Achieving the Finance Targets of the Global Biodiversity Framework: A Scenario Approach for the United Kingdom

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Acknowledgements

We wish to thank Mike Perring (UK Centre for Ecology and Hydrology), James Vause (UNEP-WCMC), Mark Hirons (University of Oxford), Pierre Monnin (Council on Economic Policies), Josh Ryan-Collins (University College London) as well as Ian Mairs, Thomas Byrne and Ray Lone (Department for Environment, Food and Rural Affairs) for reviewing the report and providing invaluable insights.

We express gratitude to the attendees of two workshops on June and October 2025.

The authors also gratefully acknowledge Andrey Levitskiy, Allison deVries, Alison Curry, Heather Stallard, Karla-Maria Perez Blanco, Lucy Rodwell and Rachel Hayman for support on the delivery of this project.

This work was produced as part of the Agile Sprint *"How can the UK implement the finance goals of the global biodiversity framework?"* and financially supported by a grant from the Natural Environment Research Council (NERC) (grant number NE/W004976/1) as part of the Agile Initiative at the Oxford Martin School.

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Executive Summary

Nature degradation poses material financial risks to the UK economy with potential GDP losses estimated at up to 12% vs baseline by the 2030s, larger than the economic impacts of the 2008 financial crisis and the COVID-19 pandemic (Ranger et al., 2024). Nature risks stem from both domestic and international environmental degradation. Half of the UK's nature-related financial risks originate internationally, emphasising the need for international cooperation on disclosure and risk management (Ranger et al., 2024). The UK's domestic vulnerability is compounded by severe nature depletion undermining the ecosystem services on which economic activity depends.

The UK's international biodiversity footprint is also substantial, exceeding the global average in many domains, with the UK's historical and current consumption patterns creating substantial biodiversity impacts in other regions through supply chains and commodity imports. Understanding the international biodiversity impacts of UK private financial flows is a complimentary approach to the country's footprint via consumption and production. Elucidating the international biodiversity impacts of UK private financial flows highlights policy interventions necessary to realign financial flows in line with the targets of the Global Biodiversity Framework (GBF).

Realigning financial flows is also vital as global nature negative financial flows (~$7 trillion annually[1]) are more than 30 times greater than current annual funding on nature-based solutions ($200 Billion) (UNEP, 2023). Nature negative financial flows are the outcome of an economic system that explicitly and implicitly subsidises activities harmful to nature. Realigning these flows into nature positive activities is not simply about reallocating capital but also about reshaping the underlying incentives that guide economic behaviour. Policy responses aim to reduce demand for nature-damaging goods and services, and to change the incentive structures within key sectors so that producers are rewarded for adopting practices with lower environmental impact (IPBES, 2024). In essence, public policy is seeking to align private finance with nature positive objectives, encouraging "economic activity done differently," rather than redirecting financial flows.

AIMS AND OBJECTIVES

This report aims to assess the impact of privately UK-financed activities (UK supply chains, overseas financing and foreign direct investment) on biodiversity and the potential impacts of interventions to align the UK's international finance flows with the GBF. This task is achieved through the following five key objectives, focused on:

1) **Mapping international financial flows** of the six largest UK banks by country and sector.
2) **Assessing the portfolio dependencies and risks** from global ecosystem degradation.
3) **Evaluating portfolio impacts** on ecosystem services worldwide.
4) **Exploring scenarios** of nature action and geopolitical dynamics affecting financial flows.
5) **Testing policy interventions** — such as subsidy reform— and their influence on nature-related financial outcomes.

[1] This figure is considered an underestimate as it only focusses on direct impacts.

KEY FINDINGS

1) UK International financial flows mapping

Mapping the portfolios of major UK banks reveals that financing is concentrated in services and manufacturing, with electricity and utilities forming a notable but smaller share. Transport, construction, agriculture, and mining occupy limited portions of portfolios but carry outsized biodiversity relevance due to land-use change and resource extraction.

Geographically, UK financial exposures are dominated by the United States, followed by advanced economies in Europe and Asia, and smaller yet ecologically significant holdings in Brazil and other emerging markets. Because nature-related risks are concentrated in manufacturing and services, these sectors are the primary conduits through which ecological degradation threatens the financial system.

2) Dependencies and Risks from Ecosystem Degradation

We analysed the dependencies on and risks from ecosystem degradation. Using the ENCORE database, we assessed how strongly different sectors depend on various ecosystem services, and we overlaid these dependencies with country-specific hazard and vulnerability indices. This allowed us to distinguish between dependency (exposure) and risk (hazard, vulnerability and exposure). **Financial flows depend heavily on mass stabilisation and erosion** control, but since those ecosystem services remain relatively intact in many regions, the associated financial risk is low. In contrast, we found **the highest nature risk stemming from flood and storm protection, surface water, groundwater, and climate regulation**.

3) Portfolio Impacts on Ecosystem Services

UK-financed activities significantly affect ecosystems already heavily degraded**. Soil quality, pest control, climate regulation**, **mediation of sensory impacts,** and other key ecosystem services are being undermined by sectors financed by UK banks. Across ENCORE's thirteen environmental pressure categories, the most significant pressures from UK-financed activities include **noise and light disturbance, toxic pollution to soil and water, water extraction, greenhouse-gas emissions, and land conversion.** Continued financial support for damaging activities threatens to accelerate biodiversity loss while simultaneously increasing the financial system's exposure to those risks.

4) Explorative scenario Analysis: Nature Action and Geopolitics

An exploratory scenario analysis assessed potential future dynamics under four combinations of nature action and geopolitical cooperation: **green cooperation** (coordinated, alignment-based nature action), **grey cooperation** (coordinated, risk-based action), **green protectionism** (fragmented, alignment-based action) and **grey protectionism** (fragmented, risk-based action). Guided by the 23 GBF targets, researchers identified **90 interactions** between finance and biodiversity goals, grouped into **30 intervention clusters.** These span direct (e.g. financing conservation), indirect (e.g. influencing supply chains), and mixed roles for finance. The interconnections underscore that only a systemic, multi-sectoral approach can meet GBF objectives.

5) Impacts of Subsidy Reforms and a Global Plastics Treaty

Under the 'green cooperation' scenario and assuming that public-finance shifts affect private-finance profitability and capital allocation by sector, the study modelled the impact of four interventions using ENCORE:

- **Fossil fuel subsidy reform**, modelled as reduced demand for coal and boosted renewable energy investment, lowering freshwater use for direct operations and decreasing abiotic resource extraction for upstream value chain. However, renewable expansion increases demand for critical minerals, posing new risks of deforestation linked to mining.

- **Fertiliser subsidy reform** reduced nutrient emissions by around **0.75%** (direct and upstream) across portfolios (maximum of ~2%, bank 6), with greater direct reductions in the UK and largest upstream impacts in the US, China, India, and Indonesia — regions with high fertiliser overuse.
- **Fisheries subsidy reform**, yielded the largest declines in **biotic resource extraction** by around 0.5% (direct) and 1.45% (upstream), curbing overfishing pressures. Most impacts occurred indirectly through retailers and distributors financed by UK banks. Major exposure reductions occurred in China, Indonesia, the UK, and Norway.
- **Plastic-pollution reform** (modelled through the introduction of a Global Plastics treaty) generated the most significant overall benefit — cutting **solid-waste generation by 13% (direct)** and **12% (upstream) (maximum ~16%, bank 1)**. The largest reductions appeared in the US, UK, and China, with further gains expected once production-phase impacts are considered.

6) Impacts of green financial policy reforms

A complementary analysis building on Marsden et al. (2024) methodology based on an existing dataset of private financial flows linked to critical ecosystems —the **Amazon rainforest, boreal forests, tropical peatlands, and mangroves**— assessed the potential effect of **mandatory nature-related disclosures** for financial institutions; **higher capital requirements** for environmentally harmful exposures; **greener collateral rules;** and **allocative credit policy** to discourage lending to high-impact sectors.

In an exploratory scenario analysis based on the same 'scenario worlds', we find that these measures could significantly reduce financing to activities linked with land-use change, though effectiveness varies by tool, jurisdiction and sector. The analysis underscores that **international coordination and robust regulatory standards** are essential to prevent financial "leakage" — where disinvestment in one jurisdiction shifts harmful activities elsewhere.

In "green" scenarios (alignment-based policies), flows to nature-negative sectors decline substantially; in "grey" (risk-based) scenarios, effects are more limited even under global coordination. Under "protectionist" scenarios where the UK acts independently, the largest impacts occur in Brazil's Amazon and Indonesia's peatlands. A "green protectionist" stance — ambitious alignment-based policies by the UK alone without global coordination — reduces financial flows to the Amazon by **up to 8%**. A **greater impact could be achieved when the UK, EU and other nodes strategically pursue an ambitious, alignment-based approach rather than a globally coordinated, risk-based approach**: for the Amazon rainforest, a strategic 'green' protectionist scenario cuts flows by 30% versus 20% in the 'grey' cooperative scenario.

For other ecosystems such as tropical peatlands, mangroves, and boreal forests, partnering with key host nations (e.g., Indonesia and Canada) magnifies benefits and ensures fairness, aligning with GBF finance targets while avoiding unintended consequences.

Together, our analyses demonstrate the scale of improvement possible when governments and financial regulators coordinate to align fiscal, trade, and financial/monetary policies with biodiversity goals.

LIMITATIONS AND OPPORTUNITIES

Changing incentives to address nature negative impacts from economic activities would lead to both a decrease in nature negative financial flows (by reducing return on investment for example) and changing production methods at the sectoral level ultimately decreasing nature negative impacts (IPBES, 2024).

Despite the limitations in our modelling approach, we believe our work highlights the potential of combining environmental and financial datasets to illuminate the links between finance and nature. Our study therefore serves as both a methodological experiment and a call to action. **Long-term sustained growth cannot be achieved if there are not supporting resources (ecosystem services) to enable it.** We show that UK finance both depends on and damages the ecosystems on which it relies. We demonstrate that feasible policy interventions — from subsidy reform to prudential regulation — could realign financial flows with ecological integrity. Further research must refine these models, expand data coverage, and explore the complex feedbacks between natural systems and financial ones.

RECOMMENDATIONS

Based on our analysis, we argue that the UK government has several concrete opportunities to reduce damaging financial flows including: **mandatory nature-related disclosures; capital and collateral requirements reflecting environmental risk; green allocative credit policy steering private lending away from activities damaging nature; harmful subsidies reform and fiscal incentives to discourage environmentally harmful activities and reallocate funds to biodiversity protection.** Whilst acknowledging the UK may have limited direct agency on the enabling environment of countries where its international financial flows are allocated, pursuing international coordination on these interventions would also be beneficial given that half of its nature-related financial risk originates abroad.

In sum, our results show that the UK's financial system exerts significant global ecological pressure. Yet the same system, if steered through smart regulation, could become a driver of the transition toward the ambitious goals of the GBF.

1. Introduction

1.1. Background

The Kunming-Montreal Global Biodiversity Framework (GBF) "*sets out an ambitious pathway to reach the global vision of a world living in harmony with nature by 2050*" including 23 targets for 2030 and 4 goals for 2050: to protect and restore nature (Goal A), prosper with nature (Goal B), share benefits from genetic resources fairly (Goal C) and invest and collaborate (Goal D) (CBD, 2022).

The financial system has a critical role to play in tackling the biodiversity loss crisis and meeting the GBF targets. Environmentally harmful finance flows were conservatively estimated at $7 trillion annually, over 30 times current annual funding on nature-based solutions ($200 Billion) (UNEP, 2023). Whilst in GBF targets 14, 15, 18 and 19 (figure 1) the role of finance is more apparent, financial decisions made on an everyday basis can either contribute to or hinder achieving all the targets set by the Kunming-Montreal Global Biodiversity Framework. Target 16 'Enable Sustainable Consumption Choices To Reduce Waste and Overconsumption' is an example of this.

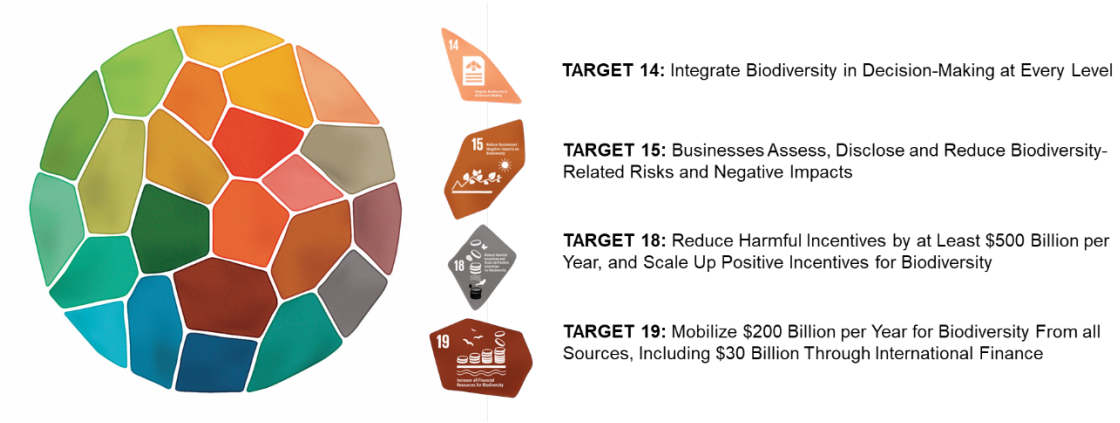

Figure 1: The 'finance' goals of the Kunming-Montreal Global Biodiversity Framework.

Source: Authors based on GBF branding toolkit.

The double materiality between nature and finance (Oman and Svartzman, 2021), as well as the myriad of transmission channels through which nature and the financial system interact necessitates a systems approach (NGFS, 2023). A mosaic of 'greening finance' (addressing nature-negative financial flows) and 'financing green' (scaling up nature positive investments) approaches and a systemic understanding of the interactions between these are required to meet the GBF targets in the next 5 years.

Implementing the GBF necessitates a 'whole of government and the whole of society' approach (CBD, 2022) at both 'top-down' and 'bottom-up' levels. Financial institutions operate under a landscape defined by domestic and international financial regulations, fiscal and economic policy, environmental policies and regulations. They are also subject to market preferences which are influenced by the former and driven by consumers.

1.2. Need for this assessment

The UK is one of most biodiversity depleted countries in the world: "with nearly one in six of the UK's terrestrial and freshwater species now being threatened with extinction (Burns et al. 2023)" (Department of Agriculture, Environment and Rural Affairs (DAERA), Scottish Government, Welsh Government and UK Government, 2025) which poses domestic risks to the UK economy. Domestic nature degradation diminishes the provision of critical ecosystem services (e.g. clean and abundant water, healthy soil, clean air) for society and the economy. In addition, an analysis on the materiality of nature-related financial risks to the UK has shown that half of the risk from nature originates internationally (Ranger et al., 2024). Ultimately, 100% of the economy is dependent on nature (Dasgupta, 2021).

Implementing a 'whole of government and the whole of society' approach (CBD, 2022) is not only a way for the UK to meet its commitment to achieving the GBF targets by 2030, but also a strategic move to safeguard biodiversity and the UK economy. Long-term sustained growth cannot be achieved if there are not supporting resources (ecosystem services) to enable it. Recent assessments have shown that the UK is falling behind on its progress towards the targets in the Environmental Improvement Plan. The Office of Environmental Protection finds that for species abundance and habitat restoration targets, several trends remain deteriorating or flat, and prospects of meeting the targets are "largely off track." (OEP 2025). In the 2023–24 review, of 13 Environment Act targets assessed, only three showed "good progress," nine "mixed progress," and one "limited progress." The government acknowledges that woodland creation needs acceleration and that nature-friendly farming and habitat restoration must scale up to contribute meaningfully to overall biodiversity conservation targets.

Understanding the biodiversity impacts of international financial flows is an important precursor to achieving the finance-related targets of the GBF. Particularly, Targets 14, 15, 16, 18 and 19, relevant to the biodiversity impacts of businesses, financial institutions, and the public sector. Mapping international financial flows can serve to inform policy interventions necessary to progress towards achieving the goals of the GBF. For example, mapping the UK's nature-related risks identified the need for international cooperation on business disclosure and risk management, as half of these financial risks come from overseas through supply chains (Ranger et al., 2024).

The international biodiversity footprint of the UK is also substantial, exceeding the global average in many domains (Jennings et al., 2021) with consumption exceeding planetary boundaries (Green Alliance, 2021). Notably, as a developed economy the UK has had a disproportionate impact on global biodiversity historically and (Jennings et al., 2021) through the UK's historical and current consumption patterns creating substantial biodiversity impacts in other regions through supply chains and commodity imports particularly from the global South (Hickel et al., 2022). The UK would need to decrease its footprint on consumption and production by at least 75% to remain within planetary boundaries (Jennings et al., 2021). Understanding the international biodiversity impacts of UK private financial flows is a complimentary approach to the country's footprint on consumption and production. Elucidating the international biodiversity impacts of UK private financial flows highlights policy interventions necessary to realign financial flows in line with the targets of the GBF.

Realigning financial flows to achieve the targets of the GBF is necessary to close the financing gap between investment in biodiversity conservation and financial flows detrimental to biodiversity (Deutz et al., 2020). Alongside upscaling private finance for biodiversity, the repurposing of harmful public financial incentives to increase public investment in biodiversity will be imperative (Deutz et al., 2020; UNEP, 2023). Government

subsidies which are harmful to biodiversity are estimated at around four times larger than the total positive biodiversity finance flows (Deutz et al., 2020). Even in the highest projected scenario for increased investment in biodiversity, the financing gap will not be closed without reform of harmful subsidies (Deutz et al., 2020). Hence, repurposing harmful public finance is a crucial component of the analysis.

This report aims to assess the impact of privately UK-financed activities (UK supply chains, overseas financing and foreign direct investment) on biodiversity and the potential impacts of interventions to align the UK's international finance flows with the GBF, and explore a variety of methodological approaches for estimating the impact of achieving policy targets aligned with the GBF.

Section 2 maps the international financial flows of the six largest UK banks (loans, bond and equity) to different countries and economic sectors. Section 3 assesses the UK international financial flows dependencies and risks from and impacts on ecosystem services degradation globally. Section 4 introduces an explorative scenario approach to assess how the impact of the UK international financial flows could change under different nature action and geopolitical dynamics by focussing on eight intervention groups: multinational aid; increase gender equality for biodiversity action; reducing harmful subsidies for biodiversity; scaling up nature positive financial flows; increasing protected areas; reduce nature negative activities; green policy enabling tools and monetary and prudential policies. Section 5 introduces a methodological approach to explore the effect of four interventions on the impact of the UK international financial flows: harmful subsidies reform for three sectors —energy (section 5.2.1.); agriculture (section 5.2.2.); fisheries (section 5.2.3.)— and the implementation of a Global Treaty on pollution (5.2.4). Section 6 analyses the role of a set of green policy enabling tools and monetary and financial policies (mandatory climate- and nature-related disclosures; increasing capital requirements for environmentally harmful activities; greening collateral requirements and quantitative or allocative credit policy) in the financial flows of companies linked to land-use change and degradation in specific ecosystems: Amazon rainforest (Brazil), boreal forests (Russia, Canada), tropical peatlands (Indonesia), and mangroves (Indonesia). Section 7 concludes with a discussion and a set of recommendations for the UK.

2. Mapping the UK international financial flows

Understanding the international financial flows of the UK is critical for assessing the country's role in shaping global economic and environmental outcomes. As one of the world's most important financial centres, the UK intermediates vast sums of capital across borders, influencing investment patterns, resource use, and biodiversity impacts well beyond its own territory. Mapping these flows provides not only transparency around where UK-financed activities are concentrated, but also a foundation for identifying opportunities to align financial practices with sustainability goals, particularly in relation to biodiversity protection under the Kunming-Montreal Global Biodiversity Framework.

To contextualize these financial flows, it is essential to distinguish between direct (Scope 1) and indirect (Scope 3) financial activities. While most UK bank financing is directed toward developed countries—primarily the UK and the United States—a significant share, albeit still concentrated in advanced economies, is deployed overseas to developing countries. This distribution underscores both the global character of the City of London and the international reach of UK financial institutions. In this study we focus on the cross-border dimension, and specifically on the portfolios of the six largest UK banks, whose combined balance sheets represent the

majority of the sector's international exposures. Our dataset covers roughly 78% of overseas financing[2], ensuring that the analysis captures the systemically most relevant institutions and the main channels through which UK finance shapes biodiversity outcomes abroad (Bank of England, 2024).

2.1. Methodology

First we build on existing work by Ranger et al. (2024) to map the international financial flows of the six largest UK banks to different nations using data collected from analysing their Pillar 3 reporting to the Bank of England and global input-output models to assess geographical and sectoral distributions of financial flows (following the methodology of Ranger et al. (2024) and O'Donnell et al. (2025)).

To assess the dependencies, risk and global footprint of UK financed activities for the 6 largest banks, we switched from loan only data from Pillar 3 reports used in previous assessments of the impacts of UK banks to loan, bond and equity data from Bloomberg and DealScan. It provides much larger coverage of regions with much fewer assumptions than Pillar 3.

To quantify the sectoral and regional composition of the bond and equity portfolios held by the six largest UK banks, we used data from the Bloomberg Terminal. This dataset provided partial exposure information, disaggregated by both country and sector, and categorised assets across fifteen broad industry groupings. To integrate these classifications into our modelling framework, we developed a concordance table to map Bloomberg's sector categories to the more detailed and internationally standardised EXIOBASE sector taxonomy. Once this alignment was established, we applied a proportional allocation method to distribute exposures across more granular sectoral categories within each country, using national economic output data to guide the disaggregation. This two-tiered mapping—by sector and by country—ensured that the resulting exposure profiles reflected the economic structures of the specific regions in which the investments were located.

Coverage in the Bloomberg data varied by institution, but for all six UK banks, it represented a meaningful share of their total bond and equity holdings. To address residual gaps in coverage, we assumed that the subset of securities captured by Bloomberg was representative of the broader sectoral and regional composition of each portfolio. This assumption is supported by the fact that Bloomberg primarily includes the most liquid and strategically significant holdings. Based on this representativeness, we scaled the observed exposures to match the total value of bond and equity portfolios reported on each bank's balance sheet. Since EXIOBASE reports all values in euros, we converted financial data from domestic currencies using historical exchange rates corresponding to each bank's reporting period. This ensured consistency and comparability across institutions and alignment with the units used in our modelling framework. All financial data used in this study corresponds to reporting year 2024.For the loan portfolios, we relied on data from the DealScan database, which tracks syndicated loan transactions globally. Although DealScan does not cover the entirety of bank lending activity—excluding smaller, non-syndicated loans—it captures the largest and most systemically relevant exposures. Accordingly, we treated this subset as broadly indicative of the overall sectoral and regional risk structure of each bank's loan book. While this introduces some uncertainty, the omission of smaller loans is less problematic, as these tend to mirror the sectoral distribution of larger loans and represent limited individual exposure.

Unlike Bloomberg, DealScan classifies borrowers using the Standard Industrial Classification (SIC) system, which differs from the EXIOBASE taxonomy. To ensure consistency across asset classes, we developed a

[2] Whilst the dataset includes the banks domestic exposures, as the majority of the portfolio is overseas we refer to the dataset as 'UK international financial flows'.

concordance table mapping SIC codes to EXIOBASE sectors. This required a detailed reconciliation of industry definitions and aggregation levels to ensure conceptual coherence. Finally, we scaled the observed syndicated loan exposures to align with the total value of loans reported on each bank's balance sheet, allowing us to construct comprehensive risk exposure profiles despite the partial nature of the underlying data.

2.2. Results

In this section we show how the choice of data source shapes the estimated size of UK banks' international portfolios. Figure 2 presents the total portfolio values for the six largest UK banks, comparing exposures derived from Pillar 3 loan disclosures with those constructed from Bloomberg and DealScan, which include loans, bonds, and equities. The results show that portfolios based on Bloomberg and DealScan are consistently larger, in some cases more than doubling the loans exposures reported in Pillar 3. This demonstrates both the significance of bond and equity holdings in shaping banks' international footprint and the limitations of analyses restricted to loan data alone.

