Greenbank

Integrating Nature - Pathways for Investors

The Assessment Journey: Key Findings and Lessons Learned

Contents

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The Assessment Journey: Key Findings and Lessons Learned

This paper is part of our series on Integrating Nature - Pathways for Investors. In this paper, we explore the assessment journey we have followed within Greenbank to date and share some early learnings from this work.

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Introduction

In January 2025, Greenbank set three initial nature targets[1] including one focused on assessment, committing to "conduct and publicly disclose an assessment of nature-related dependencies, impacts, risks and opportunities for in-scope investments."

To date, we have conducted a heatmap assessment and started the process of asset tagging (see our paper **Assessing Nature-related Risk and Opportunity: A Practical Framework for Investors**). For the heatmap assessment, we followed the recommendations of the Finance for Biodiversity's target setting framework and have focused on the priority and secondary sectors initially. Overall, 30% of our in-scope investments[2] fall within these sectors.

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[1] Greenbank sets new nature targets | Greenbank
[2] Our in-scope investments are listed equities and corporate bonds with > 10 holders, as at 31st December 2024. This excludes tail stocks, i.e. they are not actively bought by Greenbank and are usually held by clients when they transfer in their portfolios which have previously been managed elsewhere.

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Findings from the heatmap assessment

Materiality ratings for priority impact sectors and the pressures on nature

Drivers of nature change	Impact drivers	Beverages	Chemicals	Consumer Staples Distribution & Retail	Electric Utilities	Food Products	Metals & Mining	Oil, Gas & Consumable Fuels	Pharmaceuticals
Land, Freshwater, and Sea Use Change	Area of Land Use								
	Area of Freshwater Use	ND		ND					ND
	Area of Seabed Use	ND		ND					ND
Overexploitation of Resources	Volume of Water Use								
	Other Biotic Resource Extraction (e.g. fish, timber)	ND	ND	ND			ND	ND	ND
	Other Abiotic Resource Extraction	ND		ND	ND	ND			ND
Climate Change	GHG Emissions								
Pollution	Emissions of non-GHG Air Pollutants								
	Emissions of Toxic Soil and Water Pollutants								
	Emissions of Nutrient Soil and Water Pollutants			ND					
	Generation and Release of Solid Waste								
	Disturbances (e.g noise, light)								
Invasive Species	Introduction of Invasive Species				ND				
% of total Greenbank AUM*		**1.6%**	**0.16%**	**0.31%**	**6.78%**	**0.11%**	**0.72%**	**0.32%**	**7.84%**

Key

Very High (VH)		Low (L)		No data to assess the level of materiality on nature	
High (H)		Very Low (VL)			
Medium (M)		No link identified between the sector and nature impact			

(i) Priority sector findings

Our investment portfolio has exposure to eight out of the ten priority sectors identified by the Finance for Biodiversity target setting framework, representing 17.8% of our total in scope assets under management. However, most of this exposure is to the electric utilities (6.78%) and pharmaceuticals sectors (7.84%). Our exposure to the other six priority sectors is negligible, as you can see in the priority heatmap below. Therefore, this findings section focuses on the pharmaceuticals and electric utilities sectors.

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Electric Utilities

Electric utility companies rely heavily on natural systems including large-scale land and water use and generate a wide range of emissions and waste. This includes greenhouse gases but also other air pollutants, toxic discharges into soil and water and disturbances, e.g. noise and light. The combined scale and diversity of these impacts suggest that electric utility companies represent a key point of pressure on ecosystems and nature within our investments.

This also makes the sector one of our most exposed areas to tightening environmental regulation and shifting expectations around sustainability. Activities such as freshwater abstraction for cooling, land conversion for infrastructure, and waste generation carry increasing risks in a context of climate instability and biodiversity decline. For us as investors, this means the environmental management practices of companies in this sector are likely to influence both financial resilience and future performance.

Pharmaceuticals

The pharmaceuticals sector also represents a material part of our portfolio and shows a consistent pattern of environmental pressure across all pollution-related impact areas. The ENCORE data highlights persistent issues related to emissions into air, water, and soil, largely due to the nature of its production processes and products often involving chemicals and complex waste streams. Water use is also notable, pointing to the sector's dependence on water for manufacturing and cooling, although some data gaps remain. Solid waste generation and disturbances also may contribute to local ecosystem degradation.

