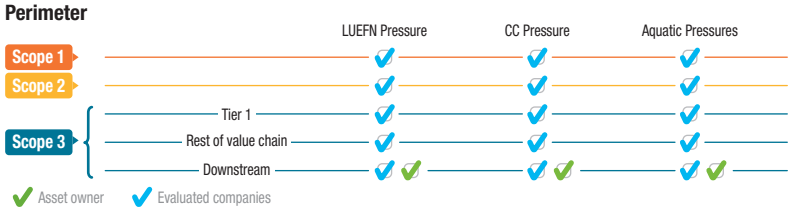
Case study Summary sheet

Context

CASE STUDY

Footprint use category: Financial assets
Assessment time: 2019
Business application: Assessment / rating of biodiversity performance by third parties, using external data Screening and assessment of biodiversity risks and opportunities

Perimeter



COMPANY'S IDENTITY

Financial asset's identity
Securities held by French financial institutions (Listed shares, short-term and long-term debt securities)

Asset class Listed equity, corporate and sovereign bonds

Underlying entities
1 443 issuing companies (French and foreign corporations)

Asset under Management (AuM)
EUR 1.055 trillion

Why?

Provide the foundation for future research on the assessment of biodiversity related physical and transition risks

When?

Computation in 2020 based on data French financial institutions held at the end of 2019

How often?

One off

What?

Quantitative estimates of the impacts and dependencies of the French financial system with BIA-GBS

For who?

Central banks, financial supervisors, financial institutions and public authorities which seek information on the hotspots of biodiversity risks.

How detailed?

Results are summed and aggregated over all securities (called the "portfolio") and are broken down by Scope and pressure

DATA COLLECTED

Item	Description	Source
Financial data - Securities level	Data on the securities held by French financial institutions (ISIN identifiers, the charcteristics of the issuing company and the value held in aggregate by French financial institutions)	Securities Holding Statistics by Sector (SHS-S) database (2019)
Financial data - Issuer level	Turnover breakdown by sector and country for each issuer based on ISIN identifiers	Carbon4 Finance's database CRIS
GHG emission data	CO_2-eq emissions by company and by Scope	Carbon4 Finance's database CIA

Footprint and dependencies analysis

RESULTS

Results for the whole portfolio

42%

of the value of securities held by French financial insitutions comes from issuers that are highly or very highly dependent on one or more ecosystem services for their direct operations (Scope 1)

Total Static footprint

130 000 MSA.km²

or about 24% of metropolitan France

Total Dynamic footprint

+4 800 MSA.km²

or about 48 times the area of Paris

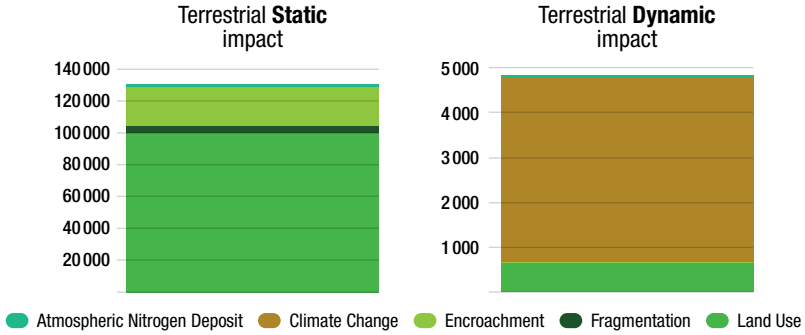


Figure 24: Terrestrial static (left) and dynamic (right) impact in MSA.km² of the Securities held by French financial institutions (Listed shares, short-term and long-term debt securities) broken down by pressure

KEY MESSAGES

- Displaying different approaches and aggregating data at different levels put forward a comprehensive understanding of the dependencies
- A large share of the static footprint originated from sectors related to food processing but the top sectors contributing to the dynamic footprint are mostly related to the manufacture and refining of fossil fuels, chemicals and trade.
- Considering the sectors' entire value chain is key to properly estimate the impacts and dependencies of portfolios

IMPROVEMENTS

Additional analyses could be performed, for example:

- Future studies should develop tailored biodiversity-related scenario analyses for financial risk assessment, offering detailed insights into shock nature and transmission channels.
- Specific methodologies are needed to capture biodiversity-related risks across sectors and financial institutions, acknowledging limited substitutability and tipping point risks
- Conceptual frameworks like double materiality should be used to assess financial institutions' alignment with biodiversity goals