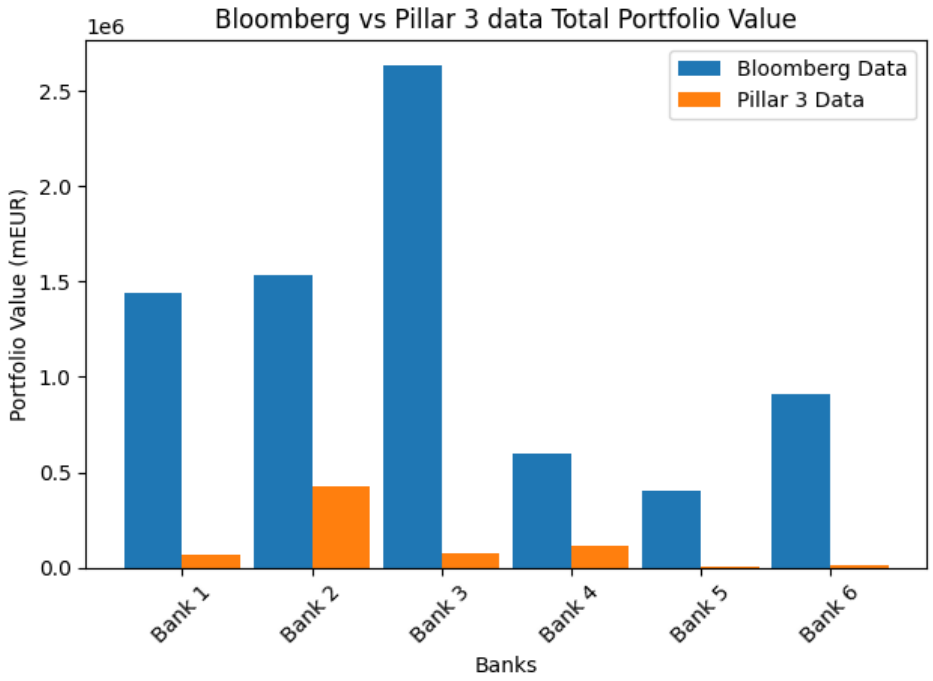

Figure 2: Total portfolio value of the six largest UK banks. Orange bars represent Pillar 3 data on loans and blue bars represent loan, bond and equity data from Bloomberg and DealScan. It provides much larger coverage of regions with much fewer assumptions.

In Figure 3, we show the sectoral composition of the portfolios of the six largest UK banks. The results indicate that services and manufacturing together account for the largest share of exposures, underscoring the concentration of UK bank financing industrial production. Electricity and utilities also represent a significant share, while transport, construction, agriculture, and mining are comparatively smaller in portfolio weight. Despite their smaller size, exposures to agriculture and mining are particularly relevant from a biodiversity perspective given their direct links to land use change and resource extraction. This distribution highlights how UK banks' international portfolios are most heavily tied to sectors with substantial implications for both economic activity and environmental outcomes.

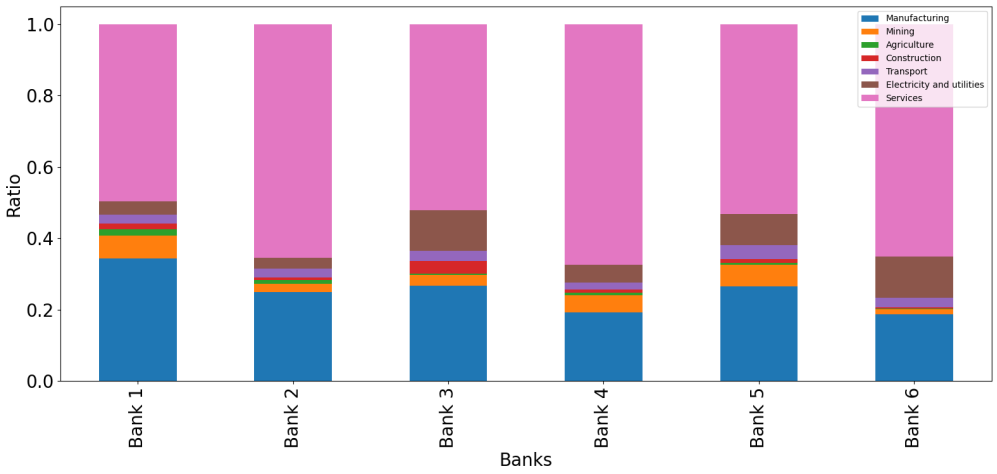

Figure 3: Sectoral composition of the portfolios of the six largest UK banks. Services and manufacturing dominate the distribution, followed by electricity and utilities, while transport, construction, agriculture, and mining account for smaller shares. ~10% of the portfolio is inter-banking lending.

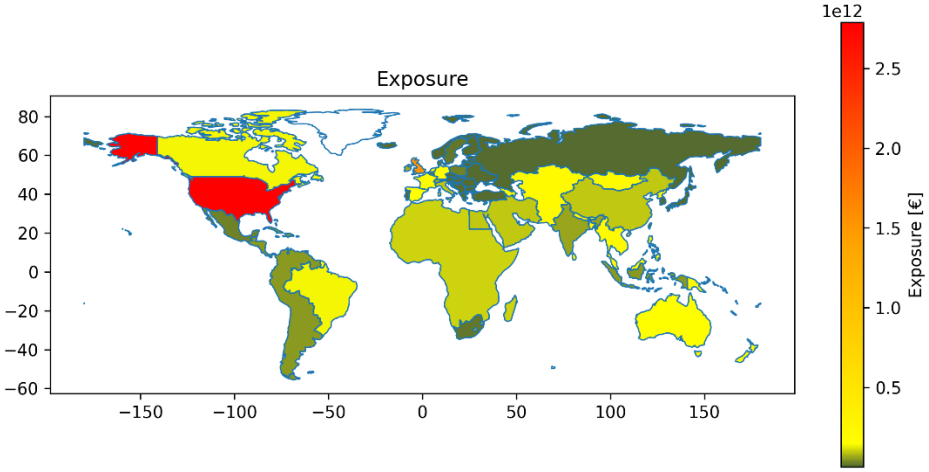

Figure 4: Geographical distribution of total exposures of the six largest UK banks. The United States dominates as the primary destination for UK-financed activities, followed by smaller shares across Europe, Asia, and emerging markets.

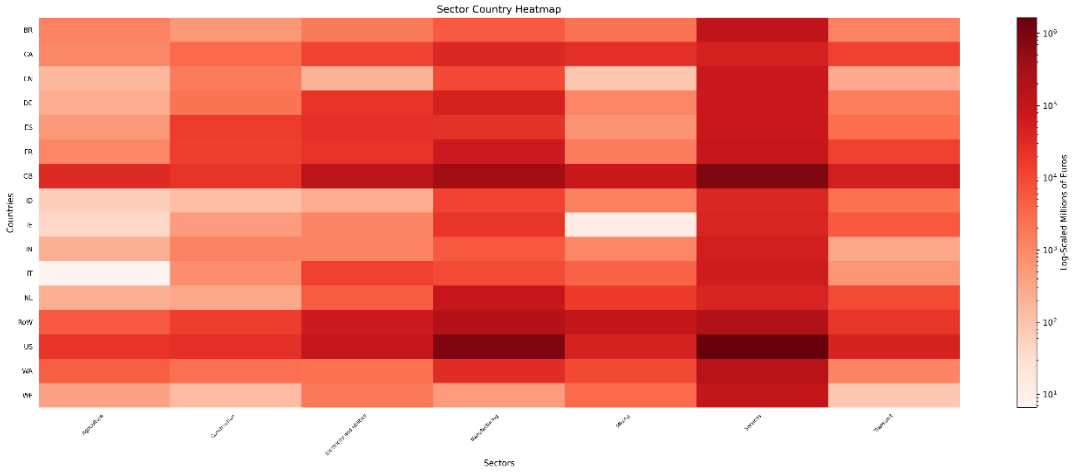

Figure 5: Heatmap of UK international financial flows by sector and region

In figures 4 and 5, we show the geographical distribution of total exposures across the six largest UK banks. The results clearly indicate that the United States dominates as the single largest destination for UK-financed activities, reflecting both the depth of US capital markets and the global integration of UK banks with the American economy. Other advanced economies in Europe (France, Spain, Netherlands, Italy, Ireland, Denmark, Great Britain), Asia (China, India, Indonesia) as well as in Brazil and Canada represent meaningful but smaller shares, while exposures to emerging markets are comparatively limited. This pattern highlights the systemic importance of the transatlantic financial link and suggests that biodiversity risks associated with UK international finance are strongly mediated through activities in the US and other high-income countries, even though smaller exposures to emerging markets may carry disproportionate ecological significance.

3. UK international financial flows and ecosystem services degradation

3.1. From dependencies to risk

First, we map the dependencies of the UK international financial flows to ecosystem services using the ENCORE Knowledge Base (ENCORE Partners, 2023). According to the Intergovernmental Panel on Climate Change framework for risk assessment, exposure is one of the three components of risk, together with hazard and vulnerability (IPCC, 2014). Building on existing work by Ranger et al. (2023)'s risk quantification approach for nature-related financial risk assessment, we calculate **nature risk**[3] around two key components.

The first component involves estimating the probable maximum loss (L) for each sector (s) and country (c) in relation to a specific ecosystem service (e), denoted as **Ls,c,e**. This estimation relies on ENCORE dependency scores to quantify sectoral exposures, capturing both scope 1 and scope 3 dependencies. The estimates are derived using the EXIOBASE input–output modeling framework, following the approach introduced by Svartzman et al. (2021). The second component focuses on developing country- and ecosystem service–specific sensitivity indices **(Sc,e)**. These indices combine information on hazard and vulnerability to represent the likelihood and potential magnitude of ecosystem service degradation under national conditions. The sensitivity index is defined as:

$$\mathrm{Sc,e} = \mathrm{Hc,e} \times \mathrm{Vc,e} \qquad (1)$$

where **Hc,e** represents the **hazard** (the probability or intensity of degradation of ecosystem service e in country c), and **Vc,e** represents the **vulnerability** (the degree to which the country is exposed and sensitive to that degradation, given its adaptive capacity). For each ecosystem service, we characterised countries as very low (VL) to very high (VH) for hazard and vulnerability based on the quintile values of their scores with VL representing healthy ecosystems and VH representing very degraded ecosystems.

Finally, the **overall nature risk** for each sector, country, and ecosystem service is obtained by combining the sectoral loss potential with the national sensitivity index. This is expressed as:

$$\mathrm{NRs,c\,e,} = \mathrm{Ls,c,e} \times \mathrm{Sc,e} \qquad (2)$$

[3] Nature risk in this report builds on Ranger et al. (2023; 2024) nature value at risk metric but without incorporating the Sector-specific vulnerability distribution (Lc,s(P)) component.

where **NRs,c,e** denotes the **nature risk**, capturing the expected impact on sector s in country c arising from the degradation of ecosystem service e. This formulation provides a risk-adjusted measure of potential financial losses, supporting the assessment of systemic nature-related risks across sectors and regions.

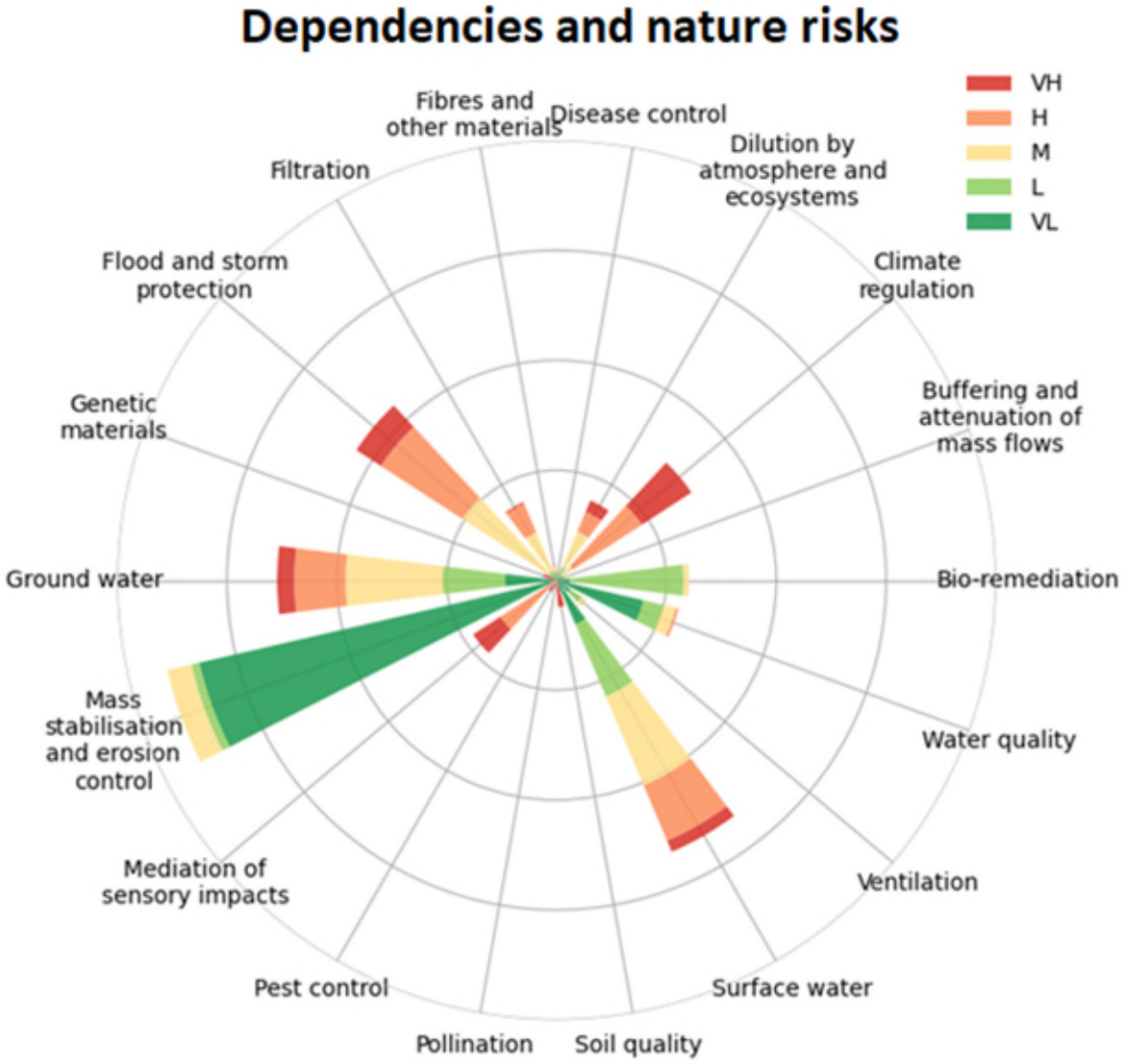

Figure 6: The dependency and nature risk of the UK financial flows for the 6 largest UK Banks. The height of the bars is the portfolio value dependent on ecosystem services, and the colours represent the degradation and vulnerability of that ecosystem service in the country of investment. [VH: very high; H: high; M: medium; L: low; VL: very low.]

As shown in figure 6, the largest dependencies of the UK international financial flows are mass stabilisation and erosion control followed by surface water, groundwater, flood and storm protection, climate regulation and mediation of sensory impacts. But when incorporating the country- and ecosystem service–specific sensitivity indices (denoted by different colours in figure 6), it becomes apparent that a large dependency (exposure) on an ecosystem service does not necessarily pose a risk. For example, whilst the 'Mass stabilisation and erosion control' is the ecosystem service with the highest dependency, the majority of the financial flows are under a very low (VL) level of degradation which means that it is not the ecosystem service which poses the highest risk. This conclusion is aligned with the dependency and risk analysis in Ranger et al. (2024).

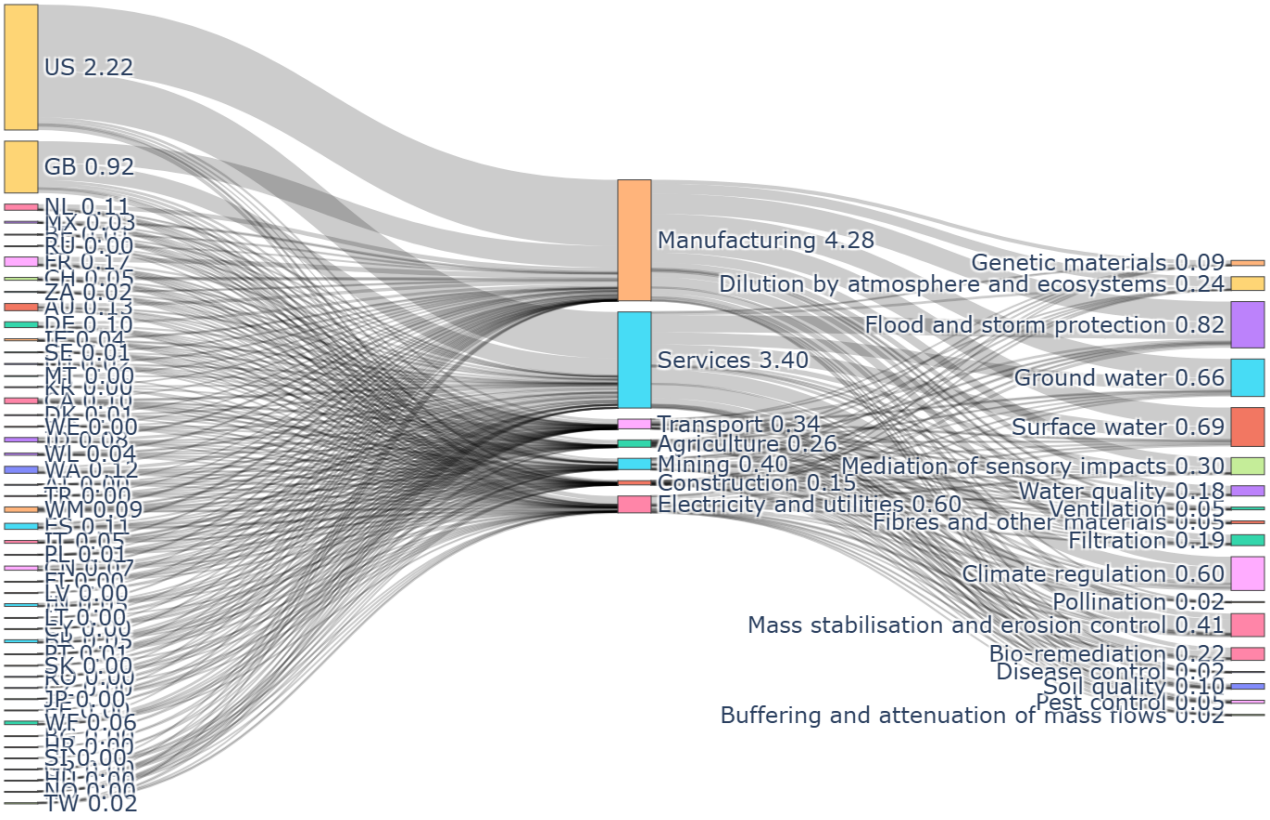

Figure 7: Sankey diagram illustrating the total nature risk for the six UK banks considered in this report. The flows link the banks' exposures across countries to economic sectors, and further to ecosystem services.

As shown in Figure 7, the nature risk for the six UK banks is heavily concentrated in the manufacturing and services sectors[4], which together represent the bulk of their exposures. These two sectors act as major channels through which ecosystem risks are transmitted to the financial system, given their reliance on natural resources and ecosystem services for production, infrastructure, and continuity of operations. While other sectors such as electricity and utilities, transport, agriculture, construction also contribute to the overall exposure, their relative weight is much smaller compared to manufacturing and services. At the same time, the ecosystem services most at risk are not evenly distributed. The diagram highlights that the largest concentration of nature risk is associated with flood and storm protection, surface water, groundwater, and climate regulation. These services are fundamental to economic and financial stability: for instance, flood and storm protection safeguards assets and infrastructure from physical damage; surface and groundwater are indispensable inputs for industrial processes and service delivery; and climate regulation underpins long-term economic resilience by stabilising weather patterns and mitigating systemic shocks. This concentration of risk suggests that the degradation or loss of a small number of critical ecosystem services could disproportionately affect the financial system, amplifying both direct impacts on loan and investment portfolios and indirect second-round effects across the global economy. In practice, this means that the resilience of banks' portfolios is closely tied to the health of these natural systems, and that failure to account for such dependencies leaves institutions exposed to potentially severe financial losses.

[4] As shown in figure 3, 'services' is the largest sectoral component of the portfolio followed by 'manufacturing'. Figure 7 synthesises the nature risk of that portfolio and shows that the sector with highest nature risk is 'manufacturing' followed by 'services'.

3.2. Impact

Based on the UK financial exposures data, we estimated the impact of UK private financial flows using the ENCORE Knowledge Base (ENCORE Partners, 2023). For direct operations (scope 1), we used the impact materiality score for each production process and multiplied it by the influence of the impact driver on the natural capital asset. We could then multiply the importance of the natural capital asset to the provision of the ecosystem service to get the impact on the ecosystem service. This is outlined in equation (1) and was established in O'Donnell et al. (2025), building upon dependency analysis methodologies (Van Toor et al., 2020).

$$Scope\ 1\ Impact\ Intensity_{s}^{ESS} = Materiality_{s}^{ID} \times Influence_{ID}^{NCA} \times Importance_{NCA}^{ESS} \quad (3)$$

That is for each sector, s, and ecosystem service, ESS, the impact intensity score is a combination of the impact driver, ID, materiality for each sector, the influence of each impact driver on the natural capital asset (NCA) and the importance of the natural capital asset on the ecosystem service.

For the upstream supply chain (scope 3), the EXIOBASE3 (Stadler et al., 2018) Leontief matrix was then used to estimate the impact intensity of the upstream supply chain of each sector-region pair, following the method first established by Svartzman et al. (2021). For each sector-region pair and ecosystem service, the upstream supply chain has an impact intensity score (equation 4).

$$Scope\ 3\ Impact\ Intensity_{s,r}^{ESS} = Scope\ 1\ Impact\ Intensity_{s}^{ESS} \times \overline{(L - I)} \quad (4)$$

$$\text{where } \overline{(L - I)} = (L - I) * \left((i'(\widehat{L - I}))^{-1} \right)$$

When the scope 1 and scope 3 impact intensity scores are multiplied by the financial exposure in the associated sector and region, the value represents the impact intensity of the portfolio, which is the proportion of the bank's portfolio contributing to impact on the ecosystem service via the portfolio activities' direct operations or upstream supply chains (equation 5)

$$Financial\ Impact\ Intensity\ {}_{s,r,bank}^{ESS} = \frac{[value\ of\ loan]_{bank}^{rs} \times Impact\ Intesnity_{r,s}^{ESS}}{\sum_{rs=1}^{n} [value\ of\ loan]_{bank}^{rs}} \quad (5)$$

To understand the potential materiality of this impact, it is important to understand the health of the underlying ecosystems being impacted. Based on the nature-related financial risk framework outlined in Ranger et al. (2023), risk is the combination of hazard, vulnerability and exposure. Therefore, we use the hazard-vulnerability scores for each ecosystem service by country developed by Ranger et al. (2023; 2024) to understand the characteristics of the underlying impacted ecosystems. For each ecosystem service, we characterised countries as VL to VH for hazard and vulnerability based on the quintile values of their scores with VL representing healthy ecosystems and VH representing very degraded ecosystems (see section 3.1).

By combining the financial impact intensity with these scores, we can understand whether the UK financial system is primarily impacting heavily degraded ecosystems that are at risk of collapse or relatively healthy ecosystems that might be more resilient as they face fewer threats. The importance of state of nature metrics has become increasingly recognised in combination with reporting the impacts and dependencies of financial portfolios to understand the probability of risks and opportunities materialising (TNFD, 2023). This provides a glimpse into the state of nature where the UK financial system currently is impacting.

