



Investor Engagement Brief on Nature

Forestry, Paper and Packaging Sector

This is the second edition of the 'Sectoral Investor Engagement Briefs on Nature' series. It has been designed for use by the Finance for Biodiversity Foundation's members and investors involved in the Nature Action 100 initiative.

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Finance *for*
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Foundation

Overview

- This Investor Nature Engagement Brief on the Forestry, Paper and Packaging Sector forms part of a series of sector-focused engagement briefs created by the [Finance for Biodiversity \(FfB\) Foundation](#) and its members.
- The purpose of this unique series is to support investors engaging with companies on nature-related issues, notably with a series of questions that can serve as a starting point for investors when engaging with companies regarding their impacts and dependencies on nature, and in particular, when seeking to influence company actions and strategies to curb biodiversity loss and shift towards a nature-positive approach. The Forestry, Paper and Packaging sector is one of the priority sectors for the Nature Action 100 investor initiative, and this engagement guide has been designed to support investors that are involved in that initiative.
- The Forestry, Paper and Packaging sector generates nearly 2% of the overall impact on biodiversity from companies in the MSCI ACWI Index¹- which means that this sector ranks sixteenth of all assessed sectors with an impact on biodiversity.² The sustainable transformation of this sector is important for biodiversity because of the expected rise in demand for forestry, pulp and paper products as businesses switch towards a bio-based economy, and away from products relying on petrochemical inputs. This increased demand will bring risks including the potential for pollution, as well as deforestation. In the meantime, plastic packaging is becoming a serious environmental threat, with 353Mt of plastic waste generated in 2019,³ of which an estimated 140Mt has already accumulated in aquatic environments.⁴ The OECD forecasts this to increase to 1,014Mt by 2060.⁵
- The sector's transformation will also contribute to meeting a number of the targets set out in the Global Biodiversity Framework (GBF), and to meeting a number of the UN's Sustainable Development Goals (SDGs).

1. The MSCI ACWI Index was used as the company universe, as it is a leading benchmark for many investors. The index captures large and mid-cap companies across 23 Developed Markets and 24 Emerging Markets with over two thousand constituents

2. This figure is derived from [Finance for Biodiversity's multi-tool study](#) which covered 68 GICS L3 industries in the MSCI ACWI index in total.

3. OECD (2022), Global Plastics Outlook: Economic Drivers, Environmental Impacts and Policy Options, OECD Publishing, Paris, <https://doi.org/10.1787/de747aef-en>.

4. Our World in Data based on OECD Global Plastics Outlook 2022- 2019 data

5. OECD (2022), Global Plastics Outlook: Policy Scenarios to 2060, OECD Publishing, Paris, <https://doi.org/10.1787/aa1edf33-en>.

Table of Contents

Overview	2
What's Inside the Brief	4
PART I: Connections between the Forestry, Paper and Packaging	5
Sector and Nature	
PART II: Recommended Company Actions to help address	
Biodiversity Loss	28
PART III: Finance for Biodiversity Foundation's Call to Action:	
Questions for Investors to Engage Companies on Nature	35
Part IV: Supporting Resources for Company Analysis	42
Acknowledgements	47
Appendix 1: ENCORE Impacts Database - Forestry, Paper and	48
Packaging Sector	
Appendix 2: Comparing different economic classification systems	52

What's inside the brief

This brief is made up of four sections

The **first section** provides an overview of the sector including how the sector specifically impacts and depends on nature, particularly in sensitive locations. It then looks at some of the most forward-looking regulations on biodiversity that can inspire investors as they help to guide the transformation of the companies in their portfolio. Finally, this section considers how the sector links to the objectives of the goals and targets of the Kunming-Montréal [Global Biodiversity Framework](#) (GBF); an international agreement adopted in December 2022 under the [UN Convention on Biological Diversity](#) (CBD) which sets out an ambitious pathway to reverse biodiversity loss by 2030 and to reach the global vision of a world living in harmony with nature by 2050.

The **second section** then considers, in detail, some of the most relevant sector-specific company actions that investors can expect of companies at different stages of their journey to address biodiversity loss.

The **third section** lays out a series of questions that can serve as a starting point for investors planning to engage with companies on nature.

The **fourth section** provides a curated set of useful supporting tools that can be used to assist the engagement process.

This brief has been developed in alignment with the sectoral guides published by [the Taskforce on Nature-related Financial Disclosures](#) (TNFD)⁶ and the partnership between [Business for Nature](#) (BfN), the [World Economic Forum](#) (WEF) and the [World Business Council for Sustainable Development](#) (WBCSD) as well as the sectoral reports from [Planet Tracker](#). This brief has been written by investors for investors.

The FfB Foundation has also produced a more general [Guide on Engagement with Companies](#) for financial institutions that are looking for ways to engage with companies on biodiversity across multiple sectors.

6. The TNFD is a market-led, science-based and government-backed initiative providing organisations with the tools to act on evolving nature-related issues



Part I

Connections between the Forestry, Paper and Packaging Sector and Nature

Introduction

Scope of the sector

The Forestry, Paper and Packaging sector is not a single homogeneous industry. It includes three distinct groups of activities:

- 1 Forestry and forest products** - forest management, logging and fibre supply.
- 2 Manufacturing of pulp, paper and fibre-based packaging** - processing wood fibre into pulp, paper and fibre-based packaging.
- 3 Packaging manufacturing across non-fibre materials** - including plastic, metal and glass packaging.

These activities have different environmental impacts, dependencies and circularity characteristics. The Brief addresses the entire value chain because investors frequently engage with companies operating across multiple stages of these activities, and because their engagement activities will often seek to mitigate nature impacts by encouraging companies to shift away from less sustainable products (particularly plastics derived from petrochemicals) towards bio-based products, in addition to taking steps to reduce their nature impacts directly.

Sustainable transformation

The sustainable transformation of this sector is important for biodiversity because of the expected shift towards a bio-based economy (which will rely on significantly increased production of forestry products with significant implications for nature), but also because of the growing threat from plastic pollution, where 140 Mt of stock has already accumulated in aquatic environments.⁷

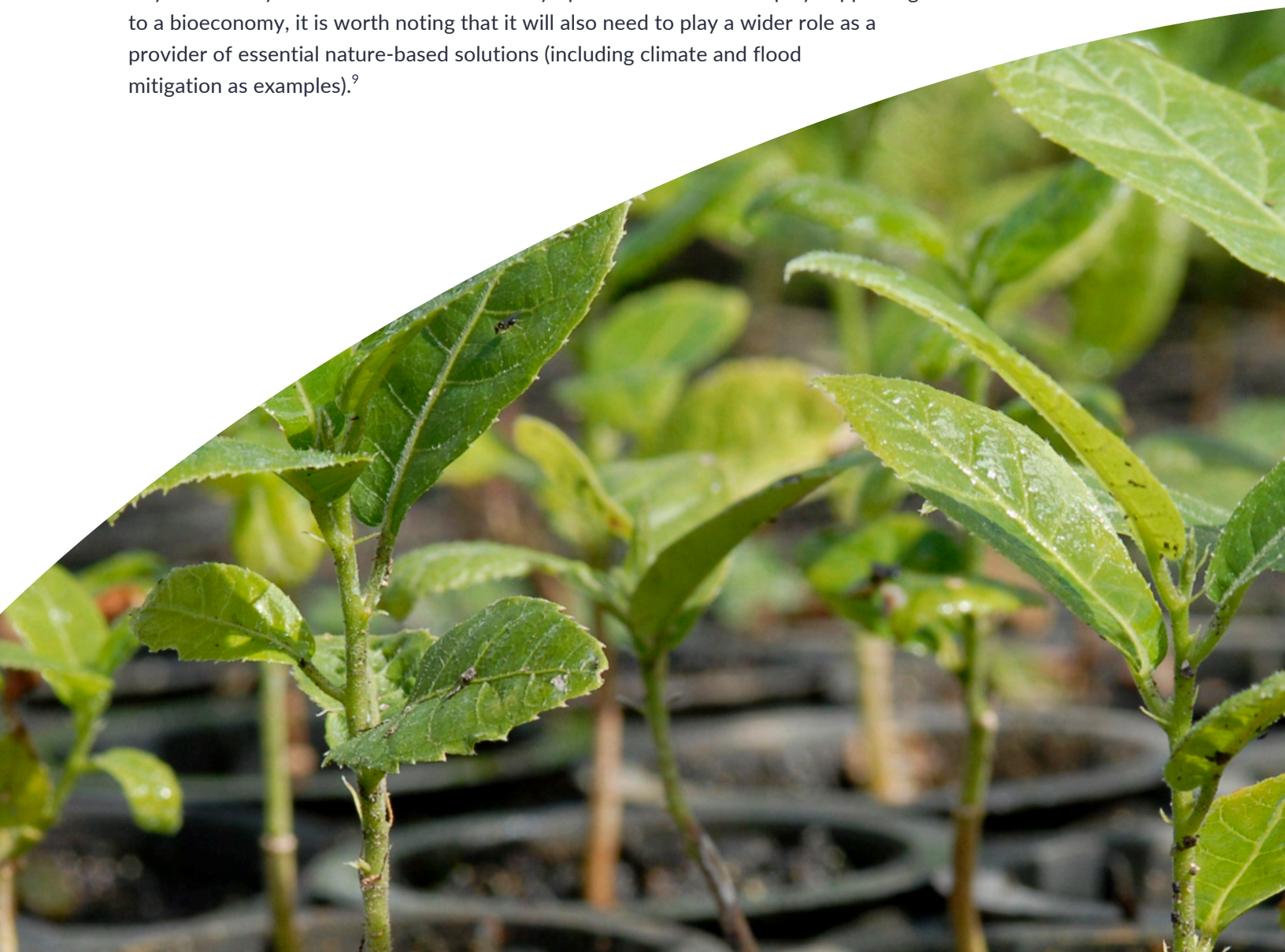
Regulation and consumer trends are pushing the packaging industry to become more sustainable. [Mintel's 2026 Global Predictions \(Packaging\)](#) report highlights the 'end of the recycling myth' as a key trend between now and 2030, as consumers become increasingly sceptical about claims that packaging is 'recyclable' when there is little evidence of actual recycling taking place. The report identifies significant majorities of consumers across diverse markets (e.g. 86% China, 83% in South Africa, 65% France, and 62% Canada) that expect brands to lead on environmental issues, including eliminating unnecessary plastic packaging. Mintel also reports that consumers will reward brands that help them to recycle, support refill systems and take-back schemes, and provide digital traceability. This highlights a particular opportunity for producers of 'smart packaging' - digital tools such as barcodes and QR codes – that can support all of these actions and strengthen the consumer/brand relationship. This analysis shows that consumers expect a sustainable transformation of the sector, creating opportunities for innovation as well as a risk for businesses that fail to change.

