# Finance for Biodiversity

2nd edition

## Guide on biodiversity measurement approaches

Finance *for* Biodiversity Pledge

European Commission

Business @ Biodiversity

Annex on *Assessing Impact* to Pledge Guidance
July 2022

# Contents



Finance *for* Biodiversity Pledge

# 1. Financial institutions measuring biodiversity impact

**Financial institutions are looking for ways to assess the impact they have on biodiversity via their finance and investment activities. The aim of this guide on biodiversity measurement approaches is to provide information on, and to help financial institutions to understand, the approaches that are currently in use and underway. The need for such an overview was expressed by signatories to the Finance for Biodiversity Pledge to support the implementation of their commitment 3 *Assessing Impact*. This guide serves as an annex to the 'Assessing impact'-paragraph with approaches and examples of the Pledge's more generic Guidance Document, and is a revised version of the 2021 guide.**

### EU Business and Biodiversity work

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 under the EU Business @ Biodiversity 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. This report series gathers and assesses the input delivered by tool developers and leading practitioners. The 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 metrics for both companies and financial institutions.

### Reading guide

This guide begins with the scoping of seven measurement approaches and a description of the selection criteria used to support selecting a measurement approach (Chapter 2). Most of them are taken from the report series Assessment of biodiversity measurement approaches. The F@B Community and the tool developers selected and further refined the criteria for the finance sector. Chapter 3 maps the approaches against these criteria, and is followed by chapter 4 which holds a description of each approach. In this second edition, the tool descriptions include anonymized output visuals. Case studies showing how measurement approaches have been used by financial institutions are included in chapter 5.

In this second edition of the guide, we have included two new chapters. Chapter 6 summarises the findings of the B@B Thematic report on Biodiversity Data, describing different types of data sources as well as innovations in the field of biodiversity data. Chapter 7 is dedicated to measuring marine biodiversity, as most of the measurement approaches described in this guide do not yet cover the marine realm extensively.

This is the second edition of the guide, published July 2022. The maturity levels in chapter 3 of this guide will be updated quarterly.

# 2. Measurement approaches selected and criteria defined

## 2.1 Selected approaches

Based on considerations within the Finance@Biodiversity Community, this guide includes only biodiversity impact measurement approaches that:

1 Are relevant to, and are currently explored or used by, the financial sector,
2 Include all main drivers of biodiversity loss, and
3 Are scientifically robust.

The following measurement approaches meet these criteria and are included in this guide:

- **BFFI** – Biodiversity Footprint Financial Institutions (CREM and PRé Sustainability, together with ASN Bank)
- **BIA-GBS** – Biodiversity Impact Analytics powered by the Global Biodiversity Score (Carbon4Finance and CDC Biodiversité)
- **CBF** – Corporate Biodiversity Footprint (Iceberg Datalab and I Care Consult as scientific partner)
- **GBSFI** – Global Biodiversity Score for Financial Institutions (CDC Biodiversité)
- **GID** – Global Impact Database, Biodiversity Impact Data (Impact Institute)
- **ENCORE** – Exploring Natural Capital Opportunities, Risks and Exposure (UNEP-WCMC, UNEP FI & NCFA)
- **IBAT** – Integrated Biodiversity Assessment Tool (BirdLife International, Conservation International, IUCN, UNEP-WCMC)

The first five approaches (BFFI, BIA-GBS, CBF, GBSFI and GID) are biodiversity footprinting tools. They all follow a roughly similar LCA-based approach to quantitatively model companies' potential biodiversity impact from data on their revenue, business activities and related input and output. ENCORE is a database that offers insight into impacts and dependencies at the subsector level. It has been compiled based on a literature review and expert interviews. IBAT offers geolocated data on important sites for biodiversity (including protected areas, key biodiversity areas and IUCN Red list species) as well as information on opportunities for conservation.

## 2.2 Criteria for comparing and selecting

To compare and assess biodiversity measurement approaches in a uniform way, a number of criteria are applied. These criteria are described in the table below. Most of them are taken from the report series Assessment of biodiversity measurement approaches. The F@B Community and 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 and 3 of the Assessment of biodiversity measurement approaches in which a more detailed discussion of the criteria can be found. Update Report 3 includes a draft Biodiversity Measurement Navigation Wheel for the finance sector.

## Criteria for selecting measurement approaches for financial institutions

### Organisational focus area (OFA)

For financial institutions 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: Update Report 3, Box 6 and F@B Community*

**Balance-sheet** All the assets, liabilities and shareholders' equity together of a financial institution at a specific point in time.

**Portfolio** A collection of finance activities or investments.

**Sector** A selection of the economy made up of firms or institutions that share the same or a related product or service.

**Index level** A method to track or evaluate the price performance of a group of assets in a standardized way, usually stocks, often to use as benchmark.

**Company** A commercial or industrial enterprise.

**Project & site level** The funding of a long-term infrastructure, industrial project or public services.

### 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 for business by the workstream Methods and adapted for finance. This is why BA 6 (certification) is missing below. *Source: Update Report 3, Box 5*

**BA 1 Assessment of current performance -** Material risk assessment, like 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 performance -** Scenario-analysis of the biodiversity development of certain portfolios, sector or asset categories, e.g. 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 -** Depends on the type of targets set by the FI, companies and governments: 'Net positive effect 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, like different forms of benchmarking. Examples: '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 by third parties -** Third party assessment by rating agency or a data provider based on biodiversity criteria and populated with external data (in the absence of company data), e.g. 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. (this business application is not yet included in this finance guide)

**BA 7 Screening and assessment of opportunities -** Identifying biodiversity opportunities for investing in restorative biodiversity actions.

**BA 8 Biodiversity accounting -** Compiling consistent, comparable and regularly produced data for internal reporting and/or external disclosure using reporting standards (like GRI) and verification by an accountant.

**BA 9 ESG screening and engagement -** Input for ESG policymaking and defining ESG criteria, ESG screening and monitoring engagement progress to bring companies in line with the ESG-policy on biodiversity.

## Asset category

Category of assets owned or managed by financial institutions. *Source: F@B Community*

| | |
|---|---|
| **Corporate loans** | Debt-based funding arrangement between a business and a financial institution such as a bank. |
| **Sustainability linked loans** | Corporate loans of which the interest margin is linked to the improvement of the borrower's ESG score or to the improvement on tailored sustainability KPIs. |
| **Listed equity** | Money invested in a company by purchasing its shares on a stock exchange. |
| **Private equity** | Money invested in a company by purchasing its shares. |
| **Corporate bonds** | Debt-based securities issued by publicly held corporations to raise money for expansion or other business needs. |
| **Sovereign bonds** | Debt-based securities issued by a government of a specific country. |
| **Mortgages and real estate** | 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. |
| **Impact funds** | Fund with a goal to implement investments that generate a measurable, beneficial environmental (and/or social) impact, in addition to a financial return. |
| **Green bonds** | Debt-based instrument to support projects that aim to have a positive impact on climate and/or the environment. |
| **Project finance** | Debt-based funding arrangement of long-term infrastructure, industrial projects, and public services using a non-recourse or limited recourse financial structure. |
| **Commodity trade** | Trade or purchase of primary goods, such as raw or partly refined materials from the agriculture, energy or metals sector. |

## Maturity level

The maturity level of a measurement approach is based on the number of financial institutions it has been applied to (*Source: Update Report 3, p. 16-17*).
In this second edition of the guide, the definitions of the maturity levels have been updated and made slightly more stringent compared to the 2021 version.

| | |
|---|---|
| **Mature** | The approach has been applied to the specific OFA, BA or asset class by at least 5 distinctive financial institutions. |
| **Emerging** | The approach has been applied to the specific OFA, BA or asset class by 1 to 4 distinctive financial institutions. |
| **Potential** | 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. |

## Pressure

Direct human influence on the environment (direct drivers, also referred to as impact drivers) that impacts biodiversity and ecosystem change, frequently involving synergies with other direct drivers. Direct drivers also feed back into indirect drivers (socio-economic and demographic trends, technological development, culture and government). *Source: IPBES*.

| | |
|---|---|
| **Land use change** | 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). |
| **Sea use change** | Human occupation and alteration of marine habitats, e.g. through wind farms, aquaculture, and shipping routes. |
| **Climate change** | 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. |

## Coverage

Biodiversity measurement tools can either focus on negative impacts on biodiversity or on the associated societal dependencies (the services provided by the ecosystems). *Source: Update Report 2, p. 26.*

| | |
|---|---|
| **Negative impacts (on species and habitats)** | Direct negative impact from human activities on species and habitats through the pressures described above. A measurement approach that focuses on negative impacts thus translates the environmental pressures associated with an activity (e.g., GHG emissions, pollution, etc.) into the effects that these pressures have on species and habitats. |
| **Positive impacts (on species and habitats)** | Direct positive impact from human activities on species and habitats. 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 (ecosystem services)** | Services provided by ecosystems that society benefits from and depends upon, like clean air, water, climate adaptation and pollination. A measurement tool that takes into account dependencies translates pressures into impacts on species and habitats (e.g., local extinctions of insects), and translates these impacts into societal consequences caused by declines in ecosystem services (e.g., loss of pollination services leading to declines of fruit harvesting). |

## Scope

The boundaries of what is included when measuring the impact or dependency. *Source: Update Report 2, p. 31-33.*

| | |
|---|---|
| **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 diversity of life on Earth: diversity of ecosystems, diversity of species and genetic diversity. Biodiversity metrics measure different things (like species, ecosystem intactness, ecosystem benefits) and can be used to answer different questions. *Source: Update Report 2, p. 46-55.*

| | |
|---|---|
| **MSA (Mean Species Abundance)** | Measures 'intactness'. MSA compares the actual abundance of native species in a given ecosystem to their (estimated) abundance if the ecosystem would be 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. |
| **PDF (Potentially Disappeared Fraction)** | Measures 'intactness'. PDF shows the percentage of species lost on 1 $m^2$ (land) or in 1 $m^3$ (water) in one year time in a specific area due to environmental pressures. It does not measure decline in species populations. All species are weighted equally; based on regressions between the intensity of each pressure and their impacts on species persistence. |
| **STAR (Risk of extinction)** | 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. |
| **Aggregate index** | A composite index based on several parameters. |
| **Monetary value** | Sum of the economic value of ecosystem services (such as timber production, fresh drinking water, carbon uptake, recreation, etc.). It helps focusing on the benefits that people may gain from nature. |

## Type of data

The type of data that is commonly used as input data for the tool.
*Source: Update Report 3, p. 66-71.*

| | |
|---|---|
| **Biodiversity state data** | State of biodiversity based on real life ecological survey data (count of populations or number of species) linked to the underlying assets assessed. Biodiversity state data modelled with pressure-impact relationships (or equivalent) are to be seen as 'pressure' data. |
| **Pressures, resources and emissions data** | Data related to emissions and extraction of resources such as raw materials, water, land use and land conversion. |
| **Economic quantification of activities data** | The amount of material the organization assessed extracts, produces, purchases or finances, e.g., the amount of cotton used for producing a T-shirt, or the amount a financial institution invests in a company. |

**All these types of data can be:**

| | |
|---|---|
| **U - User-derived data** | **U** - Inputs based directly on measurements conducted by the assessed company. These measurements can relate to biodiversity state but also to pressures or inventory data. User-collected data on inventories can thus be associated with modelling of biodiversity state. |
| **E - Externally collected data** | **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). |
| **M – Modelled data** | **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 $m^3$ of water consumed) or externally collected (e.g., use of the average MSA of a given cell on GLOBIO's grid).<br>*Source: UNEP-WCMC ABMB Discussion Paper, 2019.* |

## Effort

Required level of expertise, costs, and time investment needed for applying each approach. *Source: Update Report 3, p. 38-42.*

**Accessibility** Accessibility refers 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'.

**Required expertise** 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).

**Cost for hiring** 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).

**Other costs** 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).

**Time investment** 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).

# 3. Overview of measurement approaches

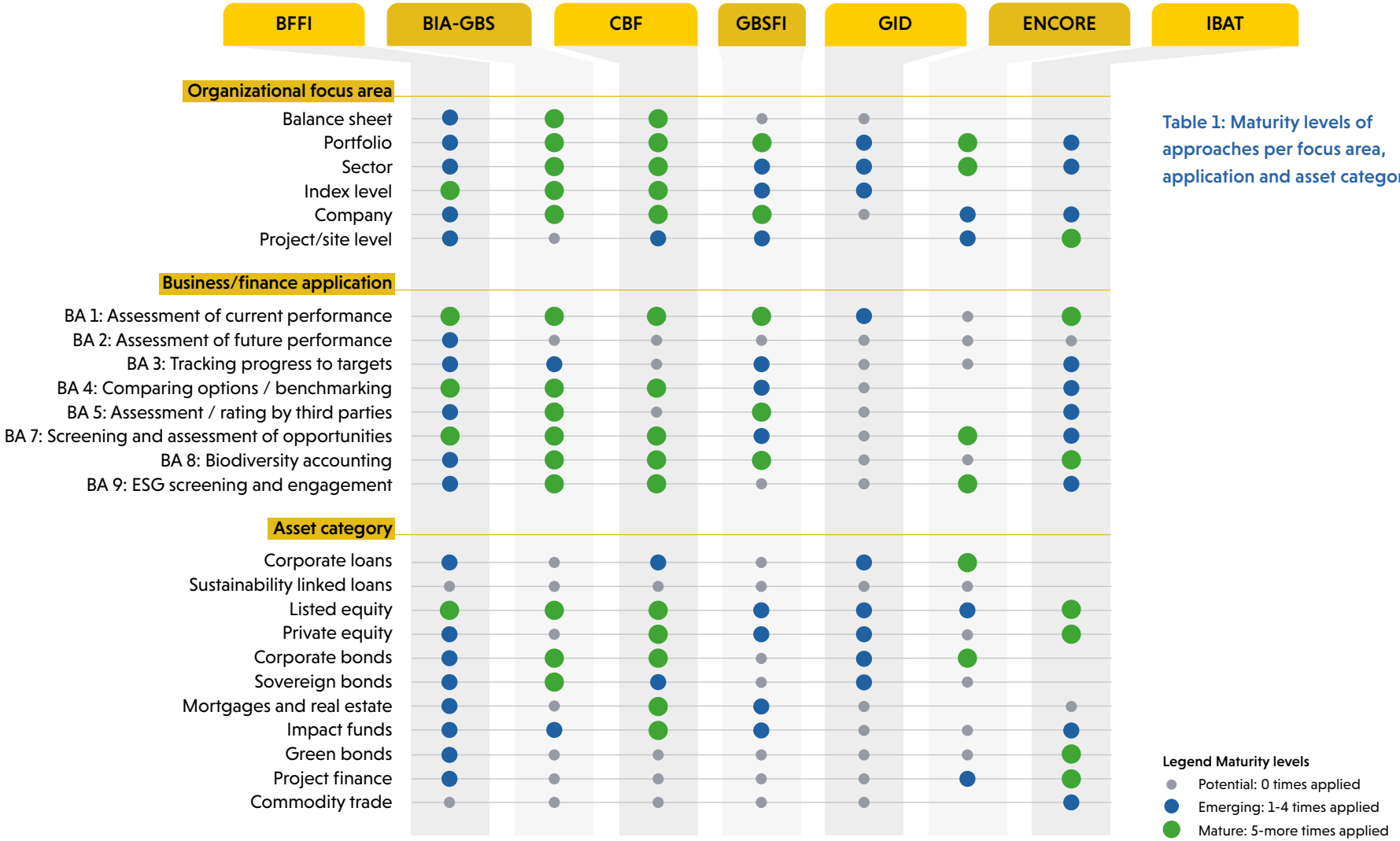



Table 1: Maturity levels of approaches per focus area, application and asset category