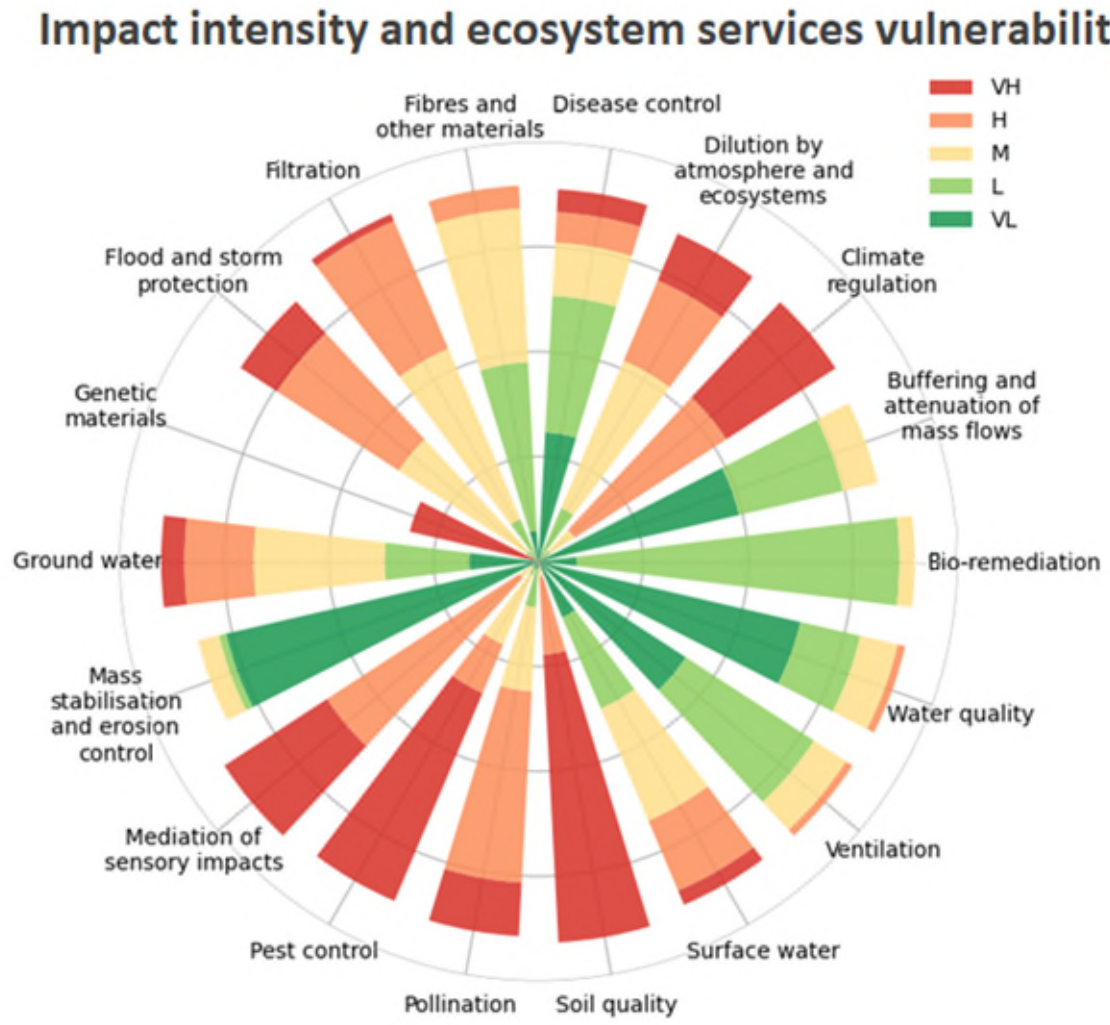

Figure 8: The impact intensity and vulnerability of the UK financial flows for the 6 largest UK Banks. The height of the bars is the portfolio value impacting the ecosystem service and the colours represent the vulnerability of that ecosystem service in the country of investment is to collapse. [VH: very high; H: high; M: medium; L: low; VL: very low.]

For many ecosystem services, the UK financial system primarily impacts already heavily degraded and vulnerable ecosystems. In figure 8, the ecosystem services soil quality, pest control, climate regulation and mediation of sensory impacts all face impact to very high and high vulnerability ecosystems by UK banks. Ecosystem services with a higher proportion of very high vulnerability ecosystems being impacted are more degraded and fragile, therefore, may face greater risks of collapse with continued impact. Therefore, the UK financial system is threatening the stability of already highly vulnerable ecosystems, threatening the loss of ecosystem service provision, the acceleration of nature degradation and the harmful consequences of nature loss. Furthermore, because the banks will also be exposed to the risks of the collapse or reduction in these ecosystem services, the UK financial system is driving its own nature-related dependency risk via its financed impact (O'Donnell et al., 2025). By continuing to finance impact in highly vulnerable ecosystems, the UK financial system is working directly against the targets of the GBF, threatening the achievement of its goals both in the UK and overseas. The UK financial system must reduce its impact on these critical ecosystems to enable the transition to an economy that supports nature rather than erodes it.

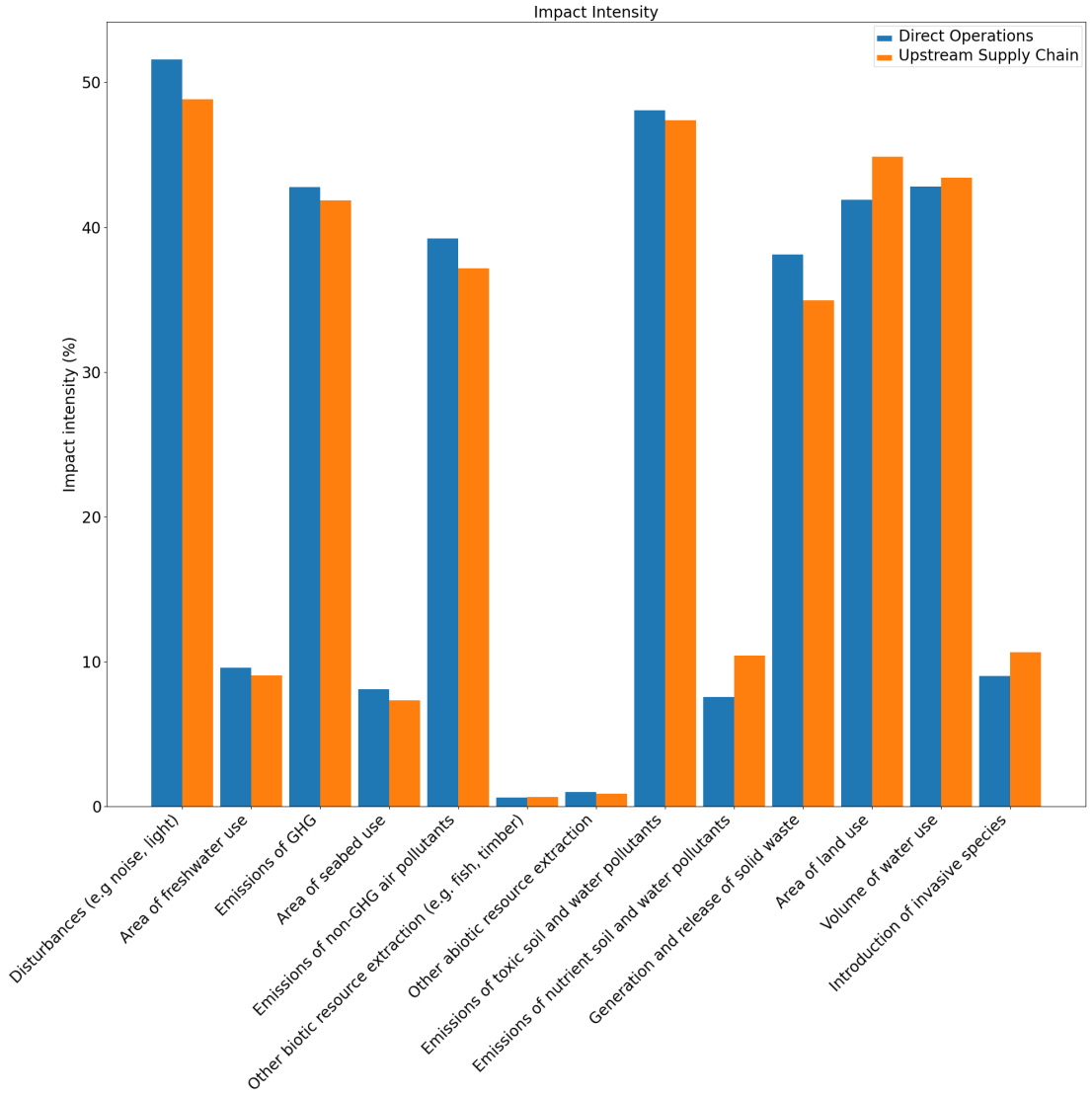

Figure 9: The Impact Intensity (%) of the 6 Largest UK Banks for each Impact Driver. The Impact Intensity represents the percentage of the portfolio contributing to impact on nature based for each impact driver.

As shown in figure 9, the impact intensity of the UK largest 6 banks portfolio spreads across all 13 ENCORE categories with disturbances (noise, light), emissions of toxic soil and water pollutants, volume of water use, emissions of GHG and area of land use exceeding 40%; and emissions of non-GHG pollutants, and generation and release of solid waste exceeding 35%. For the majority of impact drivers, the impact from direct operations (scope 1) is larger than those including upstream supply chains except for area of land use, volume of water use, emissions of nutrient soil and water pollutants and introduction of invasive species. The higher scope 3 values for specific ecosystem services could be that the UK banks have limited direct exposure to sectors such as agriculture in their portfolio, which produce nutrient pollutants and use large amounts of land . However, the banks will certainly have exposure to these sectors in the upstream supply chains of their investments. This will have implications for how financial institutions impact ecosystems and how best to reduce that impact as upstream supply chains will be an extra step removed from the bank itself.

4. Scenario development

As shown in section 3, the UK international financial flows both depend on and impact the ecosystem services of other countries. As noted by Ranger et al. (2024), half of the nature-related financial risk to the UK comes from abroad. This reinforces the need for a global approach when pondering how the UK can achieve the financial objectives of the GBF. In this section, we develop an explorative scenario analysis to understand how the world might change in the next five years (delimited by the 2030 targets of the GBF). The aim of this exercise is to identify policy interventions to estimate the impact of different bundles of policy interventions quantitatively (sections 5 and 6).

The objective of this scenario development is to use a simple approach which was informed during a co-development workshop, using simple but transparent assumptions, to demonstrate the potential scale of financial flows into actions that impact on nature under different geopolitical and policy scenarios.

4.1. Methodology

Our first step is to go through the 23 targets in the GBF and identify the potential role that finance can play in the achievement of each target. We classify the role of finance across four main categories: for each target, what kinds of interventions or changes have the potential to mediate the relationship between finance and that target that relate to:

a) national legislation (e.g. domestic taxes to influence sustainable consumer behaviour);

b) international policies/ regulations (e.g. World Trade Organisation imposing regulation to address invasive alien species through trade);

c) company actions / risk management (e.g. scale up implementation of Taskforce on Nature-related Financial Disclosures (TNFD) recommendations);

d) nature market initiatives (e.g. improve women's access to finance for conservation).

Using the GBF targets guidance notes (e.g.: links to other elements of the KM-GBF indicators) as a starting point followed by a literature review, we identified 90 ways that finance interacts with GBF targets and grouped them into 30 intervention groups. Some of the intervention groups listed include categories where the role of the finance sector is direct, indirect or a combination of both. For example, blended finance mechanisms to address biodiversity hotspots; increase the bankability of sustainable commodities or scaling up of finance for technological innovation in sustainability are all examples of interventions with direct links to finance. On the other hand, for other intervention groups the interaction with the finance sector can be both direct and indirect. For example, 'Strengthening Indigenous Peoples and Local Communities (IPLC) rights and opportunities' includes both improving IPLC's access to finance for conservation (direct link to finance), granting legal personhood to nature, increasing IPLC engagement and inclusion in decision-making and strengthening IPLC land rights (indirect links to finance).

Mapping the GBF interventions and their direct and indirect link to finance was helpful in revealing connections between different interventions and the financial sector as well as validating the need for a systems approach for meeting the GBF targets.

We then graded (using a 1 (low) to 5 (high) scale) each intervention group in terms of their policy relevance and uncertainty of their outcome separately to identify those with highest values in each category. Then we

combined the sum of the grading for both categories to identify the intervention groups with the top values. Our highest-ranking intervention groups (in no particular order) include:

1. **Multinational aid:** representation and funding from governments and mission-oriented development banks. For example, direct investment on nature-based solutions or aid for technical assistance on policy reforms.
2. **Increase gender equality for biodiversity action:** Mainstreaming gender into National Biodiversity Strategies and Action Plans including land ownership rights, access to finance and social safeguards and standards in nature markets.
3. **Reducing harmful subsidies for biodiversity** across energy, agriculture, fisheries and forestry.
4. **Scaling up nature positive financial flows** including nature-based solutions and carbon markets.
5. **Increasing protected areas (PA):** expanding PA network and unlocking finance mechanisms to maintain it (e.g. prevent deforestation); scaling up international marine protected areas in line with Biodiversity Beyond National Jurisdiction (BBNJ) agreement.
6. **Reduce nature negative activities:** Enhance legislation for addressing pollution, tackling tax havens linked to wildlife crime and deforestation.
7. **Green policy enabling tools:** green taxonomies, corporate and financial disclosures, due diligence duty.
8. **Monetary and prudential policies:** capital requirements, collateral requirements, quantitative or allocative credit policies.

4.2. Four scenario worlds

We identified the top 8 intervention groups to do a driver mapping using PESTLE analysis (Political, Economic, Social, Technological, Legal and Environmental factors) for each intervention group and identified two axes for scenario development (see section 4.2). As shown in figure 10, we map our scenario worlds using two axes to describe global trends in:

- Nature action: representing domestic and international policy and regulations; private sector initiatives and social movements relevant to biodiversity going from weak (grey) to strong (green). In 'green' scenarios, countries employ an 'alignment-based' approach to greening their financial system as part of commitments to the GBF whilst in 'grey' scenarios countries apply a 'risk- based' approach.
- Geopolitics: representing global dynamics in geopolitics ranging from weak (protectionism) to strong (cooperation) geopolitical collaboration and cooperation. In 'cooperation' scenarios countries apply a coordinated approach whilst in 'protectionism' scenarios countries act individually or strategically coordinate with others (for example: the UK strategically aligning with the European Union (see section 6).

Using today as a starting point, we map four scenario worlds 'Green cooperation'; 'Grey cooperation'; 'Green protectionism' and 'Grey protectionism' up to 2030 (figure 10). The following sections include a descriptive narrative of each of the 8 intervention groups identified in section 4.1. in these four scenario worlds by 2030.

The scenarios included in this report are of explorative in nature with the objective to identify scenario elements relevant to the UK international finance flows (section 2) which can be quantitatively modelled (sections 5 and 6).

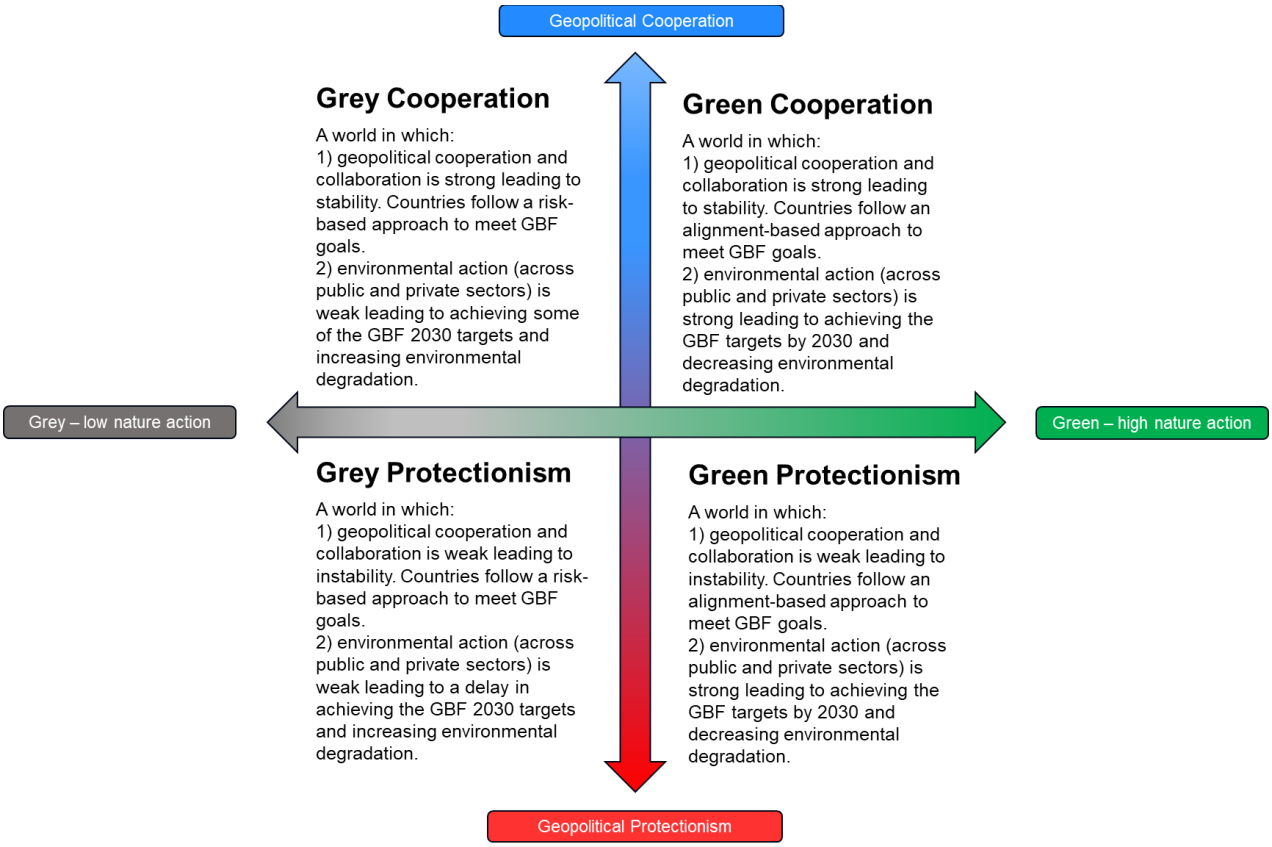

Figure 10: Four scenario worlds

4.2.1. Green cooperation

In a world with high nature action across multiple stakeholders and high geopolitical cooperation and collaboration, countries follow a whole of government and whole of society approach (CBD, 2024) which leads to meeting the GBF 2030 targets by 2030. Examples for the 8 interventions groups identified in section 4.1 include:

1. **Multinational aid:** increased funding towards multinational aid decreases the Sustainable Development Goals (SDG) funding gap and leads to greater aid to environmental projects and greater equality. Scaling up of Loss and Damage funds and debt cancellation in an inclusive and developing country centric way. More equal voting rights in MDB developing countries.

2. **Increase gender equality for biodiversity action:** incorporation of the GBF's Gender plan for action in NBSAPs as well as inclusion of gender-specific indicators in the development of national indicators.

3. **Reducing harmful subsidies for biodiversity:** coordinated scale up support or initiative for harmful subsidy removal through, for example, BIOFIN initiative or Green Fiscal policy network. Repurposing harmful subsidies towards nature positive outcomes through careful planning.

4. **Scaling up nature positive financial flows:** Increase domestic public spending on biodiversity. Significant scaling up of nature-based solutions and domestic and international biodiversity credit markets in a coordinated manner, ensuring markets deliver additionality, permanence, ecological equivalence, net-positive outcomes for biodiversity.

5. **Increasing protected areas:** the 30x30 target is increasingly being met and is on track by 2030 in countries globally, including in the ocean. In less developed and more biodiverse countries, the land tenure and local populations are included to prevent loss of livelihood, traditional knowledges and ways of life. In developing countries, international fiscal transfers are deployed to compensate for forgone revenue due to a reduction of land for commodity production in favour of increasing protected areas.

6. **Reduce nature negative activities:** strengthening of pollution regulation (including a Global Plastics treaty) through a mix of taxes and fines leads to additional government revenue that is partly repurposed to increase in domestic public spending on biodiversity. Greater international consensus on preventing commodity production driving key ecosystems towards dangerous tipping points, such as the Brazilian Amazon and Indonesian peatlands.

7. **Green policy enabling tools:** Interoperable green taxonomies. Mandatory nature-related corporate and disclosures across jurisdictions.

8. **Monetary and prudential policies:** The Financial Stability Board and Basel committees adopt nature into their Global Systemically Important Banks (G-SIB) capital surcharge framework leading to incentives to reduce nature risk for largest banks across their whole portfolio and divestment from fossil fuel companies. Greater buy-in for Network for Greening the financial system (NGFS) leads to greater integration of nature risk and allows resilience building measures to be assessed and implemented. International compulsory carbon tax (biodiversity tax).

4.2.2. Grey cooperation

In a world with low nature action across multiple stakeholders and high geopolitical cooperation and collaboration, countries do not follow a whole of government and whole of society approach but a risk-based approach to minimise transition risks associated with the implementation of the GBF. This leads to countries meeting only some of the GBF 2030 targets by 2030. Examples for the 8 interventions groups identified in section 4.1 include:

1. **Multinational aid:** increased funding for multinational aid to activities without consideration to nature degradation, e.g. military expenditure, major infrastructure projects in areas of high biodiversity value.

2. **Increase gender equality for biodiversity action:** coordinated improvements to gender equality, but with limited consideration of the intersection between equality and conservation. Development is prioritised at the expense of biodiversity.

3. **Reducing harmful subsidies for biodiversity**: prioritisation of harmful subsidy reduction provided they lead to economic growth. For example, reduction of fossil fuel subsidies towards renewables to enable an energy transition driving foreign investment but without consideration for the environmental implications of new renewables sites.

4. **Scaling up nature positive financial flows:** increase domestic public spending but focussed on risk approach to natural capital (e.g. ensuring water provision without consideration for biodiversity). Collaborative scaling up of nature markets which are of limited ecological robustness. Financial flows from these markets will increase, but with poor ecological outcomes (e.g. delivery of non-additionality, limited ecological equivalence, leakage, non-permanence etc.) Markets will be operational, but act as a license to pollute, failing to deliver benefits for biodiversity.

5. **Increasing protected areas:** Coordinated global increase in the amount of land and sea area designated as 'protected' but with limited ecological benefits in practice ('Paper parks'), due to limited conservation

action, lack of monitoring, ineffective ecological indicators, and limited enforcement of prohibited activities within these areas. In some countries, 30x30 target may be met on paper, by numerical area of land under specific designations, with limited change in the state of nature in practice.

6. **Reduce nature negative activities:** Coordinated reduction in specific nature negative activities which undermine global GDP growth, without focus on the ultimate dependency of all activities on biodiversity. Reduction of only nature negative activities which present the highest financial risk (e.g. water).

7. **Green policy enabling tools:** Mandatory nature-related corporate and disclosures across jurisdictions but keeping requirements relatively broad to prevent overregulating the financial system, which prevents meaningful capital reallocation.

8. **Monetary and prudential policies:** The Financial Stability Board and Basel committees expands its climate-related transition risk analytical framework to incorporate nature transition risk into their Global Systemically Important Banks (G-SIB) capital surcharge framework. To protect banks and their own monetary policy operations from transition risks, central banks implement moderate capital buffers to activities exposed to transition risks (e.g. companies operating in sensitive ecosystems).

4.2.3. Green protectionism

In a world with high nature action across multiple stakeholders and low geopolitical cooperation and collaboration, countries follow an uncoordinated approach which prevents from achieving a global structural alignment of the economy and financial system towards nature positive outcomes. Examples for the 8 interventions groups identified in section 4.1 include:

1. **Multinational aid:** reduced aid budget overall. Scale up of debt-for-nature swaps with biodiversity outcomes tightly defined by creditor countries; capacity-building for export market development; bilateral and multilateral support targeted at key partners in international trade to preserve supply chain resilience from nature degradation.

2. **Increase gender equality for biodiversity action:** incorporation of gender into NBSAPs and national indicators but limited aid or capacity-building offered to support this internationally.

3. **Reducing harmful subsidies for biodiversity**: decrease of harmful subsidies for domestic agriculture and other damaging sectors; increase subsidies for production of green farming commodities; focused on developing national competitive edge in nature transition.

4. **Scaling up nature positive financial flows:** public spending on nature but prioritised by alignment with competitiveness priorities. Significant scaling up of domestic markets, focused on attracting foreign capital (including safeguards where necessary to drive this).

5. **Increasing protected areas:** deliver 30x30 domestically and advocating other countries do so without fiscal compensation for differing economic circumstances.

6. **Reduce nature negative activities:** strengthening efforts to reduce drivers of nature loss (pollution, overexploitation) domestically, outsourcing biodiversity impacts internationally; internationally, only prioritise areas critical for domestic security (e.g., due to supply chains).

