

# A “SILENT SPRING” FOR THE FINANCIAL SYSTEM? EXPLORING BIODIVERSITY-RELATED FINANCIAL RISKS IN FRANCE

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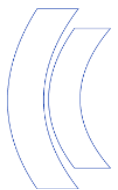
3: OFFICE FRANÇAIS DE LA BIODIVERSITÉ (OFB)

4: UNIVERSITÉ SORBONNE PARIS NORD, CENTRE D'ÉCONOMIE ET DE GESTION DE PARIS NORD (CEPN)

5: ECOLE NORMALE SUPÉRIEURE DE PARIS

6: CDC BIODIVERSITÉ

*\*THE VIEWS PRESENTED HERE ARE THOSE OF THE AUTHORS AND DO NOT NECESSARILY EXPRESS THE VIEWS OF THE BANQUE DE FRANCE*



# BIODIVERSITY AND ECOSYSTEM SERVICES

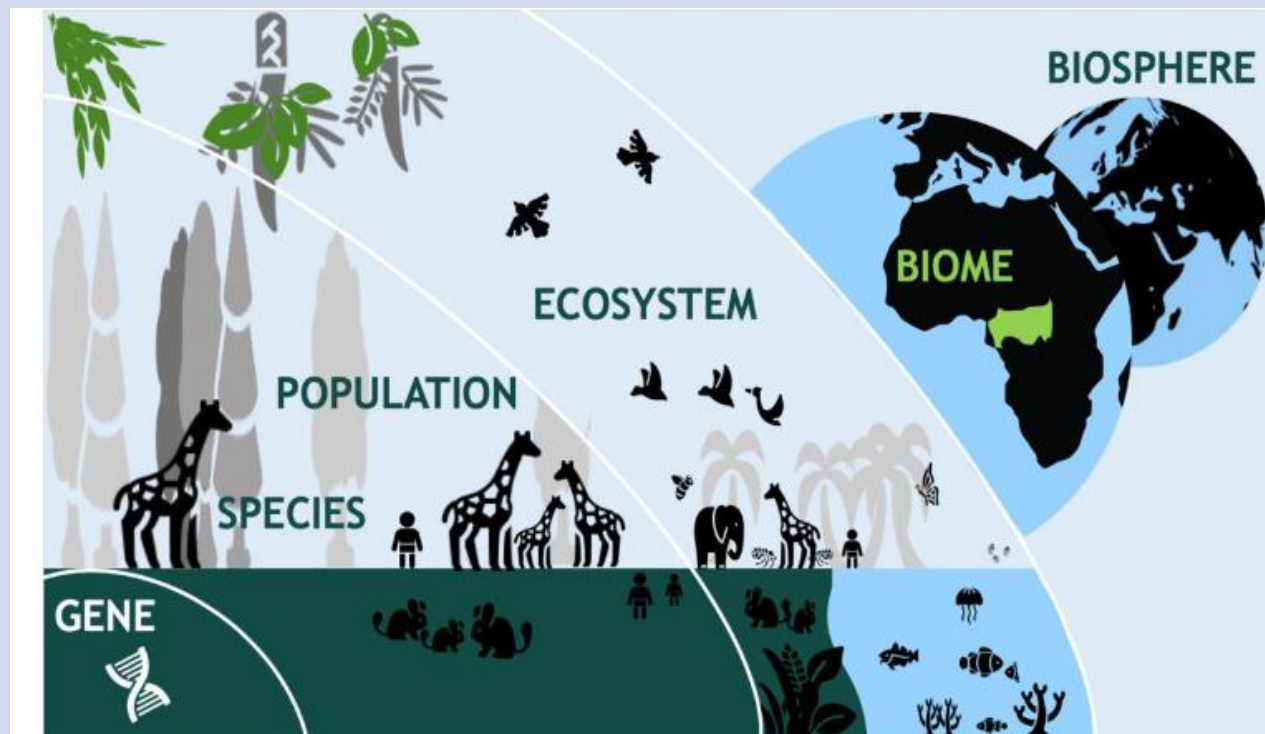
Biodiversity includes:

- The diversity **within species (genetic)**
- The diversity **between species**
- The diversity **of ecosystems**
- Almost **infinite network of interrelations and interactions**

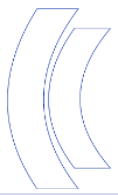
Biodiversity as « enabling asset » (Dasgupta, 2021) allowing natural capital to provide ecosystem services to humans:

- **Provisioning services** (food, timber, fibers...)
- **Regulation and maintenance services** (climate regulation, erosion control, flood control, disease control, pollination...)
- **Cultural services** (recreational, tourism, spiritual...)
- Underpinned by **basic ecological functions** (soil formation, nutrient cycling, ...)

*“Biological diversity is the variability among living organisms and the ecological complexes of which they are part” (IPBES, 2019)*



Source: authors (based on icons8), adapted from Dasgupta (2021)

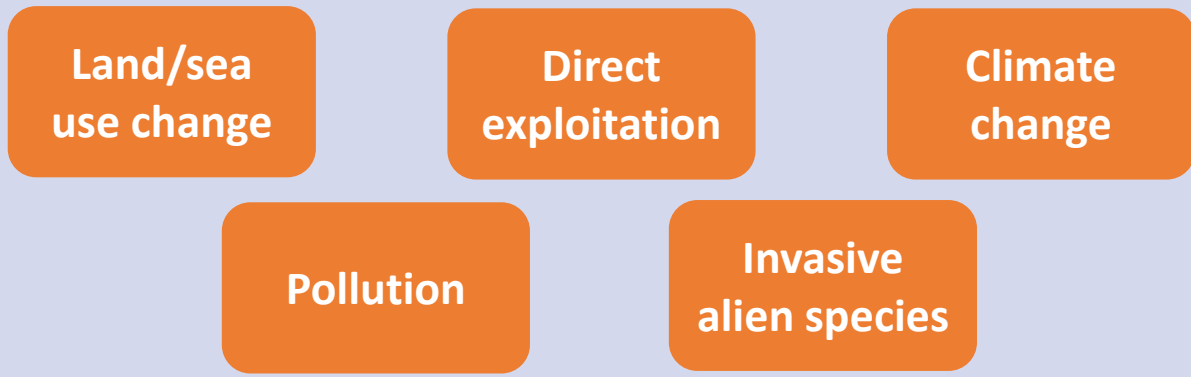


# BIODIVERSITY LOSS

Extinction rate of species currently tens to hundreds times higher than reference rate of the past million years (IPBES, 2019)