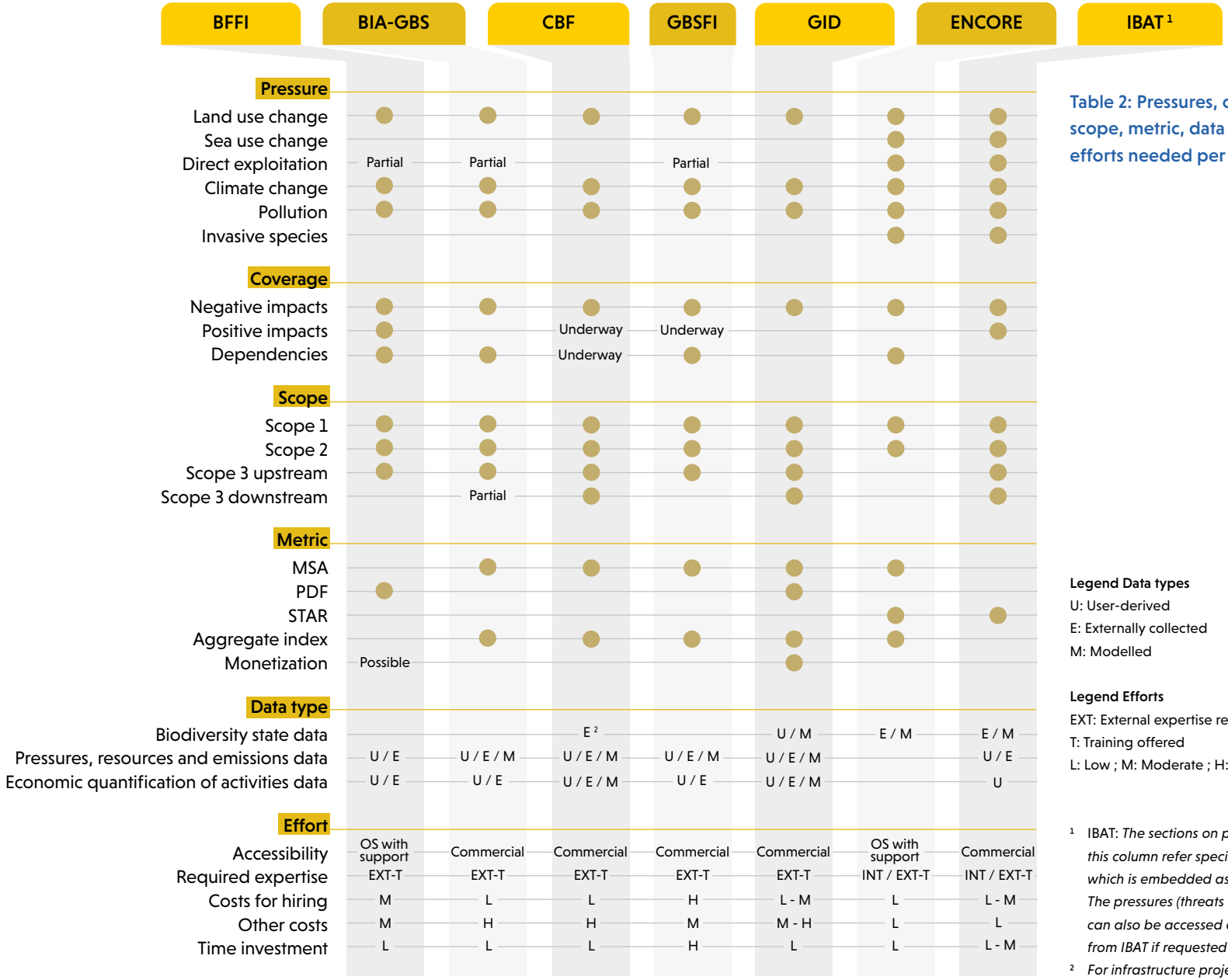



**Table 2: Pressures, coverage, scope, metric, data type and efforts needed per approach**

**Legend Data types**
U: User-derived
E: Externally collected
M: Modelled

**Legend Efforts**
EXT: External expertise required;
T: Training offered
L: Low ; M: Moderate ; H: High

[1] IBAT: *The sections on pressures and scope in this column refer specifically to the STAR metric, which is embedded as a data layer in IBAT. The pressures (threats from the IUCN Red List) can also be accessed directly under licence from IBAT if requested by companies.*

[2] *For infrastructure projects.*

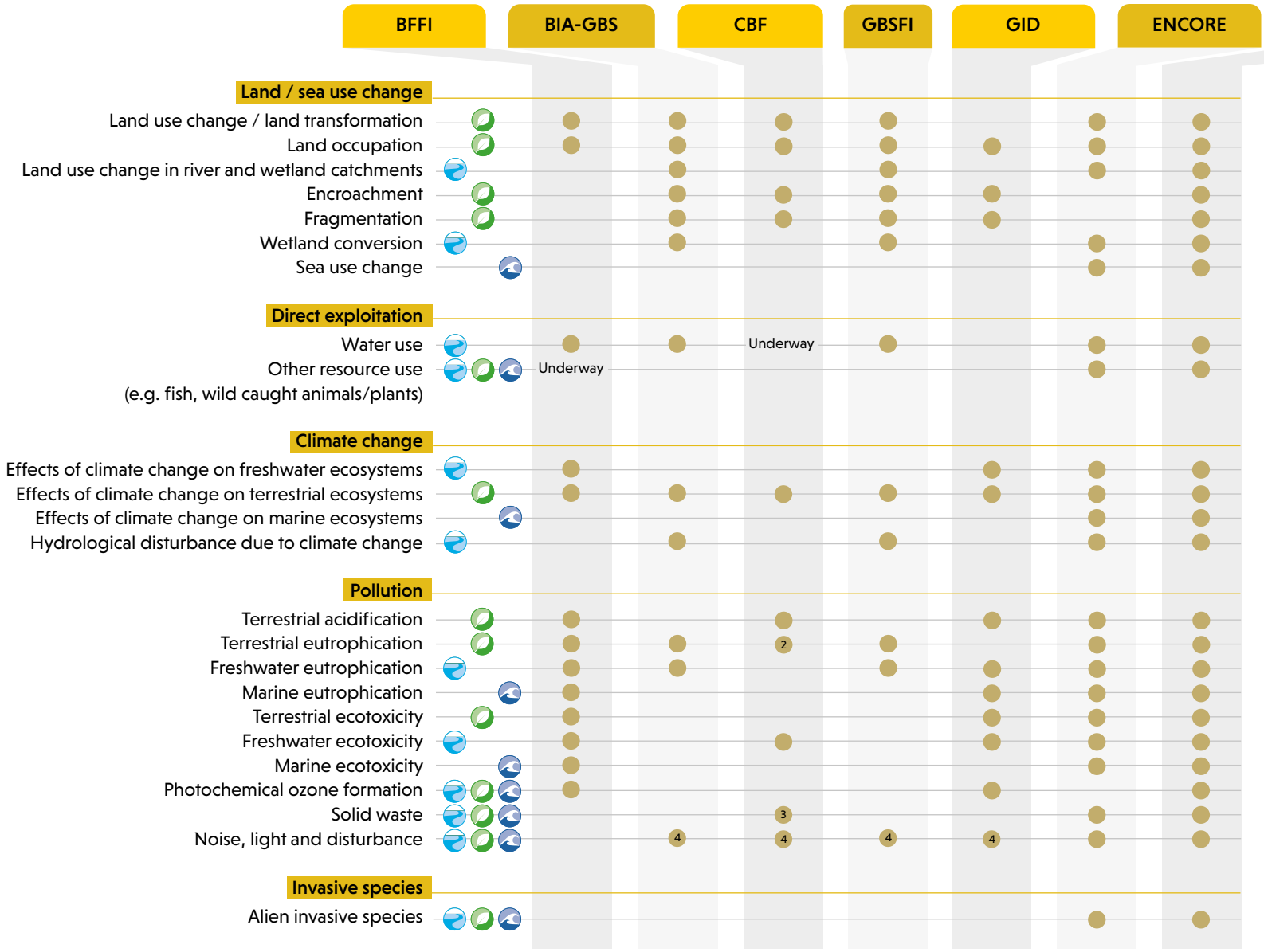



**Table 3: Aspects covered per pressure per approach**

**Legend Realms**

- Freshwater
- Terrestrial
- Marine

[1] *This column refers specifically to the STAR metric, which is embedded as a data layer in IBAT. The pressures (threats from the IUCN Red List) can also be accessed directly under licence from IBAT if requested by companies.*

[2] *Atmospheric nitrogen deposition*

[3] *Plastic entanglement*

[4] *Related to encroachment*

# 4. Information per measurement approach

## 4.1 BFFI - Biodiversity Footprint Financial Institutions

**The Biodiversity Footprint Financial Institutions (BFFI) provides a biodiversity footprint of the economic activities in which a financial institution (FI) invests. 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.**

### 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. 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). Recently this step was completely automated by linking data from a number of data provides 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 in which a FI invests, 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. 40) is used to calculate the environmental pressures on a midpoint level (e.g., climate change resulting from $CO_2$ 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 $m^2$ per € invested (for each investment category) and the total footprint in $m^2$ 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. Currently, a fixed list of qualitative issues is publicly available per equity category, and a general description

of the procedure to assess which issues are not covered in the quantitative assessment is to be found in the 2016 assessment report by ASN Bank (currently not on their website). However, some additional considerations will need to be added for a more specific assessment.

## 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 financial institutions 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 and ReCiPe) are publicly available and the BFFI methodology is explained in their 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 financial institutions to zoom in on a selection of loans and investments.
- Use the footprint to develop a "no net loss of 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.

## What does it measure?

The BFFI method measures potential biodiversity loss in PDF.ha.yr for scope 1, scope 2 and scope 3 pressures. A number of case studies have been accompanied with a dependencies study based on ENCORE. Although ENCORE is not part of BFFI, we could partially use some of the same data and principles.

## What input data are needed?

Revenue data when the analysis is done at portfolio level.

Purchasing 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.

## 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.
- The complementary qualitative analysis guides correct interpretation and use

**Limitations**

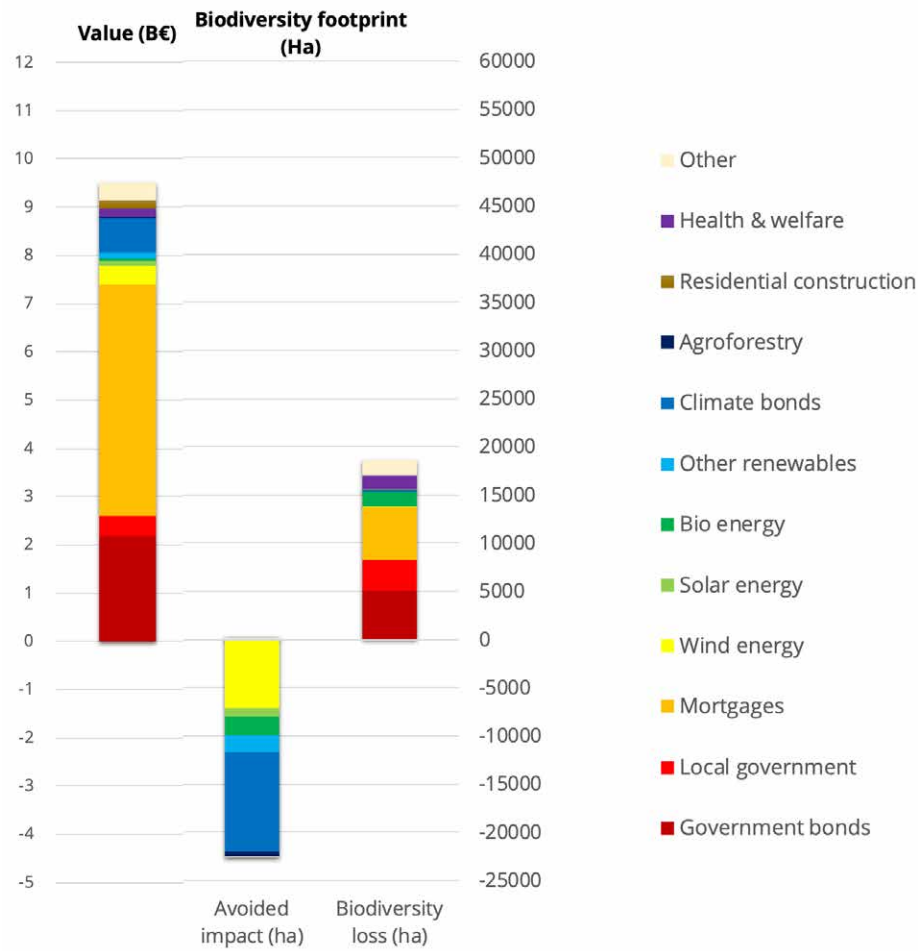
- Since the approach is based on sector averages, revenue and models, it currently represents potential rather than actual biodiversity footprint.
- EXIOBASE data is based on sector averages, and thus not company-specific. This weakness can be addressed by using other LCA databases or by collecting additional 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 has been 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?