7. **Green policy enabling tools:** Domestic green taxonomy to suit own context (e.g., carve outs for priority sectors) but limited involvement in international standardisation. Mandatory nature-related corporate and disclosures in certain jurisdictions but avoiding overly constraining international competitiveness.

8. **Monetary and prudential policies:** Positive incentives for domestic nature transition using green interest rates and refinancing operations.

4.2.4. Grey protectionism

In a world with low nature action across multiple stakeholders and low geopolitical cooperation and collaboration, countries follow a risk-based approach to minimise transition risks in a disorganized fashion which leads to delay in meeting the 2030 GBF targets. Examples for the 8 interventions groups identified in section 4.1 include:

In a world with low nature action across multiple stakeholders and low cooperation between countries the following interventions group:

1. **Multinational aid:** decrease in multinational aid leading to conflict, increased inequality, and decreased SDG progress. Increase in aid spent domestically, such as to support building housing for asylum seekers. Bilateral aid is selectively increased based on geopolitical ties rather than biodiversity priorities, with minimal transparency or multilateral engagement.

2. **Increase gender equality for biodiversity action:** gender rights advance unevenly depending on domestic political culture with little to no consideration of the intersection with conservation in most cases.

3. **Reducing harmful subsidies for biodiversity**: are addressed inconsistently, often rebranded without structural change due to strong industry resistance and limited international pressure. Any subsidies promoting domestic growth are increased.

4. **Scaling up nature positive financial flows:** efforts to build capacity for nature markets lack stable funding and cross-border support, making upscaling initiatives highly uneven. Domestic biodiversity markets are piloted in selected countries, but investor confidence remains low amid fragmented policy environments.

5. **Increasing protected areas:** protected areas might expand on paper, especially where it does not conflict with economic interests, but actual enforcement and funding would be missing. Global targets (such as 30x30) cannot be achieved without cooperation and accountability.

6. **Reduce nature negative activities:** deforestation policies are selectively enforced and often undermined by economic pressures, with no international support to protect critical ecosystems. Pollution legislation is passed in some countries under public pressure, but weak enforcement and regulatory capture limit effectiveness.

7. **Green policy enabling tools:** Green budgeting tools are adopted by a small number of technocratic finance ministries but lack political support and institutional uptake.

8. **Monetary and prudential policies:** Due to a lack of strong regulation, transparency and international norms, financial flows to nature negative activities won't be reduced. Private finance is directed by profit-maximisation and towards politically favoured sectors. Green or nature-positive finance remains marginal. Central banks focus on narrow, short-term monetary stability and national economic competitiveness, deprioritising biodiversity and nature related objectives. Tools like climate stress testing or ESG risk weighting are niche or symbolic in most countries. Central banks are more near-term focussed following traditional investment and financial time horizons – taking the view that most long-term risk (such as nature and climate) can be diversified away from.

5. Harmful subsidies and pollution

Building on the impact intensity analysis of the 6 largest UK Banks (section 3.2), this section introduces the methodological approach (section 5.1) of the effect of four interventions on the impact of the UK international financial flows:

1) harmful subsidies reform for energy (section 5.2.1.);

2) harmful subsidies reform for agriculture (section 5.2.2.);

3) harmful subsidies reform for fisheries (section 5.2.3.) and

4) implementation of a Global Treaty on plastic pollution (5.2.4).

Section 5.3. presents the results of the analysis and section 5.4. the modelling limitations.

The four interventions are modelled in a 'Green cooperation' world where nature action is strong and there is global cooperation and collaboration (section 4.2.1.). An assumption in this explorative scenario analysis is that the harmful subsidies reform corrects market distortions and leads towards redirecting private investment into more nature positive outcomes. Whilst these interventions would be implemented by governments, there is increasing push from the private sector towards environmentally harmful subsidies reform both in agriculture and fossil fuels. For example, "*Financial institutions representing total assets under management of $7.2 trillion called on G20 ministers to repurpose their agricultural subsidies;* and fossil fuels —"*260 companies, representing over $1.6 trillion in global annual revenue, urged governments to ramp up clean energy and phase out fossil fuels"* (Business for nature).

5.1. Methodology

Similarly to the methodology outlined in Section 3, we used the ENCORE knowledge base to calculate the impact intensity of the financial portfolios via pressures as the baseline for scenario analysis. The EXIOBASE3 Leontief matrix was used to estimate the impact intensity values for the upstream supply chain (scope 3) (Stadler et al., 2018; Svartzman et al., 2021). We introduce further details on specific interventions and subsidies in the following sections.

For each intervention, a literature review was conducted to determine the potential effect that the policy intervention might have on the relevant pressures for each sector. ENCORE pressure materiality ratings span 13 categories: area of freshwater use, area of seabed use, disturbances (e.g. noise, light), emissions of nutrient pollutants to water and soil, emissions of toxic pollutants to water and soil, introduction of invasive species, area of land use, emissions of GHGs, emissions of non-GHG air pollutants, generation and release of solid waste, other abiotic resource extraction, other biotic resource extraction (e.g. fish, timber) and volume of water use (ENCORE Partners, 2023). **If the potential effects on pressures identified would influence the operating model of the sector directly, such as through reducing a specific pollutant or lowering resource extraction, the ENCORE literature review underpinning the materiality ratings for each sector and pressure was consulted to determine where the intervention could have an effect. The ENCORE materiality ratings for each pressure and sector were then changed to reflect the effect of the intervention.** With the new ENCORE materiality ratings, the scope 1 and scope 3 impact intensity values for each bank were recomputed and compared with the baseline (section 5.4).

Alternatively, if the intervention instead focused on a change in demand, such as in the case with fossil fuel subsidy reduction, the financial flows themselves were altered. For the energy instance, there was no change

to the pressures generated by the fossil fuel sector, which remain the same and are very damaging. However, the costs associated with the fossil fuel pressures were instead embedded into the price, shifting demand to another alternative energy source, in this case renewables. So, instead of changing the ENCORE materiality ratings, the financial portfolio of the banks was altered to demonstrate this shift in demand that we posit would be reflected in bank portfolios.

5.2. Modelling

5.2.1. Energy

Background

The continued use of fossil fuels is a major barrier to halting and reversing biodiversity loss. This is recognised in Target 18 of the Kunming-Montreal Global Biodiversity Framework (GBF), which calls for "reduc[ing] of harmful incentives by at least US$500 billion per year and scal[ing] up positive incentives for biodiversity" by 2030. Fossil fuel subsidies create harmful incentives by providing direct and indirect public support for fossil fuel-based energy and fuel consumption (Damania et al., 2023). This public support causes the under-pricing of fossil fuels, leading to overconsumption, despite large public costs due to worsening climate change effects, reduced human health due to air pollution and other social consequences (Parry , Black and Vernon 2021; Damania et al., 2023; Black et al., 2023). Climate change, caused by fossil fuel emissions, will impact natural ecosystems as climatic conditions change suitable habitats far too quickly for most species to evolve or migrate, compounding human direct impacts causing nature degradation. Therefore, to achieve the goals of the GBF, we must tackle climate change and, therefore, fossil fuel subsidies play a large role.

Fossil fuel subsidies can be explicit subsidies, defined by the World Bank as "*a deliberate policy actions by the government that specifically targets electricity, fuels or heating and that results in … reduc[ing] the net cost of energy purchased, reduc[ing[the cost of energy production or delivery [or] increase[ing] the revenues retained by those engaged in energy production and delivery (energy suppliers)*" (Kojima and Koplow 2015, p. 4). These explicit subsidies are estimated to be approximately $500 billion per year globally and lead to the under-pricing of fossil fuels due to direct government intervention in specific markets (energy, fuel etc.) (Parry et al., 2021; Damania et al., 2023). Alternatively, fossil fuels are also indirectly supported by not considering the additional societal and social costs that fossil fuel emissions cause, which the IMF define this failure to consider externalities as "implicit subsidies" (Damania et al. (2023); Parry, Black, and Vernon, 2021). Accordingly, implicit subsidies are estimated to be worth approximately $5 trillion globally and dwarfs the explicit subsidies provided directly via energy- and fuel-focused policies (Black et al., 2023). Therefore, both explicit and implicit subsidies are under-pricing fossil fuels, either through directly intervening in demand or supply side dynamics or indirectly by externalising the public costs imposed due to the continued use of these fuels. Notably, in many studies investigating implicit fossil fuel subsidies, the cost of nature degradation due to climate change or air pollution has not been included, highlighting that these estimates are likely a gross underrepresentation.

Estimates by the IMF have suggested that global explicit subsidies have generally plateaued at approximately $500 billion, while implicit subsidies are expected to have increased through to 2025 (Parry, Black, and Vernon 2021). The subsidies also differ by fuel with petroleum receiving the largest amounts (46%) of implicit and explicit subsidies overall and coal receiving 41% of global subsidies (Parry, Black, and Vernon, 2021). The study also investigates the end-users of the subsidies, finding that coal-based power generation represents the largest recipient with 25% of the global subsidies (Parry, Black and Vernon, 2021). With electricity generation, the government sets expectations for the future of industry by providing critical infrastructure, supporting

international finance of fossil fuels via export credit agencies and operating state-backed entities (Morgan and MacNeil, 2025). Therefore, public subsidies could have an important role to play in determining the investment landscape for private investors.

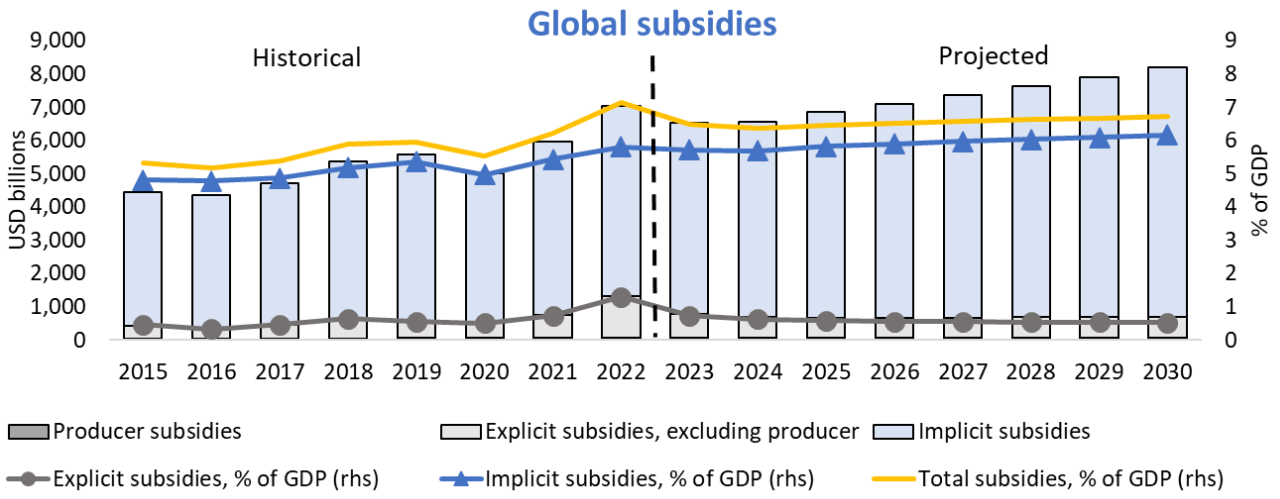

Figure 11: The historical and projected future global explicit and implicit fossil fuel subsidies for producers and consumers. This is based on the 2023 IMF Fossil Fuels Subsidy data. Figure from (Black et al., 2023).

Guidance on subsidy reform and repurposing suggests that savings from subsidy removal should be used to (1) support marginalized communities and (2) increase investment in renewable energy technologies. However, this has not been the case (Kitson et al., 2017; Gass and Echeverria, 2017; Damania et al., 2023; Laan et al., 2024).

Harmful subsidy reform

Therefore, we investigated the reduction of consumption based on the removal of explicit and implicit subsidies using the IMF 2023 data on global subsidies (Black et al., 2023). To estimate the effect on consumption of the removal of subsidies, we estimated the change in demand based on the difference between the realised price (p_{real}) and the efficient price (p_{eff}), which included both the removal of explicit fossil fuel subsidies and included the social costs of carbon. For the elasticity of coal energy, the value is estimated at -0.4 based on the global values used by the IMF Climate Policy Assessment Tool (CPAT) (CPAT Team, 2024).

$$\frac{\Delta Q}{Q} = \varepsilon \frac{[p_{eff} - p_{real}]}{p_{real}}$$

For cases where the change in quantity was below -1, this was assumed that there was a complete collapse in demand and was corrected to -1. Because electricity production can be underpinned by government infrastructure and policies regarding the energy mix, it was assumed that the financial portfolio exposures for "Production of electricity by coal" was reduced by the same proportion as the consumption reduction by removing the subsidies in that country.

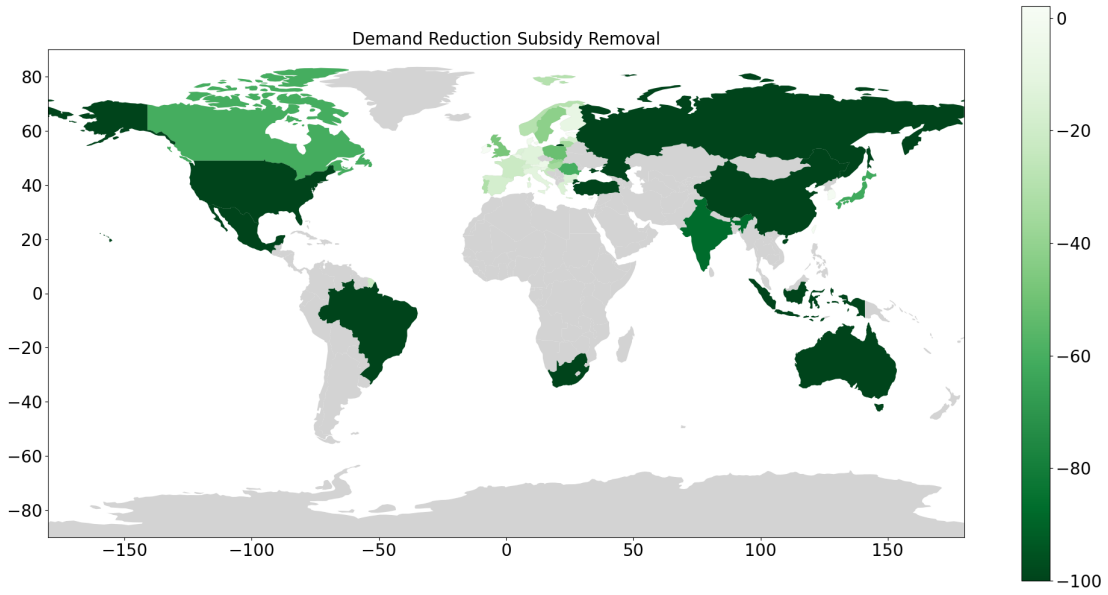

Figure 12: The demand reduction (%) of coal for electricity after the removal of implicit and explicit subsidies by country. This is also the percentage of portfolio value for coal electricity that is transitioned to renewables in the scenario.

Based on the recommendations to use the savings in subsidies for investment in renewable energy infrastructure, the portfolio values removed from coal electricity production (Figure 12) was transferred to wind and solar photovoltaic electricity in each country based on the ratio of wind and solar already invested for each country. This assumes that all money was transferred directly from a portfolio exposure in coal electricity production directly to renewable (wind or solar photovoltaic) energy production, which is over simplified and unlikely. However, it can provide an estimate for the change in portfolio impact of switching investments entirely from coal to renewables, an interesting case for exploration. The assumption to shift the money directly to renewable energy also preserves the overall value of the bank portfolio to avoid artificial reductions in impact due to a decrease in overall portfolio value.

5.2.2. Agriculture

Background

When considering reforming subsidies to reduce harmful public spending, agricultural subsidies are a key aspect to consider. The World Bank reports that US$635 billion in agricultural subsidies are paid per year based on the countries with available data, estimating that the actual global number could be over US$1 trillion (Damania *et al.*, 2023). Deutz *et al.*, 2020 found that there are about US$451 billion of harmful agricultural subsidies paid every year.

Other reports estimated US$520 billion of agricultural support that is potentially harmful to biodiversity (UNDP-BIOFIN, 2024). While the exact numbers differ depending on the study and accounting methodology used, they agree that substantial amounts of public funding are used for agricultural subsidies, as well as the harm they cause to the environment.

One of the ways in which agriculture harms nature and biodiversity is through agricultural inputs such as excess nitrogen fertiliser, pesticides, and herbicides. While these are useful for increasing agricultural production to some extent, they have adverse effects on human health and the environment (UNEP, 2017). Environmental

consequences of the use of pesticides and fertilisers include soil degradation, water pollution, the eutrophication of rivers and lakes, harmful effects on biodiversity and greenhouse gas emissions, which intensify climate change (UNEP, 2022).

More specifically, pesticides were found to be pervasive in the environment, often at levels above environmental thresholds, which leads to substantial negative effects on nature and human health (Vulliet *et al.*, 2014; Elibariki and Maguta, 2017; Guida *et al.*, 2018; Hvězdová *et al.*, 2018; Pietrzak *et al.*, 2019; UNEP, 2022). These include negative impacts on bees, birds, aquatic organisms, species that would offer natural pest control, and biodiversity (Cloyd, 2012; Roubos, Rodriguez-Saona and Isaacs, 2014; Kovács-Hostyánszki *et al.*, 2016; Sánchez-Bayo and Wyckhuys, 2019; Tassin de Montaigu and Goulson, 2020; UNEP, 2022). Additionally, a substantial share of the global pesticide market (25%) is made up of illegal pesticides, which may contain unapproved ingredients that pose a critical risk to the health of farmers and the environment (TRACIT, 2019).

Similarly, the use of fertilisers can lead to excess nutrients entering water bodies, leading to eutrophication and thereby harming nature and biodiversity (Jwaideh, Sutanudjaja and Dalin, 2022). Every year, about 161 Tg of nitrogen are applied to arable land, but only about 73 Tg (46%) is taken up by the crops (Zhang *et al.*, 2021).

In the “Towards a Pollution-Free Planet” report, the UN Environmental Programme suggests adoption of agroecological practices, organic farming and integrated pest management in combination with the use of environmentally friendly pesticides to reduce pesticide and nutrient runoff into water bodies, reduce soil pollution and minimise ammonia emissions (UNEP, 2017).

However, subsidies for agricultural inputs are incentivising the overuse of inputs, which leads to environmental degradation and biodiversity loss (Steenblik, 1998). A modelling study by Henderson and Lankoski (2019) showed that input subsidies for pesticides and fertilisers lead to increased nitrogen runoff, negative effects on water quality, as well as increases in agricultural greenhouse gas emissions. Furthermore, for pesticides and herbicides, it was found that input subsidies can lead to excessive use of pesticides (UNEP, 2022) and encourage the use of chemical solutions instead of more sustainable integrated pest management (Tambo and Liverpool-Tasie, 2024).

Similarly, the overuse of fertilisers can be encouraged by subsidy-induced price incentives (Schultz 1964 as cited in Damania *et al.*, 2023); (Islam and Beg, 2021). Research shows that nitrogen fertiliser subsidies lead to an increase in the use and even overuse of N-fertilisers, which is aggravated by neglecting the correct nutrient ratios and the resulting inability of plants to take up the additional nitrogen (Huang, Gulati and Gregory, 2017). This applies especially to subsidies that are coupled to the use of inputs, which have been found to be responsible for approximately 17% of global nitrogen pollution over the past 30 years (Damania *et al.*, 2023).

Harmful subsidy reform: Emissions of nutrient pollutants to water and soil

In ENCORE the harmful environmental impacts of agriculture and therefore agricultural subsidies for agricultural inputs are covered in the materialities of the sector 'Growing of non-perennial crops’ in the form of ‘Emissions of nutrient pollutants to water and soil’ for fertilizer with a ‘Very High’ impact materiality for cereals and ‘High’ for all other crops. This is explained by the substantial environmental pollution, particularly of soils and nearby water bodies.

Several studies have come to the conclusion that reducing certain agricultural subsidies, might alleviate the negative effects of agriculture on biodiversity. A shift from general input-coupled subsidies to decoupled payments was found to reduce environmental harm and pollution (UNEP, 2020).

Positive examples for intervention to reduce and restructure input subsidies exist. The UN Environmental Programme reports that countries have started removing general direct pesticide subsidies and started replacing them with more targeted subsidies that incentivise the use of low-risk products instead (UNEP, 2022). Some countries even introduced taxes on harmful pesticides to incentivise reduced use and shifts to less harmful products (UNEP, 2022). One example is Denmark, where a tax on pesticides was introduced, with different tax rates depending on the pesticide's harmfulness (Nielsen *et al.*, 2023). The tax successfully incentivised this shift to less harmful options and managed to reduce the pesticide load by 16% (Nielsen *et al.*, 2023).

Similar examples exist for the reduction of fertiliser use due to restructured subsidies. Between 1990 and 2015, the EU reformed its subsidies program by decoupling it from input use, which led to a 20% reduction in nitrogen fertiliser use and a 17% decrease in agricultural nitrous oxide emissions (World Bank, 2018). A study found that targeted cuts in fertiliser overuse zones could lead to approximately a 35% reduction in nitrogen pollution, while only decreasing yields by about 1% (Wuepper *et al.*, 2020).

Another effect of reducing fertiliser use is the reduction of GHG emissions from agriculture. A study by Laborde *et al.*, (2019) found that ending all coupled subsidies could decrease GHG emissions by 34 million tons CO2-eq due to reduced use of synthetic fertilisers.

While a reduction of fertiliser input might raise concerns about the adverse effects on yields and food production, research shows that in some regions the overuse of fertilisers incentivised by subsidies even lowers yields (Damania et al., 2023). The World Bank found that about 50% of global calorie production happens in regions where fertilisers are used excessively (Damania et al., 2023).

We therefore suggest that a reduction in agricultural input subsidies in the most polluting countries, combined with subsidy reforms (to pay decoupled subsidies instead) and adequate training fertiliser application and nutrient ratios, would lower the negative pressure of arable farming on nature and, consequently, biodiversity.

To model these changes in ENCORE we reduce the ENCORE impact of the 'Growing of non-perennial crops' sector on 'Emissions of nutrient pollutants to water and soil' from 'Very High' to 'High' for cereals and 'High' to 'Medium' for the other crops in the sector category[5].

5.2.3. Fisheries

Background

Whilst not all subsidies to fisheries are harmful, those which are deemed capacity-enhancing are commonly considered so (Sumaila *et al.*, 2010, 2019; Skerritt *et al.*, 2023). There are a range of estimates for the scale of harmful fisheries subsidies: from US$ 22.2 bn (Damania *et al.*, 2023) to US $50 billion (Arlaud *et al.,* 2024), with Deutz *et al.,* reporting an estimate of US$ 36 billion (Deutz *et al.,* 2020). An estimated ~60% of subsidies to fishing globally are capacity-enhancing, where effort and negative externalities are not accounted for in price. As with many agricultural subsidies, capacity enhancing subsidies in fisheries can incentivise over-production and over-exploitation, including harvesting of fish stocks beyond the maximum sustainable yield (Skerritt *et al.*, 2023). Harmful fishing subsidies can also contribute to inequitable trade, undermine small-scale fishing, and hinder international cooperation (Damania *et al.*, 2023). International agreements aim to target these harmful

[5] A similar analysis could be undertaken for pesticides and "Emissions of toxic soil and water pollutants".

subsidies, including the World Trade Organisation Agreement of Fisheries Subsidies, adopted in 2022, and which came into force in September 2025 (World Trade Organisation, 2025). This prohibits subsidies where: fishing activities are illegal, where fish stocks are overexploited, and where fishing occurs on the high seas and so is not under any collective sustainable management agreement (World Trade Organisation, 2024).

Repurposing of fishery subsidies must ensure food security is not compromised, and be just and equitable (Merayo et al., 2019). Eliminating all capacity-enhancing subsidies would have adverse socioeconomic impacts, particularly on small scale and artisanal fishers (Damania et al., 2023). Considerations for reforming subsidies could include redirecting subsidies towards sustainable management. Options also include decoupling subsidies from fishing effort, and re-purposing capacity enhancing subsidies to large scale fishing to instead increase support for small scale fishers. For example, a 2020 analysis found that in addition to large scale fishing receiving the highest share of harmful subsidies (US$ 18.3bn), small scale fishing also received the lowest share of beneficial subsidies: highlighting a potential point of leverage (Schuhbauer et al., 2020). Effective, equitable repurposing of harmful subsidies considering food security and distributive justice must ultimately engage key stakeholders in the process. By contrast, our analysis provides only an exploratory exercise, modelling potential impacts of aspects of harmful subsidy reform.

