, and obtain associated resources and expertise.

Despite the challenges, for EIB the BFFI method emerges as the most straightforward solution for project-level application and closely aligns with existing environmental and social due diligence processes. The methodology can focus on critical aspects and allows the use and integration of multiple types of data, including supply chain impacts and climate assessment data. Finally, being an open-source methodology designed for continuous improvement, it is imperative that researchers and practitioners continue to work on improving the tool.

## ABN AMRO's use of GID in impact reporting

ABN AMRO has reported for 4 years in a row on the monetized impact of its portfolio on six different types of capital. Natural Capital is one of the 6 capitals reported on in the [Impact report 2021](#) and is mainly underpinned by the GID tool. ABN AMRO also used the GID to publish a [report](#) in May 2022 on the specific biodiversity impact of its lending and investment activities. Comparison of the 2020 with the 2021 data showed a decrease of the negative Impact on biodiversity as a result of a change in strategy.

By using the GID to measure and value the impact on biodiversity, ABN AMRO was able to better understand its negative impact on biodiversity and to identify which of the sectors within its portfolio generate the largest impact. It also gave insight into the geographical location of the impact on biodiversity. This will improve policies and makes engagement with clients and other stakeholders more effective. The dataset also gives insights into the indirect impact of clients through their supply chain.

The GID expresses the effects of different drivers of loss in single units: the loss of a hectare with pristine biodiversity (biodiversity ha) and monetary units (€). This allows for aggregation and comparability and helps ABN AMRO to put its biodiversity impact into the context of the wider impact measurement and to integrate it into existing tools.

## ISS STOXX® Biodiversity indices using BIAT output

The [ISS STOXX® Biodiversity indices](#) were introduced in April 2023, offering a comprehensive approach to integrate biodiversity challenges into investment portfolios. The indices address three different biodiversity goals (avoid, minimise, enable) and incorporate an additional climate objective.

The indices are classified into two categories: "Biodiversity" and "Biodiversity Leaders." The former tilt exposure to companies with high scores in seven biodiversity- and climate-related SDG objectives, while the latter include companies with high revenues derived from activities aligned with SDGs. A key component of the ISS STOXX Biodiversity framework is the Potentially Disappeared Fraction of Species (PDF), an output of ISS ESG's Biodiversity Impact Assessment Tool. PDF seeks to measure how corporates affect our natural world by considering a set of environmental pressures on species and habitats across the entire value chain and different geographical locations. PDF is divided by each company's Enterprise Value Including Cash (EVIC) to avoid size biases. The indices select the top 80% companies in each ICB Sector by PDF/EVIC.

## Nature-related impacts and dependencies assessment with S&P NBS by a leading Asia-based financial institution

An Asia-based financial institution joined the Partnership for Biodiversity Accounting Financials (PBAF) to collaborate with international organisations on addressing nature-related issues. This institution was among the first in its home country to join the TNFD. The risk management team aimed to assess the institution's nature-related impacts and dependencies and publish a report in line with TNFD recommendations, making them the first in their home country to do so. They sought specialists to support this analysis.

The risk management team required external support to assess the nature-related impacts and dependencies of their investment assets and assets under operations, and to publish the first TNFD report in their home market following the LEAP approach (Locate, Evaluate, Assess, and Prepare).

The S1 analytics solutions and product group discussed a four-step process that would draw on the **S&P Global Nature & Biodiversity Risk data** solution, built on the Nature Risk Profile open-source methodology launched by the UN Environment Programme (UNEP) and S&P Global. This solution covers 20k+ public and private companies with over 1.6 million assets mapped to corporate owners and provides

130+ decision-grade metrics to assess a company's impact and dependencies on nature as recommended by the GBF and in line with the TNFD LEAP approach.

The process entailed a four-step approach:

- 1 Evaluating the ecosystem footprint
- 2 Determining the ecosystem significance
- 3 Creating a dependency score
- 4 Helping to prepare the TNFD report

S1 collaborated with the risk management team to collect essential data that covered both the company's own operational assets, plus the assets it was financing. S1 leveraged its Nature & Biodiversity dataset to evaluate the nature-related impacts and dependencies of these assets, and then aggregated the results to the portfolio level. The assessment covered 159 major asset and operating sites across industries within the financial institution's home market. There were regular meetings during the engagement to help the risk management team understand the data collection process, methodology, and results. The results were then integrated into a TNFD report.

## Making Oceans Count project

The objective of the 'Making Oceans Count' project is to have risks and opportunities related to marine ecosystems better accounted for by key Nordic financial actors, by:

- Raising awareness and offering support to enhance the understanding, assessment and management of these risks and opportunities; and
- Investigating solutions to further integrate ocean data and metrics into financial decision-making and academic training.