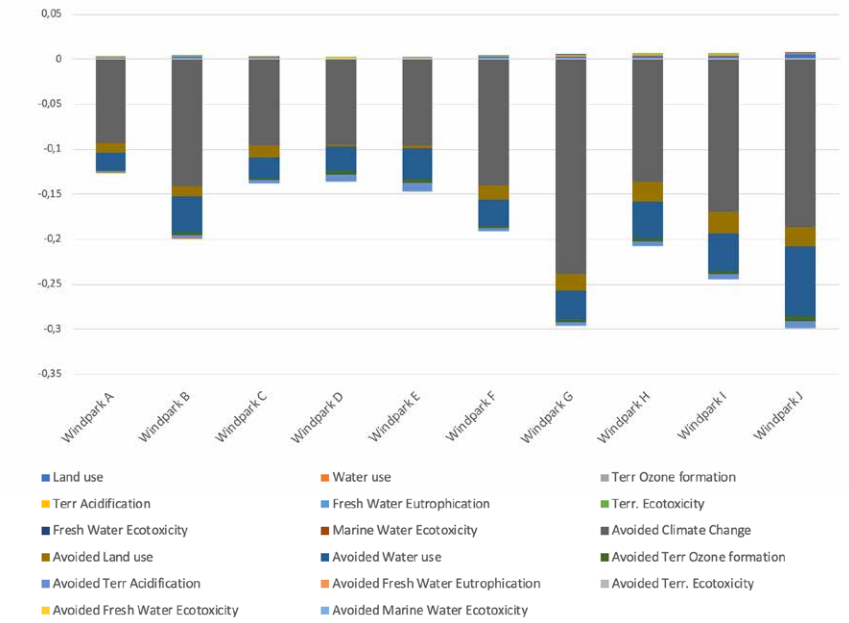
Costs are dependent on the size of the project and the level of detail needed.

## Output visuals BFFI

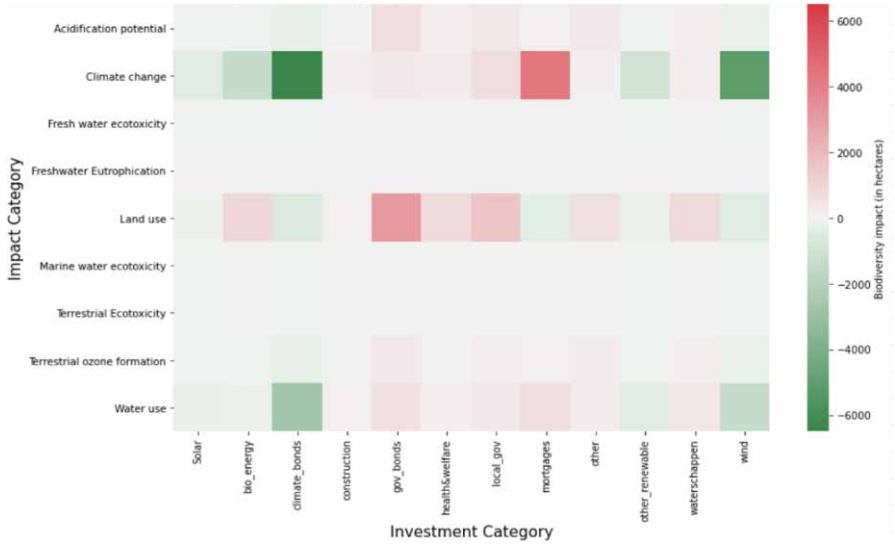
### Total value and total biodiversity impacts at portfolio level



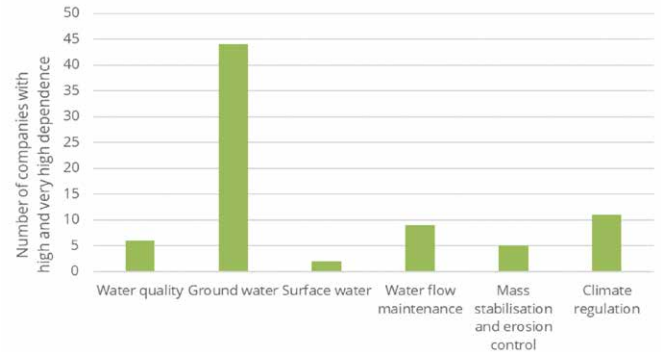
## Biodiversity impact by drivers of loss, per project in m² per invested euro



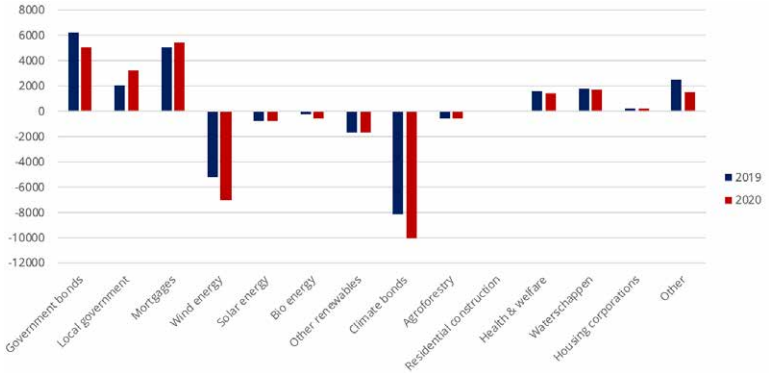

## Heatmap for biodiversity impact at balance level, linking investment categories to impact categories (drivers of biodiversity loss)




## 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



## 4.2 BIA-GBS - Biodiversity Impact Analytics powered by the Global Biodiversity Score

**Biodiversity Impact Analytics (BIA-GBS) measures the biodiversity impact of companies. Investors can identify biodiversity hotspots in their portfolios and use biodiversity impact data for decision-making and to engage with key stakeholders. By offering large-scale biodiversity data, 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 pressure.

### 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.

In addition, Carbon4 Finance has set its own scientific review committee.

### Current stage of development

The database is currently running and used by financial institutions.

**Upcoming developments include:**

- Integration of company-specific data for other pressures (e.g. land use, pollution, or direct exploitation), starting with the agri-food sector.
- Development of methodology for a confidence score
- Assessment of sovereign bonds
- Improvement of the dependency measurement

### Transparency of method

The BIA-GBS methodology documentation is described 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.

### Additional information

**CDC Biodiversité's benchmark sheets:**

- Benchmark factsheet: Agriculture and Agrifood sector
- Benchmark factsheet: Chemical sector
- Technical annex for benchmarks

### 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. The measurement of dependencies will also be integrated in 2022. 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

### What does it measure?

BIA-GBS provides an estimate of the potential 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 GBSFI (see chapter 4.4). The impacts of pressures caused by specific economic activities on ecosystems are quantified using the GLOBIO model (see text box p. 40). BIA-GBS is not intended to replace local indicators which are best suited to local or on-site biodiversity assessments.

## What input data are needed?

BIA-GBS is an integrated solution meaning that data needed from financial institutions 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, the GHG data reported by the company is used (if available). Company-specific data for other pressures will be integrated in 2022, starting with the agri-food sector. 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., through IBAT) if asset locations are known.

## 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 the climate change pressure
- Integration of company-specific data for the other pressures under development, starting with the agri-food sector in 2022
- Differentiates static (e.g. land occupation) and dynamic (e.g. land conversion) impacts
- Easy to use
- 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
- Compatible with international objectives: 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).
- Biodiversity input data (MSA, pressure-impact relationships) based on extensive meta-analysis which allows for adding new studies continuously

**Limitations**

- Since the approach is based on sector averages, revenue and models, it currently represents potential rather than actual biodiversity footprint.
- Except for climate change data, pressures and emissions data is based on sector averages, and thus not company-specific. Considering the data used, it is currently not recommended to make important decisions based on intra-sectoral comparisons.
- Pressure-impact relationships in the GLOBIO-model are biased towards the most studied species and ecosystems.
- Impacts on marine biodiversity are not covered.
- 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?

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.

## Output visuals BIA-GBS

### Summary of portfolio impact on biodiversity

*Source: GBS 1.1, 02/22, Carbon4 Finance*

| Absolute impact (MSAppb*) | Portfolio Covered Size (Meuros) | Portfolio Investment intensity (Msappb* per b€ invested) |
|---|---|---|
| 77 | 983.71 M€ | 78 |

**Footprint MSAppb***

| | Dynamic | Static |
|---|---|---|
| Aquatic | 7 | 17 |
| Terrestrial | 33 | 19 |

**Footprint MSA.km²**

| | Dynamic | Static |
|---|---|---|
| Aquatic | 0,1 | 9,5 |
| Terrestrial | 4,2 | 125,7 |

**Surface Equivalents**

Terrestrial Dynamic impacts: x football fields: 790

Terrestrial Static impacts: x size of Paris: 1.2

Terrestrial dynamic impacts are predominant

When considering the MSAkm2 static impacts are bigger because cumulated past impacts are by definition higher and terrestrial surfaces represent 92% of the total area considered.
Once normalised in MSAppb*, we can see the predominance of terrestrial dynamic impacts.

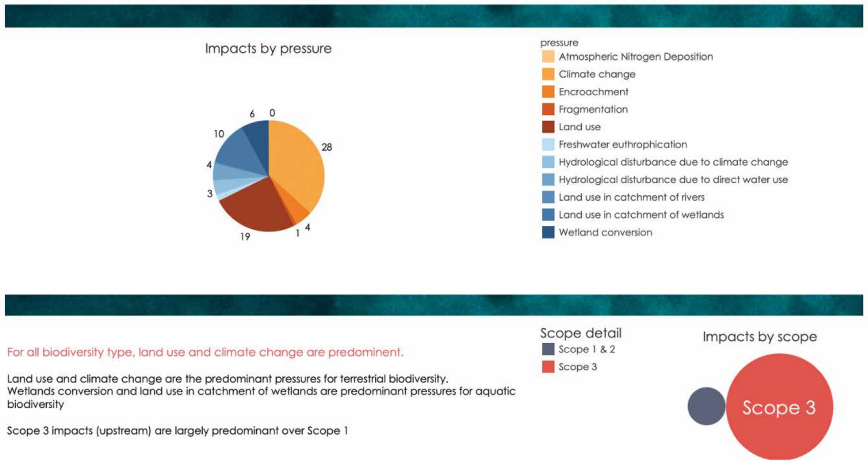
All compartments are significant with a predominance of Terrestrial dynamic impact.
The portfolio contributes to an annual loss of terrestrial biodiversity equivalent to the artificialization of 1230 soccer fields.

**Portfolio Investment intensity in MSAm2** (MSAm2 per k€ invested)

| | Dynamic | Static |
|---|---|---|
| Aquatic | 0,1 | 9,7 |
| Terrestrial | 4,3 | 127,8 |

### Summary of portfolio impact on biodiversity and the most dominant pressures (drivers of biodiversity loss)

*Source: GBS 1.1, 02/22, Carbon4 Finance*


For all biodiversity type, land use and climate change are predominent.

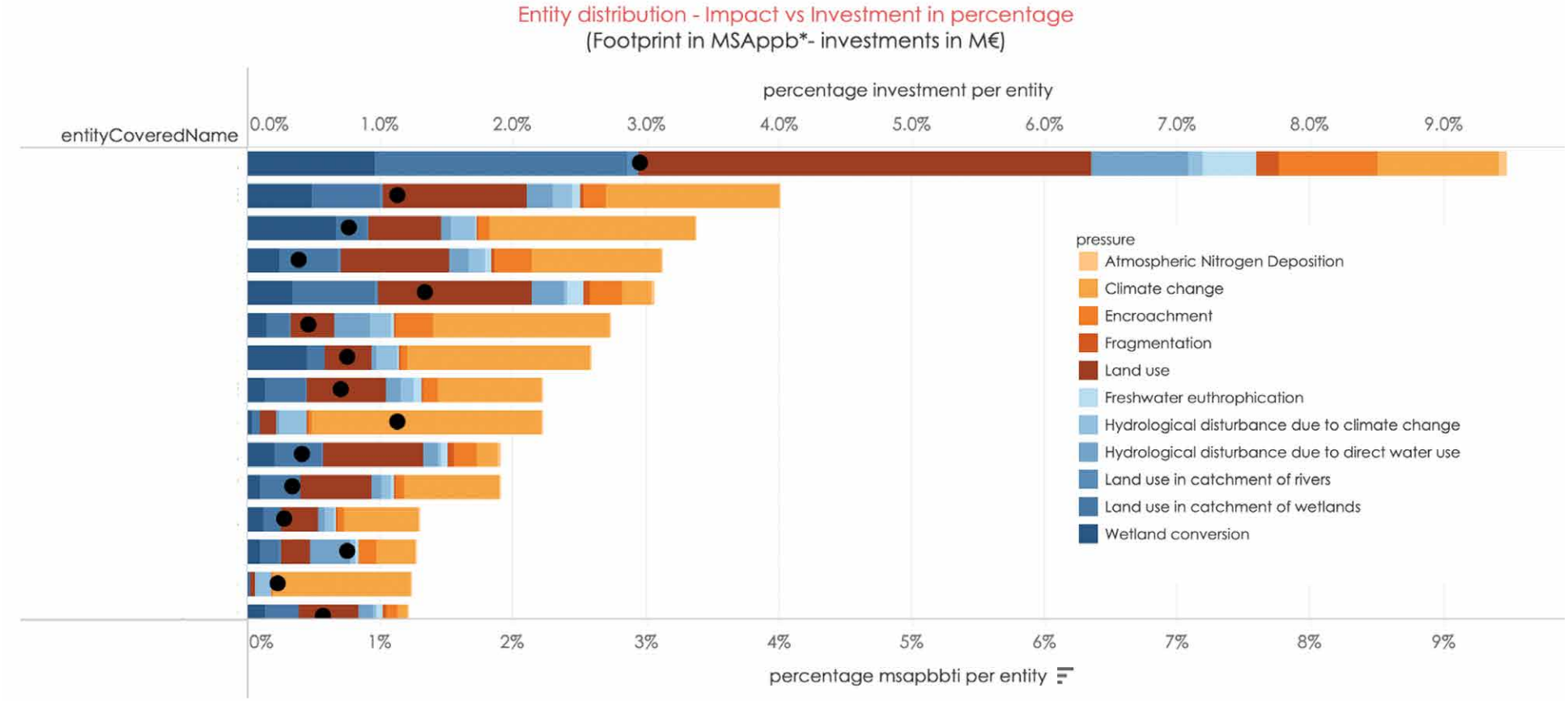
Land use and climate change are the predominant pressures for terrestrial biodiversity.
Wetlands conversion and land use in catchment of wetlands are predominant pressures for aquatic biodiversity

Scope 3 impacts (upstream) are largely predominant over Scope 1

**Distribution of impact and pressures (drivers of biodiversity loss) of entities (like companies) within a portfolio**

*Source: GBS 1.1, 02/22, Carbon4 Finance.*

- The bar is the share of the score in MSAppb*
- The black dot is the share of the investment in %



## 4.3 CBF - Corporate Biodiversity Footprint

**The Corporate Biodiversity Footprint (CBF) is designed to assess the annual impact of activities of corporates, financial institutions, 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/assets/sovereigns based on the products or services purchased or sold. This is done for four main environmental pressures on species and habitats: climate change, land use, air pollution and water pollution.