5.3 Assessing the Biodiversity-Related Financial Risks of the French financial institutions with BIA-GBS

5.3.1 Context and objectives

In response to the growing awareness of the economic impacts associated with biodiversity decline and ecosystem degradation, financial institutions are increasingly paying attention to **biodiversity-related financial risks (BRFRs).** In this context, a 2021 joint study by the Banque de France, the French Biodiversity Office (OFB), the French Development Agency (AFD), Carbon4 Finance and CDC Biodiversité proposed a **first exploration of those risks for the French financial system** (Svartzman et al. 2021). This study highlighted the challenges associated with the assessment of interactions between biodiversity and the economy and provided the first estimation of financial risks for the French financial system based on data on the debt securities and listed shares issued by non-financial corporations and held by French financial institutions.

The **physical risk** was approximated by a measure of the **dependencies** of the economic activities financed by French financial institutions, and the **transitions risks** are approximated with measures of **impacts on terrestrial and freshwater biodiversity** of economic activities. The results were computed using Biodiversity Impact Analytics powered by the Global Biodiversity Score (**BIA-GBS**), jointly developed by Carbon4 Finance and CDC Biodiversité (version 1.1 of the GBS).

5.3.2 Methodology

The data collected to assess dependencies and impacts consists of the **list of securities held**, with their ISIN identifiers, the characteristics of the issuing company and the aggregated value held by French financial institutions, by type of institution. The data on the securities comes from Securities Holding Statistics by Sector (SHS-S) database. Three types of securities were studied: listed shares, short-term debt securities, and long-term debt securities. The sample was restricted by taking 1 443 issuing companies accounting for 95 % of the total value of securities held (hereafter referred to as the "portfolio").

The first step was to **connect the securities** held by French financial institutions **to their issuing company**. BIA-GBS methodology allows to link the ISIN identifier of each security with the issuer of the security. Following this mapping process, the final coverage encompassed 90% of the total market value of listed shares and debt securities held by French financial institutions.

The next step was the **evaluation of each issuer's dependency on ecosystem services** (with an average dependency score in %, see section 1.3.3 for the methodology) **and its biodiversity footprint** (in MSA.km²). The calculation of dependency scores and impacts is based on the specific sector and region in which the issuer's production activities take place. BIA-GBS provides a sectoral and geographical decomposition of each issuing company's turnover (through Carbon4 Finance's CRIS database), before converting the production activities and regions to the EXIOBASE format and plugging them into the GBS. GHG inventory data are derived from Carbon4 Finance's CIA database which computes greenhouse gas emissions from a comprehensive bottom-up analysis and fed directly as input into the GBS (see section 2.3 for more details on BIA-GBS's methodology).

Once the dependencies and impacts were assessed at the issuer level, the final step was **to aggregate these dependencies and impacts at the portfolio level**. For this purpose, the quantity of securities held by French financial institutions for each issuer was combined with the issuer's dependency score ("DS") and impacts ("Footprint") as follow:

For each ecosystem service:

$$DS_{portfolio} = \sum_{issuer\ i} DS_i \frac{market\ value\ of\ securities\ issued\ by\ i\ in\ portfolio}{total\ amount\ securities\ in\ portfolio}$$

And for the impact:

$$Footprint_{portfolio} = \sum_{issuer\ i} Footprint_i \frac{market\ value\ of\ securities\ issued\ by\ i\ in\ portfolio}{enterprise\ value\ of\ the\ security\ issuer^*}$$

* The enterprise value is computed by adding the market capitalisation of equity shares to the market value of debt and minority interests (investment in another company).

5.3.3 Results and discussion

DEPENDENCIES

The dependencies of securities held by French financial institutions were assessed using several approaches and different levels of results: at portfolio level, disaggregated by ecosystem service and by economic sector.