Harmful subsidy reform: GHG emissions

ENCORE classifies the fisheries sector as having a “medium” GHG emissions impact materiality, as “Fishing activities can release greenhouse gases emissions from burning of fossil fuels by fishing vessels and from refrigeration systems” (ENCORE partners, 2023).

Fuel use in fishing vessels is the main driver of GHG emissions from catch fisheries (Kristofersson, Gunnlaugsson and Valtysson, 2021). Fossil fuel subsidies to catch fisheries form the largest proportion of capacity-enhancing subsidies to large scale industrial fishing, at US$7.2 billion. Small scale fisheries receive US$0.6 billion in fuel subsidies (Schuhbauer *et al.*, 2020). Some estimates, when accounting for implicit subsidies (in the form of low taxes on fuels) place the value of fuel subsidies to the fishing industry as high as US $17-25 bn or US $35-50 billion (Guillen *et al.*, 2025). Fossil fuel subsidies are capacity enhancing in catch-fisheries, particularly as fuel costs account for 30-50% of fishing costs (Peng *et al.*, 2025). Catch-fisheries contributed approximately 0.5% of anthropogenic CO2 emissions in 2016: 4% of the global emissions due to food production (Kristofersson, Gunnlaugsson and Valtysson, 2021). Emissions increased ~30% from 1990-2016, without substantial increases in catch volumes: primarily the result of increases in industrial level fishing (Peng *et al.*, 2025).

Repurposing harmful fossil fuel subsidies would remove support to high-emissions forms of catch fishing. This may incentivise transition towards forms of fishing which use less fuel-intensive gear, although at the same time, having significant economic consequences for global fishing industries (Peng *et al.*, 2025). Fuel consumption is related directly to the type of vessel used, whereas fuel use per kg landed (use intensity) is dependent on the species targeted, the fishing gears used, and mesh size. Reducing fossil fuel subsidies may incentivise improved fuel use efficiency in fishing industries, to maintain catch volume. The most fuel-efficient methods depend on target species; hence, transitions to different gear as a result of subsidy reform is likely to vary between locations. Overall, however, low-fuel gears could reduce GHG emissions by an estimated 4-61%, species-dependent (Gephart *et al.*, 2021). Hence, repurposing harmful fisheries subsidies to fossils fuels may reduce GHG emissions in catch fisheries through transition to low-fuel gear.

Therefore, to model the impact of repurposing harmful fossil fuel subsidies to catch fisheries, we lower the ENCORE impact materiality category of GHG emissions in Fisheries from "medium" to "low".

Harmful subsidy reform: area of seabed use

ENCORE classifies the fisheries sector as having a "high" impact materiality for area of seabed use, as "Some fishing activities occupy or interact with the seabed (e.g. beam trawling, dredging). This can significantly damage seabed habitats and morphologies such as reef formations." (ENCORE partners, 2023).

The highly fuel-intensive fishing method of bottom trawling has high impacts on benthic habitats (Rijnsdorp *et al.*, 2020; Bastardie *et al.*, 2022). The reform of fossil fuel subsidies to fisheries may therefore incentivise a transition away from bottom trawling. We may therefore expect a transition to other fishing methods to be associated with a reduction in disturbance to the seabed. The UN Marine Biological Diversity of Areas beyond National Jurisdiction (BBNJ Agreement) may also contribute to a reduction in this impact pressure, as countries will be subject to procedures on deep-sea mining if they are party to both the BBNJ Agreement and the International Seabed Authority (which regulates deep-sea mining). (High Seas Treaty, 2023) As such, to model the impact of repurposing harmful fossil fuel subsidies to catch fisheries, the ENCORE impact materiality category of 'area of seabed use' in Fisheries is reduced from "High" to "Medium".

Harmful subsidy reform: biotic resource use

ENCORE classifies the fisheries sector as having a "high" impact materiality for biotic resource use, as "Approximately 87% of wild fisheries are exploited unsustainably (fish are removed at rates higher than species' recovery rates), leading to overfishing on a global scale. Entire populations of fish species can collapse due to wild fishing, including non-target species (referred to as bycatch). Additionally, recreational fishing can put pressure on fish populations. Overfishing, excessive catch-and-release practices, and illegal fishing can deplete fish stocks, disrupt aquatic ecosystems, and harm the overall biodiversity of rivers, lakes, and oceans." (ENCORE partners, 2023).

Most recent estimates record that ~$20 bn worth of subsidies contribute to overfishing (Damania *et al.*, 2023). The newly-enforced WTO Agreement on Fisheries Subsidies Rule 1 would prevent subsidies being provided in areas where fish stock is assessed as overfished (World Trade Organisation, 2022). Subsidy reform which aligns to this agreement may therefore lead to a reduction in overfishing, and an exploitation of fish stocks at more sustainable levels. More sustainable use of marine resources may also result from the enforcement of the newly-ratified Agreement on Marine Biological Diversity of Areas beyond National Jurisdiction (BBNJ Agreement), where marine protected areas may limit overfishing (United Nations, 2025).

Therefore, to model the impact of repurposing subsidies to catch fisheries which currently contribute to overfishing, the ENCORE impact materiality category of 'biotic resource use' in Fisheries is reduced from "High" to "Medium".

Harmful subsidy reform: water pollutants

ENCORE classifies the fisheries sector as having a "medium" impact materiality for emissions of toxic soil and water pollutants, as "Most fishing activities require use of fishing boats and ships, which can emit toxic pollutants through (1) chemicals used for washing of ships that can affect erosion of estuaries, sediment

resuspension, and turbidity, (2) oil and fuel leakage from motors, (3) spillage of antifouling paints." (ENCORE partners, 2023).

As fossil fuel subsidies are a substantial proportion of harmful subsidies to fisheries, representing ~$7bn of the ~$22bn in capacity-enhancing subsidies, transition to lower fuel intensity gear through subsidy reform could also reduce fuel pollution. Therefore, to model the impact of repurposing fossil fuel subsidies, the ENCORE impact materiality category of 'water pollutants' in Fisheries is reduced from "medium" to "low".

5.2.4. Plastic pollution

Plastic production has more than doubled only in the last two decades, reaching 460 million tonnes in 2019 (Ritchie et al., 2023). In 2016 alone, 19-23 million metric tons of plastic waste generated in 2016 entered aquatic ecosystems (Borrelle et al., 2020) and every year 1-2 million tonnes of plastic gets disposed in oceans (Friends of the Earth, n.d.). Annual plastic emissions to 2030 for 173 countries representing ca 97% of the global population projecting current trends, could reach 53 million metric tons per year by 2030 (Borrelle et al., 2020). Therefore, the predicted growth in plastic waste exceeds efforts to mitigate plastic pollution. Plastic is one of the most pressuring crises of our time, affecting both the health of ecosystems and communities depending on those impacted ecosystems. Academics, international conservation organisations and multi-lateral institutions speak about plastic, especially in relation to marine plastic pollution, as a social-ecological crisis (Borrelle et al., 2020; Damania et al. 2023). Pollution created by plastics however does not stop at the end-of-life stage of this material (i.e. waste and disposal), but its full life cycle has important social-ecological impacts, from the very raw material, feedstock, used in its production process, namely fossil fuels. Not only does plastic produce important climate and environmental change impacts itself but it also contributes to exacerbate the extractives industry at its source (Vasarhelyi, 2023).

Background

It is for this set of social-ecological concerns that global environmental governance has been long considering and discussing a so-called Global Plastic Treaty. The extensive international negotiations, with the final *negotiation* round (INC-5.2) which took place from 5th-14th August 2025 in Geneva, Switzerland and the first round happened in Punta del Este, Uruguay in November 2022, have not yet reached a conclusive agreement. This is because of disagreements among parties about the legally binding nature of the Treaty and whether this should address the full-life cycle or just the end-of-life stage of the material (i.e., its waste management). Despite the political disagreement, modelling studies however show that we need a strategy which does not stop at the waste and disposal but addresses the origin of plastic pollution at its source through a life-cycle approach (Barrowclough & Birkbeck, 2022; Systemiq, 2024). These models and research stream show what it could occur under an ambitious global strategy for plastic, informing here the ambitions for our modelled green cooperative scenario.

The changes induced by the introduction of a global and legally binding Plastic Treaty addressing the full life-cycle of this material on the real economy, with important implications also for the financial sectors not directly explored in this report, that are mostly discussed in the literature include:

- Reduced demand for fossil fuels (oil and gas) (IEA, 2018).
- Higher costs for producers: (i) new financial tax or compensation fee and (ii) increased extended producer responsibility so for producers to fund waste collection, recycling, and disposal infrastructure and possible clean-up pledges as well as pay for, when applicable, non-compliance penalties (Systemiq, 2024; Velis, 2024)

- Redirection in financial flows towards 'Harmonization of global product design and recyclability standards [...] and increase the pace of development of local plastic waste recycling and processing industries' (IISD, 2018,online)
- Redirection towards sustainable alternatives (e.g. bioplastic but potential spillover in increased crop production). Embedded in wider transition policy, feedstock in plastic production indicates that 'defossilization goes beyond decarbonization as emphasized in mainstream debates on energy transitions by introducing alternatives to the use of oil, gas and coal as raw materials for synthetics.' (Tilsted and Newell, 2025, p. 1214).
- Increased demand for high-quality and most advanced companies and countries with recycling mechanisms and technologies
- Increased demand for high-quality and most advanced companies with waste management services and strategies

In a 'Green cooperation' scenario, we assume a legally-binding Global Plastic treaty is agreed in the next 2 years.

Plastic regulation change: generation and release of solid waste

Despite the full-life-cycle plastic management we think it is beneficial to move towards, our modelled changes to economic sectors involve mostly generating and realising of solid waste in the form of plastic for two reasons. First, this is because plastic is a key industrial waste component, which is potentially mismanaged with even more social-environmental implications (IISD, 2018; Systemiq, 2024). Second, the waste management sectors are predicted to be among the most affected ones also in terms of real-economy changes on trade, which is why we think changing the values for these specific pressures in our exploratory model made the most sense.

In the ENCORE database, 'Generation and release of solid waste' is a pressure for a few sectors, including: Manufacturing ; Electricity, gas, steam and air conditioning supply ; Construction; Transportation and storage; Accommodation and food service activities; Information and communication; Real estate activities; Professional, scientific and technical activities; Administrative and support service activities; Public administration and defence & Compulsory social security; Human health and social work activities; Arts, entertainment and recreation; Activities of extraterritorial organizations and bodies.

Therefore, to model the impact of a global and legally binding Plastic Treaty which addresses the full-life cycle of plastics, from the very fossil feedstock down to the waste management and re-purposing through effective recycling processes, the ENCORE impact materiality category of 'Generation and release of solid waste' is reduced by one materiality ranking. For example, "Manufacture of footwear" was shifted from low to very low.

In modelling possible outcomes of still ongoing Plastic Treaty negotiations, the report *Plastic Treaty Futures* (Systemiq, 2024) provides an in-depth analysis of four possible future scenarios. By building from a BAU in which no treaty is achieved, and global cooperative mechanisms fail to get consensus on any policy action to tackle plastic pollution, four scenarios are then developed around the axes of 'degree of coordination' (national vs global action) and 'scope of action' (end-of-life vs full lifecycle). Parallelly, within the scope of action, 15 policy interventions are identified to achieve four main pillars (Reduce; Eliminate; Expand Safe Circularity; Controlled Disposal). The first 8 among these interventions are then modelled to change in the two future scenarios tackling only the end-of-life stage (i.e. global and national waste management scenarios) and the latter set of 7 policy interventions were instead included when modelling futures of full lifecycle national and global.

Two elements emerge as particularly important and relevant for any modelling work around plastic pollution can be drawn out of this report. First, because of the scale and specificity of micro-plastics, both in terms of impacts and removal technologies and processes, the report includes a transversal pillar (E) which is aimed at tackling micro-plastic pollution. This can be addressed in end-of-life scenarios through downstream policies to better capture micro-plastics as well as in a full lifecycle through starting to reduce micro-plastic use and manage microplastic emissions in upstream production processes. Second, across all scenarios, significant emphasis is placed on the so-called 'mismanaged plastic waste' which even if less accounted for in mainstream discussions represents nevertheless a critical element driving some of the most evident consequences of plastic pollution in the short-term through dumpsite and unsanitary landfills close to communities, open burning harmful for people behind it and the environment, especially atmospheric, and growing releases of plastic waste in land and water.

5.3. Results

Harmful subsidies reform for energy

As shown in figure 13, for fossil fuel subsidy reduction, the percentage change in direct operations was much larger than the scope 3 changes. This is likely because demand changes that were estimated to alter the financial portfolios were not changed in the EXIOBASE3 Leontief matrix and, therefore, did not fully reflect the trickle though effect of the demand changes in fossil fuel but rather compares the fossil fuel value chain to renewables value chains. The largest change in impact intensity for direct options was for "Area of freshwater use" at a decrease of just under 0.6%. This is likely due to the large amounts of water required for fossil fuel energy generation that is not required for solar and wind energy generation.

For the upstream value chain, the largest reduction was "Other abiotic resource extraction" at a just over 0.2% reduction. The upstream value chain of coal is primarily mining and, thus, generates large amounts of abiotic resource extraction. Although the renewable upstream value chain also requires mining, it requires less physical mass than coal mining because smaller amounts of the mined critical minerals are required. However, it must be recognised that deforestation due to critical mineral mining has increasingly become a significant challenge (Berthet et al., 2024; Stanimirova et al., 2024).

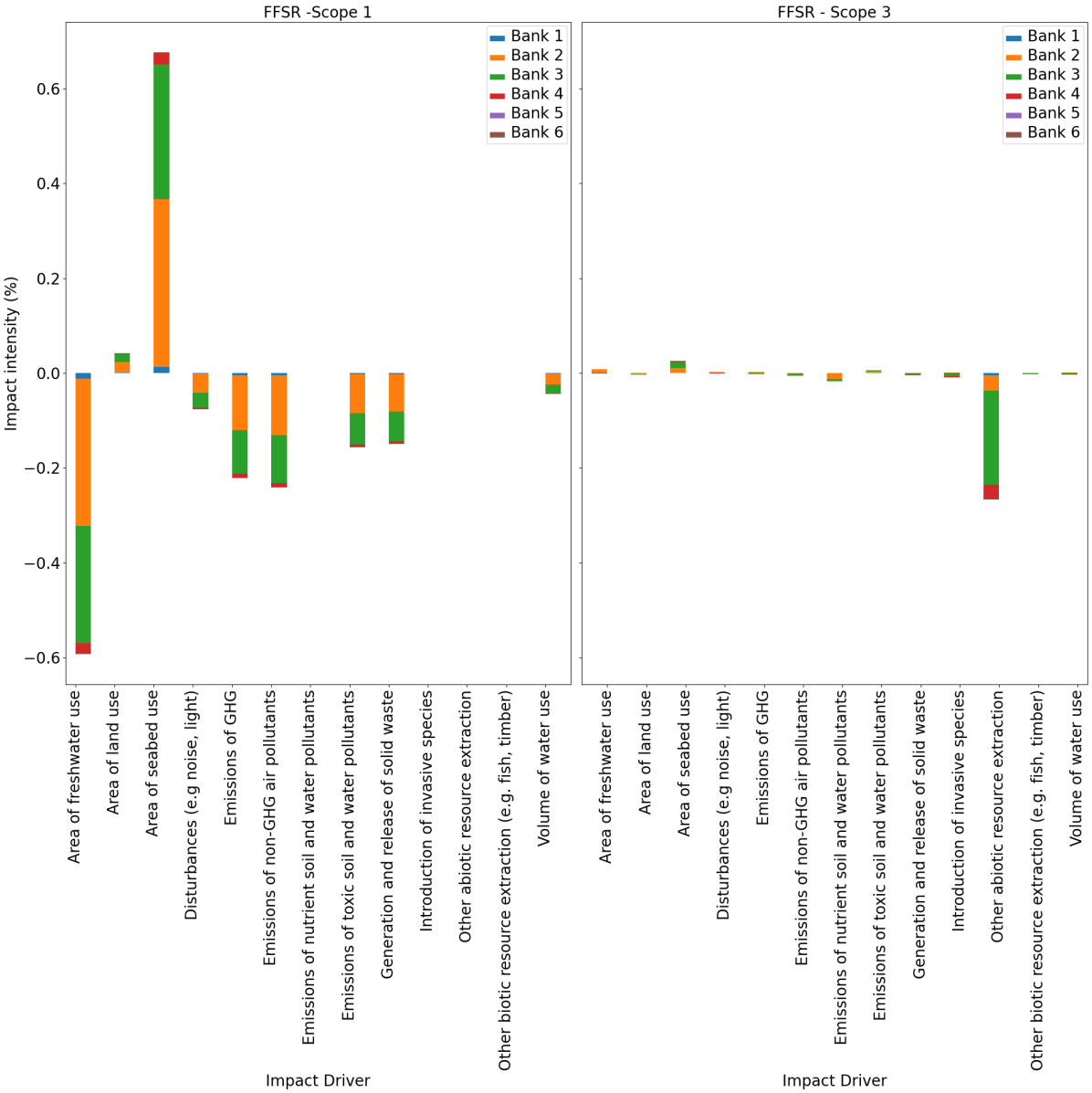

Figure 13: Percentage change in impact intensity compared to the baseline (current portfolio) for each impact driver and for each bank as a result of fossil fuel subsidy reform (FFSR).

Interesting, FFSR also caused an increase in impact intensity of over 0.6% for "Area of seabed use." This could be due to the use of seabed for offshore wind. Therefore, it is critical to recognise that, although FFSR is crucial to protecting nature by mitigating the damaging effects of climate change, nature will also face impacts and risks due to renewable energy generation. However, this model does not embed the potential damage that might be caused to nature due to climate change and, therefore, the reductions in impact intensity are likely incredibly underestimated. Climate change is potentially set to become the largest driver of nature loss in the next few decades and must be prevented to achieve the GBF targets (IPBES, 2019; Jaureguiberry et al., 2022). These results underscore that, while technological innovations can enable the climate transition, a transition to a nature-positive economy will require grappling with tradeoffs and embedding nature into the core of our economy.

Harmful subsidies reform for agriculture

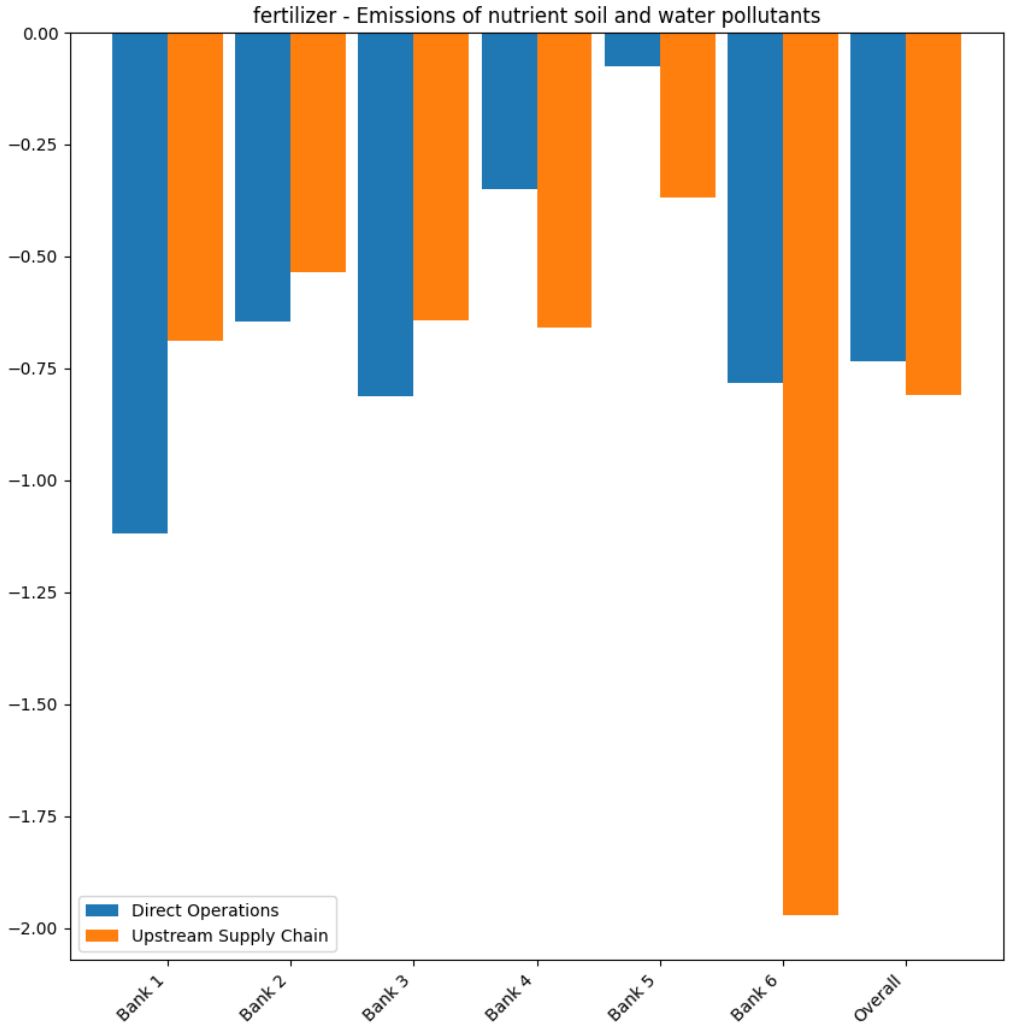

Figure 14: Percentage change in impact intensity compared to the baseline (current portfolio) for emissions of nutrient pollutions and for each bank as a result of fertilizer subsidy reform.

For fertilizer subsidy reform (figure 14), there was an overall reduction in "Emissions of nutrient pollutants" of approximately 0.75% for direct operations and the upstream supply chain. However, there was great heterogeneity between the banks in terms of magnitude and in terms of direct operations and upstream supply chain exposure. While some banks saw relatively large direct operations impact intensity reductions (Bank 1 at ~1.1%), others primarily saw a decrease in impact intensity in the upstream supply chain (Bank 6 at ~1.9%). It is likely that there is large variation in the exposure to agriculture in the bank portfolios that is driving these differences. Like fisheries, if a bank's portfolio has limited exposure to agriculture directly, it might generate its impact via its exposure to the upstream supply chain and food distributors and retailers.

