FACTSHEET: RAW MATERIALS EXTRACTION

Version 1 (March 2023)

AIM OF THE FACTSHEET

The benchmark factsheet is designed for companies or investors to assess a sector's impact on biodiversity. Companies can use the factsheet to compare their impacts (*e.g.*, assessed with the Global Biodiversity Score tool) to the sector average or to estimate their impacts and main pressures on biodiversity. Also, investors can use it to screen their biodiversity impacts, or rate specific companies' performance against sectoral benchmarks. Finally, factsheets will help nourish the work of the EU Taxonomy by identifying low impact companies. It is supported by a technical annex and a reading guide.

WHAT DOES THE SECTOR INCLUDE?

The Raw materials extraction sector covers:

- forestry management and logging;
- oil and gas extraction;
- mining of coal, lignite and peat;
- mining of metals including iron, copper, nickel, aluminium, precious metals, zinc, lead and tin, thorium and uranium;
- quarrying of stone, sand, clay and salt, and chemical minerals and fertilizers(1).

EXIOBASE INDUSTRY GROUP	NACE rev2 CODE
Forestry and logging; Extraction of crude petroleum and natural gas; Mining of coal and lignite; Mining of metal ores; Other mining and quarrying	A.02 Forestry and logging B – Mining and quarrying

KEY MESSAGES

➤ The forestry sector accounts for a significant proportion of the impacts of the Raw materials extraction sector, mainly because of the high Land Use pressure it generates.

➤ The Raw materials extraction sector is one of the most impactful sector and far ahead of what is set by planetary boundaries although the impacts of mining and oil and gas may seem minor compared to timber.

➤ A significant part of the terrestrial dynamic impact of the mining is related to climate change because of energy-intensive processes.

➤ Most of the impacts fall under Scope 1 because the extraction process is located at the beginning of the other economic sectors' value chain and therefore does not have a long upstream supply chain.

KEY FIGURES(2)(3)

ECOSYSTEM SERVICES DEPENDENCIES Scope 1

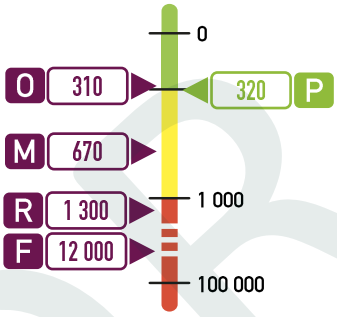
Forestry
42%

Oil and gas
14%

Mining
18%

TERRESTRIAL STATIC PERFORMANCE OF THE SECTOR(3)

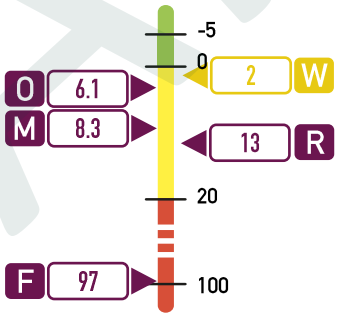
Intensity (MSA.m²/kEUR)



- R: Raw materials extraction sector Scope 1 terrestrial static intensity
- F: Forestry Scope 1 terrestrial static intensity
- O: Oil & Gas Scope 1 terrestrial static intensity
- M: Mining Scope 1 terrestrial static intensity
- P: World terrestrial static intensity compatible with planetary boundaries (4)

TERRESTRIAL DYNAMIC PERFORMANCE OF THE SECTOR(3)

Intensity (MSA.m²/kEUR)



- R: Raw materials extraction sector Scope 1 terrestrial dynamic intensity
- F: Forestry Scope 1 terrestrial dynamic intensity
- O: Oil & Gas Scope 1 terrestrial dynamic intensity
- M: Mining Scope 1 terrestrial dynamic intensity
- W: Corporate world average terrestrial dynamic intensity

STATIC AGGREGATED SCORE Scope 1

Forestry
150 000
MSAppb/bEUR

Oil and gas
2 400
MSAppb/bEUR

Mining
6 300
MSAppb/bEUR

BIODIVERSITY FOOTPRINT(2)

Realm	Accounting category	Impact intensity – MSA.m²/kEUR					
		Forestry		Oil & Gas		Mining	
		Scope 1	Vertically integrated(5)	Scope 1	Vertically integrated(5)	Scope 1	Vertically integrated(5)
Terrestrial	Static	12 000	15 000	310	480	670	1 100
	Dynamic	97	120	6.1	8.1	8.3	13
Aquatic(6)	Static	570	710	58	710	13	32

