BIODIV'2050 **OUTLOOK:**

CLUB B4B+

Global Biodiversity Score: Establishing an ecosystem of stakeholders to measure the biodiversity performance of human activities

2021 update

N°18 - December 2021

MISSION ÉCONOMIE DE LA BIODIVERSITÉ

CDC BIODIVERSITÉ | Caisse des Dépôts GROUPE

TABLE OF CONTENT

EXECUTIVE DIRECTOR: MARC ABADIE
EDITOR IN CHIEF: ANTOINE CADI
COORDINATION AND EDITION: JOSHUA BERGER, ANTOINE CADI, DAVID MAGNIER (CDC BIODIVERSITE)
REDACTION (IN ALPHABETICAL ORDER): JOSHUA BERGER, ROSE CHOUKROUN, ALEXIS COSTES, JUSTINE MARIETTE, SIBYLLE ROUET-POLLAKIS, ANTOINE VALLIER, PATRICIA ZHANG
WITH CONTRIBUTION FROM: MANON BÉZARD, ANTOINE CADI, MARGAUX DURAND, ESTHER FINIDORI, CHARLOTTE GARDES, SYLVIE GOULARD, AMANDINE KEMMEL
THANKS TO: B4B+ CLUB MEMBERS (IN PARTICULAR EDF GROUP, SCHNEIDER ELECTRIC FOR THE CASE STUDIES)
ARTWORK: JOSEPH ISIRDI – WWW.LISAJOSEPH.FR
CONTACT: MEB@CDC-BIODIVERSITE.FR
COVER PHOTO: © MAARTEN ZEEHANDELAAR DE SHUTTERSTOCK
PUBLICATION OF MISSION ECONOMIE DE LA BIODIVERSITE, FINANCED BY BANQUE DES TERRITOIRES DE LA CAISSE DES DEPOTS
REFERENCE: CDC BIODIVERSITE (2021). GLOBAL BIODIVERSITY SCORE – 2021 UPDATE - ESTABLISHING AN ECOSYSTEM OF STAKEHOLDERS TO MEASURE THE BIODIVERSITY PERFORMANCE OF HUMAN ACTIVITIES, BERGER, J., CHOUKROUN, R., COSTES, A., MARIETTE, J., ROUET-POLLAKIS, S., VALLIER, A., ZHANG, P., MISSION ÉCONOMIE DE LA BIODIVERSITE, PARIS, FRANCE, 56P.

© NicoElNino de Shutterstock

FOREWORD

Biodiversity is the living fabric of our planet. By eroding it at a pace that is unprecedented in human history, we are threatening the ability of Earth to support complex life. In order to avoid these potentially catastrophic outcomes, "transformative changes" (Díaz et al. 2019) are required in our social, economic and financial systems. It is my hope that the 15th meeting of the Conference of the Parties (COP 15) to the Convention on Biological Diversity will contribute to delivering such transformations, with the adoption of an ambitious global biodiversity framework (GBF) for the 2021-2030 period.

While the primary responsibility for triggering such transformative changes to revert biodiversity loss rests, above all in democracies, with accountable governments (*e.g.* by introducing sector- and location-specific regulations, protecting certain areas and removing harmful subsidies), all players are concerned. In fact, one of the pillars of the post-2020 GBF will consist precisely in mainstreaming biodiversity, which means among other things that all economic agents should more systematically account for biodiversity-related criteria in their decision-making processes.

This could have many implications for the financial community, including central banks and financial supervisors. For financial institutions, this could mean that the assessment of nature-related risks and opportunities increasingly becomes part of financial risk analysis, as promoted by the recently launched private-led Taskforce on Nature-related Financial Disclosures (TNFD). From a financial regulation perspective, this could imply that disclosing on biodiversity-related dependencies, impacts and risks becomes mandatory, as will be the case in France following the article 29 of the 2019 Energy and Climate Act.

For central banks and financial supervisors, the above could mean that they will increasingly have to recognize biodiversity loss as a source of financial risk and to integrate the management of such risks within the remit of their mandates, including for the purpose of financial supervision and monetary policy.

In order to make progress on all these fronts, the development of analytical approaches that can help assess the impacts that financial institutions have on the natural environment through their portfolio allocation will be critical. In this context, tools such as the Global Biodiversity Score (GBS) are invaluable. By enabling financial institutions to better understand how the firms in portfolio impact biodiversity directly and indirectly (i.e. through their value chains) and by translating these impacts into a single metric (the Mean Species Abundance, MSA), such tools can contribute to better inform financial institutions' decision-making processes in the face of biodiversity loss.

The GBS tool was used, for instance, in a Banque de France Working Paper (Svartzman et al. 2021) to estimate the impacts on terrestrial and freshwater (i.e. not marine) biodiversity of economic activities financed by French financial institutions. The authors found, among others, that the accumulated terrestrial biodiversity footprint of the French financial system is comparable to the loss of at least 130 000 km² of 'pristine' nature, which corresponds to the complete artificialization of 24% of the area of metropolitan France.

Of course, the complexity of ecosystems and the uncertainty at stake call for humility and for learning-by-doing approaches, including by comparing the results obtained through different methods and metrics. Moreover, it will be essential to develop approaches that can address biodiversity loss and climate change jointly rather than in silo.

In short, we are only at the beginning of the learning curve when it comes to understanding the complex links between the natural environmental, the economy and the financial system. The authors of this report help us speed up the learning process. The latter will be critical if we are to live up to the urgent ecological challenges ahead of us. We do not have too much time.

SYLVIE GOULARD

Deputy Governor of the Banque de France

A WORD FROM THE CHAIRMAN

2020 abruptly reminded humanity of its undeniable connection to nature and biodiversity, posing as an additional yet unnecessary warning of the emergency to halt biodiversity loss and reconcile human activities with the very foundation on which they stand and depend. Our hope is that it will manifest as a turning point in the Human-Nature relationship. We hope that the increased awareness of numerous stakeholders – from governments to companies, investors and citizens – will further reinforce the shifts that have already emerged and serve the advancement of an ambitious post-2020 biodiversity framework.

Since the official launch of the GBS in May 2020, aimed at the calculation of the footprint of economic activities on biodiversity, more than 16 societies all over the world have conducted or are conducting a Biodiversity Footprint Assessment of their impacts using the GBS (on top of a dozen prior pilots). The recent launch of France's sustainable tourism plan named "Destination France" paves the way towards the calculation of large companies' biodiversity footprint in the tourism sector, thus broadening the commitment to nature to more and more economic players.

2020 and 2021 also brought new challenges, with the first elements of a common classification system for sustainable economic activities or "Green taxonomy" designed to align economic players and investors with the European Union's Green New Deal targets and objectives. To engage a constructive dialogue between investors and economic players, CDC Biodiversité made very clear the importance of building a common language for them.

On the corporate side, the ecosystem is now growing rapidly with more and more assessments and trained consultants. On the investor side, the solutions are being deployed and are under constant development. As the universes of financial assets are very wide and diverse, there is a real challenge in accessing data.

To meet this challenge effectively, it seemed obvious to us to partner with data specialists and in this context, we chose to focus on a particularly relevant partnership with Carbon4 Finance.

Technical synergies between the carbon and the biodiversity footprint are multiple and they will allow us to save precious time on the development of biodiversity data. Beyond these technical aspects, we share with our partner the values of rigor and transparency, and the conviction that expertise on the corporate side is essential to provide quality information to investors.

A first important step has been taken with the launch of the BIA-GBS database in July 2021, which provides access to operational data on biodiversity for a large universe of listed assets, making it possible to assess portfolios for all types of investors. This tool is in line with the latest French regulatory developments and I hope that it will inspire other countries by providing information on impacts, dependencies and soon the alignment of investments.

I would like to highlight that it is first step as we want to take a long-term view in order to support, with ever-improving data, the necessary transition of our economy to a model that is truly compatible with the physical limits of our planet.

CDC Biodiversité also remains very active in the various platforms dedicated to discussions and alignment amongst tool developers. We wish that the continuous efforts and improvements achieved will support a realistically ambitious engagement of the corporate world for the coming decade. We believe that things are moving into the right direction. We are convinced that Humanity has never been more well-armed to face the challenges at stake.

MARC ABADIE
CDC Biodiversité Chairman

© ILYA AKINSHIN de Shutterstock

Key concepts of the GBS and its ecosystems

© Anna Kucherova de Shutterstock

1 Key concepts of the GBS and its ecosystems

1.1 Brief history of the Global Biodiversity Score®

In 2020, CDC Biodiversité took its part into the transformative change required to protect biodiversity by releasing the Global Biodiversity Score® or GBS 1.0, the first version of its biodiversity footprint assessment tool. After five years of development, road-testing and a scientific review, the GBS tool is now available to companies seeking a leading role in the preservation of biodiversity through the quantitative assessment of their impacts and the building of a consistent, science-based and effective biodiversity strategy involving both their activity and their value chain. Since then, the first ever Biodiversity Footprint Assessment (BFA) was conducted by Schneider Electric, rapidly followed by other large companies (see Table 2 below). To meet the increasing interest of companies and enable the mainstreaming of GBS-based assessments, CDC Biodiversité also launched trainings dedicated to the tool and BFAs.

As we are writing this publication in Autumn 2021 the latest released version of the tool is the GBS 1.3.0, several BFAs led either by CDC Biodiversité or by trained GBS assessors are ongoing, GBS online trainings in English were held to support the international uptake of the tool and the Biodiversity Impact Analytics powered by the Global Biodiversity Score® database directed specifically towards the financial sector was launched in July 2021 in partnership with Carbon4 Finance, a leading data provider.

1.2 The GBS ecosystem

1.2.1 Current organization

Broadcasting information to a large number of users is valuable for the biodiversity footprint assessment and the GBS. Therefore, an **ecosystem composed of consultants, data providers, companies, and investors** has been established (CDC Biodiversité 2020h).

CDC Biodiversité invests continually in the tool's development and improvement. Thus, the GBS is constantly evolving. About 40 financial institutions, corporates and consultancies have been gathered in the Business for Positive Biodiversity Club (B4B+ Club), coordinated by CDC Biodiversité, and providing best practice sharing, updates on the state of the art, GBS testing and networking for its members (see the FAQ section for more details). To keep users updated and to answer their questions, technical support is also included in the B4B+ Club membership.

External consultants and internal company staff are trained by CDC Biodiversité to conduct BFAs. Data providers / rating agencies are also trained to provide biodiversity data and ratings for a wide range of companies and financial assets.

Two training levels are currently available[1]:

- **Level 1 trainings** (1 day), targeting anyone willing to understand how to draw a link between biodiversity erosion and economic activities using a GBS-based BFA.
- **Level 2 trainings** (2 days), enabling trainees to lead the comprehensive GBS-based BFA of any organization autonomously. Having completed the level 1 training is necessary to attend the level 2.

These trainings ensure that rating agencies and GBS assessors know how to use the tool appropriately. Therefore, the trainees take a test at the end of their trainings and CDC Biodiversité keeps an updated list of trained GBS assessors. In order to publish the results of a BFA, the BFA needs to have been conducted by an assessor who completed the level 2 training (see FAQ). The list of trained level 2 consultants with the required licence, is provided by Table 1 (they can conduct BFA for their clients):

As of November 2021, more than 23 companies had been trained for level 1 or 2 and at least sixteen BFAs or Sector level materiality assessments[2] had been conducted or are being conducted (see Table 2 below).

In 2022, CDC Biodiversité will work with external partners to develop a "reporting framework", which will then be used by external auditors to verify and to provide quality assurance on existing BFAs. This "*GBS verified*" service will provide assurance (*e.g.* limited or reasonable assurance) for investors, companies and other stakeholders on BFA results. For more information on the GBS ecosystem, readers can refer to the last publication (CDC Biodiversité 2020h).

(1) For more information and inscription please refer to our training platform: https://cdc-biodiversite.riseup.ai

(2) Sector level materiality assessment (or screenings): biodiversity footprint assessed only with financial data. BFA: biodiversity footprint assessed with financial and more accurate data (commodities and/or pressures data).

Table 1: *List of trained level 2 consultants with valid licence as of November 2021*

COMPANY	ASSESSOR	
	FIRST NAME	LAST NAME
B&L évolution SCOP EC	Sylvain	Boucherand
Biodiv'Corp	Véronique	Dham
BioPerf.biz	Olivier	Schär
Blooming	Kevin	Mozas
Deloitte	Marianne	Dupré
I Care & Consult	Eliette	Verdier
INDEFI	Clémence	Laurencel
Nomadéis	Stéphane	Baudé
The Biodiversity Consultancy (TBC)	Adeline	Serckx
Utopies	Pierre	Viard

Table 2: *List of BFA or Sector level materiality assessments conducted or ongoing as of November 2021*

COMPANY	SECTOR	PROJECT'S NAME	ASSESSORS
Multinational Leisure company	Non financial services and other activities	Sector level materiality assessment	**Biodiv'Corp**
Picard	Agriculture and Agri-Food	Biodiversity Footprint Assessment	**Biodiv'Corp**
TSE (Third Step Energy)	Energy (production and supply of electricity)	Sector level materiality assessment	**Biodiv'Corp**
Charcoal company	Raw material extraction	Biodiversity Footprint Assessment	**Blooming**
Almo Nature Benefit SpA	Agriculture and Agri-Food	Benchmark report for the cat & dog pet food industry	**CDC Biodiversité**
Nestlé Waters France	Agriculture and Agri-Food	Nestlé Waters 4 brands Biodiversity Footprint Assessment	**CDC Biodiversité, BioPerf.biz, TBC**
Vattenfall	Energy (production and supply of electricity)	Assessment of Vattenfall biodiversity footprint in line with the SBTN's guidance	**CDC Biodiversité, Deloitte**
Schneider Electric	Electrical and electronic equipment	Schneider Electric's end to end Biodiversity Footprint Assessment	**CDC Biodiversité, PRé sustainability**
Nestlé Waters UK	Agriculture and Agri-Food	Biodiversity Footprint Assessment	**TBC**
Multinational professional services company	Non financial services and other activities	Sector level materiality assessment	**TBC**
Retailer company	Agriculture and Agri-Food	Sector level materiality assessment	**TBC**
Telecommunication company	Non financial services and other activities	Biodiversity Footprint Assessment	**TBC**
Technology company #1	Non financial services and other activities	Sector level materiality assessment	**TBC**
Technology company #2	Non financial services and other activities	Sector level materiality assessment	**TBC**
Agrifood company	Agriculture and Agri-Food	Sector level materiality assessment	**Utopies**
Food service company	Agriculture and Agri-Food	Sector level materiality assessment	**Utopies**
Engie	Energy (production and supply of electricity)	Sector level materiality assessment	**Utopies**
UTMB (Ultra Trail du Mont Blanc)	Non financial services and other activities	Sector level materiality assessment	**Utopies**
Hermès International	Manufacturing industry	Biodiversity Footprint Assessment	**CDC Biodiversité, WWF**
Retail Group	Distribution sector	Sector level materiality assessment	**External consultant**
Decathlon	Distribution sector	Sector level materiality assessment	**Decathlon**

BOX 1 The GBS in short

This box aims to remind the GBS main features to readers already somehow familiar with it. For a more comprehensive introduction, readers are invited to refer to the 2017, 2019 and 2020 reports (CDC Biodiversité 2017; 2019; 2020h) and the FAQ section of this report.

Some definitions and clarifications

The GBS is a **corporate biodiversity footprint assessment tool**: it can be used to evaluate the **impact** or **footprint** of companies and investments on biodiversity. The results of assessments conducted with the GBS are expressed in the MSA.km² **unit** where MSA is the Mean Species Abundance, a **metric** expressed in % characterising the intactness of ecosystems. MSA values range from 0% to 100%, where 100% represents an undisturbed pristine ecosystem.

In order to break down impacts across the value chain and provide ways to avoid double-counting, the GBS uses the concept of **Scope**, or value chain boundary. **Scope 1** covers direct operations. Impacts occurring upstream are broken down into non-fuel energy generation which falls within **Scope 2**, and other purchases which fall within **upstream Scope 3**. Finally, downstream impacts belong to **downstream Scope 3**. Our previous reports (CDC Biodiversité 2019; 2020h) provide more details on this concept.

To account for impacts lasting beyond the period assessed, GBS results are further split into **dynamic** or **periodic gains/losses** – occurring within the period assessed –, **future** – which will occur in the future - and **static** or **cumulated negative** - persistent - impacts. These concepts are illustrated in section 2.4.

Methodology

In order to assess corporate biodiversity footprint, the main approach of the GBS is to link data on **economic activity** to **pressures on biodiversity** and to translate these pressures into **biodiversity impacts**. A **hybrid approach** is used to take advantage of data available at each step of the assessment. BFAs use company specific data on purchases or related to pressures (such as land use changes or greenhouse gas emissions). In the absence of precise data, a default calculation assesses impacts based on financial turnover data.

To link activity, pressures and impacts, the GBS uses peer-reviewed tools such as EXIOBASE (Stadler et al. 2018), an environmentally extended multi-regional input-output model, or GLOBIO (Alkemade et al. 2009; Schipper et al. 2016), a model assessing the impact of various pressures on biodiversity intactness. Its underlying assumptions are transparent.

In the long run, the aim of the GBS is to cover all biodiversity impacts across the value chain (including both upstream and downstream impacts). It currently covers direct operations and upstream impacts (cradle to gate) on terrestrial and aquatic (freshwater) biodiversity. The pressures covered are (see section 2.3 for a brief description of each of them):

- Land use (LU)
- Fragmentation of natural ecosystems (F)
- Human encroachment (E)
- Atmospheric nitrogen deposition (N)
- Climate change (CC)
- Hydrological disturbance due to direct water use (HD_{water}) and due to climate change (HD_{CC})
- Wetland conversion (WC)
- Freshwater eutrophication (FE)
- Land use in catchment of rivers (LUR) and wetlands (LUW)
- Ecotoxicity (experimental, X)

GLOBAL BIODIVERSITY SCORE®

As of November 2021, the B4B+ Club included the following members:

CONSULTANT WORKSTREAM

BiodivCorp – Wild your business
The Biodiversity Consultancy
Bioperf.biz
BIOTA
biotope
B&L évolution
Deloitte.
I Care – Because our impact matters
INGÉROP – Inventons demain
UTOPIES

VALUE CHAIN WORKSTREAM

almo nature – Owned by the animals – fondazione Capellino
CITEO
DECATHLON
EDF
egis
GRTgaz
ICADE
L'ORÉAL
LVMH
Nestlé Waters – The Healthy Hydration Company™
orano
Schneider Electric
SOLVAY – asking more from chemistry®
TOTAL
VATTENFALL

FINANCE WORKSTREAM

bpifrance
Caisse des Dépôts Groupe
CNP assurances
CA – Toute une banque pour vous
Generali Global Infrastructure
HSBC
MEESCHAERT Asset Management
mirova – Responsible Investing
SOCIETE GENERALE

PARTNERS

epe – entreprises pour l'environnement
Noé
orée – Entreprises, territoires et environnement

Users of the GBS need a licence to use the Global Biodiversity Score® trademarks, but also to use the software, including the databases, and documentation, and in the cases of consultants to sell services using the GBS. For more information on the licences, readers can refer to the FAQ.

1.2.2 Steps of a GBS-based Biodiversity Footprint Assessment

A GBS-based Biodiversity Footprint Assessment follows 4 steps as shown by Figure 1 below.

- **Framing**: the first step of the evaluation is to define the perimeter and do a first screening of the impacts. This allows to set clear boundaries and know where to focus efforts during the data collection step.
- **Data collection**: the second step consists in collecting data for the assessment considering that the most precise data is also often the less available. Assessors should prefer survey, pressure, raw materials, and physical flows data to financial data[1].
- **Computation**: the third step aims at feeding the GBS tool with data to compute impacts on biodiversity.
- **Analyses**: the last step interprets the results to provide quantitative and qualitative analyses (comparing to sector benchmarks, listing the BFA's limits, etc.) but also to set relevant targets and objectives to improve the biodiversity footprint of the company.

After that, and in line with the Science Based Targets Network (SBTN)'s framework, companies can take actions to avoid and reduce their impact on biodiversity. They can also regenerate and restore ecosystems or contribute to system-wide change (transform).

Finally, companies can monitor their biodiversity footprint and observe how their actions contribute to align with a trajectory beneficial to biodiversity.

To see an application of these steps, readers can refer to the Schneider Electric case study (section 4.2).

(1) Figure 10 details the "data hierarchy".

1.2.3 GBS-based solutions for financial institutions

CDC Biodiversité offers two types of GBS-based solutions for financial institutions. For non-listed assets, they are grouped under the brand **GBS for Financial Institutions (GBS FI)**. For listed assets, the **Biodiversity Impact Analytics powered by the Global Biodiversity Score® (BIA-GBS)** database is co-developed with the data provider Carbon4 Finance (C4F).

GBS FI solutions apply to the entire non-listed universe, including real estate, infrastructure or even private equity. They use the GBS methodology to conduct the assessment, so the output results are comparable and fungible with other GBS-based assessments (BIA-GBS, BFA...). At this stage, the assessment methods are tailored to each assignment in order to take into account the specific conditions of access to data and the specificity of the assets covered. The first step of such exercises is a preliminary study of their feasibility. Indeed, before starting the assessment, the availability of sufficient data must be ensured to produce a result that is relevant and also useful in relation to the expectations and needs of the financial institution. The second step is to calibrate the data collection protocol, the challenge here is to find the best compromise to obtain the best possible data for the GBS while respecting the constraints of time and budget. The rest of the work then takes place as a BFA-type assessment with the phases of data collection, analysis and reporting of results. As for a BFA, the duration and budget of these missions vary according to the size (number of lines and sub-portfolios) of the perimeter, the desired output granularity (sub-type of assets, geography, etc.) and the complexity of the additional qualitative analysis (analysis of dimensions not covered by the GBS, design of biodiversity strategies in particular with regard to the challenges of alignment with international objectives, etc.). As such non-listed asset assessments mature, standardized approaches could be developed.