7. Our World in Data based on OECD Global Plastics Outlook 2022- 2019 data

Forestry, nature-based solutions and the bio-economy

In part, this transformation will be realised by substituting bio-based alternatives for the petrochemical-based plastic packaging currently in use, creating significant opportunities for the forestry end of the sector's value chain. However, to sustainably scale a bio-based packaging industry, forestry operations must be (re)designed to balance expanded extraction with the restoration of degraded lands, investment in reforestation and afforestation, reduced loss and waste of materials, and improved forest management strategies, as well as facilitating the growth of conservation areas.⁸ This topic, including the nature-related trade-offs involved in shifting to a bio-economy with forestry at its heart, are discussed in detail in WWF's report 'Everything from Wood'. The authors of that report also make the very important point that 'excessive and wasteful' consumption must also be reduced to avoid placing unsustainable demands on our forests.

Beyond the key role that sustainable forestry operations will have to play supporting the transition to a bioeconomy, it is worth noting that it will also need to play a wider role as a provider of essential nature-based solutions (including climate and flood mitigation as examples).⁹



8. Beck-O'Brien, M., Egenolf, V., Winter, S., Zahnen, J., Griesshammer, N. (2022). Everything from wood – The resource of the future or the next crisis? How footprints, benchmarks and targets can support a balanced bioeconomy transition. WWF Germany.

9. <https://iucn.org/our-work/topic/nature-based-solutions-climate>

The sector value chain

As Figure 1 illustrates, the sector value chain draws on a range of inputs, and the wood, paper and packaging products that the industry produces are used across multiple sectors of the economy.

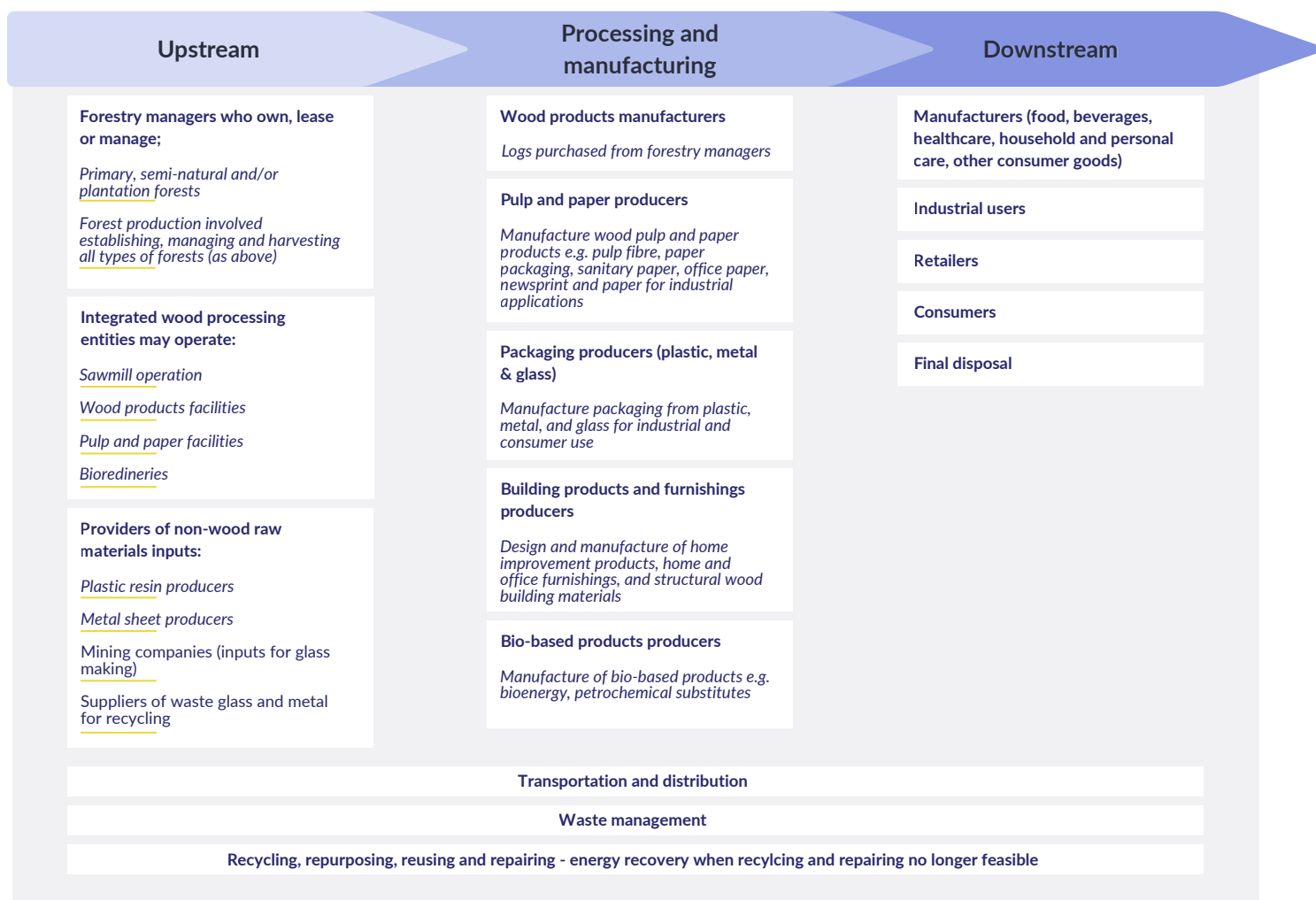


Figure 1: Typical business activities in the forestry, paper, and packaging value chain (FfB Foundation, based on TNFD Additional sector guidance – Forestry, pulp and paper, 2024)

Forestry

The global forestry market was estimated to be worth nearly USD 980bn in 2024,¹⁰ double the FAO estimate for the value of global exports of wood and paper products in 2024 which was USD 486bn¹¹. Both these figures cover the entire output from the forestry industry – the value of the raw materials produced for the paper packaging part of the sector ('fibre furnish') is not identified in the FAO report, however, a survey of market research firm estimates implies a figure for the fibre furnish market in 2024 of approximately USD 45bn.¹²

Table 1 shows the distribution of forestry production by volume across different regions – Asia (mainly China) is the largest producer accounting for nearly 30% of global production. Africa comes second, with Europe a close third – both with around 20% of global production volumes.

Region	2022 production (million m ³)	2022 production (million m ³)
Asia	1,153	29%
Africa	807	20%
Europa	794	20%
North & Central America	699	18%
South America	443	11%
Oceania	81	2%
World	3,983	100%

Table 1: Forestry production by region (Total roundwood removals), 2022. Source: Forest Research (Forestry Statistics 2024)

When net exports are considered, FAO data showed China was the largest net exporter in 2024, with Brazil and Canada ranking second and third.

10. <https://www.thebusinessresearchcompany.com/report/forestry-and-logging-market>

11. FAO. 2025. Global forest products facts and figures 2024 – Industrial roundwood, sawnwood, wood-based panels fibre furnish, paper and paperboard wood fuel, charcoal and pellets export, and import value. Rome. <https://doi.org/10.4060/cd8005en>

12. For example: <https://www.linkedin.com/pulse/total-fiber-furnish-market-understanding-investment-afdc/>

Packaging

As might be expected, the packaging part of the value chain is larger, with estimated global revenues in 2024 of USD 1.0-1.4 tr,¹³ split across a range of different materials. Paper and cardboard accounts for 32% of global revenues, and plastic packaging (flexible and rigid) accounts for another 24%, as illustrated by Figure 2.

