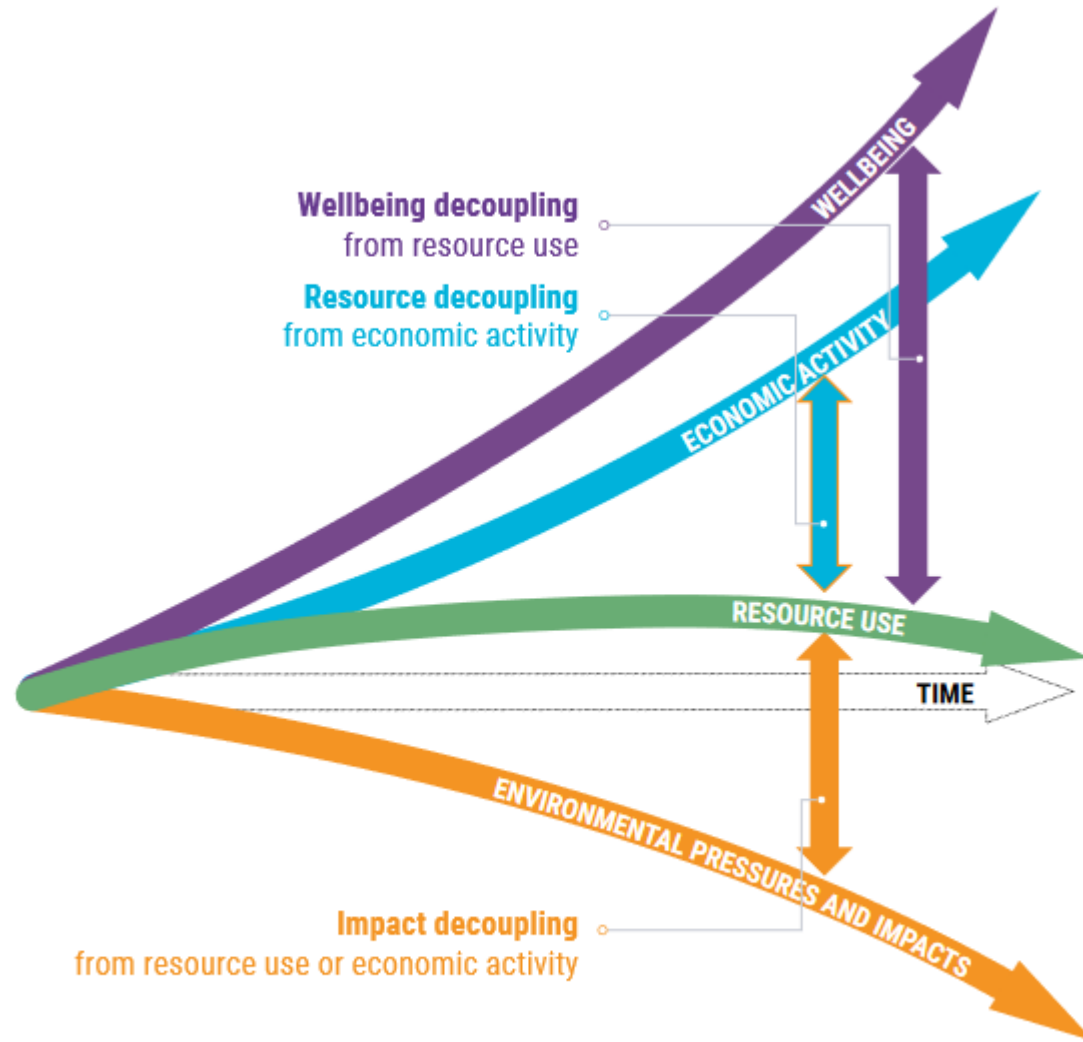
A satellite view of the Earth from space, showing the curvature of the planet and the blue oceans. A semi-transparent purple rectangular box is overlaid on the left side of the image, containing the title and author information.

Identify and assess leverage points for biodiversity conservation in the European Union with a focus on non-food biomass

Stephan Pfister, Shuntian Wang

Inputs by: Viktoras Kulionis, Francesca Rosa, Sidi Peng

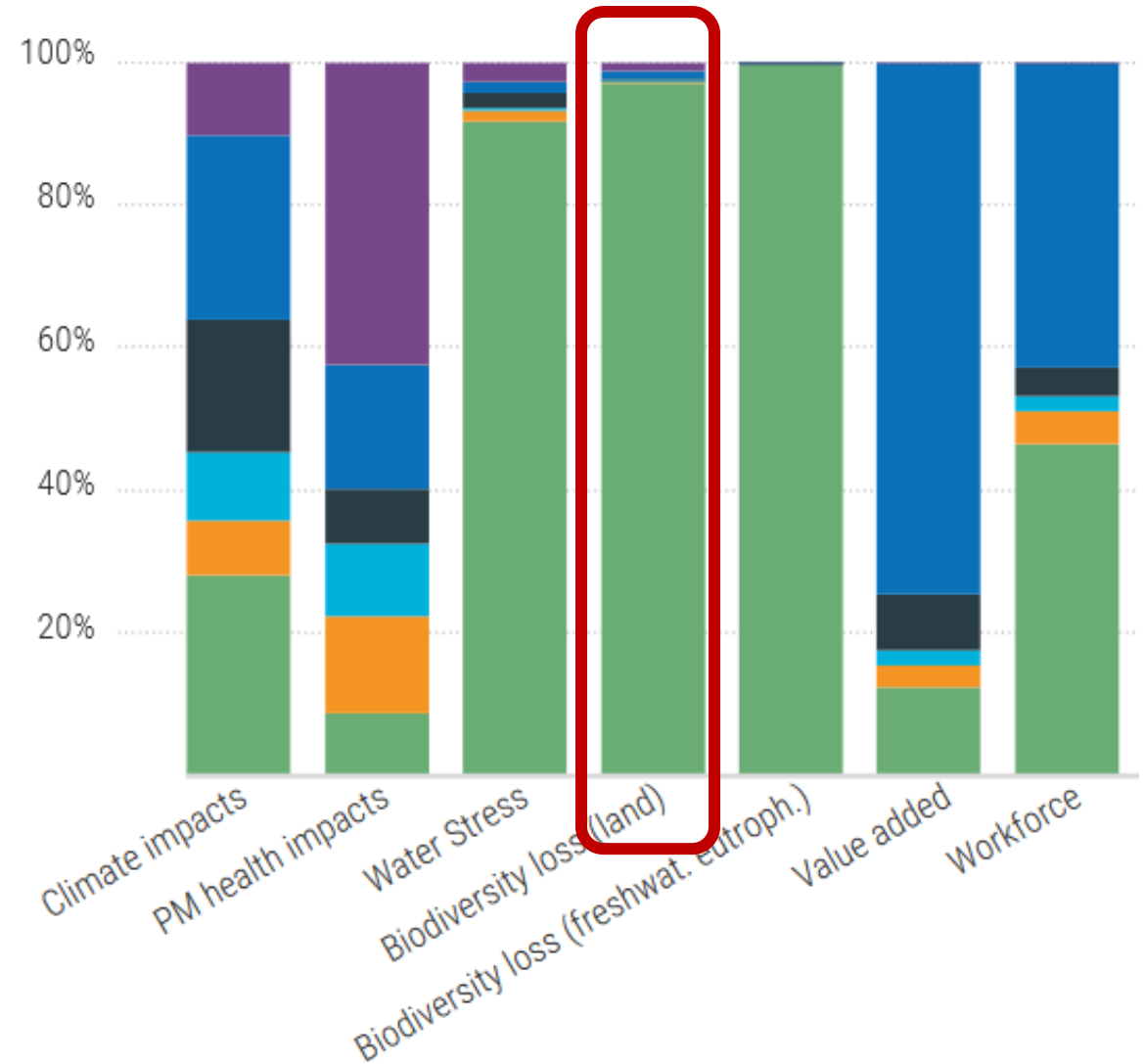
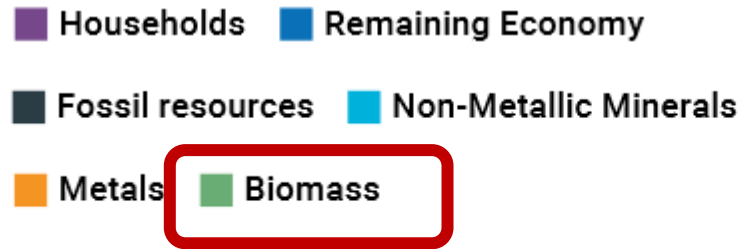
Decoupling in the Global Resource Outlook 2024 (GRO 2024)



- Selected leverage points identified in GRO 2024:
 - **Based on UNCBD:**
 - Overarching targets: Global Biodiversity Framework, including protecting 30% land and sea by 2030
 - Target 18: eliminate, phase out or reform subsidies harmful to nature.
 - Target 19: leverage private and blended finance for investment in biodiversity.
 - **Based on IPBES (2019a):**
 - Channeling finance towards combatting nature loss.