Supported by the Velux Foundation, the project has been implemented by a consortium comprising the Green Digital Finance Alliance, WWF Denmark, and the Copenhagen Business School, with the participation of key Nordic FIs including Finance for Biodiversity Pledge signatories such as PensionDanmark, PKA and DNB.

The project suggests an integrated approach following three steps: 1) exploring and prioritising, 2) assessing, and 3) responding to FIs' exposure to marine risks and opportunities. It demonstrates that the potential levels of direct and indirect exposure to marine biodiversity risks are significant, and stem from a wide range of economic activities. The project focusses on offshore renewable energy, food production, pharmaceuticals, coastal infrastructure, marine transportation and supporting financial services. It analyses the contribution of these sectors to drivers of marine biodiversity loss and their dependence on marine ecosystem services. The approach was piloted in the Nordic region, but has global applicability.

Furthermore, the project has assessed key opportunities for FIs in terms of using ocean-relevant data and metrics. By engaging with data platforms and investors, the project developed blue metric concepts that could fill the current gaps in marine biodiversity data for FIs, such as metrics for assessing geolocated exposures to marine-sensitive zones. These concepts will be shared to inspire data providers and users to develop market applications.

## Accelerating the nature strategy of a Leading Global Asset Manager using the GIST Impact Nature & Biodiversity Suite

A Top 20 global asset manager is using GIST Impact's Nature & Biodiversity Suite to accelerate and expand its industry leading nature commitments. The Firm's priorities are managing nature risks, developing nature-positive investment strategies, investee engagement, and TNFD reporting. The Firm has initially focused on three themes: biodiversity, deforestation and water.

The Global Biodiversity Footprint was used to compare the Firm's funds against selected benchmark funds and indexes. Global Species Extinction Risk per \$M USD investment was quantified for each company and compared by sector, counterparty, environmental driver, and affected ecosystems. The Firm used company-reported data from 2016 to 2024 to identify nature leaders and laggards, and applied attribution analysis to model sector allocation and counterparty selection effects for portfolio optimisation.

Deforestation and water analysis was accomplished using the GI-SLA geospatial analysis tool, which assesses location-specific risks and impacts for over 3 million physical assets. Exposure to deforestation hotspots was assessed for each corporate asset, complementing value chain deforestation risk analysis. Company water usage was compared with exposure to localised factors including water stress and water supply depletion. Sector and portfolio aggregation was compared with benchmarks to prioritise segments for further analysis and engagement.

The GIST Data Portal was used for deep-dive analysis of specific companies, whereas portfolio analysis was performed in the Firm's own preferred analytic environment using bulk data downloads from GIST.

Within 3 months, GIST data and analytics have been applied to support all of the Firm's nature priorities, demonstrating the value of a robust, bottom-up data foundation to support evolving nature strategies.

## From forest to finance: Using the BII to track biodiversity decline and investment risk in the Amazon

The Natural History Museum collaborated with Federated Hermes on a report analysing the impact of deforestation on biodiversity intactness in the Amazon rainforest biome between 2000 and 2020 at a resolution of 1km<sup>2</sup>.

The data showed how land-use changes and intensification caused the biome's average BII to fall between 2000 and 2020, that this decline was widespread, and that in some small-scale areas the decrease was very significant.

This data highlighted the continued vulnerability of the Amazon rainforest, and how deforestation had a notable impact on the biodiversity of the biome over the past 20 years. The report was also able to identify some of the drivers of deforestation in the Amazon, such as ranching, crops, fires, logging and new roads.

With this level of insight, Federated Hermes was able to cross-reference the Museum's BII geospatial dataset with their own location data on corporate assets and operations to identify several nature-related risks to their investment portfolios. These risks fell into four main categories: reputational (i.e. how consumer pressure could impact sales), physical (i.e., supply chain security), regulatory (i.e. exposure to incoming legislation) and systemic (i.e., the existential threats biodiversity loss poses to the financial system and global economy).

This demonstrated that the Natural History Museum's BII metric can be applied to comprehend biodiversity changes and predictions at larger spatial scales, providing valuable data and insights for asset managers when cross-referenced with the location of corporate assets and operations.

# 7. Biodiversity data types and sources

The biodiversity measurement approaches outlined in this guide provide FIs with meaningful and decision-useful information. This chapter describes the types of data sources that are available as well as innovations in the field of biodiversity data. It builds largely on the EU B&B Platform [Thematic report on Biodiversity Data](#) and lessons learned within the FfB Foundation, which is building a Biodiversity Data Platform to guide FfB members in selecting the right data points and providers for specific objectives.