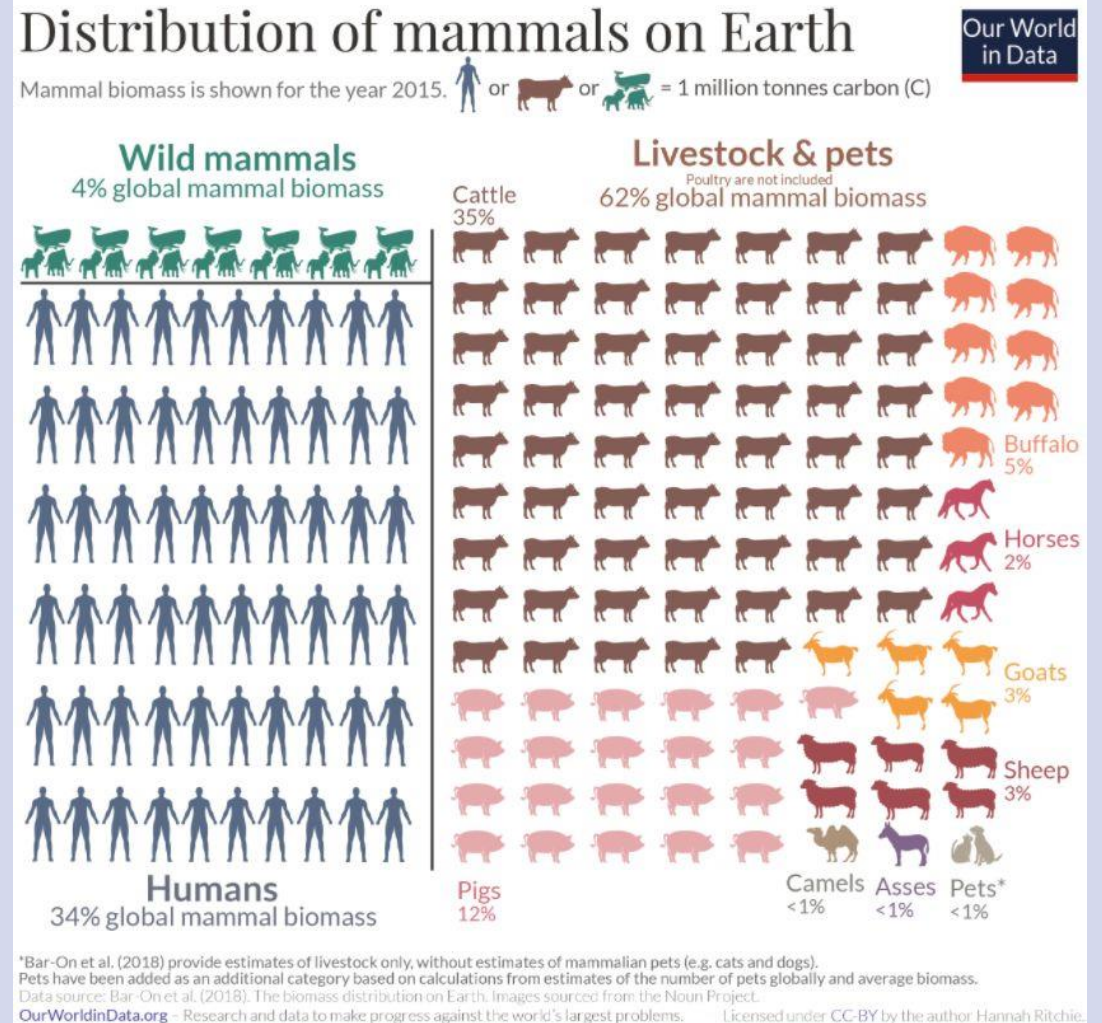
The majority of the total biomass of vertebrates is composed of livestock and human beings, with **only about 5% made up by wild species** (Bar-On et al., 2018)

5 main direct drivers related to human activities (IPBES, 2019):

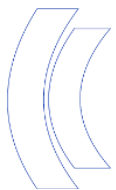


Potential major socioeconomic impacts, yet difficult to assess :

- **Non-linearity** of ecosystem processes (tipping points)
- **Irreversibility**
- **Interconnectedness of ecosystems**



Source: Our World in Data, Adapted from Bar-On et al. (2018)



# FROM BIODIVERSITY LOSS TO FINANCIAL RISKS

Traditionally, central banks and supervisors have adopted a **risk-based approach to climate change**:

- Risk for **financial stability**
- Risk for **price stability**

**Rapidly growing awareness of biodiversity-related financial risks (BRFR):**

- Central banks: DNB (van Toor et al., 2020), NGFS & INSPIRE (2021)
- G7 (2019), OECD (2019), WEF (2020), PwC & WWF (2020), World Bank (2021)
- Dasgupta Review (2021): one chapter dedicated to BRFR
- Private sector: TNFD (2021); SCOR & MNHN (2021)
- France's article 29 (décret d'application) requires financial institutions to disclose on:

*“Les principaux risques émanant des impacts causés par la stratégie d'investissement et les principaux risques émanant des dépendances à la biodiversité des actifs et activités dans lesquels l'entité a investi”*