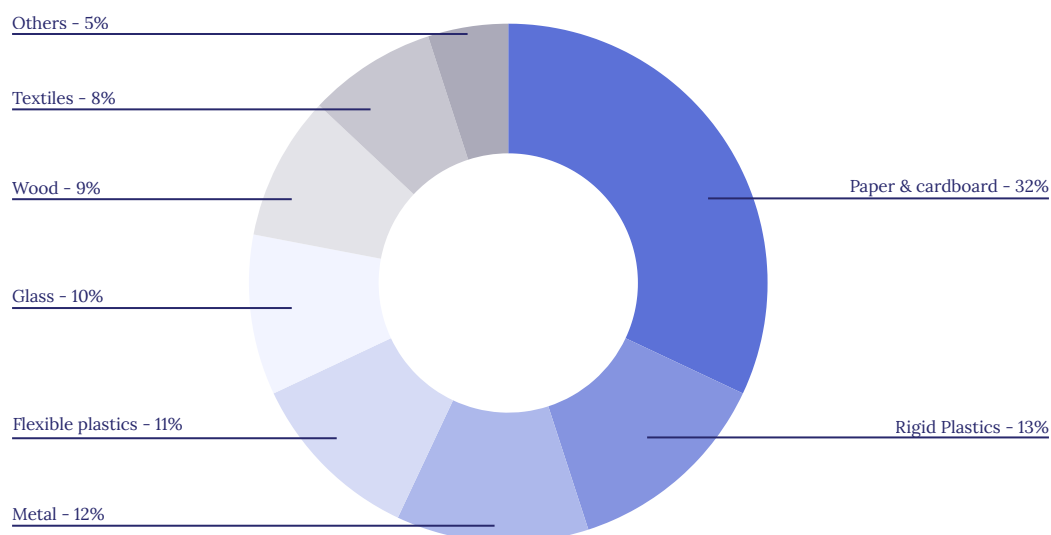


Figure 2: Global packaging market shares (revenues). FfB Foundation estimates

Packaging products are used widely across the economy. The biggest users from a business perspective are food and beverage companies, accounting for a combined 51%,¹⁴ as shown in Figure 3.

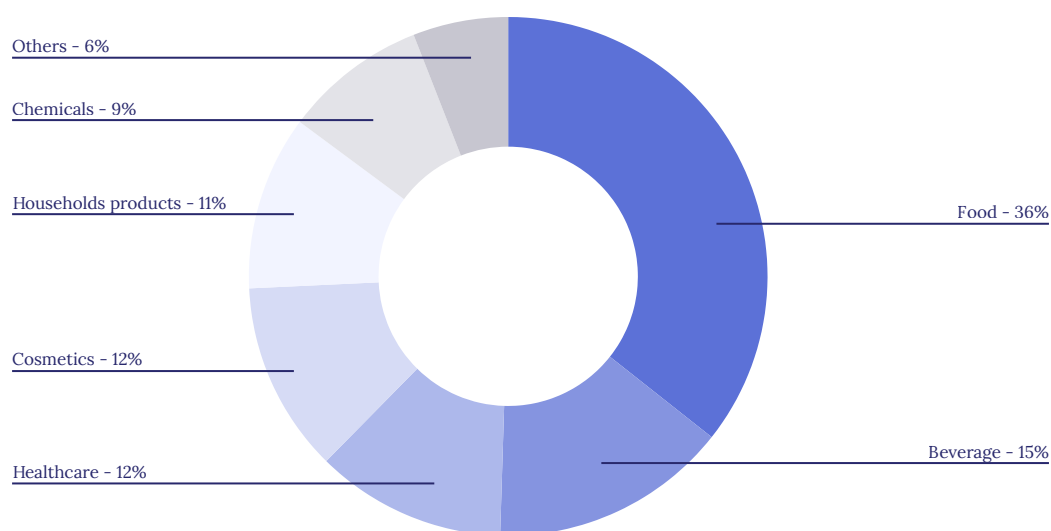


Figure3: Main users of packaging products (market share). FfB Foundation estimates

13. Based on a survey of various market research sources

14. Based on a survey of various market research sources – estimated for 2023/24

How this sector impacts and depends on nature

It is crucial for investor engagement practices to be anchored in science and best practices to help drive the sustainable transformation of companies toward the goals and targets of the Kunming-Montréal [Global Biodiversity Framework](#) (GBF). Understanding and measuring how this sector impacts and depends on nature is, therefore, essential to better manage supply chains and encourage more sustainable practices.

The Forestry, Paper and Packaging sector depends on natural resources (mainly wood, petrochemicals, metal, and sand) to produce wood products, pulp, and packaging materials, and each of these production and manufacturing processes generate a diversity of impacts on nature.

Forestry has a very clear dependency on nature and the potential impacts of forestry are also obvious. Undisturbed forests support very high levels of biodiversity and hold significant quantities of carbon. The nature impact of forestry for the production of raw materials for pulp and paper production will vary widely, depending on the methods being used. At the most negative end of the spectrum would be an extractively managed non-native monocrop forest, depleting water resources and deploying significant levels of harmful chemicals.¹⁵ Such practices have a severe impact on biodiversity and are often linked to high levels of deforestation and/or forest degradation.¹⁶ At the other (positive) end of the spectrum would be a forest managed according to sustainable principles such as those established by WWF's Forest Forward programme¹⁷ or the Forestry Stewardship Council's (FSC) Principles.¹⁸

Pulp and paper manufacturing requires significant amounts of water and heat, and also frequently involves the use of bleaching agents and other toxic chemicals. As a result, it is a significant source of GHG emissions, and toxic water and soil pollutants (including sulphur compounds, nitrogen oxides, chlorinated and organic compounds).¹⁹ In 2024, paper and paperboard consumption amounted to 423 mT – approximately 58% of this was collected for recycling.²⁰ This recovery rate has remained relatively constant in recent years so the remaining 42% will have been supplied from forestry harvesting. Forecasts for future consumption obviously vary but the consensus is for continued growth, particularly in response to efforts to reduce the use of plastic in packaging.

Glass manufacturing is an energy-intensive process due to the extreme temperatures (often above 1,500 °C) required to melt and form raw materials like silica sand, soda ash, and limestone into glass. The industry heavily relies on fossil fuels to generate these temperatures which generate significant greenhouse gas emissions (including CO₂, NO_x, SF₆, SO₂) and air pollution (SPM, VOCs, SO_x, heavy metals). Silica, the main raw material input, is mined, resulting in the usual nature risks associated with this activity. However, glass is infinitely recyclable, unlike many other packaging materials, creating a significant opportunity to reduce the use of raw materials.

15. <https://www.bbc.co.uk/news/business-67144689>

16. Grantham et al, 2020. Anthropogenic modification of forests means only 40% of remaining forests have high ecosystem integrity. *Nature Communications*, 11(1), 5978. <https://doi.org/10.1038/s41467-020-19493-1>

17. https://forestsforward.panda.org/latest/thought_leadership/?12065466/Bringing-forests-forward-pathway

18. <https://connect.fsc.org/document-centre/documents/resource/392>

19. Gavrilescu, Puitel, Dutuc, & Craciun. (2012). Environmental impact of pulp and paper mills. *Environmental Engineering and Management Journal*. 11. 81-86. 10.30638/eemj.2012.012.

20. FAO. 2025. Global forest products facts and figures 2024 <https://doi.org/10.4060/cd8005en>

Aluminium production is also an energy-intensive process that uses a lot of water. The aluminium manufacturing process starts with open cast bauxite mining which has significant, albeit localised, negative impacts on nature (with the potential for long-term restoration of the mined area). The bauxite is then converted into aluminium oxide via the 'Bayer process', which involves the application of heat, pressure and water. In addition to aluminium oxide, the process produces large quantities of a highly alkaline bauxite residue which must be treated (washed) to reduce its alkalinity. In some cases it is then dried, after which it can be safely stored or used in various industrial applications including in the production of cement. However, in many cases it is left in slurry form in tailings ponds, creating serious environmental risks. The aluminium oxide itself is then dissolved in molten cryolite and aluminium fluoride before being electrolytically reduced to aluminium. This process requires very significant quantities of electricity (usually from non-renewable sources) and generates CO₂ as a by-product, so is responsible for significant GHG emissions.²¹ However, once produced, aluminium (like glass) is infinitely recyclable.

Plastic production is a substantial contributor to global GHG emissions. In 2019, plastics generated 1.8 billion tons of greenhouse gas GHG emissions – 3.4% of global emissions – with 90% of these emissions coming from their production and conversion from fossil fuels.²² Petrochemical plants, where plastic is synthesized from raw materials, are major sources of air and water pollution. Manufacturing methods such as polymerization, extrusion, injection molding, and blow molding require significant energy inputs. During polymerization, volatile organic compounds (VOCs), such as benzene, toluene, and xylene, are released into the atmosphere, contributing to smog formation and air quality degradation. Additionally, the release of toxic byproducts, such as dioxins and furans, poses risks to human health and ecosystems.²³ However, plastic has significant advantages as a packing and packaging material, and so has steadily increased in popularity - the OECD forecasts that plastic use will nearly triple by 2060 compared to a 2019 baseline- see Figure 4.