(1) The impacts of quarrying of clay, salt, chemical and fertilizer minerals are quite underestimated by the GBS
(2) The results are broken down into three main categories: those related to logging, those related to oil and gas extraction and those related to all other mining and quarrying
(3) For ease of reading, only Scope 1 is presented. The other impacts are detailed in the table below and in the technical annex. Note that static results include the impacts related to the Climate change pressure.
(4) The terrestrial static intensity compatible with planetary boundaries is equal to 28%MSA * total emerged land surface
(5) The vertically integrated results refer to the sum of Scope 1, 2 and upstream Scope 3 impacts.
(6) The aquatic dynamic results have a high uncertainty and are therefore not presented here. However, the data is available in the technical annex.

KEY ISSUES OF THE SECTOR

ECOSYSTEM SERVICES DEPENDENCIES OF THE SECTOR

The direct dependencies of the sector are calculated by the ENCORE model, a tool developed to provide knowledge on sectors' dependency on various ecosystem services. Details about the methodology and the graphs displaying the output of all the dependencies are provided in the technical annex.

The dependencies figures displayed in the left boxes of the "Key figures" section are an aggregated score over all ecosystem services for Scope 1: 42 % for the forestry sector, 14 % for the oil and gas extraction sector and 18 % for the mining sector.

The highest Scope 1 dependencies of the sector are **water-related ecosystem services**(1).Water plays indeed an important role in the oil, gas and mineral extraction processes, as well as in forest areas where water absorption by trees is an integral part of the water cycle.

The forestry category has the highest dependency score but **forests also deliver a large number of ecosystem services** by providing timber or wood biomass, absorbing carbon, regulating water flows and ensuring soil quality.

HOW DOES THE SECTOR CONTRIBUTE TO CHANGES IN THE STATE OF NATURAL CAPITAL?

Forests play a key role in the overall balance of the Earth system and provide ecosystem services that are essential to the human population, hosting some of the richest biodiversity on the planet. Wood production is not only responsible for the **loss of a large part of biodiversity**, mainly through **spatial pressures**, but also causes the depletion of carbon sinks and contributes to the increase of greenhouse gases in the atmosphere.

Global warming caused by the combustion of oil and gas is the most known contribution of these commodities to biodiversity loss. However, oil and gas also generate **direct pressures on biodiversity through exploration processes** that cause landscape fragmentation, habitat conversion and noise pollution.

Finally, mining causes **direct impacts notably through the site-specific land use**, but is also responsible for indirect impacts due to the release of pollutants, the construction of infrastructure (*e.g.,* to allow the transport of extracted materials), water consumption, noise... In addition, accidents involving the release of hazardous materials can occur and cause significant negative effects on the environment.

RISKS AND OPPORTUNITIES

Raw material demand is projected to at least double by 2060 compared to 2011 (OECD 2019), meaning that the **impacts associated with raw material extraction are expected to increase globally**. Projections broken down by raw material category up to 2060 are provided in the technical annex.