CBF is uses a very granular input/output-model (proprietary model 'Wunderpus' developed by Iceberg Data Lab since 2019) to derive the consumption of resources and the emissions associated with each product. These pressures are calculated along the whole value chain of the entity or asset (scope 1, 2 and 3 – upstream and downstream – according to the definitions and boundaries set forth in the GHG Protocol), appraising their processes, products, and supply chains.

Based on the modelled environmental pressures, impacts expressed in $km^2$.MSA are calculated using GLOBIO (see text box p. 40). Impacts arising from each different pressure are aggregated into a single metric. This annual impact also considers the long-term-impact on biodiversity of current activities or equipment sold (time integration following the convention used in LCA and applied for GHG emissions in the GHG protocol).

The modelled data are enriched with reported (operational or environmental) data when possible, to ensure that the best quality of data is being used to calculate the CBF.

### Organisations and reviewers

The methodology and any new developments are supervised by a scientific committee to ensure the quality and the relevance of the CBF. The scientific committee includes representatives from WWF, Share Action, PRé Sustainability, MNHN, UNEP-WCMC, I care and Solinnen. The role of the scientific committee is to advise on the key scientific pillars of the methodology, the latest scientific developments and its alignment with best available resources and methodologies to account for biodiversity impacts.

User feedback and prioritization of development are steered by the CBF Steering Committee, comprising six financial institutions willing to promote the CBF approach.

### Current stage of development

Since January 2022, all sectors are covered and mapped including the financial sector and sovereigns. The most material pressures on biodiversity are covered for all sectors are covered and throughout the value chain (including upstream and downstream impacts).

### Transparency of method

The CBF methodological guide is available on IDL website. Additional training material, especially sectoral slides are available on the client platform. Quarterly webinars are organized to present the methodology and every new customer receives personalized training sessions. All clients have access to the ESG Research team that can answer questions and provide transparency on the assumptions made.

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

The CBF calculates the biodiversity footprint that financial institutions have through their investing or financing activities. It does so by assessing the annual impact of a corporate/real asset/sovereign's activities on global and local biodiversity throughout the value chain.

As the CBF can be broken down into multiple KPIs (impacts per scope, impacts per pressure, absolute and relative impacts), the metric is an appropriate indicator to measure a company's biodiversity-related risks and to identify the source of risks.

The database can provide a dynamic view of the progress made by a corporate over time thanks to reduced resource consumption, pollution prevention or product/market shift. The granularity of the approach and its bottom-up enrichment allow financial institutions to identify within sectors the companies with the strongest impact on biodiversity due to their products, processes, or supply chain.

## What does it measure?

The CBF assesses the estimated annual impact of a corporate/asset/sovereign's activity based on products and assesses their impact on biodiversity throughout the value chain. This estimated annual impact also considers the persistence of pressures due to these annual activities across time (time integration). The result of the calculation is aggregated in a quantitative footprint (expressed in km2. MSA), and/or in an overall score (from 1 to 6), positioning the issuer in relation to its sector peers.

A Data Quality Level indicator is provided with each calculated datapoint, and shows the uncertainty level of the calculation based on the input data used. Disaggregation of by pressure and by scope (scope 1, 2, 3 upstream and downstream) is available to allow identification of the key source of impact of an issuer.

## What input data are needed?

**The CBF is based on publicly available data, which may be, for corporates and real assets:**

- Financial information (sales by sector, balance sheet)
- Operational information (purchase, production by product)
- Environmental information (pollution by source or by product)

**For sovereigns:**

- Macro-economic information (GDP, investment by macro-sector)
- Environmental information (public accounting of GHG emissions, protected areas, etc.)

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

For a more complete picture of corporates' impacts on biodiversity, CBF could be complemented with geolocated data on endangered species or habitats (e.g., through IBAT) if asset locations are known. Furthermore, the SB2A climate database provided by Iceberg Data Lab uses the same model flows and scope coverage, thus allowing for comparability between biodiversity and climate impacts.

## Main strengths and limitations

**Strengths:**

- The CBF performs an analysis based on products and assesses their impact throughout the value chain (all scopes) of a corporate/asset/sovereign, using reported data from company reports (data collection from analysts) and other publicly available information
- Physical flows and environmental footprints are mapped for more than 2.000 products and services from 1,200 sectors and 259 countries. This allows for a detailed analysis of companies' impact, and for benchmarking of companies within their sector. BCF is therefore suited for integration into investing or lending decision-making processes. The analysis is enriched with reported data to the extent possible, thus reducing model bias and uncertainty.
- The tool is suitable for assessing performance at corporate level over multiple asset classes (listed equity, bonds, sovereigns) and aggregated financial portfolios, comparing issuers within sectors and for comparing individual incremental impact.
- The methodological guide of the CBF is publicly available and includes descriptions, limitations and future development for each indicator.
- Iceberg Data Lab does not provide commercial services to issuers in order to be free of any conflicts of interests. The scientific committee and the steering committee ensure quality and relevance of the CBF.
- Iceberg Data Lab now has3 years of track-record in providing biodiversity data to financial Institutions. This illustrates that the approach is mature to serve the needs of financial institutions in integrating biodiversity into reporting and creating thematic funds or indices.
- The CBF is compatible with national and international frameworks (e.g., French 'Article 29', TNFD, SBTN).

**Limitations:**

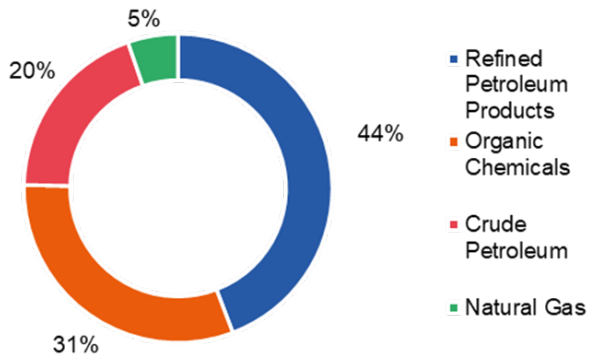
- Since the approach is based on sector averages, revenue and models it currently represents potential rather than actual biodiversity footprint
- Based on financial data, except for climate change, granularity within a sector is limited
- Pressure-impact relationships in the GLOBIO model are biased towards the most studied species and ecosystems.
- Invasive species and soil degradation are not factored in yet; overexploitation is factored in only partially.
- Water use is not included.
- Impacts on freshwater and marine biodiversity are only covered partially.

## What are the costs?

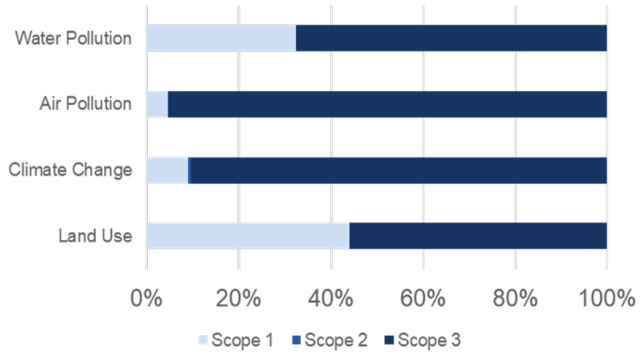
Various methodological documents and training sessions are provided to users as well as onboarding to the client platform. Time investment needed by the FI itself is low (less than 10 days, turnkey results) and support is provided during the licence.

## Output visuals CBF

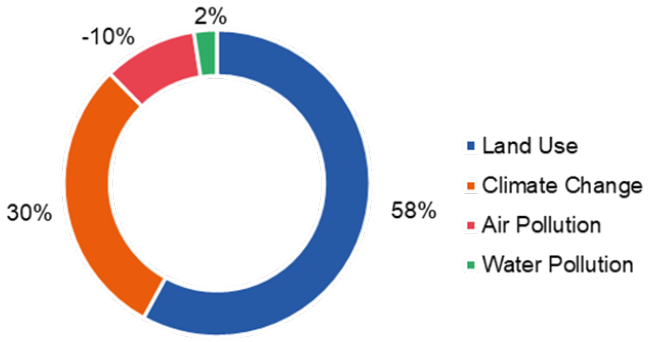
### Distribution of absolute contribution to CBF impact by products

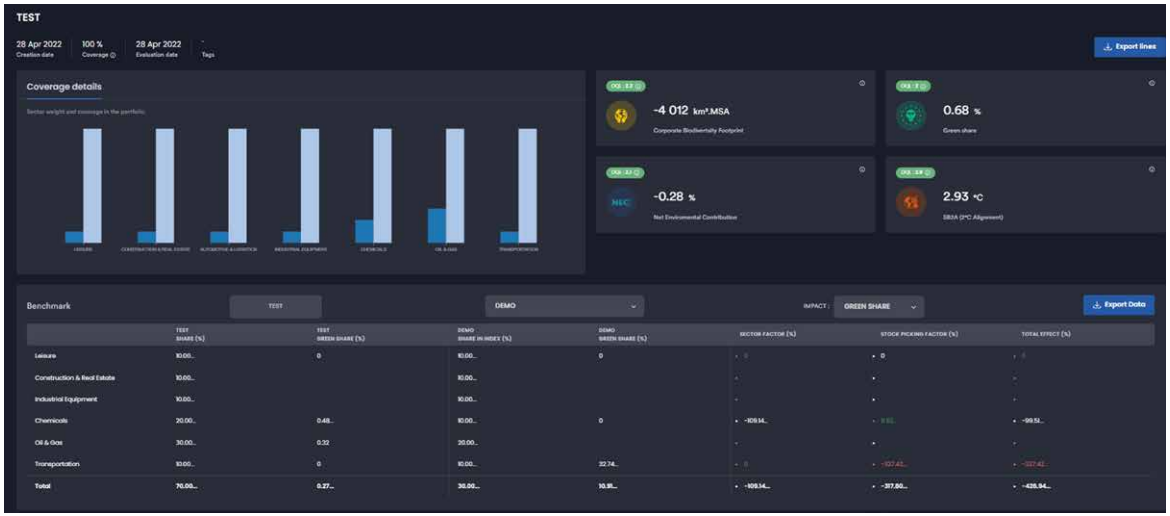



### Distribution of CBF impact by scopes




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



## 4.4 GBSFI - Global Biodiversity Score for Financial Institutions

**The Global Biodiversity Score for Financial Institutions (GBSFI) is based on the GBS®, a tool which provides an overall and synthetic vision of the biodiversity footprint of economic activities. It is measured by the Mean Species Abundance (ratio between the observed biodiversity and the biodiversity in its pristine state). Calculation of the Mean Species Abundance is based on PBL Netherlands Environmental Assessment Agency's GLOBIO model of five terrestrial pressures (land use, nitrogen deposition, climate change, fragmentation, and infrastructure/ encroachment) and five aquatic pressures, and their impacts on biodiversity.**

The GBS is deployed for two main uses: biodiversity assessment for companies (GBS) and for financial institutions (GBSFI). The methodological grounds are identical for both, but the operational frameworks differ considering the differences in terms of coverage (one company versus multiple financial assets) and data availability (comprehensive company data versus scarce publicly available data). Footprints are estimated in a two-step process. First, pressures caused by specific economic activities on biodiversity are quantitatively assessed. Then, the impacts of these pressures on ecosystems are estimated. This last step relies on the GLOBIO model which is based on pressure-impact relationships.

### Organisations behind it

Lead: CDC Biodiversité (France)
Other: Club of Businesses for Positive Biodiversity (B4B+ Club) acts as a platform for the GBS development (a group of +30 businesses representing different sectors, including the finance sector)

### Current stage of development

The first operational version of the GBS was launched in May 2020. The first biodiversity footprint assessments for companies were conducted in 2020. The first GBSFI analysis are being conducted in early 2021. An analysis of a non-listed assets portfolio for a French insurer is ongoing in Q1.
A footprint database for listed assets will be launched in Q2 as the Biodiversity Impact Analytics (BIA) developed with Carbon4 Finance, see BIA in this overview.

### What purpose can it be used for?

The GBSFI is suitable for calculating the footprint of a financial asset portfolio. Its ability to produce results for investment decisions is conditioned by the underlying data availability which varies depending on the asset type.
For listed assets (equity and corporate bonds) an integrated solution, BIA, is under development. In that case, limited data from users will be necessary (only underlying company identification number). For other asset types, at first GBSFI will remain a tailor-made approach that can only be used if a minimum data is provided by the financial institution (it can either be its own data, data purchased from third-party data providers or a mix of both).

### What does it measure?

GBSFI provides an overall and synthetic vision of the biodiversity footprint of financial assets (e.g., listed equity) considering the full value chain of underlying economic activities (associated companies businesses). As GBSFI 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 GLOBIO model which is based on pressure-impact relationships.

### What input data are needed?

The GBSFI 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 a financial institution invested in)
2 Pressures, resources and emissions data:
   - Commodities (t), 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 a 13 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 might be directly calculated.

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

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

## Main strengths and limitations?

**Advantages:**

- 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
- 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.
- 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?