## 7.1 A broad variety of data sources

Data used by biodiversity measurement approaches include the following:

- **Financial data**, e.g., a company's turnover and purchases.
- **Physical flows**, e.g., a company's greenhouse gas emissions and water withdrawal.
- **Pressure on biodiversity**, e.g., linkage to deforestation and land use change.
- **State of nature**, e.g., ecosystem (extent and condition) and species (extinction risk, population abundance).
- **Provisioning of ecosystem services**, i.e., the supply of provisioning, regulating, supporting and cultural services by natural assets.
- **Quality of management response**, e.g., product certification, measures taken to mitigate negative biodiversity impact.

This data can come from a wide variety of sources, including ecological surveys, corporate disclosures, governmental and NGO-driven databases, and scientific literature.

## 7.2 Data sources and models used by footprinting tools

The approaches described in this guide rely on different data sources, including economic and biophysical company-level data (such as footprinting tools), and qualitative information (such as ENCORE), among others. With this data, the associated impacts on biodiversity and dependencies on ecosystem services are calculated.

The following table provides an overview of the type of data, unit of measurement, coverage, last update, and link to source regarding the measurement approaches described in this guide:



APPROACH	BFFI	BIA-GBS	BIAT	BII	BRF	CBF	ENCORE	GBS-FI	GID	GIST NBS	IBAT	MBFM	S&P NBS
Type of data	Reported data + company financials + modelled data	Modelled data	Modelled data	Academic peer-reviewed modelled data	Modelled data	Modelled data	Scientific and grey literature	Modelled data	Modelled data	Reported (traceable to source) + Asset Level + Financials + Bottom Up (spatial) Data + Scientific + Modelled	Reported/ bottom-up (spatial) data	Reported data + modelled data	Reported data + company financials + asset level disclosures + modelled data
Unit	PDF.ha.yr	MSA.km <sup>2</sup>	PDF.km <sup>2</sup> .yr; MSA.km <sup>2</sup>	BII%.Km <sup>2</sup>	Risk score (unitless)	km <sup>2</sup> .MSA.yr	Various qualitative and quantitative	MSA.km <sup>2</sup>	US Dollar; True Price method to monetise impacts	Impact: PDF and LCE (km <sup>2</sup> ); Risk and Exposure Scores (unitless)	Km <sup>2</sup> ; PDF	PDF; MSA.km <sup>2</sup>	Impact: High Significant Area; Ha.eq Dependency: Dependency Score 0-1
Coverage (e.g., number of companies)	No info	~ 7 000 companies + sovereigns	+ 17 000 issuers	50 000 <sup>5</sup>	Over 17 000 registered users (incl. mainly companies), and total 2 million location sites assessed. Note: this value is for both Water Risk Filter (WRF) & Biodiversity Risk Filter (BRF) combined in WWF Risk Filter Suite platform	> 8 500 companies & 100 + sovereigns	~ 11 000 users <sup>4</sup>	No info	Global coverage: 65 sectors in 141 regions	> 17 500 companies (98% of global investible market)	280	MSCI ACWI Investable Market Index (IMI)	> 20 000 Company coverage (98% of Global Market Cap covered). Large Cap: 70% Mid Cap: 20% Small Cap: 7%
Last update	2024	2025	2025	2000 – 2021 <sup>7</sup>	2024	2025	2024	2025	2024	2025	2025	2025	2022 <sup>6</sup>
Source	<a href="#">Link</a>	<a href="#">Link</a>	<a href="#">Link</a>	<a href="#">Link</a>	<a href="#">Link</a>	<a href="#">Link</a>	<a href="#">Link</a>	<a href="#">Link</a>	<a href="#">Link</a>	<a href="#">Link</a>	<a href="#">Link</a>	<a href="#">Link</a>	<a href="#">Link</a>

<sup>4</sup> Academia/research, business, finance sector (including banking, insurance, investment, and others), government, intergovernmental organisation, multi-stakeholder groups, and NGO/Civil Society

<sup>5</sup> Available through third-party platforms

<sup>6</sup> Latest financial year covered

<sup>7</sup> Represents latest year of modelled data; rapidly developing data to be 'one year behind'.



## Underlying datasets and models used by footprinting tools

Footprinting tools have a considerable presence in this guide. These estimate impacts using input-output databases and biodiversity models. Their resulting company-level impact figures represent potential rather than actual, on-the-ground measurements. In some cases, models and calculations are enriched with reported data on pressures or management responses from companies, thus making results more closely aligned with a company's real biodiversity impact.