## NGFS Occasional Paper

**Biodiversity and financial stability:  
exploring the case for action**



# BIODIVERSITY - HOW TO ACCOUNT FOR PHYSICAL AND TRANSITION RISK?

Insights into the assessment of biodiversity-related **physical risks**



Insights into the assessment of biodiversity-related **transition risks**

**Dependencies**

**Impacts**

**NON-FINANCIAL CORPORATIONS**



**FRENCH FINANCIAL INSTITUTIONS**



# DEPENDENCIES TO ECOSYSTEM SERVICES – METRIC AND DATA

Insights into the assessment of biodiversity-related **physical risks**



**Dependencies**

**NON-FINANCIAL CORPORATIONS**

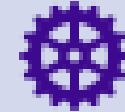
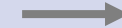


## Data:

ENCORE database  
(Natural Capital Finance Alliance, UNEP-WCMC)



Ecosystem Service



Business process

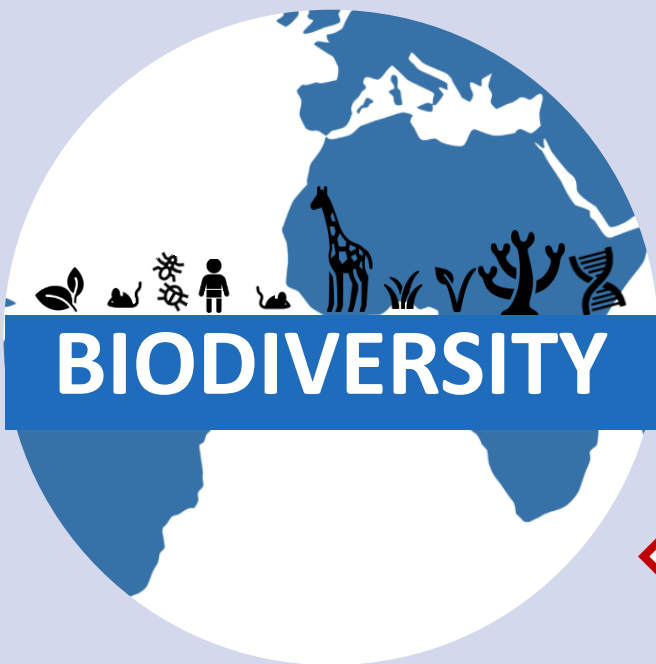


Firm

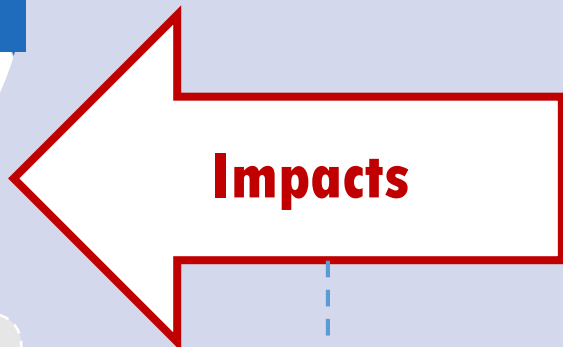
## Metric:

A dependency score to 21 different ecosystem services  
From 0% (no dependency) to 100% (very high dependency)

# IMPACTS ON BIODIVERSITY– METRIC AND DATA



Insights into the assessment of biodiversity-related transition risks

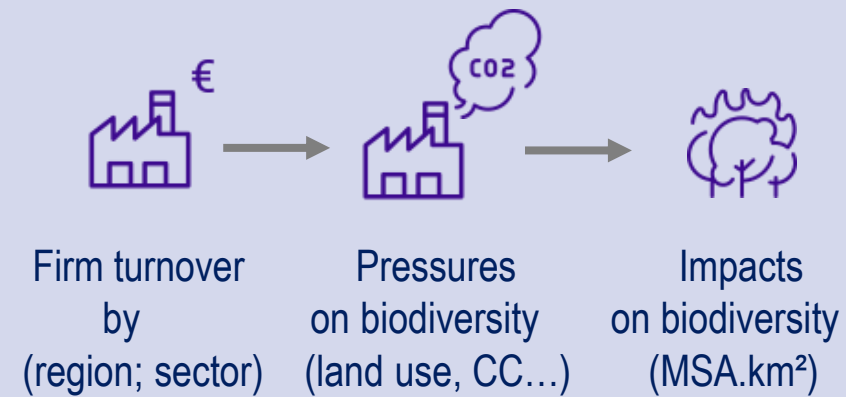


NON-FINANCIAL CORPORATIONS



## Data:

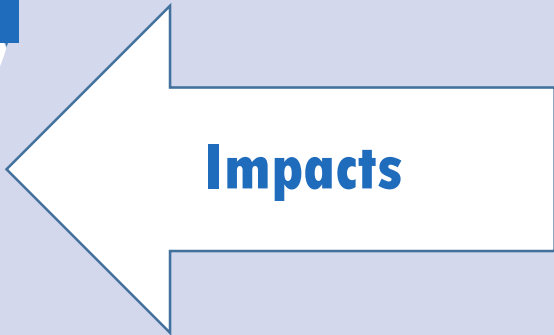
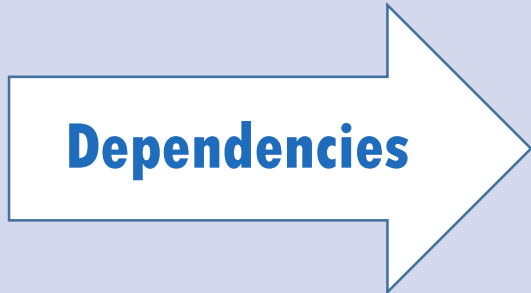
Global biodiversity score (GBS, CDC Biodiversité), based on GLOBIO (PBL) (used with the support of the BIA, Carbon4Finance)



## Metric:

Mean Species abundance (MSA).km<sup>2</sup>  
*An impact of 1 MSA.km<sup>2</sup> is comparable with the complete loss of 1 km<sup>2</sup> of “intact” nature.*