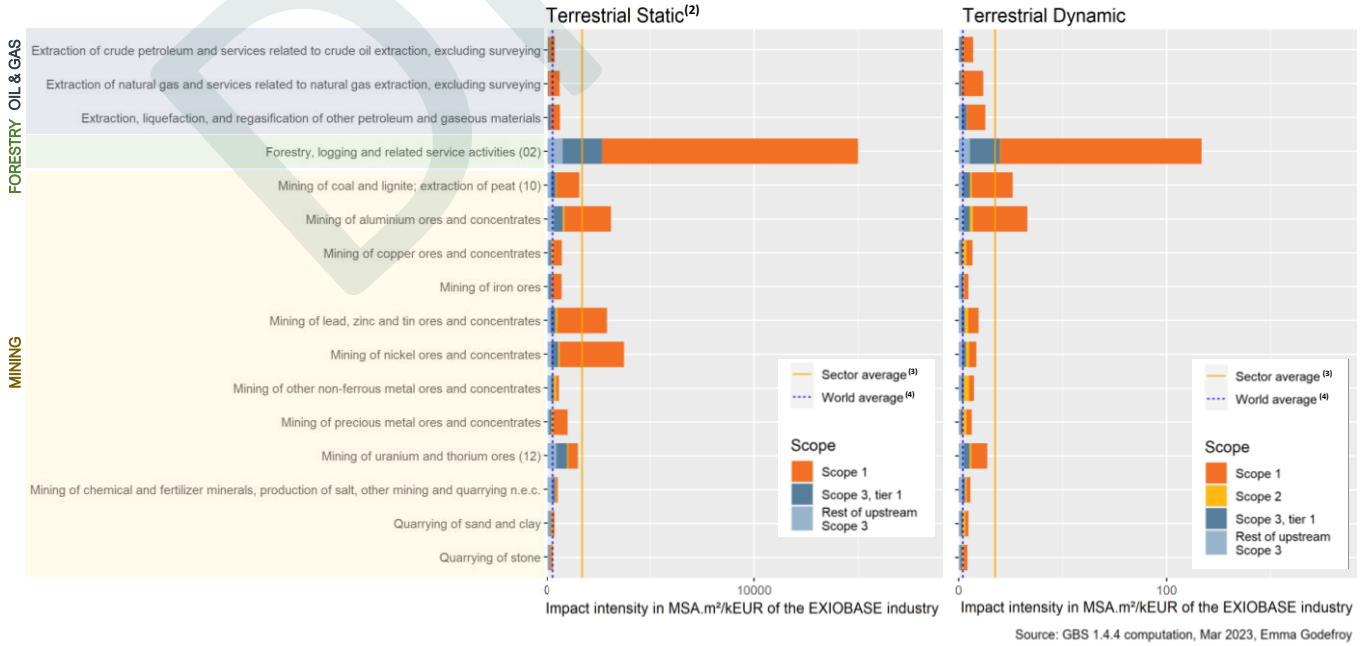
Climate considerations are also pushing all economic sectors to develop on a more sustainable baseline tied to low-carbon energy. This global energy transition to fight climate change will create new markets for mined materials (used for electricity transmission and storage, electric vehicles and renewable energy infrastructure), thus putting pressure on the mining sector. The transition to climate neutrality could replace the current dependency on fossil fuels with one on raw materials. **Ensuring a sustainable supply of raw materials** will require rethinking how resources are consumed, becoming more circular, and ensuring that new extraction and mining activities are designed to reduce their impact on biodiversity.

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 industry the impact is divided by the turnover of the corresponding industry, allowing the industries to position themselves related to one another.

For all industries, most of both **static and dynamic impacts occurs within the Scope 1** since the Raw materials extraction sector comes upstream of most economic sectors such as energy production, processing or manufacturing. The impact of the EXIOBASE industry "Forestry, logging and related service activities" is the most significant and is mostly due to land use.

Scope 2 impacts account for a significant share of the impacts for the Mining category compared to the other ones, particularly as **metal extraction is energy-intensive** (through mining equipment but also crushing and grinding processes). Those impacts are mainly related to the Climate Change pressure.



Source: GBS 1.4.4 computation, Mar 2023, Emma Godefroy

(1) Water related services are "Surface water", "Ground water" and "Water flow maintenance".
(2) Note that the terrestrial static results include impacts related to the Climate change pressure.
(3) Sector average is an average of the Scope 1 impacts of all EXIOBASE industries of the benchmark sector weighted by the turnover of each industry.
(4) World average is an overall average of the Scope 1 impacts of all EXIOBASE industries for all regions of the world weighted by the turnover of each industry / region couple.