**EXIOBASE** – EXIOBASE is a global, detailed Multi-Regional Environmentally Extended Supply-Use Table and Input-Output Table, developed by the EXIOBASE consortium consisting of NTU, TNO, SERI, Universiteit Leiden, WU, and 2-0 LCA Consultants. Developed by harmonising and detailing supply-use tables for many countries and estimating emissions and resource extractions by industry, EXIOBASE provides detailed information on the flows of goods and services between different sectors and regions of the world economy. This database is valuable for high-level analysing the environmental and socioeconomic impacts of global supply chains, allowing to assess the interconnectedness of economies and make informed decisions on sustainability and resource management. For more information on EXIOBASE, please refer to: <https://www.exiobase.eu>.

**GLOBIO** – The GLOBIO model (developed by PBL, UNEP GRID-Arendal, UNEP-WCMC, Radboud University Leiden and Wageningen University) was developed to feed into scenario analysis. It calculates the impacts of anthropogenic pressures on biodiversity based on scientifically underpinned cause-effect relationships. The main GLOBIO model focuses on impacts on terrestrial biodiversity, whereas the GLOBIO-Aquatic model calculates the impacts on freshwater biodiversity. Both terrestrial and aquatic biodiversity are represented by the MSA metric. Although the GLOBIO model was developed to cover global developments, the dose-response relationships can be applied at other geographical levels as well. The GLOBIO model is used by CBF, BIA-GBS, GBS-FI, MBFM and GID (for land use) to translate pressures into potential biodiversity impacts. For more information on GLOBIO, please refer to: [www.globio.info](http://www.globio.info).

**ReCiPe** – The ReCiPe model (developed by the National Institute for Public Health and the Environment (RIVM), Radboud University Nijmegen, Leiden University, PRé Consultants and Norwegian University of Science and Technology (NTNU Trondheim) was originally developed for LCA. It calculates the effects of emissions and resource extractions on ecosystem quality, damage to human health and resource scarcity, based on a number of environmental models. The effects on ecosystem quality are expressed in terms of terrestrial, aquatic and marine biodiversity loss. Biodiversity is represented by the PDF.m<sup>2</sup>.yr (for terrestrial biodiversity) and PDF.m<sup>3</sup>.yr (for freshwater and marine biodiversity) metrics. Both can be aggregated into one metric (PDF.m<sup>2</sup>.yr), although this conversion brings along uncertainties. ReCiPe's biodiversity module is used by BFFI and GID (for emissions) to translate pressures into potential biodiversity impacts. For more information on ReCiPe, please refer to: <https://www.rivm.nl/en/life-cycle-assessment-lca/recipe>.

*Source: Assessment of biodiversity measurement approaches for businesses and financial institution. Annex 1 to Update report 2. December 2019, Business & Biodiversity Platform.*

## 7.3 Innovative data collection methods

With continuous technological developments, new data sources are becoming available that offer more direct information on the state of biodiversity than biodiversity footprinting tools do.

### Environmental DNA (eDNA)

Animals, plants and bacteria constantly leave DNA traces behind in the environment (e.g., cells, hairs, etc). This environmental DNA (eDNA) can be retrieved from environmental samples such as water, air, soil, etc. and used to identify which species are or have been present in the sampled environment. eDNA monitoring thus offers an innovative and cost-effective way to collect primary data on biodiversity, for example at sites where companies have their operations. Furthermore, it can assist in ground truthing the predictions of biodiversity footprinting models and help measure progress towards restoration and net positive targets.

### Bioacoustics

Bioacoustics consists of the analysis of animal sounds. Various types of microphones can be used to capture the sounds in a landscape at different frequencies. Species and taxonomic groups can be identified from these soundscape recordings; a process which is automated through artificial intelligence technologies. By comparing soundscape recordings over time and by overlaying them with baseline soundscapes, the biological integrity of a landscape can be assessed. Furthermore, bioacoustics could be used to monitor human activities as well, for example tracking illegal activities by monitoring gunshots related to poachers or chainsaws in the case of illegal logging.

### Remote sensing

In remote sensing, information about a landscape or object is gathered based on its reflection and/or emission of radiation (i.e., visible light, infrared and microwave radiation). Satellite imagery is the most widespread example of remote sensing, but data could also be collected by drones or aeroplanes. The number of remote sensing sensors, platforms and applications has increased significantly over the past years. The availability of geospatial asset data (i.e., information on the exact location and ownership of commercial assets) is key to making remote sensing data useful to FIs. This type of data is currently mainly limited to primary industries, such as mining, oil and gas, shipping, etc., whose impacts are directly linked to operations. For sectors more downstream in the value chain, geospatial asset data covering suppliers is often limited. Tools such as [Deepview](#) work to fill this gap and map the relationships between producers, traders, and goods manufacturers, such that remote sensing data can be linked to asset data and used to provide insight in value chain impact and risk.