UNEP (2024); <https://wedocs.unep.org/20.500.11822/44902>

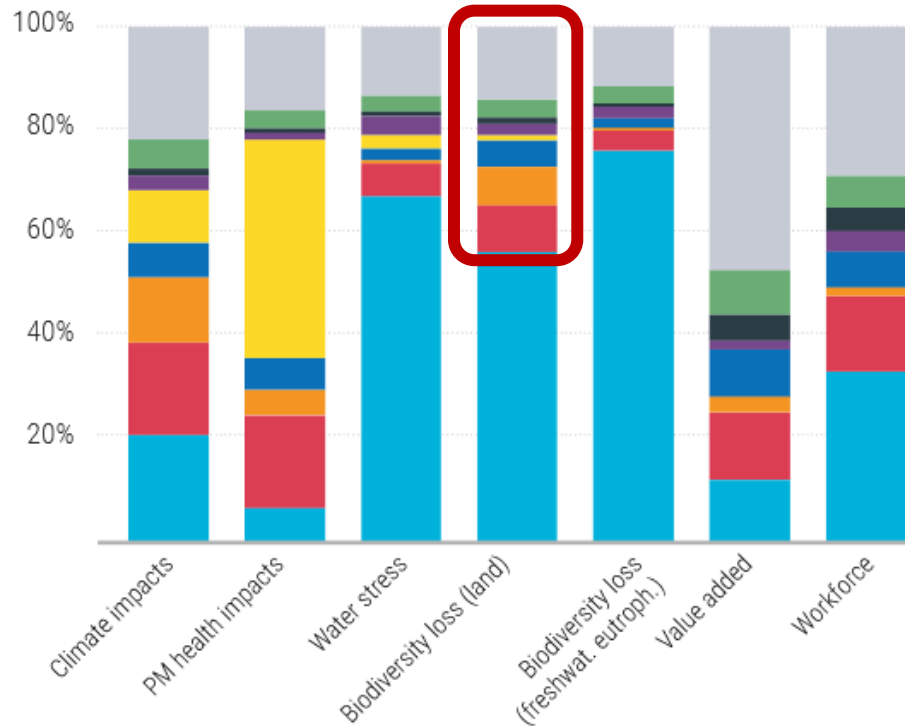
Biomass in the Global Resource Outlook 2024



UNEP (2024); <https://wedocs.unep.org/20.500.11822/44902>

Biomass in the Global Resource Outlook 2024

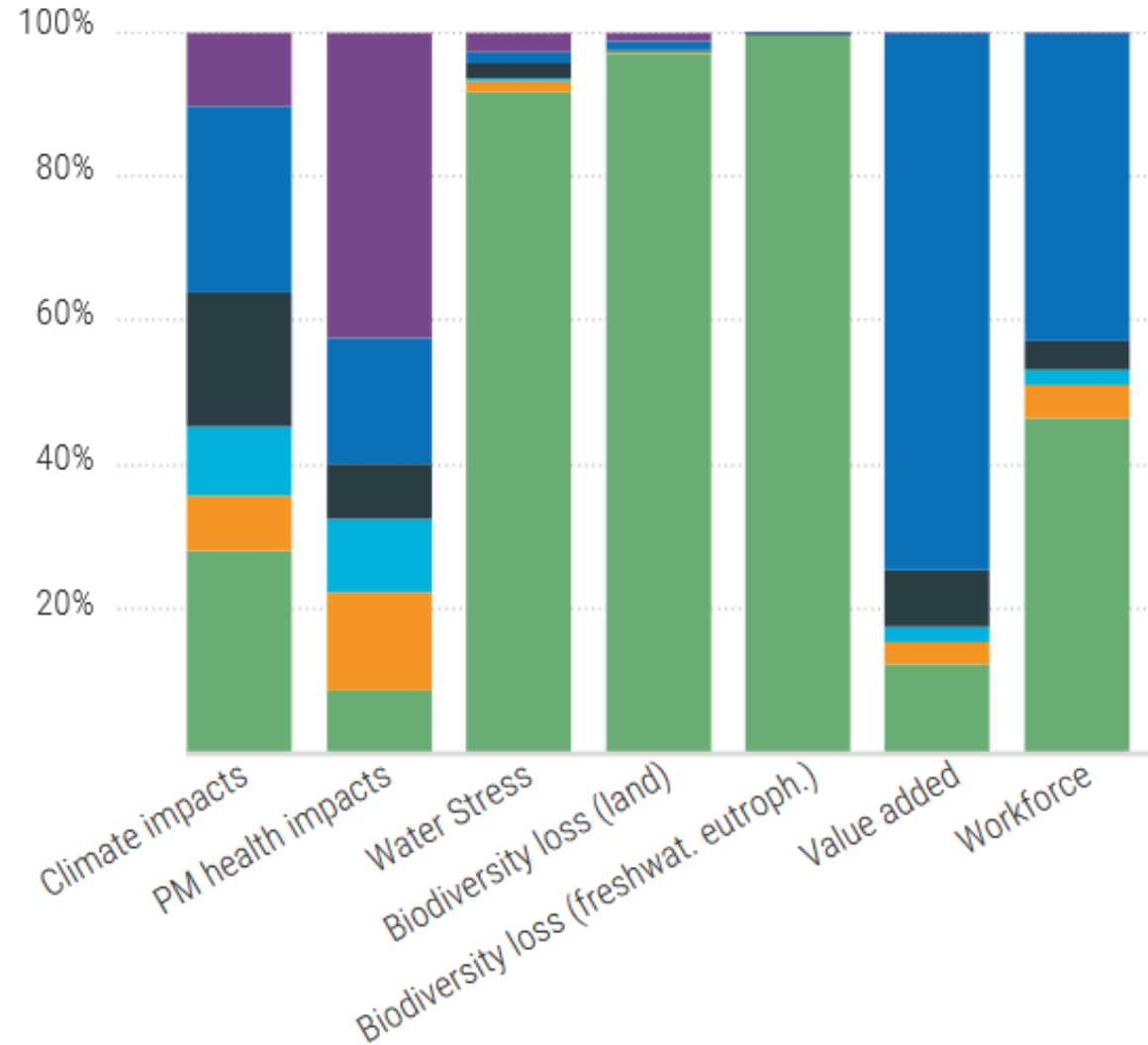
Non-food



Provisioning system*

- Food
- Built environment
- Energy: electricity used in homes
- Public mobility
- Household fuel use: heating (energy) and private mobility
- Clothing
- Education
- Water, sewage, health
- Other