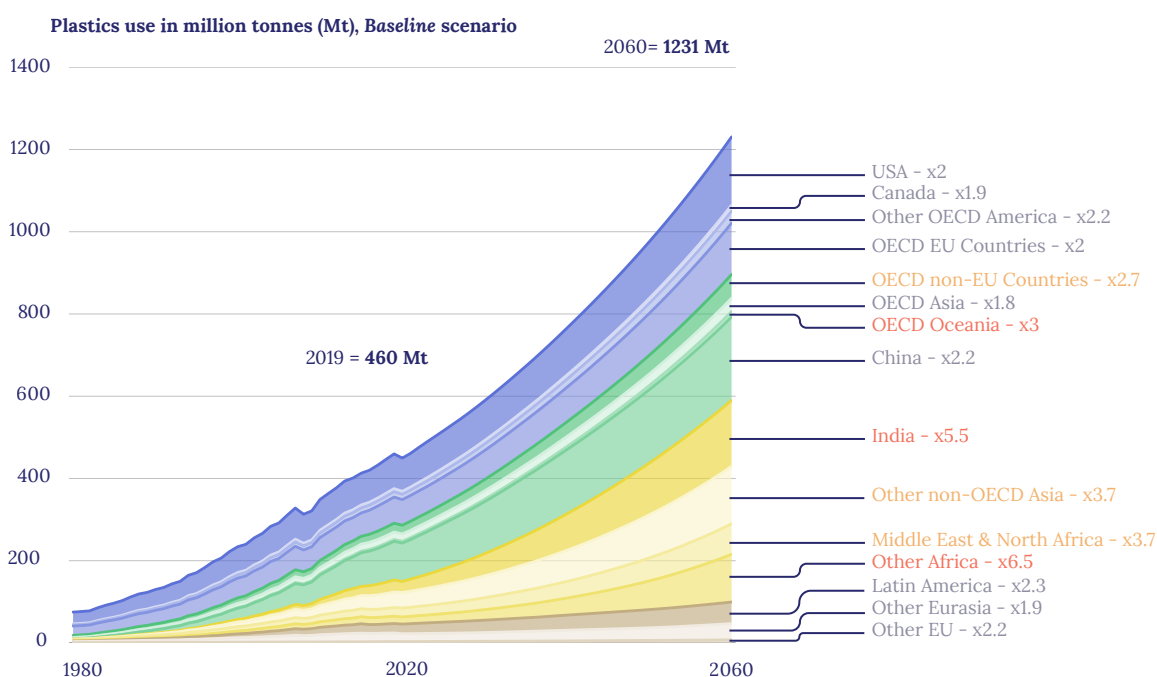


Figure 4: Projected growth of plastics use by 2060, by geography. OECD. *Global Plastics Outlook Policy* (2023)

21. Brough and Jouhara, The aluminium industry: A review on state-of-the-art technologies, environmental impacts and possibilities for waste heat recovery, International Journal of Thermofluids, Volumes 1-2, 2020, <https://doi.org/10.1016/j.ijft.2019.100007>

22. <https://www.oecd.org/environment/plastics/increased-plastic-leakage-and-greenhouse-gas-emissions.htm>

23. Adekanmbi et al. Assessing the environmental and health impacts of plastic production and recycling. World Journal of Biology Pharmacy and Health Sciences, 2024, 17(02), 232-241. Article DOI: <https://doi.org/10.30574/wjbps.2024.17.2.0081>

As a result, pollution from plastic waste is a growing problem. The breakdown of plastics in soil and water releases toxic chemicals like phthalates and Bisphenol A,²⁴ which are considered hazardous chemicals toxic to aquatic life, and endocrine disruptors damaging to health.²⁵ The OECD forecasts that stocks of plastics accumulating in aquatic environments are projected to be more than triple, increasing from 140 Mt in 2019 to 493 Mt in 2060²⁶ - see Figure 5.

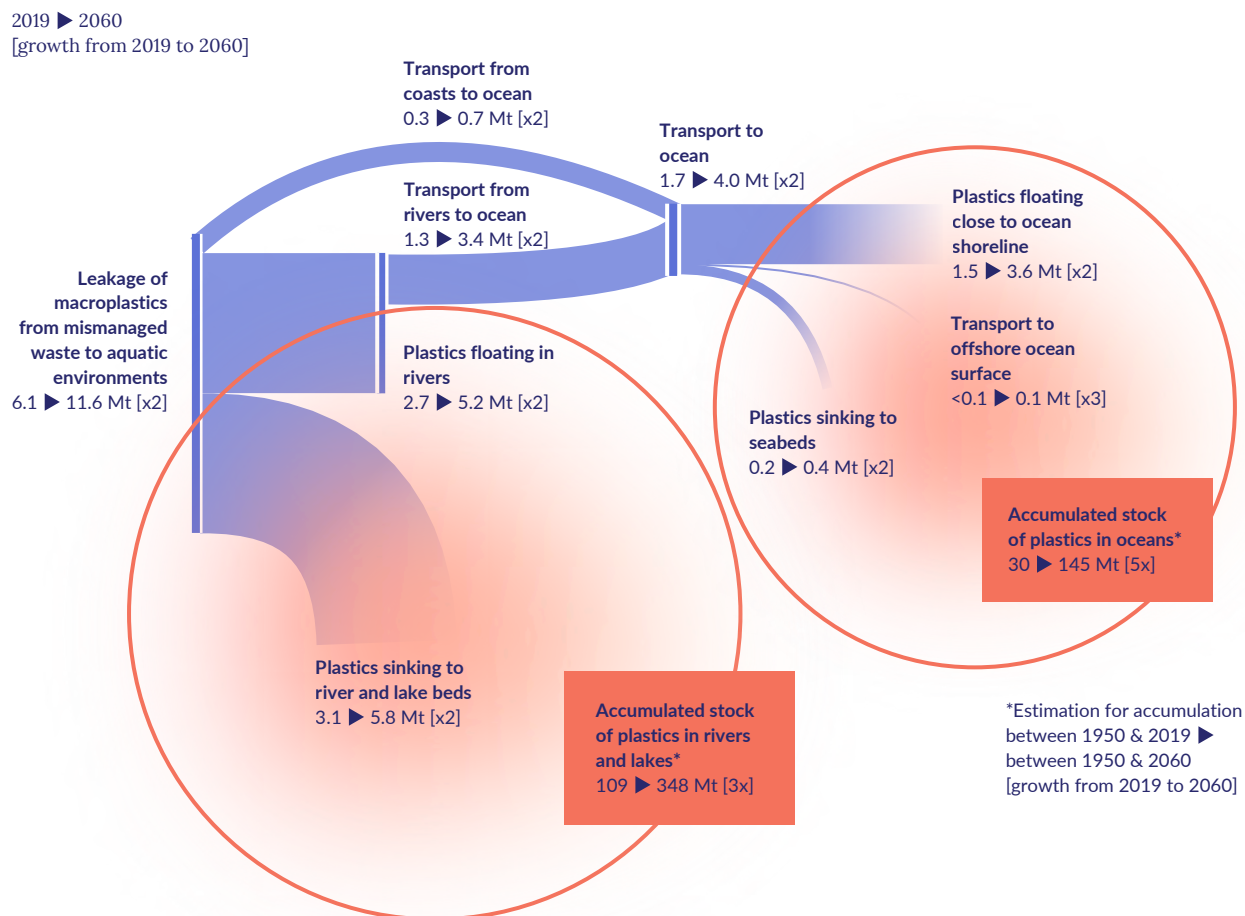


Figure 5: Projected growth of plastics leakage into the environment by 2060. OECD (2022), Global Plastics Outlook: Policy Scenarios to 2060

24. <https://www.eea.europa.eu/publications/peoples-exposure-to-bisphenol-a/>

25. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8157593/>

26. OECD (2022), Global Plastics Outlook: Policy Scenarios to 2060, OECD Publishing, Paris, <https://doi.org/10.1787/aa1edf33-en>

Tools for assessing nature impacts

High-impact commodities

SBTN [High-Impact Commodities List](#) (HICL) is a non-exhaustive list of the most common environmental impacts associated with the production of major commodities (i.e., the direct operations stage). Table 2 below presents the environmental impacts associated with aluminium, pulp, cellulose, paper, paperboard, cardboard, and crude oil, which are all commodities associated with different parts of the Forestry, Paper and Packaging sector.

