FACTSHEET: Food and Agriculture

AIM OF THE FACTSHEET

The benchmark factsheet is designed for companies or investors to assess a sector's impacts and dependencies on biodiversity, measured using the Mean Species Abundance (MSA) metric. Companies can use the factsheet to compare their impacts and dependencies (*e.g.*, assessed with the Global Biodiversity Score (GBS) tool) to the sector average or to estimate their impacts and main pressures on biodiversity. Investors can also use it to screen their biodiversity impacts and dependencies, or rate specific companies' performance against sectoral benchmarks. Finally, factsheets will help nourish the work of major reporting frameworks by identifying low impact companies. It is supported by a reading guide and general and sectoral appendices.

The calculations were performed using GBS version 1.4.9 in October 2024.

WHAT DOES THE SECTOR INCLUDE?

The sector covers the cultivation of crops (cereals, vegetables, fruits, nuts, oil seeds, sugar crops, plant-based fibers, and others), livestock farming (cattle, pig, poultry and other livestock) along with the production of raw milk, wool, and other animal products. It also covers the processing of food products (meat, dairy products, vegetable oils, rice, sugar, fish, and others) and the manufacture of beverages, including both alcoholic and non-alcoholic drinks.

The table below shows the correspondence between EXIOBASE industry groups included in the sector and NACE rev2 CODE divisions.

KEY MESSAGES

➤ The Food and Agriculture sector has the **greatest impacts** on biodiversity, with its **Scope 1** terrestrial static impacts representing three quarters of those across all sectors. **Land use** and **climate change** are the primary impact drivers.

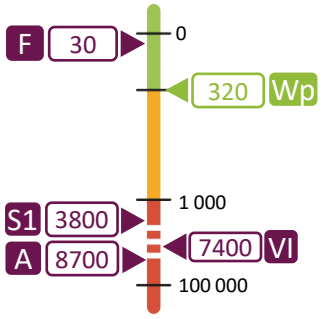
➤ Two main industry types are to distinguish within the sector: **crop and livestock husbandry**, which have significant Scope 1 impacts, and **processing & manufacturing**, which purchase crops and animal products, thus having substantial upstream Scope 3 impacts.

➤ Strategic selection of **agricultural practices** is essential for reducing the sector's impacts. Additionally, the **food industry** and **retail** sector can help shape the market by applying pressure on agricultural practices and influencing **consumer dietary choices**.

EXIOBASE INDUSTRY GROUPS	NACE rev2 CODE
Crop and animal production, hunting and related service activities [1]	A.01. Crop and animal production, hunting and related service activities
Manufacture of food products	C.10. Manufacture of food products
Manufacture of beverages	C.11. Manufacture of beverages

TERRESTRIAL STATIC PERFORMANCE OF THE SECTOR

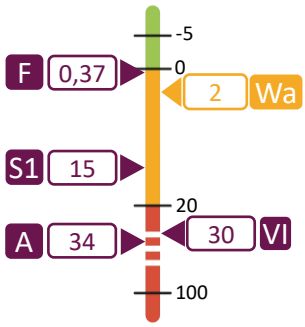
Intensity (MSA.m²/kEUR) [2]



- S1 Sectoral Scope 1 terrestrial static intensity
- VI Sectoral vertically integrated [3] terrestrial static intensity
- A Agriculture Scope 1 terrestrial static intensity
- F Food Scope 1 terrestrial static intensity
- Wp World terrestrial static intensity compatible with planetary boundaries[4]

TERRESTRIAL DYNAMIC PERFORMANCE OF THE SECTOR

Intensity (MSA.m²/kEUR)



- S1 Sectoral Scope 1 terrestrial dynamic intensity
- VI Sectoral vertically integrated [3] terrestrial dynamic intensity
- A Agriculture Scope 1 terrestrial dynamic intensity
- F Food Scope 1 terrestrial dynamic intensity
- Wa Corporate world average terrestrial dynamic intensity

CRITICAL DEPENDENCIES TO ECOSYSTEM SERVICES

Upstream Dependency score	**Scope 1** Number of dependencies
Crop and animal production	
72 % High	14
Manufacture of food products	
53 % Medium	2
Manufacture of beverages	
50 % Medium	2