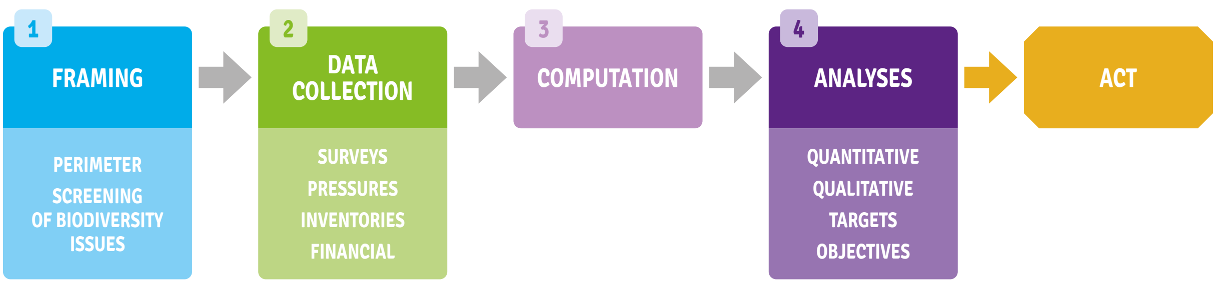


Figure 1: *Steps of a GBS-based Biodiversity Footprint Assessment*

Table 3: *Definitions of GBS pressures and associated IPBES pressures*

IPBES PRESSURES	GBS PRESSURES	DEFINITION
Terrestrial Pressures		
Land/sea use change	Encroachment (E)	Human encroachment comprises anthropogenic activities in otherwise natural areas. Direct (noise, light, etc.) and indirect (right of way for hunting, tourism, etc.) disturbance caused by human activities are accounted for.
	Fragmentation (F)	Fragmentation is the pressure caused by the reduction and subdivision of natural habitats and the disappearance of ecological corridors preventing species movement and limiting their living spaces (a species' population size is positively correlated to its habitat area size).
	Land use (LU)	The intensity of land management impacts natural habitat quality and quantity. High-intensity land uses such as intensive cropland maintain a high level of pressure which prevents ecosystem from reverting towards more natural states. The conversion of natural ecosystems into urban areas, croplands, managed forests, etc. also directly deteriorates ecological integrity.
Climate change	Climate change (CC)	Excess of emitted greenhouse gas leads to disturbance of the global climate. The global mean temperature increase (GMTI) and the induced climate change modify the repartition areas of different biomes, which threatens the survival of numerous species who cannot adapt fast enough to this phenomenon.
Pollution	Atmospheric nitrogen deposition (N)	Agricultural and industrial activities cause nitrogen emissions into the atmosphere. Transported by the wind or water (acid rains), the nitrogen deposits on terrestrial ecosystems. When the critical load of the ecosystem is exceeded, the imbalance caused by additional nitrogen deposition harms ecological integrity via, for instance, eutrophication and shifts in plant competition.
	Terrestrial ecotoxicity (X)	Terrestrial ecotoxicity is the pressure caused by chemical substances (organic substances and metal ions) on terrestrial ecosystems. This includes for instance the damage caused by some pesticides on ecosystems.
Aquatic (freshwater) pressures		
Land/sea use change	Wetland conversion (WC)	The conversion and draining of wetlands for human purposes lead to the loss of aquatic ecosystems (converted into degraded terrestrial ecosystems).
Direct exploitation[(1)]	Hydrological disturbance due to direct water use (HD_{water})	Hydrological disturbance is caused by the deviation of current river flows from the natural ones. Causes of flow deviation are multiple. In the GBS, the Hydrological disturbance pressure is further split into a direct water use and a climate change component, based on the source of flow deviation (other causes of flow deviation include river dams used for hydropower, water storage and/or other purposes). The flow deviation associated to Hydrological disturbance due to direct water use is caused by anthropic water abstraction.
Climate change	Hydrological disturbance due to climate change (HD_{CC})	Hydrological disturbance is caused by the deviation of current river flows from the natural ones. The second component of this pressure assessed in the GBS is the flow deviation caused by climate change (through changes in rainfall or evaporation).
Pollution	Freshwater ecotoxicity (X)	Freshwater ecotoxicity is the mirror of Terrestrial ecotoxicity affecting freshwater ecosystems: it is the pressure caused by chemical substances on aquatic ecosystems.
	Freshwater eutrophication (FE)	Human activities can lead to excess of nutrients leaching into water bodies. The imbalances overstimulate algal and aquatic plant growth, which may result in oxygen depletion, harming other organisms.
	Land use in catchment of rivers (LUR) / wetlands (LUW)	Upstream land use changes, and in particular the intensification of a watershed's upstream land uses through urbanisation or agricultural intensification, has an indirect negative impact on downstream water bodies. Land use type (and intensity) is indeed a good proxy for the nutrient emissions leaching from human activities to ecosystems. In the GBS, this pressure is split in two, depending on the type of ecosystems affected: rivers or wetlands.

(1) Terrestrial Direct exploitation is also covered in the GBS through pressures due to resources extraction (crops, woodlogs, mining...).

BIA-GBS was launched in July 2021. The database now covers **listed assets** such as stocks and bonds. 100 000 assets involving 8 000 issuers are currently covered. The database thus covers the main indices (MSCI World, S&P500, STOXX600) for these two universes. In this first version, BIA-GBS is built by combining the GBS's impact factors with C4F's data on the distribution of turnover in terms of sector and country provided by the Climate Risk Impact Screening (CRIS) database and with green-house gas emissions data for Scope 1, 2 and 3 from C4F's Climate Impact Analytics (CIA) database. The data is accessible directly via data feeds. Portfolios can also be uploaded on a dedicated platform to run and explore the results. The current broad coverage of BIA-GBS makes it possible to evaluate a large number of portfolios as well as to estimate the first orders of magnitude for listed assets with sectoral benchmarks and indexes. BIA-GBS was used in particular by researchers at the Banque de France and partner institutions (including CDC Biodiversité) to assess the biodiversity risks of the French financial system (Svartzman et al. 2021). Numerous improvements are being developed to improve the results and functionality of the database, including the inclusion of more granular corporate data, dependency scores (already available as described in section 3.5) as well as indicators for alignment with international objectives. These new developments aim to respond to changes in the reporting framework, in particular the French regulatory framework with Article 29 of the Energy Climate Law for which standardized reports will be offered in the first half of 2022.

1.3 Pressures covered by the GBS

Except Ecotoxicity which is evaluated through other data sources (CDC Biodiversité 2020b), the GBS pressures are derived from the GLOBIO 3.6 model and thus follow GLOBIO's definitions (Alkemade et al. 2009; Schipper et al. 2016). Table 3 provides short and easy to understand definitions, further illustrated by the visual representations of pressures in Figure 2.

1.4 Accounting for stocks and flows of impacts

Accounting for the state of biodiversity requires to consider stocks and flows: the stock of individuals alive at a given moment (*e.g.* of a given species), and the flow of deaths or births of individuals during a period. Similarly, accounting for impacts on ecological integrity benefits immensely from distinguishing stocks of past cumulated impacts up to a given moment and flows of new positive or negative impacts during a period. The GBS follows such a stock/flow accounting framework and distinguishes **'dynamic'** and **'static'** impacts (CDC Biodiversité 2020a). *'Dynamic impacts'* are *periodic gains or losses i.e.* flows of new impacts occurring within the period assessed (Endangered Wildlife Trust 2020). They describe changes, degradations or restorations of ecosystems during the period assessed. '*Static impacts*' are *cumulated negative impacts*, defined so that the sum of remaining biodiversity (*cumulated positive impacts*) and cumulated negative impacts expressed in percentage equals 100% (Endangered Wildlife Trust 2020). These definitions are aligned with the concepts of the Biological Diversity Protocol (BD Protocol). In a simplification of the equations of the BD Protocol, the following equation describes the relationship between static (stock) and dynamic (flow) impacts[1]:

$$Static_{n+1} = Static_{n} + Dynamic_{n}$$

With n the period assessed and n+1 the period immediately after.

In line with this equation, impacts which persists over time will move from the 'dynamic' accounting category (to which they belong during the period they are first generated) to the 'static' accounting category thereafter. For instance, a land transformation from *Natural forest* to *Intensive agriculture* in 2021 is associated with a periodic loss or dynamic loss in 2021, and as long as the land transformation is not reversed, it will be added to the cumulated negative impact or static impacts from 2022 onward. Thus, static impacts include all the '*persistent' or 'long-lasting' effects* which remain over time and were generated before the period assessed.

The boundary between static and dynamic impacts depends on the period assessed. This period can be anything, from a year to 50 years or more. In GBS-led BFAs, it is usually a year, but this is not a rule.

In some cases, a source of pressure on biodiversity will lead to increasing impacts in the future, even if the source disappears. Properly accounting for such cases require to introduce '*future*' impacts in the accounting framework. The impacts assessed with the GBS do not yet include pressure sources requiring to use future impacts, and they are thus not mentioned in GBS results[2]. Future impacts and the comparison with impact assessment approaches using time integration are further discussed in the GBS critical review documents (CDC Biodiversité 2020a).

Table 4 shows a non-exhaustive list of examples of pressure intensity decreasing/increasing (causing a dynamic impact or periodic gain/loss) or staying constant (causing no periodic gain/loss and maintaining static or cumulated negative impacts constant).

(1) In practice, it is not always possible to assess the real dynamic and static impacts and a potential (risk of) impact is assessed instead. This is for instance the case when financial or commodity tonnage data are fed into the GBS (instead of land occupation data): the equation does not hold in such cases of potential impacts.

(2) Greenhouse gas emissions persist in the atmosphere for dozens or hundreds of years and arguably cause future impacts. The GBS however follows a conservative approach and assesses their future impacts as "current" dynamic impacts, which is justified by the shape of the impulse response of surface air temperature to a pulse of GHG emissions as explained in previous publications (CDC Biodiversité 2019; 2020g).

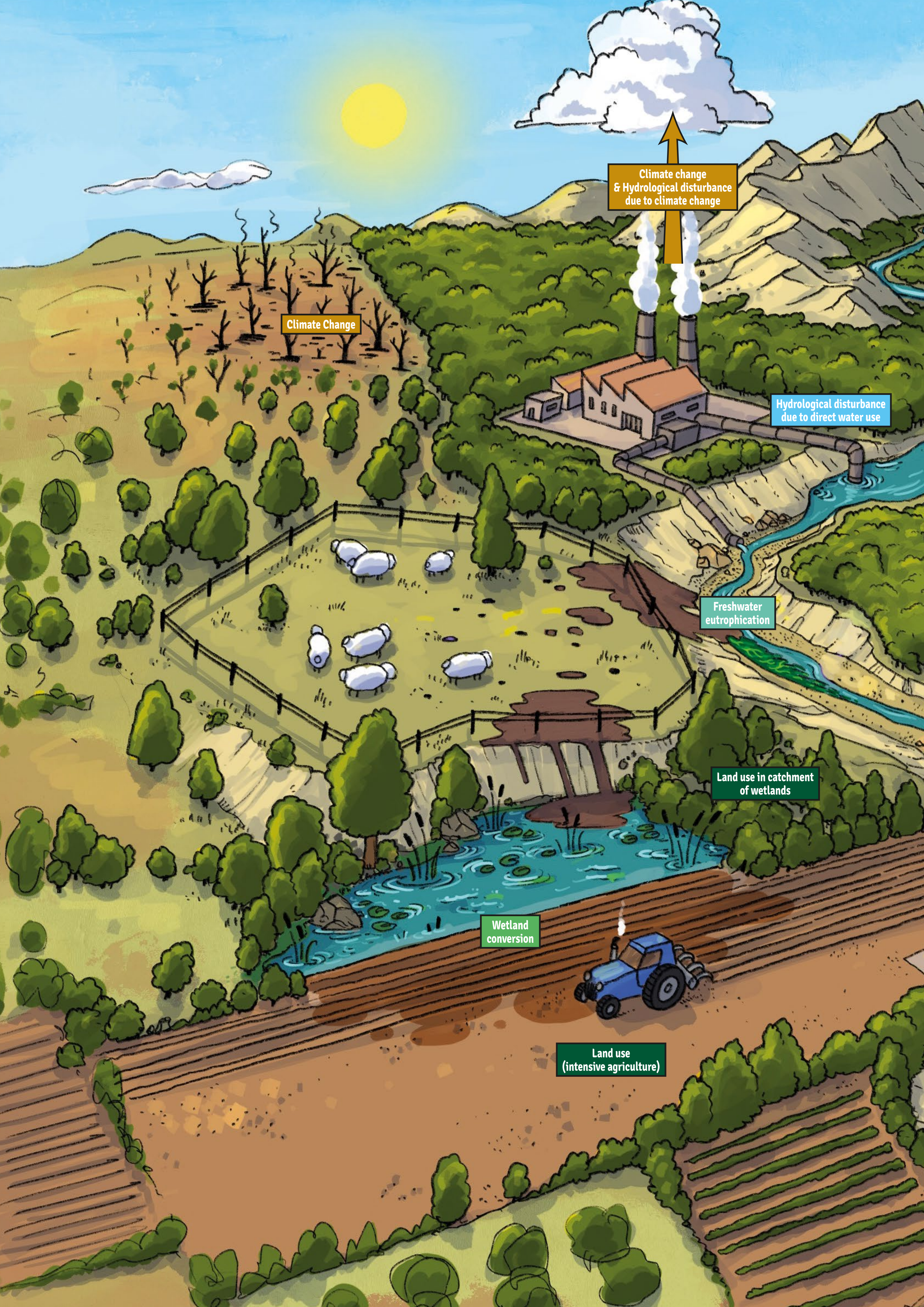

Climate change
& Hydrological disturbance
due to climate change
Climate Change
Hydrological disturbance
due to direct water use
Freshwater
eutrophication
Land use in catchment
of wetlands
Wetland
conversion
Land use
(intensive agriculture)

Figure 2: *Visual illustration of all the pressures covered in the GBS 1.3.0*

On a practical side, the GBS 1.3.0's assessment of aquatic pressures' **dynamic impacts** is less robust and CDC Biodiversité advises not to report the values of these impacts; an update of the assessment of aquatic pressures in 2022 should solve this issue.

Figure 3 illustrates a simple case of a company assessing its impacts over two subsequent years: year N and year N+1, with most drivers of pressures intensity increasing during the second year. It demonstrates how the change (or not) in pressure intensity translates in terms of impact accounting.

The company has one facility where it pumps water from a nearby river for its activities (at a constant rate of 100 000 m^3/month) and releases GHGs in the air and phosphorous in the river. During year N, a new storage facility is built.

The impacts assessed with the GBS will be broken down as follow:

- Since the company did not indicate that the water withdrawals or phosphorous emissions increased in year N compared to year N-1, the pressure intensity did not increase (the flow deviation and the nutrient concentration should be constant): only static impacts are generated;
- The existing facility (1000 m^2) was present in year N-1 and causes only static impacts related to spatial pressures;
- The new storage (100 m^2) built within year N causes dynamic impacts related to spatial pressures;
- GHG emissions adds up the to the GHG emissions in the atmosphere and contributes to the GMTI, causing dynamic impacts related to climate change[1].

During year N+1, the accounting of impacts evolves:

- The withdrawal rate stays constant and, in the absence of data proving otherwise, the flow deviation of the river is the same as during year N: the Hydrological disturbance due to direct water use pressure intensity is constant and there is no dynamic impact and the static impact is the same as in year N;
- The increase in the amount of phosphorous emitted causes dynamic losses of biodiversity which will add up to the existing static impacts;
- The facility causes static impacts and the dynamic impact caused by the construction of the storage in year N is now part of the static impact of year N+1;
- New GHG emissions keep causing dynamic impacts related to climate change.

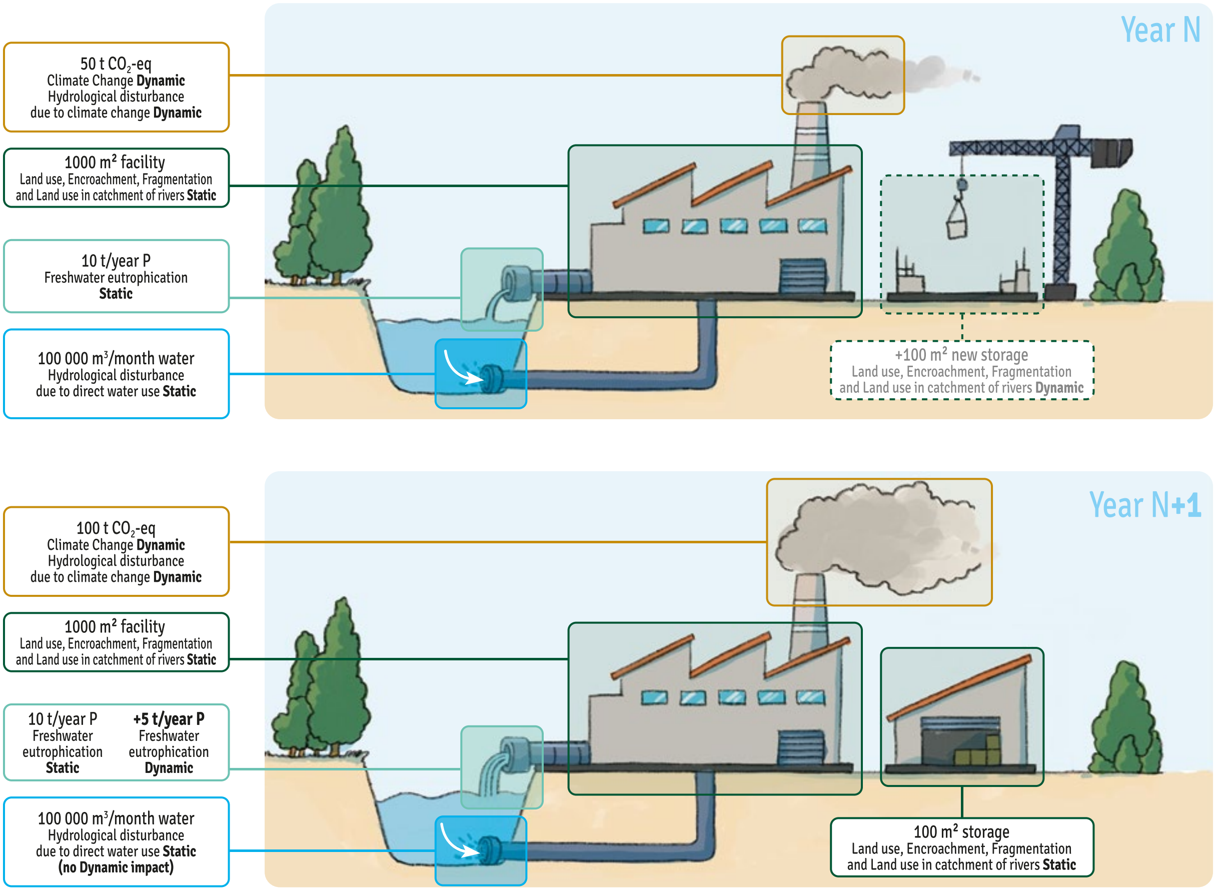
(1) As explained in the note below Table 4, the static impact of past emissions is not assessed in the GBS 1.3.0 but should be estimated in future versions.

Table 4: ***Examples of pressure intensities increasing/decreasing or staying constant and implication for accounting categories*** *(does not cover exhaustively all the pressures)*

REALM	PRESSURE	PRESSURE INTENSITY CONSTANT LEADING TO NO PERIODIC GAIN/LOSS (NO DYNAMIC IMPACT AND STATIC IMPACT CONSTANT)	PRESSURE INTENSITY DECREASING/INCREASING LEADING TO A PERIODIC GAIN/LOSS (DYNAMIC IMPACT)
Terrestrial	Land use	Land occupation constant	Land conversion, *e.g.* from intensive agriculture to extensive agriculture
	Fragmentation	The surface areas of patches of natural habitats remain constant	Patches of natural habitats are fragmented further (*e.g.* a road is built and cuts a forest in two) and their sizes decrease
	Climate change	The global mean temperature does not further increase*	The global mean temperature increases due to additional GHG emissions in the atmosphere
Aquatic	Hydrological disturbance due to direct water use	The flow deviation is maintained constant (*e.g.* through a constant withdrawal pattern across the year, in a watershed at an equilibrium)	Withdrawals decrease compared to the previous period (*e.g.* year on year) and the flow deviation thus drops
	Freshwater ecotoxicity	The concentration of ecotoxic substances is maintained constant in freshwater ecosystems (*e.g.* through a steady flow of emissions)	Emissions of ecotoxic substances accumulate in freshwater ecosystems and their concentration builds up, causing soaring harm to ecosystems

* In practice, even if GHG emissions stopped, the Global Mean Temperature Increase (GMTI) would continue to raise due to the inertia of the climate system. However, if a company stops emitting GHG emissions, it has no new responsibility for the further GMTI. In practice, the GBS 1.3.0 does not yet calculate the static or cumulated negative impacts related to climate change attributable to companies, it would require knowing the historic cumulated GHG emitted by companies, for at least the last 100 years.

Figure 3: ***Illustration of static and dynamic impacts accounting in two subsequent BFAs***



1.5 Key data companies should report

As part of *Aligning Biodiversity Measures for Business (ABMB)* initiative, biodiversity impact assessment tool developers gathered in order to identify common input data sets and agree on a limited set of input indicators and format which companies could collect to feed most measurement approaches. The reasoning behind this is that, if tool developers could converge on a set of common input indicators, businesses would be more likely to collect data on this common set. Businesses would be reassured about the robustness of the set and would know that the data collected could be used with any tool, allowing them to switch from one tool to the next without obstacle (ABMB, 2019). This important work of convergence between different tools is still ongoing via the *Align* project and a standardised approach will be available by 2023.

The data useful to collect and report for assessing the biodiversity footprint with the GBS, as well as with many other tools, are presented in Table 5. More data can also be useful to collect for an assessment with the GBS, but only the key ones are presented here.

As much as possible the reported data should also be reported by geography. Indeed, unlike climate change, biodiversity cannot be approached with global characterisation factors such as the impact of one tonne of CO_2 on global climate. Local characteristics and spatial differences need to be taken into account. In other words, while climate change assessments can use the total greenhouse gas emissions of a company to assess its impacts, without the need for break down by geographies, such a spatial breakdown is essential for biodiversity impact assessments (ABMB, 2019).