Pharmaceutical companies' environmental impacts stem from several core activities, including energy-intensive manufacturing processes, the use of hazardous chemicals, and the discharge of active pharmaceutical ingredients and by-products into water systems. These activities contribute to risks such as water pollution, antimicrobial resistance, and local ecosystem disruption, while reliance on high-quality water supplies underscores the sector's dependency on natural resources. From an investment perspective, these factors point to potential vulnerabilities as regulatory scrutiny on pharmaceutical waste and emissions intensifies, and as societal expectations for sustainable production increase. The strength of companies' environmental management, waste treatment, and sustainable manufacturing practices will be central to assessing long-term resilience and risk in the sector.

Other overall findings

Overall, freshwater use and the pollution impact drivers emerge as the most significant and widespread drivers of nature-related impacts across the priority sectors held within our portfolio. Freshwater use is a consistent concern, as many portfolio companies rely heavily on freshwater resources for their operations. As water scarcity intensifies and regulatory frameworks evolve, companies may face growing risks related to operational disruptions, resource access, and increased compliance costs.

Similarly, pollution is a prevalent issue, with emissions of greenhouse gases, air pollutants, and toxic substances affecting ecosystems and biodiversity. These environmental impacts create not only ecological risks but also regulatory and reputational challenges, which could negatively influence the financial performance of affected companies.

(ii) Secondary sector findings

Our analysis of the secondary sectors in our portfolio, which account for approximately 11% of our total in scope assets under management, highlights several material impacts on nature, though generally at lower levels than the priority sectors (see secondary sector heatmap below).

Materiality ratings for secondary impact sectors and the pressures on nature

Drivers of nature change	Impact drivers	Construction Materials	Independent power and renewable electricity	Personal care products	Semiconductors & semiconductor equipment	Textiles, apparel and luxury goods
Land, Freshwater, and Sea Use Change	Area of Land Use					
	Area of Freshwater Use				ND	ND
	Area of Seabed Use			ND	ND	ND
Overexploitation of Resources	Volume of Water Use					
	Other Biotic Resource Extraction (e.g. fish, timber)		ND		ND	ND
	Other Abiotic Resource Extraction		ND		ND	ND
Climate Change	GHG Emissions					
Pollution	Emissions of non-GHG Air Pollutants					
	Emissions of Toxic Soil and Water Pollutants					
	Emissions of Nutrient Soil and Water Pollutants		ND		ND	
	Generation and Release of Solid Waste					
	Disturbances (e.g noise, light)					
Invasive Species	Introduction of Invasive Species		ND		ND	ND
% of total Greenbank AUM*		**0.62%**	**0.53%**	**2.72%**	**5.47%**	**1.67%**

Key

Very High (VH)	Low (L)
High (H)	Very Low (VL)
Medium (M)	

No link identified between the sector and nature impact

No data to assess the level of materiality on nature

*Our in-scope investments are listed equities and corporate bonds with > 10 holders, as at 31st December 2024. This excludes tail stocks, i.e. they are not actively bought by Greenbank and are usually held by clients when they transfer in their portfolios which have previously been managed elsewhere.

We have negligible exposure to the construction materials sector and so have focused on the semiconductors and semiconductor equipment sector and personal care products sectors in this analysis.
The semiconductor and semiconductor equipment sectors show notable impacts, particularly through emissions of toxic pollutants to soil and water. While the sector's overall footprint is lower than more resource-intensive industries, the potential for localised environmental harm remains, especially given the scale of our holdings in this sector. These pollution risks may lead to tighter regulatory scrutiny and increased expectations around waste and chemical management. Key pressures arise from energy-intensive chip production, the use of hazardous chemicals, and the generation of liquid and solid waste streams, which can also drive high water consumption and chemical disposal challenges.