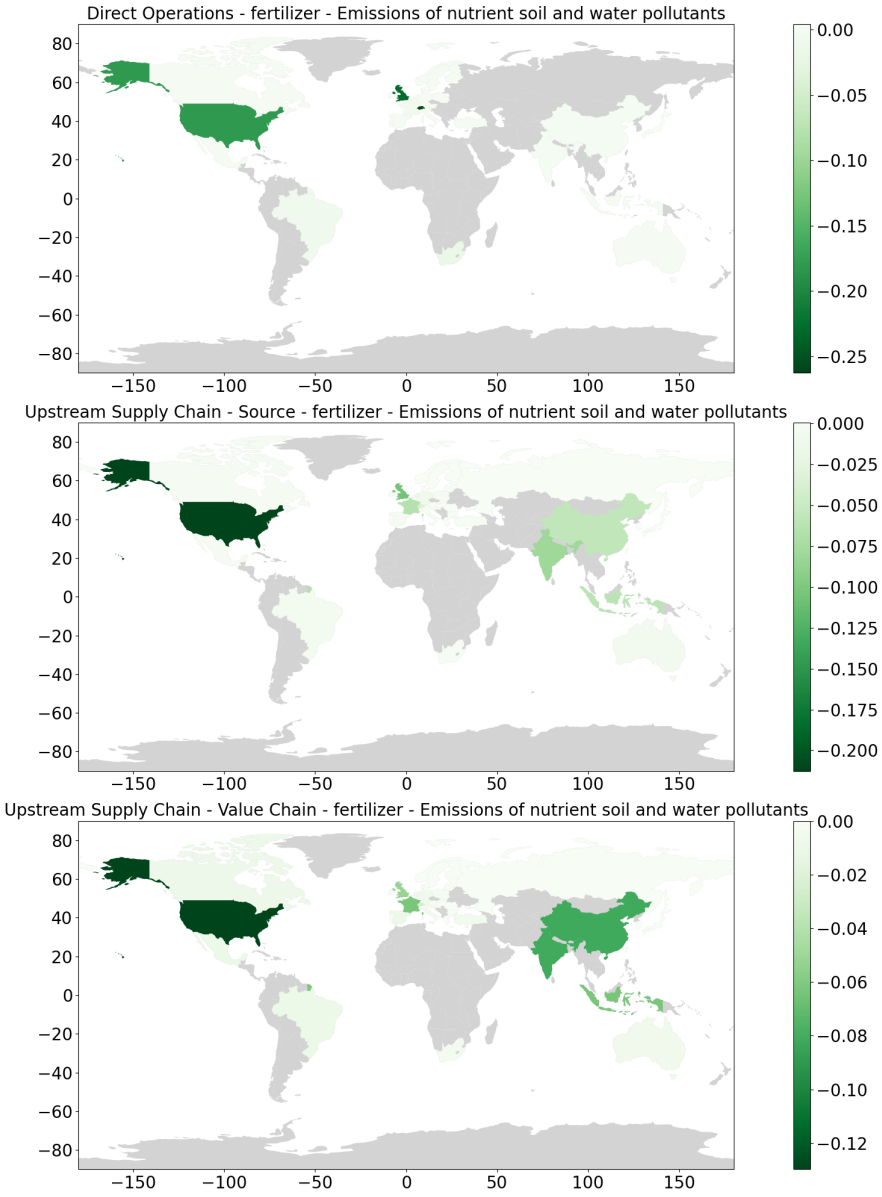

Figure 15: Regional distribution in the overall reduction of impact intensity for 'Emission of nutrient soil and water pollutants' for fertilizer subsidy reform for direct operations and the upstream supply chain. The upstream supply chain source country demonstrates what country the supply chain originates and the upstream supply chain value chain country demonstrates the country where impact was reduced.

As shown in figure 15, for direct operations, the United Kingdom would experience the largest decrease in impact intensity via the financed impact of the UK banks. This potentially highlights that the UK financial system has higher exposure to domestic agriculture and, therefore, generates more impact intensity domestically due to unsustainable fertilizer use. For the upstream supply chain, the largest reductions were experienced in the United States, followed by China, India and Indonesia. This aligns with the literature review that indicated China and India as particularly using unsustainable amounts of fertilizers that are causing harmful environmental effects via nutrient pollution. Therefore, fertilizer subsidy reform in the UK and globally could reduce the impact intensity of the UK financial system and help to achieve GBF goals.

Harmful subsidies reform for fisheries

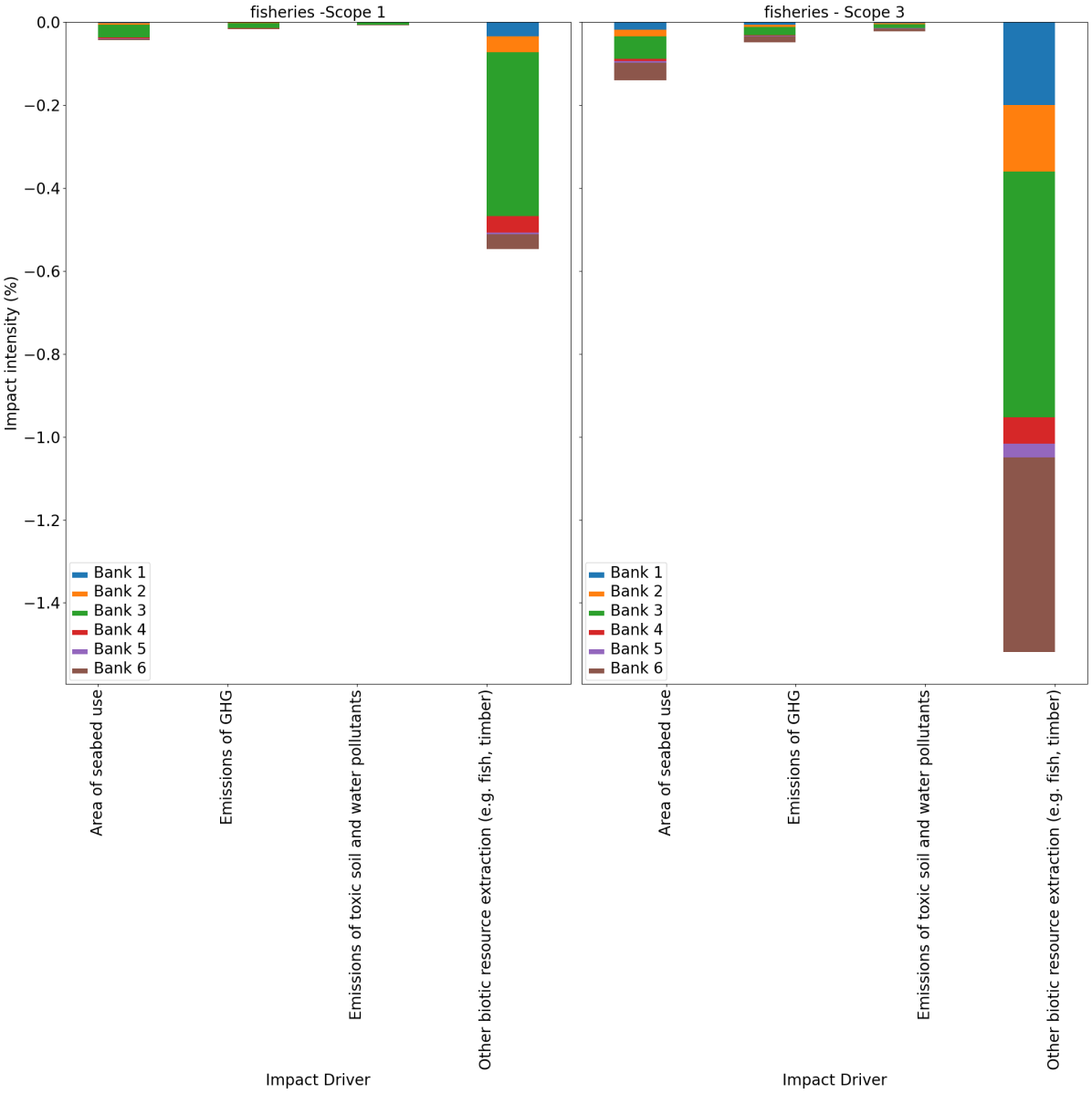

Figure 16: Percentage change in impact intensity compared to the baseline (current portfolio) for each material impact driver and for each bank as a result of fisheries subsidy reform.

As show in figure 16, unsurprisingly the largest reduction in impact intensity for fisheries subsidy reform is "Other biotic resource extraction" (~0.5% direct, ~1.45% upstream), which is the direct harvest of fish and seafood. To enable sustainable fisheries, the harvest of fisheries cannot exceed to sustainable maximum yield, which in many cases involves decreasing fishing pressure to enable fish populations to recover. In current subsidy regimes, policy is incentivising unsustainable harvesting levels and, therefore, inevitable collapse of key fish populations. By removing these subsidies, ideally the impact intensity of fish extraction can be managed by reducing pressure on populations and allowing recovery.

Fisheries subsidy reduction had a much larger reduction in impact intensity in the upstream supply chain exposure of the banks' portfolios compared to the direct operations exposure. One explanation for this could be that the banks may not have much direct exposure to fishing companies directly in their equity, bond or

loan portfolios but they may be exposed indirectly via investments in seafood retailers and food distributors. Thus, the primary mechanism through which the UK financial system impacts fisheries is via their food retailers and distributors and, therefore, they might be an appropriate target for possible regulation or subsidy reform.

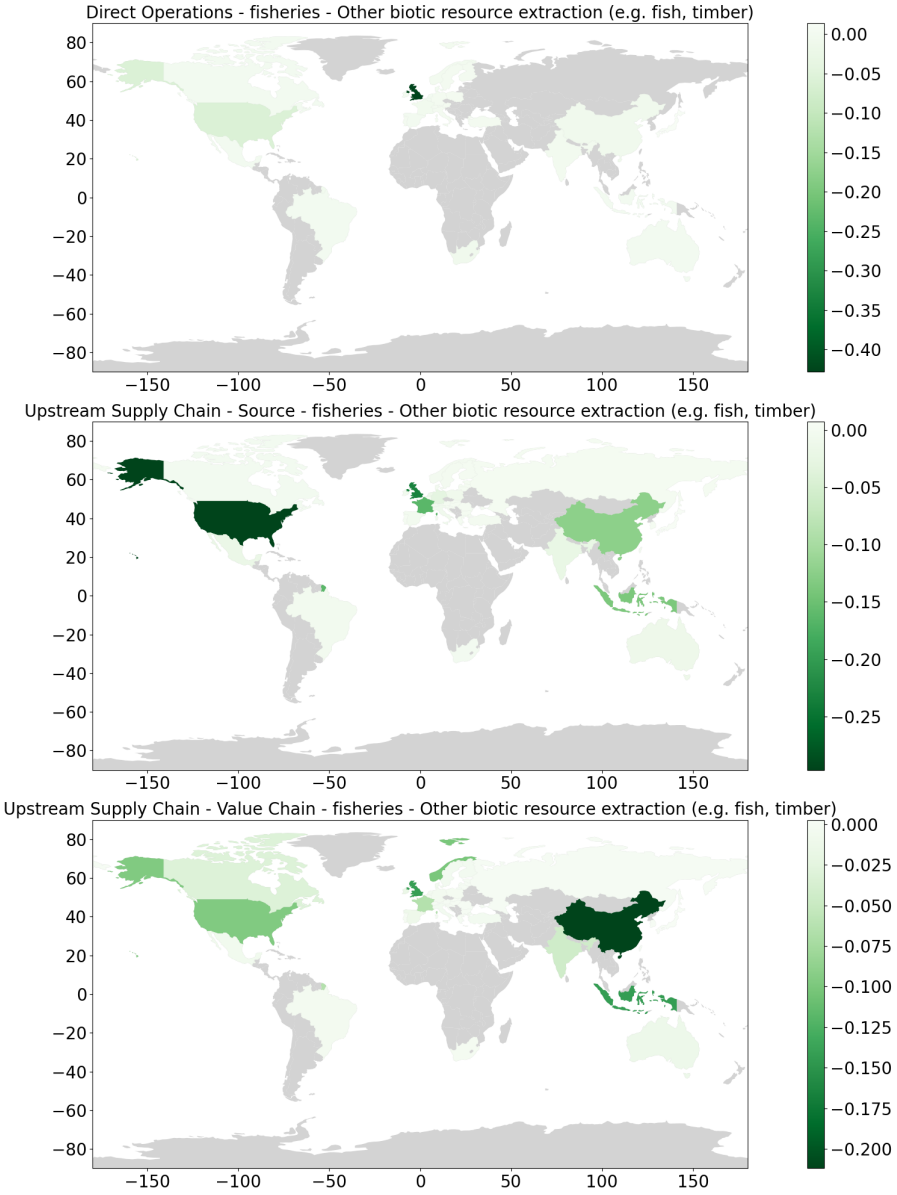

Figure 17: Regional distribution in the overall reduction of impact intensity for 'Other biotic resource extraction' for fisheries subsidy reform for direct operations and the upstream supply chain. The upstream supply chain source country demonstrates what country the supply chain originates and the upstream supply chain value chain country demonstrates the country where impact was reduced.

For the direct operations, the reduction in impact intensity is almost exclusively in the UK, which indicates that the UK banks have limited direct exposure to fishing companies outside of the UK via their investments. For the upstream supply chain, however, the UK banks are exposed to companies with upstream exposure to fisheries in many more countries, with most impact originating from the United States, the United Kingdom still, China, France and Indonesia. The majority of the impact intensity reduction due to subsidy reform would materialise in China, followed by Indonesia, the United Kingdom and Norway. Therefore, although the United Kingdom does see significant impact intensity reduction due to decreased fishing pressure, the largest impact alleviation is seen in international fisheries due to very international upstream supply chains.

Global Treaty on plastic pollution

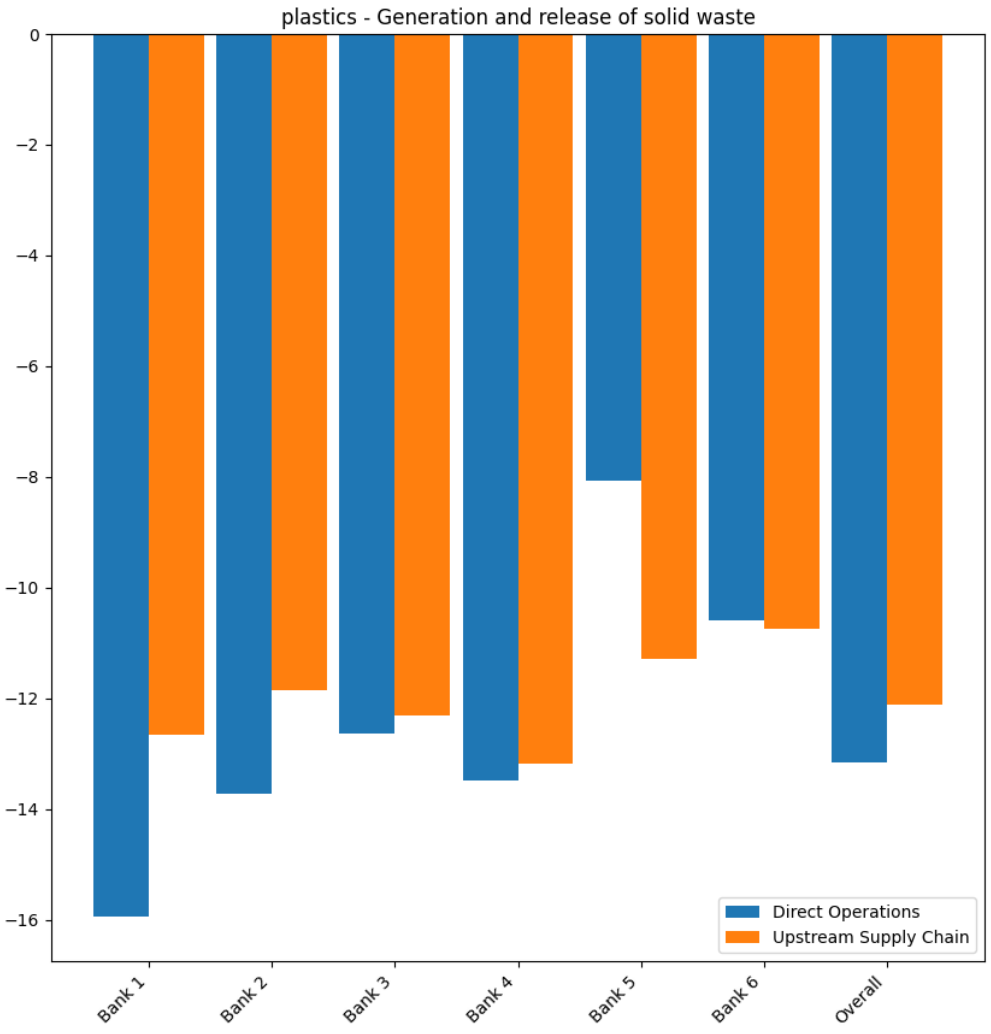

Figure 18: Percentage change in impact intensity compared to the baseline (current portfolio) for 'Generation and release of solid waste' for each bank as a result of plastics reform.

Overall, the reform of plastic pollution had the largest reduction of impact intensity of all the interventions (figure 18). Overall, there was a reduction in impact intensity for solid waste generation of ~13% for the direct operations and ~12% for the upstream supply chain with a maximum of ~16% for Bank 1's direct operations. Because plastic is so widely used, the effects of regulating its use were far reaching, spanning across many sectors using plastics. It is important to note also that this analysis did not include the impact reduction in the production of the plastic itself but, rather on the downstream usage and pollution of plastic. Therefore, it is likely that these reductions in impact intensity are underestimated still as plastic production has medium intensity across multiple pressures and very high intensity for "Emissions toxic pollutants to soil and water". Research has also indicated that as demand for plastics decreases with new regulations that this will ultimately lead to a decrease in production and, thus, a reduction of impact via this channel as well.

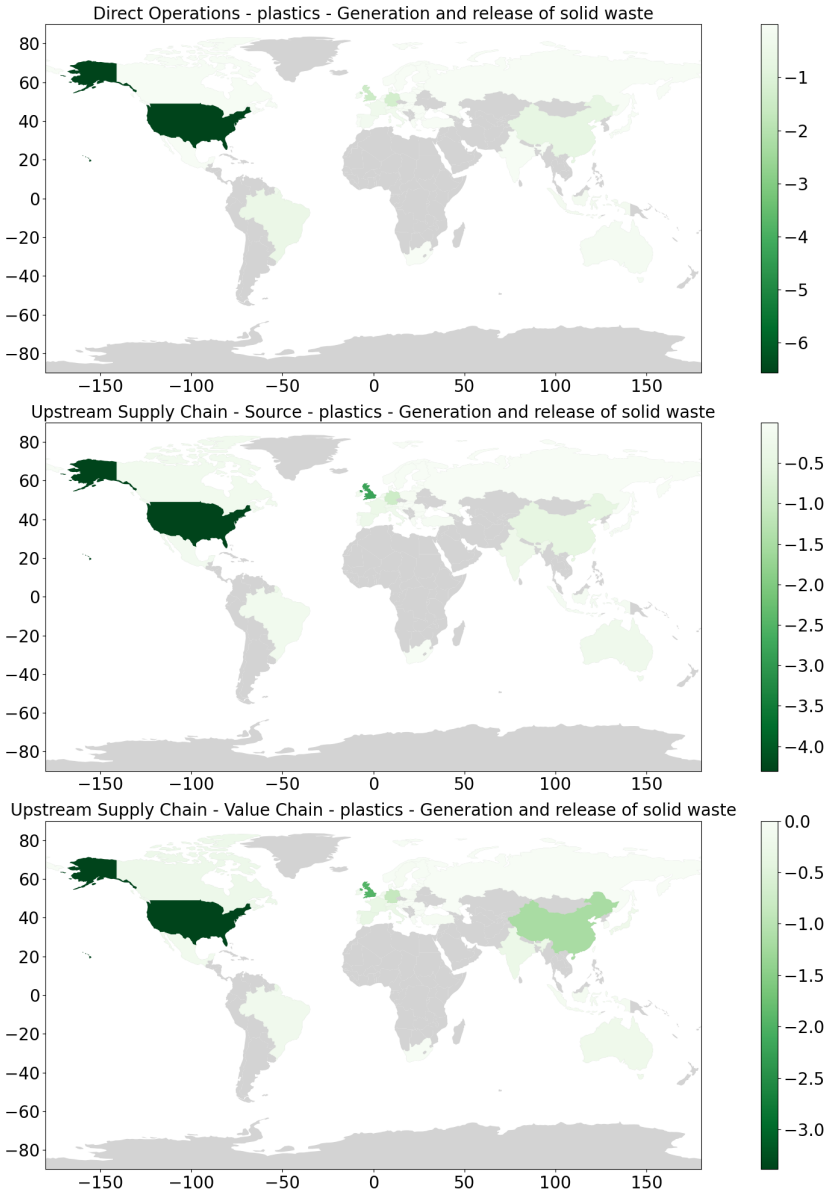

Figure 19: regional distribution in the overall reduction of impact intensity for the 'Generation and release of solid waste' for the intervention on reducing plastic for direct operations and the upstream supply chain. The upstream supply chain source country demonstrates what country the supply chain originates and the upstream supply chain value chain country demonstrates the country where impact was reduced.

As shown in figure 19, the impact reduction in the United States contributed the largest to the overall decrease in generation and release of solid waste, followed by the United Kingdom. Importantly, in the value chain country, China is highlighted as another country that experienced significant decreases in impact intensity. This indicates that, via the financed impact of the UK banks, the intervention on plastic would have the largest effect in these three countries.

5.4. Modelling: limitations and next steps

A particular strength of this approach is that it provides sector-specific ratings for the impact via pressures on the environment. Therefore, we can estimate the effect of particular sector-specific changes influenced by relevant interventions. Because the ENCORE knowledge base also provides a literature review for each of these

ratings, we can use this to justify any changes made to the rating as a result of the intervention based on our own literature review. Finally, the ENCORE approach is very transparent because of its simplicity. We can explicitly outline the changes that we have made in changing the ratings as well as any assumptions that have been made in the process.

However, this simplicity also has limitations. Firstly, the ENCORE model materiality ratings are globally consistent so do not include regional differences in business model or impact intensity. This may be a potential limitation in modelling the effect of fisheries subsidy reform, for example. Harmful fisheries subsidies have variable impacts in different regions, due to the ease of movement of fish stocks, and fishing fleets, between jurisdictions. Some regions act as net 'sources' of harmful subsidies, in particular, countries with a high human development index, in Asia, Europe and North America. Other countries act as net 'sinks' of subsidies: Africa and Oceania experience fishing which is supported by more harmful subsidies than these continents' nations provide (Skerritt *et al.*, 2023). Detecting variable spatial impacts is limited in ENCORE, due to global impact materiality multipliers.

Secondly, the ENCORE materiality ratings are qualitative rankings from very low (VL) to very high(VH). Converting these ratings into quantitative scores contains a large assumption that the scores scale linearly in terms of intensity, which could influence the results. Thirdly, the ENCORE literature review does not contain a large amount of detail about the difference between a medium (M) rating and low (L) rating, for instance, so we had to make an assumption in terms of whether the intervention was sufficient to changing the ratings, based on the literature.

Fourthly, a limitation to using ENCORE to model these interventions, is that only negative impacts are captured. Public finance interventions such as subsidy reform will aim to re-purpose harmful financial flows, and re-direct these towards activities which have positive impacts on nature. For example, literature on repurposing harmful subsidies to fisheries suggests directing finances instead towards small scale, subsistence and artisanal fisheries, aiming to improve social equity, economic viability and resilience (Schuhbauer *et al.*, 2020). However, as ENCORE is designed to enable businesses to understand the scale of their impacts on biodiversity, the tool is not well-suited to modelling the impact of upscaling financial flows to activities with positive impacts on biodiversity. Therefore, only reductions in the negative impacts of fishery subsidies can be modelled through ENCORE.

As a data screening tool, a key limitation is the inability of the model to capture the system-level change which would be anticipated to result from public policy interventions. For example, repurposing harmful subsidies to fisheries would likely result in notable socio-economic impacts which are not captured in ENCORE. Modelling work has suggested that targeted repurposing of harmful fisheries subsidies could close the income gap between current wages and minimum living wage for small scale fishers in 11 of the 30 least-developed coastal countries (as defined by the UN). This would benefit an estimated 7 million fishers, and approximately 33 million people when fishing households are included (Teh *et al.*, 2024). These substantial potential socio-economic impacts will not, however, be easily captured within ENCORE and complementary approaches would be needed. Further limitations explicitly relating to the methods suitability for scenario modelling will be outlined later in the report.

There were other methodologies that we could have explored for this analysis, each with their own benefits and drawbacks. Firstly, Integrated assessment models (IAMs), such as GLOBIO4 (Schipper et al., 2019). Many of these are particularly designed for policy scenario analysis. However, these models typically do not have sector-specific metrics, which makes it challenges to estimate changes in impact of financial portfolios, which are quantified in terms of sector-region exposures. This limits the flexibility for scenario analysis looking at

business model change driven by regulation as we have modelled here. Furthermore, these models are based on many assumptions, which are not particularly transparent.

Secondly, earth economy models, such as GTAP-InVEST, provide another method for policy scenario analysis through powerful coupling of computable general equilibrium models (GTAP) and spatially explicit ecological models (InVEST). These models estimate how the economy affects the environment and, in turn, how the environment affects the economy, and can be used for comparison of economic and ecological impact between different policy scenarios (Johnson et al., 2021; 2023). However, computable equilibrium models (CGE) can struggle to capture system-level change because they assume that the economy is in equilibrium and will return to the same equilibrium, which may not be the case in the face of nature degradation or system-level policy interventions (Farmer et al., 2015). Furthermore, these models usually compute changes to GDP and do not explicitly extend to the financial system, requiring additional analysis to apply the results to financial portfolios (Farmer et al., 2015). As scenario analysis of nature-finance interactions develops, exploring scenario analysis through these more robust and detailed earth-economy models should be explored.