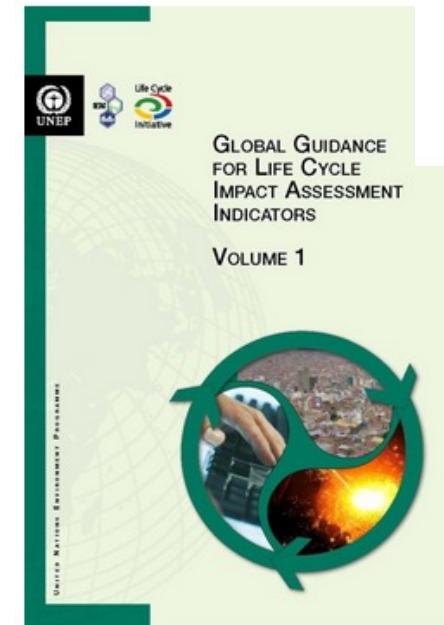
*Including embodied energy



UNEP (2024); <https://wedocs.unep.org/20.500.11822/44902>

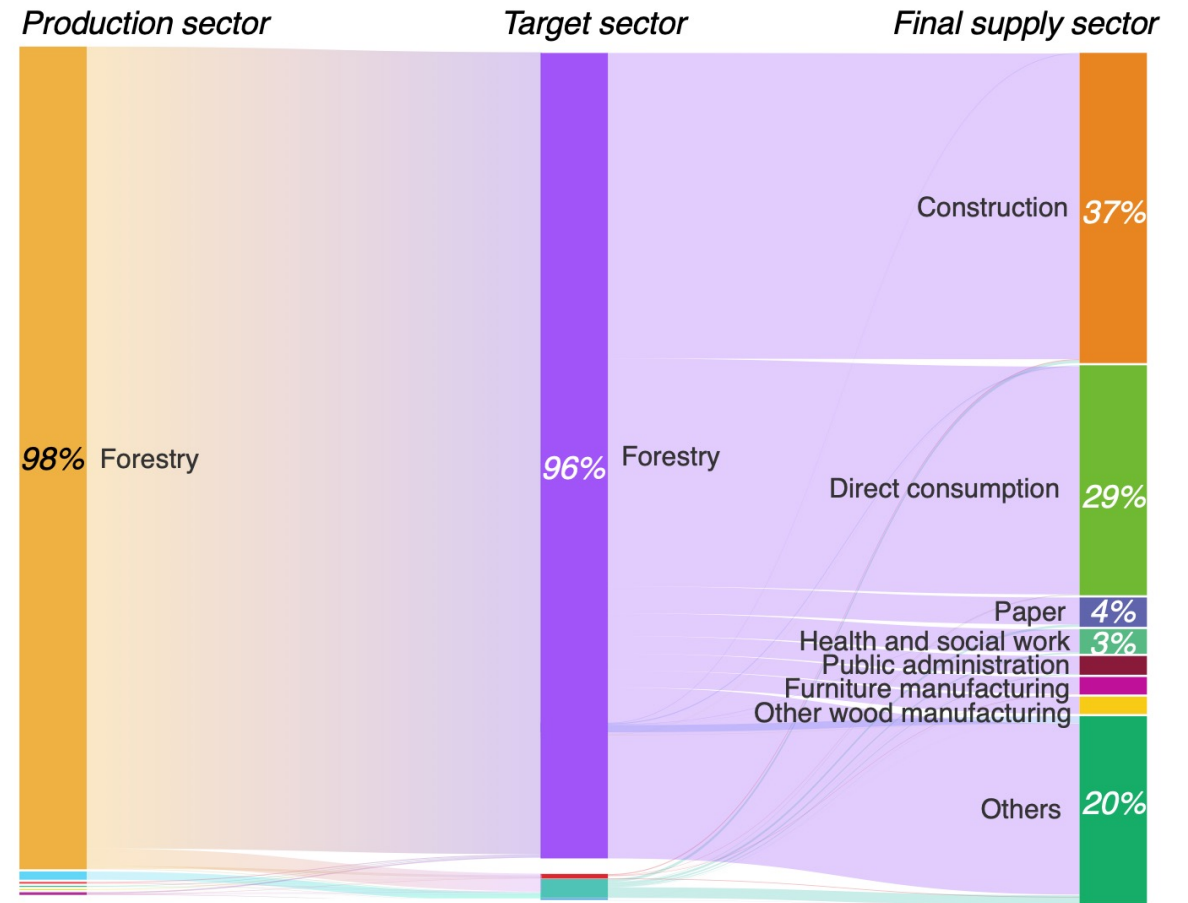
Assessing biodiversity impact of non-food Biomass

- Inventory data: EXIOBASE version 3.8.2 (Stadler et al., 2018)
- Biodiversity impacts for land use, based on UNEP-SETAC (Chaudhary et al. 2016), as analyzed in GRO 2024
- Analyzing the non-food biomass sectors using the method of Cabernard et al. 2019
 - Problem: Feed not covered as ends up in food sector
 - Separate analysis



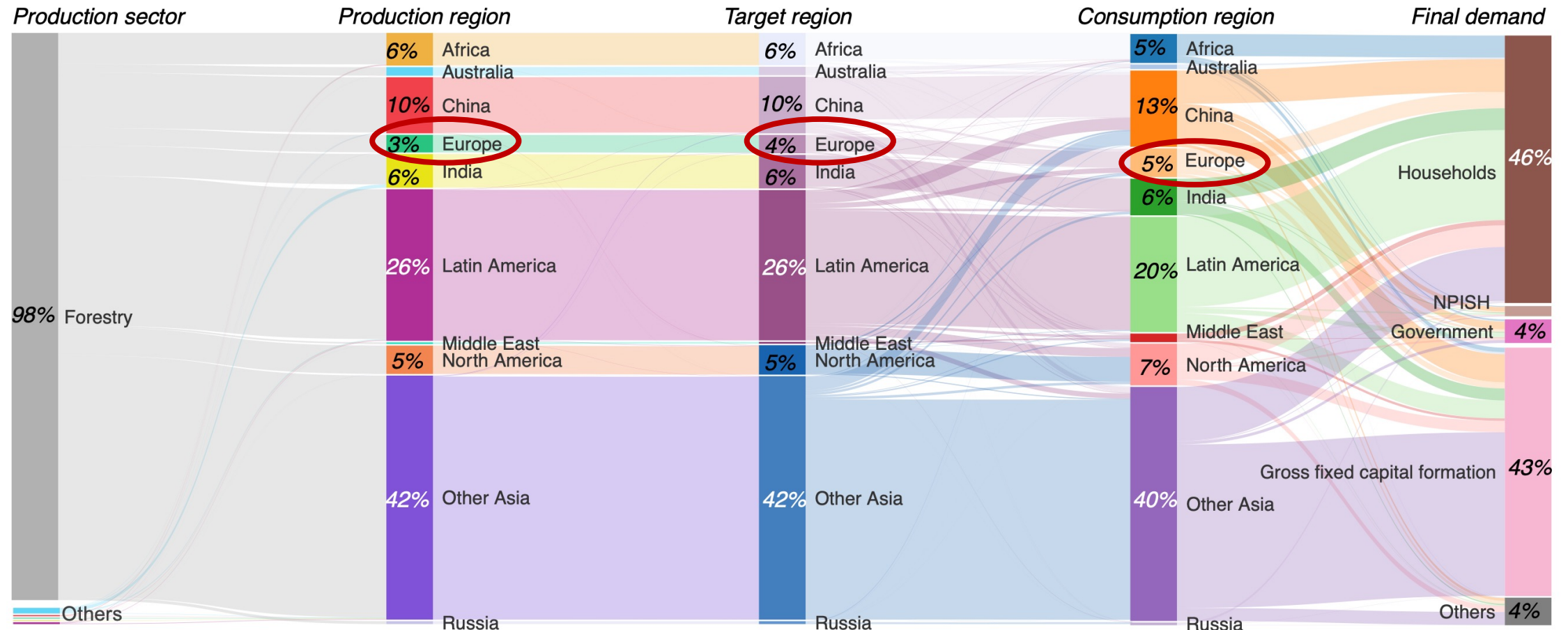
Global Picture: Biodiversity loss of land use

- The land-use-related biodiversity footprint of the non-food biomass sector is **0.06 global PDF**
 - Approximately 32% loss caused by all sectors.
- **Production perspective:** forestry, logging and related service activities accounted for 98%.
- **Final Supply perspective:**
 - Construction sector: 37%
 - Direct final use of the forestry sector: 29%
 - Paper 4%



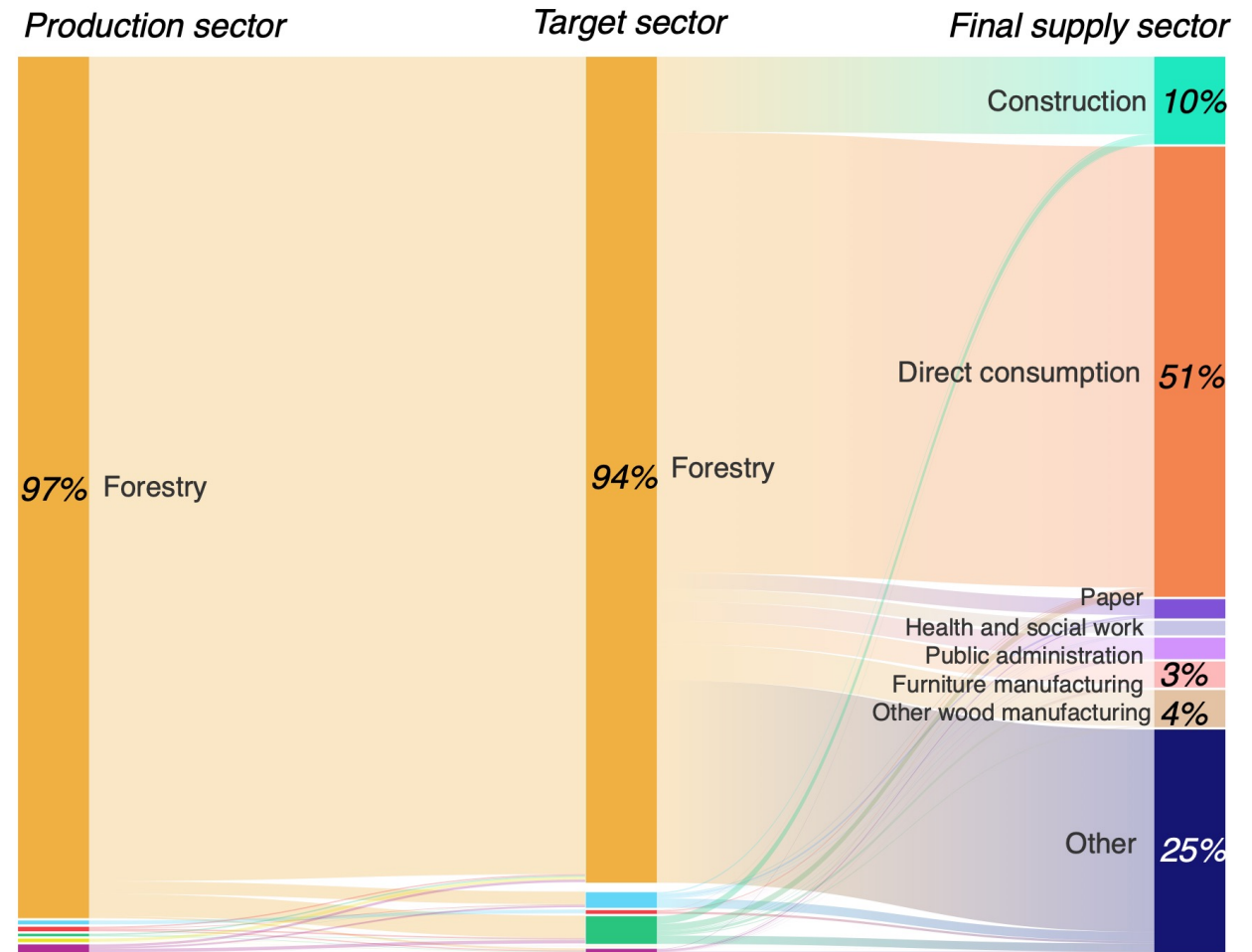
Global Picture: Biodiversity loss of land use