First, the assessment of dependencies at portfolio level gives low or medium dependency score (below 50%) on each ecosystem service, for Scope 1. These relatively low dependencies can be explained by an averaging effect: when a sector dependency is assessed, the average of the dependency levels of all the production processes involved is used, which tends to mitigate the dependency of the whole sector (if one process is highly dependent but the others low). An alternative would have been to assign the sector the highest level of dependency of the business processes used, rather than the average. Dependencies are then analysed by looking at the proportion of the portfolio with high dependencies on one or more ecosystem services. The results suggest that a **significant proportion of the portfolio could be affected by the disruption of ecosystem services**: 80% of the amount in the portfolio are issued by companies that are at least moderately dependent (dependency score > 40%) on at least one ecosystem service in their direct operations (see first bar in Figure 22), 42% by companies that are at least highly dependent (dependency score >60%) on at least one ecosystem service (second bar), and 9% by companies that are very highly dependent (dependency score >80%) on at least one ecosystem service (third bar).

Since the case study was conducted, a new dependency score has been developed, which would have been highly relevant for this study: the critical dependency score (see 1.3.3). Instead of measuring the average dependency on all ecosystem services at portfolio and company level, this approach highlights isolated high dependencies and indicates the **proportion of the portfolio or the company that is critically dependent on at least one ecosystem service** (dependency score higher than 80%).

Going beyond this analysis of direct operations and considering the upstream dependencies on ecosystem services, the analysis revealed that all issuers are at least slightly dependent on all ecosystem services through their value chains.

When high dependency scores are observed within the portfolio, the question remains as to whether they can be explained by a few specific ecosystem services or whether they are dispersed among several. A breakdown of the dependency scores by ecosystem service shows that the very high dependency scores (>80%) are mainly concentrated on two ecosystem services: **surface water and ground water.**

Finally, the analysis by economic sector highlights sectors that depend on a large number of ecosystem services and are therefore particularly exposed. This is the case for **issuers that rely on agricultural production directly** (*e.g.*, growing crops or rearing animals for meat) or **indirectly** (*e.g.*, food and drink manufacturing).

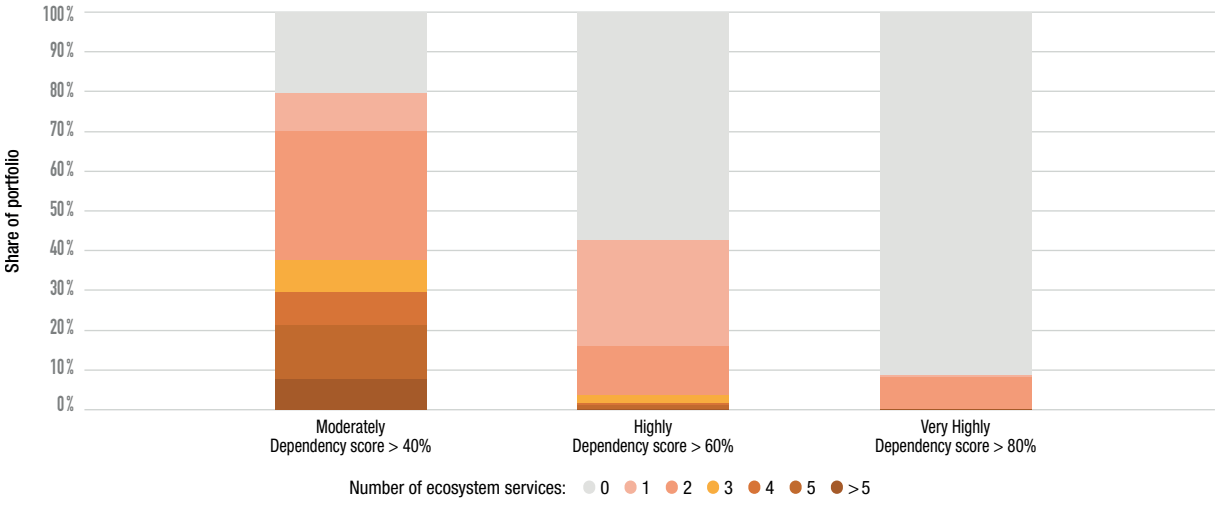


Figure 25: Share of the portfolio dependent (through Scope 1) on n ecosystem services at least Moderately, at least Highly and at least Very Highly