The personal care products sector also exhibits pressures linked to pollution and water use. Many companies in this sector rely on resource-intensive manufacturing processes, contributing to chemical runoff and solid waste.
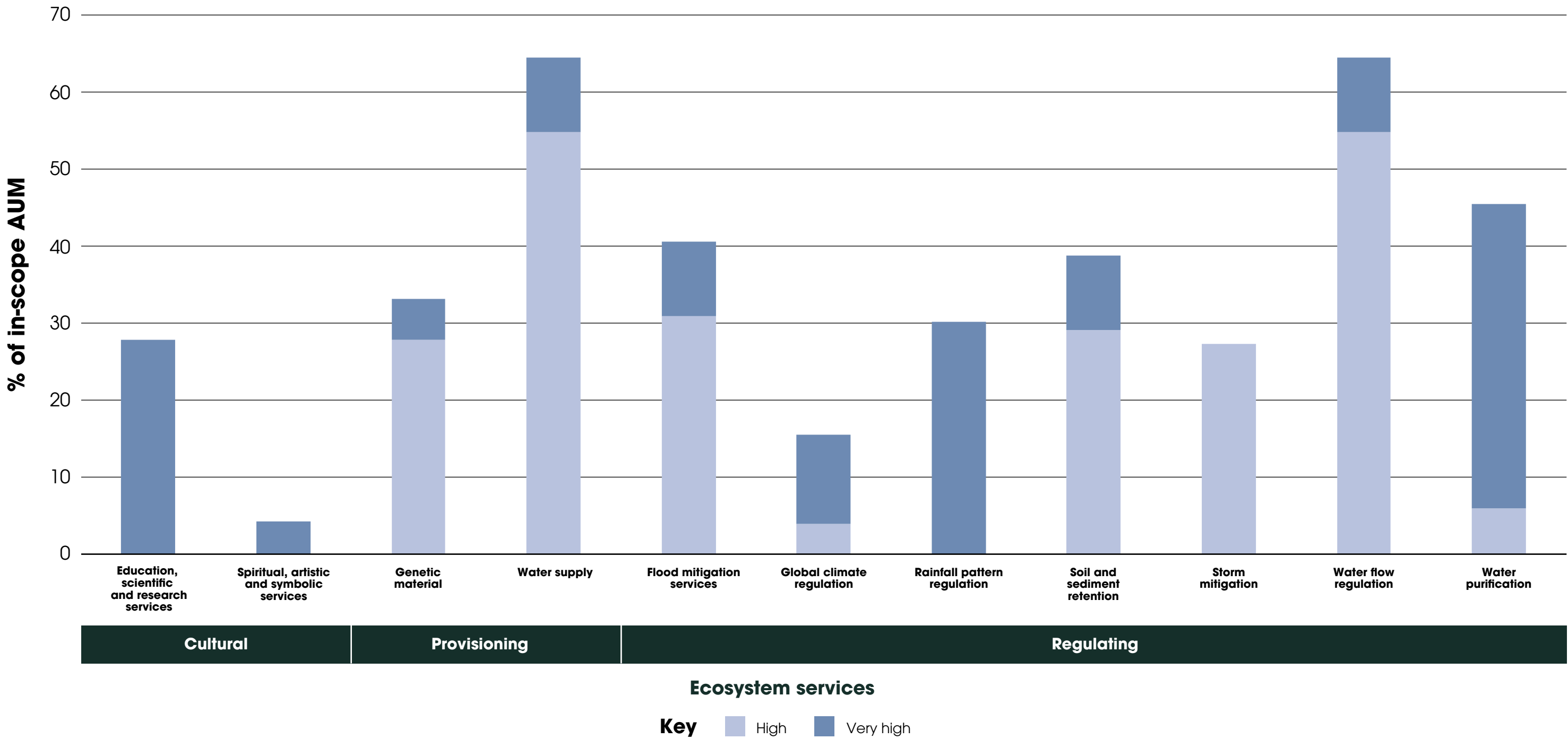
Overall, across the secondary sectors, land use, water consumption, and pollution remain the primary drivers of nature-related impacts.

(iii) Dependency findings – priority and secondary sectors

Overall, our analysis highlighted 11 key dependencies on nature distributed broadly across the 35 companies within our priority and secondary impact sectors (please see graph on page 14 and 15). Our dependency on "regulating and maintenance services" represented the most material exposure across the portfolio, particularly in sectors such as energy, food and beverage, personal care products, and pharmaceuticals, where water flow regulation, water purification, and flood mitigation were particularly critical. Provisioning services, most notably water supply and access to genetic materials, were also identified as a key dependency, especially within the pharmaceuticals sector. Cultural services, while less material from a risk perspective, emerged in small clusters such the pharmaceutical sector's reliance on education, scientific and research services.