- A lot of domestic flows; Latin America as significant exporter (to China, North America and Europe)
- Dominated by Households and Infrastructure (Gross fixed capital formation)



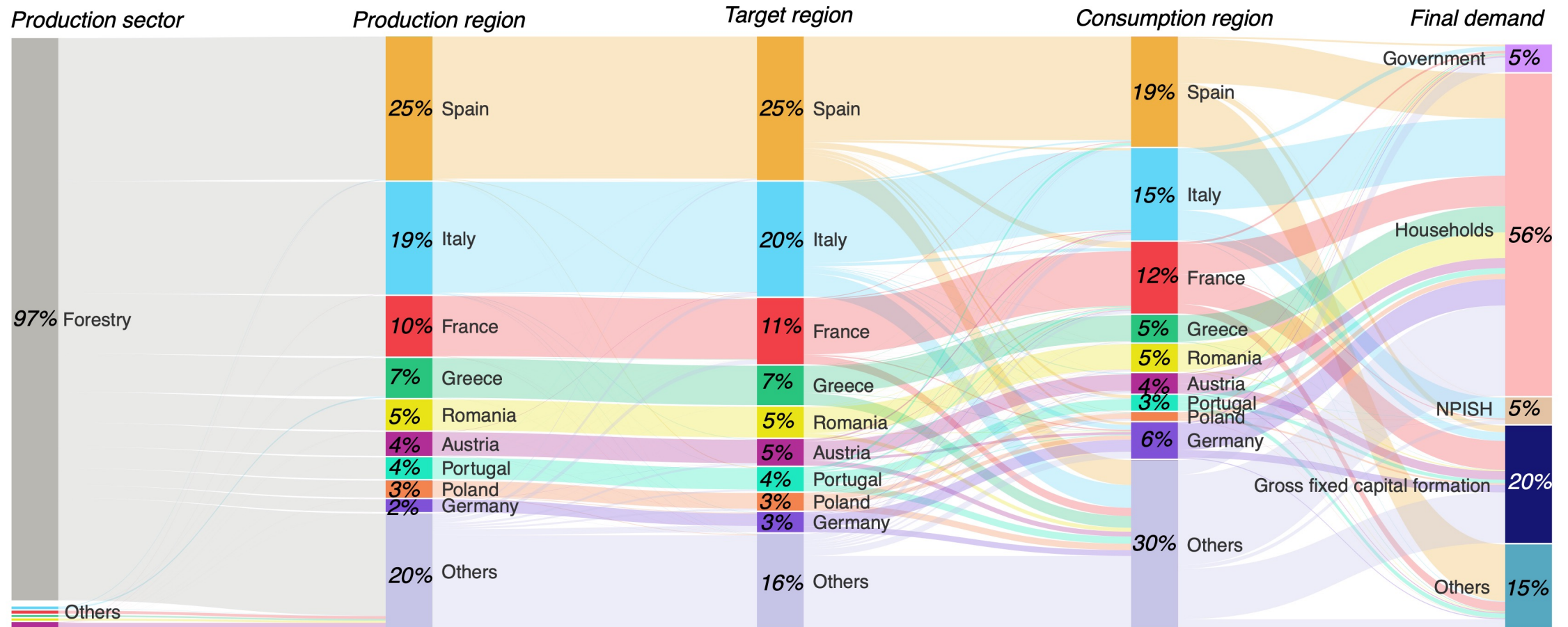
EU Non-food biomass sector: Biodiversity loss of land use

- Total EU impact: **0.0019 Global PDF** (~3% of global)
- Forestry dominates on production and target
- Final Supply
 - Mainly direct consumption
 - Construction 10%
 - Other wood products 4%
 - Furniture 3%



EU Non-food biomass sector: Biodiversity loss of land use

- A lot of domestic flows; Italy and Spain significant “exporters” of impacts
- Dominated by Housholds



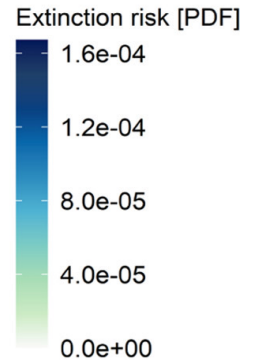
Non-food biomass summary

- Production:
 - Main leverage point is Forestry (Feed is ~5% of forestry BD impact)
 - Uncertain land use extensions for forestry
- Demand:
 - In Europe dominated by household consumption and direct use of forestry products
 - Globally: Household consumption and infrastructure dominate (construction is key)
- **Future demand** depending on:
 - Biobased economy
 - Biochar production for carbon storage
 - Restored habitats



Addressing production but not demand...

- EU Policy for reduced intensity forestry
 - Rosa et al. (2023) analyzed impacts of EU consumption for various scenarios using
 - GLOBIOM integrated assessment model
 - RCP6.5 (baseline) and RCP 2.6



RCP6.5

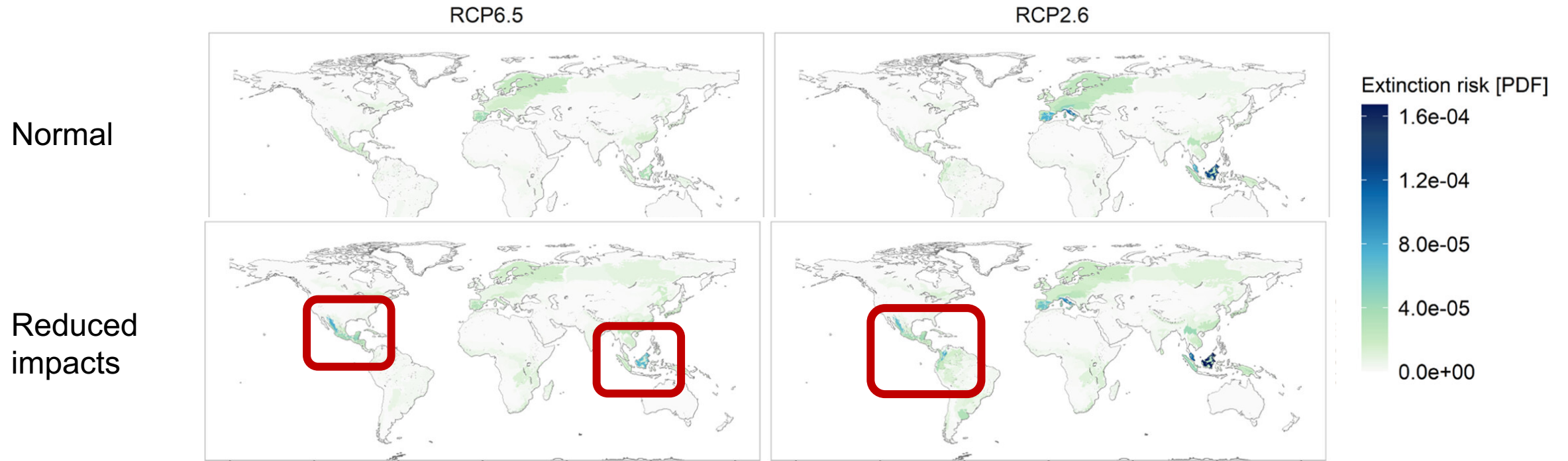


RCP2.6



Addressing production but not demand...

- EU Policy for reduced intensity forestry
 - Rosa et al. (2023) analyzed impacts of EU consumption for various scenarios using
 - GLOBIOM integrated assessment model
 - RCP6.5 (baseline) and RCP 2.6
 - Normal vs. reduced impact harvesting / set aside areas



Addressing production but not demand ...