### Further reading:

- [Resource Watch & UN Biodiversity Lab](#): Overview of major publicly available geospatial datasets that can be used to provide ESG insights on environmental variables and biodiversity impacts and risks.
- [Satelligence & SarVision](#): Offer remote sensing services that provide insight in deforestation and forest degradation.



# 8. Assessing impacts in the marine environment

The measurement approaches described in this guide only partially cover marine biodiversity, which remains largely unaddressed by financial institutions. This chapter provides FIs with essential information to begin assessing their impacts and dependencies on marine biodiversity. It outlines the main economic sectors and associated pressures that may negatively impact marine ecosystems, presents existing tools and datasets relevant to the marine realm, and highlights examples of portfolio-level, sector-specific, and geolocation-based approaches for impact assessment.

## 8.1 The marine realm: key economic sectors and impact drivers

Marine ecosystems are highly material for FIs to integrate into their impact and dependency assessments. Firstly, due to the essential **ecosystem services** they provide, i.e., the benefits that humans obtain from nature. Some of these are (or similar):

- Provisioning services: Seafood, minerals, energy production, raw materials (e.g., seaweed), genetic resources, and medicinal and ornamental resources, among others.
- Regulation and maintenance services: carbon sequestration, waste treatment, erosion regulation, nutrient cycling, water purification, primary production, and habitat provision, among others.
- Cultural services: tourism and recreation, spiritual and religious values, education and scientific opportunities, aesthetic value, intrinsic value, among others.

Secondly, because of the multiple **impact drivers** on marine biodiversity caused by a wide range of marine and land-based activities, through both direct and indirect pathways.

- Sea use and physical impacts: disturbance of the seabed (e.g., through bottom trawling) and loss of marine and coastal habitats (e.g., through dredging, sand mining, and coastal development)
- Pollution: due to chemical waste (e.g., pesticides, herbicides), nutrient and organic matters, marine litter (including micro litter), noise, light and heat
- Climate change: leading to ocean warming, acidification and deoxygenation
- Living resource exploitation: extraction and disturbance of species
- Invasive species and pathogens: spread of nonindigenous species and microbial pathogens

A range of economic sectors drive these pressures and depend on the previously described ecosystem services.

Financial institutions may prioritise those sectors that already have established links with the finance sector –receiving capital and insurance, though not always sustainably—and that also have material interactions with marine ecosystems and species, either through impacts or dependencies. A list of prominent **economic sectors**<sup>8</sup> includes:

- Oil and gas (e.g., offshore extraction)
- Mining (e.g., coastal, seabed, and deep-sea mining)
- Infrastructure and real estate (e.g., coastal development, ports, coastal defense such as seawalls, and dredging activities)
- Maritime transportation (e.g., shipping, port operations, and ballast water discharge)
- Seafood sector (e.g., capture fisheries, aquaculture, and related supply chains including processing and feed production)
- Plastic-intensive industries (e.g., packaging, consumer goods, textiles, and automotive manufacturing)

<sup>8</sup> This list is not intended to be prescriptive, but rather highlights sectors with significant impacts and/or dependencies on the marine environment, as well as established connections to the financial sector. Overlaps between sectors are to be expected. For example, marine tourism intersects with both infrastructure and maritime transportation, particularly in the context of cruise operations and coastal development.

- Agriculture and land use (e.g., crop and livestock production contributing to nutrient runoff and chemical pollution via rivers and coastal catchments)
- Coastal and marine tourism (e.g., cruise tourism, recreational boating, diving, and coastal resort development)
- Marine renewable energy (e.g., offshore wind, wave and tidal energy, often involving large-scale infrastructure)
- Desalination (e.g., industrial-scale seawater desalination plants impacting water quality and marine life)

## 8.2 Tools and data resources for the marine realm

Currently, none of the measurement approaches developed for the finance sector adequately address impacts or dependencies on marine environments. The existing quantitative methodologies for biodiversity assessments are primarily land-based, thus facing limitations in terms of impact driver coverage when it comes to marine ecosystems and species. Nonetheless, **the measurement approaches described in this guide are planning to or are already able to provide assessments for some critical impact drivers and ecosystem services:**

- BFFI: coverage of marine ecotoxicity and eutrophication
- BIAT: coverage of marine ocean acidification and eutrophication as an impact; addressed ecosystem services include mass stabilization & erosion control and water flow maintenance
- WWF BRF & WRF: allows assessing risks related to water (water risk filter) and biodiversity (biodiversity risk filter) including those in marine environments
- BRF: coverage of limited marine fish availability