BIODIVERSITY FOOTPRINT

Realm	Accounting category	Impact intensity - MSA.m²/kEUR					
		Crop and animal production		Manufacture of food products		Manufacture of beverages	
		Scope 1	Vertically integrated	Scope 1	Vertically integrated	Scope 1	Vertically integrated
Terrestrial	Static	8700	12000	32	4400	15	1300
	Dynamic	34	50	0.38	16	0.29	6.2
Aquatic[5]	Static	630	850	1.2	310	0.029	84

(1) For practical reasons, the EXIOBASE industry group "Crop and animal production, hunting and related service activities" is designed as "Crop and animal production" in this factsheet

(2) Impact intensities (MSA.m²/kEUR) obtained by dividing the absolute impacts of the sector (MSA.m²) by its total turnover, enabling comparisons between sectors, industries or industry groups for the same amount of turnover. Further details available in the general appendix.

(3) The vertically integrated results refer to the sum of Scope 1, 2 and upstream Scope 3 impacts.

(4) World terrestrial static intensity compatible with planetary boundaries $= \frac{terrestrial\ static\ impact\ compatible\ with\ planetary\ boundary}{global\ turnover} = \frac{28\%MSA * total\ emerged\ land\ surface}{global\ turnover}$

(5) Critical dependency score evaluates the proportion of an activity or value chain which is critically dependent on at least one ecosystem service, *i.e.* the ecosystem service is non-substitutable. Methodology and details are available in the general appendix and reading guide.

(6) The aquatic dynamic results have a high uncertainty and are therefore not presented here. However, the data is available in the general appendix.

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KEY ISSUES OF THE SECTOR

ECOSYSTEM SERVICES DEPENDENCIES OF THE SECTOR

The dependencies of the sector are calculated using the GBS, based on data from the ENCORE model, developed to provide knowledge on sectors' dependency on 21 ecosystem services (UNEP 2024). Details about the methodology and graphs displaying the output of the dependencies are provided in the general appendix.

The Food and Agriculture sector is **intrinsically dependent** on biodiversity and the **ecosystem services** it provides, such as pollination and water resources. Indeed, about one third of our food products derives from animal-pollinated, mostly bee-pollinated, crops (Aizen et al. 2009). Biodiversity supports the **stability** of agricultural production and enhances the **resilience** of the system to shocks and stresses, including those caused by climate change, while fostering genetic diversity.

Although the food-processing sector's direct operations exhibit limited reliance on ecosystem services, it remains deeply connected to the agricultural sector within its supply chain. Consequently, the upstream **critical dependencies** of the sector's three industry groups are notably high (see page 1), indicating that their value chain is contingent on at least one type of ecosystem service.

HOW DOES THE SECTOR CONTRIBUTE TO BIODIVERSITY LOSS?

The sector's impacts on biodiversity is significant, with **Scope 1 activities** accounting for nearly three quarters of terrestrial static impacts, measured in MSA.km². This is primarily due to agricultural activities supporting the sector's operations, as crop and animal production is the main upstream component of the food value chain. The sector strongly impacts biodiversity through **spatial pressures** and particularly land use. Notably, over one third of the terrestrial land surface and nearly three quarters of the available freshwater resources are devoted to crop and livestock production (IPBES 2019). Also, about 25% of global **greenhouse gas** (GHG) emissions stem from land clearing, crop production, and fertilization (IPBES 2019), highlighting the sector's significant contribution to climate change through each of its scopes.

These negative impacts on biodiversity can be intensified by factors such as **international markets, demographic changes, urbanization, trade** and **consumer preferences**. Overexploitation, pollution and other drivers of these impacts are at least partially due to **unsustainable agricultural practices** (FAO 2019).

Further details on the sector's impact on biodiversity are provided in the sectoral appendix.