... Is not a good idea if just done within a region:

- EU domestic impacts reduce, but footprint increases (depends on scenario and practice)
 - Trade-offs due to supply chains
 - International policies needed
- Decoupling well-being from material footprint and related impacts requires demand-side management



Addressing production but not demand

... Is not a good idea if just done within a region:

- EU domestic impacts reduce, but footprint increases (depends on scenario and practice)
 - Trade-offs due to supply chains
 - International policies needed
- Decoupling well-being from material footprint and related impacts requires demand-side management
- Besides production and consumption, **financing** is important
 - Leverage through investment, especially for future
 - Combining view on biodiversity impacts and ecosystem services dependency: “double materiality”



EUs financial investments

- EU outward investment 2022:
 - 9.4 trillion € (11.9 trillion total)
 - 42% of the world's outward investment.
- Kulionis et al (2024): Analysis of MSCI ACWI index companies:
 - ~ 3000 companies, from 23 Developed and 24 Emerging countries
 - Representative coverage of investments
 - Analysis of Biodiversity impacts using
 - GLORIA MRIO database (Lenzen et al., 2022)
 - LC-IMPACT method (UNEP-SETAC CFs for Land use)



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RESEARCH ARTICLE

JOURNAL OF INDUSTRIAL ECOLOGY WILEY

Biodiversity impact assessment for finance

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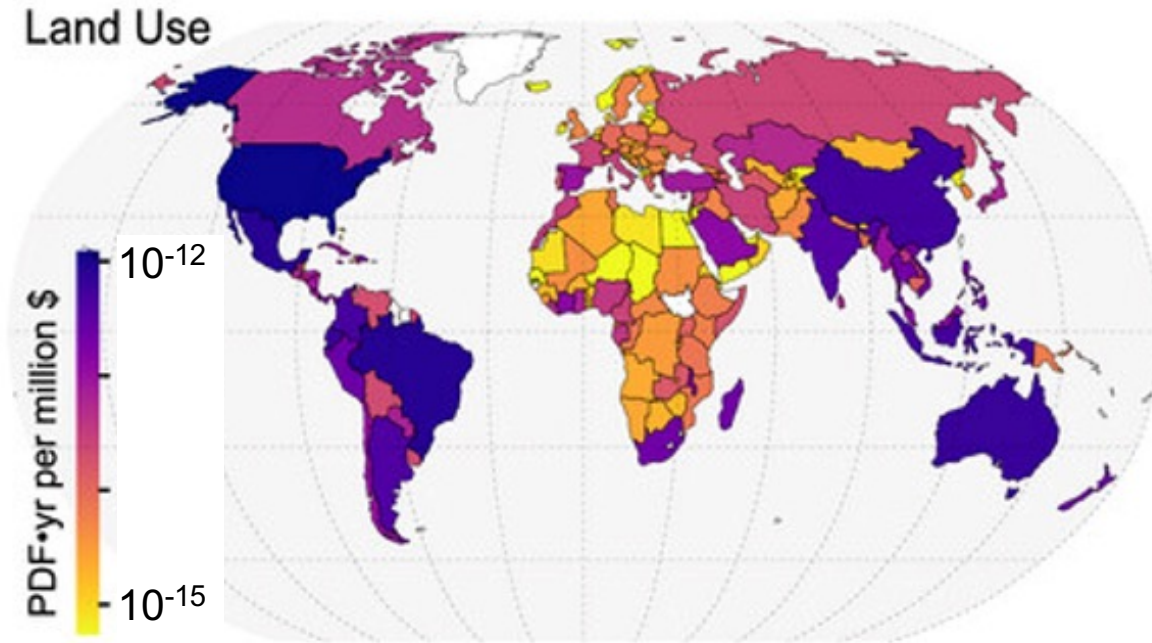
Editor Managing Review: Enrico Benetto

Abstract

Biodiversity loss, driven by human activities, significantly affects the environment, human societies, and economies. Using the extended multi-regional input-output (EEMRIO) and life cycle assessment (LCA) techniques, we offer insights into how these methodologies can be used to inform financial decisions related to biodiversity focusing on two key aspects: biodiversity impacts and ecosystem service dependencies. Our method combines spatially explicit characterization factors from LC-IMPACT with the Global Resource Input-Output Assessment (GLORIA) database to estimate biodiversity impacts. As a case study we assess the biodiversity impact of the MSCI All Country World Index (MSCI ACWI) which consist of about 3000 large- and mid-sized companies, from 23 developed and 24 emerging countries. The results demonstrate that most of the biodiversity impact is caused in the Americas, followed by Asia, despite its low representation in the index's country weight (6%). Europe shows the least impact.

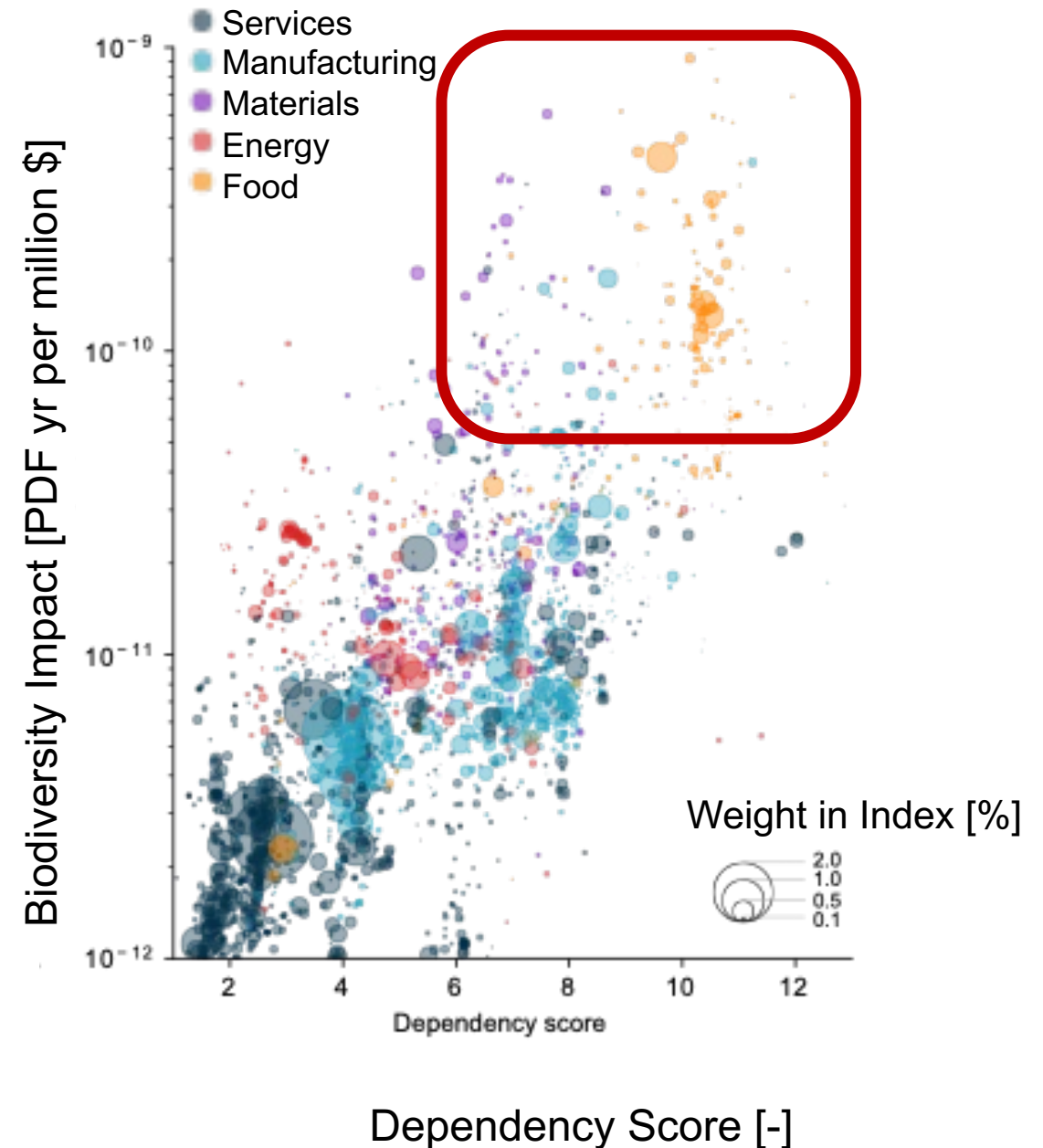
MSCI ACWI index assessment

- Biodiversity impact of land use mainly in **Americas** and **Asia**
 - Strong effect in supply chains due to
 - Intense trade
 - Differences in regionalized CFs



MSCI ACWI index assessment

- Investment in Food followed by Materials has highest impacts
- For non-food biomass:
 - Materials
 - Biobased Energy
- Benchmark against reference investments, incl:
 - Scope 4 emissions (replacement effect)
 - Research needed