In the GBS, the data can be inputted per country (241 countries listed in the Appendix), EXIOBASE region (49 regions from the EXIOBASE model) or EXIOBASE region group (11 aggregated EXIOBASE regions). The exhaustive list of regions in EXIOBASE, and aggregated region groups, are displayed in Table 6 of the GBS 2018 technical update (CDC Biodiversité, 2019). GPS data are also useful to collect as they could be used in future versions of the GBS.

BOX 2

Invited expert – Charlotte Gardes on key data companies and financial market participants should report

Charlotte Gardes, Former Deputy Head of Unit, in charge of sustainable finance and climate risk – French Treasury; Climate Change and Financial Stability Expert at the IMF since Sept. 2021

A wide range of policy instruments aim at ensuring that the financial system can assist the real economy in making strategic decisions on the trade-offs between sustainability goals, but also monitor investments, exert corporate governance and facilitate the diversification and management of risk. As former Governor of the Bank of England Mark Carney has underlined in 2015, "bridging informational gaps is the priority in order to restore market efficiency". As such, a majority of sustainable interventions in the European Union have relied on informational policies to achieve policy objectives that aim at uncovering potential climate-related financial risks and at incentivizing the flow of capital to environmentally sustainable activities.

It is anticipated that companies' extra-financial disclosures will grow in relevance and comparability

The directive of 22 October 2014 (so-called "NFRD"[1]) as regards disclosure of non-financial and diversity information by certain large undertakings and group ("public interest entities", meaning listed companies, banks, and insurance companies) has established reporting on companies' environmental social and governance policy and performance in the form of key performance indicators. It also provides for the description of the main environmental, social and governance risks, and the way the company manages them. Non-binding guidelines have further specified this directive, in 2017 and 2019. The NFRD was transposed into French national law in 2017 – it is codified in article L 225-102-1 of the French Commercial Code. The non-financial performance statement must present, for the most relevant social, environmental and societal risks (under a materiality principle), a description of the main risks related to the company's activity, a description of the policies applied by the company and the results of these policies, including key performance indicators. The risks involve those generated by the company on its environment (*e.g.* overexploitation of soils, etc.), but also the risks it may face (*e.g.* depletion of natural resources). It must be drawn up by a company when its average number of employees exceeds 500 during the fiscal year, with specific thresholds in terms of total balance sheet or net sales amount. The non-financial performance statement must be designed as a tool for steering the company's strategy, while allowing the company to promote its corporate social responsibility actions and to respond to a demand for transparency from internal and external stakeholders.

(1) https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:32014L0095&from=FR

Following a report (De Cambourg, Gardes, and Viard 2019), and because there is ample evidence, that the information that companies report is insufficient, the European Commission has proposed a Corporate Sustainability Reporting Directive (CSRD)[2] in April 2021. It aims at extending the scope of these requirements to include all large companies (listed or not), under the previous 500-employee threshold and by including listed SMEs (with the exception of listed micro-enterprises) – and at anchoring a double materiality principle. The verification of extra-financial statements (included in the management report) by an independent service provider aims to be generalized, alongside the harmonization of verification standards. The European Financial Reporting Advisory Group will be responsible for developing a sustainability reporting standard (of generic, sectoral and company-specific nature), following the publication of technical recommendations and a roadmap in February 2021[3].

It should be pointed out that companies must also comply with Article 8 of the Taxonomy Regulation that requires those falling within the scope of the existing NFRD – and the additional companies brought under the scope of the proposed CSRD - to report on the extent to which their activities are sustainable. Indicators have been specified by a delegated act, adopted by the European Commission on 6 July 2021[4].

Investor disclosure has recently gained momentum in European Union (EU) and French law

France has been ahead of European law in terms of extra-financial transparency for investors since 2015, with Article 173-VI of the French Energy Transition for Green Growth Act[5]. This French framework has been assessed in June 2019 (Ministère de la Transition Ecologique et Solidaire – Commissariat général au développement durable et al. 2019) and has had a strong influence on the European regulatory scheme, of which the Sustainable Finance Disclosure Regulation (SFDR, published in November 2019)[6] is the keystone. Article 29 of Law No. 2019-1147[7] (so-called "Energy-Climate Law") of 8 November 2019 falls within this context, and articulates French and EU

(2) https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52021PC0189
(3) https://www.efrag.org/Lab2
(4) https://ec.europa.eu/finance/docs/level-2-measures/taxonomy-regulation-delegated-act-2021-4987_en.pdf
(5) https://www.legifrance.gouv.fr/loda/article_lc/LEGIARTI000031048231/
(6) https://eur-lex.europa.eu/eli/reg/2019/2088/oj
(7) https://www.legifrance.gouv.fr/jorf/article_jo/JORFARTI000039355992

requirements. The implementing decree[1] published on 27 May 2021 complements European law in three key complementary areas: *(i)* climate,- notably with the required disclosure of alignment strategies with regards to the temperature objectives of the Paris Agreement, as well as the share of Taxonomy-aligned assets (or balance-sheet) and finally the share of fossil fuels related activities; *(ii)* biodiversity - notably through the required disclosure of alignment strategies with regards to international biodiversity preservation objectives; and *(iii)* the integration of ESG factors in the risk management, governance and transition support systems (notably shareholder engagement) of financial actors.

The articulation between the EU and the French (FR) framework are detailed below, both at entity level and product level.

(1) https://www.tresor.economie.gouv.fr/Articles/2021/06/08/publication-of-the-implementing-decree-of-article-29-of-the-energy-climate-law-on-non-financial-reporting-by-market-players

TYPE OF REGULATION (EU/FR) AND ADOPTION DATE	WHO SHOULD COMPLY?	TIMING OF DISCLOSURE
Existing NFRD requirements (L. 225-102-1 of the French Commercial Code) **Taxonomy Regulation EU/2020/852** (June 2020) Delegated act under article 8 of the Taxonomy Regulation (adopted on 6 July 2021) Regulatory Technical Standards (RTS) under articles 5 and 6 of the Taxonomy Regulation proposed by the European Supervisory Authorities (ESAs) in October 2021[2] (to be adopted on 1 January 2023)	Disclosure obligations for NFRD-compliant entities (for entity-level reporting) and for financial products (for product-level reporting)	**Entity-level reporting** - Eligibility reporting on the Taxonomy's climate objectives as from 1 January 2022 for non-financial companies; alignment reporting as from 1 January 2023 for non-financial companies - Eligibility reporting in 2022 and 2023 for financial companies on the Taxonomy's climate objective, and alignment reporting in 2024 for financial companies (article 8) - Full reporting (on climate and environmental objectives) in 2026 on fiscal year 2025 for non-financial and financial companies **Product-level reporting: as per SFDR (*below*) (articles 5, 6 and 7)**
Disclosure Regulation EU/2019/1988 (November 2019) RTS under articles 4, 8, 9, 10 and 11 proposed by the ESAs in February 2021 (to be adopted on 1 January 2023[3]) **Implementing decree of Article 29 of the Energy-Climate Law**	Asset managers, investment firms, pension funds, insurers and reinsurers, credit institutions providing portfolio management Portfolio managed by credit institutions or investment firms Alternative investment funds (AIFs) and UCITs[4] Insurance-based investment products (IBIPs) Pension products, workplace pensions products (regulated under the IORP directive and PEPP[5])	**Entity level reporting** - *Under articles 3, 4 and 5 of SFDR*: 10 March 2021 (and 30 June 2021 (for those exceeding on their balance sheet dates 500 employees during the financial year) for starting to consider principal adverse impacts. - For entities > 500 employees, a due diligence policy on principal adverse impacts is mandatory, with specific indicators from 30 June 2023 (on 2022, which is the first reference period) - *Under the implementing decree of Article 29*: 2022 for the information on the general approach, internal resources, governance, commitment/voting policy, strategy for alignment with the Paris Agreement, biodiversity strategy and the process for identifying, assessing, prioritizing and managing risks related to the consideration of ESG criteria; 2023 for all information requirements **Product-level reporting** *Under SFDR* - Pre-contractual disclosures on the consideration of sustainability risks and the expected impact on the return of the product (articles 6, 8 and 9): 10 March 2021 - Periodic disclosures and website disclosures for so-called "Article 8" and "Article 9" products (article 11): 1 January 2022 - Consideration of principal adverse impacts in pre-contractual reports (article 7): 30 December 2022 *Under the implementing decree of Article 29*: strategy for alignment with the Paris Agreement, biodiversity strategy and risk management process (as detailed above) from 2022 for collective investment undertakings and asset management agreements whose outstanding exceeds EUR 500 million

(2) https://www.esma.europa.eu/press-news/esma-news/esas-propose-new-rules-taxonomy-related-product-disclosures

(3) https://www.esma.europa.eu/file/121928/download?token=gBwiw998

(4) Undertakings for Collective Investments in Transferable Securities.

(5) Institutions for Occupational Retirement Provision and Pan-European Personal Pension Product.

Table 5: *Key data companies should report*

Non-financial disclosure

YEARLY LAND OCCUPATION

The input indicators should:

1. distinguish between land cover categories (*e.g.* from GLC2000)
2. distinguish between different land use intensities
3. reflect annual changes

Land uses categories that can be used for the GBS are listed below. Ideally wetlands should also be reported.

Land uses proposed by ABMB	GLOBIO Land uses used in the GBS
Forest - Natural	Forest - Natural
	Burnt forest
Forest - Used	Forest - Plantation
	Forest - Clear-cut harvesting
	Forest - Selective logging
	Forest - Reduced impact logging
Natural grassland	Natural grassland
Pasture moderately to intensively used	Pasture - moderately to intensively used
	Pasture - man-made
Extensive cropland	Extensive cropland
	Woody biofuels
	Agroforestry
Intensive cropland	Intensive cropland
Monoculture cropland	Irrigated or monoculture cropland
Natural bare area and ice	Bare area
	Snow and ice
Urban area	Urban area

YEARLY GREENHOUSE GAS (GHG) EMISSIONS

In order to be able to compute the impact with the desired time horizon (*e.g.* 20 years or 100 years), data on GHG emissions should be split by GHG.

The data input can be Yearly emissions by GHG and expressed in kg, for Scope 1, 2 and 3 upstream.

NITROGEN AND PHOSPHOROUS CONCENTRATION IN WATER

Average yearly concentrations, expressed in g/m^3

In the GBS, emissions (and not concentrations) of P compounds expressed in kg are used.

PESTICIDES

Concentrations expressed in kg 1,4-dichlorobenzene equivalents (1,4DCB-eq).

In the GBS, emissions of ecotoxic substances expressed in kg are used (and not just pesticide concentrations), with information on the discharge compartment (air, water, soil, etc.).

TONNES OF COMMODITIES PURCHASED OR PRODUCED

Quantities expressed in tonnes per commodity type. For the list of commodities please refer to the Appendix

YEARLY WATER WITHDRAWALS AND CONSUMPTIONS

Expressed in m^3. For the definitions of withdrawal and consumptions, refer to CREEA_D8.1_Water Case Study Report*, p. 10.

Financial disclosure

REVENUES

Revenue per industry** in mEUR.

PURCHASES

Purchases per industry** in mEUR.

* Available at https://www.exiobase.eu/index.php/publications/documentation
** For the list of industries, please refer to Table 7 in CDC Biodiversité (2019)

1.6 Linkages of the GBS with the EU taxonomy

The EU defines the (green) taxonomy as: "a classification system, establishing a list of environmentally sustainable economic activities. It could play an important role helping the EU scale up sustainable investment and implement the European Green Deal. The EU taxonomy would provide companies, investors, and policymakers with appropriate definitions for which economic activities can be considered environmentally sustainable"[(1)]. The EU taxonomy seeks to establish thresholds, called "technical screening criteria", for green economic activities that: (1) contribute significantly to one of the six environmental objectives: climate change mitigation, climate adaptation, sustainable use and protection of water and marine resources, transition to a circular economy, pollution prevention control, and **protection and restoration of biodiversity and ecosystems**, (2) do not significantly harm (DNSH) the other objectives, (3) comply with minimum safeguards (*e.g.* safeguards defined in the OECD Guidelines on Multinational Enterprises and the UN Guiding Principles on Business and Human Rights).

To prepare the EU taxonomy, the European Commission formed a Technical Expert Group (TEG) on sustainable finance which delivered its final report on 9 March 2020, containing technical criteria for climate change mitigation and climate adaptation and DNSH criteria for the other four environmental objectives pursued by the taxonomy. Work has since continued and a Platform on sustainable finance has been established to support the European Commission to update and improve the taxonomy. The Platform published a draft report on preliminary recommendations on technical screening criteria for the remaining four environmental objectives (including the biodiversity objective) on 3 August 2021[(2)]. The Platform's advice will inform the development of the Commission's delegated act on the taxonomy technical screening criteria for the four remaining environmental objectives to be adopted in the first half of 2022.

In the future, technical screening criteria for the protection and restoration of biodiversity and ecosystems could include thresholds expressed in MSA.m²/t

The GBS and GBS-based BFAs connect with the EU taxonomy at multiple levels: potential thresholds, DNSH criteria and provision of information to feed future updates of the taxonomy.

In the future, technical screening criteria for the protection and restoration of biodiversity and ecosystems could include thresholds expressed in $MSA.m^2/t$, just like it currently include thresholds such as emissions lower than 0.498 t CO_2-eq/t of cement for the climate change mitigation objective (EU Technical Expert Group on Sustainable Finance 2020). The MSA metric is already cited in the Platform on sustainable finance's draft report.

The DNSH criteria can have different uses depending on the stakeholders. For example, a company could ensure to respect the DNSH criteria beyond the quantitative BFA using the GBS; while financial institutions could use them to understand what company should report to warrant the non-destruction of biodiversity or ecosystems.

CDC Biodiversité is developing sectoral benchmark factsheets which could feed the EU taxonomy by identifying low- and high-impact sectors, helping to establish thresholds. Conversely, elements of the EU taxonomy, and in particular the DNSH criteria, are reported in the factsheets, to help companies and investors understand how the taxonomy influences each sector. For instance, concerning the Agriculture and agrifood sector, one of the four DNSH criteria for the growing of perennial crops, the growing of non-perennial crops and livestock production for ecosystems (defined as: "activities should not result in a decrease in the diversity or abundance of species and habitats of conservation importance or concern or contravene existing management plans or conservation objectives") is reproduced on the Agriculture and agrifood benchmark factsheet (CDC Biodiversité, 2021a). Additional criteria which did not fit within the factsheet are listed in its technical appendix.

(1) https://ec.europa.eu/info/business-economy-euro/banking-and-finance/sustainable-finance/eu-taxonomy-sustainable-activities_en

(2) https://ec.europa.eu/info/publications/210803-sustainable-finance-platform-technical-screening-criteria-taxonomy-report_en

Update on methodological developments

© Maksim Safaniuk de Shutterstock

2 Update on methodological developments

2.1 Consolidation approaches and Scopes

The section 3.3.1 of a previous publication (CDC Biodiversité 2019) defined the approaches to consider when delineating the perimeter under the control of the company: **financial control** (100% of the impacts of assets over which the entity has more than 50% of the voting rights, *e.g.* by owning more than 50% of the shares of a given activity, are attributed to its Scope 1)**, operational control** (100% of the impacts of assets over which the entity has full authority are attributed to its Scope 1) or **share of the assets owned** (the impacts of a given asset are attributed to the entity's Scope 1 in proportion to the share of the asset it owns). The choice of biodiversity impacts accounting method should be consistent with the existing financial accounting choices of the company. Figure 4 illustrates the consequences of these choices in terms of Scopes accounting for the assessed entity, named "Company A"[(1)].

As illustrated by Figure 4, different consolidation approach can yield very different accounting of impacts across Scopes. Properly defining the consolidation approach and its consequences on Scopes is thus critical.

Case #1 - operational control approach: companies B and C are fully operated by A, therefore, their direct impacts are accounted for in the Scope 1 of company A. Company D is not operated by A, but A has 75% of the shares of D which can be accounted for in the investments of company A. Investments belong to the downstream Scope 3 for the investor (category 15 in the GHG protocol (Greenhouse

(1) Figure 4 is inspired by the French ADEME's webpage: https://www.bilans-ges.ademe.fr/fr/accueil/contenu/index/page/bilan%2Bges%2Borganisation/siGras/1

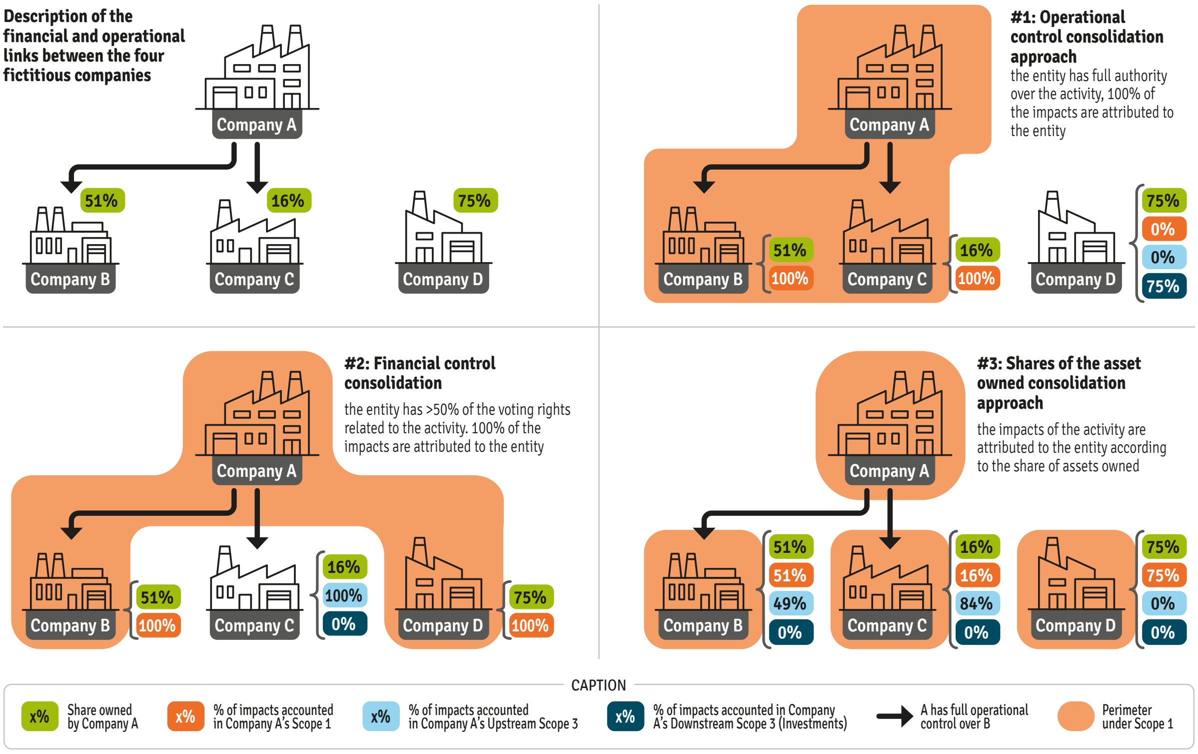


Figure 4: *Illustration of how the consolidation approach affects the accounting of impacts between Scopes for the fictitious "Company A"*

Gas Protocol 2011, 3)), therefore **75% of company D's direct impacts are accounted for in the downstream Scope 3 impacts of company A**.

Case #2 - financial control approach: companies B and D are detained more than 50% by A, so their direct impacts are accounted for in the Scope 1 of company A. Company C is owned less than 50% by A but is fully operated by A, which means that C is fully leased by A. According to the GHG protocol, leased assets are part of the upstream Scope 3 (category 8 in the GHG Protocol) for the assessed entity. Therefore, **100% of the direct impacts of C are accounted for in the upstream Scope 3 of A**.

Case #3 – shares of assets owned approach: companies B, C, and D's direct impacts are accounted for in the Scope 1 of A pro rata the share of assets owned by A (respectively 51%, 16% and 75% of their direct impacts). For companies B and C which are fully operated by A, following the logic of case #2, **B and C are also leased assets for A. Their direct impacts are already partly accounted in company A's Scope 1, their remaining impacts is then accounted for in the upstream Scope 3 of company A** (upstream leased assets). As for company D, it is not operated by company A so the remaining direct impacts (25%) of D is not accounted for in the Scope 3 of company A.

2.2 Oil & gas CommoTool

2.2.1 Context

Global warming caused by oil & gas combustion is certainly the most widely known contribution of oil & gas to biodiversity loss. Yet, oil & gas also generate direct pressures on biodiversity through other major threats identified by the latest IPBES report (Díaz et al. 2019). Exploration processes cause habitat conversion and intense noise pollution in terrestrial and marine ecosystems, also contributing to landscape fragmentation. During fossil fuel exploitation, direct – habitat conversion, degradation, pollution and disturbance – and indirect impacts – increased accessibility and human expansion into previously wild areas, causing additional disturbance, illegal hunting, the introduction of invasive alien species, water pollution – are intense (Beckmann et al. 2012). The land use footprint of energy development and other accompanying biodiversity impacts of fossil fuel production will likely increase. Trainor, McDonald, and Fargione (2016) estimate that direct land use change due to oil, natural gas and coal production could be as high as 6 900 km² per year until 2040 in the United States only.

2.2.2 Perimeter of the Oil & gas CommoTool

The purpose of the GBS's Oil & gas CommoTool is to compute the biodiversity impact factors related to crude oil and natural gas (MSA.m²/t of commodity) **for the location where they are consumed**. Transformed petroleum products are not covered. Several impacts are not yet covered: waste management, linear infrastructure (pipeline, powerlines) and prospection.

Pressures accounted for in the oil & gas CommoTool are land use (LU), encroachment (E), fragmentation (F) and climate change (CC) for terrestrial biodiversity and land use in catchment of rivers (LUR) and wetlands (LUW), wetland conversion (WC), hydrological disturbance due to water use (HD_{water}) and climate change (HD_{CC}) for aquatic pressures. Impacts from atmospheric nitrogen deposition (N) and freshwater eutrophication (FE) are not considered. This limitation seems reasonable as in life-cycle inventory (LCI) databases, nitrogen and phosphorous emissions for both processing and extraction phases are negligible. Pressures on marine biodiversity are not covered (as for the rest of the GBS).

2.2.3 Methodology summary

Figure 5 provides an overview of the input data and key assumptions involved in the Oil & gas CommoTool and describes the main characteristics of the impact factors obtained.