OPPORTUNITIES OF THE SECTOR

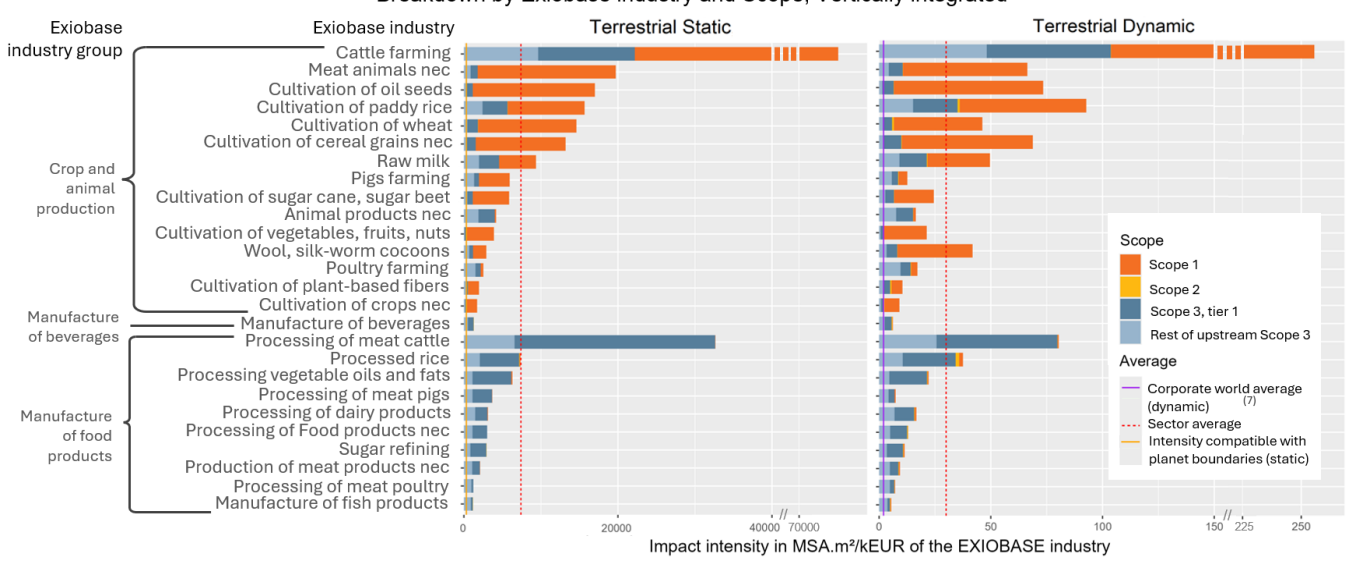
The agricultural sector encompasses a range of production systems with varying impacts on biodiversity. This diversity is evident in aspects such as different breeds or varieties, extensive or intensive practices, and methods like conventional, organic, regenerative agriculture, as well as agroecology and agroforestry, among others. **Strategic selection and combination** of these practices can serve as effective levers to reduce the biodiversity footprint.

The diversity of production systems presents an opportunity for Food industries, positioned downstream in agriculture's value chain, to source raw materials with lower impacts on biodiversity, and enhancing the resources traceability. Industries could, for instance, shift towards more sustainable practices, such as **plant-based product formulations.** More broadly, one-third of global food production intended for human consumption never reaches consumers (FAO 2015). Therefore, **reducing waste** throughout the entire value chain is an essential strategy.

Consumer demand drives sustainability and significantly impacts the Food sector. Indeed, it enables sustainability-focused brands to achieve five times the revenue growth of less sustainable brands (Bain & Company 2023) .

SCOPE AND INDUSTRY BREAKDOWN

Here is presented the breakdown of the terrestrial static and dynamic impacts by Scope and EXIOBASE industry. The results are in MSA.m²/kEUR (i.e., for each EXIOBASE industry, the impacts are divided by the turnover of the corresponding industry, allowing the industries to position themselves compared to one another).



Source: GBS 1.4.9 computation, Oct 2024, Blanche Houot

The sector shows significant impact intensities in both **Scope 1** and **upstream Scope 3**, with two distinct patterns emerging among its industries: "Crop and animal production" industries exhibit most of their impacts in Scope 1, whereas food and beverage manufacturing industries show most of their impact intensities in Upstream Scope 3. These results are consistent with the structure of the Food and Agriculture value chain, where food manufacturing activities rely on agricultural raw materials, making their upstream Scope 3 impacts corresponding to the Scope 1 impacts of the "Crop and animal production". The high Scope 1 terrestrial static and dynamic impact intensities in the "Crop and animal production" industry are due to the extensive **land use** for crop cultivation and livestock husbandry, and particularly for **pasture** as it accounts for more than two-thirds of all agricultural land (Ritchie and Roser 2024).