Discussion: EU non-food biomass and biodiversity

- 4 general main leverage point for land use BD impacts
 - Forestry
 - Reduce biodiversity impacts of wood production
 - Materials and Construction
 - Enhance efficiency, functionality, and circularity in bioeconomy
 - Household consumption
 - Reduce demand / change products and services
 - Investment practices
 - Fixed capital formation play a major role globally
 - Replaced investment needs to be considered

Limitations to be addressed for Future Biodiversity Assessment



- Limited sector resolution of MRIO :
 - Coupling with more detailed data such as FABIO / FORBIO and TRASE
 - Enhance forest land use data
- Future scenario based on Integrated Assessment Models (IAM) have low sector and regional resolution:
 - Combination of MRIO and IAMs
 - Identify leverage points in future scenarios
 - Get better insight into sectoral structure of scenarios
- Finance and investment sector need to be addressed:
 - Better detail within sectors
 - Scope 4 emissions (replacement effect)

Other impact categories to be covered as well

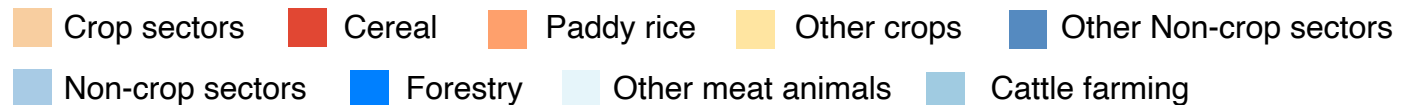
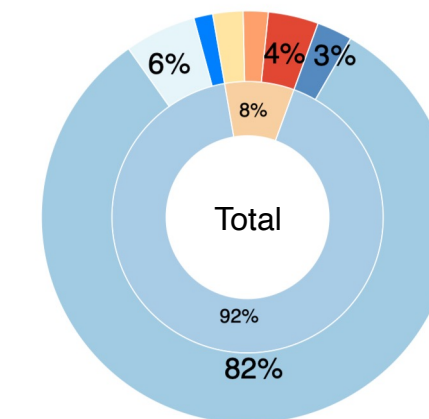
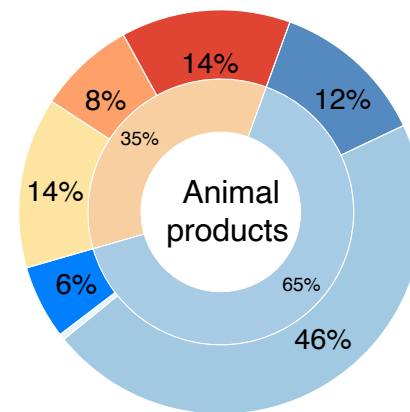
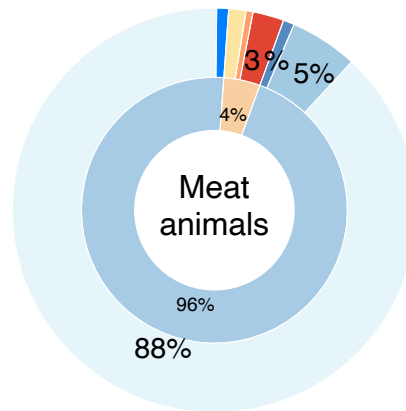
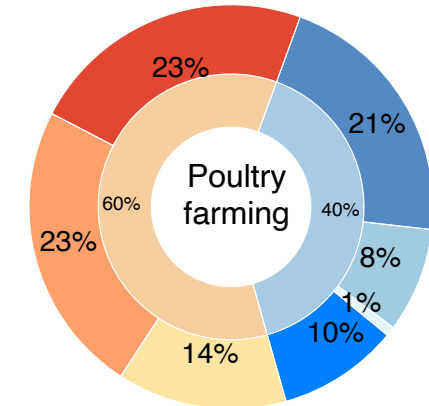
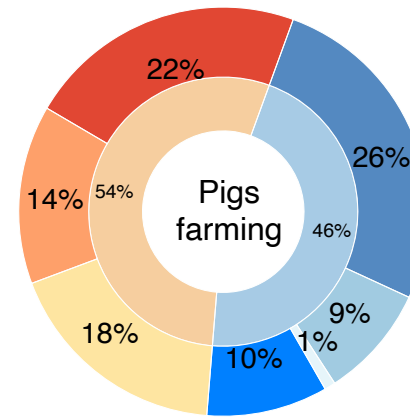
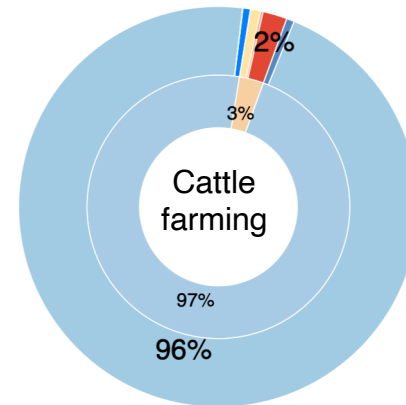
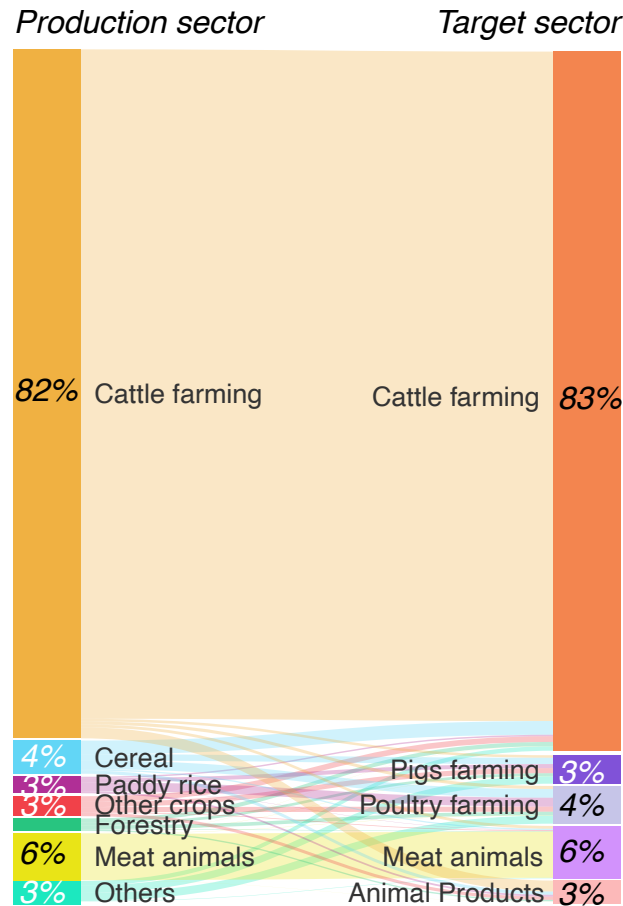
Thanks for Your Attention!