- ENCORE: coverage of marine-related natural capital assets, impact drivers and ecosystem dependencies, as well as relevant spatial maps
- GBS-FI: towards a pressure-based assessment of impacts on marine biodiversity
- GID: coverage of marine ecotoxicity and eutrophication (for coastal ecosystems) as a category of water pollution
- GIST GI-GBF: coverage of species diversity loss via marine eutrophication pathways
- IBAT and STAR: IBAT provides access to marine biodiversity datasets for project finance (e.g., Key Biodiversity Areas in marine environments) and STAR will be extended to marine species (currently covers mammals, birds and amphibians)

From a **data perspective**, and to further develop measurement approaches, there is a wide availability of primary data on marine ecosystems' pressures, state of nature, and ecosystem services that can already be explored. There are several marine data platforms which provide extensive information (e.g., [European Marine Observation and Data Network](#), [Marine Biodiversity Observation Network](#) for North America and global regions, and UNEP-WCMC's global [Ocean Data Viewer](#)). However, this environmental data needs to be related to the invested activities of the FIs which is made challenging by the relatively poor state of corporate disclosures on marine impacts and dependencies. There are already several opportunities that can be explored by FIs in terms of:

- a. Assessing their overall exposure to material ocean impacts and dependencies;
- b. Conducting 'deep dives' into the most material sectors' risks and opportunities; and
- c. Assessing their geolocated exposure to marine sensitive zones.



8.3

### 8.3 Assessing portfolio and sector exposure to marine impacts and dependencies

Datasets on critical marine impacts and dependencies related to specific economic activities and production processes may be used for portfolio assessment. Multi-regional input-output models and LCA tools can complement these datasets to integrate indirect exposures. Mapping these linkages can help FIs identify the potential nature-related risks and opportunities they are exposed to, as well as prioritise sectors and areas for actions and further data collection.

Tools such as ENCORE can be used as a starting point to analyse the materiality of potential dependencies and impacts on marine ecosystems of particular sectors, sub-sectors and production processes. This includes information on both impact drivers and dependencies on ecosystem services (see section 8.2, for example). Furthermore, for certain sectors, data on their contribution to key marine pressures can be assessed using emission estimates—such as air pollutants, nutrient and organic enrichment, or marine ecotoxicity—available from databases like EXIOBASE.

The analysis can be complemented by more specific resources available for the marine environment. More specifically, the following **current and upcoming publications and advancements can help FIs in their understanding of biodiversity performance in marine environments:**

- Marine activity/pressure/impact linkages: The [Linkage framework](#) developed under the European Commission's 7th framework project 'Options for Delivering Ecosystem-Based Marine Management' (ODEMM) provides linkages

between specific sectors' activities and 24 marine pressures.

- Resources developed for specific ecoregions: The [Ecosystem Overviews](#) by the International Council for the Exploration of the Sea (ICES) analyse the key marine pressures and impacting activities per ecoregion in scope.
- Guidance developed for specific sectors:
  - TNFD's [marine transportation and cruise lines, fishing and aquaculture](#). Other guidance documents, such as [Oil and gas](#) and [Metals and mining](#), are also marine-relevant, though their primary focus is broader
  - UNEP FI's briefing papers on [Deep-Sea Mining](#), [Dredging & Marine Aggregate Extraction](#), [Offshore Oil & Gas](#), and a set of [Recommended Exclusions for Financing a Sustainable Blue Economy](#). Additionally, the guide [Turning the Tide: How to Finance a Sustainable Ocean Recovery](#) explores key ocean sectors—selected for their strong connection to private finance—and offers insights into their environmental and social impacts and dependencies, links to other blue economy sectors, materiality assessments, and criteria and indicators for sustainable financing (including annexes with verification guidance, recommended actions, and alignment with the [Sustainable Blue Economy Financing Principles](#)). The report [Diving Deep: Finance, Ocean Pollution and Coastal Resilience](#) complements these resources by focusing on two critical sectors: waste prevention and management (especially plastic pollution) and coastal infrastructure and resilience, providing guidance for aligning finance with ocean sustainability.
- Ocean country-level natural capital accounting: Global Ocean Accounts Partnership has been developing approaches and supporting countries to create national ocean accounts.

### 8.4 Assessing geolocated exposure to marine sensitive zones

Integrating a geolocated dimension with marine investments and spatial planning is critical. [A global map of human impact on marine ecosystems](#) reported that a significant fraction of marine ecosystems (41%) is strongly affected by multiple anthropogenic drivers. First, extensive geolocated datasets exist that can be used to assess the proximity and possible impact on Marine Protected Areas (MPAs) and other sensitive areas provided the companies' asset location is known:

- Protected areas: UNEP-WCMC's [World database on protected areas](#), also integrated into IBAT, is the most comprehensive global database on terrestrial and marine protected areas.
- Sensitive areas: IBAT includes [Key Biodiversity Areas](#) (KBA) and species data covering marine zones. Datasets on the [Ecologically or Biologically Significant Marine Areas](#) defined by the Convention on Biological Diversity (CBD) can be used as well.
- Additional spatial resources can be found in the [Turning the Tide: How to Finance a Sustainable Ocean Recovery](#) guide from UNEP FI.