Thirdly, agent-based models (ABMs) are another approach that can be used to explore outcomes of complex nature-finance interactions. Agent-based models allow for the simulation of complex socio-ecological interactions via simulating the behaviour of individual "agents" and have been posited as a potential modelling framework for climate change model (Farmer et al., 2015). With developments in AI, agent-based approaches have been described for nature-finance interactions, primarily from the financial risk perspective (Reece et al., 2024). However, these models require precise data, intensive calibration and engagement with stakeholders with deep interdisciplinary expertise (Reece et al., 2024).

6. Disclosures, capital requirements, collateral requirements and quantitative credit policies (by Lydia Marsden[6])

This section now considers how financial and monetary policies to actively 'green' private financial flows – as opposed to the impact of real economy measures to deliver the GBF on the composition of the UK lending - could evolve under different scenarios of environmental ambition and geopolitical cooperation. To illustrate this, it utilises a granular dataset of international financial flows to companies associated with land-use pressures in five globally important ecosystems – the Amazon rainforest in Brazil; boreal forests in Canada and Russia; and mangroves and peatlands in Indonesia (Marsden et al. 2024; 2025).

6.1. Review of policy interventions to green private finance

This section reviews the most common measures suggested to green private financial flows and their theoretical transmission channels to reallocate capital away from environmentally harmful activities. It then conducts a high-level review of relevant empirical and model-based evidence on the effect size of these channels. Given the nascent state of many green financial and monetary policies, empirical studies of their impacts on financing volumes are relatively limited (OECD, 2024) – however other sector-based interventions

[6] This section was developed by Lydia Marsden informed by discussions with other co-authors.

are reviewed as possible analogues. It then suggests calibration factors to be used to stylise the effects of these policies on new financial flows that are misaligned with the GBF in the subsequent scenario analysis. We focus only on quantity changes (i.e., in volumes) rather than price changes (i.e., in yields) for tractability. Given the paucity of empirical evidence on how similarly targeted financial and monetary policy interventions (even when not targeted at environmental issues) have historically impacted the sectoral allocation of financial flows, the analysis remains very much exploratory.

6.1.1. Mandatory climate- and nature-related disclosures

Transmission mechanism

Public disclosures of the environmental risks posed to corporate and financial institution have been a central component of the regulatory push to green private finance, with climate-related disclosure policies now adopted in over 50 countries worldwide (OECD, 2024). By increasing information discovery, disclosures aim to better reveal the risks *posed to* market actors, enabling their calculation and pricing within financial markets. Theoretically, market discipline will then shift capital allocation in line with a green transition (Ryan-Collins, 2019; Ameli et al., 2020). *Corporate* disclosures are the main avenue for market discipline, intended to be used by their financiers and investors to directly inform engagement and investment strategies and changes to cost/availability of capital. *Financial institution* disclosures are intended to be used by stakeholders, policymakers, and investors regarding institutions' management of climate- and nature-related risks.

While initially voluntary, many governments have now mandated climate-related financial disclosures for corporates and financial institutions. Nature-related disclosures are becoming mandatory in some jurisdictions (for example, via the European Union's Corporate Sustainability Reporting Directive (CSRD)). Progress at the broader international level is being made by voluntary frameworks such as the TNFD, which now marks 730 adopters globally. Standardisation by international actors such as the International Sustainability Standards Board (ISSB) will likely translate to further mandatory implementation. Despite their popularity, several theoretical critiques have been raised regarding whether transparency alone will meaningfully shift capital allocation away from incumbent, 'dirty' sectors (Ameli et al., 2021; Irvine-Broque and Dempsey, 2023).

Evidence of impact on financing volumes

The empirical evidence is mixed as to whether voluntary or mandatory sustainability disclosures for corporates and financial institutions meaningfully shift financial flows and investment behaviour away from 'harmful' activities. It is challenging to disentangle the effects of disclosures from other factors and to select a relevant response variable (e.g., focusing on the quality of corporate versus financial institution disclosures) (Giannetti et al., 2023; OECD, 2024). The clearest analogue to the focus of this note is whether climate-related disclosures reduce lending to and investment in fossil fuels or other emissions-intensive sectors. The empirical research mostly focuses on the effects of disclosures *by financial institutions*, rather than the effects of corporate disclosure on their funding opportunities (OECD, 2024). A key challenge implied by this research is that substantial ESG disclosures by firms can signal greater credit quality resulting in lower financing costs overall, regardless of the firms' underlying activities and alignment with the green transition (Raimo et al., 2021; Gallucci et al., 2025).

Looking at mandatory disclosures, research has found that following an ESG disclosure mandate, banks responded with price and monitoring effects, demonstrated by increasing spreads and/or reducing lending maturities but not reducing lending volumes to fossil fuel firms (Demetriades and Politsidis, 2025) or firms with

poor environmental and social records (Wang, 2023). Looking at voluntary disclosures via early adoption of the TCFD, Hasan et al. (2023) found TCFD-member banks charge polluting borrowers – defined as those subject to EPA enforcement actions, toxic chemical releases, and a proprietary ESG environmental score – a 9% higher loan spread, on average, after joining the initiative and reduced loan supply to these firms by 5-38%. While these effects appear substantial, they are concentrated on borrowers subject to *litigation and policy enforcement risk* (i.e., from *acute* environmental incidents) rather than the *transition risks* (i.e., fossil fuels, coal) of aligning with climate pathways[7]. Finally, a study by the French central bank found that French investors subject to mandatory climate-related disclosure standards reduced their holdings in fossil fuel companies by an average of 39% (Mésonnier and Nguyen, 2020), but does not look at bank lending or capital markets facilitation.

Looking at the quality and volume of disclosures more broadly (rather than the onset of disclosure), the evidence is mixed. Gambacorta et al. (2024) find that lending to the most carbon-intensive firms (Scopes 1-3) declines by an average of 6.4% for a one standard deviation increase in the 'strength' of their disclosures[8]. However, banks that used a positive tone in their reports provided *more* lending to dirty firms. This 'window dressing' effect is also observed by Xing et al. (2021), who find that Chinese firms with higher environmental disclosure quality do not obtain more loans, concluding that 'soft environmental disclosure' hinders the greening of credit allocation. Similarly, Giannetti et al. (2023) discovered that European banks that emphasise sustainability were associated with *greater* volumes of lending to borrowers in dirty sectors and those with higher emissions, without charging higher interest rates or shortening debt maturities, even accounting for transition financing.

Assumed effect size for this note

In summary, there is mixed empirical evidence on the impact of climate-related disclosures on lending to and investment in damaging activities (OECD, 2024). The evidence above suggests disclosures can decrease emissions-intensive finance volumes; however, others suggest abundant disclosures can mask business-as-usual. The transmission from nature-related financial disclosures to shifting capital allocation away from 'dirty' or high transition risk activities is arguably much more complex, due to a lack of widely agreed nature transmission pathways and the local-global trade-off inherent to nature-related risks (Ranger et al., 2023).

Due to this, we stylistically assume two cases for the impact of mandatory nature-related disclosures (i.e., in line with the TNFD) on new lending and capital markets facilitation to key 'dirty' activities over the next 5 years (to 2030). In a 'greenwashing' case (implemented in our 'grey' scenarios – see next section), disclosures have a 0.5% impact on financing volumes to 2030 whereas in a 'robust' case (implemented in our 'green' scenarios), disclosures reduce financing volumes by 5% annually to 2030[9]. Given that disclosures affect both banks and institutional investors, these affect all asset classes, with capital markets facilitation affected by both the declining demand for issued securities by institutional investors and declining appetite for facilitation by banks.

[7] For example, the ESG scores used to identify damaging companies largely focus on labour and governance issues and traditional 'sin stocks' (e.g., tobacco, gambling); while it is augmented by Scope 1 emissions, none of these elements are likely to meaningfully capture fossil fuel firms. For instance, the ESG MSCI KLD ETF index (based on the same dataset) includes several petroleum refining companies such as Valero and Marathon: https://www.msci.com/documents/10199/63d0b3f6-6007-4d31-8335-7b608e3c4873

[8] The occurrence of environment-related words in the annual report relative to the total number of words in the report.

[9] This 'robust' scenario could, for example, see disclosures mirror the French Energy & Climate Law which is viewed as more stringent than the TCFD recommendations due to requirements for financial institutions to disclose their alignment with the Paris Agreement and consider biodiversity impacts.

6.1.2. Increasing capital requirements for environmentally harmful activities

Transmission mechanism

Capital requirements are financial policy measures applied to banks to increase their resilience to risks that emerge in their balance sheets and to mitigate the build-up of risks. In this sense, they typically focus on protecting on-balance sheet exposures of banks *from* (nature-related) risks, though they can be used in an allocative fashion[10].

Capital requirements require banks to hold a minimum amount of capital (equity and certain types of debt that can absorb losses) relative to their risk exposures. Microprudential capital requirements seek to preserve the soundness of individual banks following the Basel Pillar Framework, with Pillar 1 setting a baseline level of regulatory capital as a percentage of risk-weighted assets and Pillar 2 composed of add-ons due to bank-specific risk exposures[11]. Macroprudential buffers – such as the countercyclical capital buffer (CyCB) and systemic risk buffer (SyRB) in Europe – seek to build resilience to and mitigate systemic risks that the microprudential approach does not capture (Hiebert and Monnin, 2025). Using capital requirements to influence financial flows to dirty activities would require either adjustments to relevant risk-weightings in Pillar 1; Pillar 2 add-ons based on bank-specific exposure to those activities; or a sectoral macroprudential buffer which are less frequent than general macroprudential buffers (Monnin, 2021; Ikeda and Monnin, 2024).

Conceptually, targeted changes in capital requirements can meaningfully affect the volume and composition of new lending by banks through various transmission channels. Increasing capital requirements on dirty sectors, activities, or exposures decreases banks' capital adequacy ratios and can reduce overall credit provision (through price and quantity channels). Lending to the targeted sectors can also decrease, but this depends on the stringency of the requirement; the relative profitability and risk perception of these sectors; and the capital position of the bank. Overall, however, 'greening' capital requirements have been suggested as a key tool to manage nature-related risks and align financial flows with the GBF (Dafermos and Nikolaidi, 2022).

Evidence of impact on financing volumes

There is limited empirical literature on the effects of any sector-specific capital requirements[12], with even less on the effects of *green* differentiated capital requirements, which have not been widely deployed so far (OECD, 2024). Most research looks at increased capital requirements for residential real estate (RRE), since this sector has been the focus of most efforts to lean against the financial cycle due to its role in the financial crisis. For example, Geiger (2022) found that a sectoral systemic risk buffer of 2% on RRE exposures decreased lending to RRE between 1.0%-4.7% annually, while Basten (2020) found a sectoral counter-cyclical capital buffer on RRE of 1% resulted in approximately 3.6% annual reduction in lending growth to RRE for banks with weak capital cushions.

The strongest effects are observed when banks are capital-constrained (i.e., they must reduce risk-weighted assets to achieve new requirements rather than using retained earnings or equity). Here, banks adjust their lending through quantity channels to recover their capital positions, rather than by increasing rates charged

[10] The term 'allocative' here means explicitly influencing which sectors, regions, or actors receive credit or liquidity in line with a policy objective, compared to 'market neutral' approach (avoids allocation) or 'risk-based' approach which relies on implicit allocation via quantitative measures of financial risk (Thiemann et al., 2023; van 't Klooster and Prodani, 2025).
[11] See UNEP-FI and WWF (2024) for an overview of nature-related policies relevant under Pillar 2 in various jurisdictions.
[12] Most empirical research focuses on aggregate lending in response to increases in overall capital requirements.

to clients (Lang and Menno, 2023). For banks with stronger capital positions, this 'steering' effect becomes much more muted, observed as below 0.5% (Basten and Casanova, 2015; Ferrari et al., 2017).

Looking instead at *aggregate* lending, Bartsch et al. (2025) survey the empirical literature to estimate via back-of-the-envelope calculations that applying an additional macroprudential buffer of 0.5-2% to address climate-related transition risks[13] on the RWA of Eurozone banks would reduce average yearly credit growth by 1.36-5.35%, all else equal.

Overall, the literature suggests that differentiated capital requirements are likely to have a moderate effect on the volume and composition of credit allocation. The findings of the studies above find an approximate decrease in lending of 1.0%-3.5%, lasting up to around five years, for a 1% increase in the buffer on the targeted sector[14].

Assumed effect size for this note

Based on this review, we (stylistically) assume that applying a capital buffer of 1% on the targeted sector decreases lending to those activities by a maximum of 5% annually over next 5 years (to 2030). This slightly higher upper bound reflects the observation that empirical studies may underestimate sectoral lending elasticity to higher capital requirements by not accounting for signalling effects such as changing risk perceptions (Basten and Casanova, 2015; Geiger, 2022)[15].

6.1.3. Greening collateral requirements

Transmission mechanism

Collateral frameworks are a core aspect of monetary policy – by determining which assets will be pledged by eligible counterparties (i.e., banks) in exchange for access to central bank liquidity and on which terms, they support central banks to strengthen monetary policy transmission, manage financial stability, and protect their own operations from risks (Bindseil et al., 2017). Both marketable (e.g., corporate and sovereign bonds) and non-marketable (e.g., corporate loans) assets are typically classified as eligible. By determining which assets provide access to the most liquid asset on financial markets (central bank money), collateral frameworks can affect the price, demand, and supply conditions of these relative to non-eligible assets (Gabor and Ban, 2016; Bindseil et al., 2017). These incentives created by collateral policy can in turn affect the real economy by shifting the directionality of investment in real assets (Nyborg, 2017). These directional effects currently allow

[13] Tailored to each bank depending on their exposure to transition risks.

[14] Where the empirical evidence studies a buffer of 2%, we halve the effect size by assuming a linear effect. Higher buffers could be non-linear and amplify effect sizes (but could also potentially go in the other direction) – as we did not find this in the empirical literature we maintain a linear assumption for tractability.

[15] Note that model-based studies using non-equilibrium approaches tend to suggest a greater lending elasticity to differentiated capital requirements (Raberto et al., 2019; Dafermos and Nikolaidi, 2021). This is because, in these models, lending is endogenous and is influenced by their own capital adequacy ratio, the financial position of borrowers, and demand for loans - all of which are influenced by changes in the capital regime. These multiple channels lead to a more pronounced impact of capital requirements compared to models where bank lending is constrained by deposits. Here, overall lending is capped and banks take decisions based on the marginal profitability of loans. Under these assumptions, differentiated capital requirements may to a reallocation of credit *towards* the targeted sector if it remains more profitable to lend to it compared to the marginal loan in the economy (Oehmke and Opp, 2022).

incumbent, environmentally harmful sectors to disproportionately benefit on both primary and secondary markets, as has been shown for the Bank of England (Dafermos et al., 2022; McLaughlin, 2024).

Eligible assets and their underlying companies benefit via several channels. Access to central bank money makes these assets attractive for financial institutions, leading to additional demand for them in secondary markets (provided they are tradeable) – pushing their price up and their yield down (Bindseil et al., 2017; Pelizzon et al., 2024). This premium will be more pronounced for assets that receive more lenient deductions for downside risk, termed lower 'haircuts', by the central bank. These secondary market benefits can translate to the primary markets. Companies whose assets are already eligible and receive favourable haircuts are likely to issue more eligible securities (supply side) to respond to secondary market demand. These issuances also receive favourable financing conditions (Nyborg, 2016; Pelizzon et al., 2024). Conversely, it stands that exclusion from the collateral framework would negatively impact firms' financing conditions. 'Greening' collateral frameworks could therefore play a role in (dis)incentivising private financial flows away from (dirty) green activities. This is most directly relevant for loans and bonds, since central banks do not typically include equities within collateral frameworks (e.g., Bank of England, 2025).

Evidence of impact on financing volumes

There is limited empirical research on the alignment effects of changing collateral frameworks for climate (OECD, 2024). However other research has studied other changes to eligibility and haircuts in collateral frameworks that explicitly sought to *expand* towards targeted assets (compared to other more 'mechanical' changes such as rating upgrades/downgrades that bring assets in/out of the list respectively).

Eligibility: For loans, eligibility discounts appear relatively moderate, for example by an average reduction of 7bps for mortgages in the Netherlands that could then be securitised into eligible mortgage backed securities (Van Bekkum et al., 2018) and 8bps for medium-quality corporate loans in France (Mésonnier et al., 2022). This is also associated with an increase in credit volumes of 0.3-3% to eligible firms compared to otherwise similar firms (Bignon et al., 2016; Van Bekkum et al., 2018), though the effect rises to 8-11% for single-bank SMEs and medium quality mortgages[16] (Cahn et al., 2018; Van Bekkum et al., 2018). Most research focuses on bank lending rather than marketable assets. However Pelizzon et al., (2024), looking at the Eurosystem framework over 2010-2016, find a stronger yield decline of 4.6-20 bps for eligible corporate bonds[17] compared to not-yet-eligible counterparts, as well as an increase in public bond issuance for the underlying firms of 3.7-4.5% due to a mixture of absolute expansion in borrowing and reallocation in the debt mix from loans to bonds[18]. Empirical research may underestimate the effect size of collateral eligibility changes, since financial markets are likely to predict the inclusion of a bond or other asset on the list in advance (Pelizzon et al., 2024).

Haircuts: To the best of our knowledge, all empirical studies on the differentiated impact of central bank collateral haircuts on capital allocation look at the effect on yields rather than volumes (e.g., Ashcraft et al., 2011; Cassola & Koulischer, 2019; Pelizzon et al., 2024). However, Pelizzon et al., (2024) do find that haircut effects on yields and the securities lending market is smaller than the eligibility effect. McConnell et al., (2022) show in a model study that increasing central bank haircuts for dirty assets decreases the volume of lending to that sector via increasing their relative interest rate compared to green loans, however the stylised model they use does not provide a meaningful effect size.

[16] These are both large asset classes that are almost entirely supported by bank lending, likely leading to a stronger effect size.
[17] This is intuitive, since for bond issuance any yield premium passes directly to the issuer from the primary markets whereas for loans it is dependent on pass-through from the bank providing the loan and posting the collateral.
[18] Table H4, supplementary information.

Assumed effect size for this note

Based on the review above, we stylistically assume that exclusion of the targeted assets from central bank collateral frameworks results in a reduction of lending to that issuer by a maximum of 4% and a reduction of bond facilitation to that issuer by 5.5% annually. Since all the empirical studies focus on *expanded* eligibility in collateral frameworks rather than *reduced* eligibility, we must assume that the effect is symmetric regardless of direction (i.e., is the same for exclusion as inclusion). For haircuts, we apply the finding from Pelizzon et al. (2024) that eligibility effects dominate over haircut effects. For this exploratory analysis, we place the haircut effect size at 25% of the eligibility effect for that asset (e.g., 1% for lending).

6.1.4. Allocative or quantitative credit policy

Transmission mechanism

Green financial policy can also operate through a direct allocation channel (Kedward et al., 2024). Implemented by a central bank, in direct coordination with government, this policy approach requires banks to expand or restrict lending to specified sectors or activities in line with green transition pathways. Rather than relying on financial institutions' endogenous responses to altered risk-return signals, the effect on new financial flows is therefore a binding quantitative constraint via quotas or minimum growth/disinvestment rates. Quantitative credit allocation has been operationalised in Brazil's rural credit scheme to align agricultural financing with strict environmental requirements (Assunção et al., 2019), and in China between 2006-2014 to direct the lending of private and public credit institutions towards green sectors and away from fossil fuels and other polluting sectors (Dikau and Volz, 2023).

Assumed effect size for this note

By design, allocative or quantitative credit policy eliminates financial flows within scope. For tractability, we assume that binding credit guidance therefore leads to a full reallocation of the targeting lending and capital markets facilitation volumes as prescribed by the policy. Given the strength of this measure, we limit the policy to companies with the greatest absolute impacts on sensitive ecosystems (see scenario analysis, section 6.2) and require a reduction in average annual financing volumes of 80%, but note that this is a relatively ad-hoc assumption.

6.1.5. Overview of effect sizes for this note

Table 1 summarises the effect sizes we stylise from the empirical literature to conduct the exploratory scenario analysis in this note.

Table 1: Effect sizes of different policy interventions included in explorative scenario analysis

Policy intervention	Maximum impact on funding volume per annum over 5 years		
	Bank lending	Bond issuance	Equity issuance
Disclosures - window dressing	-0.5%	-0.5%	-0.5%
Disclosures - robust	-5%	-5%	-5%
Capital buffer - increase by 1%	-5%	-5%	-5%
Collateral framework - increase haircuts	-1%	-1.4%	0%
Collateral framework - exclusion	-4%	-5.5%	0%
Allocative credit policy – direct lending and portfolio restrictions	-80%	-80%	-80%

6.2. Illustrative data

To illustrate the impact of these scenarios on the achievement of the finance-based goals of the GBF, we use an existing dataset (Marsden et al., 2024; Marsden, Ryan-Collins, Abrams, et al., 2025), which includes financial flows across multiple asset classes between 2014-2023 to companies linked to land-use change and degradation in specific ecosystems: the **Amazon rainforest** (Brazil), **boreal forests** (Russia, Canada), **tropical peatlands** (Indonesia), and **mangroves** (Indonesia). These case studies were chosen based on: (i) scientific evidence of threshold behaviour or 'tipping points' rendering their protection particularly urgent; (ii) their degradation having critical implications for climate change; and (iii) these specific jurisdictions hosting the largest remaining extent of each ecosystem[19]. Given their importance to both climate and biodiversity goals, credible transition pathways to achieving the GBF targets are highly likely to involve preservation and restoration of these ecosystems. As a result, the UK's contribution to these financial flows will need to be part of its interventions to achieve the GBF.

In each case, Marsden et al. identify key drivers of nature loss increasing resilience loss in each ecosystem. In all cases, land-use change and degradation was the most important direct driver, alongside global climate change[20]. It then identifies the key sectors associated with this direct driver in each case and constructs firm-level proxies[21] for land-use pressures to identify the most important companies within these sectors, prioritising location-specific data that links[22] firm activities to the specific ecosystem wherever possible. Availability of this type of data varied across ecosystems, meaning that the companies included: (i) do not represent an exhaustive list; (ii) operate at different stages of the value chain (e.g., production versus export); and (iii) consequently, may be associated with more direct or indirect drivers of land-use change and degradation.

The research used data from the London Stock Exchange Group (LSEG) to trace financial flows to these companies and their subsidiaries over the past decade (2014-2023), covering bank lending and capital markets

[19] This choice is not intended to preclude other ecosystems from future focus from financial policymakers but rather illustrates a starting point for analysis – prioritising those ecosystems posing highly uncertain and high magnitude, global impacts - that could be extended to other areas.

[20] We do not focus on companies linked to climate change drivers (i.e., greenhouse gas emissions) since this has been the subject of significant policy and academic research.

[21] For example, data from Trase Supply Chains linking trade in agricultural commodities to on-the-ground environmental impacts and land tenure data from Global Forest Watch.

[22] We refer to this collectively as companies "linked to" land-use change and degradation in the case studies.

facilitation (equity and bond issuances)[23]. It mapped the financial institutions (predominantly commercial and investment banks) that originated these deals and analysed their individual contributions as well as the geography (i.e., headquarters) and ownership of the ultimate parents of these financial institutions[24].

Figure 20 provides an overview of the linked environmental-financial dataset. The UK's contribution varies from approximately 1% of the total (for mangroves in Indonesia) to 10% of the total (for the Brazilian Amazon) (20c). In all case studies except mangroves, the UK sits in the top ten countries – peaking at 2nd for the case of the Brazilian Amazon, 5th for Canadian boreal forests and Indonesian peatlands, and 6th for Russian boreal forests. This suggests that, despite the wide range of domestic (i.e., the ecosystem-hosting country) and international actors involved in facilitating these financial flows, the UK has an important role to play both directly and potentially through leadership and coordination. Note that financial flows go beyond the banking system – capital markets underwriting activities (particularly bonds) account for approximately a third of financial flows (depending on the case study) and may not fall within scope of banks' capital requirements if issued securities are not held for trading purposes.