– Questions

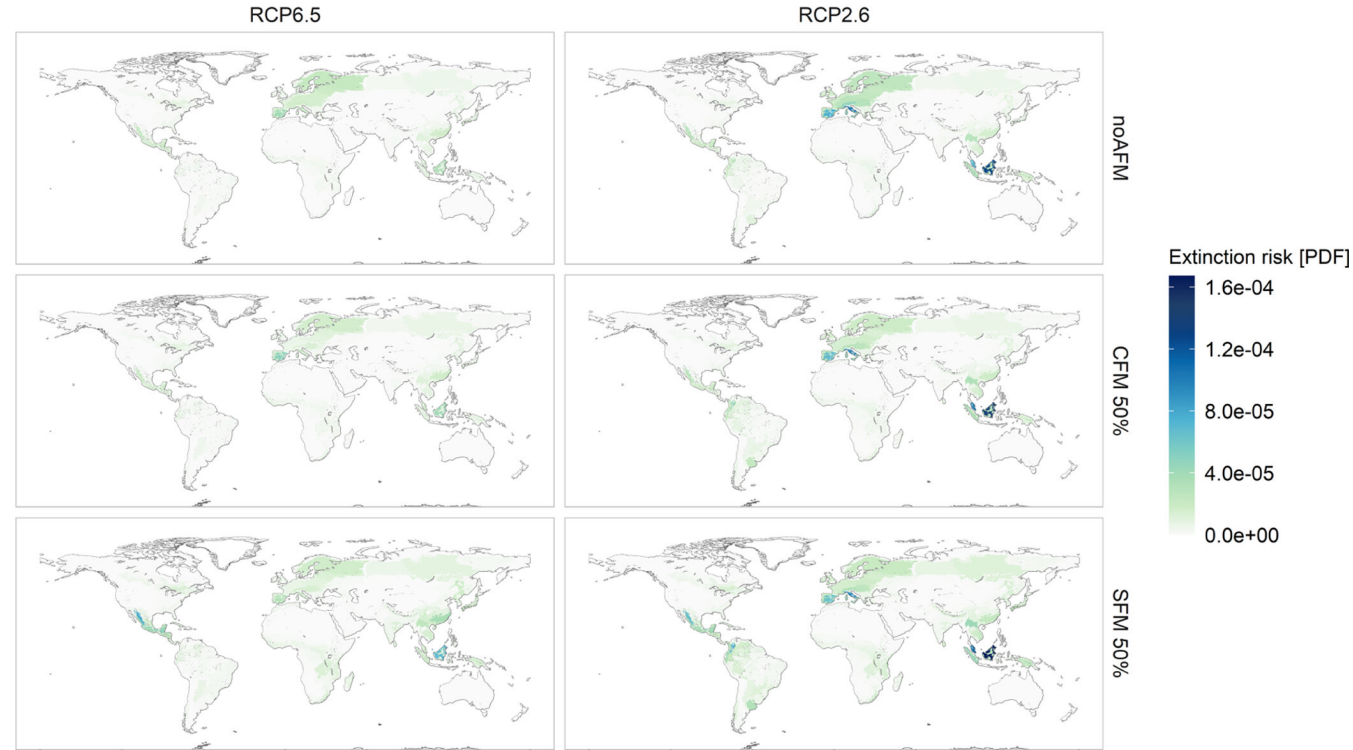


Biodiversity impact of animal production: Total 0.043 Global PDF

83% is cattle farming (mainly pasture impacts), approximately 8% of the biodiversity footprint from crop sectors
 Feed impact is 0.0034 Global PDF (5% of Forestry)



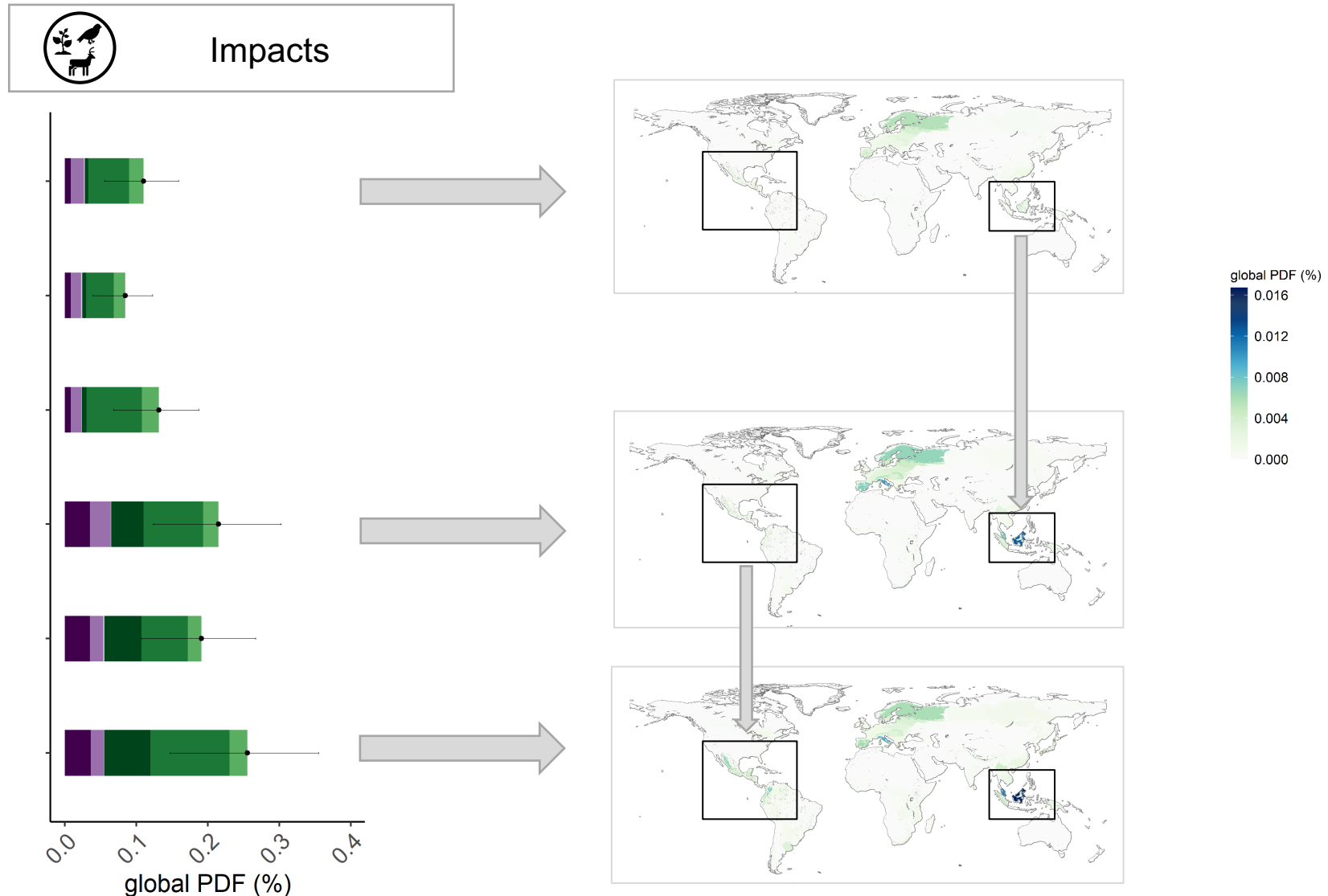
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Spatial distribution of global extinction risk in 2100 caused by demand for EU28 wood and lignocellulosic energy crops at ecoregion resolution under the two climate scenarios RCP6.5 and RCP2.6 and the most extreme alternative forest management scenarios, where half of EU28 forestland currently under forest management is converted to closer-to-nature practices or to set-asides.

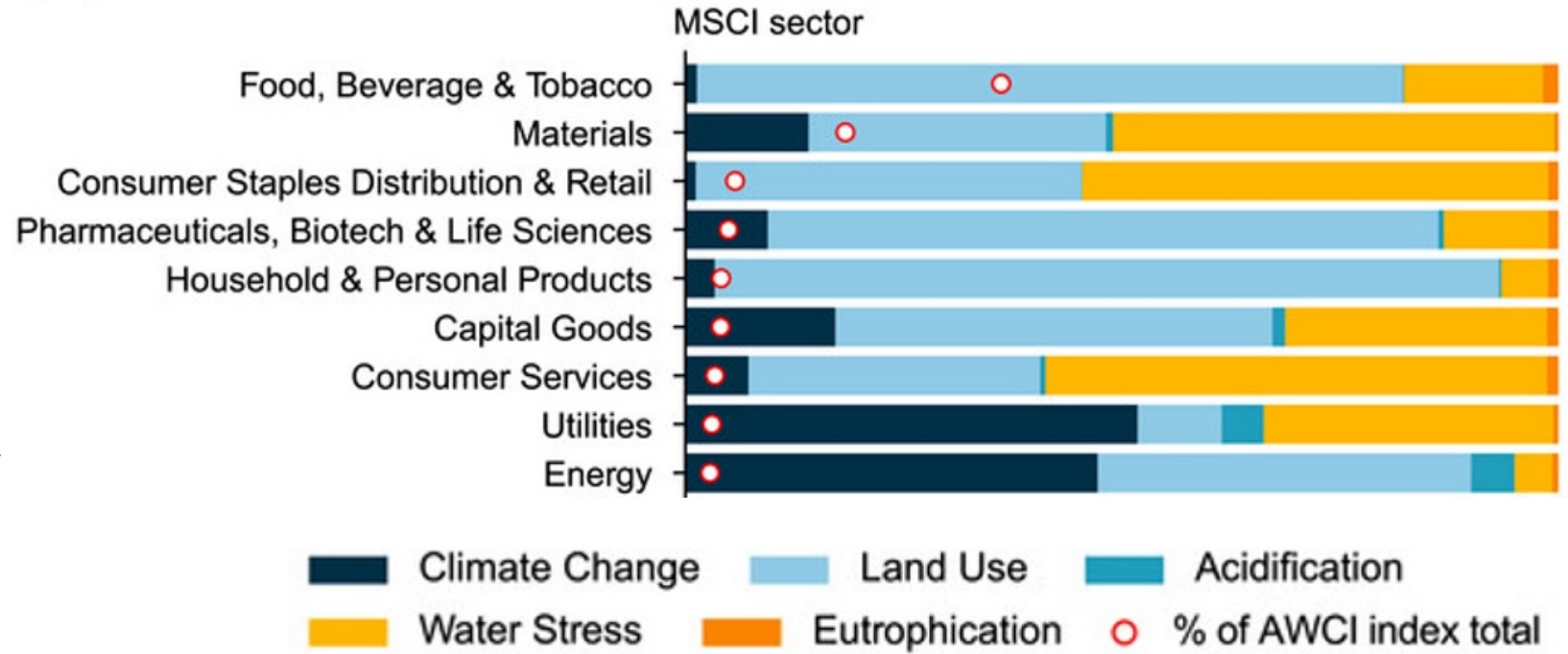
Rosa et al. 20233: <https://doi.org/10.1021/acs.est.2c07867>

Results - EU28 Forest biomass footprint



MSCI ACWI index assessment I

- Major impacts Food, Beverage & Tobacco
- Main BD loss caused by
 - 1st land use
 - 2nd water stress
 - 3rd climate change
(Utilities and Energy)



EU outward investment 2022:

€9,382 billion (**€11 883 billion total**)

In 2022, Europe was the leading outward investor in the world, accounting for more than two-fifths (42%) of the world's outward investment stocks.