Product Environmental Footprint (PEF)'s life cycle inventory data are used to build impact factors for crude oil and for natural gas, taking into account the national or regional sourcing of the fuel consumed and the associated mix of extraction techniques (CDC Biodiversité 2020e). For both commodities, the output product is a "mix" of conventional versus non-conventional technologies as well as a mix of onshore versus offshore production. Unlike other CommoTools which focus on the production location, the impact factors available in the CommoTool apply to the location where the crude oil or natural gas are consumed (these countries or regions should thus be filled in the GBS's input file).

Climate change and Hydrological disturbance due to climate change impacts are assessed based on GHG emissions from PEF. Downstream Scope 3 emissions are not attributed to fossil fuel production in the GBS 1.3 (but will be in future versions).

In PEF, only **the drilling site is considered in terms of land occupation, not the concession**.

Land transformation data from PEF are used to estimate the Land use and Wetland conversion dynamic pressures. First, the fraction of the land conversion occurring over terrestrial ecosystems and over wetlands is estimated by assuming that wetlands are converted within the same proportion as the share of wetlands in the country or

INPUT DATA

- **GHG emission, spatial data** from PEF
- **Water consumption** (Mielke, Anadon, Narayanamurti 2010)
- **Land use efficiencies per extraction technique** (Trainor and al. 2016)
- **Loss during preparation ratio, conversion efficiency ratio** (Fhtenakis 2009)
- **Net Caloric Values** (EIA 2004)
- **Wetland areas** (GLOBIO-IMAGE) aquatic), **remaining MSA** (GLOBIO-IMAGE terrestrial)

OUTPUTS

- Impact factors in **MSA.km²/t** for **2 products (crude oil and natural gas)**, in **49 EXIOBASE regions** (of distribution), broken down by **dynamic** and **static** impacts for the pressures CC, LU, E, F, WC, LUR, LUW, HD_{water}, HD_{CC}

Figure 5: *Overview of input data and impact factors of the oil & gas CommoTool*

region. The remaining biodiversity over extraction sites is considered equal to 0% MSA, as assumed in the GBS for mining commodities.

For the static impacts of Land use and Wetland conversion, the land occupation data of PEF were considered inadequate. A rough assumption was thus taken: the global average ratio between land conversion over land occupation for mining of 4.85% was used for oil & gas.

The land occupation data are also used to estimate the dynamic and static impacts of the Encroachment, Fragmentation, Land use in catchment of rivers and wetlands pressures, using their mid to endpoint impact intensities - in MSA.km²/km² occupied - (CDC Biodiversité 2020c; 2020g).

Regarding land use of national offshore production, only a pipeline transport between the oil or gas field and the shore is considered. The land use of offshore platforms is not included. No specific pipeline is modelled for national onshore production.

To assess water consumption due to the extraction of oil and gas, water-use coefficients from the literature were used (Mielke, Anadon, and Narayanamurti 2010), as the PEF water consumption data were deemed inconsistent. In their report, Mielke, Anadon, and Narayanamurti (2010) focus on the consumptive use of water during the extraction phase for different energy (including oil and gas), different extraction technique and different phases of energy production. Water-use coefficients cover groundwater and surface water. Their study focuses primarily on United States data, which is a limitation for the GBS. The United States value was considered as a global average and its water use coefficient was applied to all countries and regions.

Impact intensities of withdrawn water expressed in MSA.km² per m³ from the GBS aquatic module (CDC Biodiversité 2020b) were used.

The main limits of the CommoTool are:

- the methodology evaluating the land occupation of drilling sites based on the ratio computed for mining commodities is very rough,
- impact factors are not broken down by extraction techniques,
- accidentology (oil spills) and associated ecotoxicity are not considered.

2.3 ProductTool

2.3.1 Context

The GBS can take into account diverse types of data (pressure, inventories of raw materials, financial data). It covers the impacts of the extraction of raw commodifies thanks to the "CommoTools" for crops, livestock and grass, woodlogs, mining and oil & gas commodities. It did not cover impacts of transformed products until now. The first BFAs conducted so far have however revealed that companies often have inventories of transformed products and not raw materials, which led to the prioritisation of the development of the ProductTool. This paragraph presents the **"ProductTool", introduced in the version 1.2.0 of the GBS, linking life cycle inventories databases to the GBS**.

Disclaimer: this methodology is still under construction and has not yet been reviewed externally. The results obtained may be subject to greater uncertainties, the list of covered products and the description of the methodology are not comprehensive.

2.3.2 Perimeter and overview of the ProductTool

In the GBS 1.3.0, the ProductTool covers **45 products**. The life cycle inventory data of these products come from the **PEF** database developed by the Joint Research Center of the European Commission. For most of the covered products, data is available only for an average **European** production and/or for an average **world** production (or rest of world without Europe).

For most of the assessed products covered in the GBS 1.3.0 so far, the perimeter covered is **cradle-to-cradle**, meaning that data of all Scopes 1, 2, 3 regarding the life cycle of the products are inventoried. Thus, the impacts of the extraction of raw materials, transportation, processing, use and end-of-life should be covered. For more details, please refer to the exact description of each product that can be found in the PEF database and on the platform OpenLCA Nexus[1]. In the future, new products added to the GBS might cover other Scopes (in particular, they may cover only Scope 1 impacts) and a specific documentation will detail the Scopes covered.

The **pressures** Land use (LU), Climate change (CC), Hydrological disturbance due to water use (HD_{water}) and due to climate change (HD_{CC}), Freshwater eutrophication (FE) and terrestrial and freshwater Ecotoxicity (X) are assessed with specific methods detailed below. Encroachment (E), Fragmentation (F), Land use change in catchments of rivers (LUR) and wetlands (LUW) are indirectly assessed through land occupation data. The pressures Atmospheric nitrogen deposition (N), and Wetland conversion (WC) are not assessed.

For each product, data were collected in PEF according to a given **functional unit** (1 m^3, 1 kg, etc.) and the impact factors in the GBS are thus expressed in **MSA.km² per functional unit of the product**.

GBS users can therefore enter the quantity of the assessed product (*e.g.* tonnages, or any relevant functional unit) in the specific GBS products data collection file, and choose the relevant process in terms of technology or geography: the GBS will then assess the impacts caused by this quantity of product.

2.3.3 Methodology summary

In a LCI database, each **product** is associated with a specific **process** which inventories the underneath **input and output flows** (elementary, product or waste) for a given **functional unit**. The linkage of the LCI databases with the GBS is done at the flow level, and the principles of linkage are summarised in the following paragraphs for each pressure on biodiversity. Besides, Figure 6 provides an overview of the data used to construct the ProductTool impact factors.

Land use: the flows considered for this pressure are the **areas (m², ha) per type of land use** (land use "input" flows). In LCI databases, these flows are distinguished in 2 types: land occupation and land transformation. In the ProductTool, only the land occupation flows are

(1) https://nexus.openlca.org/

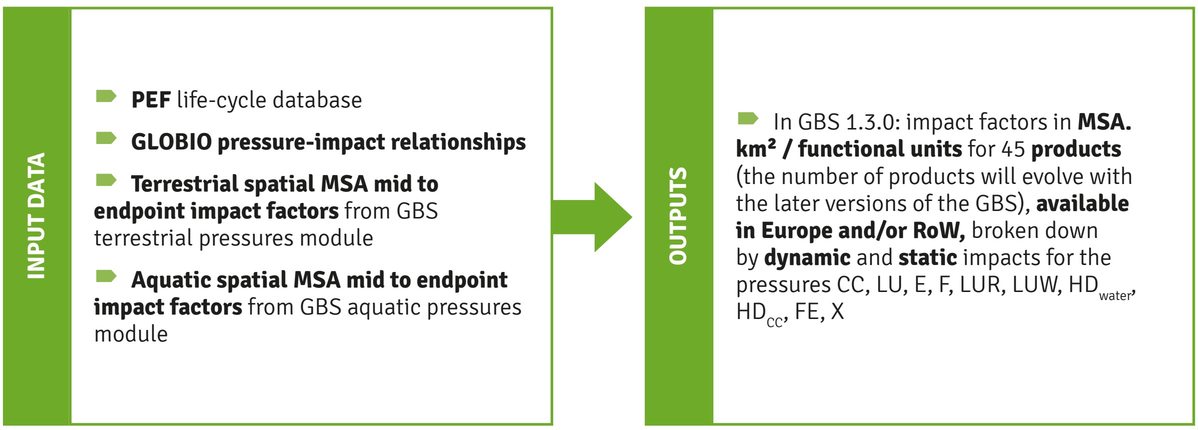


Figure 6: ***Overview of input and output data of the ProductTool in GBS 1.3.0***

considered[1]. Most of the PEF land use flows have direct match with GLOBIO, however some flows are quite general without enough details on the associated management intensity ("Forest", "Agriculture" etc.) and it is then necessary to take assumptions to break them down into a mix of "sub" land use types, such as Intensive cropland and Extensive cropland (instead of just "Agriculture"). The average "sub" land use type mix of the process' region (or the average global mix if the process is global) is used. If the land use is "Unspecified", its land occupation is split among all GLOBIO land use types (and not just the "agriculture" sub-land use types as for the previous case). The static and dynamic impacts are computed based on those matches of land occupation to the GLOBIO land use thanks to the terrestrial mid to endpoint impact intensities for the region of the PEF process[2] in MSA.km²/km² occupied per type of GLOBIO land use, described in the GBS terrestrial module review report (CDC Biodiversité 2020g). If the PEF process is global, the global mid to endpoint impact intensity is used.

Encroachment, Fragmentation, Land use change in catchments of rivers and wetlands: the impacts associated to these pressures are computed similarly to the Land use pressure, thanks to the same **land occupation flows**, and the mid to endpoint impact intensities in MSA.km²/km² occupied described in the GBS terrestrial module review report (CDC Biodiversité 2020g) and the freshwater module report (CDC Biodiversité 2020c).

Hydrological disturbance due to water use: all **used and discharged water volumes** (input and output water flows) are considered. They are usually provided in m³ or kg, and could be from natural origin or turbines, for cooling, discharges, etc. The input flows are considered as **withdrawals**, and the outputs flows as **discharges** and the sum of all input flows minus the sum of all output flows[3] is considered as the (net) **consumption**. The withdrawals and the consumption are inputted in the GBS evaluator function for the pressure HD_{water}: the global HD_{water} mid to endpoint impact intensities in MSA.km²/m³ of withdrawal and consumption is applied and the **maximum of the obtained impact is considered as the impact on biodiversity**. The mid to endpoint impact intensities are described in the GBS freshwater module review report (CDC Biodiversité 2020c).

Climate change and Hydrological disturbance due to climate change: **GHG emissions** are linked with the GBS (GHG output flows). GWPs for a 100-year time horizon from IPCC AR5 (Greenhouse Gas Protocol, 2016) are used to convert GHG emissions data into t CO_2-eq. The mid to endpoint impact intensity in MSA.km²/t CO_2-eq described in the GBS terrestrial module review report (CDC Biodiversité 2020g) is then applied.

Freshwater eutrophication: **emissions of phosphate and phosphorus to the "freshwater" and "soil" compartments** are considered[4] (phosphorous output flows). For the "soil" compartment, a multiplier of 0.1 is applied (CDC Biodiversité 2020c). Molar masses are used to evaluate the relative weight of phosphorus (P-eq) in phosphate (CDC Biodiversité 2020c):

The mid to endpoint impact intensities in MSA.km²/t P-eq of the region of the PEF process[5] provided in the GBS (CDC Biodiversité 2020c) are then applied.

Ecotoxicity: **emissions of chemical substances** (output flows) **having ecotoxicity impact factors in the GBS** are considered. Most of these substances document a CAS number. The existing (global) impact factors in MSA.km²/t of substance are respectively applied to these flows (CDC Biodiversité 2020b). The flows specify the compartment of emission. For "freshwater", "seawater" or "ocean", and "agricultural soil", the matching is straightforward with the compartments in the ecotoxicity module of the GBS.

Resources flows: these flows account for **quantities of commodities needed in a given process** (for example the quantity of copper needed in the manufacture of a photovoltaic solar panel). In PEF data, the inventoried pressure data for a given product (input and output flows, for example m² of land occupation, m³ of water use etc.) should cover the whole life cycle of this product. If both the inventoried pressure data and the quantities of commodities (Resource flows) were connected, there would be double counting of biodiversity impacts. In the example of copper used to manufacture a photovoltaic solar panel, the land occupation linked to the extraction the copper is already counted in the land occupation (input flows) of the process of photovoltaic solar panel[6]. Therefore, in the GBS 1.3.0, these resources flows are not taken into account.

When combined with other data fed into the GBS, the impacts calculated with the ProductTool are summed up with the ones from financial data and the CommoTools, see section 2.4 for more details.

(1) It is due to the fact that land use transformation flows in PEF data did not seem very robust: on some products there were dynamic biodiversity gains (MSA.km² < 0) which seemed incoherent with the given example. Moreover, results with the chosen method were more aligned with GBS CommoTools results.

(2) This is imprecise as it may differ from the region where the land occupation occurs. However, the location of the land occupation is lacking in PEF data. This note is also applicable to the water use flows.

(3) The water flows are regionalised, but in current versions of the GBS (1.3.0 at the time of writing), they are summed across the regions.

(4) In the GBS 1.3.0, the impact of other phosphorous compounds is not yet assessed.

(5) This is imprecise as it may differ from the region where the land occupation occurs. However, the location of the land occupation is lacking in PEF data. This note is also applicable to the water use flows.

(6) The copper quantity (which is a Resource flow) is linked to midpoint impact categories such as "Mineral resource scarcity" in ReCiPe 2016, rather than the "Land use" midpoint.

Some of the limitations of the ProductTool identified so far are listed below. In terms of data used:

- PEF provides only aggregated data ("system processes" in Life Cycle Assessment or LCA language) and does not allow disaggregation of sub-processes, so that it is complicated to distinguish the localisation of each flow in the value chain;
- The part of the ProductTool linked to PEF contains only cradle-to-cradle impacts which cannot be disaggregated by stage of the value chain (see above). As a consequence, if better data are available about the extraction of the raw materials used in a product, it is not possible to use the data on the raw materials without double counting the impacts related to the extraction phase (once in the ProductTool and once in the CommoTool used to evaluate the raw material extraction for instance);
- In terms of geography, most of the PEF processes linked so far to the GBS are limited to the continents level (Europe or World);
- The PEF database is constructed and modelled by different data providers and contains its own limitations.

GBS results are disaggregated to provide the highest possible level of detail

In terms of the methodology used to link the PEF database to the GBS:

- For the Land use pressure, another method could be considered by taking into account the land transformation flows due to potential inconsistencies in PEF data[1]. For now, only occupation flows are used, meaning that the dynamic impact factors computed are based on GLOBIO-IMAGE land use trends. When linking the GBS to other databases in the future such as ecoinvent or Agribalyse, this method could be tested;
- For the Ecotoxicity pressure, in some cases, emissions of metals are considered as emissions of their ions, which probably leads to overestimations of impacts (*e.g.* the emission of 1kg of copper to the air is considered equivalent to the emission of 1kg of Cu^{2+});
- The information on the location of input and output water flows available in PEF is not used (they are summed up globally);
- In general, the linkage of the flows to the GBS is still incomplete and some flows from PEF are not yet connected to the GBS: the ProductTool underestimates some of the impacts of products.

As a reminder, the ProductTool is still under construction. The module will be enriched with other databases in the future such as Agribalyse and ecoinvent. We are currently working with GreenDelta, the developer of openLCA[2], to improve the linkage methodology.

2.4 Impacts combination

The purpose of this section is to explain **how impacts computed from various data sources are combined to avoid double-counting and ensure the best possible result accuracy**.

2.4.1 Reminder on the hierarchy of GBS data input types

The GBS is flexible to allow the use of various data sources in the computation. A detailed description of the possible data inputs is provided in the 2020 technical update (CDC Biodiversité 2020d). As a reminder, five main data types can be used ("product" data having been added more recently to the GBS, see section 3.3):

- **Financial data**: turnover and purchases expressed in monetary units;
- **Product data**: tonnages of transformed products;
- **Physical flows and raw material data**: tonnages of natural resources extracted and emissions of GHGs and pollutants;
- **Pressure data**: surface areas of land occupation and land conversion per land use type, concentration of nitrogen and phosphorus in water;
- **Ecological survey data**: fauna and flora inventories.

From financial to ecological survey data, the list above follows an increasing level of accuracy in the yielded results and a decreasing level of availability, as illustrated by Figure 7. More information on data quality characterisation can be found in the 2019 technical update (CDC Biodiversité 2019) and in this report's FAQ.

(1) This is imprecise as it may differ from the region where the land occupation occurs. However, the location of the land occupation is lacking in PEF data. This note is also applicable to the water use flows.

(2) https://www.openlca.org/

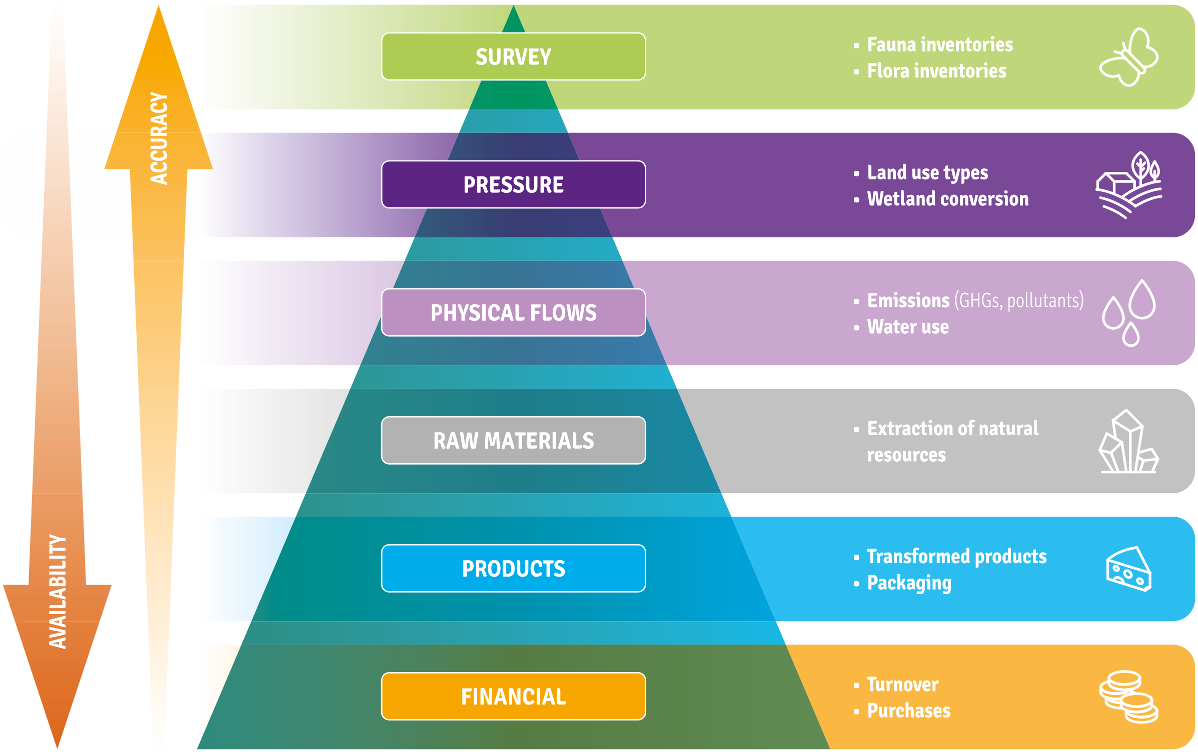


Figure 7: *Hierarchy of the various data inputs in the GBS*

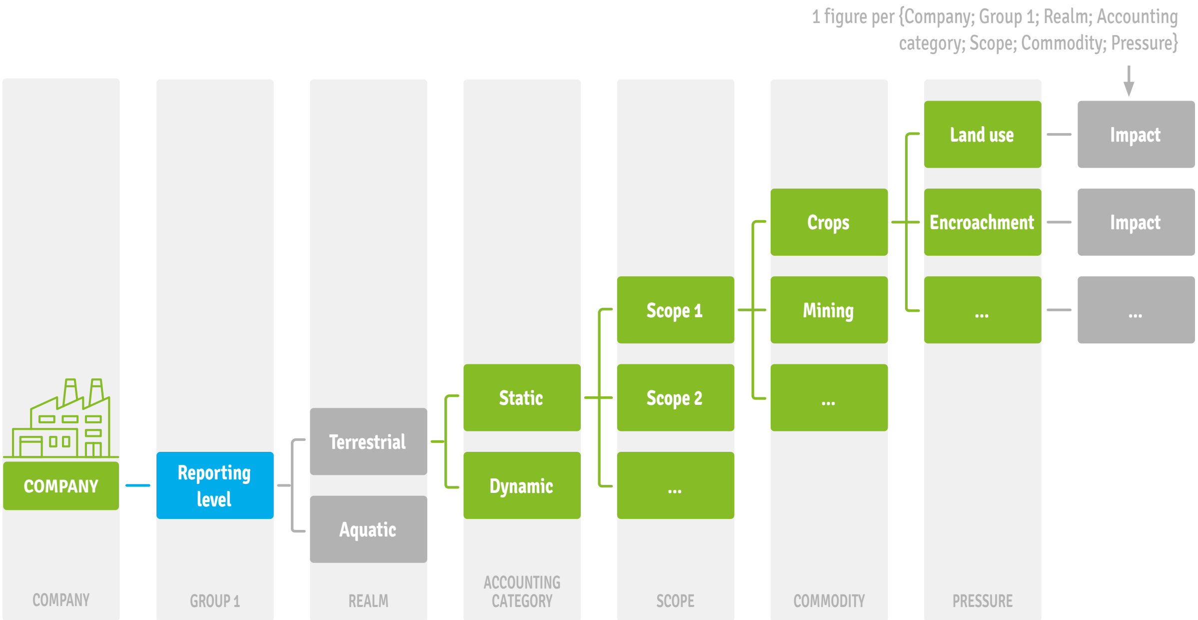


Figure 8: *The GBS provides impacts at the most disaggregated level possible*

2.4.2 Impacts combination: methodology to ensure the best result accuracy and avoid double counting

GBS results are disaggregated to provide the highest possible level of detail. The granularity is as presented by Figure 8, *i.e.* one impact figure per:

- Company;
- Reporting levels chosen for the assessment or "Group 1" (as they are named in GBS data collection files): business unit, department, etc.;
- Realm: terrestrial or aquatic;
- Accounting category: static (cumulated negative impact) or dynamic (periodic gain/loss);
- Scope: Scope 1, Scope 2, Tier 1 of upstream Scope 3, Rest of upstream Scope 3, Downstream Scope 3;
- Commodity (or Product): Crops, Fodder Crops, Mining, Oil & Gas, Woodlogs, Livestock, Grass, Products[(1)];
- Pressure: Land use, Encroachment, Fragmentation, Atmospheric nitrogen deposition, Climate Change, Terrestrial ecotoxicity, Hydrological disturbance due to climate change, Hydrological disturbance due to direct water use, Land use in catchment of rivers, Land use in catchment of wetlands, Wetland conversion, Freshwater eutrophication, Freshwater ecotoxicity.