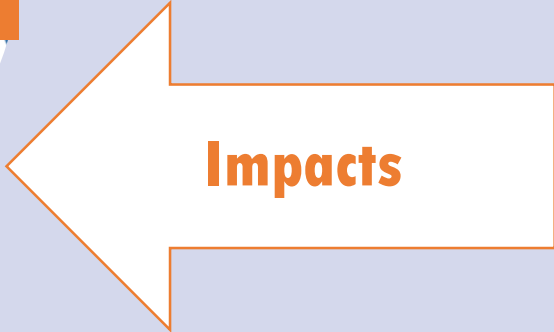
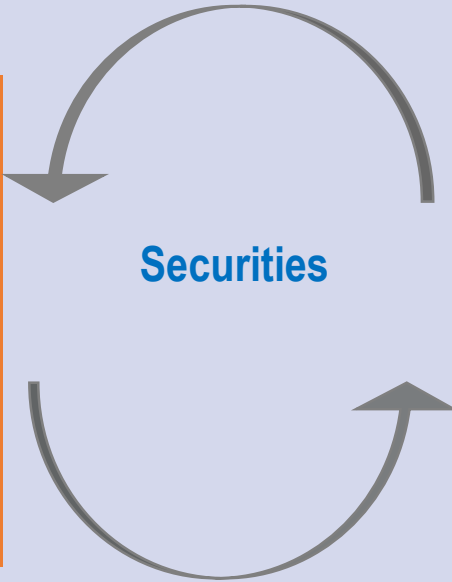
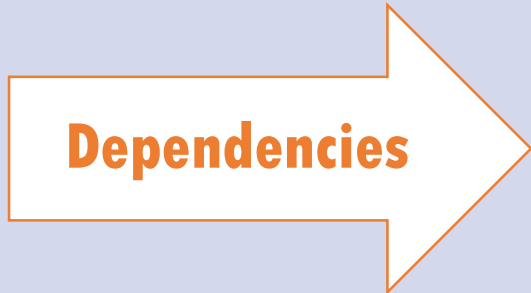
# METHODOLOGY - STEP 1



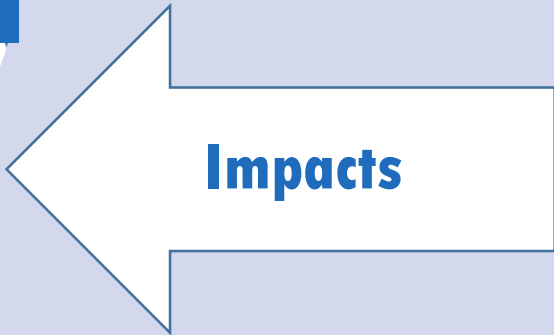
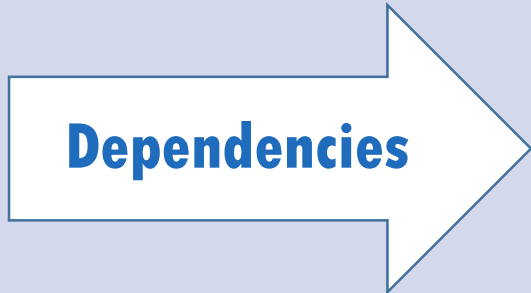


# METHODOLOGY – STEP 2

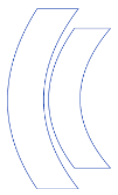
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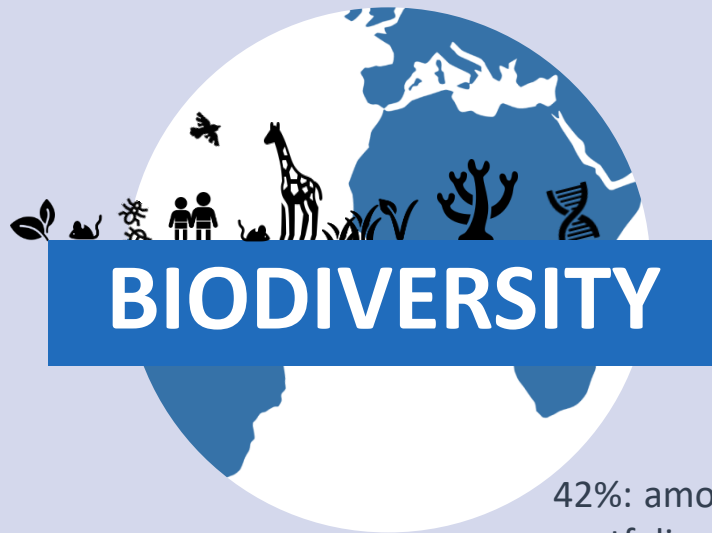
# METHODOLOGY – STEP 3



3



# RESULTS



130,000 MSA.km<sup>2</sup>: static (or accumulated) terrestrial biodiversity impact of the portfolio (equivalent to the artificialization of 24% of metropolitan France)

**Impacts**

**Dependency**

42%: amount of securities in portfolio that comes from issuers that are highly or very highly dependent on at least one ecosystem service