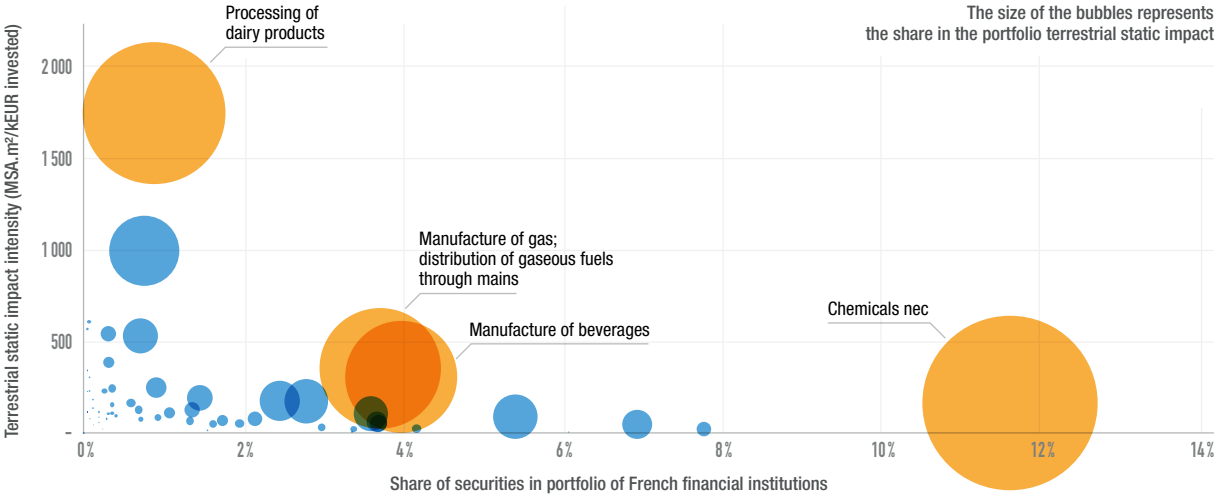


Figure 26: Terrestrial static impact on biodiversity per EXIOBASE sector of the portfolio. The orange bubbles represent the sectors with the greatest impact (together accounting for more than 50% of total terrestrial static impact)

IMPACTS

The **terrestrial static impact** on biodiversity of the French financial system reaches 130 000 MSA.km² which is equivalent to the destruction of 24% of the area of metropolitan France. The biodiversity intensity of the portfolio is 130 MSA.m²/k€ of securities held.

Most of the static terrestrial impact comes from upstream activities, and 42% of this impact comes from direct suppliers (Tier 1 of Upstream Scope 3 impacts). Land use change is by far the main pressure explaining these results [19].

Several economic sectors[20] contribute substantially to the footprint including Chemicals nec, Processing of dairy products, Manufacture of beverages and Manufacture of gas, and are illustrated in Figure 24. However, a distinction must be drawn between sectors that have a high impact because they account for a large proportion of the portfolio of financial institutions, *e.g.,* Chemicals nec for instance, and those that have a high impact intensity per invested amount [21](in MSA.m²/kEUR of invested amount) such as the agri-food sectors, including Processing of dairy products or Manufacture of beverages.

Static aquatic impacts are not discussed here, not for a lack of materiality, but because the analyses are similar to those for the terrestrial static impacts: they are mainly due to the issuers' upstream value chain and driven by the chemicals, gas, and food processing sectors.

The portfolio has a **terrestrial dynamic impact** of +4 800 MSA.km², equivalent to the annual destruction of twice the size of Luxembourg. Climate change is largely responsible for this impact, accounting for 86% of it. The proportion of Scope 1 impacts is higher for the dynamic than for the static accounting category, mainly due to climate change impacts which are significant in direct operations of manufacturing and processing industries.

While a large part of the static footprint comes from sectors linked to food processing, the main sectors contributing to the dynamic footprint are rather linked to the manufacture and refining of fossil fuels, chemicals and trade, as these are sectors with high greenhouse gas emissions (see Figure 27).

(19) Note that climate change is not included as a static pressure on biodiversity in this methodology.

(20) The sectors mentioned are the EXIOBASE sectors. A correspondence table between the NACE and EXIOBASE sectors is available here: https://ntnu.app.box.com/s/ziox4zmkgt3cdsg549brr0qaecskgjsd/file/682195219009

(21) This intensity depends on the intensity of the sectors per kEUR of turnover as well as on the ratio of turnover to enterprise value including cash (EVIC).