GBS input files should always specify the company and sub-entity concerned by the documented data. Then, according to the data type, the coverage of computed impacts varies as summarised by Table 6.

- **Financial data** yield impacts for all realms, all accounting categories, all Scopes except downstream Scope 3 – unless specific monetary data related to this Scope are provided –, all commodities and all pressures. Especially, turnover data is enough to compute Scope 1, Scope 2 and upstream Scope 3 impacts for all commodities and pressures.
- When using **Product data**, in the GBS 1.3.0, the impacts are usually computed for all the life-cycle (see section 3.3), without being able to distinguish between Scopes (and Product data must thus be used with care by the assessor conducting the BFA). All realms and accounting categories are covered and all the pressures except Atmospheric nitrogen deposition (N) and Wetland conversion (WC) are covered.
- When using **Raw material data**, the impacts are computed only for the Scope(s) and commodity concerned by the data. All realms and accounting categories are covered, whereas the pressures covered depend on the CommoTool involved, as described in the GBS 2019 technical update (CDC Biodiversité 2020h). For instance, tonnages of wheat produced provide Scope 1 static and dynamic impacts on both terrestrial and aquatic biodiversity for all the pressures covered by the Crops CommoTool.
- When using **Physical flow** or **Pressure data**, the impacts are computed only for the Scope(s) and pressure concerned by the data, while the realm and accounting category(ies) concerned depend on the pressure involved. They are not linked to a specific commodity. Hence, when Pressure data are provided, the final results are not split

(1) The Commodity break down is lost when impacts are combined. It is available only for impacts calculated with financial or commodity tonnages inputs.

Table 6: ***Coverage of the computed impacts according to the data type***

DATA TYPE	THE COMPUTED IMPACTS COVER AND ARE BROKEN DOWN BY				
	REALM	ACCOUNTING CATEGORIES	SCOPE	COMMODITY	PRESSURE
Financial	All realms	All accounting categories	All Scopes*	All commodities	All pressures
Product	All realms	All accounting categories	All Scopes without distinction	*Not linked to a commodity*	All pressures except N and WC
Raw material	All realms	All accounting categories	Scopes of the data	Commodities of the data	Pressures accounted for the commodity
Physical flow	Realm(s) corresponding to the flow	Accounting category(ies) accounted for the flow**	Scopes of the data	*Not linked to a commodity*	Pressure corresponding to the flow
Pressure	Realm corresponding to the pressure	All accounting categories	Scopes of the data	*Not linked to a commodity*	Pressures of the data
Ecological surveys	Realms of the data	All accounting categories	Scopes of the data	*Not linked to a commodity*	*Not linked to a pressure*

** Downstream Scope 3 impacts are computed only if data related specifically to this Scope are provided.*
*** In the GBS 1.3.0, only the dynamic impacts of GHG emissions are calculated and, generally, only the static impacts of pollutant emissions are calculated (implying that pollutant concentrations are assumed constant for a given level of emissions).*

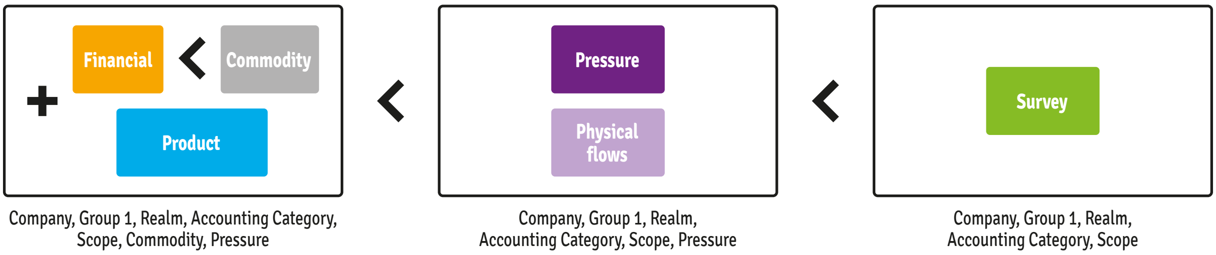


Figure 9: *Order of preferences between GBS input data types. Reading: A < B: B is preferred to A.*

per commodity. For instance, land occupation of the corporate offices of the company assessed yields Scope 1 static and dynamic impacts on terrestrial biodiversity.

- When using **Ecological surveys** (which is extremely rare due to the technical and economic difficulties to collect comprehensive enough data), the realm, accounting category and Scope covered depend on the inventory data used. They are not linked to a specific pressure nor commodity. For instance, ecological inventories of terrestrial species on production sites provide Scope 1 static impacts on terrestrial biodiversity. Dynamic impacts are also computed if the ecological surveys span over several years.

When several types of data are provided, it is likely that several impacts related to the same **septet of {Company; Group 1; Realm; Accounting category; Scope; Commodity; Pressure}** are computed. To avoid double counting, it is thus necessary to calculate only one figure for each septet. This step is referred to as "**impact combination**" in the GBS.

Three rules are observed to handle the combination:

- The order of preferences between the various data sources is as presented by Figure 9;
- Impacts calculated from Product data are added to impacts calculated from Financial and Commodity data after these have been summed over all commodities, *i.e.* they are summed by sextet of {Company; Group 1; Realm; Accounting category; Scope; Pressure}. This calls for great care from assessors conducting BFAs when using Product data: all the data covering the life-cycle of the products included in Product data must be removed from Financial and Commodity data in order to avoid double counting. The resulting impacts are then subjected to further replacement by impacts calculated from Pressure or Ecological survey data.
- 100% of each impact septet (for the replacement of impacts calculated with Financial data by impacts calculated with Commodity data) or sextet (for the other replacements) calculated with lower accuracy data are replaced by that computed on better accuracy data.

⚠ The underlying assumption here is thus that the perimeter of the replacing septet or sextet is the same as that of the replaced bucket. If this is not the case, the structure of the data must be adapted – primarily using one or several additional Group 1 – to make sure that no impact gets lost in the process.

2.4.3 Illustration on an example

Imagine the company Food Inc., conducting the BFA of its French business unit "BU France" for the year 2020.

The available data are reproduced in Table 7, Table 8 and Table 9.

The steps followed to combine impacts are described below. For the sake of simplicity, only **terrestrial dynamic impacts due to the pressures Land use and Climate Change for the Scopes 1, 2, Tier 1 of upstream Scope 3 and Rest of upstream Scope 3 (8 septets)** are detailed below.

Table 7: *Food Inc.'s financial data*

GROUP 1	REGION	INDUSTRY GROUP	TURNOVER FOR THE YEAR 2020
BU France	France	Cultivation of crops	EUR 20 million

Table 8: *Food Inc's raw material data*

GROUP 1	CROPS PRODUCTION (SCOPE 1)
BU France	1 000 000 t of wheat 500 000 t of barley

Table 9: *Food Inc's physical flow data*

GROUP 1	GHG EMISSIONS
BU France	Scope 1: 10 000 t CO_2-eq Scope 2: 9 000 t CO_2-eq Tier 1 of upstream Scope 3: 72 000 t CO_2-eq

STEP 1: IMPACTS COMPUTATION FOR ALL AVAILABLE DATA

Turnover data provide impacts for all the buckets.

Table 10: ***Impacts computed based on Food Inc.'s financial data***
(extract for the dynamic impacts related to the pressures Climate change and Land use only)

GROUP 1	REGION	INDUSTRY GROUP	TURNOVER FOR THE YEAR 2020
BU France	France	Cultivation of crops	EUR 20 million

COMPANY	GROUP 1	SCOPE	ACCOUNTING CATEGORY	REALM	COMMODITY	PRESSURE	FOOTPRINT (MSA.KM²)
Food Inc.	BU France	Scope 1	Dynamic	Terrestrial	Crops	Climate change	2
Food Inc.	BU France	Scope 2	Dynamic	Terrestrial	Crops	Climate change	3
Food Inc.	BU France	Tier 1 of upstream Scope 3	Dynamic	Terrestrial	Crops	Climate change	4
Food Inc.	BU France	Rest of upstream Scope 3	Dynamic	Terrestrial	Crops	Climate change	5
Food Inc.	BU France	Scope 1	Dynamic	Terrestrial	Crops	Land use	6
Food Inc.	BU France	Scope 2	Dynamic	Terrestrial	Crops	Land use	1
Food Inc.	BU France	Tier 1 of upstream Scope 3	Dynamic	Terrestrial	Crops	Land use	2
Food Inc.	BU France	Rest of upstream Scope 3	Dynamic	Terrestrial	Crops	Land use	7
Food Inc.	BU France	Scope 1	Dynamic	Terrestrial	Other commodities*	Climate change	Sum = 20
Food Inc.	BU France	Scope 2	Dynamic	Terrestrial	Other commodities	Climate change	Sum = 15
Food Inc.	BU France	Tier 1 of upstream Scope 3	Dynamic	Terrestrial	Other commodities	Climate change	Sum = 35
Food Inc.	BU France	Rest of upstream Scope 3	Dynamic	Terrestrial	Other commodities	Climate change	Sum = 100
Food Inc.	BU France	Scope 1	Dynamic	Terrestrial	Other commodities	Land use	Sum = 50
Food Inc.	BU France	Scope 2	Dynamic	Terrestrial	Other commodities	Land use	Sum = 9
Food Inc.	BU France	Tier 1 of upstream Scope 3	Dynamic	Terrestrial	Other commodities	Land use	Sum = 12
Food Inc.	BU France	Rest of upstream Scope 3	Dynamic	Terrestrial	Other commodities	Land use	Sum = 23

* In GBS outputs these lines are split by Commodity type. Here only the total is provided for the sake of simplicity. This note applies to all the last lines of the table..

Crop inventory data provide impacts related to Scope 1 for the pressures covered by the Crops CommoTool, as shown by Table 11.

Table 11: ***Impacts computed based on Food Inc.'s Crops data*** *(extract for the dynamic impacts related to the pressures Climate change and Land use only)*

GROUP 1	CROPS PRODUCTION (SCOPE 1)
BU France	1 000 000 t of wheat 500 000 t of barley

COMPANY	GROUP 1	SCOPE	ACCOUNTING CATEGORY	REALM	COMMODITY	PRESSURE	FOOTPRINT (MSA.KM²)
Food Inc.	BU France	Scope 1	Dynamic	Terrestrial	Crops	Climate change	0.5
Food Inc.	BU France	Scope 1	Dynamic	Terrestrial	Crops	Land use	7

GHG emissions data provide impacts related to Scope 1, Scope 2 and Tier 1 of upstream Scope 3 for the pressure Climate Change, as shown by Table 12.

Table 12: ***Impacts computed based on Food Inc.'s GHG emissions data***

GROUP 1	GHG EMISSIONS
BU France	Scope 1: 10 000 t CO_2-eq Scope 2: 9 000 t CO_2-eq Tier 1 of upstream Scope 3: 72 000 t CO_2-eq

COMPANY	GROUP 1	SCOPE	ACCOUNTING CATEGORY	REALM	PRESSURE	FOOTPRINT (MSA.KM²)
Food Inc.	BU France	Scope 1	Dynamic	Terrestrial	Climate change	12
Food Inc.	BU France	Scope 2	Dynamic	Terrestrial	Climate change	10
Food Inc.	BU France	Tier 1 of upstream Scope 3	Dynamic	Terrestrial	Climate change	80

STEP 2: IMPACTS COMBINATION

When impacts calculated from turnover and Crops data are combined, the most accurate figures for each sextet or septet replace the least accurate, yielding the results presented by Table 13.

Table 13: ***Combined impacts computed based on Food Inc.'s turnover and Crops data***
(extract for dynamic impacts related to the pressures Climate change and Land use only)

GROUP 1	TURNOVER FOR THE YEAR 2020
BU France	EUR 20 million

+

GROUP 1	CROPS PRODUCTION (SCOPE 1)
BU France	1 000 000 t of wheat 500 000 t of barley

COMPANY	GROUP 1	SCOPE	ACCOUNTING CATEGORY	REALM	COMMODITY	PRESSURE	FOOTPRINT (MSA.KM²)
Food Inc.	BU France	Scope 1	Dynamic	Terrestrial	Crops	Climate change	~~2~~ 0.5
Food Inc.	BU France	Scope 2	Dynamic	Terrestrial	Crops	Climate change	3
Food Inc.	BU France	Tier 1 of upstream Scope 3	Dynamic	Terrestrial	Crops	Climate change	4
Food Inc.	BU France	Rest of upstream Scope 3	Dynamic	Terrestrial	Crops	Climate change	5
Food Inc.	BU France	Scope 1	Dynamic	Terrestrial	Crops	Land use	~~6~~ 7
Food Inc.	BU France	Scope 2	Dynamic	Terrestrial	Crops	Land use	1
Food Inc.	BU France	Tier 1 of upstream Scope 3	Dynamic	Terrestrial	Crops	Land use	2
Food Inc.	BU France	Rest of upstream Scope 3	Dynamic	Terrestrial	Crops	Land use	7
Food Inc.	BU France	Scope 1	Dynamic	Terrestrial	Other commodities	Climate change	Sum = 20
Food Inc.	BU France	Scope 2	Dynamic	Terrestrial	Other commodities	Climate change	Sum = 15
Food Inc.	BU France	Tier 1 of upstream Scope 3	Dynamic	Terrestrial	Other commodities	Climate change	Sum = 35
Food Inc.	BU France	Rest of upstream Scope 3	Dynamic	Terrestrial	Other commodities	Climate change	Sum = 100
Food Inc.	BU France	Scope 1	Dynamic	Terrestrial	Other commodities	Land use	Sum = 50
Food Inc.	BU France	Scope 2	Dynamic	Terrestrial	Other commodities	Land use	Sum = 9
Food Inc.	BU France	Tier 1 of upstream Scope 3	Dynamic	Terrestrial	Other commodities	Land use	Sum = 12
Food Inc.	BU France	Rest of upstream Scope 3	Dynamic	Terrestrial	Other commodities	Land use	Sum = 23

SCOPE 1 IMPACTS RELATED TO CROPS ARE TAKEN FROM CROPS DATA FOR ALL PRESSURES

IMPACTS FOR OTHER SEPTETS ARE LEFT UNCHANGED FROM FINANCIAL DATA

IMPACTS FOR OTHER COMMODITIES ARE LEFT UNCHANGED

In a subsequent step, impacts calculated based on GHG emissions are added in the most accurate figures for each sextet are kept. Since GHG data are involved, the granularity per commodity is lost and combined impacts are summed over all the commodities. Combined impacts are presented by Table 14.

Table 14: ***Combined impacts computed based on Food Inc.'s turnover, Crops and GHG emissions data*** *(extract for the dynamic impacts related to the pressures Climate change and Land use only)*

GROUP 1	TURNOVER FOR THE YEAR 2020
BU France	EUR 20 million

\+

GROUP 1	CROPS PRODUCTION (SCOPE 1)
BU France	1 000 000 t of wheat 500 000 t of barley

\+

GROUP 1	GHG EMISSIONS
BU France	Scope 1: 10 000 t CO_2-eq Scope 2: 9 000 t CO_2-eq Tier 1 of upstream Scope 3: 72 000 t CO_2-eq

↓

COMPANY	GROUP 1	SCOPE	ACCOUNTING CATEGORY	REALM	PRESSURE	FOOTPRINT (MSA.KM²)
Food Inc.	BU France	Scope 1	Dynamic	Terrestrial	Climate change	12
Food Inc.	BU France	Scope 2	Dynamic	Terrestrial	Climate change	10
Food Inc.	BU France	Tier 1 of upstream Scope 3	Dynamic	Terrestrial	Climate change	80
Food Inc.	BU France	Rest of upstream Scope 3	Dynamic	Terrestrial	Climate change	5+100=105
Food Inc.	BU France	Scope 1	Dynamic	Terrestrial	Land use	7+50=57
Food Inc.	BU France	Scope 2	Dynamic	Terrestrial	Land use	1+9=10
Food Inc.	BU France	Tier 1 of upstream Scope 3	Dynamic	Terrestrial	Land use	2+12=14
Food Inc.	BU France	Rest of upstream Scope 3	Dynamic	Terrestrial	Land use	7+23=30

Scope 1, Scope 2 and Tier 1 impacts related to Climate change are calculated from GHG emissions data

Total Rest of upstream Climate change impacts are calculated from financial data

Scope 1 Land use impacts are calculated from Crops data for the commodity crops and summed with Scope 1 Land use data for other commodities computed on financial data

Sum of Land use impacts due to Crops and other commodities computed on financial data

Considering that BFAs often involve numerous data sources and a much more complicated data structure with several Groups 1 (reporting levels), an overview of what data are used to assess the impact for each pair of pressure and Scope in the combined impacts through a **summary table called the "Pressure x Scope x Data" table** is very useful. According to the complexity of the BFA, it may be necessary to split the Pressure x Scope x Data table per Group 1.

The Pressure x Scope x Data table related to Food Inc. example is Table 15. For example, it reveals that Turnover data are the ones involved in the calculation of Land use Tier 1 of upstream Scope 3 impacts (through the estimation of purchases with the input-output EXIOBASE model, etc.).

Table 15: ***Pressure x Scope x Data table for Food Inc.'s BFA***

REALM	PRESSURE	SCOPE 1	SCOPE 2	UPSTREAM SCOPE 3		DOWNSTREAM SCOPE 3
				TIER 1	REST OF UPSTREAM	
Terrestrial	Land use	Tonnages of wheat and barley Turnover* (assessing the impact of non-crop commodities)	Turnover	Turnover	Turnover	*No data*
	Encroachment					
	Fragmentation					
	Atmospheric nitrogen deposition					
	Terrestrial ecotoxicity	Turnover				
	Climate change	Scope 1 GHG emissions	Scope 2 GHG emissions	Tier 1 of upstream Scope 3 GHG emissions		
Aquatic	Hydrological disturbance due to climate change					
	Hydrological disturbance due to direct water use	Tonnages of wheat and barley Turnover* (assessing the impact of non-crop commodities)	Turnover	Turnover		
	Wetland conversion					
	Land use in catchment of rivers					
	Land use in catchment of wetlands					
	Freshwater eutrophication					
	Freshwater ecotoxicity	Turnover				

* Turnover data for the industry group Cultivation of crops are used to assess the impacts of commodities other than crops (fodder crops, mining, livestock, grass, oil & gas, woodlogs). For this industry group, it is likely that the Scope 1 impacts related to these commodities are negligible.

2.5 Dependencies to biodiversity

So far, the GBS assessed only economic activities' impacts on biodiversity. While impacts on biodiversity remain the focus of the tool, an assessment of the dependency to biodiversity of activities and their value chain has been added in version 1.3.0.

An industry is dependent on an ecosystem service when **at least one of its production processes depends on this service to function properly**. The ENCORE (Exploring Natural Capital Opportunities, Risks and Exposure) database assesses dependencies of each sector to each ecosystem service (Natural Capital Finance Alliance (Global Canopy, UNEP FI, and UNEP-WCMC) 2021)[1]. It is based on existing classifications of ecosystem services and economic sectors and dependencies are assessed through literature review and expert interviews when the literature is not sufficient. CDC Biodiversité developed a methodology to calculate Scope 1 and upstream dependency scores, based on ENCORE's classification, first tested together with students from the French engineering school Les Ponts (Benchekroun, et al. 2020) The dependencies thus calculated are provided through a CC BY-SA 4.0 licence[2].

2.5.1 Scope 1 dependencies

Based on the ENCORE database and on the EXIOBASE classification and industries descriptions, dependency scores were computed for each EXIOBASE industry based on the following methodology.

To obtain the ecosystem services dependency values, a correspondence table between EXIOBASE and ENCORE industries is built. ENCORE sub-industries (classification based on the GICS classification[3]) which have no equivalent in EXIOBASE are excluded. For each ENCORE sub-industry corresponding to an EXIOBASE industry, only the processes included in the definition of the EXIOBASE industry are kept. A weight is attributed to each ENCORE production process depending on its importance in the sub-industry. Besides, a table of materialities is extracted from the ENCORE database, reporting the materialities for each process of each ENCORE sub-industry. The materialities are converted into percentage: 0% for no known dependency[4], 20% for Very Low, 40% for Low, 60% for Medium, 80% for High and 100% for Very High dependency.

The dependency score of the EXIOBASE industry k on the ecosystem service j can then be calculated as:

$$Dependency\ score_{k,j} = \sum_{l\ \in processes\ in\ industry\ k} Weight_l \times Materiality_l$$

Figure 10 displays the Scope 1 dependencies of different sectors on ecosystem services.

(1) https://encore.naturalcapital.finance/en

(2) Creative Commons Attribution-ShareAlike 4.0 International (CC BY-SA 4.0): https://creativecommons.org/licenses/by-sa/4.0/legalcode

(3) https://www.msci.com/our-solutions/indexes/gics

(4) Materiality ratings are likely to change as new information becomes available in the scientific and grey literature.