**NON-FINANCIAL CORPORATIONS**

**Debt securities & listed shares (the 'portfolio')**

**FRENCH FINANCIAL INSTITUTIONS**

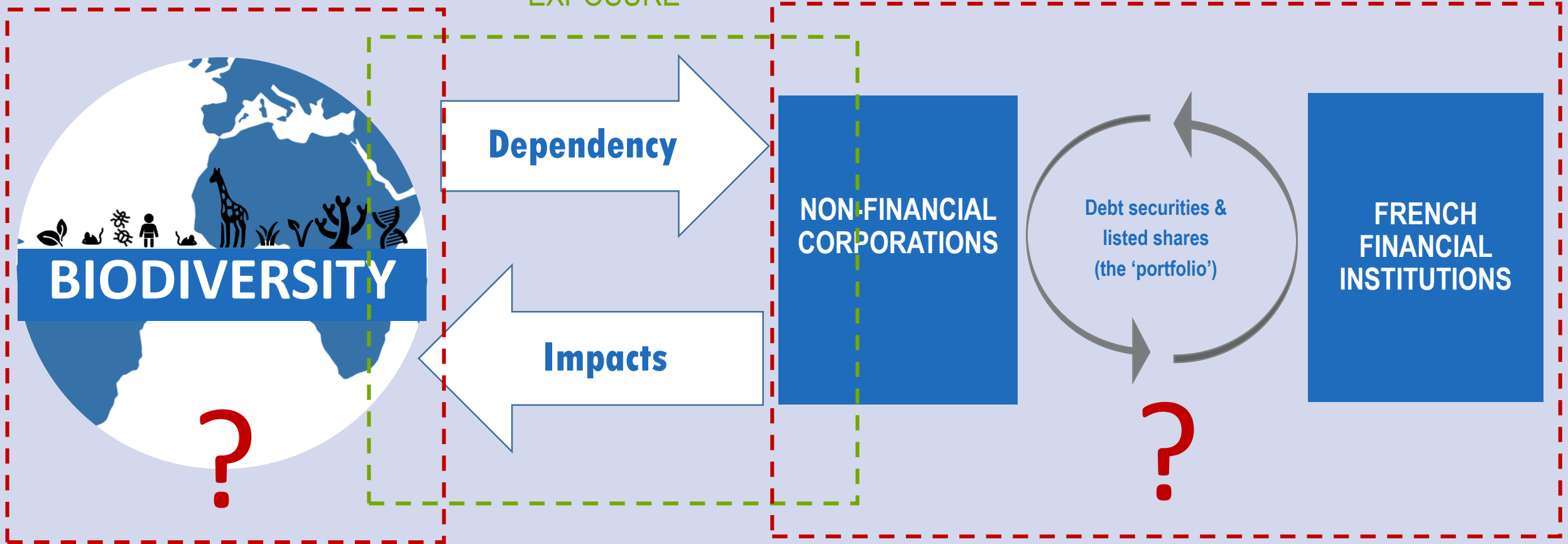
Source: A "Silent Spring" for the financial system? Exploring biodiversity-related financial risks in France. *Banque de France Working Paper*