6.3. Scenario analysis

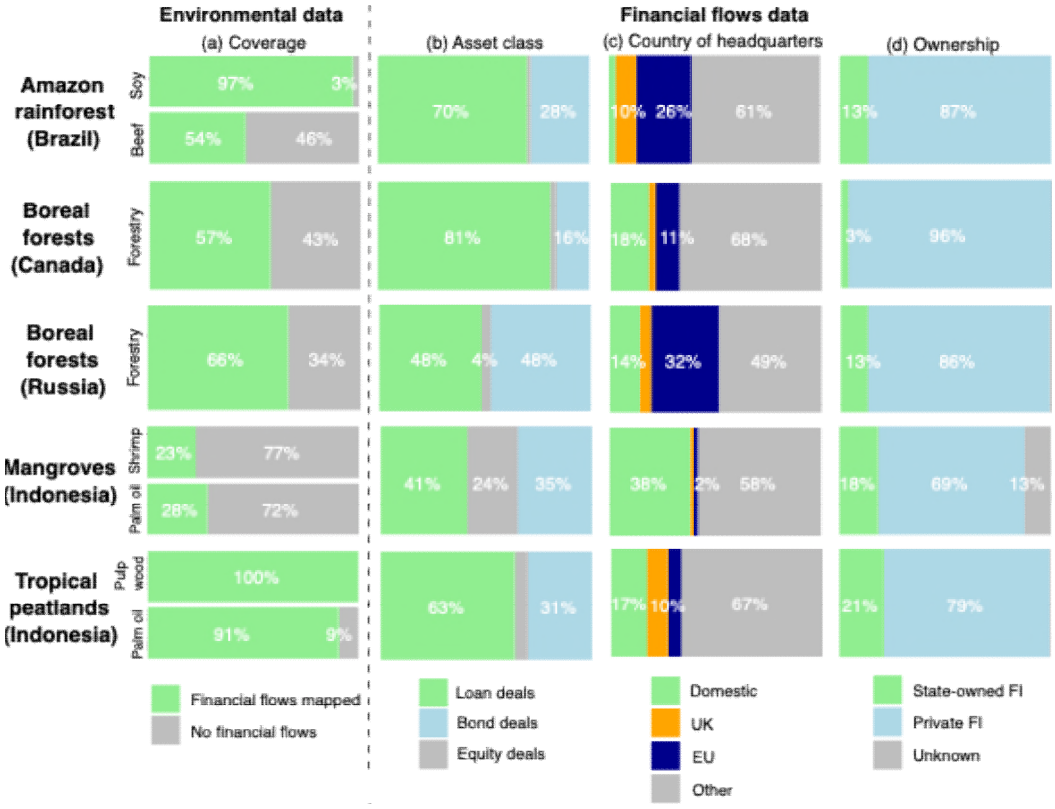

Figure 20: Summary of financial flows (all countries) indirectly linked to land-use pressures in five ecosystem case studies -(a) The proportion of proxies for land-use pressures to which financial flows could be mapped; (b) the type of deal (lending or capital markets underwriting, bonds and equities respectively); (c) the country of headquarters for the financial institution arranging the deal; and (d) whether the financial institution that arranged the deal is state-owned or private (either fully private or publicly listed). All financial flows data focuses on the banks that arrange the deal, rather than any investors that provide upfront capital (in the case of bond and equity deals); (c) and (d) refer to the ultimate parent of the financial institution.

[23] All financial amounts are inflated to 2024 USD using the US Consumer Price Index sourced from LSEG.

[24] For a detailed methodology, see Marsden et al. (2024) for the Brazilian Amazon and Indonesian peatlands and Marsden et al. (2025) for boreal forests in Canada/Russia and mangroves in Indonesia.

In **grey** scenarios, nations employ a 'risk-based' approach to greening their financial system as part of commitments to the GBF. This means they focus on protecting domestic headquartered financial institutions from the transition risks associated with the implementation of the GBF. Governments mandate disclosures of nature-related risks but keep requirements relatively broad. This induces 'window-dressing' rather than meaningful capital reallocation (see section 6.1.1). To protect banks and their own monetary policy operations from transition risks, central banks implement a moderate capital buffer of 1% to activities exposed to transition risks, such as companies operating in sensitive ecosystems and apply haircuts to these assets within their collateral requirements.

In **green** scenarios, nations employ an 'alignment-based' approach to greening their financial system as part of commitments to the GBF. This means they focus on tackling the contributions to domestic headquartered financial institutions to ongoing impacts on ecosystems and deploy the tools available to them to reverse this. Governments mandate disclosures of nature-related risks which include robust requirements on sensitive ecosystems and on disclosing plans to *align* with the goals of the GBF. Moderate capital requirements are maintained, but the central bank moves to instead exclude companies operating in sensitive ecosystems from collateral frameworks. In coordination with government, it also applies direct restrictions on the financing via bank lending or capital markets facilitation of the companies with the greatest negative impacts on sensitive ecosystems (the top five in absolute terms per ecosystem).

In **protectionist** scenarios, the UK acts alone, however it may strategically coordinate with the European Union to standardize their approaches. In **cooperative** scenarios, all countries deploy the same approach.

Table 2: 'Greening' finance policy interventions under each scenario.

Scenario	Policy interventions
Grey protectionism	• Mandatory nature-related disclosures largely induced window dressing. • 1% capital buffer on activities exposed to transition risks, including on companies operating in ecosystems. • Increased haircuts in central bank collateral frameworks for companies operating in sensitive ecosystems. The UK acts alone.
Grey protectionism (with strategic cooperation with EU)	• Mandatory nature-related disclosures largely induced window dressing. • 1% capital buffer on activities exposed to transition risks, including on companies operating in ecosystems. • Increased haircuts in central bank collateral frameworks for companies operating in sensitive ecosystems. • The UK and the EU align their approach.
Grey cooperation	• Mandatory nature-related disclosures largely induce window-dressing. • 1% capital buffer on activities exposed to transition risks, including on companies operating in sensitive ecosystems. • Increased haircuts in central bank collateral frameworks for companies operating in sensitive ecosystems. • All countries operationalise the same approach.
Green protectionism	• Mandatory nature-related disclosures with robust requirements. • 1% capital buffer on activities driving impacts on sensitive ecosystems. • Exclusion of companies operating in sensitive ecosystems from central bank collateral frameworks. • Mandatory lending and portfolio restrictions companies with the highest impacts in sensitive ecosystems. • The UK acts alone

Scenario	Policy interventions
Green protectionism (with strategic cooperation with EU)	• Mandatory nature-related disclosures with robust requirements. • 1% capital buffer on activities driving impacts on sensitive ecosystems. • Exclusion of companies operating in sensitive ecosystems from central bank collateral frameworks. • Mandatory lending and portfolio restrictions companies with the highest impacts in sensitive ecosystems. • The UK and the EU align their approach.
Green cooperation	• Mandatory nature-related disclosures with robust requirements. • 1% capital buffer on activities driving impacts on sensitive ecosystems. • Exclusion of companies operating in sensitive ecosystems from central bank collateral frameworks. • Mandatory lending and portfolio restrictions companies with the highest impacts in sensitive ecosystems. • All countries operationalise the same approach.

We apply the effect sizes outlined above to our dataset of financial flows between 2014-2023 to companies operating in sensitive ecosystems (Table 2). To do the calculations for the scenario analysis, we make the following (relatively strong) assumptions:

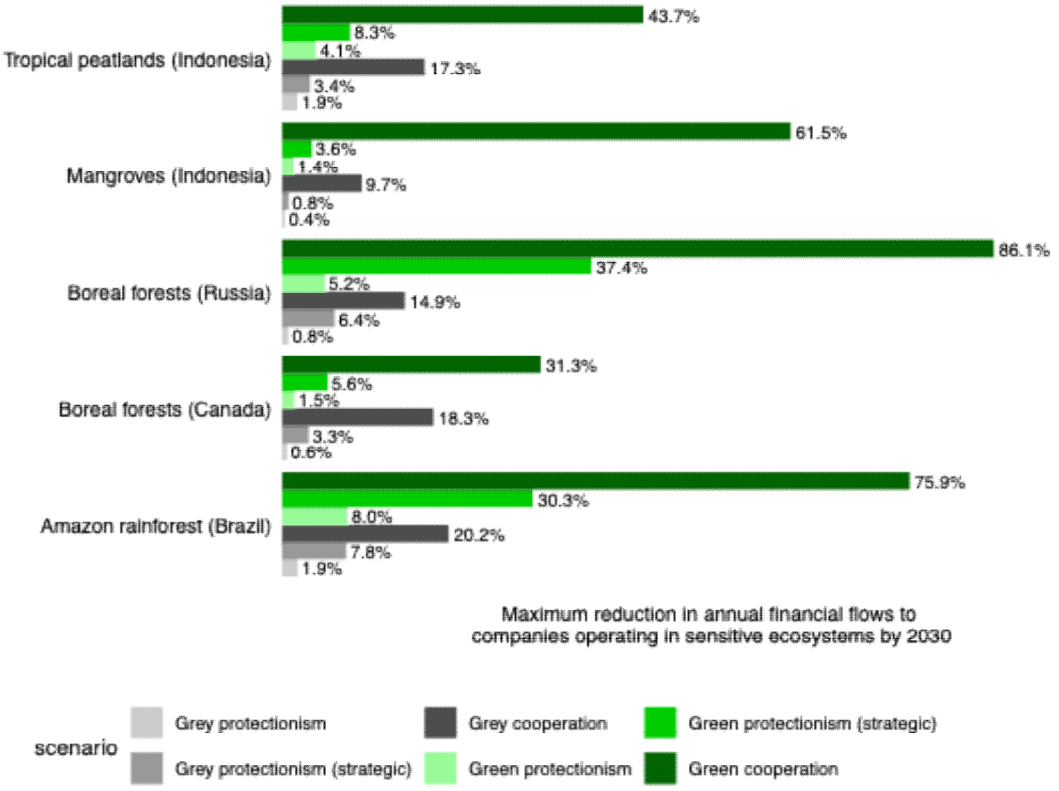

*Figure 21: **Results of stylised scenario analysis**. The potential impact of interventions to green finance on annual financial flows to companies impacting sensitive ecosystems. Reduction by 2030 compared to a baseline where annual financial flows to these companies remain constant at the levels observed on average between 2014-2023. Note that percentage values should be taken as strong approximations, given the limited empirical data on effect sizes and exploratory nature of the analysis.*

- Baseline level of annual financial flows remains the same in 2030 as it did on average over the period of 2014-2023 (i.e., ignore other policy and financial developments).
- Baseline geographic, asset class, and issuer composition of financial flows to 2030 remains the same (i.e., the same distribution between countries as observed cumulatively between 2014-2023).
- No substitution effects (between asset classes or geographies) to maintain tractability, noting that inter-asset, inter-bank, and inter-country substitution effects appear very common in response to capital requirements or voluntary divestment of high-carbon assets (Aiyar et al., 2014; Schairer et al., 2025).
- Firms do not transition (i.e., the same firms remain in-scope of the policy interventions proposed in this note). In practice, if firms had robust transition plans, they would fall out of scope of policy measures (see Marsden et al., (2025, Sec. 4)).
- All firms' assets are initially accepted in central banks' collateral frameworks.

Given that we rely on back-of-the-envelope calculations and that empirical data is rather limited, this remains very much an exploratory analysis as some calibration factors remain relatively arbitrary. Future research could conduct a sensitivity analysis of this to understand if the conclusions qualitatively change under different assumptions of effect sizes.

6.4. Results

Figure 21 presents the results of this exploratory scenario analysis on annual financial flows to companies operating in sensitive ecosystems based on the dataset. As expected, green scenarios are more effective at reducing financial flows to these activities misaligned with the GBF, as are cooperative scenarios. 'Risk-based' policies in isolation, even if implemented in a globally coordinated way, are unlikely to steer financing flows away from companies operating in sensitive ecosystems by 2030, with effects ranging from 15-20% reductions in the grey cooperation scenario.

When acting alone (in the protectionist scenarios), the UK has the greatest impact on the Amazon rainforest (Brazil) and tropical peatlands (Indonesia), mirroring the distribution of its international financial flows (Figure 20). In the grey protectionist scenario, the impacts are minor (0.4-1.9% of financial flows per ecosystem). Switching to a green approach can make the UK's leadership much more significant even where there is no cooperation, tackling up to 8% of financial flows in the case of the Amazon rainforest (Brazil). Coordinating strategically with the EU in protectionist scenarios offers the opportunity to substantially increase the impact of the UK's leadership, at least doubling the impact on financial flows in all ecosystems in both grey and green scenarios.

An interesting insight of this exploratory analysis is that more impact may be achieved through the UK and EU, and other nodes, pursuing an ambitious, alignment-based approach over a globally coordinated, risk-based approach. This is clearly the case for the Amazon rainforest, where the strategic green protectionist scenario results in 30.3% reductions in financial flows compared to 20.2% for the grey cooperative scenario. For Russian boreal forests the results are similar – 37.4% and 14.9% respectively – however the influence of the EU and UK is likely to have substantially declined compared to the baseline data due to Russia's invasion of Ukraine.

For other ecosystems, including additional strategic coordination partners could make an ambitious, if fragmented, alignment-based approach more impactful over grey cooperation. For tropical peatlands and mangroves and Canadian boreal forests, this could include the ecosystem-hosting countries (Indonesia, Canada) Indonesia since domestic financial flows are substantial in these cases (Figure 20). This coordination with ecosystem-hosting countries would be key even if the UK and EU act alone, to prevent unintended impacts

that would not be aligned with a just implementation of the finance-based goals of the GBF (Marsden et al., 2025).

Overall, the scenario analysis above – while exploratory – illustrates how a stylised, high-level approach can inform both policymaking and diplomacy on the finance-based goals of the Global Biodiversity Framework. The empirical evidence reviewed here also suggests that many financial and monetary policy measures, outside of credit guidance, would deliver quite moderate changes to 'green' private financial flows. This suggests that they should form part of wider portfolio of fiscal and environmental policies that also influence the attractiveness of real economy investments and as a result, their underlying financing (OECD, 2024). These sorts of policies would also be required to address other internal and external funding flows to companies negatively impacting ecosystems, such as retained earnings and public financial flows which also play a major role (i.e., from development and other state-owned banks).

7. Summary, limitations & recommendations

7.1. Summary

In this study, we set out to understand how the UK's international financial flows interact with biodiversity loss and what kinds of policy interventions could help the UK meet the finance targets of the Kunming-Montreal Global Biodiversity Framework (GBF), as well as test novel methodologies and explore these using simple scenarios. We began by mapping the international financial flows of the six largest UK banks. Using data from Bloomberg and DealScan, we examined not only loans but also bond and equity exposures, extending previous analyses that had relied solely on Pillar 3 loan disclosures. By incorporating these additional asset classes, we were able to construct a far more comprehensive picture of how UK finance interacts with the global economy. The inclusion of bonds and equities greatly increased the estimated size of the banks' international portfolios, revealing the global reach of the UK's financial system.

Our mapping showed that the banks' portfolios are dominated by services and manufacturing, followed by electricity and utilities. Although agriculture and mining make up a smaller share in nominal terms, they are especially important from a biodiversity perspective because they drive land-use change and resource extraction. Geographically, we found that the United States absorbs the largest share of UK-financed activity, followed by other developed economies in Europe and Asia. Smaller but ecologically critical exposures appear in emerging markets such as Brazil and Indonesia. This distribution demonstrates that nature-related risks linked to UK finance are transmitted primarily through high-income markets but often manifest most acutely in the Global South, where ecosystems are both richer and more fragile.

After mapping where and how the UK's financial flows are concentrated, we turned to analysing their dependencies on nature and the risks from ecosystem degradation. Using the ENCORE database, we assessed how strongly different sectors depend on various ecosystem services, and we overlaid these dependencies with country-specific hazard and vulnerability indices. This allowed us to distinguish between exposure and actual risk. For example, we observed that financial flows depend heavily on mass stabilisation and erosion control, but since those ecosystem services remain relatively intact in many regions, the associated financial risk is low. In contrast, we found that dependence on surface water, groundwater, and flood and storm protection coincides with high levels of ecosystem degradation, producing higher financial risk.

When we analysed these relationships by sector, we found that manufacturing and services again dominate, accounting for the majority of exposure to ecosystem degradation. These sectors serve as the primary conduits through which nature-related risk enters the UK financial system, given their reliance on natural resources and the stability of environmental systems. The degradation of some key ecosystem services — particularly those related to water availability, flood protection, and climate regulation — has the potential to produce disproportionate financial losses.

We then estimated the impacts of UK-financed activities on nature. We combined the financial exposure data —both direct operations (scope 1) and upstream supply chains (scope 3)— with ENCORE's impact-intensity scores and multiplied it by the influence of the impact driver on the natural capital asset. We could then multiply the importance of the natural capital asset to the provision of the ecosystem service to get the impact on the ecosystem service. To understand the potential materiality of this impact, we overlaid these dependencies with country-specific hazard and vulnerability to calculate how much of each bank's portfolio contributes to ecosystem services degradation.

We showed that UK-financed activities are affecting ecosystems that are already heavily degraded and vulnerable. Soil quality, pest control, climate regulation, mediation of sensory impacts, and other key ecosystem services are being undermined by sectors financed by UK banks. Continued financial support for damaging activities threatens to accelerate biodiversity loss while simultaneously increasing the financial system's exposure to those risks.

We also examined the distribution of impacts across the thirteen environmental pressure categories used by ENCORE. We found that the largest pressures arise from disturbances (noise, light), toxic pollution to water and soil, water use, greenhouse-gas emissions, and land conversion. In this assessment, the impacts from direct operations exceed those from supply chains in the majority of environmental pressures, which differs from other studies comparing direct versus indirect impacts at the scale of individual organisations which typically finds that supply chain effects are larger (Bull et al. 2022).

To explore the potential utility of the methods developed, we ran several policy scenarios and used our models to evaluate potential changes in the nature-related impact intensity of UK international financial flows. We tested four policy scenarios: reforming subsidies in energy, agriculture, and fisheries, and introducing a Global Plastics Treaty. For each intervention, we used ENCORE to adjust sector-specific impact intensities or model demand changes (fossil fuel subsidy reform) and recalculated the effects on the UK banks' portfolios. This analysis was exploratory and indicative, as some of the assumptions underpinning the analysis likely do not hold in reality and require further exploration (i.e. that changes in public finance flows into different sectors change the profitability of those sectors and therefore proportionally affect private finance flows into those sectors).

For the scenario on reducing fossil fuel financing, we simulated the removal of both explicit and implicit subsidies and modelled the resulting fall in demand for coal and assumed that this would cause a corresponding shift of investment toward renewables such as wind and solar. This showed that correcting fossil-fuel price distortions could sharply reduce the pressures of freshwater use, greenhouse-gas emissions and toxic pollutants embedded in UK private financial flows, but increase the nature-related harms from seabed use, likely attributable to the expansion of offshore wind.

Reforming agricultural input subsidies — particularly those that promote excessive fertiliser— led to large potential reductions in nutrient pollution to water and soil. We modelled this by lowering ENCORE's impact

categories for crop cultivation, based on empirical evidence from countries that have successfully reduced fertiliser use through subsidy decoupling and taxation.

In the fisheries sector, we modelled the removal of harmful fuel subsidies, drawing on the World Trade Organisation's 2022 Fisheries Subsidies Agreement. The simulations showed reductions in greenhouse-gas emissions, seabed disturbance, and biotic resource exploitation. These results suggest that aligning financial incentives with sustainable fishing could deliver measurable biodiversity benefits while also reducing fuel use and carbon emissions.

Next, we modelled the introduction of a Global Plastics Treaty that regulates plastic production and consumption across the full product life cycle. This intervention reduced pressures from pollution, fossil-fuel extraction, and waste leakage into oceans. Together, these interventions demonstrate the scale of improvement possible when governments and financial regulators coordinate to align fiscal, trade, and banking policies with biodiversity goals.

In Section 6 we use a different methodology based on empirically-observed flows of finance into critical ecosystems that are experiencing high rates of harm from privately-financed activities (based on the methodology of Marsden et al. 2025), review a suite of regulatory levers that could steer private finance away from nature-harmful activities and run exploratory scenarios that estimate their potential effects. We test the effect of mandatory nature-related disclosures (building on TNFD aligned reporting), higher capital requirements for environmentally damaging exposures, greener collateral rules, and allocative credit policy as complementary tools that regulators and central banks can deploy. We then test how these instruments could change bank portfolios tied to high-risk ecosystems (Amazon rainforest, boreal forests, tropical peatlands and mangroves), finding that a combination of measures could meaningfully reduce financed impacts but that the magnitude varies by tool, sector and jurisdiction. For greatest effectiveness, these require international coordination, robust reporting standards and careful design to avoid leakage or unintended consequences.

7.2. Limitations and opportunities

While our study makes a significant contribution to understanding the ecological dimensions of UK finance, our results are exploratory and a major focus of the report is on the testing of alternative methods for evaluating the nature-related impacts of international financial flows. Our objective was to test methods, identify data gaps, and demonstrate how financial modelling and biodiversity science can be combined, not to produce definitive numerical estimates.

Our analysis faces several limitations. Our financial data, though extensive, remain incomplete. The Bloomberg and DealScan databases do not capture all exposures, particularly smaller non-syndicated loans. We assumed that the available data were representative of total portfolios, but we recognise that this may introduce bias. We had to reconcile several different sectoral classifications to integrate financial and environmental data. We created concordance tables between Bloomberg and EXIOBASE categories, but such mapping inevitably entails simplification and potential misalignment. Our geographic coverage operates mainly at the national level, yet biodiversity impacts are often localised. Country-level averages can mask sub-national hotspots where degradation or exposure is far more severe. The scenarios we developed rely on stylised assumptions. For instance, we modelled the removal of fossil-fuel subsidies as if the entire value of displaced investments were redirected into renewables. In practice, such transitions would be partial and mediated by political and market forces. Similarly, we made assumptions that changes in public finance into harmful sectors via reductions in harmful subsidies would translate into proportional changes in private investment into those same sectors as they become less profitable, an untested and improbable but necessary assumption in this case.

Despite these limitations, we believe our work highlights the potential of combining environmental and financial datasets to illuminate the links between finance and nature. Our study therefore serves as both a methodological experiment and a call to action. We show that UK finance both depends on and damages the ecosystems on which it relies. We demonstrate that feasible policy interventions — from subsidy reform to prudential regulation — could realign financial flows with ecological integrity. And we acknowledge that our tools remain imperfect. Further research must refine these models, expand data coverage, and explore the complex feedbacks between natural systems and financial ones. Importantly, a nexus approach which addresses interdependencies and interlinkages between sectors, actors and systems is needed to avoid unintended consequences from a siloed- approach (IPBES, 2024).

The message of this study is ultimately one of opportunity. The same financial system that currently accelerates biodiversity loss could, if guided by coherent policy, become a cornerstone of the global transition toward a sustainable economy. Whilst delaying action to address biodiversity loss by a decade would lead to a doubling of costs to address the crisis (IPBES, 2024), a shift towards a nature positive economy could lead to US$10.1 Trillion in annual business value and 395 million new jobs (WEF, 2020). Our results suggest that regulatory reform is not only an environmental imperative but also a matter of financial sustainability. The UK, as one of the world's foremost financial centres, is well placed to lead that transformation.

7.3. Recommendations

Based on these results, we argue that the UK government has several concrete opportunities to reduce damaging financial flows. First, mandatory nature-related disclosures should extend the logic of climate reporting to biodiversity, requiring financial institutions to quantify dependencies, impacts, risks and opportunities. Whilst our report also includes examples of empirical evidence from climate disclosure shows that the effect of disclosure on shifting capital flows has to date been weak, the increase in uptake of TNFD — 730 organisations and US$22.4 trillion AUM committed to voluntary reporting (TNFD, 2025) — vs TCFD sends a positive market signal which needs to be factored in the UK sustainability reporting standards consultation process. Second, capital and collateral requirements should reflect environmental risk: banks financing high-impact sectors could face higher capital charges, while low-impact lending could receive preferential treatment. Third, allocative credit policies could steer private lending away from harmful activities. Fourth, the UK can reform public subsidies and fiscal incentives to discourage environmentally harmful activities and reallocate funds to biodiversity protection. Finally, the UK should pursue international coordination, recognising that half of its nature-related financial risk originates abroad.

In sum, our results show that the UK's financial system exerts significant global ecological pressure. Yet the same system, if steered through smart regulation, could become a driver of the transition toward the ambitious goals of the GBF.

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Natural Environment Research Council

The Agile Initiative is supported by the Natural Environment Research Council as part of the Changing the Environment Programme – NERC grant reference number NE/W004976/1

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