By identifying our investment portfolio's key dependencies on nature, this process allows us to better anticipate potential risks arising from ecosystem degradation and to identify opportunities where companies are actively managing or reducing their reliance on vulnerable natural resources. A dependency on ecosystem services does not necessarily mean there is a financial risk. In the next stage of our assessment, we will try to gain deeper understanding of the location of a company's assets, to assess whether the ecosystem can continue providing the specific ecosystem service, for example does the company operate in an area which is vulnerable to drought, while being highly dependent on water flow regulation.

Dependencies as a % of total AUM for the 35 companies identified as within the priority and secondary impact sectors
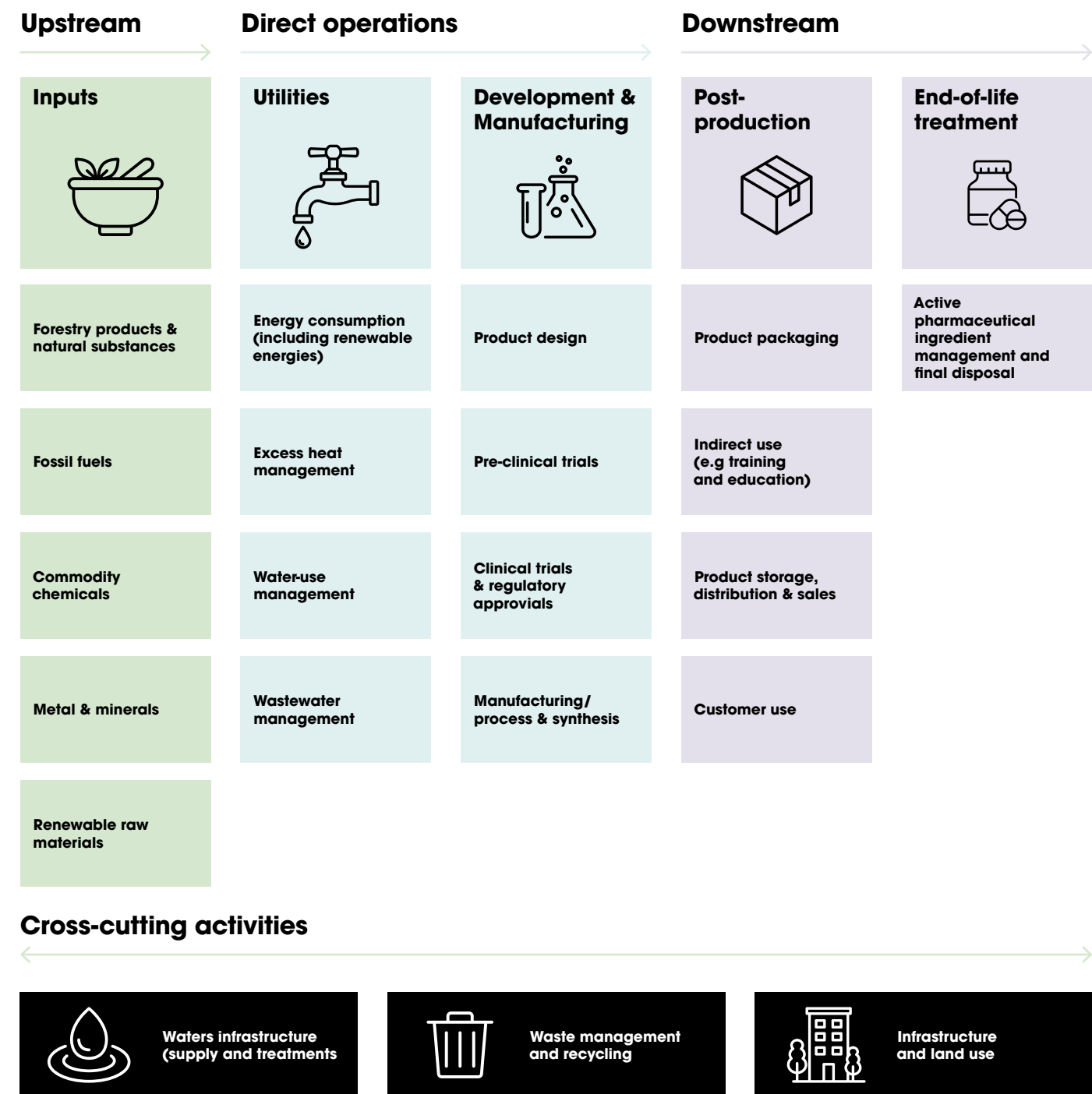