Commodity	Bauxite / Aluminium	Pulp, cellulose, paperboard, cardboard, tissue	Crude Oil
Land use and land change	×		×
Freshwater ecosystem use/change	×		×
Marine ecosystem use/change	×		×
Water Use	×	×	×
Other resources use	×		×
Soil pollution	×	×	×
Freshwater Pollution	×	×	×
Water pollution	×		
Marine pollution			×
Solid Waste			×
Climate change	×	×	×
Non-GHG air pollution			

Table 2: SBTN High-Impact Commodities List for the Forestry, Paper and Packaging sector. SBTN High-Impact Commodities List (HICL)

Assessing impacts using ENCORE

The ENCORE²⁷ database provides a tool for financial institutions that allows them to identify the potential impacts ('pressures') and dependencies on nature for sectors of the economy, both in terms of their direct operations and also their value chain.

As part of the 2024 update of ENCORE, information on key upstream and downstream value chain links was added, covering two tiers upstream and two tiers downstream from the direct operations.

The actual nature impacts of a particular company in the Forestry, Paper and Packaging sector will vary depending on the products it is producing and the business models and locations of the companies in its value chain.

Terminology nature impacts

ENCORE, TNFD and SBTN use similar concepts but apply different terminology when discussing 'impacts'.

ENCORE focuses on the potential impact that a sector can have on nature as a result of its direct operations and those in its value chain. In ENCORE 'impacts' refer to categories of environmental pressures associated with an economic activity (e.g., water abstraction, land use change, pollution, resource extraction). These are sector-level indicators of the typical intensity of pressures exerted on nature. **ENCORE ratings** (e.g., "Very High") therefore **signal the potential significance of a pressure for a given sector**, but they do not measure the resulting ecological state change, nor are they location-specific. In other words, ENCORE highlights potential impact, not actual impact.

By contrast, **SBTN and TNFD distinguish clearly between the potential impact (the 'pressure' (SBTN) or 'impact driver' (TNFD) - which are equivalent to ENCORE's 'pressures'), and the actual impact on nature.**

In **SBTN terminology**, a 'pressure' (e.g., water withdrawal) may lead to an 'impact', defined as a change in the state or functioning of ecosystems. **TNFD** uses the term 'impact driver' (instead of 'pressure') and 'impacts on nature' for the resulting ecological change.

In this guide, consistent with SBTN and TNFD, 'impact' refers to actual changes in the state of nature, and 'pressure' or 'potential impact' refers to the potential harm.

ENCORE's impact categories (pressures), SBTN pressures and TNFD impact drivers can each be mapped to the IPBES five drivers of nature loss: (1) land and sea use change, (2) direct exploitation of organisms, (3) climate change, (4) pollution, and (5) invasive alien species.

However, SBTN and TNFD extend the framework by distinguishing between the driver/pressure itself and the resulting change in ecosystem state. This distinction is important: a sector may exert a high level of pressure associated with one or more IPBES drivers, but the actual impact on nature of a sector and/or a specific company depends on geographic context, ecosystem sensitivity and cumulative effects.

It is also important to note that a single 'pressure' (e.g. Emissions of toxic pollutants to water and soil) can result in multiple 'impacts' on nature.

27. <https://encorenature.org/en/about/about-encore>

The potential nature impacts of the Forestry, Paper, and Packaging sector are summarised in the ENCORE database (scale from Very Low to Very High), providing a clear insight into the effects that different products and supply chains will have on a company's potential nature impacts - see Figure 6.

Impact drivers	Potential impacts ('pressures')	Logging	Silviculture and other forestry activities	Support services to forestry	Manufacture of paper and paper products	Manufacture of products of wood, cork, straw and plaiting materials (ex furniture)	Manufacture of plastic products	Manufacture of glass and glass products	Manufacture of other fabricated metal products
Land/freshwater/ocean-use change	Area of land use	Very high	Very high	N/A	Low	Low	Low	Low	Low
	Area if freshwater use	Medium	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Area of seabed use	No data	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Climate change	Emissions of GHG	Medium	No data	Medium	Medium	Medium	Medium	Medium	Low
Pollution	Emissions of non-GHG air pollutants	Very high	Very high	Low	High	Medium	Medium	Medium	Low
	Emissions of toxic soil and water pollutants	Medium	High	Medium	Medium	Medium	Very high	No data	Very high
	Emissions of nutrient soil and water pollutants	N/A	High	N/A	N/A	N/A	N/A	N/A	N/A
	Generation and release of solid waste	Low	Low	Low	High	Medium	Medium	Medium	Low
Resource exploitation	Volume of water use	Medium	Medium	Medium	Medium	Medium	Low	Medium	Medium
	Other biotic resource extraction (e.g. timber)	Very high	No data	No data	N/A	N/A	N/A	N/A	N/A
	Other abiotic resource extraction	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Invasive and other	Disturbances (e.g. noise, light)	High	High	Medium	Medium	High	Medium	Medium	Medium
	Introduction of invasive species	Medium	High	Medium	N/A	No data	N/A	N/A	N/A

Figure 6: Summary of potential nature impacts as shown in ENCORE (2024 version). FfB Foundation analysis.

In line with other sectors, the upstream activities (logging and silviculture) have a Very High potential impact across a number of impact drivers including land-use change, emissions of non-GHG air pollutants, and other biotic resource extraction, combined with a High impact from emissions of toxic and nutrient soil and water pollutants, disturbances, and the introduction of invasive species.

Manufacturing relating to paper, plastic and metal packaging also has a Very High or High potential impact in relation to emissions of non-GHG air pollutants, emissions of toxic soil and water pollutants, generation and release of solid waste, and disturbances.

Assessing dependencies (ENCORE)

In addition to the potential impacts discussed above, it is important to consider the sector's dependency on natural systems and their (ecosystem) services. Forestry-related activities are Very Highly or Highly dependent on a wide range of ecosystem services (e.g. biomass provisioning, genetic material, climate regulation, and water supply), whereas the activities relating to the manufacture of paper, plastic and metal packaging are less dependent (rated Medium or lower in ENCORE) – see Figure 7 below (refer to Appendix 1 for more details on these ecosystem services).

Impact drivers	Potential impacts ('pressures')	Logging	Silviculture and other forestry activities	Support services to forestry	Manufacture of paper and paper products	Manufacture of products of wood, cork, straw and plaiting materials (ex furniture)	Manufacture of plastic products	Manufacture of glass and glass products	Manufacture of other fabricated metal products
Provisioning service	Biomass provisioning	Very high	Very high	Medium	N/A	N/A	N/A	N/A	N/A
	Genetic material	No data	Very high	Medium	N/A	N/A	N/A	N/A	N/A
	Water supply	Medium	High	High	Medium	Low	Low	Medium	Medium
	Other provisioning services - animal-based energy	Medium	Low	Low	N/A	N/A	N/A	N/A	N/A
Regulating and maintenance services	Global climate regulation	No data	Very high	Very low	Very low	Very low	Very low	Very low	Very low
	Rainfall pattern regulation	N/A	Very high	Very high	Medium	Medium	Very low	Medium	N/A
	Local (micro and meso) climate regulation	N/A	Very high	Medium	Low	Low	Low	Low	Low
	Air filtration	High	Medium	No data	Very low	Medium	Very low	Very low	N/A
	Soil quality regulation	High	Very high	N/A	N/A	N/A	N/A	N/A	N/A
	Soil and sediment retention	Very high	Very high	Medium	Low	Low	Low	Low	Low
	Solid waste remediation	Medium	Medium	N/A	Medium	Medium	Low	Medium	Medium
	Water purification	N/A	Very high	Very high	N/A	N/A	Medium	Medium	Medium
	Water flow regulation	Medium	High	Medium	Medium	Medium	Medium	Medium	Medium
	Flood migration services	Medium	High	Very low	Medium	Medium	Medium	Medium	Medium
	Storm migration	Low	Medium	Very low	Medium	Medium	Medium	Medium	Medium
	Noise attenuation	Very low	N/A	N/A	Very low	Very low	Very low	Very low	Very low
	Pollination	N/A	Medium	N/A	N/A	N/A	N/A	N/A	N/A
	Biological control	High	High	Low	Very low	Very low	N/A	N/A	N/A
	Nursery population and habitat maintenance	N/A	High	No data	N/A	N/A	N/A	N/A	N/A
	Other regulating and maintenance services - Dilution	No data	No data	N/A	Low	Low	Low	No data	Low
	Other regulating and maintenance services - Mediation	Very low	N/A	N/A	N/A	N/A	Very low	Very low	Very low

Figure 7: Summary of nature dependencies for the Forestry, Paper and Packaging sector (ENCORE, 2024 version). FfB Foundation analysis.

The actual nature dependencies of a particular company in the sector will vary depending on the products it is producing and the business models and locations of the companies in its value chain. It is also worth noting that sustainably managed forestry operations will be enhancing or maintaining a variety of ecosystem services (potentially including biomass provisioning, global and local climate regulation, rainfall pattern regulation, air filtration, waterflow regulation and flood mitigation).

Priority locations within the sector value chains

As expressed in the [TNFD recommendations](#)²⁸, nature-related impacts and dependencies are location-specific and therefore require local, context-specific assessment and responses. As a result, investors benefit from knowing the locations that are linked to the supply chain of an overall industry. The TNFD provides sectoral guidance for individual companies on how to 'Locate' their impacts on biodiversity, as the first step of their [LEAP assessment](#) (Locate-Evaluate-Assess-Prepare), a four-step integrated assessment framework for nature-related issues.