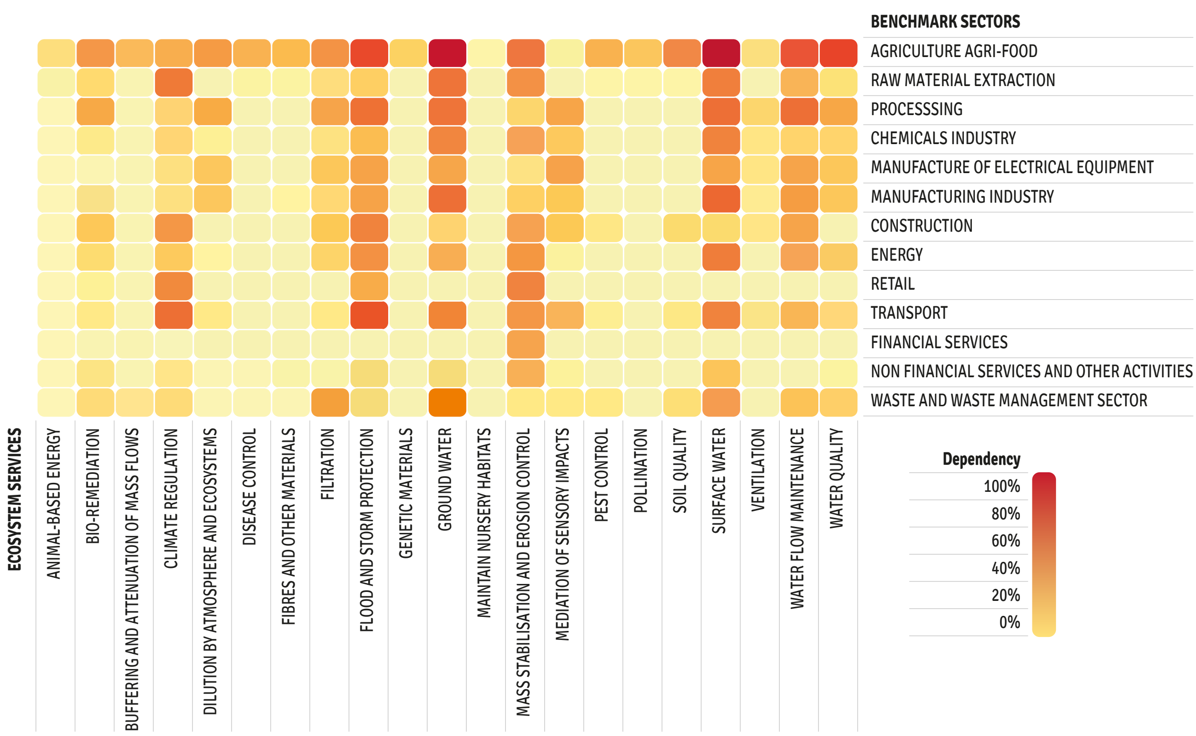


Figure 10: ***Scope 1 dependencies for all 13 "benchmark industries" distinguished by CDC Biodiversité***

2.5.2 Upstream dependencies

Industries' reliance on biodiversity is complex because their supply chains also depend on ecosystem services. For instance, even though the food-processing sector has a limited dependency on pollination through its direct operations, it relies heavily on other sectors in its supply chain, such as the agricultural sector, which are highly dependent on pollination and on other ecosystem services. As a result, fully capturing the dependency of one sector on services provided by nature requires to consider the dependency of its whole supply chain (World Economic Forum and PwC 2020).

Using the EXIOBASE Input-Output table, and more specifically the Leontief Inverse Matrix that exhibits all the value chain interrelations required to produce an output, the upstream dependencies of each sector can be identified. More information on the EXIOBASE Input-Output Table and the Leontief Inverse Matrix, is available in the GBS' Input Output critical review report (CDC Biodiversité 2020d).

To obtain the upstream dependencies (without Scope 1), the Scope 1 interrelations needs to be subtracted from the Leontief Inverse Matrix. This is done by subtracting the Identity matrix from the Leontief matrix. Besides, since the dependency scores cannot be summed up, the Leontief matrix also needs to be normalized. It would otherwise result in upstream dependency scores sometimes exceeding 100%. To do so, the coefficients of the Leontief inverse matrix are divided by the sum of the purchases.

Considering the Scope 1's dependency matrix constructed using the ENCORE materialities mentioned in the previous section, the upstream dependencies of the EXIOBASE industries on the different ecosystem services are computed thanks to the following formula:

$$\textit{Upstream dependency matrix} = \textit{Scope 1 dependency matrix} \times (\textit{Leontief inverse matrix} - \textit{Identity matrix})_{normalised}$$

The detailed methodology can be found in CDC Biodiversité's benchmark factsheets' technical appendix (CDC Biodiversité, 2021b).

For each Group 1 (level of reporting chosen for the BFA) of the assessed company, the Scope 1, upstream and vertically integrated dependency scores per ecosystem service are provided in the output of the GBS for versions 1.2 and more recent.


© Wonderisland de Shutterstock


© Akarawut.de/Shutterstock

3 Case studies

Case study Summary sheet

Context

CASE STUDY

Footprint use category: Project / site and Corporate & portfolio
Assessment time: 2019

Perimeter

		LUEFN Pressure	CC Pressure	Aquatic Pressures
Scope 1		✓	✓	✓
Scope 2		✓	✓	✓
Scope 3	Tier 1	✓	✓	✓
	Rest of value chain	✓	✓	✓
	Downstream	☐	☐	☐

COMPANY'S IDENTITY

EDF

Industry
Utilities

Sub-industry
Production of electricity by gas

2019 turnover
71.3 billion EUR

Listed
Euronext, CAC 40

Why?

ASSESS THE BIODIVERSITY IMPACTS OF ENERGY PRODUCTION ACTIVITIES FOR THREE GAS POWER STATIONS, EXPLORE BIODIVERSITY FOOTPRINT ASSESMENTS (BFA) WITH THE GBS.

When?

COMPUTATION IN DECEMBER 2020 BASED ON 2019 FIGURES

How often?

ONE OFF

What?

TERRESTRIAL AND FRESHWATER BIODIVERSITY FOOTPRINTS LINKED TO THREE GAS POWER STATIONS' DIRECT OPERATIONS (AKIN TO A SITE-LEVEL ASSESSMENT) AND PURCHASES (THE THREE POWER STATIONS BEING SIMILAR TO A SMALL BUSINESS UNIT)

For who?

INTERNAL USE, STRATEGY, SOURCING

How detailed?

RESULTS ARE AVAILABLE FOR EACH GAS POWER STATION AND BROKEN DOWN BY SCOPE AND PRESSURE

DATA COLLECTED

Item	Description	Source
Land use	Areas occupied by the three power stations and associated land use type	EDF
GHG emissions	Scope 1 and 2 GHG emissions of the three powers stations	
Water withdrawals and discharge volumes	Water withdrawals and discharged volumes of the three power stations	
Natural gas consumed	Natural gas consumed for the functionning of the plants	
Financial data	Turnover and purchases of the three plants	

Footprint analysis

RESULTS

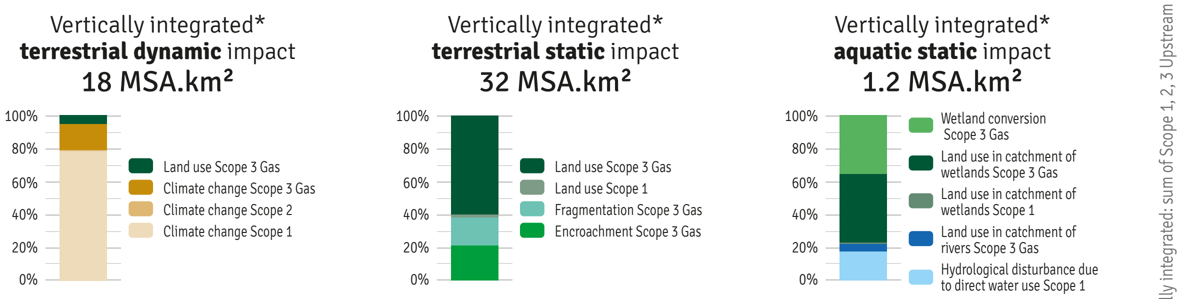


Figure 11: *Impacts split by accounting category, realm, pressure and Scope for the three production units*
(Source: GBS 1.0.1, December 2020, Antoine Vallier)

KEY MESSAGES

- GHG emissions and water use are the main drivers of impacts in the direct operations, while the impacts from land use at the production site are relatively small.
- The extraction of natural gas plays a predominant role in the upstream impacts of the power stations.
- Compared to a conservative counter-factual scenario, EDF management practices on the production sites contribute to avoiding impacts on biodiversity.

IMPROVEMENTS

- Ecological surveys and waste management data related to circular economy could not be used with the version of the tool used in the study (1.0.1)
- Due to sourcing data limitation, the world average impact factor was used to assess the upstream Scope 3 impacts related to natural gas extraction
- The approach used to estimate avoided impacts is preliminary

3.1 EDF

3.1.1 Context and objectives

EDF is interested in better understanding how a biodiversity footprint methodology can be applied to its activity of electricity generation. This case study is part of a broader analysis where different tools are tested and compared. EDF has been very active in managing biodiversity on its production sites[1], using the GBS is an opportunity to broaden its biodiversity analysis to the supply chain.

For CDC Biodiversité, this case study is an opportunity to test and reinforce the GBS for the electricity sector. It is expected that carbon-intensive energy production types are significant contributors to the climate change pressure. Using the GBS allows the assessment of other pressures and the identification of impact hotspots in the supply chain.

The assessment focuses on three natural gas power plants owned and managed directly by EDF in mainland France. Relying exclusively on natural gas combustion, they produce electricity fed into the French continental network. In 2019, they represented 2.2 % of installed capacities of EDF in France. In 2019 electricity produced with gas represented 2% of total EDF SA production[2] in mainland France. Detailed production characteristics per site are presented by Table 16.

The temporal perimeter is the year 2019. The assessment covers direct operations (Scope 1), non-fuel energy purchases (Scope 2) and upstream impacts (Upstream Scope 3). Downstream impacts were not evaluated.

The case study has two main objectives. The first one is the identification of impact hotspots considering Scope 1, Scope 2 and upstream Scope 3. The second one is the exploration of the concept of "avoided impacts".

The first objective involves the core use of the GBS methodology. The interest is to see how it applies to one type of power generation technique. It fits within a broader work of CDC Biodiversité aiming at building an electricity production module that will provide biodiversity impact factors for different energy production techniques. The second objective is more innovative. It is to compare the lower impacts associated to the active biodiversity management implemented by EDF to a counterfactual to assess "avoided impacts".

3.1.2 Methodology

The methodology for this case study follows the typical framework of a BFA. Table 17 provides an overview of the data collected and where they fit within the assessment.

For Scope 1, land use and fragmentation are assessed using surface areas per land use type. The data provided by EDF for land use types corresponds to the EUNIS framework[3]. CDC Biodiversité and EDF built a correspondence to translate the EUNIS habitats inventoried into GLOBIO land use types. As a first approximation, hydrological disturbance due to water use was assessed using water (net) consumption data only (see **Results and discussion** below for a discussion on water withdrawals). The associated GBS's basin-level impact factors were applied (Escaut, Durance and Moselle). Seawater withdrawals were ignored since the impacts on marine biodiversity were excluded from the perimeter (the GBS 1.0.1 being unable to cover them). The onsite GHG emissions during natural gas combustion were used to assess the impacts due to climate change. The other pressures are not assessed.

For Scope 2, climate change related pressures are assessed using GHG emissions. Other pressures are evaluated based on electricity purchases amounts (in practice, the land occupation, water use, etc. related to average French electricity generation were not available in the GBS 1.0.1 and will be available after the release of the GBS's electricity module).

For upstream Scope 3, impacts associated to the natural gas supply are evaluated based on the annual amount of natural gas consumed (in Nm^3). The (default) global GBS' impact factor is applied given that the sourcing location is unknown. For other materials, monetary purchases of various goods and services as provided by EDF are used. CDC Biodiversité associated each purchase to an EXIOBASE industry.

EDF has implemented specific land management practices on its (Scope 1) production sites with the aim of preserving biodiversity. For example, when possible, forest areas are conserved. For open areas, late mowing is preferred. These practices were put in place before the assessment, and it is considered that gains already occurred in the past. However, **avoided impacts** *i.e.* the negative impacts prevented compared to a counterfactual scenario can be assessed. The counterfactual scenario here is defined as the implementation of usual management methods without any effort in relation to biodiversity.

The assessment of avoided impacts is limited to the land use and fragmentation pressures due to the lack of time and, partly, of data. In principle, other pressures could also be covered by also considering water use, pesticides use or even greenhouse gas emissions linked to land management. For land use, the counterfactual is Urban area with an associated MSA of 5%.

(1) See https://www.edf.fr/en/the-edf-group/taking-action-as-a-responsible-company/corporate-social-responsibility/biodiversity#act4nature

(2) See https://www.edf.fr/en/the-edf-group/dedicated-sections/investors-shareholders/financial-and-extra-financial-performance/edf-group-s-facts-and-figures

(3) European Nature Information System, https://eunis.eea.europa.eu/

3.1.3 Results and discussion

A MAIN RESULTS

The overall results are presented by Table 18.

The vertically integrated, *i.e.* combined Scope 1, 2 and upstream Scope 3, terrestrial dynamic impacts - periodic gain/loss or flow of impacts - of the three production units are 18 MSA.km². The terrestrial static impacts - accumulated negative impact or stock of impacts[1] - are 32 MSA.km². The total aquatic static impacts are 1.2 MSA.km². Aquatic dynamic impacts are not included as the methodology is being improved for these impacts.

Figure 11 identifies the main impact hotspots for each pressure and Scope. Regarding the terrestrial dynamic impacts, Scope 1 impacts due to climate change, from the gas combustion, are largely preponderant, followed by the climate change impacts due to the upstream Scope 3 extraction of natural gas. The impacts related to Land use conversion due to natural gas extraction is notable. Regarding the terrestrial static impacts, spatial pressures associated to the extraction of natural gas are largely predominant. The impacts from land use at the production site level (Scope 1) are comparatively low. Finally, on the aquatic static compartment, the picture is more contrasted. There is also a preponderance of impacts related to the upstream Scope 3 extraction of natural gas, and the Scope 1 impacts related to hydrological disturbance due to direct water use are noticeable (around 17% of vertically integrated impacts).

Results regarding avoided impacts are presented by Table 19. EDF management prevents on average about 15% of its impacts related to Scope 1 spatial pressures compared to the counterfactual scenario for all three sites. These encouraging figures highlight the positive potential of dedicated measures in favour of biodiversity. Encouraging EDF's suppliers (upstream Scope 3 in Figure 11) to replicate these measures and implement impact reduction actions would further contribute to limiting its biodiversity impact.

B LIMITATIONS AND IMPROVEMENTS

The assessment has several limitations and room for improvement.

Not all available data could be used. For instance, ecological survey of wall lizard populations at the Bouchain site could not be used since a single-species ecological survey without knowledge of optimal population size cannot be translated into MSA. Data on positive waste management or circular economy were not considered either due to GBS limitations. Some pressures were not evaluated for Scope 1 (see Table 17). Finally, it should be noted that the oil and gas module of the GBS has not yet been evaluated by third party experts. The main concepts and assumptions related to the oil and gas module are presented in section 2.2 of this report.

Hydrological disturbance due to direct water use was estimated only based on consumption data computed as discharges subtracted to withdrawals. The impacts of withdrawals could be assessed with further developments of the GBS.

The world average impact factor was used to assess the upstream Scope 3 impacts related to natural gas extraction. Improving the underlying methodology for assessing these impacts appears to be a priority. For purchases, a good tracing with the identification of specific countries of origin or given extraction site would allow to enhance the impact calculation.

Regarding avoided impacts, the evaluation of the fragmentation is simplified by not considering roads crossing the natural patches. On Martigues site, only a fraction of the entire site (almost 50 ha) is necessary to produce electricity but in the counterfactual scenario, the entirety of the site (and not only the area used for electricity production) was considered as urban area (MSA: 5%) which overestimates avoided impacts.

3.1.4 Lessons learnt

The assessment identifies major impact hotspots related to EDF three production sites' vertically integrated footprint. While, as expected, the impacts related to climate change due to Scope 1 GHGs emissions are significant (Figure 11), the study highlights the importance of the impacts related to the extraction of natural gas.

The actions implemented by EDF to avoid impacts on biodiversity could also be quantified. In this respect, this case study is an opportunity for CDC Biodiversité to move forward on the concept of avoided impacts. The definition of a counterfactual scenario and the calculation of the related impact variation on a concrete case illustrates the capacity of the GBS to perform this type of analysis but also highlights the difficulty of its generalisation. A collective approach would make it easier to provide the necessary work force and the consensus for the systematisation of this type of sectoral analysis.

For this study, data availability was satisfactory overall. Indeed, most of the data used were already collected by the company for other reporting purposes (*e.g.* climate reporting).

(1) As usual in GBS 1.1 assessments, climate change static impacts have not been assessed due to GBS methodological limitations. This explains a relatively low static impact compared to the dynamic impact.

Table 16: ***Key information on the three sites assessed***

SITE*	INSTALLED CAPACITY (MW)	YEAR	HOURS OF OPERATION (HM)	NET POWER SUPPLY (MWh)
Blenod	450	2019	6200	2 100 000
Bouchain	605	2019	6000	2 800 000
Martigues	Martigues 5: 465 Martigues 6: 465	2019	Martigues 5: 5400 Martigues 6: 5700	3 900 000

* Natural gas power plants from EDF electricity generation mix.

Table 17: ***Overview of how the collected data were integrated into the GBS for each pressure and Scope***

<table>
<tr><th>REALM</th><th>PRESSURES</th><th>SCOPE 1</th><th>SCOPE 2</th><th>UPSTREAM SCOPE 3</th></tr>
<tr><td rowspan="6">Terrestrial</td><td>Land use</td><td rowspan="2">Habitats from fauna and flora studies (ha)</td><td rowspan="5">Electricty consumption :
2019 energy bills (€)</td><td rowspan="12">2019 Natural gas volume for combustion (Nm³)
2019 Purchase amounts (€)</td></tr>
<tr><td>Fragmentation</td></tr>
<tr><td>Encroachment</td><td>Not assessed</td></tr>
<tr><td>Atmospheric nitrogen deposition</td><td>No emission reported</td></tr>
<tr><td>Terrestrial ecotoxicty</td><td>No emission reported</td></tr>
<tr><td>Climate change</td><td rowspan="2">2019 GHG emissions (t)</td><td rowspan="2">2019 GHG emissions (t)</td></tr>
<tr><td rowspan="6">Aquatic</td><td>Hydrological disturbance due to climate change</td></tr>
<tr><td>Wetland conversion</td><td>Not assessed</td><td rowspan="5">Electricty consumption :
2019 energy bills (€)</td></tr>
<tr><td>Land ues in catchment of rivers and wetlands</td><td>Not assessed</td></tr>
<tr><td>Freshwater eutrophication</td><td>No impact: no emission</td></tr>
<tr><td>Hydrological disturbance due to water use</td><td>2019 water consumption (m^3)</td></tr>
<tr><td>Freshwater ecotoxicity</td><td>No emission reported</td></tr>
</table>

Table 18: ***Summary of total impacts for the three production units*** *(Source: GBS 1.0.1, December 2020, Antoine Vallier)*

BIODIVERSITY REALM	ACCOUNTING CATEGORY	VERTICALLY INTEGRATED FOOTPRINT (MSA.KM²)	AVOIDED IMPACTS (MSA.KM²)
Terrestrial	Dynamic	18	/
Terrestrial	Static	32	-0.1
Aquatic	Static	1.2	-0.03

Table 19: ***Total Scope 1 land use and fragmentation avoided terrestrial static impacts for the three sites*** *(Source: GBS 1.0.1, December 2020, Antoine Vallier)*

TERRESTRIAL SPATIAL PRESSURES SCOPE 1 MSA.m²	MANAGEMENT GAINS MSA.m²	MANAGEMENT GAINS %
610 000	-105 000	17%

Case study Summary sheet

Context

CASE STUDY

Footprint use category: Corporate level **Assessment time:** 2019

Perimeter

		LUEFN Pressure	CC Pressure	Aquatic Pressures
Scope 1		✓	✓	✓
Scope 2		✓	✓	✓
Scope 3	Tier 1	✓	✓	✓
	Rest of value chain	✓	✓	✓
	Downstream	☐	✓	☐

COMPANY'S IDENTITY

Schneider Electric

Industry
Manufacturing

Sub-industry
Electrical machinery

2019 turnover
27.2 billion EUR

Listed
Euronext

Why?

QUANTIFY BIODIVERSITY HOTSPOTS AND OPPORTUNITIES ALL ALONG SCHNEIDER ELECTRIC'S VALUE CHAIN, WITH A GLOBAL AND SCIENTIFIC APPROACH

What?

END-TO-END (SCOPE 1, 2 AND 3 UPSTREAM) IMPACTS. ADDITIONALLY, DOWNSTREAM CLIMATE CHANGE IMPACTS HAVE BEEN ASSESSED

When?

2019 IMPACTS

For who?

ENVIRONMENTAL & STRATEGY TEAMS AT SCHNEIDER ELECTRIC EXTERNAL STAKEHOLDERS, INCLUDING A CALL TO ACTION TO OTHER BUSINESSES

How often?

REGULAR SIMPLIFIED ASSESSMENT TO MONITOR PROGRESS AND FULL ASSESSMENTS AT SIGNIFICANT UPDATES OF THE GBS.

How detailed?