# CONCLUSION: FUTURE RESEARCH AVENUES ON BIODIVERSITY-RELATED FINANCIAL RISKS

DANGER / SHOCK

VULNERABILITY / ADAPTIVE CAPACITY

EXPOSURE



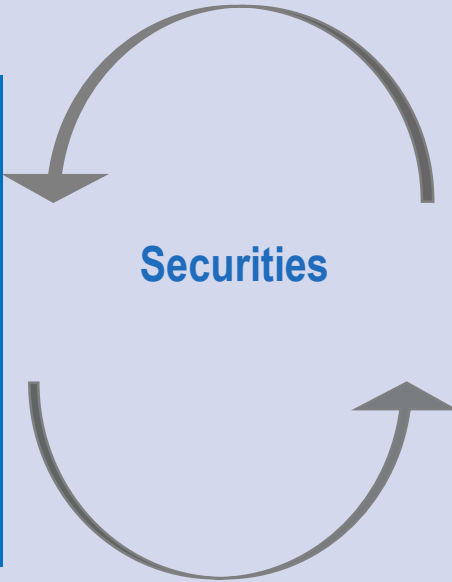
**THANK YOU !**



# ANNEXES

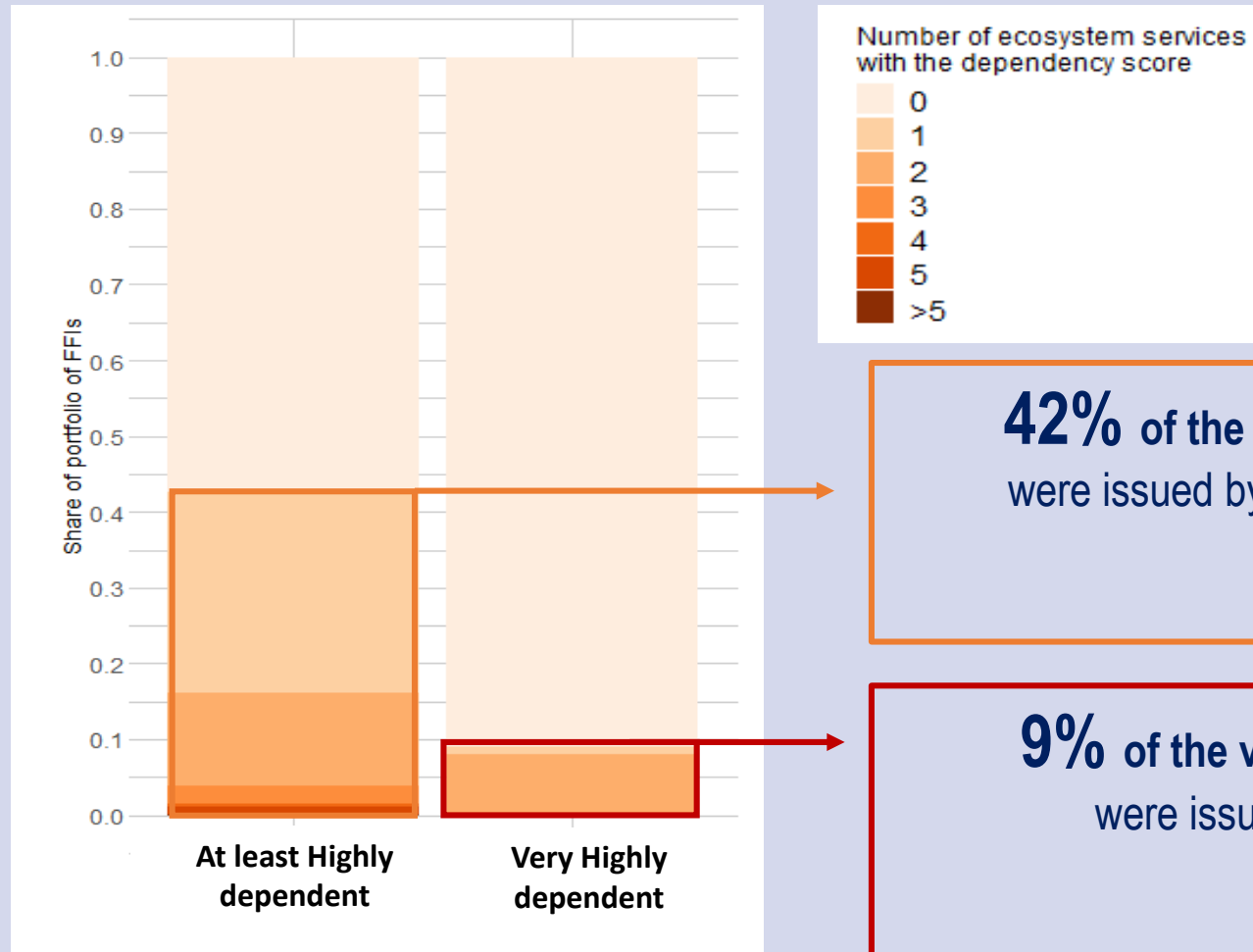


# RESULTS – DEPENDENCIES OF THE PORTFOLIO TO ECOSYSTEM SERVICES



# RESULTS – DEPENDENCIES OF THE PORTFOLIO TO ECOSYSTEM SERVICES – SCOPE 1

Share of the portfolio dependent (through scope 1, direct operations) to  $n$  ecosystem services at least Highly or at least Very Highly



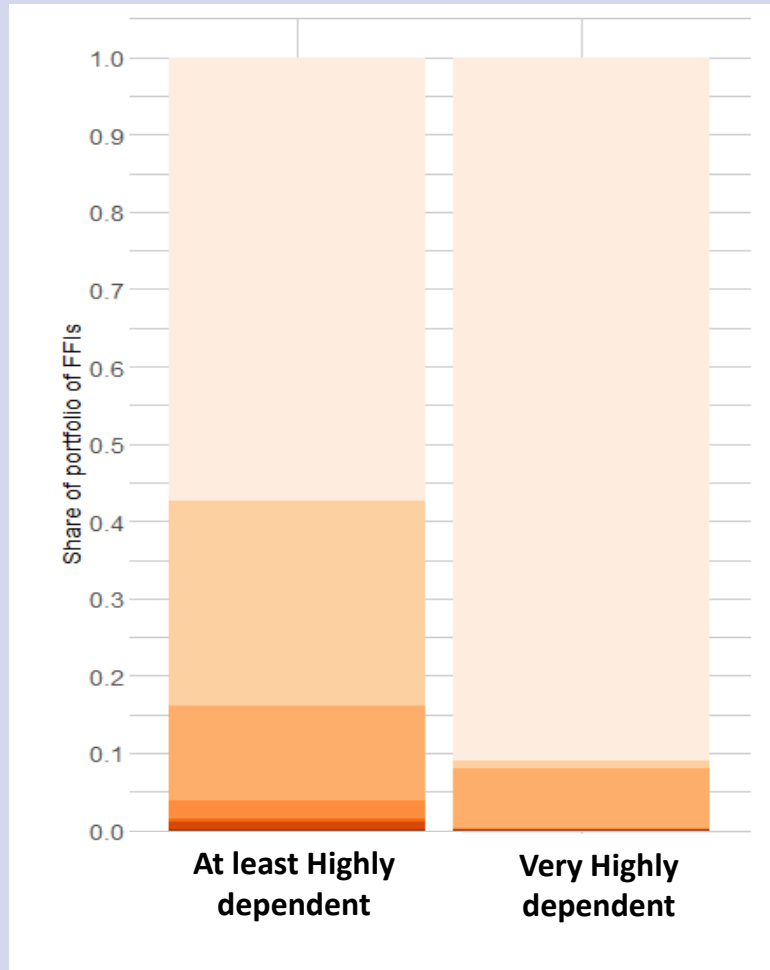
**42%** of the value of securities held by French financial institutions were issued by companies that are **highly or very highly dependent** on **at least one ecosystem service** (≈ 420 billion EUR)

**9%** of the value of securities held by French financial institutions were issued by companies that are **very highly dependent** on **at least one ecosystem service** (≈ 90 billion EUR)

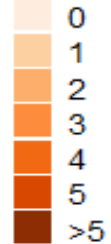


# RESULTS – DEPENDENCIES OF THE PORTFOLIO TO ECOSYSTEM SERVICES – SCOPE 1

Share of the portfolio dependent (through scope 1, direct operations) to  $n$  ecosystem services at least Highly or at least Very Highly



Number of ecosystem services with the dependency score



Considering dependencies of direct operations the portfolio mostly depends on:



Ecosystem services related to **water provision**

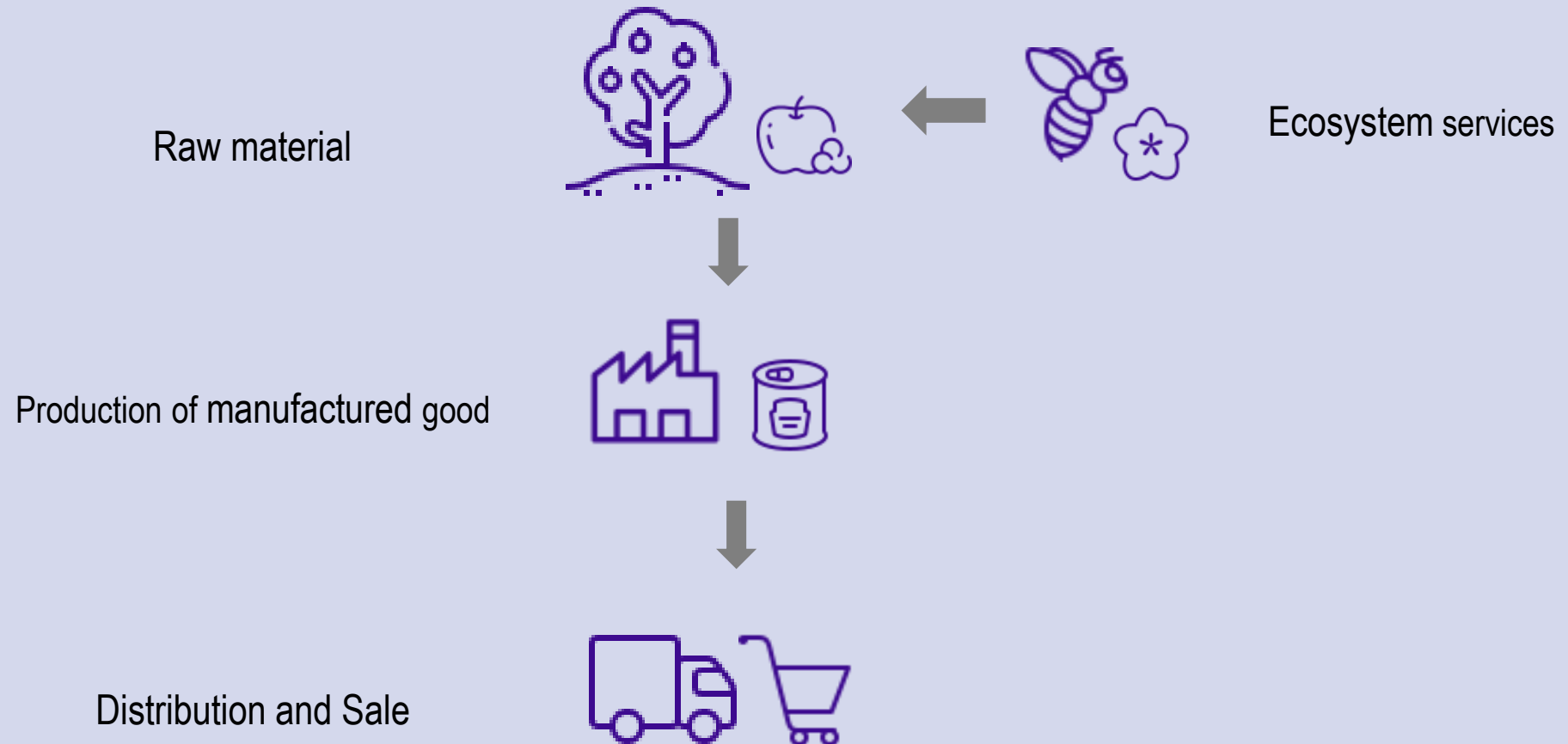


**Maintenance and regulation ecosystem services** such as Mass stabilization and erosion control, Flood and storm protection and Climate regulation

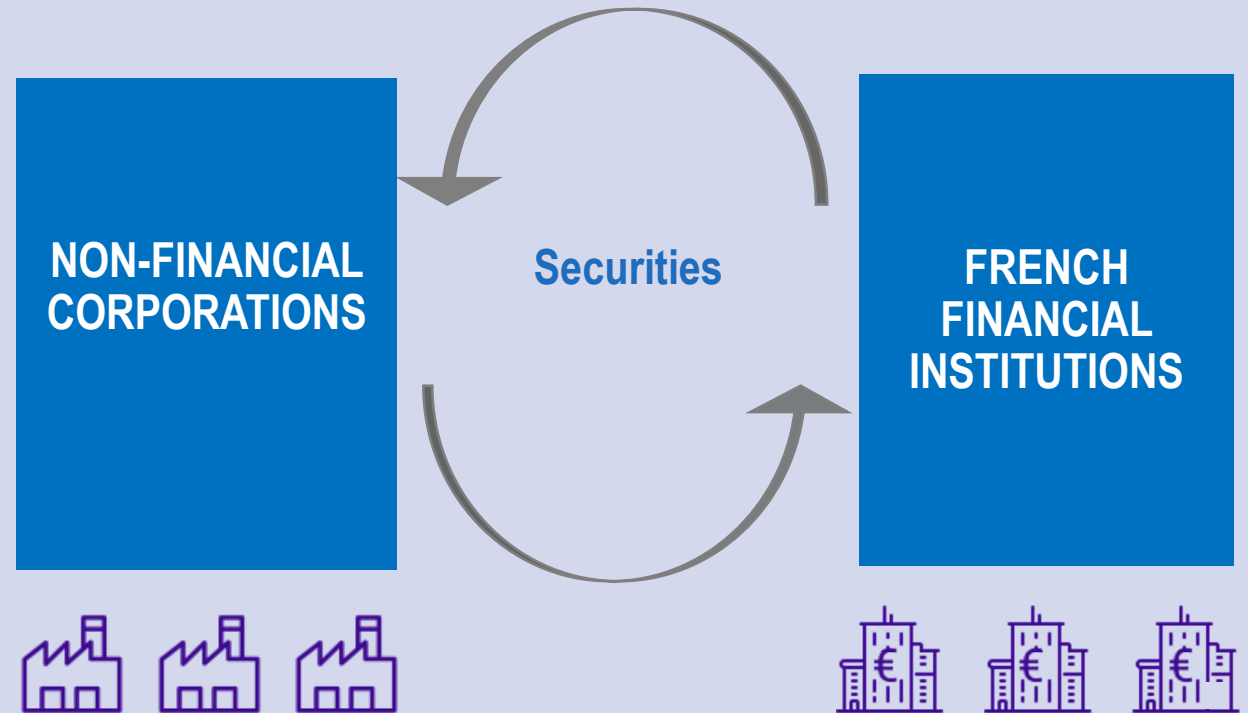
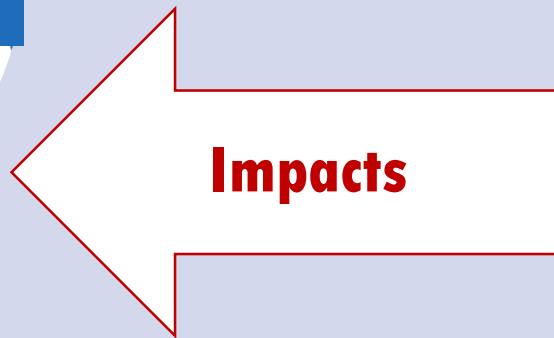
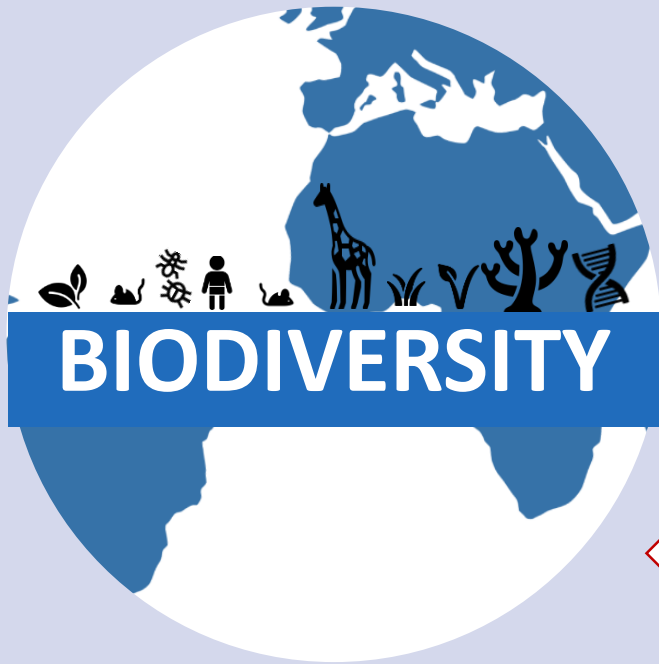