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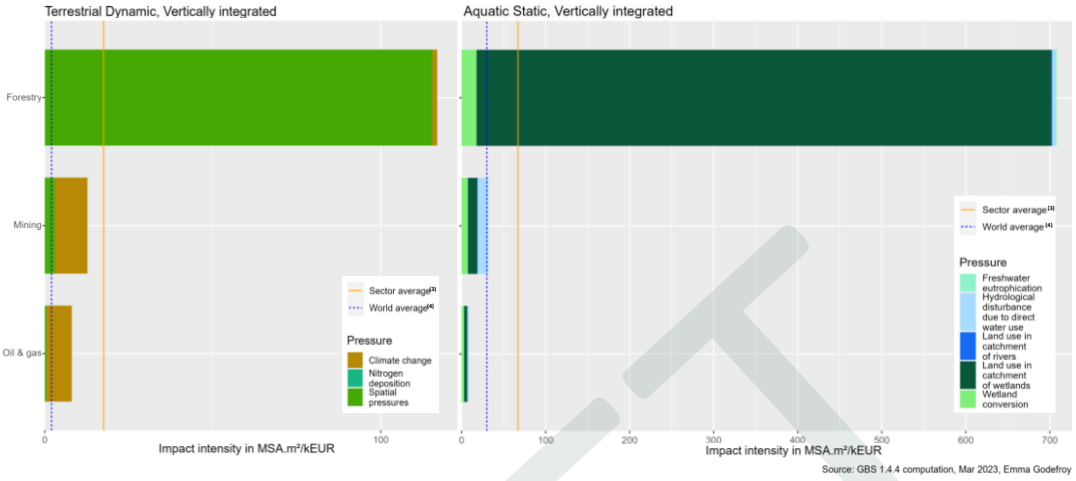
IMPACT DRIVERS BREAKDOWN

The impacts of the Forestry category are significant, but the nature of the sector is quite different from that of other raw materials, mainly because of the larger areas used.

The dynamic impacts of the Forestry category are mainly related to spatial pressures while the impact of the other sectors are primarily due to the Climate change pressure (1).

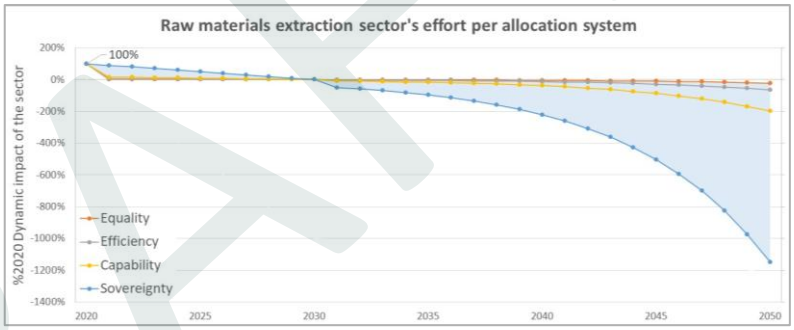
The aquatic impacts are mostly due to pollution (*via* Land use in catchment of wetlands) and land use (*via* Wetland conversion). The pressure Hydrological disturbance due to direct water use is significant only for the Mining category (2).



SCIENCE BASED TARGETS FOR BIODIVERSITY AND PROPOSED TRAJECTORIES

The global post-2020 biodiversity framework aims to reach at least a global no net loss of biodiversity in 2030 and restore biodiversity between 2030 and 2050. This is interpreted as a global dynamic impact of 0 in 2030 and a return to the "one of functional integrity of the Earth system" by 2050. The amount of efforts is to be allocated to economic sectors and companies. Different allocation approaches described in the table below can be used to share efforts and lead to different sectoral trajectories.

ALLOCATION	APPROACH	DATA USED
Equality	Everyone has the same right	Number of employees in the sectors (2010)
Efficiency	Cost-effectiveness	Restoration cost (EUR/[MSA.m²])
Capability	Industries' ability to pay	Turnover (MEUR) (2011)
Sovereignty	Grandfathering	2020 dynamic impact (MSA.km²/year)



The sector has the highest effort to achieve in the sovereignty allocation as the sector represents 19 % of the 2020 global dynamic impact. But due to one of the highest restoration costs in comparison to other sectors and a limited number of employees, the effort for equality and efficiency allocations are low. However, these approaches treat the sectors independently of each other, which makes these allocation modes not realistic. For example, some raw materials will be crucial for the ecological transition, which could tend to increase the impacts of the sector. The technical annex presents a complementary methodology for estimating the impacts by 2050 for a baseline and a sustainable scenarios.