Companies and investors should focus on 'priority locations' i.e. areas that are:

- **Material locations** – where the organisation has material nature-related impacts, dependencies, risks and/or opportunities;²⁹ and/or
- **Sensitive locations** – defined by the TNFD as ecologically sensitive locations that meet one or more of five criteria: important for biodiversity, including species; and/or areas of high ecosystem integrity; and/or areas of rapid decline in ecosystem integrity; and/or areas of high physical water risks; and/or areas of importance for ecosystem service provision, including benefits to Indigenous Peoples, local communities and stakeholders.³⁰

The assessment of impacts on priority locations will vary greatly for each individual company. In an ideal world, specific company disclosures will provide the location detail that investors need to investigate their potential exposure to companies operating in priority locations. However, in the absence of such disclosures, investors can use a variety of tools to support this analysis.

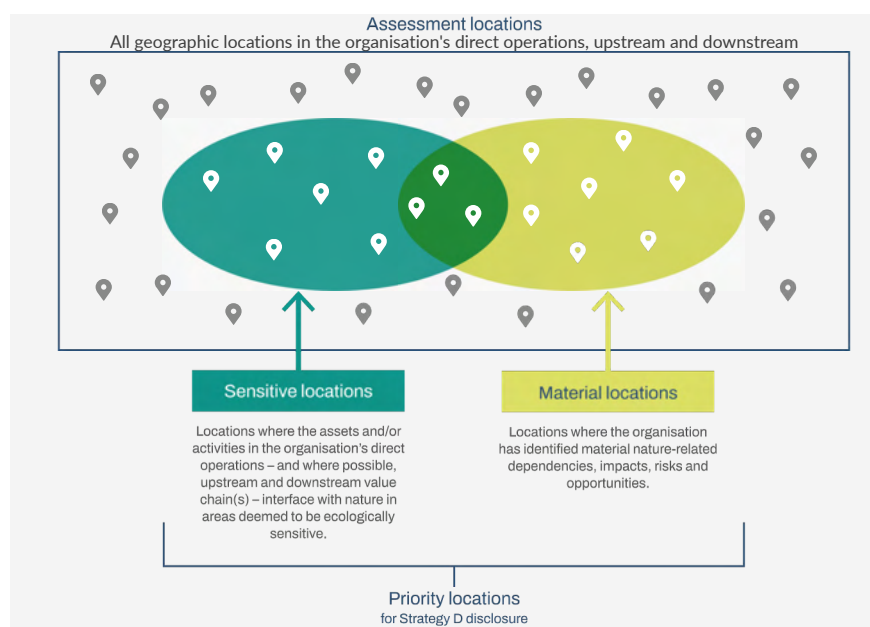


Figure 8: Priority locations, [Guidance on the identification and assessment of nature-related issues - The TNFD LEAP approach v1](#) - September 2023

28. These are recommendations that provide companies and financial institutions of all sizes with a risk management and disclosure framework to identify, assess, manage and, where appropriate, disclose nature-related issues, green transition plans, nature markets and bioeconomy investment strategies.

29. 'Material' in the context of impacts and dependencies is defined by the TNFD as 'the organisation's most significant impacts on the ... environment'

30. See: https://tnfd.global/wp-content/uploads/2023/08/Guidance_for_Financial_Institutions_v1.pdf?v=1695215983

Case study: mapping pulp and paper mills against deforestation risk

One example of such a tool (still in development) is the [EPN Pulp Mills Capacity Expansion map](#). This map shows ongoing Environmental Paper Network research of planned and proposed new pulp capacity around the world, and the proximity of these paper mills to the risk factors of deforestation fronts and Intact Forest Landscapes – see Figure 9.

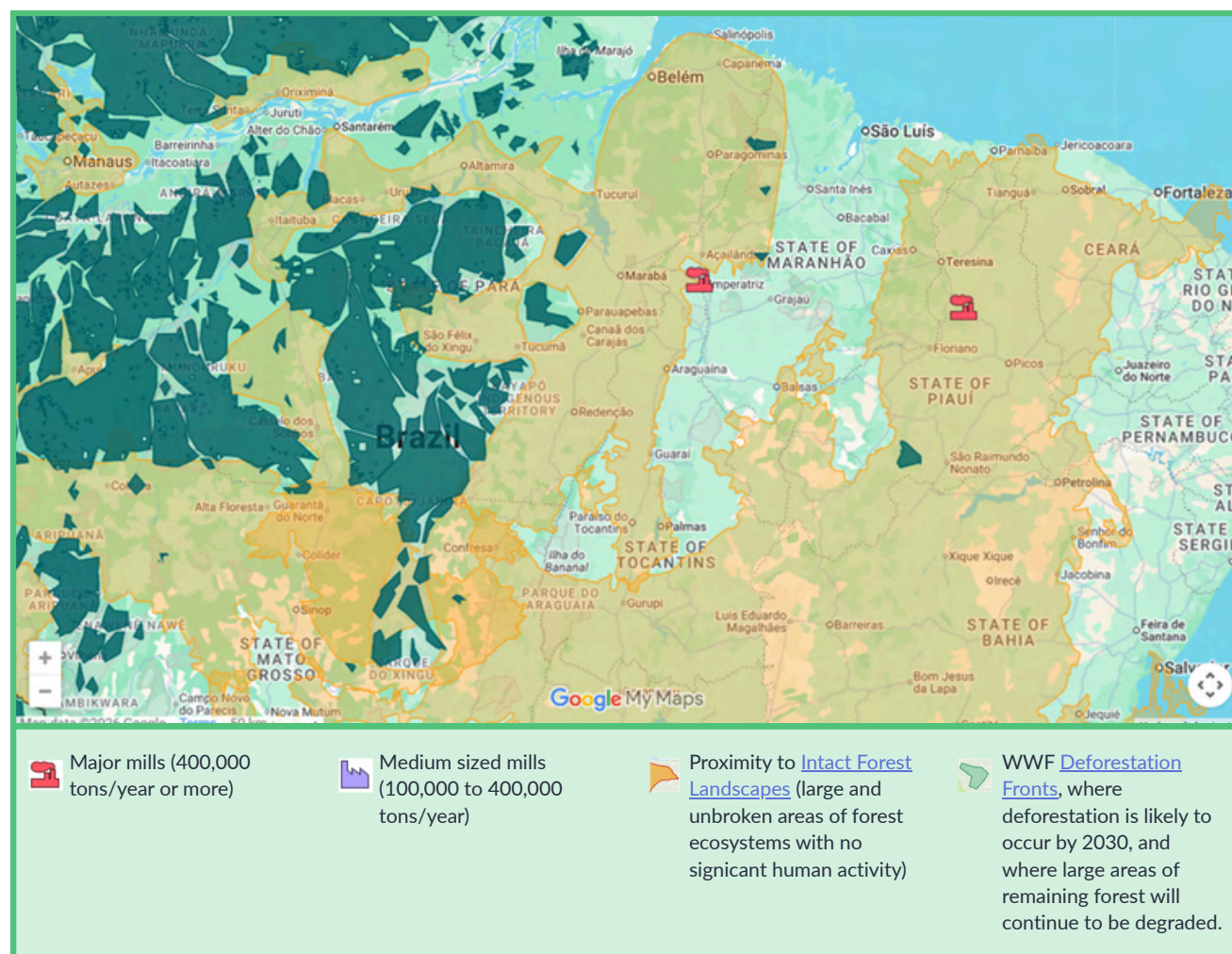


Figure 9: EPN Pulp Mills Capacity Expansion map (extract by FfB Foundation)

Recycling – a potential solution?

As noted previously, the forestry, paper and packaging sector is expected to grow, particularly in relation to forest products and plastics. One way to mitigate the negative impact on nature of this increased demand is to use the products themselves at the end of their lives as feedstock for producing new products, thus reducing the demand for 'virgin feedstock'.

Wood is both biodegradable and inherently recyclable. However its recyclability depends on how it has been treated when being converted into paper and wood-based packaging, and the extent to which it has been combined with other non-wood products (e.g. plastic carton liners) or treated with chemicals.

Glass and aluminium can both be recycled repeatedly without any deterioration in the basic quality of the feedstock (although issues relating to contamination of the material to be recycled can complicate the process).

Plastic is much more of a challenge. A study of the global plastics supply chain published in 2025 showed that only 9% of the total plastic produced in 2022 used recycled plastic as a feedstock (38Mt out of a total of 386Mt).³¹ The same study estimated that only 14% of the total plastic waste generated in 2022 (268Mt) was captured for recycling (nearly 40% went to landfill and another 34% was incinerated, with the balance unaccounted for). The Ellen MacArthur Foundation estimated that of the 14% captured for recycling, less than half is actually recycled and that material is invariably converted into lower-grade plastic that is not recycled after that.³²

Global packaging recycling rates by material

Data regarding recycling rates for different packaging materials is not easy to find and definitions are not always consistent.