Using the results of the GBSFI does not require specialist knowledge and the metrics of km2 MSA is relatively easy to understand and visualize. For tailor-made approaches the required time effort depends on the desired level of detail and data availability. Quick approximations can be obtained with industry and country-level averages, and more refined assessments can be obtained if more precise data is collected. A quick assessment takes a couple of weeks and uses easily accessible (and existing) data. A typical detailed assessment should require a couple of months and might require the aggregation (or creation) of additional data, e.g., on habitat maps. GBSFI is a commercial tool (its underlying tool, the GBS, is however available freely for academics). The GBSFI provides tailor-made solutions so the technical and knowledge skills needed to apply the GBSFI will need to be hired (high costs, more than 20 working days). The tool developer offers training allowing the financial institution to apply the tool themselves in further iterations (if it already owns the required data). Costs for license fees, data and training are medium (between €4k and €10k). As the GBSFI is used to meet specific needs expressed by the financial institution (e.g., developing a biodiversity ETF, or a biodiversity-positive fund), the time investment needed by the FI itself is high (more than 30 days).

## 4.5 GID – Global Impact Database, Biodiversity Impact Data

**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 four main pressures: contribution to climate change, air pollution, water pollution and land occupation.

Emission pressures (contribution to climate change, air pollution and water pollution) 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 GIS datasets on biome cover, biodiversity state and crop productivity. GID relies on both ReCiPe and GLOBIO for pressure-impact modelling (see text box p. 40). Trade data from 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 the 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, Caixia 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.

The Global Impact Database (GID) is based on 10 years of experience in impact measurement. The GID 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 financial institutions. Upcoming developments include:

- the addition of a tool to automate the combination with investment data
- coverage of new biodiversity pressures (e.g. land use change, water use)
- extension of company-level data
- creation of a new biodiversity risk dataset

### 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 financial institutions quantify and understand the biodiversity impact of investments and portfolios based on exposure to companies, 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 reporting and non-reporting companies and 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).

## 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.m² 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.

## What input data are needed?

GID Biodiversity impact estimates are mapped to portfolios to measure biodiversity impact. Data on portfolio companies, countries, and sectors are required to map to GID. GID can be combined with lending or investment data such as invested amount and interest income 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, 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).

## 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:**

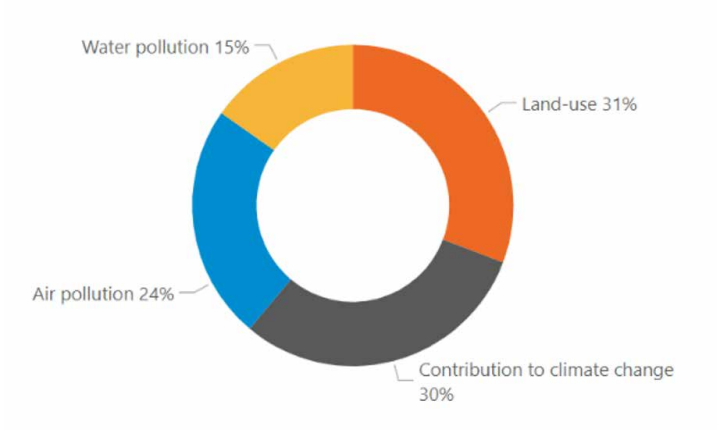
- Represents an estimate of impact rather than actual impact
- In the current version, pressures that are not considered due to data availability include impact of climate change on marine ecosystems, water use/scarcity, invasive species, chemicals and land use change (other than through land use)
- 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?

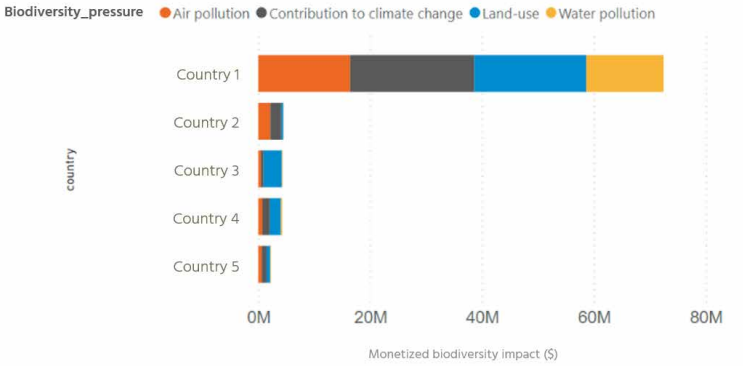
The GID data can be acquired directly or be purchased alongside Impact Institute advisory services. Fees depend on whether additional advisory or data is required (e.g., assistance in analysis and reporting), the amount of data (e.g., size/diversity of a portfolio), and whether custom additions are required (e.g., enhanced granularity sectors made specifically for a portfolio).

## Output visuals GID

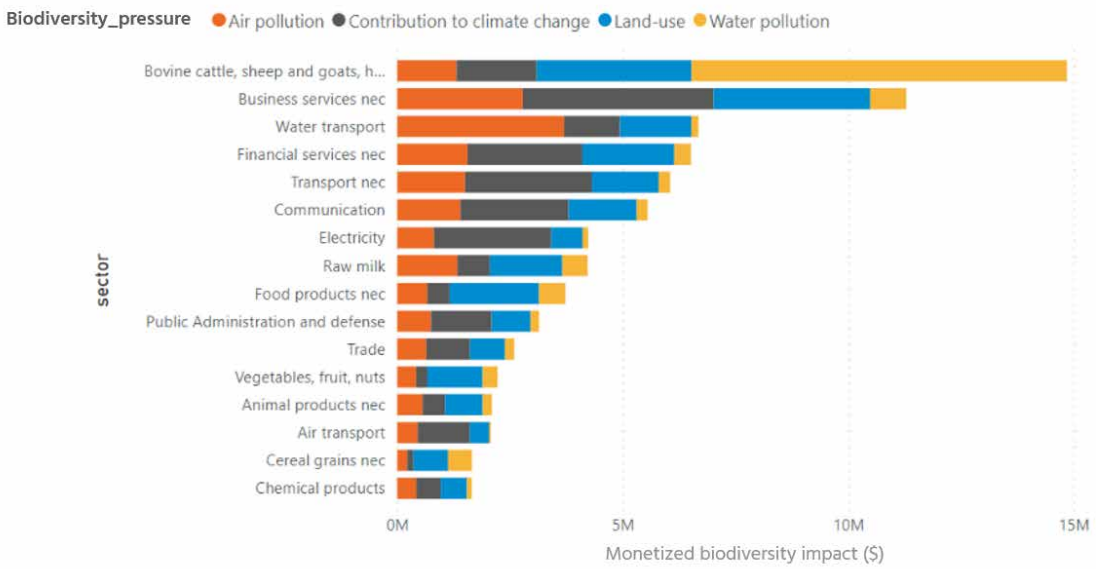
### Biodiversity impact breakdown by pressure



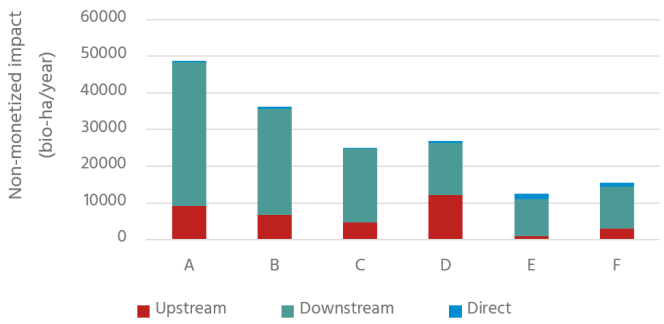

### Biodiversity impact by investment country and biodiversity pressure – Monetized



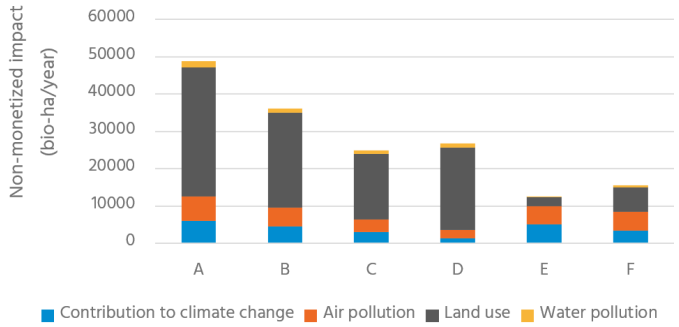

### Biodiversity impact by investment sector and biodiversity pressure – Monetized



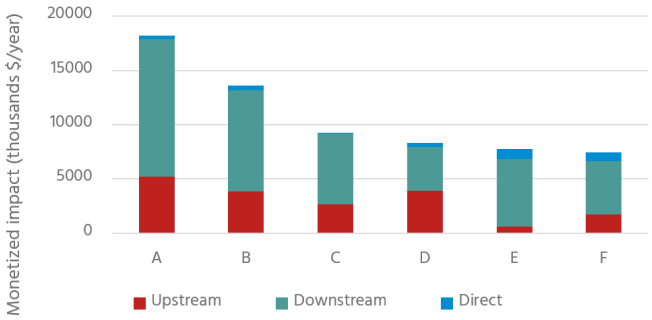
## Biodiversity impact by investment company and value chain segment – Non-monetized



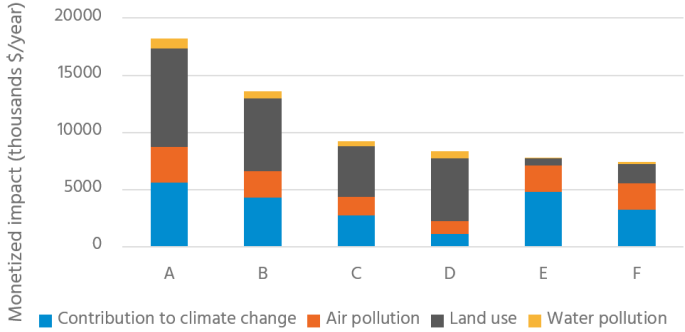

## Biodiversity impact by investment company and biodiversity pressure – Non-monetized




## Biodiversity impact by investment company and value chain segment – Monetized




## Biodiversity impact by investment company and biodiversity pressure – Monetized



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

**Exploring Natural Capital Opportunities, Risks and Exposure (ENCORE) enables users to visualise how the economy potentially depends and impacts nature and how environmental change creates risks for businesses.**

ENCORE has two main parts: the first focuses on natural capital, the second focuses on biodiversity (a specific component of natural capital). For the first, starting from a business sector, ecosystem service, impact driver, or natural capital asset, ENCORE can be used to start exploring risks related to natural capital. These risks can be explored further to understand location-specific risks with maps of natural capital assets, drivers of environmental change, and impact drivers. For the second, ENCORE allows finance sector users to assess their portfolios' potential alignment with the vision of a nature positive future.

### Organisations and reviewers

ENCORE was developed by the Natural Capital Finance Alliance (Global Canopy, UNEP FI and UNEP-WCMC) and was initially funded by the Swiss State Secretariat for Economic Affairs (SECO) and the MAVA Foundation. It was tested through finance sector pilots in Peru, Colombia and South Africa by PwC and Little Blue Research. The second phase of work was funded by the Swiss Federal Office for the Environment (FOEN). A testing group of 30 financial institutions were involved in shaping, reviewing and testing the second phase of ENCORE's development.

### Current stage of development

The first phase of ENCORE concluded in 2019 and resulted in the creation of the website, which allows finance sector users to explore potential dependencies and impacts on natural capital for all economic activities. The website launch was accompanied by a step-by-step guide for banks. New functionalities launched in 2021 include a free accounts system, ability to visualise dependency/impact links between economic activities and natural capital, and a map of natural capital risk hotspots.

In the second phase, ENCORE was developed further to help financial institutions understand the alignment of their portfolios with global biodiversity goals. An initial version of the ENCORE biodiversity module was launched in May 2021. It will be updated and finalised following agreement of the post-2020 Global Biodiversity Framework by the Parties to the Convention on Biological Diversity.

### Transparency of method

The ENCORE natural capital methodology includes pages dedicated to each component of the ENCORE knowledge base (e.g. natural capital assets, ecosystem services) and the spatial data it contains. The method used in the ENCORE biodiversity module is also available online. It is accompanied by a 'how to' guide, which includes a step-by-step walkthrough and hypothetical case studies.

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

**1. Risk management:**

- Identify potentially material ecosystem services, natural capital assets, and impact drivers for different sectors.
- Identify important drivers of environmental change potentially affecting the portfolio.
- Assess the potential risk of disruption to specific natural capital considerations in specific locations. 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 financial institutions. This material can inform the next steps financial institutions 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 financial institutions 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 financial institutions can take to drive greatest alignment with global biodiversity goals.

## What does it measure?

ENCORE provides users with a view of how economic activities (referred to as 'production processes') might depend or impact natural capital. The tool also provides qualitative materiality ratings for dependencies and impacts, which help users understand which dependencies and impacts might warrant the most immediate attention.
The knowledge base in ENCORE includes:

- 21 ecosystem services
- 8 natural capital assets
- 27 drivers of environmental change
- 11 impact drivers (inputs to or outputs from production processes)
- 86 production processes
- 138 sub-industries (from the Global Industry Classification Standard, GICS)
- 11 GICS sectors

In addition, the tool allows users to explore spatial data on natural capital assets (e.g., variability in water supply), drivers of environmental change (e.g., flood events), and impact drivers (e.g., prominence of light pollution as an indicator of disturbance to species). The information in ENCORE is based on a large body of scientific and grey literature supplemented with input from experts within the scientific and conservation community and industry.

The ENCORE biodiversity module (released in May 2021) focuses on agriculture and mining initially - two key sectors driving biodiversity loss globally. It combines finance sector user inputs (e.g., area of agricultural land, mining companies) with underlying modelled biodiversity data to provide portfolio level current exposure results for two key goal relevant metrics: species extinction risk and ecological integrity risk. These two metrics relate to two key components that are expected to be included in the Convention on Biological Diversity's Post-2020 Global Biodiversity Framework, to be agreed in 2022. This is accompanied by sector-level future scenarios to indicate potential future risks (for mining), as well as guidance on how financial institutions can work with clients/ customers to increase their alignment with global biodiversity goals.

## What input data are needed?

ENCORE natural capital functionalities - All the user needs to know is in which sub-industries or production processes they are interested. This will return information on the potential dependencies and impacts of the production processes in the selected sub-industries, as well as relevant materiality ratings. If users know approximate locations for economic activities of interest, they can explore spatial data relating to potential dependencies and impacts on the ENCORE map page. This can help with initial screening of potential natural capital related risks and provide a starting point for more in-depth analysis.