Impact intensities vary widely within industry groups. The "**cattle farming**" industry has notably higher terrestrial impacts compared to others within its group, due to large surfaces needed for grazing (Scope 1) and animal feed (upstream Scope 3). Beef is among the most resource and emissions-intensive foods globally, requiring seven times more land and producing seven times more greenhouse gas emissions than chicken, and 20 times more than beans, per gram of protein (Waite and Zionts 2022). As this is the primary Upstream Scope 3 contributor to the "processing of meat cattle" industry, this industry results in the highest impact intensity within the manufacturing sector. A detailed analyse of the variety of impact intensities is available in the sectoral appendix.

The ranking between industries is slightly different between the dynamic and static results, with some industries having a relatively greater impact than others in the dynamic results. This is particularly the case for the "cultivation of paddy rice" and "wool, silk-worm cocoon" industries, due to the high GHG emissions, and more specifically methane emissions, from their direct activities.

On a broader scale, the whole sector's terrestrial static impact intensities are far above **the limit compatible with planetary boundaries**, and its terrestrial dynamic impact intensities exceed the **corporate world average**, with 7 400 MSA.m²/kEUR for terrestrial static impacts and 30 MSA.m²/kEUR for terrestrial dynamic impacts (see page 1).

(7) The sector average is the average weighted by the part of each industry in the total sector's turnover.

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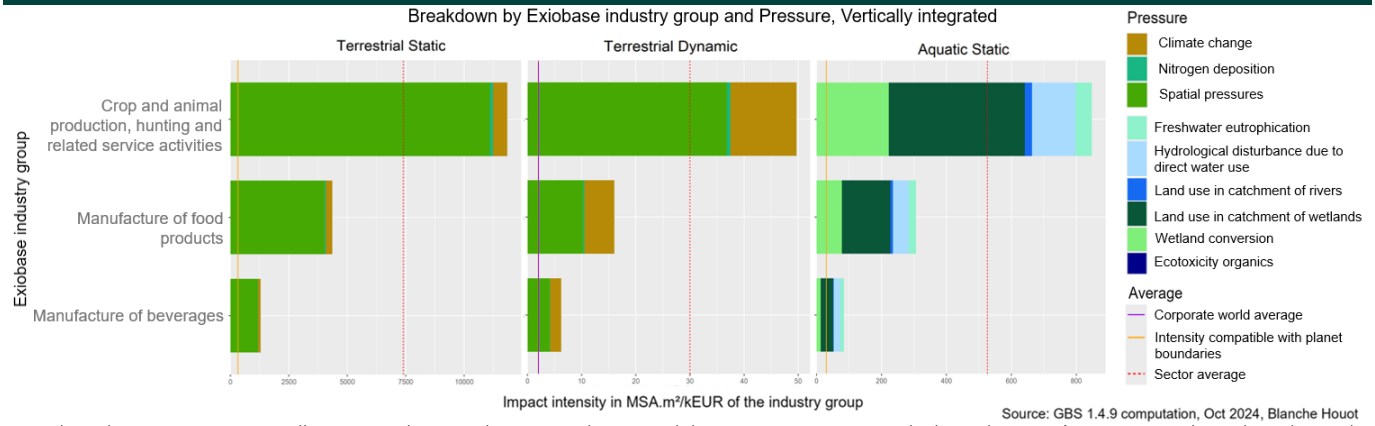
IMPACT DRIVERS BREAKDOWN