Table 3, on the next page, summarises a variety of statistics to help compare the extent to which various packaging materials are currently being produced using recycled material as an input, and the extent to which material is being captured at the end of its life for recycling.

31. Houssini, K., Li, J., & Tan, Q. (2025). Complexities of the global plastics supply chain revealed in a trade-linked material flow analysis. *Communications Earth & Environment*, 6(1), 257. <https://doi.org/10.1038/s43247-025-02169-5>

32. World Economic Forum, Ellen MacArthur Foundation and McKinsey & Company, *The New Plastics Economy – Rethinking the future of plastics* (2016). <https://content.ellenmacarthurfoundation.org/m/1775fbba280fa21/original/The-New-Plastics-Economy-Rethinking-the-future-of-plastics.pdf>

Material category	Proportion of recycled material used as an input	Recycle rate ³³	Scope/definition
Paper & fibre / paper packaging	56%	21%	Share of recovered paper in total 'fibre furnish' production (2024); ³⁴ Proportion of paper containers and packaging captured for recycling in the USA in 2018 ³⁵
Glass packaging	33%	42%	Estimated share of recycled glass in total container glass production (2014); ³⁶ Estimated recycling rate for only glass bottles ³⁷
Aluminium cans	30%	75%	Estimated proportion of scrap aluminium in total aluminium consumed (USA, 2022); ³⁸ Estimated recycling rate for aluminium beverage cans ³⁹
Plastic / PET bottles	9%	47%	Share of recycled plastic used in global plastic production (2022); ⁴⁰ Estimated recycling rate for PET bottles ⁴¹

Table 3: Comparison of the proportion recycled material used as inputs in the production of different packaging materials (global unless otherwise indicated)

As Table 3 shows, the proportion of recycled material used as input is highest for paper and fibre, illustrating the fact that the collection of paper and cardboard for recycling is significantly more advanced in many countries than it is for other materials. However, when recycling rates for packaging materials are considered (i.e. examining end-of-life as opposed to inputs) it can be seen that paper packaging ranks the lowest. Reliable data on global recycling rates for paper-based food packaging are not available, but are likely to be even lower given the challenges presented by food contamination and thus the need to clean the material before it can be recycled.⁴²

33. Defined here as: Quantity of recycled material produced (process output) / Quantity of material placed on the market. When used to assess the effectiveness of waste management systems, the formula used is: Total material recycled (process output) / Total solid waste generated

34. FAO. 2025. Global forest products facts and figures 2024 <https://doi.org/10.4060/cd8005en>

35. <https://www.epa.gov/facts-and-figures-about-materials-waste-and-recycling/paper-and-paperboard-material-specific-data>

36. Westbroek CD, Bitting J, Craglia M, Azevedo JMC, Cullen JM. Global material flow analysis of glass: From raw materials to end of life. J Ind Ecol. 2021; 25: 333–343. <https://doi.org/10.1111/jiec.13112>

37. Global beverage recycling dataset 2025, International Aluminium Institute and Eunomia https://international-aluminium.org/wp-content/uploads/2025/11/Eunomia_IAI-Recycling-Rates-Final-Report-V6.0.pdf

38. U.S. Geological Survey, Mineral Commodity Summaries, January 2024 <https://pubs.usgs.gov/periodicals/mcs2024/mcs2024-aluminum.pdf>

39. Global beverage recycling dataset 2025

40. Houssini, K., Li, J., & Tan, Q. (2025)

41. Global beverage recycling dataset 2025

42. <https://foodpackagingforum.org/resources/food-packaging-materials-and-recycling>

The other important factor not reflected in Table 3 is the number of times something can be recycled. As noted previously, glass and aluminium can be recycled multiple times without degrading. In contrast, when paper and paper packaging is recycled the fibres break down into shorter lengths during each recycling process, with the result that there is a physical limit on the number of times wood-based products can be recycled. Plastic is similar – the Ellen Macarthur Foundation study referenced earlier estimated that c.80% of PET bottles captured for recycling are turned into polyester fibres for carpets, clothing and other non-packaging applications. These products are then generally not easily recyclable and so are sent to landfill or incineration at the end of their lives so the recycling is only a one-time event.

In addition to the recyclability of the packaging material itself, other important factors include:

- 1 the extent to which there are systems in place to collect and process the material, and
- 2 the extent to which recyclability is incorporated into the design of products (e.g., the ease with which different materials can be separated at the start of the recycling process).⁴³

These are both areas where packaging companies have a role to play.

43. <https://thecpi.org.uk/library/PDF/Public/Publications/Guidance%20Documents/Recyclability-Guidelines-2024.pdf>

Forward-looking regulations relevant to the sector

Investors can be inspired by forward-looking regulations on biodiversity to guide the transformation of the companies in their portfolio. With engagement, they can exercise influence on companies to improve their practices and be prepared in the context of a sustainable policy transition, going further than simple compliance with environmental safeguards.

In the Forestry, Paper and Packaging sector, the most forward-looking nature-related regulations have been identified in Europe and in the United States. In addition, the ongoing negotiations of the UN Plastics Treaty will likely have implications for the sector.

Europe

- [EU Circularity Action Plan](#) – this plan was issued in 2020 and sets out the EU’s ambitions ‘for a cleaner and more competitive Europe’ by establishing a ‘strong and coherent product policy framework that will make sustainable products, services and business models the norm and transform consumption patterns so that no waste is produced in the first place’. The Plan sets out an ambition for all packaging on the EU market to be reusable or recyclable by 2030.⁴⁴
- [EU Directive on single-use plastics](#) - aims to prevent and reduce the environmental impact of certain plastic products, including cotton bud sticks, cutlery, plates, straws and stirrers, food and beverage containers, plastic bags, and packets and wrappers. The Directive came into force on 3rd July 2021, with a recycling mandate taking effect on 1st January 2025. EU Member States are required to take use alternatives to Single Use Plastics (SUP) food and beverage containers where they are easily available and affordable. They must reduce the consumption of SUPs for which there is no alternative through awareness-raising, new designs, labelling, and improved waste management and clean-up obligations for producers, and report the progress made to the European Commission. Specific targets that applied from 2025 include a 77% separate collection target for plastic bottles (increasing to 90% by 2029), 25% minimum recycled content in PET⁴⁵ beverage bottles, and 30% in all plastic beverage bottles from 2030.⁴⁶
- [EU Packaging and Packaging Waste Regulation](#) (PPWR) - adopted in early 2025 and fully applicable from 12th August 2026, is a core component of the EU’s Circular Economy Action Plan. The PPWR aims to ensure that all packaging placed on the EU market is reusable, recyclable, or compostable by 2030. It replaces the previous Packaging and Packaging Waste Directive⁴⁷ and introduces mandatory design-for-recyclability criteria, recycled content targets, and packaging waste reduction goals, while also standardising Extended Producer Responsibility (EPR) systems⁴⁸ and labelling across Member States. The regulation will significantly affect packaging producers, importers, and users across the value chain in the EU. In particular, the PPWR also introduces PFAS concentration limits for food-contact packaging, effective from 12 August 2026.

44. <https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1583933814386&uri=COM:2020:98:FIN>

45. Polyethylene terephthalate is the most common thermoplastic polymer resin of the polyester family and is used in fibres for clothing, containers for liquids and foods, and thermoforming for manufacturing, and in combination with glass fibre for engineering resins

46. <https://packagingeurope.com/comment/europes-single-use-plastics-directive-what-do-we-know-so-far/12620.article>

47. Directive 94/62/EC 27

48. EPR systems are designed to hold producers financially accountable for the cost of managing their packaging and products in the waste stream

- [EU Regulation on Deforestation-free products](#) – the EUDR requires that all EU imports and exports of specific soft commodities, including wood, are deforestation-free and produced in compliance with the laws of the country of origin. Any operator or trader who places these commodities on the EU market, or exports from it, will have to be able to prove that the products do not originate from recently deforested land or have contributed to forest degradation. While the EUDR entered into force in 2023, however, its application dates have been delayed twice. The main EUDR obligations apply from 30 December 2026 for medium-sized and large operators, and from 30 June 2027 for micro/small enterprises.⁴⁹ The amended regulation differentiates between primary operators, downstream operators, and traders, placing the greatest burden on the company responsible for the first point of entry into the EU. Printed products (books, newspapers, etc) are now explicitly excluded, but other wood-derived products (including packaging) remain in scope.
- [EU Nature Restoration Law](#) (Regulation (EU) 2024/1991) creates a legally binding framework for restoration of degraded ecosystems across the EU, requiring Member States to develop national restoration plans and implement measures over 2030–2050 horizons. Member States are required to submit draft National Restoration Plans by 1 September 2026 and final plans by September 2027. This is likely to affect forestry management, land-use considerations, and biodiversity-related investment and permitting dynamics relevant to the sector.
- [Registration, Evaluation, Authorisation and Restriction of Chemicals \(REACH\)](#) – this EU law applying to the chemicals sector will also impact packaging. Under REACH, the European Chemicals Agency (ECHA) has published an updated proposal to restrict PFAS ('forever chemicals') across many uses, including packaging, sealing, and printing.⁵⁰ The EU Commission will ultimately decide on the restriction in consultation with member states. The timetable for implementation is currently unclear, but the EU Commission has indicated that packaging placed on the market before 12 August 2026 will not be required to be withdrawn.⁵¹
- [EU Corporate Sustainability Due Diligence Directive \(CSDDD\)](#) - adopted in 2024, requires large companies to identify and address potential adverse human rights and environmental impacts across their value chains. For companies operating in forestry, paper and packaging, this may include supply chain due diligence on deforestation, biodiversity and labour rights. With effect from 18 March 2026, the CSDDD was significantly amended under the EU's Omnibus I simplification package, which raised the scope thresholds to companies with more than 5,000 employees and €1.5 billion turnover, removed the mandatory climate transition plan obligation, and extended the first compliance deadline to July 2029.