The ENCORE biodiversity module is initially available for two key sectors: agriculture and mining, focusing on direct production, rather than supply chain activities (i.e., farms and mines, rather than retail outlets or refineries). There is no global database of farm locations; users can therefore feed in area of agricultural land per country for the agriculture component. For the mining component, users can select company and country combinations.

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

IBAT, Trase and SPOTT. The webinar 'Environmental risk screening: A training on nature-related tools used by the finance sector' (December 2021) shows how ENCORE, IBAT, Trase and SPOTT can be used in combination.

## Main strengths and limitations

**Strengths**

- Accessible to all audiences as it requires very little prior knowledge of natural capital, ecosystem services, and dependencies and impacts.
- The ENCORE knowledge base draws on a vast body of scientific and grey literature and has been through extensive review processes.
- It comprehensively covers all impacts and dependencies, aligned with authoritative approaches (e.g., the Natural Capital Protocol and the IUCN's Threats Classification).
- Natural capital information in ENCORE can easily be linked to users' own financial data to support economic analyses at varying levels.
- Includes spatial data from existing third-party sources, which allows users to get a quick sense of potential natural capital-related risks in specific locations.

**Limitations**

- ENCORE's materiality ratings for dependencies and impacts only indicate potential dependencies and impacts, based on generic global screening. This is appropriate to inform initial screening but it should be followed by spatially explicit and company-specific assessments to inform on location-specific dependencies and impacts.
- While the knowledge base is built on the best available scientific and grey literature, some dependency and/ or impact links may be missing due to lack of sufficient robust literature.
- The information in ENCORE considers present-day technologies and industry norms; it does not account for future developments by industries to reduce dependencies and impacts.
- Only direct impacts and dependencies are covered. Users cannot explore impacts and dependencies across

the full value chain of a production process (e.g., the dependencies listed for the 'Production of paper products' process exclude the dependencies related to growing and harvesting wood products, which are covered under forestry-related processes.)

- No coverage of cultural ecosystem services as these are deemed to be important for all industries (e.g., to maintain health and mental wellbeing of workforces). Also, no coverage of nutrition under provisioning ecosystem services as it is assumed that all industries depend on their customers and staff being able to access food.

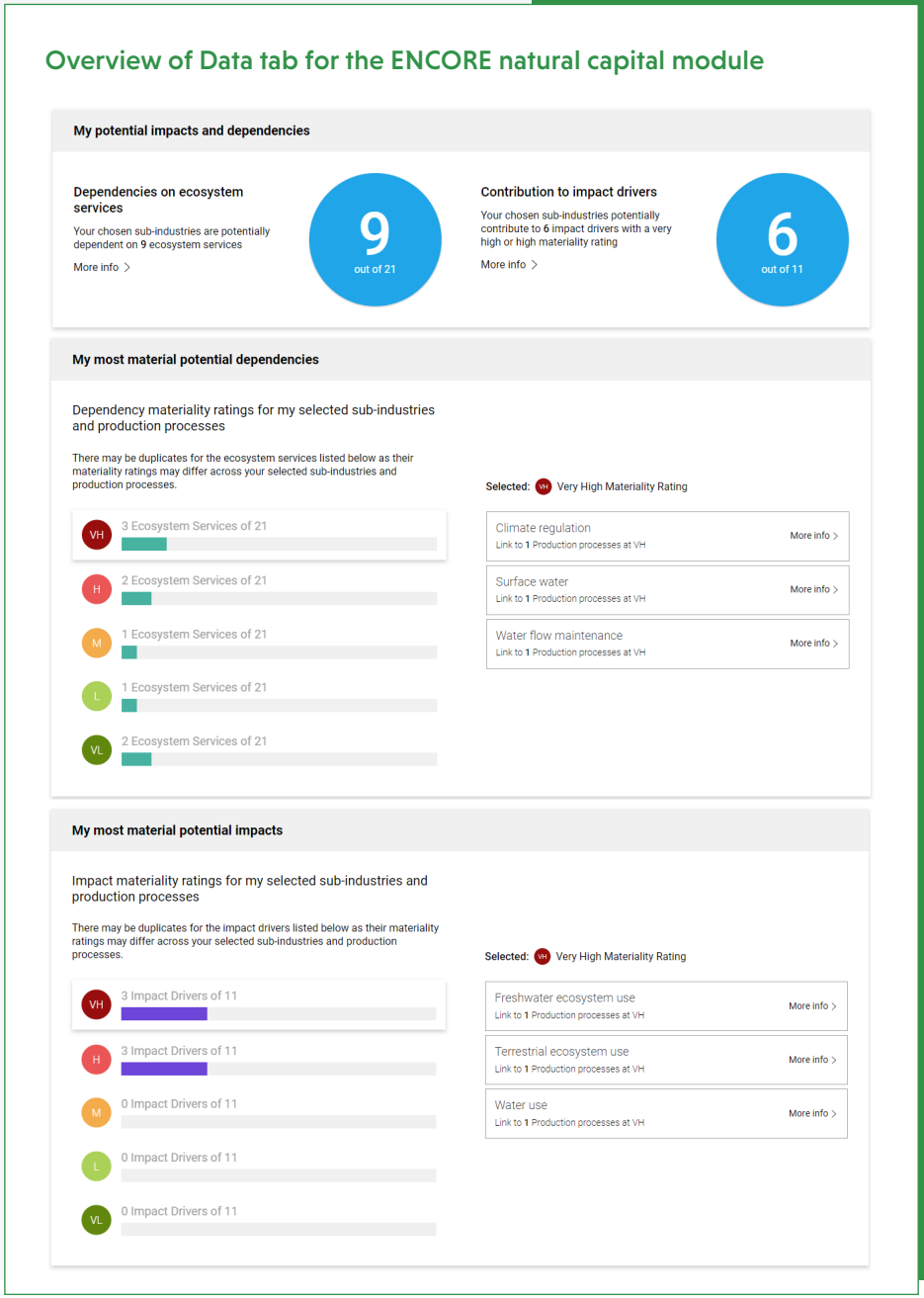
## What are the costs?

User fee - ENCORE is an open access tool. Information from the tool can be used under a CC BY-SA 4.0 license.

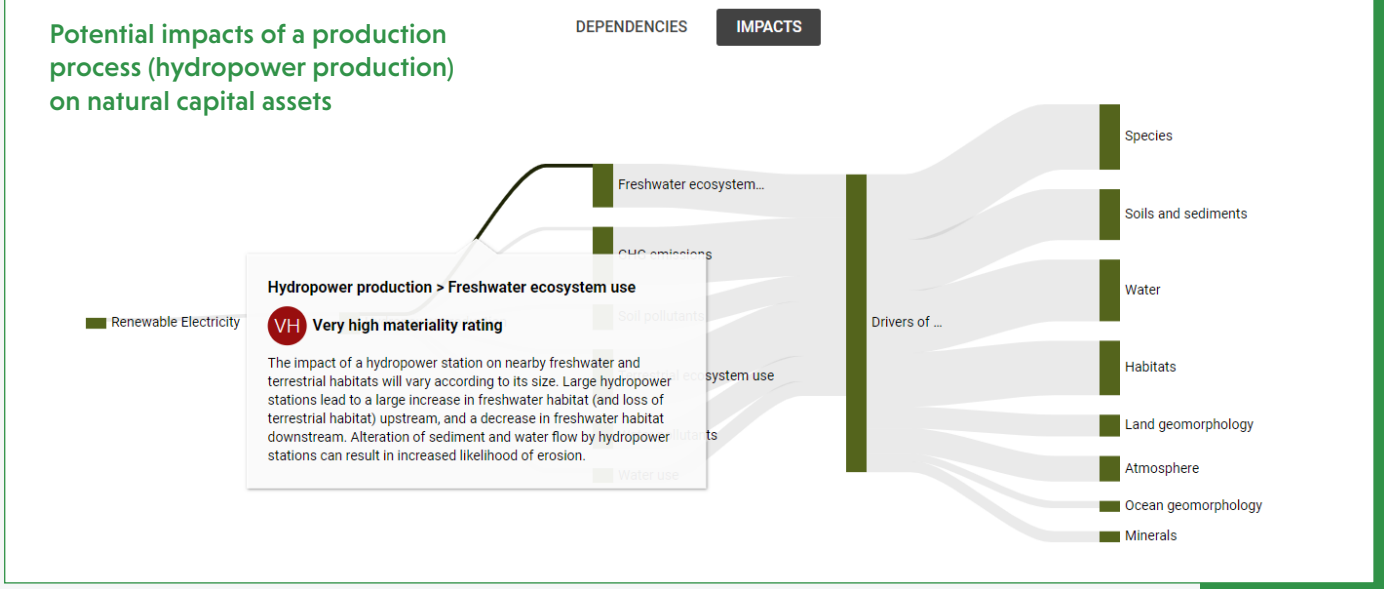
Effort involved in using ENCORE - Time required to use and interpret the ENCORE knowledge base will vary according to the depth of engagement. It is possible to get a snapshot of potential dependencies and impacts for selected economic activities in less than 30 minutes. More detailed analyses that combine the ENCORE knowledge base with user-sourced data (e.g., data on financial flows for given industries) can take a few weeks or months.

## Output visuals ENCORE

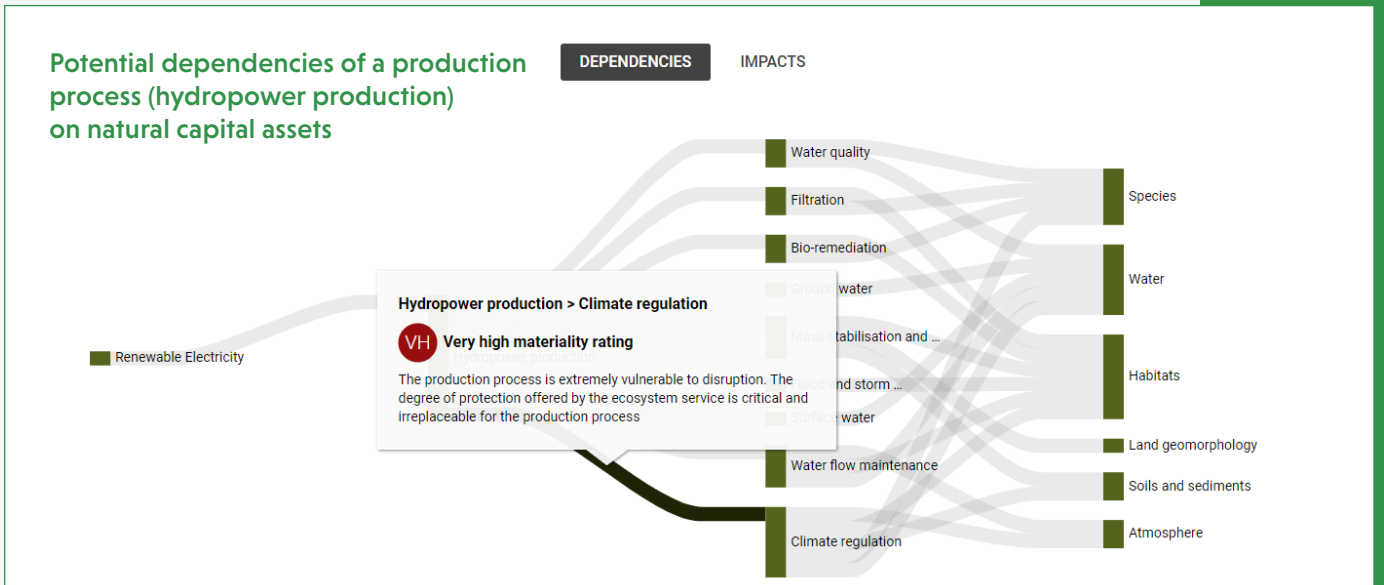
### Overview of Data tab for the ENCORE natural capital module



## Potential impacts of a production process (hydropower production) on natural capital assets




## Potential dependencies of a production process (hydropower production) on natural capital assets



## 4.7 IBAT - Integrated Biodiversity Assessment Tool

**Integrated Biodiversity Assessment Tool (IBAT) is a web-based biodiversity data provider and the single source of licenced commercial access to global biodiversity datasets based on the IUCN Red List of Threatened Species™, the World Database on Protected Areas (WDPA) and the World Database of Key Biodiversity Areas (WDKBA). Furthermore, IBAT provides access to the Species Threat Abatement and Restoration Metric (STAR) – a metric that allows quantification of the potential contributions that species threat abatement and restoration activities offer towards reducing extinction risk across the world.**

IBAT offers geolocated data on important sites for biodiversity, in the form of polygons for protected areas and Key Biodiversity Areas, and distribution maps for IUCN Red List species. If locations of physical assets, companies, projects, or supply chains are known, these can be uploaded by investors and overlapped with IBAT's biodiversity maps to enable early-stage biodiversity risk screening and due diligence. Users need to create an account to be able to upload projects and create reports and data downloads.

STAR is one of the derived data layers in IBAT. Taking into account that biodiversity is distributed unevenly around the world, STAR assesses the potential of specific actions at specific locations to contribute to global conservation targets. STAR scores show the potential contribution of conservation or restoration actions in a specific location to reduce the extinction risk for species that live in that location. In other words, it shows what portion of the global threat-abatement and restoration potential could be realized for all Threatened and Near Threatened species in that Area of Interest to become Least Concern. STAR is based on a global map of species extinction risk scores mapped by 5 x 5 km.

### Organisations and reviewers

IBAT is an Alliance between BirdLife International, UNEP-WCMC, IUCN, and Conservation International. The IBAT team has a Governance Committee comprised of the Director/Deputy Director of each of the four Alliance Partners, as well as a User Sub-committee, Technical Sub-committee and Scientific Advisory Group.

The development of STAR was led by the IUCN Species Survival Commission's Post-2020 Taskforce, which is hosted by Newcastle University (UK), in collaboration with 88 scientists from 54 institutions in 21 countries around the world.

### Current stage of development

IBAT was conceived in 2005 by staff across the Alliance organisations and launched at IUCN World Conservation Congress in 2008. IBAT worked closely with commercial organisations from the start (e.g., The World Bank, Inter-American Development Bank, BP, etc.) to ensure the tool was fit-for-purpose and met the needs of their users. It is used extensively within project finance. However, it is not yet widely used for financial portfolio analysis due to constraints in accessing company location data. Future developments will include a calibration functionality for STAR, which will allow companies to input and adjust the estimated STAR score based on which species/threats they know to be present at their site. This will allow realistic targets to be set and realised over time. Guidance on this calibration functionality is expected soon.