Source: GBS 1.4.9 computation, Oct 2024, Blanche Houot

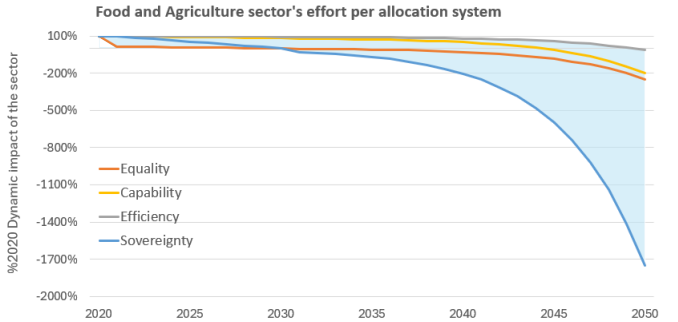
As explained in page 2, in a vertically integrated approach, terrestrial static and dynamic impacts are mainly driven by **spatial pressures**, with Land Use being the most significant due to crop production and grazing, followed by Encroachment and Fragmentation. **Climate Change** is the next most significant pressure on terrestrial biodiversity for this sector and represents a significant part of its terrestrial dynamic impacts. This is due to GHG emissions, which can occur at every step of the value chain, mainly through CO2 and methane emissions. When assessing the direct impacts of manufacturing industry groups (i.e., their Scope 1 impacts), Climate Change even stands out as the most significant pressure on biodiversity. For instance, Climate Change accounts for 92% of the terrestrial dynamic Scope 1 impacts within the food manufacturing industry group. This is mainly due to fossil fuels consumption for vehicles and machinery and fugitive emissions from refrigeration (Persefoni 2024).

Crop and animal production activities also exert significant pressures on aquatic ecosystems, particularly wetlands. Agricultural practices **in catchment of wetlands** can lead to pollution from runoff, degrading water quality. Additionally, the direct **wetland conversion** into agricultural land has led to significant impacts upon aquatic ecosystems through actions such as drainage and fertilizer application (FAO 2008).

TRAJECTORIES TO ACHIEVE THE INTERNATIONAL TARGETS

The Kunming-Montreal Global Biodiversity Framework (GBF) aims to reach at least a global no net loss of biodiversity in 2030 (interpreted as a global dynamic impact of 0 in 2030) and restore biodiversity between 2030 and 2050. CDC Biodiversité suggests interpreting the GBF using global MSA trajectories and distributing required efforts across economic sectors and companies. Four allocation systems encapsulate different ethical points of view that the society could consider when asking companies to contribute to biodiversity gains. This methodology focuses on the Scope 1 of each sector.

ALLOCATION	APPROACH	DATA USED	SECTOR'S FIGURES
Equality	Everyone has the same right	Number of employees in the sectors (Eurostat 2018)	**6.1 %** of the total global workforce
Efficiency	Cost-effectiveness	Restoration cost (EUR/[MSA.m²])	**10** EUR/[MSA.m²] (vs 5.5 for the global average[12])
Capability	Industries' ability to pay	Turnover (MEUR) (EXIOBASE 2011)	**6.8 %** of the total global turnover
Sovereignty	Grandfathering[13]	2020 dynamic impacts (MSA.km²/year)	**42 %** of the total global 2020 dynamic impacts



Due to its particularly high Scope 1 dynamic impacts and the upstream position of the agricultural industries in the economic value chain, the Food and Agriculture sector has the most significant dynamic impacts on biodiversity, making sovereignty allocation very demanding. In contrast, the efficiency allocation requires minimal effort as the restoration cost is considerably high for the sector. The equality and capability allocation entail moderated efforts due to the sector's low number of employees and turnover compared to other sectors. Thus, the blue area covers the wideness of the possible paths companies of the Food and Agriculture sector could have to follow to reach nature positive targets.