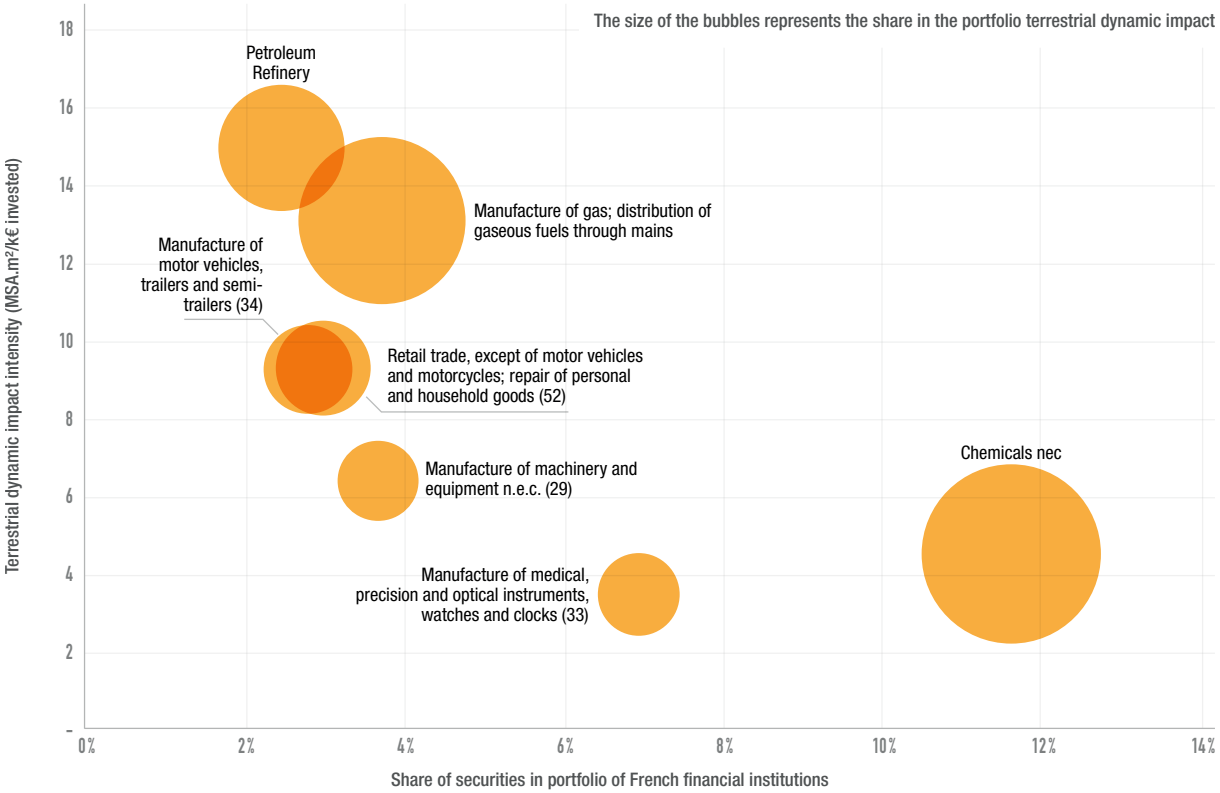


Figure 27: Terrestrial dynamic impact on biodiversity per EXIOBASE sector for the most impactful sectors (accounting for more than 50% of total dynamic terrestrial impact)

5.3.4 Lessons learnt

By quantitatively estimating and analysing dependencies and impacts of the securities held by French financial institutions, this study provided the **foundation for future research on the assessment of biodiversity related physical and transition risks**. BIA-GBS proved highly relevant and allowed to evaluate the dependencies and impacts of the portfolio of French financial institutions with a **large coverage**, over 90% of the securities selected for the study.

Assessing dependencies using several approaches and combining data at different levels (portfolio level, broken down by ecosystem services and by economic sectors) has provided a first insight into the results. The analysis highlighted the need to understand the distribution of high and very high dependencies to ecosystem services, which is now captured in the critical dependency score.

However, it is essential to bear in mind that this study shares similar limitations to those of the GBS considered throughout this publication, particularly regarding the coverage of pressures and ecosystem (refer to section 1.3.1).

Finally, this study could be supplemented by additional analyses. The data could be analyzed with more granularity since it is available at company level but has only been used here aggregated at the portfolio level. Critical sectors or businesses could be identified and examined. Biodiversity-related scenarios and analyses of responses to specific shocks are also necessary to move forward in the understanding of biodiversity-related financial risks and the Network for Greening the Financial System is working towards developing such scenarios and analyses (NGFS 2023).