% of in-scope AUM

Ecosystem services

| Cultural | Provisioning | Regulating |

Education, scientific and research services, **Spiritual, artistic and symbolic services**, **Genetic material**, **Water supply**, **Flood mitigation services**, **Global climate regulation**, **Rainfall pattern regulation**, **Soil and sediment retention**, **Storm mitigation**, **Water flow regulation**, **Water purification**

Key — High — Very high

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Asset tagging findings

Asset tagging builds on the heatmap approach by incorporating asset-level data to provide a more detailed view of nature-related risks. It allows for a more granular assessment of exposure to nature-related dependencies and impacts through qualitative, quantitative or location-based metrics, and is typically applied to sub-sections of a portfolio where nature exposure is expected to be material.

Within our portfolio, we have chosen the pharmaceuticals sector as the initial focus for further assessment. This reflects both the sector's designation as a priority within the Finance for Biodiversity framework and our relatively high financial exposure to the sector.

The pharmaceutical sector operates across a complex and globally distributed value chain that spans research, development, manufacturing, distribution, and end-of-life product management. Each stage of this value chain interacts with nature in distinct ways, generating both impacts on ecosystems and dependencies on natural resources and services (see diagram on page 17).

Scope of the value chain for the pharmaceutical sector

Upstream	Direct operations		Downstream	
Inputs	**Utilities**	**Development & Manufacturing**	**Post-production**	**End-of-life treatment**
Forestry products & natural substances	Energy consumption (including renewable energies)	Product design	Product packaging	Active pharmaceutical ingredient management and final disposal
Fossil fuels	Excess heat management	Pre-clinical trials	Indirect use (e.g training and education)	
Commodity chemicals	Water-use management	Clinical trials & regulatory approvials	Product storage, distribution & sales	
Metal & minerals	Wastewater management	Manufacturing/ process & synthesis	Customer use	
Renewable raw materials				

Cross-cutting activities

Waters infrastructure (supply and treatments	Waste management and recycling	Infrastructure and land use

Adapted from source: Roadmaps to Nature Positive - Foundations for the Pharmaceuticals sector, World Business Council for Sustainable Development

Pharmaceutical companies rely heavily on natural commodities sourced from land, freshwater, and marine ecosystems. These include raw materials such as plant-derived compounds, animal-derived substances, such as horseshoe crab blood for endotoxin testing, and microbial genetic material used in drug discovery and development.[3] Many of these inputs are classified as high-risk commodities due to their association with threatened species or sensitive ecosystems, as outlined in the Science Based Targets Network (SBTN) High Impact Commodity List[4] and the IUCN Red List[5].

The upstream phase also includes water dependency for synthesis, cleaning, and cooling processes. In water-scarce regions, this creates a significant vulnerability, requiring careful stewardship and investment in water resilience and replenishment programmes.

During production, pharmaceutical companies generate a range of pollutants and waste streams. These include:

- Active Pharmaceutical Ingredients (APIs), some of which are persistent in the environment and contribute to antimicrobial resistance (AMR).[6]

- Hazardous and non-hazardous waste, which must be managed through recycling, incineration, or landfill.

- Wastewater discharges, often containing chemical oxygen demand (COD), biological oxygen demand (BOD), and temperature variations that affect aquatic ecosystems.

- Air pollutants, including non-GHG emissions such as particulate matter.

The sector is also responsible for land use change through the development of manufacturing and research and development facilities, some of which are located near ecologically sensitive areas. These sites may require biodiversity action plans and ecosystem condition assessments to mitigate disturbances.

Pharmaceutical companies rely heavily on natural commodities sourced from land, freshwater, and marine ecosystems.