POSSIBLE ACTIONS TO REDUCE THE IMPACTS ON BIODIVERSITY

Whole value chain	• Energy: use **renewable electricity ,** increase **energy efficiency** by upgrading and maintaining equipment, and produce and utilize **biogas** through the methanisation of food waste, animal manure, agricultural residues (Guidehouse Europe 2024, WRI 2018) • Establish **transparent and deforestation-free supply chains** (Food and Land Use Coalition, 2019)
Crop and animal production	• Minimize **food waste** by repurposing food by-products for animal feed or compost to ensure circular resource use (FAO 2019) • Integrate **pest management** through a combination of natural predators, mechanical and chemical methods (FAO 2025) • Promote **low-input farming systems** by incorporating organic amendments, crop rotations or cover crops • Enhance **landscape structure** by designing crop mosaics and establishing wildlife corridors like hedgerow and buffer strips (Pantera et al. 2021) • Adopt **agroforestry** practices by implementing alley cropping, windbreaks and silvopastoral systems • Optimize **animal feed** by using additives to reduce nitrogen excretion or methane emissions • Develop **agroecological practices** through regenerative agriculture techniques such as no-till farming and polycultures (Houšková et al. 2021)
Manufacturing industries	• Adopt **energy-efficient** processes, such as cold pasteurization and optimized heat exchangers in food processing plants
End of life / consumption	• Implement **industrial composting** and repurpose **agricultural waste** by using it for bioproducts • Improve the **recyclability and degradability** of packaging materials • Support consumers in choosing **sustainable diets**, while shaping demand through **new product formulations** • Adopt a **lower impact**, mainly **plant-based diet** to reduce the consumption of agricultural commodities (WRI 2018) • Favour **local and seasonal products**

(12) The global average weighted by the turnover of each benchmark sector

(13) The grandfathering approach means that the obligations of industries (or companies) are based on their historic impacts, here their 2020 biodiversity dynamic impact.

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ENVIRONMENTAL SAFEGUARDS

Some impacts and pressures are not covered by the figures displayed in this benchmark factsheet (partly due to limitations in the Global Biodiversity Score tool used to obtain them). The general appendix provides a more detailed description of the uncertainties and limitations of the results. They should not be ignored when defining the biodiversity action plan.

- **Avoid locating activities on or near sites of high environmental value** or establish a specific management plan (*e.g.* avoid encroachment on protected areas for livestock or crop production (in Brazil, Congo, etc.)).
- Make sure that farmers do not have harmful practices such as **deforestation,** as recommended by the EU Deforestation regulation[14].
- Implement measures to detect and eradicate the **spread of invasive species.**
- Conduct a **systematic review** to identify priority ecosystem services, meaning those on which project operations are most likely to have an impact and those on which the project is directly dependent (*e.g.*, water) (IFC 2012).

Moreover, of the three components of biodiversity, the GBS only focuses on the ecosystem diversity, and does not cover species or genetic diversity. See the GBS review report "Quality assurance" for the full list of environmental safeguards to implement (CDC Biodiversité 2020; IFC 2012).

The Science Based Targets Network (SBTN) has developed **Science-Based Targets for Nature** to help companies identify, address, and minimize their environmental impacts. Guidance has already been developed for setting Freshwater and Land targets.
The SBTN target-setting framework consists of five steps: Assess, Prioritize, Set targets, Act and Track.

The **Farm to Fork Strategy** is a core concept of the **European Green Deal**, aiming to make food systems fair, healthy and environmentally-friendly, notably by reversing the loss of biodiversity.

The 2030 targets of the Farm to Fork Strategy are :

- **Reducing the use and risk of chemical pesticides** by 50% and the use of more hazardous pesticides by 50%.
- **Reducing nutrient losses** by at least 50% while maintaining soil fertility, leading to a minimum 20 % decrease in fertilizer use.
- **Reducing the sales of antimicrobials** for farmed animals by 50%.
- **Expanding organic farming** to cover 25% of agricultural land.

More details and extracts from the SBTN Guidance and the Farm to Fork Strategy are presented in the sectoral appendix. Please note that the EU taxonomy is not detailed in this factsheet as it does not cover the Food and Agriculture sector.

BIODIVERSITY FOOTPRINT ASSESSMENT

GENERAL OBJECTIVES OF A GBS-BASED ASSESSMENT

The factsheet helps companies of each sector to understand their most material impacts and dependencies. However, a Biodiversity Footprint Assessment is more company-specific and allows to calculate the companies' impacts and dependencies on biodiversity. Indeed, a GBS-based assessment uses companies' data (emissions, land occupation or other pressures, raw materials and products purchased and produced by the companies) to calculate biodiversity impacts.