FIs can overlay this geospecific data on the environmental status of marine zones with data on physical assets, observational or estimated data on the pressures originating from these assets, as well as financial ownership data. This can already be explored for a number of material ocean-based industries, such as:

- Offshore renewables: Asset-level data on sites, licences, operators and equipment is generally accessible through national agencies, and regional and industry portals, and can be linked to specific companies and projects.
- Marine transportation: Automatic Identification System (AIS) data, tracking the position of vessels, as well as vessel characteristics' data, is widely available and can be connected to relevant transportation activities, companies and investments.
- Ports and coastal infrastructure: Data on key ports' activities and infrastructures can be leveraged, as well as shipping data connected to ports.
- Offshore extractives: For oil and gas activities, geolocated data on sites, licences, pipelines and operators is generally available, accessible through national agencies' portals and regional portals. For aggregates and mineral extraction, disclosures on main points and areas for extraction may be used when available. For the sensitive issue of deep-sea mining, the International Seabed Authority (ISA) [Deep Seabed and Ocean Database](#) has been set to cover exploratory contracts' activities in the high seas.

## 8.5 What is needed?

In order to reverse the triple crisis of climate change, biodiversity loss and pollution, a new and holistic appreciation of the ocean's role in global markets is key. An important step will be to better integrate marine biodiversity into financial decision-making. Additionally, there is a need to develop a wider set of methodologies that can be used to measure the impacts and dependencies of economic activities on the marine biodiversity of different ecoregions. The development or extension of environmental and cumulative impact assessment models to cover a wider set of marine pressures is needed to translate data on economic activities into more comprehensive assessments of their impacts on marine biodiversity and vice versa. In conjunction, there is a need for enhancing corporate disclosure in all material sectors, including geolocated and site-specific data. All these initiatives should pave the way for the integration of fit for purpose blue metrics into the landscape of tools used by FIs. At the same time, FIs can start to assess their impacts and dependencies on marine ecosystems with the data and tools that are already available.



# 9. Next steps

This guide is one of the many steps in the journey towards measuring the biodiversity impacts and dependencies of investments and finance activities. We encourage FIs to test and apply the tools currently available. Through the F&B Community under the EU B&B Platform and the FfB Foundation we will continue to share knowledge and best practices while consolidating new market insights. More information on how to get started with assessments and how to integrate biodiversity into operations and decision-making for FIs can be found in the '[Act Now](#)' guide.

This review includes new tools and methodologies to assist FIs in understanding their relationship with nature. Such tools bring in different perspectives and data that are helpful to investment decision making. Specifically, they should expand to incorporate mainstream data providers in the finance sector, as well as data that sheds light on nature-related risks and opportunities.

## 9.1 Using the approaches wisely

The biodiversity measurement approaches included in this guide are a *useful way to understand where potential impacts and dependencies might lie* and to focus attention and effort within a portfolio of investments. Additionally, which nature-related risks derive from the interactions of portfolio companies with biodiversity. We encourage FIs to use these measurement approaches by keeping two things in mind:

Firstly, some of the tools described in this guide currently assess *potential (modelled) impacts and dependencies*, rather than actual, on-the-ground measurement of impacts and dependencies on biodiversity. The actual impact a company exerts on biodiversity might deviate from the

modelled potential impact. Furthermore, some tools, such as ENCORE, are based on sector averages rather than company-level data. Making wise use of modelled impact data implies:

- Using the results only for purposes for which they can be usefully employed, such as estimating portfolio impacts and dependencies, monitoring and screening biodiversity risks and opportunities, investor engagement programs, training portfolio managers, and understanding the relative contribution of different drivers of loss, scopes, asset classes, value chains and sectors to focus efforts on reversing and halting biodiversity loss.
- Data on potential, estimated impacts and dependencies can and should not be used for 'stock picking'.**
- Supplementing biodiversity footprinting tools with geolocation tools, such as IBAT, and/or data on companies' involvement in ESG-related incidents or controversies. This would help identifying issues linked to location or corporate action not currently covered in footprinting assessments.
  - (Collectively) engaging with companies for further disclosure of company-specific information which can improve the accuracy of the tools, by replacing modelled data with actual company data (as is already occurring with greenhouse gas emissions data) and to provide information on company locations.