Conclusions

- **Operational method** for portfolio assessment
 - MRIO with LCIA and ES assessment useful
- **Ecosystem Service** assessment needs improvements
 - Regionalization (so far global per sector)
 - Scaling of index (so far based on economic activity)
- **Net impact** of investment / portfolios need further considerations
 - Identify actual reference impact
 - beyond consequential and rebound effect
 - Avoid greenwashing with scope 4



Biodiversity gains momentum in the business world

- **Business and biodiversity assessment**
 - Impacts and dependencies



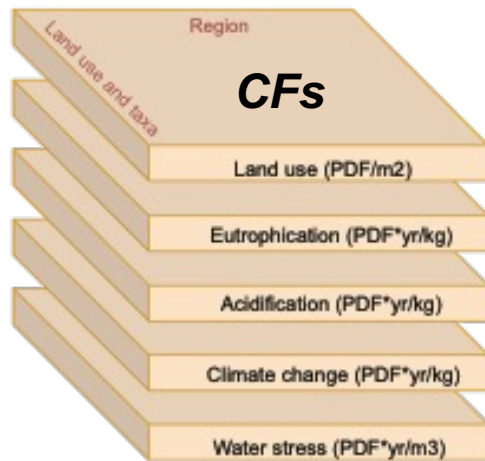
- **Taskforce for Nature-related Financial Disclosures (TNFD)**
 - Various level of risks (e.g. physical and transitional risks)
 - Biodiversity as a characteristic of Nature Assets (Values)



- **Biodiversity SBT**
 - “Measure, Set, and Disclose”



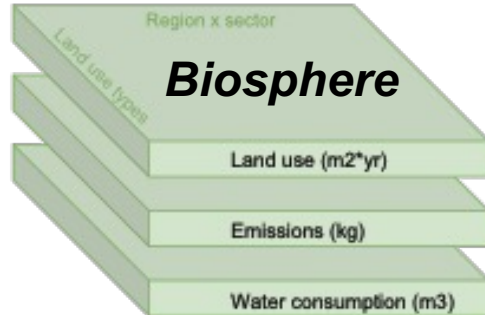
Regionalized impact assessment per sector



Regionalized LCIA

LC-Impact CFs: “core”, “average” (Verones et al., 2020)

- Land use
- Eutrophication
- Acidification
- Climate change
- Water stress



Regionalized LCI

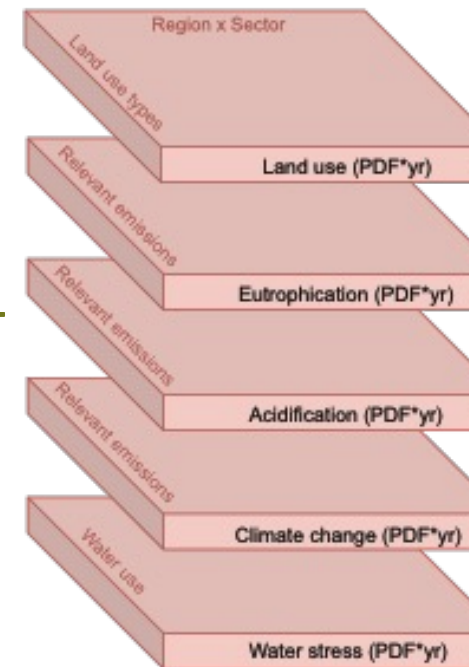
GLORIA MRIO database (Lenzen et al., 2022)

- 160 countries; 4 “rest of the world” regions
- 120 sectors



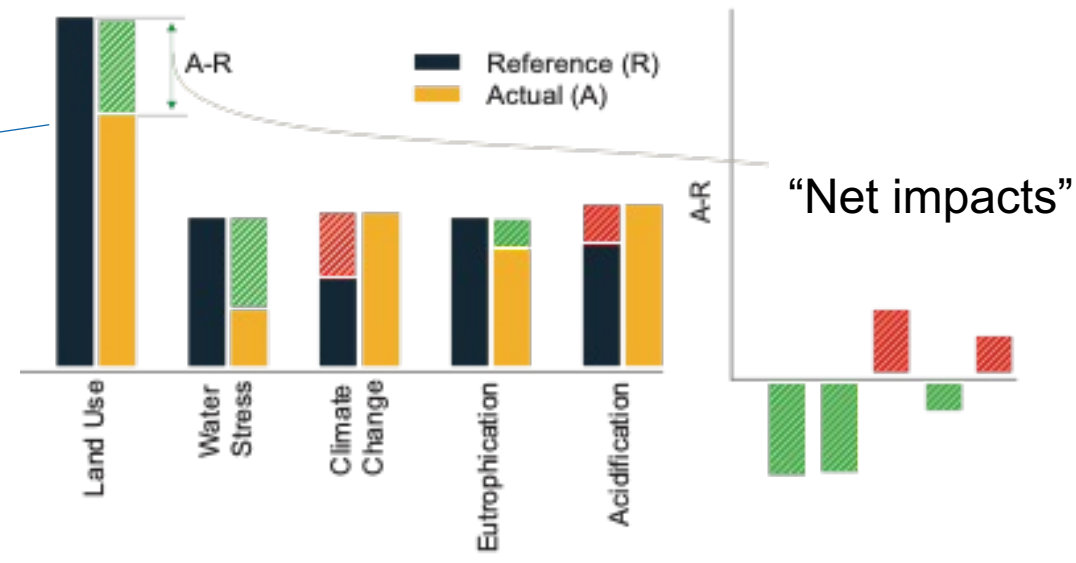
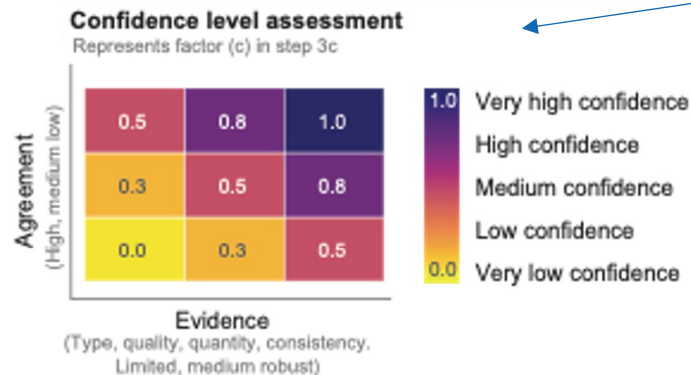
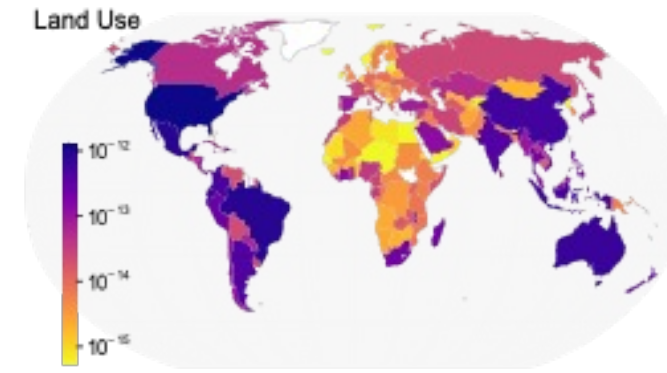
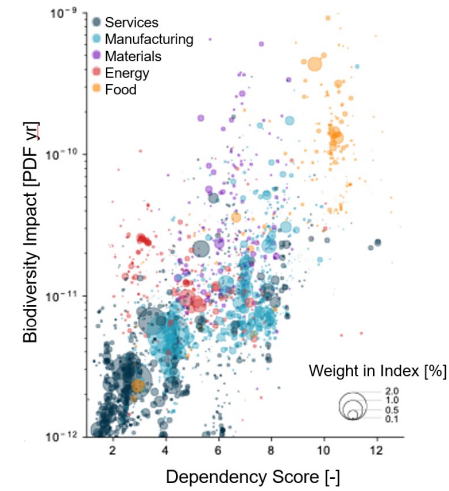
- Nitrogen and Phosphorus emissions from EXIOBASE version 3.8.2 (Stadler et al., 2018)

Impact per sector and regions



What can it be used for?

- Assessment of portfolios and specific companies
 - Quick analysis
- Benchmark against reference investments (e.g. ACWI average)
 - **Scope 4 emissions**
 - are uncertain!



“Net impacts”