Additionally, IBAT will seek to further integrate other decision-grade biodiversity datasets from the four partner organisations in line with business needs. IBAT is also engaging in a number of partnerships with organisations, such as ESG data providers to ensure wider reach and impact of biodiversity datasets.

### Transparency of method

- The World Database on Key Biodiversity Areas includes sites identified using A Global Standard for the Identification of Key Biodiversity Areas.
- The IUCN Red List of Threatened Species™ is the world's most comprehensive information source on the global conservation status of animal, fungi, plant species and more (currently 142,577 species assessments). See Red List categories and Criteria
- The World Database on Protected Areas is the authoritative source of data on protected areas (WDPA Manual).
- The STAR Metric, based on the IUCN Red List, is peer reviewed – see Mair et al., 2021

## What is the main purpose of this tool?

When combined with data on the location of assets, data from IBAT can help financial institutions to act on biodiversity-related risks (e.g., production locations located near protected areas) and opportunities (i.e., as expressed by STAR). The vision of the IBAT Alliance is that access to authoritative biodiversity data results in organisations taking positive action for nature.

STAR can help national governments, corporates, civil society and the finance industry and investors identify the potential contribution they can make to global targets such as the Sustainable Development Goals. It can help these actors identify which management responses are most likely to reduce species extinction risk, through management designed to reduce threats to species

## What does it measure?

IBAT enables companies and financial institutions to assess whether geographic sites (e.g., projects, portfolios, supply chains) are located in or adjacent to protected areas and areas of high biodiversity value outside protected areas (Key Biodiversity Areas). Furthermore, one can identify which IUCN Red List species occur in proximity to areas affected by operations. IBAT also enables compliance with IFC Performance Standard 6 and the Equator Principles. STAR measures the contribution that investments can make to reducing species extinction risk, through abatement of pressures on threatened species, and restoration of habitat, for any given site or region. The STAR report will show how the potential at this site compares to other sites around the world or in that country or region, and what proportion of global and regional targets the site can offer. STAR can be calibrated based on ground-truthed data and used for science-based target setting and monitoring.

## What input data are needed?

IBAT users can enter or upload unlimited 'Areas of Interest' to screen using site-specific reports or multi-site analyses. Data are also available to download or access through APIs for integration into in-house systems. Information is required on company locations to be able to analyse portfolios against potential risk exposure.

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

Investors should consult ENCORE to determine a portfolio's impacts and dependencies on natural capital, as well as the potential to increase alignment with global biodiversity goals. At this stage, additional insights on specific biodiversity features surrounding 'Areas of Interest' can be investigated using IBAT. The webinar 'Environmental risk screening: A training on nature-related tools used by the finance sector' (December 2021) shows how IBAT can be used in combination with ENCORE, TRASE and SPOTT.

## Main strengths and limitations

**Strengths:**

- Mature; IBAT is used by an increasing range of leading companies across all sectors (examples here) and develops in line with their feedback and business needs.
- Globally authoritative; IBAT only provides scientifically robust data that are based on global standards, supported by the scientific community and are decision-grade.
- Geographic coverage; IBAT provides spatially-explicit data in all biomes and delivers the most comprehensive global compendia on species and sites for biodiversity.
- Data granularity and quality; IBAT geospatial data are regularly updated, peer reviewed and globally authoritative. Derived raster layers are currently available at 5km and 1km grid cells for STAR and rarity-weighted species richness respectively.
- Use cases; IBAT can be used effectively when an Area of Interest is known. For business applications where spatially-explicit information is not available, we would direct investors to IBAT's emerging partnerships with ESG data providers.
- Scalability; analyses can be run from the project to portfolio level with STAR being the best example of a metric that generates comparable and scalable scores at any scale desired.
- Easy to use; IBAT is designed to be used by any organisation and can be easily understood without the need for external consultants or experts in biodiversity or GIS. IBAT reports can be generated without prior experience in a matter of minutes. However, the data offers a wide range of opportunities for in-depth analysis and further investigation.
- Quantitative analysis; IBAT provides raw geospatial data for analysis but its derived raster layers provide quantitative scores that can be compared and scaled across the world.

**Limitations:**

- IBAT doesn't allow for portfolio assessment in a cost effective manner yet, as it requires overlay with (commercially restricted) data sets on asset locations to understand company risk exposure.
- Coverage of protected areas: in a very few cases, nationally designated protected areas may not be available for commercial use due to requirements in licence agreements.
- Coverage of Key Biodiversity Areas: KBAs have global coverage but currently have disproportionate representation from Important Bird and Biodiversity Areas due to the IBA Programme having been launched many years before in 1979 by BirdLife International and the relatively recent release of the updated Standard.

- Coverage of IUCN Red List: taxonomic groups are deemed to have been comprehensively assessed if at least 80% of the group has been assessed; this currently includes mammals, birds, amphibians, reptiles, freshwater crabs, warm-water reef-building corals, sharks and rays, groupers, wrasses, lobsters, conifers and cycads. More information here.
- STAR: STAR does not include information about threats to habitats. Such information is not yet available at a global scale in a comparable fashion to species.

## What are the costs?

IBAT asks for licence fees in order to support the update and maintenance of its global biodiversity datasets. Subscription options depend on the number of reports and the extent of data required by a commercial entity. The number of accounts per organisation is unlimited. The IBAT Secretariat provides free training to IBAT Subscribers to ensure proper use and interpretation of the outputs.

## Output visuals IBAT

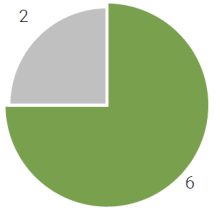
### Number of protected areas and KBA's within a 10km buffer of each project

*Source: IBAT Example Africa Multi-Site Report, June 2022*

| Site | Area (km$^2$) | Protected Areas | KBAs |
|---|---|---|---|
| Bab-El Mandeb | 7619 | 2 | 6 |
| Bale Mountains | 10311 | 13 | 5 |
| Gaborone | 54 | 0 | 1 |
| Guéckédou | 11831 | 9 | 4 |
| Magaliesburg | 421 | 7 | 1 |
| Mampikony | 731 | 2 | 2 |
| Pofadder | 156 | 0 | 1 |
| Sagala Hills | 61 | 1 | 1 |

### Summary of protected areas overlap

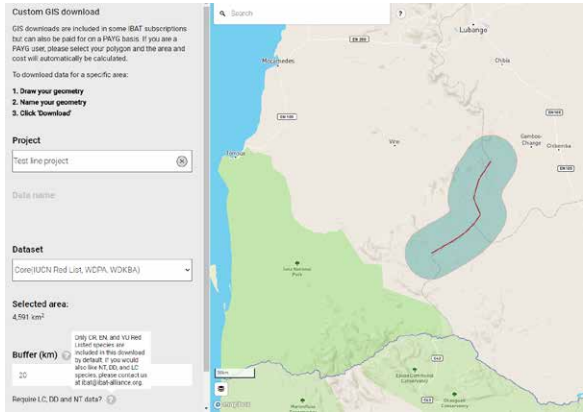
*Source: IBAT Example Africa Multi-Site Report, June 2022*



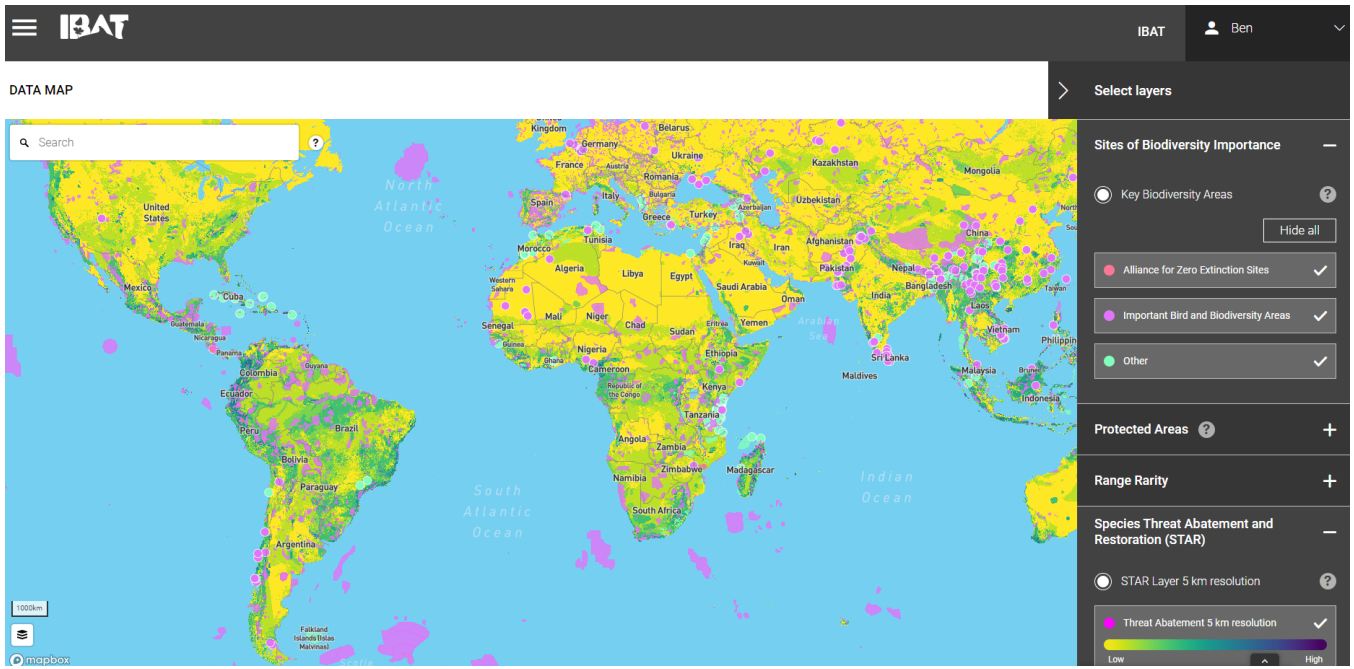

6 (75.00% of sites) are within 10.0 km of a protected area.

2 (25.00% of sites) are not within 10.0 km of a protected area.

### Example GIS Download screen



## IBAT Datamap showing STAR and KBAs




## Counts of species categorized as Critically Endangered (CR), Endangered (EN) or Vulnerable (VU) under the IUCN Red List of Threatened Species found within 50 km of each site

*Source: IBAT Example Africa Multi-Site Report, June 2022*

| Site | CR | EN | VU | TOTAL |
|---|---|---|---|---|
| Bab-El Mandeb | 21 | 35 | 116 | 172 |
| Bale Mountains | 10 | 26 | 45 | 81 |
| Gaborone | 5 | 9 | 14 | 28 |
| Guéckédou | 14 | 48 | 74 | 136 |
| Magaliesburg | 5 | 9 | 17 | 31 |
| Mampikony | 19 | 81 | 154 | 254 |
| Pofadder | 1 | 5 | 6 | 12 |
| Sagala Hills | 13 | 35 | 40 | 88 |

# 5. Case studies

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

## ASN Bank's development of the BFFI

In 2014, ASN Bank decided to develop a long term objective for one of the three sustainability pillars of the bank: Biodiversity. To understand the responsibility of the bank from an impact perspective, ASN Bank and two consultancies (CREM and PRé Sustainability) developed the Biodiversity Footprint Financial Institutions (BFFI). The BFFI is used by ASN Bank to identify biodiversity impact hotspots in the bank's portfolio and to calculate the bank's total potential impact on biodiversity (the footprint). Footprint calculations have now been conducted for 6 consecutive years (2015-2021) in which the BFFI has evolved from a time-intensive tool to a tool which has partly been automated.

Even though the level of accuracy of any footprint calculation is limited, it allows the bank to identify changes in impact through the years, the relative contribution of different asset classes and the maain impact drivers responsible. It acts as a compass and shows where efforts should be focused. Furthermore, it led to internal support from higher management to step up efforts on biodiversity. For example, the ASN Biodiversity Fund would not have been set up if ASN Bank would not have had the BFFI and the objective of reaching an overall net gain in 2030.

Moreover, being one of the first to use biodiversity footprinting in the financial sector, it allowed ASN Bank to exchange knowledge with other financial institutions, tool developer and data providers, resulting in the Partnership for Biodiversity Accounting Financials (PBAF) in 2019.

## 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 financial institutions 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.

## 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 km2.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.

## 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 an 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.

## Risk assessment with IBAT by Allianz

Since 2012, Allianz has continuously worked on implementing processes to manage sustainability-related risks across our business. This included introducing guidelines for the management of such risks across property and casualty insurance and non-listed investment transactions.

When an underwriter or investment manager identifies a potential risk based on one of the sustainability guidelines, the transaction is referred for review by one of Allianz's sustainability centres of competence. These teams then use a variety of sustainability-risk data sources to assess potential risks. IBAT is one of these data sources, and is used to assess the biodiversity impacts of insurance clients or potential investment targets on their local environment, mainly related to physical assets (e.g., infrastructure investments, real estate, renewable energy). For this, the teams need to understand threatened species, protected areas, and other indicators of biodiversity. Should risks be identified, they will be evaluated and may lead to additional conditions to Allianz's insurance offers or investment proposals to mitigate such a risk. If no viable mitigation options are found, Allianz might decline the transaction. Among the data sources used by Allianz's sustainability centres of competence, IBAT is the only geo-location-based tool for biodiversity-related information. The other data sources are focused on cross-company ESG risk information or reputational risk information.

Allianz France recently published the results of a biodiversity risk assessment performed on their investment portfolio in their Sustainable Investment Report 2021. The underlying data for the analysis was in part based on IBAT's data for Key Biodiversity Areas and the IUCN Red List. Although sovereigns (representing a considerable share of Allianz France's portfolio) could not be covered, IBAT's information layers proved useful to develop a risk matrix of investee companies' scope 1 potential impacts on biodiversity.