Secondly, *not all the drivers of biodiversity loss and scopes are covered* by all the biodiversity measurement approaches. For instance, most approaches underrepresent impacts on the marine environment and do not yet include impacts of alien invasive species. Furthermore, some tools do not include resource exploitation beyond water use, or downstream impacts. Furthermore, the biodiversity impacts of marine sectors (shipping, aquaculture, fisheries etc), construction, chemicals, agriculture, and transportation might be understated by the biodiversity footprinting tools described in this guide. Making wise use of their outputs implies:

- Knowing and disclosing which impact drivers and scopes are excluded and included by the approach that is used.
- Supplementing quantitative approaches with qualitative data on the pressures not covered by the tool and the sectors for which these are material.

Please, see the [Assessment of the biodiversity impacts and dependencies of globally listed companies: A collaborative multi-tool footprinting approach](#) (Recommendations pp. 19-23) for a comprehensive description of the challenges, implications and recommendations for FIs, companies, tool developers and data providers on the biodiversity measurement and data fields.

## 9.2 Collaborating on further developments

The field of biodiversity impact and dependency assessment is relatively new and rapidly evolving. The current diversity of approaches provides valuable innovation in this space. This, coupled with sharing of lessons learned across the measurement tools, is needed to enable a step change in our ability to measure our interactions with biodiversity.

In addition, we believe the following areas for alignment in relation to biodiversity impact and dependency measurement would be useful:

- Agreement on appropriate scopes to include for each sector, particularly in relation to scope 3 downstream impacts.
- Agreement on the basic coverage of drivers of loss that should be considered (quantitatively or qualitatively).

Furthermore, collaboration and further development is needed in the following areas:

- Until corporate disclosures improve, there is a need to agree upon a standard way of addressing data gaps in revenue data and of allocating company revenue to subsectors and geographies. For this, the creation of an open-source facility for key data sets of companies' revenue (e.g., revenue data, sector attribution and land assets in different regions) is recommended.
- Securing enhanced corporate disclosure of companies' contributions to impact drivers, which can provide robust and actual data inputs into the models.

- Ultimately, creating an open-source facility with disclosed company-level data (e.g., emissions, land assets in different regions, value chains, etc.) to be used as input into biodiversity footprinting calculations. In this regard, some existing efforts, such as TNFD's Public Data Facility or FfB Foundation's Biodiversity Data Platform, could provide more clarity for this purpose.
- Incorporating a broader range of impact drivers in key models, such as GLOBIO or ReCiPe (e.g., drivers of biodiversity loss in the marine environment).
- Extending from the assessment of negative impacts to the assessment of dependencies, (potential) positive impacts, and opportunities for systemic change.

Initiatives such as PBAF and TNFD are actively working to address some of these areas for collaboration and alignment, alongside the FfB Foundation.

Meanwhile, we will continue to update this guide on a regular basis, as the measurement approaches and their applications evolve.



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# Colophon

This guide is produced by the Finance & Biodiversity Community (F&B Community, part of the EU Business & Biodiversity Platform) together with the Finance for Biodiversity Foundation, and the tool developers. This fifth edition was published in June 2026 based on input from the tool developers.

## European Business & Biodiversity Platform

As part of the EU Business & Biodiversity Platform, the members of the Finance and Biodiversity Community have been sharing practices on assessing biodiversity impact since 2017. In addition, the Workstream Methods has been assessing different measurement approaches that are under development and in use. This guide is aligned with other reports developed by the Workstream Methods. Both the F&B Community and the Workstream Methods collaborate closely and are part of the EU Business & Biodiversity Platform.

## Finance for Biodiversity Foundation

In September 2020, members of the F&B Community launched the Finance for Biodiversity Pledge, encouraging other Financial institutions in their network to join. In 2021, the Finance for Biodiversity Foundation was set up to further facilitate collaboration amongst the Pledge signatories. A first summary on assessment was included in the [Guidance document](#) accompanying the Pledge. This guide provides further information as an annex to the Guidance document. In 2022, a [Multi-tool analysis](#) was performed by the F&B Foundation in collaboration with the biodiversity footprinting tools. Additionally, in 2024 a second [Multi-tool study](#) was released by the Finance for Biodiversity Foundation, covering both impacts and dependencies for more than 2,300 companies from both developed and developing markets.

## Invitation to join

Financial institutions from all continents are encouraged to assess the impacts on biodiversity and dependencies on ecosystem services from their portfolios, investments and loans. They are invited to share practices under the EU Business & Biodiversity Platform and collaborate under the Finance for Biodiversity Foundation to help shape the next steps towards reversing nature loss in this decade.

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