Thus, a GBS-based Biodiversity Footprint Assessment allows to:

- **Quantitatively assess the biodiversity footprint** generated by the activity of the company or by its investment portfolio and to **assess the contribution of the company to global biodiversity erosion**;
- Understand which impact drivers on biodiversity the company contributes to and which ecosystem services it is dependent on;
- Provide elements for a **short-term** and a **mid-term action plan to reduce the footprint** on biodiversity and alleviate the contribution of the company to biodiversity erosion;
- **Comply with mandatory biodiversity footprint disclosure** in France, in the European Union (action 30 of the French National Biodiversity Plan, CSDR), and in the world (Global Biodiversity Framework), as well as voluntary reporting frameworks such as the one set by the Taskforce on Nature-related Financial Disclosure (TNFD).

Limitations: The assessment does not consider some pollution impact drivers nor the existence and impacts of invasive species, the impacts on genetic and marine biodiversity.

HOW TO LEAD A BIODIVERSITY FOOTPRINT ASSESSMENT BASED ON THE GLOBAL BIODIVERSITY SCORE?

A GBS-based assessment can be led by **various organisms**:

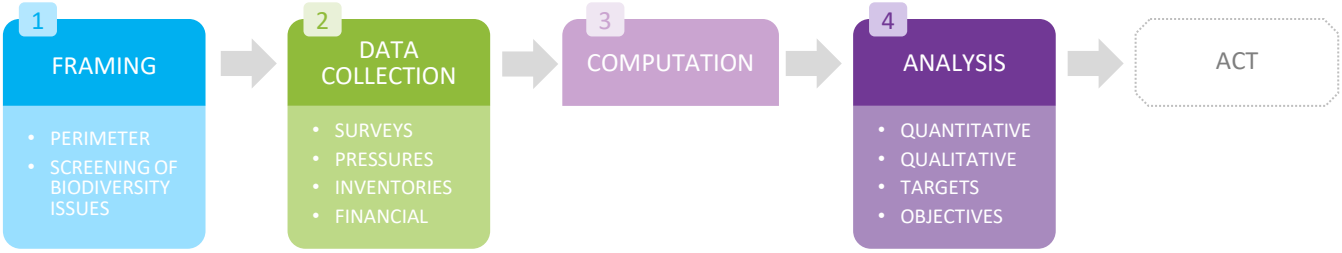
- The company itself, after being trained to use the GBS;
- CDC Biodiversité or external GBS-trained assessors, instructed by the company.

A biodiversity footprint assessment follows **4 main steps**, as shown below:

- The **framing** step validates the Scope of the assessment, particularly in terms of **Scopes and assessed pressures**.
- During the **data collection** step, the **methodological choices** are validated: assumptions applied, proxies used, possible limits identified
- The **computation** uses the refined analysis and the pressure-impact relationships of the GBS tool to compute impacts.
- The **analysis** step explains the results obtained with the GBS by **identifying major impacts** as well as the **main sources of these impacts**. It is also an opportunity to identify objectives and **impact reduction actions, aligned with international recommendations**.

The **relevance** of the assessment depends on:

- The inclusion of direct operations and value chain impacts
- The consistency and transparency of the data and methodology used
- The appropriate quality assurance and complete disclosure of the results



Food and Agriculture factsheet version 2, November 2025. GBS computations: GBS 1.4.9, December 2024, Blanche Houot.
The sources are referenced in the bibliography section of the "Food and Agriculture" sectoral appendix.

More information
About the GBS: GBS Presentation
About the factsheets: CDC Biodiversité | Documentation GBS | Etudes sectorielles
Measuring the contributions of business and finance towards the post-2020 global biodiversity framework (CDC Biodiversité, 2020)
Establishing an ecosystem of stakeholders to measure the biodiversity performance of human activities (CDC Biodiversité, 2021)
Accounting for positive and negative impacts throughout the value chain (CDC Biodiversité, 2023)

(14) The European parliament adopted a text which "obliges companies to ensure products sold in the EU have not [recently] led to deforestation and forest degradation." Source: European Parliament, POSITION OF THE EUROPEAN PARLIAMENT on Deforestation regulation, 2023.