# 6. Biodiversity data, types and sources

**The biodiversity measurement approaches outlined in this guide draw from various data sources to provide financial institutions 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 B@B Thematic report on Biodiversity Data.**

## 6.1 A broad variety of data sources

Data used by biodiversity measurement approaches can include data on (TNFD, 2021):

1. **Economic measures**, e.g. a company's turnover, raw material use, or volumes of produced goods. This type of input data is covered as 'Economic quantification of activities data' in Table 2 (p.11).
2. **Pressures on biodiversity/impact drivers**, e.g. a company's greenhouse gas emissions, resource use, or linkage to deforestation and land use change. This type of input data is covered as 'Pressures, resources and emissions data' in Table 2 (p.11).
3. **The state of biodiversity**, i.e. the status of species and ecosystems. This type of input data is covered as 'Biodiversity state data' in Table 2 (p.11).
4. **The state of ecosystem services**, e.g. a forest's carbon sink capacity.
5. **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.

## 6.2 Data sources and models used by footprinting tools

The biodiversity footprinting tools described in this guide (BFFI, BIA-GBS, CBF, GBSFI and GID) rely mainly on economic company-level data (data type 'Economic measures'). With this data, the associated pressures and impact on biodiversity are calculated with the help of input/output-databases (e.g., EXIOBASE, Eora) and biodiversity models (e.g., GLOBIO, ReCiPe - see text box). These databases and models are based on sector averages, e.g. the average land area and volume of emissions needed to produce a certain volume of raw material. The resulting company impact figures thus represent potential rather than actual biodiversity impact. In some cases, models and calculations are enriched with reported company-specific data on pressures or management response. This makes the results more closely aligned with a company's actual biodiversity impact.

### Main biodiversity models used for footprinting

**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 dose-response 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, GBSFI and GID (for land use) to translate pressures into potential biodiversity impacts.

**ReCiPe** – The ReCiPe model (developed by RIVM, Radboud University Nijmegen, Leiden University, PRé Consultants and NTNU Trondheim) was originally developed for Life Cycle Assessment (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 $PDF.m^2.yr$ (for terrestrial biodiversity) and $PDF.m^3.yr$ (for freshwater and marine biodiversity) metrics. Both can be aggregated into one metric ($PDF.m^2.yr$), 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.

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

## 6.3 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.

**Further reading:**

- Nature Metrics offers eDNA monitoring services to both businesses and financial institutions.

### 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 financial institutions. 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.
- Satteligence & SarVision: Offer remote sensing services that provide insight in deforestation and forest degradation

# 7. Measuring marine biodiversity

**Marine biodiversity is only partially covered by the measurement approaches described in this guide, and often not addressed by financial institutions. This chapter outlines what type of resources are available and how financial institutions can go about to start assessing their impacts and dependencies on marine biodiversity.**

## 7.1 Addressing the marine realm

Marine ecosystems are highly material for financial institutions to integrate in their assessments. Firstly, due to the critical ecosystem services they provide, and secondly, because of the multiple pressures on marine biodiversity caused by a wide range of ocean and land-based activities, either directly or indirectly. The key pressures highlighted in marine environmental frameworks and scientific literature for causing decline in marine biodiversity include:

- Sea use and physical impacts: disturbance of seabed and loss of habitats
- Pollution: due to nutrient and organic matters, contaminating compounds, marine litter (including micro litter), noise, light and heat
- Climate change: leading to ocean warming and acidification
- Living resource exploitation: extraction and disturbance of species
- Invasive species and pathogens: spread of non-indigenous species and microbial pathogens

Currently none of the measurement approaches developed for the finance sector adequately address impacts on marine ecosystems. The quantitative methodologies that have been developed for biodiversity assessment of investments are mainly land-based, facing limitations in terms of pressure and impact coverage when it comes to marine ecosystems. Nonetheless the measurement approaches described in this guide are planning or are already able to provide assessments for some critical pressures, impacts and dependencies, such as:

- BFFI: coverage of marine ecotoxicity and eutrophication; integration of the overexploitation of fish species under development
- GID: coverage of marine eutrophication as a category of water pollution
- ENCORE: coverage of marine-related natural capital assets, impact drivers and ecosystem dependencies, as well as relevant spatial maps
- STAR and IBAT: STAR will be extended to marine species (in addition to mammals, birds and amphibians) and IBAT provides access to marine biodiversity datasets for project finance

In order to develop further measurement approaches, there is a wide availability of primary data on marine ecosystems' pressures, state of biodiversity, impacts and ecosystem services that can already be explored. There are several marine data platforms which provide extensive knowledge (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 financial institutions which is made challenging by the relatively poor state of corporate disclosures on marine impacts and dependencies. There are already a number of opportunities that can be explored by financial institutions 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.

## 7.2 Measuring the overall exposure of portfolios to material ocean impacts and dependencies

Datasets on critical marine impacts and dependencies related to specific economic activities and production processes may be used for portfolio assessment. These datasets can be complemented by multi-regional input-output models and Life Cycle Analysis tools to integrate indirect exposures. Mapping these linkages can help financial institutions identify the potential risks and opportunities they are exposed to, as well as prioritise sectors/areas for actions and further data collection.

Natural capital 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 sub-sectors and production processes. This includes information on:

- Impact drivers: Marine ecosystem use, as well as other impact drivers of marine biodiversity loss relevant for production processes of exposed industries, such as water pollution, solid waste, disturbances, GHG and non-GHG emission and other resource uses.
- Dependencies on ecosystem services: dependencies of exposed industries on marine-related provisioning services (such as direct physical inputs of genetic and other materials), regulation and maintenance services as enablers of production processes, protection from disruption or mitigation of direct impacts (including the critical climate regulating function of marine ecosystems).

This analysis can be complemented by more specific resources for the marine environment.

- 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.

## 7.3 Conducting 'deep dives' for key sectors and activities

Portfolio analysis should be complemented with sector level expertise to gain greater insights into risks and opportunities. A key resource that has been developed for the financial sector is the UNEP FI guidance Turning the Tide: How to Finance a Sustainable Ocean Recovery. Five key ocean sectors are explored in the guide, chosen for their established connection with private finance: seafood, shipping, ports, coastal and marine tourism, and marine renewable energy. Two additional sectors (coastal infrastructure and waste prevention and management) have been added in 2022, and more sectors are expected to be included.

For each key sector, the guide provides an overview of:

- Its key environmental and social impacts and dependencies
- Its relationship to other sectors of the blue economy
- Related materiality assessments
- Detailed criteria for sustainable financing, with annexes providing indicators, verification, actions, recommendations and links to the Sustainable Blue Economy Financing Principles
- Risks and opportunities

For the respective industries, further expert studies and literature may be explored. Furthermore, for specific industries, data on their contribution to some key marine pressures can be explored. For instance, estimations of emissions, including air pollutants, nutrient and organic enrichment or marine ecotoxicity from databases (such as EXIOBASE) may be used.

## 7.4 Assessing geolocated exposure to marine sensitive zones

In order to further assess the risks, integrating a geolocated dimension with marine investments and spatial planning is critical. A global map of human impact on marine ecosystems reported that a large fraction of marine ecosystems (41%) is strongly affected by multiple drivers. First, extensive geolocated datasets exist that can be used to assess the exposure to Marine Protected Areas and sensitive zone 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 zones: 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.

This geospecifc data on the environmental status of marine zones can be overlayed 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.

## 7.5 Ways forward

In order to better integrate marine biodiversity into financial decision-making, 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 and impacts is needed to translate data on economic activities into more comprehensive assessments of their impacts on marine biodiversity. In conjunction, there is a need for enhancing corporate disclosure in 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 financial institutions. At the same time, financial institutions can start to assess their impacts and dependencies on marine ecosystems with the data and tools that are already available.

# 8. Next steps

**This guide is one of the many steps in our journey towards measuring the biodiversity impacts of our investments and finance activities. We encourage all financial institutions to test and apply the tools currently available. Through the F@B Community under the EU B@B Platform, and through the Finance for Biodiversity Foundation, we will continue to share practices and challenges and consolidate lessons learned.**

## 8.1 Using the approaches wisely

The biodiversity measurement approaches currently available are a *useful starting point in understanding where potential impacts might lie* and focusing attention and effort within a portfolio of investments. We encourage financial institutions to use them keeping two things in mind.

Firstly, the biodiversity footprinting tools described in this guide currently assess *potential (modelled) impacts* rather than actual impacts on biodiversity. The actual impact a company has on biodiversity might deviate from the modelled potential impact. Also ENCORE is based on subsector 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 impact, monitoring and screening biodiversity risks, training portfolio managers, and understanding the relative contribution of different asset classes, sectors, value chains and impact drivers to focus efforts on mitigating biodiversity loss. Data on potential impacts 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/ controversies to help identify 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).

Secondly, *not all pressures and scopes are covered* by the biodiversity footprinting tools currently available. At this point in time, most approaches underrepresent impacts on the marine environment and do not yet include impacts of alien invasive species. Furthermore, some do not include resource exploitation (including water use) or downstream impacts. In general, 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 pressures and scopes are included/excluded by the approach that is used.
- Supplementing biodiversity footprinting tools with qualitative data on the pressures not covered by the tool and the sectors for which these are material. Both ENCORE and the SBTN Initial Guidance could offer a starting point for this.

## 8.2 Collaborating on further developments

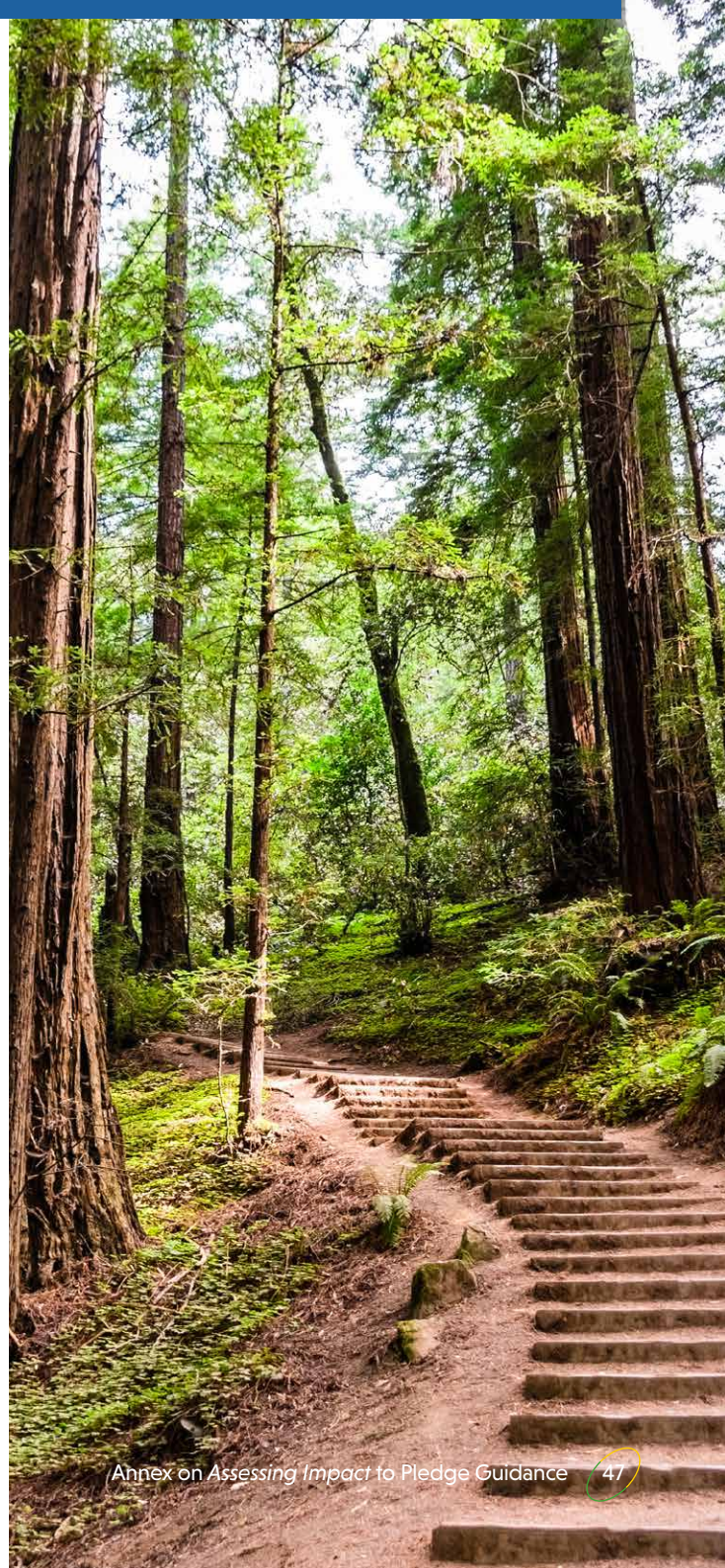
The field of biodiversity footprinting is relatively new and rapidly evolving. The current diversity of approaches provides valuable innovation in this space. This – coupled with sharing of lessons learned across the measurement tools – is needed to enable a step change in our ability to measure biodiversity impact. In addition, we believe the following areas for alignment 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 pressures that should be included within biodiversity footprinting (quantitatively or qualitatively).

Also, 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 pressures, 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.
- Incorporating a broader range of pressures 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.

Meanwhile, we will continue to update the Overview of measurement approaches table (chapter 3) on a quarterly basis in 2022, as the measurement approaches and their applications evolve.



# 9. Sources and more readings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Open-source Biodiversity Data Platform Initiative. Technical scoping paper. February 2022, Finance for Biodiversity Initiative

# Colophon

The 'Guide on biodiversity measurement approaches' is made by the Finance and Biodiversity Community (F@B Community, part of the EU Business and Biodiversity Platform) together with the Finance for Biodiversity Foundation (FfB Foundation) and the included tool developers. This second edition was published in July 2022, based on input from finance members collected during the 7 April workshop.

## Business and Biodiversity Platform

As part of the EU Business and Biodiversity Platform, the members of the Finance and Biodiversity Community have been sharing practices on measuring biodiversity impact since 2017. In addition, the workstream Methods has been assessing different measurement approaches that are under development and in use, resulting in a series of reports. This Guide builds on reports by the workstream Methods. Both the F@B Community and the workstream Methods 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 (FfB Foundation) was set up to further facilitate collaboration amongst the Pledge signatories. A first summary on measurement was included in the Guidance document accompanying the Pledge. This 'Guide on biodiversity measurement approaches' provides further information as an annex to the Guidance document.
In 2022, an additional exploration was done by the FfB Foundation in collaboration with the biodiversity footprinting tools.

## Invitation to join

Financial institutions from all continents are encouraged to measure the biodiversity impact from their portfolios, investments and loans. They are invited to share practices under the EU Business and 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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Finance for Biodiversity Pledge

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