## RESULTS – DEPENDENCIES OF THE PORTFOLIO TO ECOSYSTEM SERVICES - UPSTREAM

All security issuers **become at least slightly dependent to all ecosystem services** through their value chains



# RESULTS – IMPACTS OF THE PORTFOLIO ON (TERRESTRIAL) BIODIVERSITY



# RESULTS – IMPACTS OF THE PORTFOLIO ON BIODIVERSITY – STATIC

**Accumulated (or “Static”) biodiversity footprint** (including the impacts along all the value chain) : **130,000 MSA.km<sup>2</sup>**

- Comparable with the loss of at least 130,000km<sup>2</sup> of “pristine” nature
- Comparable with the complete artificialization of **24% of the area of metropolitan France**
- Mainly due to the **land use pressure** (climate change not included)

The static portfolio footprint is mainly due to securities coming from firms in the following **economic sectors** :

Chemicals



15.1%  
of the portfolio's  
static biodiversity  
footprint

Processing of  
dairy products



12.3%  
of the portfolio's  
static biodiversity  
footprint

Manufacture and  
distribution of gas

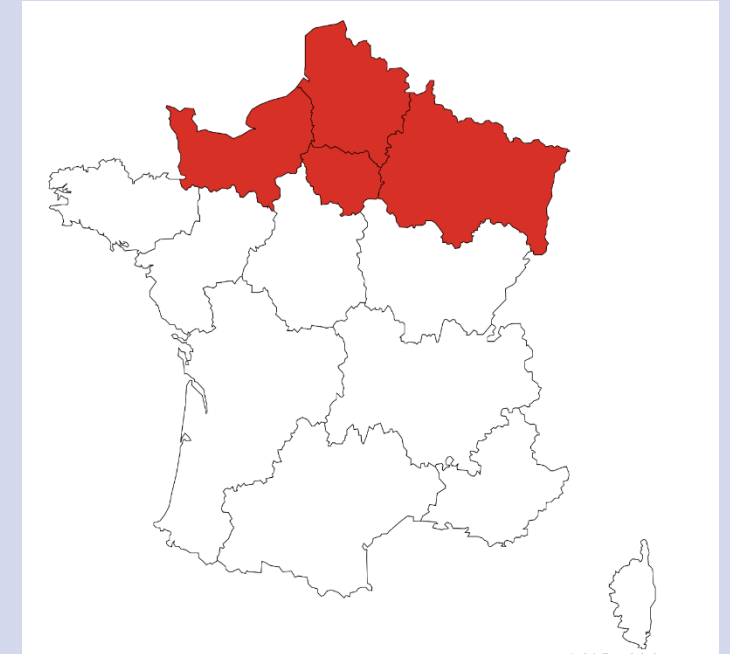


10.5%  
of the portfolio's  
static biodiversity  
footprint

Manufacture of  
beverages



9.7%  
of the portfolio's  
static biodiversity  
footprint



## RESULTS – IMPACTS OF THE PORTFOLIO ON BIODIVERSITY – DYNAMIC

**Additional (or “Dynamic”) biodiversity footprint (all value chain included) : 4,800 MSA.km<sup>2</sup> per year**

- Comparable with the loss of at least 4,800km<sup>2</sup> of “pristine” nature per year
- Comparable with the complete artificialization of **the Loire département** each year
- Mainly due to the **climate change pressure** (included in dynamic analysis)

The dynamic portfolio footprint is mainly due to securities coming from firms in the following **economic sectors** :

### Chemicals



10.9%  
of the portfolio's  
dynamic biodiversity  
footprint

### Manufacture and distribution of gas



10.2%  
of the portfolio's  
dynamic biodiversity  
footprint

### Petroleum refinery



7.7%  
of the portfolio's  
dynamic biodiversity  
footprint