POSSIBLE ACTIONS TO REDUCE THE IMPACT ON BIODIVERSITY

	Forestry	Oil and gas	Mining
SCOPE 1	Implement sustainable forest management practices with demonstrated effects on biodiversity *e.g.,* through reduced-impact logging (certifications not demonstrably leading to biodiversity gain – see technical annex) Establish stream buffer zones and watershed protection areas in production forests.	Carry out integrated environmental and social impact assessment process for any new development project. Evaluate alternate locations, routes and technical solution when developing projects in areas with high biodiversity values.	Reduce the extraction of primary resources by using recycled waste as secondary raw materials. Promote lower-impact mining techniques that cause lower soil erosion and move less material that would need backfilled.
SCOPE 2	Promote renewable electricity with demonstrated low-impacts on biodiversity. Develop efficient technologies that reduce energy losses.		
UPSTREAM SCOPE 3	Support and invest in reforestation, afforestation wider land restoration and conservation efforts.	Take action to mitigate or, where appropriate, offset any unavoidable impacts.	Restore and rehabilitate quarries or industrial sites as perennial natural areas. Reduce areas affected by mining activities by adapting traffic and storage areas.

(1) Note that the impact related to the destruction of carbon sinks is not taken into account in the results presented here.
(2) More information available in the technical annex.
(3) Sector average is an average of the Scope 1 impacts of all EXIOBASE industries of the benchmark sector weighted by the turnover of each industry.
(4) World average is an overall average of the Scope 1 impacts of all EXIOBASE industries for all regions of the world weighted by the turnover of each industry / region couple.

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 technical annex 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. For instance, avoid deforestation and encroachment on protected areas.
- **Restore habitats** during operations and/or after operations (IFC 2012).
- 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 **EU Taxonomy Climate Delegated Act**, published in the official journal in December 2021, describes conditions for activities to make a substantial contribution to the climate objectives. However, the only economic activities related to the Raw materials extraction sector that are included in this taxonomy are **forestry activities**. Here are some examples of technical screening criteria for this sector:

➤ The area on which the activity takes place is covered by an afforestation plan that consists in protection of soil and water, conservation of biodiversity and thus promotes biodiversity-friendly practices enhancing forests' natural processes.

➤ The climate benefit analysis demonstrates that the net balance of GHG emissions and removals generated by the activity is lower than a baseline associated to the business-as-usual practices.

The screening criteria published so far do not specifically address activities related to the extraction of oil and gas, coal, metals or minerals.

BIODIVERSITY FOOTPRINT ASSESSMENT

GENERAL OBJECTIVES OF A GBS-BASED ASSESSMENT

The factsheet helps companies of each sector to understand their most material impacts. However, a Biodiversity Footprint Assessment is more company-specific and allows to calculate the companies' impacts on biodiversity. Indeed, a GBS-based assessment uses companies' data (emissions, land use 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:

- **Assess quantitatively 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 to which impacts drivers on biodiversity the company contributes
- 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
- **Anticipate future 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).

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**:

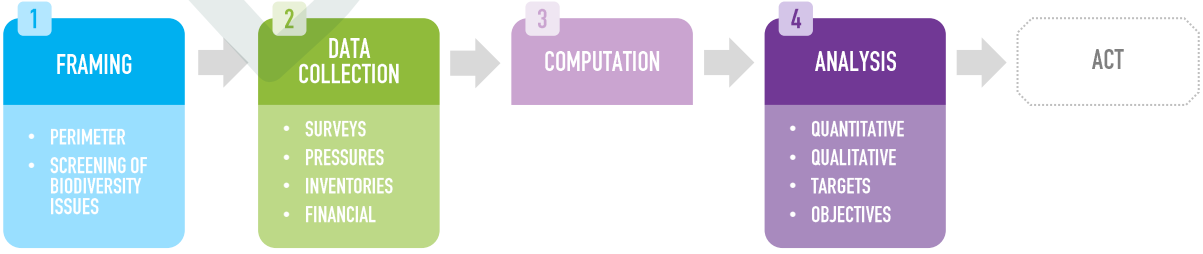
- The company itself, after being trained to use the GBS
- CDC Biodiversité or external GBS-trained assessors (list available here), instructed by the company
- A GBS-trained non-financial rating agency

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



Raw materials extraction factsheet version 1.0, Mar 2023. GBS computations: GBS 1.4.4, Mar 2023, Emma Godefroy.

More information
About the GBS: https://www.cdc-biodiversite.fr/le-global-biodiversity-score/
About the factsheets: https://www.cdc-biodiversite.fr/documentation-gbs/
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)
The sources are referenced in the section "Raw materials extraction" of the technical annex.