Pharmaceutical products continue to interact with nature after they leave the factory. Improper disposal of unused medicines, patient excretion, and ineffective wastewater treatment can lead to the release of APIs into the environment.[7] This contributes to water pollution, soil contamination, and biodiversity loss.

Companies are increasingly implementing Environmental Risk Assessments (ERAs) and safe API discharge programmes to manage these risks. Lifecycle assessments (LCAs) are also being used to evaluate the environmental footprint of products across six impact categories, including carbon, water, and resource use.

Our approach will involve mapping the full value chain impacts and dependencies, identifying a core set of KPIs aligned with TNFD guidance, and evaluating data availability to distinguish what can be sourced directly from datasets versus what requires company disclosure or engagement.

For each high-impact and dependency area identified through the assessment, we will determine relevant KPIs to enable us to monitor the company going forward. We will draw on a range of different data sources that we have access to including Bloomberg, CDP and MSCI, as well as company-reported information. This will often require further engagement with the company, to fill some of the data gaps.

This stage of the assessment is ongoing, with the pharmaceuticals sector serving as a pilot to refine the methodology. The insights gained will inform how we extend the asset tagging process to other priority sectors in our portfolio with significant nature-related impacts.

[3] World Business Council for Sustainable Development (WBCSD) (2025) Roadmaps to Nature Positive: Foundations for the pharmaceutical sector. (online) WBCSD. Available at: https://www.wbcsd.org/resources/roadmaps-to-nature-positive-foundations-for-the-pharmaceutical-sector/
[4] https://sciencebasedtargetsnetwork.org/wp-content/uploads/2024/07/High-Impact-Commodity-List-v1-1.xlsx
[5] IUCN Red List of Threatened Species
[6] Taskforce on Nature-related Financial Disclosures (TNFD) (2024) Additional sector guidance – Biotechnology and pharmaceuticals, Version 1.0. June 2024. (online) TNFD. Available at: https://tnfd.global/publication/additional-sector-guidance-biotechnology-and-pharmaceuticals/

[7] World Business Council for Sustainable Development (WBCSD) (2025) Roadmaps to Nature Positive: Foundations for the pharmaceutical sector. (online) WBCSD. Available at: https://www.wbcsd.org/resources/roadmaps-to-nature-positive-foundations-for-the-pharmaceutical-sector/

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Learnings

Some of our learnings to date are:

- **Data availability remains a key constraint.** Nature-related data is significantly less developed than climate data. Disclosures are inconsistent, fragmented, and often lack comparability across companies and sectors. This requires the researcher to triangulate multiple sources of data to build a meaningful picture of nature-related impacts and dependencies. Despite this constraint, it is important to start somewhere and layer on new data as and when it is available.

- **Very few companies are reporting location-specific nature data.** Despite there now being a range of data sources available that identify biodiversity-related risks and opportunities at different locations including the Integrated Biodiversity Assessment Tool[8], the researcher is often not able to link this data to specific companies due to a lack of detail on where companies are operating, especially when looking into the wider supply chain, both upstream and downstream.

- **The same analysis approach sector to sector cannot be easily replicated.** Our pilot of the pharmaceuticals sector has highlighted the need to adapt assessment frameworks to reflect the specific context. For example, the sector's unique global value chain, reliance on high-risk commodities, and complex waste streams call for a bespoke set of KPIs to monitor the key impacts, dependencies, risks and opportunities.

- **Completing an impact and dependency assessment is resource intensive.** Following TNFD guidelines and best practice approaches is a complex process, especially when it comes to the asset tagging stage. It is important for investors to use the heatmap stage to prioritise effectively, ensuring a focus is on areas of highest risk and opportunity.

We are actively working to overcome these challenges, for example, by engaging with portfolio companies to encourage the disclosure of relevant location-specific data and collaborating closely with the Finance for Biodiversity impact assessment and target setting working groups to share learnings, so that they can be collectively addressed by the NGO, academic and investor communities over time.

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[8] IBAT | The world's most authoritative biodiversity data

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Conclusion

In this paper we have explored the results from our heatmap assessment at the Greenbank portfolio level, shared the early findings to emerge from our asset tagging assessment and some of our learnings from the impact and dependency assessment process to date. We will be following up soon with our next paper in the series.

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