CORPORATE LEVEL, TAKING INTO ACCOUNT DATA REPORTED AT VARIOUS LEVELS INCLUDING SITES AND PURCHASE CATEGORIES

DATA COLLECTED

Item	Description	Source
Land occupation	Scope 1 surface area occupied by manufacturing facilities, distribution centers (logistics), and offices (m^2)	Schneider Electric (SE): Internal reporting & calculations
Water consumption and withdrawal	Scope 1 volumes of water consumed or withdrawn by site or by country (m^3)	SE: Extra financial reporting
GHG emissions	GHG emissions for Scope 1, 2 and 3 (upstream and downstream) (kg CO_2-eq)	SE: Extra financial reporting
Raw material purchases	Tonnages of metal ores, crude oil and wood logs purchased (t)	SE: Internal reporting, carbon footprint calculations & specific assumptions
Purchases	Breakdown of direct purchases by procurement category (EUR)	SE: Internal reporting
Turnover	Total turnover and break down by industry and country (EUR)	SE: Financial reporting & internal reporting
Energy	Electricity bought by country and technology. Fossil fuels bought for heating.	SE: Extra financial reporting

Footprint analysis

RESULTS

FOOTPRINT:
(Scope 1, 2, 3 upstream)

Terrestrial static
3 600 MSA.km²

Terrestrial dynamic
340 MSA.km²
+ 288 MSA.km²
(Downstream, excluding saved emissions)

Aquatic static
140 MSA.km²

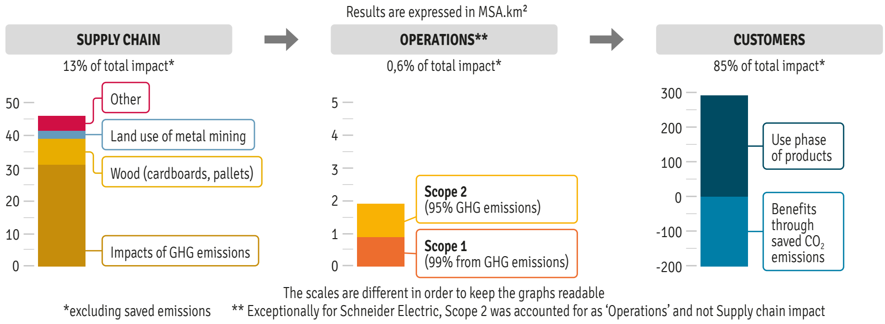


Figure 12: *Terrestrial dynamic footprint of Schneider Electric*

KEY MESSAGES

→ Upstream impacts make up a very significant part of Schneider Electric's impacts on biodiversity: engagement and traceability in the supply chain (especially plastics, metals and wood sourcing) are key to tackle biodiversity loss.

→ The main single contributor to biodiversity loss caused by Schneider Electric is downstream greenhouse gas emissions linked to product use: the ambitious carbon policy of Schneider Electric has strong synergies with the biodiversity policy it needs to adopt.

→ Impacts caused by direct operations are relatively limited (<1%) but levers of action also exist to reduce it further: land use intensity at offices, factories and distribution centers can be reduced through lower land occupation and water withdrawal and consumption in water-stressed watershed can be further reduced.

IMPROVEMENTS

→ Since upstream impacts represent such a high share of impacts, refinement of the estimations of raw material tonnages and of recycled content are required. It is also necessary to better understand the impact of recycled and certified wood

→ Developments on aquatic biodiversity assessment are needed in order to reduce uncertainties.

3.2 Schneider Electric

As a global specialist in energy management and automation in more than 100 countries, Schneider Electric offers integrated energy solutions across multiple market segments. Sustainability is at the heart of its strategy, and it has recently started its biodiversity journey. For Schneider Electric, the evaluation of its biodiversity footprint was therefore an opportunity to quantify biodiversity hotspots and opportunities all along its value chain, with a global and scientific approach.

The Biodiversity Footprint Assessment of Schneider Electric's activities has been conducted following the 5 steps described in section 1.2.2.

In the following paragraphs, the application of those steps in the specific case of Schneider Electric will be discussed.

BOX 3 Invited witness – Esther Finidori on a simple belief when it comes to corporate environment: quantify, strategize, act

We are at a turning point for biodiversity and a drastic acceleration is needed to avoid major disruption in our society. The past ten years have taught us that a lot can be done at personal, governmental or company level to limit global warming. In the coming years we must replicate and fast-track the adoption of those best practices in the field of biodiversity.

To begin their biodiversity journey, companies must measure their impact across the entire value chain, define ambitious science-based strategies and take relevant action.

In 2020, Schneider Electric was the first company to measure its biodiversity footprint across the entire value chain, using the Global Biodiversity Score®. Based on this scientific approach, we committed to achieve No Net Biodiversity Loss in our direct operations by 2030.

Understanding our impacts allowed us to pinpoint solutions to act now. For instance, greenhouse gas emissions represent over 95% of Schneider Electric's biodiversity impact; hence, stepping up the fight against climate change is an essential lever for preserving biodiversity.

At Schneider Electric, we are committed to:

- **Develop solutions for biodiversity**. We innovate every day to help our customers reduce their CO_2 emissions. In 2020, with Schneider, our customers avoided 75 mt CO_2. In the coming years we will help them avoid 100 mt CO_2 in average every year.
- **Transform the value chain,** working with our suppliers to improve the traceability of raw materials and components, develop circular economy principles (both with our suppliers and our customers) and increase the share of low(er) environmental impacts materials
- **Act locally to preserve ecosystems**. Wherever we operate we are engaged to have a biodiversity preservation and restoration program by 2025.

We are well aware that we won't succeed in this journey alone and the entire economic system needs to step up to face the challenge. The financial sector also has a major role to play: for climate change it is today the engine that creates the needed momentum for an acceleration of corporate strategies.

The private sector can begin now to quantify its impacts on biodiversity, understand the interdependencies between nature and business, identify risks and define action plans by committing to No Net Biodiversity Loss. The responsibility of every company and investor is to be sure that its economic activities respect a trajectory to favour the biodiversity preservation and restoration.

Clear and measurable international targets must also be set during the coming international instances (such as the COP15), similar to the 1.5°C target which clearly shows us the way for climate action.

Time to act is now, and impact quantification is a must-have first step in that direction.

Esther Finidori,
VP Environment Schneider Electric

3.2.1 Framing

The framing of the evaluation is an important step since it sets the boundaries and lays the foundations of the study. It usually involves the project owner and the assessors and, in the case of Schneider Electric (here the project owner), it lasted a couple of weeks.

A PERIMETER

The following questions were answered for the definition of the perimeter of Schneider Electric's evaluation:

- *Which business units, subsidiaries?* Whole Schneider Electric group
- *Which countries, site?* Global
- *What is the time period of the assessment?* 2019
- *Which Scopes?* End to end: Scope 1, 2 and 3 upstream. Additionally, downstream climate change impacts have been assessed.

B SCREENING OF BIODIVERSITY ISSUES

To identify the most impactful steps within value production, a first screening of sectoral level impacts is usually conducted based on the turnover split per region and sector with the GBS. At the site level, a screening of the presence of threatened species (IUCN Red List for example) or protected areas nearby can be conducted with tools such as the Integrated Biodiversity Assessment Tool or IBAT[1], as recommended in UNEP-WCMC report on extractives biodiversity indicators (UNEP-WCMC 2019).

- *What are the main sources of biodiversity impact within the value chain of the company?*

In the case of Schneider Electric, the first screening of the impacts with the GBS highlighted the importance of Climate change impacts as well as upstream Scope 3 impacts. Therefore, the data collection was mainly focused on these elements.

- *What are the endangered species, protected areas, critical habitat, etc. around the sites of the company?*

Schneider Electric is planning to use IBAT in addition to the GBS to gain knowledge on protected areas and endangered species around their sites (Schneider Electric and CDC Biodiversité, 2020).

3.2.2 Data collection

Data collection is probably one of the most time-consuming steps of a BFA. Collecting the best and most relevant available data requires the involvement of many different departments of the assessed company. Efforts should be concentrated on the pressures identified as the most material during the screening: in other words, efforts to collect data should be proportional to the expected impacts associated to them (*e.g.* 80% of efforts for the data associated to 80% of the impacts). In the case of Schneider Electrics, this step lasted around 2 months and involved the project owners and consultants, the procurement team, as well as Life Cycle Assessment experts.

- *What type of data can be collected?*

Based on the results of Step 1, the data collection focused on procurement data and climate change. For procurement data, LCA experts from Schneider Electric's teams worked together with the procurement in order to get the raw material data behind the manufactured products.

Table 21 summarises Schneider Electric's data, for each pressure on biodiversity and each Scope; as well as the materiality of the associated impact, as identified in the previous step.

(1) https://www.ibat-alliance.org/

Table 20: *Example of a fictitious* *(not related to Schneider Electric's case)* ***representation of the screening of the main sources of impacts*** *(●=least material; ●●●●●=most material)*

SCOPES	LAND USE CHANGE	DIRECT EXPLOITATION OF BIOLOGICAL RESOURCES	CLIMATE CHANGE	POLLUTION	INVASIVE ALIEN SPECIES
Scope 1	●	●	●●●	●●	
Scope 2	●	●	●●●●●	●	
Upstream Scope 3	●●●●	●●●●●	●●●●	●●●	

Table 21: *Schneider Electric's collected data* *(Schneider Electric and CDC Biodiversité 2020)*

IPBES PRESSURES	SCOPE 1	SCOPE 2	UPSTREAM SCOPE 3	DOWNSTREAM SCOPE 3
Land use change	○ Surface of the land occupied (m^2)	*Not yet assessed in the GBS*	● Tonnages of metal ores, crude oil and wood logs purchased (t) Purchases by procurement category (EUR) Electricity bought by country and technology.	*Not yet assessed in the GBS*
Direct exploitation of biological resources	○ Volumes of water consumed or withdrawn by site or by country (m^3)			
Pollution	○ *Assessed through financial data*			
Climate change	●●● GHG emissions (kg CO_2-eq)			
Invasive alien species	*Not yet assessed in the GBS*			

Caption: ○ not material ● material ●●● very material

3.2.3 Computation

The computation step is performed using a simple user interface from the R package developed by CDC Biodiversité. It is fed the data collected in the previous step, organised in standard inputs developed to facilitate the modelling process. The biodiversity impacts of the activities of the assessed company are computed: standard charts and an Excel file containing the results are generated to facilitate analysis. Figure 13 shows the user interface and an extract of the standard charts automatically generated.

In the case of Schneider Electric, the computation was conducted by the consultants and did not require a long period.

3.2.4 Analyses

This step is the quantitative and qualitative interpretation of the results. It involves the project owners, the consultants, and can require the help of some experts, especially for the qualitative analysis. In the case of Schneider Electric, it lasted about a month and a half.

A QUANTITATIVE ANALYSIS

The quantitative analysis aims at interpreting the results computed in the previous step. The questions related to this step are listed below and answered for the case of Schneider Electric.

- *What is the size of the impact of the company on various natural ecosystems and what are the impact hotspots?*

BOX 4 FOCUS – Reporting rules for GBS-based Biodiversity Footprint Assessments

Results of BFAs should be broken down by:

- **Realm – Terrestrial vs Freshwater**: reporting impacts on the two realms separately is required in order not to downplay aquatic impacts. Aquatic ecosystems cover a much smaller surface area of the Earth, meaning that an impact of 100 MSA.km^2 is a much larger share of aquatic biodiversity than it is of terrestrial biodiversity. It also means that aquatic impacts are usually quantitatively much smaller than terrestrial impacts (in MSA.km^2), while still being equally significant.
- **Accounting category – Dynamic vs Static**: in line with the BD Protocol, periodic gains/losses (dynamic impacts) and cumulated negative impacts (static impacts) should be reported separately (Endangered Wildlife Trust 2020). Besides, unlike dynamic impacts, static impacts cannot be summed up over reporting periods since they represent a stock of impacts.
- **Ecotoxicity impacts**: the ecotoxicity module in GBS 1.x versions being subject to greater uncertainties, ecotoxicity results should be reported separately and not compared directly to non-Ecotoxicity impacts.
- **Climate change impacts (optional)**: reporting Climate change impacts separately highlights impacts already tackled through the entity's climate policy and the non-climate impacts it needs to tackle through additional actions.

Figure 13: *Representation of the computation step*

The overall results of Schneider Electric's biodiversity footprint assessment are presented in the case study summary sheet. Scope 1 has a low impact in comparison to the rest of the value chain, most of the impact being generated in the downstream Scope 3, caused by the CO_2 emitted during the use phase of Schneider Electric's products. Excluding downstream impacts, 98% of the rest of the impacts are due to purchases, in upstream Scope 3 (Schneider Electric and CDC Biodiversité 2020).

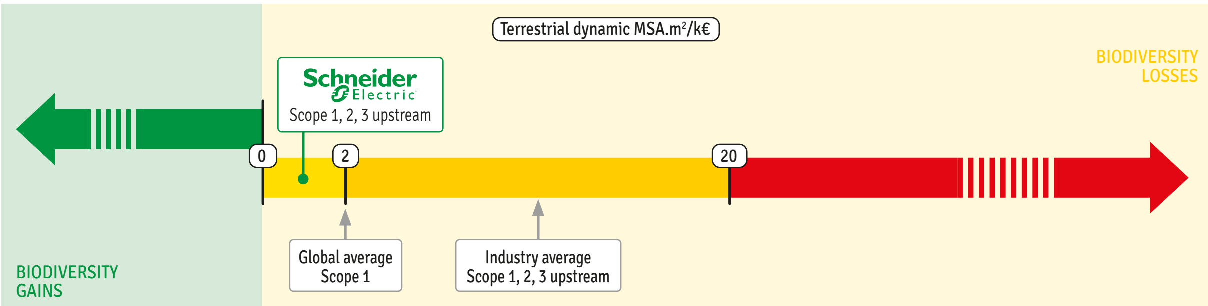
➨ *How does the company compare with others in terms of biodiversity footprint?*

Figure 14 provides an overview of Schneider Electric's performance against different benchmarks:

➨ The *Scope 1 Global average* which represents the average impact of companies globally[1].

➨ An average company of the same sector as Schneider Electric: "Manufacture of electrical machinery and apparatus n.e.c. (not elsewhere classified)" (*Industry average*) (see Box 5).

(1) It is computed by simply dividing the total annual biodiversity loss predicted by GLOBIO-IMAGE by the total monetary value of the 2011 world production reported in EXIOBASE (latest year available).



Caption: the area towards which the company should tend. intermediate performance high impact intensities, which correspond to companies causing significant harm to ecosystem integrity.

Figure 14: *2019 terrestrial dynamic performance of Schneider Electric against benchmarks* *(Schneider Electric and CDC Biodiversité 2020)*

BOX 5 FOCUS – Sectoral benchmarks

CDC Biodiversité is developing a series of 13 factsheets[2] designed for companies or investors to assess a sector's impact on biodiversity, as computed by the Global Biodiversity Score®. It is supported by an explanatory appendix. It can be used by companies to compare their impact to the sector average or to estimate their impact and main pressures on biodiversity, and by investors to screen their biodiversity impact, or to rate the performance of specific companies against sectoral benchmarks.

(2) https://www.mission-economie-biodiversite.com/actualites/fiches-benchmark-benchmark-factsheets

B QUALITATIVE ANALYSIS

The objective of this analysis is to assess to what extent the quantitative analysis covers all biodiversity impacts of the company, within the boundaries of the study, and to list limitations.

- *What are the blind spots of the study?*

Besides the GBS limitations, the data collected for the biodiversity footprint assessment of Schneider Electric also suffer from limitations. Despite the efforts of LCA experts and the procurement teams, the data were still lacking precision – especially for fabricated or recycled products. It was also not possible to know where the raw materials were coming from, so global impact factors had to be used instead of more precise country impact factors (Schneider Electric and CDC Biodiversité 2020).

BOX 6 FOCUS – Environmental Safeguards

Factors and pressures that may influence the impact of economic activities on biodiversity but are not (yet) covered by the biodiversity footprinting methodology will not show up in the footprint results. To make sure that these factors and pressures are not overlooked in the decisions taken following a footprint, the company should address these factors and pressures by means of different actions. Examples of such actions or 'environmental safeguards' are included in Table 22. Sector specific environmental safeguards can be found in each benchmark factsheet.

Table 22: ***Environmental Safeguards to implement to complete the quantitative assessment of a BFA*** *(CDC Biodiversité 2020f)*

ISSUES NOT (FULLY) COVERED BY THE GBS APPROACH	CRITERIA TO APPLY TO DIRECT OPERATIONS AND THE VALUE CHAIN (ESPECIALLY SUPPLIERS) TO ASSESS IF ACTIONS SHOULD BE TAKEN	ACTIONS ADDRESSING THE ISSUE
Location specific impact characteristics		
Water scarcity	→ If some activities in water-scarce areas	→ Establish and implement a water management system
Proximity of HCVA's (High Conservation Value Areas) / protected areas	→ If operating in or near these areas	→ Establish and implement a Biodiversity Management Plan or Biodiversity Action Plan for the entities concerned → Respect legal requirements related to the mitigation hierarchy
Presence of threatened or protected species	→ If endangered or threatened species are suspected to be locally affected by the activities → If activities must comply with the mitigation hierarchy	
Impact on soil fertility/soil quality		
Impacts on soil fertility/soil quality	→ If activities impact soil fertility or quality	→ Switch to production or sourcing only from organic or low impact agriculture
Drivers of biodiversity loss		
Introduction of invasive alien species	→ If activities can introduce invasive alien species to new areas (*e.g.* through transport)	→ *Specific certification initiatives may be used/required to guarantee compliance* → Require the implementation of a management system to prevent the introduction of invasive species → Ban the use of Genetically Modified Organisms (GMOs)
Overexploitation	→ If activities are contributing to over-harvesting or over-use of living species, pushing their populations to decline	→ In case of 'high risk' sectors: companies should assess a sustainable level of exploitation → *Specific certification initiatives may be used/required to guarantee compliance* → Comply with the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) → Ban the use of IUCN Red List species
Disturbance	→ If activities are expected to significantly disturb biodiversity (*e.g.* based on an environmental impact assessment)?	→ Carry out an Environmental Impact Assessment (EIA) and implement its recommendations → If fisheries, no salting-out.

C STRATEGY & ACTION PLAN

In this last step, targets and measures are suggested to tackle biodiversity loss.

➨ *How can the company's impacts be compatible with the planetary boundaries?*

The results of the assessment have enabled Schneider Electric to make decisions and set targets: in addition to working on local biodiversity on its sites, Schneider Electric also wants to influence beyond its Scope 1 and partner with its suppliers to reduce impacts in its supply chain. The main areas for action will be, as shown by the results of the assessment, GHG emissions, wood and metal sourcing (Schneider Electric and CDC Biodiversité 2020).

BOX 7 Focus – Possible targets at business level

Figure 15 shows possible targets at business level, with different levels of ambition. These levels of ambition are not specific to Schneider Electric's assessment (and indeed were not available when it conducted its assessment in 2020), and as the other boxes of this section, aim to showcase what companies conducting BFA can refer to. As of 2021, the "best in class" have published objectives in line with the "First stage to start the journey" objectives described in Figure 15, which are already a significant step, requiring significant efforts. First movers will have to ratchet up their ambition in the future, and other companies will have to follow their lead.

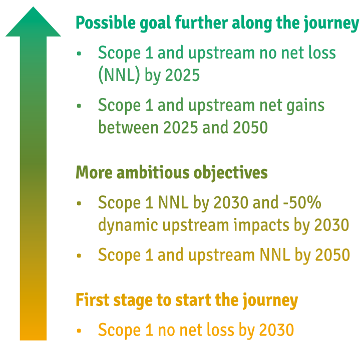


Figure 15: *Possible targets at business level*


© Siggy Nowak de Pixabay

4 FAQ

4.1 How to interpret results by data quality tier provided by the GBS?

Accurate and precise impact factors, and by extension data, have to be used to limit uncertainties in results. Accuracy refers to how close an assessed value is to the actual (true) value. Precision refers to how close the assessed values are to each other. In order to quickly estimate impact factors', and associated data's, accuracy, a tier system similar to the IPCC's tier system is used: Tier 1 being generally the least accurate and Tier 5 being the most accurate.

Data quality tiers can also be interpreted as proxies of the number of model layers involved in the measure of a biodiversity impact (Figure 16). The more model layers there are, the more model uncertainties add on top of one another, and the higher the risk of inaccuracy of the impacts measured[(1)] and, therefore, the lower the data quality tier level.

The GBS is taking into account the accuracy and the number of layers of modelling by giving the data quality tier of the data, per Scope and per realm for static and dynamic impacts. The fictitious example presented in Figure 17 shows that most of the impacts (9 500 MSA.km²) were computed based on data quality tier 1 impact factors, involving financial data as inputs. Conversely, only 800 MSA.km² were computed with fewer layers of models and a data quality tier 3 impact factor (involving pressure data, *e.g.* land occupations, as inputs) and should be more accurate[(2)]. Thus, most of the data used to calculate this footprint forced the use of multiple layers of modelling and results should be taken with caution as their accuracy is likely limited. To assess their biodiversity footprint more accurately, companies must tend to collect data associated with higher data quality tiers (in particular data on pressures, such as land occupation, etc.).

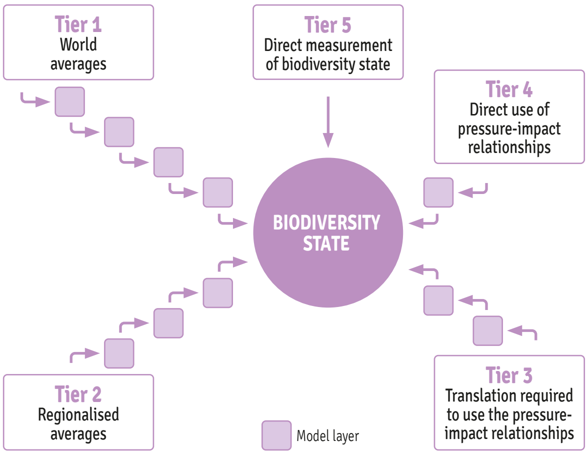


Figure 16: ***Data quality tiers and model layers***

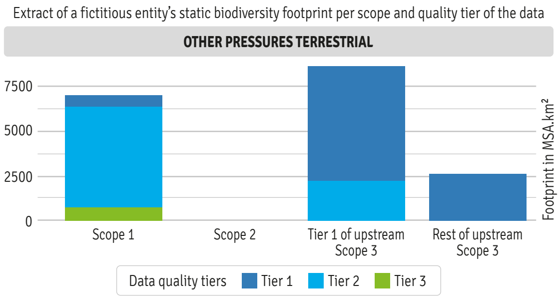


Figure 17: ***Data quality tier GBS output fictitious example***

(1) It should however be noted that even a direct measurement of biodiversity state (data quality tier 5) may be conducted with a very inaccurate protocol and may thus lead to higher inaccuracies than a measurement based on multiple models and world averages (data quality tier 1). Data quality tiers are only a guide, indicating the number of layers of modelling, but not the underlying qualities of those models.

(2) 7 900 MSA.km² were also assessed with data quality tier 2 impact factors.

4.2 Do I need a GBS licence to use the tool?

A licence is required for the use of the Global Biodiversity Score trademark, the GBS software and its data (Figure 18).

Companies and financial institutions need a licence to use the Global Biodiversity score trademark, publish results obtained with the GBS or use the software internally. If a company only wants to conduct internal test through an assessment of its biodiversity footprint conducted by an external assessor, and no results of the assessment are made public, a licence is not mandatory for the company (but still is for the external assessor).

The licence is the same for internal use and external disclosure. Businesses are advised to join the B4B+ Club, which includes a licence in its membership, as well as many other benefits (Figure 19). The licence can also be purchased as a standalone (as of 2021, EUR 1500 excluded VAT per year).

Consultants must join the B4B+ Club to access the licence extensions for commercial use (required to sell BFAs and other GBS-based services). The B4B+ Membership for consultants includes two nominative licence extensions. A licence extension is nominative and can only be used by an assessor who has successfully passed the validation test at the end of the level 2 Training.

Data providers and rating agencies require a specific licence. For more information, please contact CDC Biodiversité.

4.3 Do I need to be trained to use the GBS?

As presented in the previous paragraph, level 2 assessors are mandatory:

- For internal use (corporate and financial institutions), if the biodiversity footprint is assessed by an internal assessor and the results are published,
- For commercial use (consultants), in any case where GBS-based services are sold.

For academic use, or for internal use without results publication, level 2 assessors are not required. However, training (and in some cases technical support from CDC Biodiversité or trained consultancies) is strongly advised for any user, the GBS tool requiring non-negligible investment and knowledge to master.

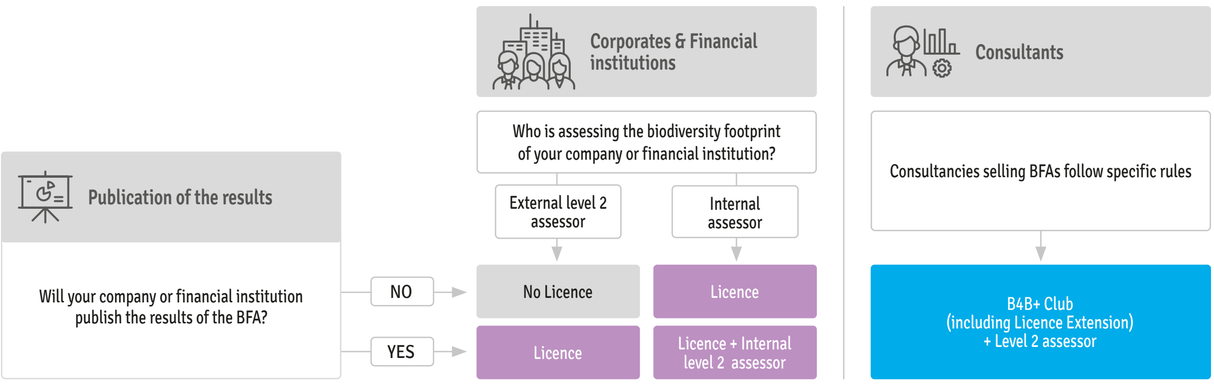


Figure 18: *Summary of the different situations requiring or not a GBS licence*

Figure 19: *B4B+ Club content*

REFERENCES

ABMB. 2019. 'Position Paper on Metrics and Midpoint Characterisation Factors'. Aligning Biodiversity Measures for Business project.

Alkemade, Rob, Mark van Oorschot, Lera Miles, Christian Nellemann, Michel Bakkenes, and Ben ten Brink. 2009. 'GLOBIO3: A Framework to Investigate Options for Reducing Global Terrestrial Biodiversity Loss'. *Ecosystems* 12 (3): 374–90. https://doi.org/10.1007/s10021-009-9229-5.

Beckmann, Jon P., Kim Murray, Renee G. Seidler, and Joel Berger. 2012. 'Human-Mediated Shifts in Animal Habitat Use: Sequential Changes in Pronghorn Use of a Natural Gas Field in Greater Yellowstone'. *Biological Conservation* 147 (1): 222–33.

Benchekroun, Mohammed, Nicolas Graves, Yasser Labchiri, and Camille Wojcik. 2020. 'What is the magnitude of biodiversity risk to the financial system ?' CDC Biodiversité, Ecole Nationale des Ponts et Chaussées.

CDC Biodiversité. 2017. 'Global Biodiversity Score: Measuring a Company's Biodiversity Footprint'. 11. Biodiv'2050 Outlook. http://www.mission-economie-biodiversite.com/downloads/biodiv2050-outlook-no-11/.

———. 2019. 'Global Biodiversity Score: A Tool to Establish and Measure Corporate and Financial Commitments for Biodiversity'. 14. Biodiv'2050 Outlook. CDC Biodiversité. http://www.mission-economie-biodiversite.com/wp-content/uploads/2019/05/N14-TRAVAUX-DU-CLUB-B4B-GBS-UK-WEB.pdf.

———. 2020a. 'GBS Review: Core Concepts'. Final version.

———. 2020b. 'GBS Review: Ecotoxicity Pressure on Biodiversity'. Final version.

———. 2020c. 'GBS Review: Freshwater Pressures on Biodiversity'. Final version.

———. 2020d. 'GBS Review: Input Output Modelling'. Final version.

———. 2020e. 'GBS Review: Oil & Gas CommoTool'. Final version.

———. 2020f. 'GBS Review: Quality Assurance'. Final version.

———. 2020g. 'GBS Review: Terrestrial Pressures on Biodiversity'. Final version.

———. 2020h. 'Measuring the Contributions of Business and Finance towards the Post-2020 Global Biodiversity Framework - 2019 Technical Update'. 15. Les Cahiers de BIODIV'2050. Paris. http://www.mission-economie-biodiversite.com/downloads/cahier-de-biodiv2050-n15-measuring-the-contributions-of-business-and-finance-towards-the-post-2020-global-biodiversity-framework/.

———. 2021a. 'Global Biodiversity Score: Factsheet-Agriculture and Agrifood'. 1.0. https://www.mission-economie-biodiversite.com/wp-content/uploads/dlm_uploads/2021/11/20211029_factsheet_Agriculture-and-Agrifood-_v1.pdf.

———. 2021b. 'Global Biodiversity Score: Sectoral Benchmarks - Technical Annex'. 1.0. https://www.mission-economie-biodiversite.com/wp-content/uploads/dlm_uploads/2021/11/20211104_benchmark-technical-annex_v1.pdf.

De Cambourg, P., C. Gardes, and V. Viard. 2019. 'Ensuring the Relevance and Reliability of Non-Financial Corporate Information: An Ambition and a Competitive Advantage for a Sustainable Europe'. Retrieved from Ministère de l'Economie et des Finances website: https://www.anc.gouv.fr/files/live/sites/anc/files/contributed/ANC/4_Qui_sommes_nous/Communique_de_presse/Report-de-Cambourg_extra-financial-informations_May2019_EN.pdf.

Díaz, S., J. Settele, E. Brondízio, H. Ngo, M. Guèze, J. Agard, A. Arneth, P. Balvanera, K. Brauman, and S. Butchart. 2019. 'Summary for Policymakers of the Global Assessment Report on Biodiversity and Ecosystem Services of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES)'. IPBES. https://ipbes.net/ga/spm.

Endangered Wildlife Trust. 2020. 'The Biological Diversity Protocol (BD Protocol)'. South Africa: National Biodiversity and Business Network.

EU Technical Expert Group on Sustainable Finance. 2020. 'Taxonomy Report: Technical Annex'. European Commission.

Greenhouse Gas Protocol. 2011. 'Corporate Value Chain (Scope 3) Accounting and Reporting Standard'. https://ghgprotocol.org/sites/default/files/standards/Corporate-Value-Chain-Accounting-Reporing-Standard_041613_2.pdf.

———. 2016 'Global Warning Potential Values'. https://ghgprotocol.org/sites/default/files/ghgp/Global-Warming-Potential-Values%20%28Feb%2016%202016%29_1.pdf.

Mielke, Erik, L. Diaz Anadon, and Venkatesh Narayanamurti. 2010. 'Water Consumption of Energy Resource Extraction, Processing, and Conversion'. *Belfer Center for Science and International Affairs.*

Ministère de la Transition Ecologique et Solidaire – Commissariat général au développement durable, Ministère de l'Economie et des Finances – Direction générale du Trésor, Autorité des marchés financiers (AMF), and Autorité de contrôle prudentiel et de résolution (ACPR). 2019. 'Bilan de l'application Des Dispositions Du Décret N°2015-1850 Du 29 Décembre 2015 Relatives Au Reporting Extra-Financier Des Investisseurs (Article 173-VI de La Loi de Transition Énergétique Pour La Croissance Verte)'. https://www.tresor.economie.gouv.fr/Articles/2019/07/02/publication-du-bilan-de-l-application-des-dispositions-du-decret-2015-1850.

Natural Capital Finance Alliance (Global Canopy, UNEP FI, and UNEP-WCMC). 2021. 'ENCORE: Exploring Natural Capital Opportunities, Risks and Exposure.' https://encore.naturalcapital.finance.

Schipper, Aafke M., Johan R. Meijer, Rob Alkemade, and Mark A. J. Huijbregts. 2016. 'The GLOBIO Model: A Technical Description of Version 3.5'. The Hague: Netherlands Environmental Agency (PBL). http://www.pbl.nl/sites/default/files/cms/publicaties/pbl_publication_2369.pdf.

Schneider Electric and CDC Biodiversité. 2020. 'Assessing Biodiversity Footprint, the Occasion to Accelerate Corporate Biodiversity Strategy'. https://www.cdc-biodiversite.fr/wp-content/uploads/2020/10/Schneider-Electric-Biodiversity-White-Paper-September-2020.pdf.

Stadler, Konstantin, Richard Wood, Tatyana Bulavskaya, Carl-Johan Södersten, Moana Simas, Sarah Schmidt, Arkaitz Usubiaga, José Acosta-Fernández, Jeroen Kuenen, and Martin Bruckner. 2018. 'EXIOBASE 3: Developing a Time Series of Detailed Environmentally Extended Multi-Regional Input-Output Tables'. Journal of Industrial Ecology 22 (3): 502–15.

Svartzman, Romain, Etienne Espagne, Julien Gauthey, Paul Hadji-Lazaro, Mathilde Salin, Thomas Allen, Joshua Berger, Julien Calas, Antoine Godin, and Antoine Vallier. 2021. 'A "Silent Spring" for the Financial System? Exploring Biodiversity-Related Financial Risks in France'.

Trainor, Anne M., Robert I. McDonald, and Joseph Fargione. 2016. 'Energy Sprawl Is the Largest Driver of Land Use Change in United States'. *PloS One* 11 (9): e0162269.

UNEP-WCMC. 2019. 'Biodiversity Indicators for Extractives, How To Guide for Phase 3 Piloting'. Version 1.4. UNEP-WCMC.

World Economic Forum and PwC. 2020. 'Nature Risk Rising: Why the Crisis Engulfing Nature Matters for Business and the Economy'. New Nature Economy Series. World Economic Forum, PwC. https://www.weforum.org/reports/nature-risk-rising-why-the-crisis-engulfing-nature-matters-for-business-and-the-economy.

APPENDIX

Table 23: ***List of commodities you can report for an assessment with the GBS***

- **Woodlogs**
- Coniferous
- Non-Coniferous
- **Metal Ores & Coal**
- Aluminum
- Copper
- Gold
- Iron
- Lead
- Nickel
- Rare Earths
- Silver
- Tin
- Zinc
- Coal
- **Oil & Gas**
- Crude oil
- Natural gas
- **Grazing**
- Grazing
- **Livestock**
- Eggs, hen, in shell
- Meat, buffalo
- Meat, cattle
- Meat, chicken
- Meat, goat
- Meat, sheep
- Meat, pig
- Milk, whole fresh buffalo
- Milk, whole fresh camel
- Milk, whole fresh cow
- Milk, whole fresh goat
- Milk, whole fresh sheep
- Other
- **Crops**
- Alfalfa for Forage and Silage
- Beets for Fodder
- Cabbage for Fodder
- Carrots for Fodder
- Clover for Forage and Silage
- Forage Products nec
- Grasses nec for Forage and Silage
- Green Oilseeds for Fodder
- Leguminous nec for forage and Silage
- Maize for Forage and Silage
- Other grasses
- Rye Grass, Forage and Silage
- Sorghum for Forage and Silage
- Swedes for Fodder
- Turnips for Fodder
- Vegetables and Roots, Fodder
- Agave fibres nes
- Almonds, with shell
- Anise, badian, fennel, coriander
- Apples
- Apricots
- Areca nuts
- Artichokes
- Asparagus
- Avocados
- Bambara beans
- Bananas
- Barley
- Bastfibres, other
- Beans, dry
- Beans, green
- Berries nes
- Blueberries
- Brazil nuts, with shell
- Broad beans, horse beans, dry
- Buckwheat
- Cabbages and other brassicas
- Canary seed
- Carobs
- Carrots and turnips
- Cashew nuts, with shell
- Cashewapple
- Cassava
- Cassava leaves
- Castor oil seed
- Cauliflowers and broccoli
- Cereals (Rice Milled Eqv)
- Cereals, nes
- Cereals,Total
- Cherries
- Cherries, sour
- Chestnut
- Chick peas
- Chicory roots
- Chillies and peppers, dry
- Chillies and peppers, green
- Cinnamon (canella)
- Citrus Fruit,Total
- Cloves
- Coarse Grain, Total
- Cocoa, beans
- Coconuts
- Coffee, green
- Coir
- Cotton lint
- Cottonseed
- Cow peas, dry
- Cranberries
- Cucumbers and gherkins
- Currants
- Dates
- Eggplants (aubergines)
- Fibre crops nes
- Fibre Crops Primary
- Figs
- Flax fibre and tow
- Fonio
- Forage products
- Fruit excl Melons,Total
- Fruit, citrus nes
- Fruit, fresh nes
- Fruit, pome nes
- Fruit, stone nes
- Fruit, tropical fresh nes
- Garlic
- Ginger
- Gooseberries
- Grain, mixed
- Grapefruit (inc. Pomelos)
- Grapes
- Groundnuts, with shell
- Gums, natural
- Hazelnuts, with shell
- Hemp tow waste
- Hempseed
- Hops
- Jojoba seed
- Jute
- Jute & Jute-like Fibres
- Kapok fibre
- Kapok fruit
- Kapokseed in shell
- Karite nuts (sheanuts)
- Kiwi fruit
- Kola nuts
- Leeks, other alliaceous vegetables
- Lemons and limes
- Lentils
- Lettuce and chicory
- Linseed
- Lupins
- Maize
- Maize, green
- Mangoes, mangosteens, guavas
- Manila fibre (abaca)
- Maté
- Melons, other (inc. cantaloupes)
- Melonseed
- Millet
- Mushrooms and truffles
- Mustard seed
- Nutmeg, mace and cardamoms
- Nuts, nes
- Oats
- Oil, palm
- Oil, palm fruit
- Oilcakes Equivalent
- Oilcrops Primary
- Oilseeds nes
- Okra
- Olives
- Onions, dry
- Onions, shallots, green
- Oranges
- Palm kernels
- Papayas
- Peaches and nectarines
- Pears
- Peas, dry
- Peas, green
- Pepper (piper spp.)
- Peppermint
- Persimmons
- Pigeon peas
- Pineapples
- Pistachios
- Plantains
- Plums and sloes
- Poppy seed
- Potatoes
- Pulses, nes
- Pulses,Total
- Pumpkins, squash and gourds
- Pyrethrum, dried
- Quinces
- Quinoa
- Ramie
- Rapeseed
- Raspberries
- Rice, paddy
- Roots and tubers, nes
- Roots and Tubers,Total
- Rubber, natural
- Rye
- Safflower seed
- Seed cotton
- Sesame seed
- Sisal
- Sorghum
- Soybeans
- Spices, nes
- Spinach
- Strawberries
- String beans
- Sugar beet
- Sugar cane
- Sugar crops, nes
- Sunflower seed
- Sweet potatoes
- Tallowtree seed
- Tangerines, mandarins, clementines, satsumas
- Taro (cocoyam)
- Tea
- Tobacco, unmanufactured
- Tomatoes
- Treenuts,Total
- Triticale
- Tung nuts
- Vanilla
- Vegetables Primary
- Vegetables&Melons, Total
- Vegetables, fresh nes
- Vegetables, leguminous nes
- Vetches
- Walnuts, with shell
- Watermelons
- Wheat
- Yams
- Yautia (cocoyam)

Table 24: ***List of countries in the GBS***

- Afghanistan
- Albania
- Algeria
- American Samoa
- Andorra
- Angola
- Anguilla
- Antarctica
- Antigua and Barbuda
- Argentina
- Armenia
- Aruba
- Australia
- Austria
- Azerbaijan
- Bahamas
- Bahrain
- Bangladesh
- Barbados
- Belarus
- Belgium
- Belize
- Benin
- Bermuda
- Bhutan
- Bolivia
- Bosnia and Herzegovina
- Botswana
- Bouvet Island
- Brazil
- British Indian Ocean Territory
- Brunei Darussalam
- Bulgaria
- Burkina Faso
- Burundi
- Cambodia
- Cameroon
- Canada
- Cape Verde
- Cayman Islands
- Central African Republic
- Chad
- Chile
- China
- Christmas Island
- Cocos (Keeling) Islands
- Colombia
- Comoros
- Congo
- Congo, the Democratic Republic of the
- Cook Islands
- Costa Rica
- Côte d'Ivoire
- Croatia
- Cuba
- Cyprus
- Czech Republic
- Denmark
- Djibouti
- Dominica
- Dominican Republic
- East Timor
- Ecuador
- Egypt
- El Salvador
- Equatorial Guinea
- Eritrea
- Estonia
- Ethiopia
- Falklands Islands (Malvinas)
- Faroe Islands
- Fiji
- Finland
- France
- French Guiana
- French Polynesia
- French Southern Territories
- Gabon
- Gambia
- Georgia
- Germany
- Ghana
- Gibraltar
- Greece
- Greenland
- Grenada
- Guadeloupe
- Guam
- Guatemala
- Guinea
- Guinea-Bissau
- Guyana
- Haiti
- Heard Island and McDonald Islands
- Holy See (Vatican City State)
- Honduras
- Hong Kong
- Hungary
- Iceland
- India
- Indonesia
- Iran, Islamic Republic of
- Iraq
- Ireland
- Israel
- Italy
- Jamaica
- Japan
- Jordan
- Kazakstan
- Kenya
- Kiribati
- Korea, Democratic People's Republic of
- Korea, Republic of
- Kuwait
- Kyrgyzstan
- Lao People's Democratic Republic
- Latvia
- Lebanon
- Lesotho
- Liberia
- Libyan Arab Jamahiriya
- Liechtenstein
- Lithuania
- Luxembourg
- Macau
- Macedonia, the former Yugoslav Republic of
- Madagascar
- Malawi
- Malaysia
- Maldives
- Mali
- Malta
- Marshall Islands
- Martinique
- Mauritania
- Mauritius
- Mayotte
- Mexico
- Micronesia, Federated States of
- Moldova, Republic of
- Monaco
- Mongolia
- Montenegro
- Montserrat
- Morocco
- Mozambique
- Myanmar
- Namibia
- Nauru
- Nepal
- Netherlands
- Netherlands Antilles
- New Caledonia
- New Zealand
- Nicaragua
- Niger
- Nigeria
- Niue
- Norfolk Island
- Northern Mariana Islands
- Norway
- Occupied Palestinian Territory
- Oman
- Pakistan
- Palau
- Panama
- Papua New Guinea
- Paraguay
- Peru
- Philippines
- Pitcairn
- Poland
- Portugal
- Puerto Rico
- Qatar
- Réunion
- Romania
- Russian Federation
- Rwanda
- Saint Helena
- Saint Kitts and Nevis
- Saint Lucia
- Saint Pierre and Miquelon
- Saint Vincent and the Grenadines
- Samoa
- San Marino
- Sao Tome and Principe
- Saudi Arabia
- Senegal
- Serbia
- Seychelles
- Sierra Leone
- Singapore
- Slovakia
- Slovenia
- Solomon Islands
- Somalia
- South Africa
- South Georgia and the South Sandwich Islands
- South Sudan
- Spain
- Sri Lanka
- Sudan
- Suriname
- Svalbard and Jan Mayen
- Swaziland
- Sweden
- Switzerland
- Syrian Arab Republic
- Taiwan, Province of China
- Tajikistan
- Tanzania, United Republic of Thailand
- Togo
- Tokelau
- Tonga
- Trinidad and Tobago
- Tunisia
- Turkey
- Turkmenistan
- Turks and Caicos Islands
- Tuvalu
- Uganda
- Ukraine
- United Arab Emirates
- United Kingdom
- United States
- United States Minor Outlying Islands
- Uruguay
- Uzbekistan
- Vanuatu
- Venezuela
- Viet Nam
- Virgin Islands, British
- Virgin Islands, U.S.
- Wallis and Futuna
- Western Sahara
- Yemen
- Zambia

What are the options to reduce the on-site and value chain-related biodiversity impacts of a business? How can financial institutions assess the physical and transition risks related to the biodiversity impacts of their activity and that of the businesses they finance? Can businesses set science-based quantitative targets to reduce their impact on biodiversity as they do for climate?

The Global Biodiversity Score (GBS) is a corporate biodiversity footprint assessment tool which seeks to answer these questions. It assesses the biodiversity impacts of economic activities across their value chain, in a robust and synthetic way. It is developed with the support of about 40 businesses and financial institutions gathered in the Business for Positive Biodiversity Club (B4B+ Club) and through collaborations with academics, NGOs and other corporate biodiversity footprint initiatives.

This 2021 update describes key concepts of the GBS and its ecosystem, provides explanatory visuals for the GBS pressures and accounting system and lists key data companies should report. It transparently describes the latest technical developments, shares the results of two more "case studies": a road test conducted by EDF and the simplified description of a full-scale assessment by Schneider Electric. It also completes the existing FAQ with more common questions about the GBS.

LA MISSION ÉCONOMIE DE LA BIODIVERSITÉ
EST FINANCÉE PAR

BANQUE des TERRITOIRES | Caisse des Dépôts GROUPE

MISSION ÉCONOMIE DE LA BIODIVERSITÉ

MISSION ÉCONOMIE
DE LA BIODIVERSITÉ

CDC BIODIVERSITÉ

102 RUE RÉAUMUR
75002 PARIS

TÉL. +33 (0)1 80 40 15 00
www.mission-economie-biodiversite.com

CDC BIODIVERSITÉ | Caisse des Dépôts GROUPE