49. <https://trade.ec.europa.eu/access-to-markets/en/news/delay-until-december-2026-and-other-developments-implementation-eudr-regulation>

50. <https://www.echa.europa.eu/-/echa-publishes-updated-pfas-restriction-proposal>

51. <https://www.sustainabilityinbusiness.blog/2026/03/latest-updates-on-per-and-polyfluorinated-substances-pfas-february-update/>

UK

- [UK EPR system for packaging \(administered by PackUK\)](#) – this system shifts the net cost of managing household packaging waste from local authorities to producers and introducing phased reporting and fee mechanisms. The UK government has published ongoing delivery updates and base fee information for the initial charging period.
- [UK Plastic Packaging Tax](#) – this tax was introduced in April 2022 and applies to plastic packaging containing <30% recycled plastic, with the aim of providing an economic incentive to use more recycled plastic in packaging. The rate with effect from 1 April 2026 is £228.82/tonne (rates are inflation-linked in subsequent years). Only businesses that manufacture or import 10 tonnes or more of plastic packaging within a 12-month period need to register. Businesses must register and submit quarterly returns even if all their packaging contains 30% or more recycled plastic.
- [UK Biodiversity Net Gain](#) - the UK was among the first countries to introduce legislation based on the concept of biodiversity net gain. England's biodiversity net gain regime commenced for most new planning permissions in 2024, requiring developments to deliver measurable net gains for biodiversity (at least 10%) through on-site measures, off-site units, or statutory credits. This provides an economic opportunity for forestry companies to create saleable biodiversity credits as part of their forestry management processes.⁵²

United States

- [California's Plastic Pollution Prevention and Packaging Producer Responsibility Act](#) (SB 54) - enacted in 2022.⁵³ SB 54 establishes a statewide EPR regime for packaging and single-use food service ware. It sets 2032 outcome requirements, including that covered materials sold into California be recyclable or compostable and that at least 65% of single-use plastic packaging and foodware be recycled, alongside mandatory producer funding for environmental mitigation (including \$5 billion over 10 years, starting 2027).
- [State-level EPR packaging laws](#) have been adopted by seven States (Maine, Oregon, Colorado, California, Minnesota, Maryland, and Washington). The laws cover paper and plastic consumer packaging introduced into each State, but the precise scope of the EPR law (and dates for registration, etc.) differs from State to State. In general, the EPR rules require producers to pay fees proportional to the amount and type of packaging that they introduce into the State. The fees are then used to fund the costs associated with collecting and managing the packaging waste covered by the legislation.
- [State-level PFAS in food packaging rules](#) - In a similar way, individual States are regulating with respect to PFAS in food packaging. Fourteen States have enacted laws relating to PFAS in food containers and packaging materials and a further ten have proposed bills pending. The legislation varies between States but generally bans the sale or use of food packaging that contains more than a set amount of intentionally added PFAS (e.g. 100ppm in California). Some States have taken a softer approach by allowing such sales to continue if the use of PFAS in the packaging is determined to be unavoidable by an official State regulator (e.g. Maine).

52. Biodiversity credits are a controversial topic and the discussion is beyond the scope of this Sector Brief – this paper provides a useful starting point: <https://www.cambridge.org/core/journals/oryx/article/biodiversity-credits-a-new-currency-to-support-nature-conservation/AA083D0C2C2DCA820A8C8FC666397F79>

53. <https://legiscan.com/CA/text/SB54/id/2600075>

China

To address its contribution to global plastic pollution, China has put in place an extensive range of policies over the last twenty years (one academic paper estimates 41 plastic-related policies applied in 2021).⁵⁴ The result is a significant framework of 'command-and-control measures' to address plastic pollution across the entire lifecycle of plastic products.⁵⁵

UN Plastics Treaty

- **The United Nations Environment Assembly (UNEA) Resolution “[End Plastic Pollution: Towards an international legally binding instrument](#)”**, established an [Intergovernmental Negotiating Committee](#) (INC) in March 2022 to develop an international legally binding instrument on plastic pollution, including in the marine environment, which could include both binding and voluntary approaches, based on a comprehensive approach that addresses the full life cycle of plastics (from design through production to disposal), including chemicals and polymers of concern.
- The INC held the second part of its fifth session (INC 5.2) in Geneva in August 2025. The session closed without reaching agreement on the text of a Plastics Treaty, in spite of support from the majority of member states and many businesses.⁵⁶
- INC 5.3 was held in Geneva in February 2026, however, the meeting focused on electing a new Chair and other officers, and no substantive treaty negotiations took place.⁵⁷ Steps beyond INC 5.3 are unclear, although INC 5.2 included an agreement to resume negotiations (INC 5.4) at a future (unspecified) date.

54. Fürst, Kathinka & Feng, Yidi. (2022). China's regulatory respond to plastic pollution: Trends and trajectories. *Frontiers in Marine Science*. 9. 982546. 10.3389/fmars.2022.982546.

55. This report provides a detailed summary: https://www.switch-asia.eu/site/assets/files/4516/plastic_policies_cn-2.pdf

56. For example, the Business Coalition for a Global Plastics Treaty issued a statement expressing disappointment in the outcome but support for continued efforts to agree a treaty <https://www.businessforplasticstreaty.org/latest/our-statement-on-the-inc-5-2-outcome>

57. <https://www.unep.org/inc-plastic-pollution/session-5.3>

How the sector links to the objectives of the Global Biodiversity Framework

The sustainable transformation of the companies in the Forestry, Paper and Packaging sector can contribute to halting biodiversity loss by 2030 in line with the [targets of the Global Biodiversity Framework](#) (GBF). The most relevant targets are summarised below.

Targets 1, 2 & 3 - Land Use, Sourcing, and Deforestation:

- **Issue:** Extraction of raw materials for packaging (wood, minerals, metals, fossil fuels) can drive deforestation and habitat loss, particularly in or near key biodiversity areas.
- **Classification:** *dependency* (on nature for material inputs), *impact* (via deforestation and land-use change), and *risk* (reputational and regulatory).
- **Materiality:** Companies face supply chain instability, and reputational and legal risks from sourcing in biodiversity-sensitive areas. Deforestation can also disrupt climate regulation and water cycles.
- **Framework relevance:**
 - TNFD: Nature-related dependencies and land-use transition risk
 - SBTN: Materiality linked to land-system change and nature pressure reduction

Target 4 - Threats to Species and Habitat Integrity:

- **Issue:** Pollution associated with raw material extraction, manufacturing, and end-of-life phases of packaging (e.g. mining, plastic leakage, landfill waste) can degrade habitats and threaten species survival.
- **Classification:** *impact* (on species) and *risk* (reputational and regulatory).
- **Materiality:** Improper waste disposal and unmanaged leakage (especially plastics and microplastics) are key contributors to species population declines and ecosystem degradation. These issues can also create significant legal and reputational risks.
- **Framework relevance:**
 - TNFD: Impact drivers on biodiversity state
 - SDG 14 & 15: Life below water, life on land

Target 7 - Pollution from Production and Waste:

- **Issue:** The sector contributes to air, water, and soil pollution through the use of toxic substances (e.g. PVC), emissions during production, and post-consumer waste mismanagement.
- **Classification:** *impact* (on ecosystem quality and health) and *risk* (reputational and legal).
- **Materiality:** Pollution undermines freshwater and soil health, affects human communities near operations (and further afield in the case of micro-plastics), and is subject to tightening regulations (e.g. bans on single-use plastics).
- **Framework relevance:**
 - TNFD/SBTN: Pollution as a driver of nature loss
 - SDGs: 3 (Good health), 6 (Clean water), 14, 15

Target 8 - Climate Impacts from Packaging Lifecycle:

- **Issue:** The sector emits GHGs through fossil-based plastic production, deforestation⁵⁸, and energy-intensive transport of bulky materials.
- **Classification:** *impact* (on climate) and *risk* (from climate-related regulation and transition costs).
- **Materiality:** Climate change exacerbates nature loss, increasing business exposure to physical and transitional climate and nature-related risks.
- **Framework relevance:**
 - TNFD: Cross-cutting climate-nature interactions
 - SBTi FLAG: Land-sector emissions and reductions

Target 10 - Natural Resource Dependency and Depletion:

- **Issue:** Heavy reliance on natural capital (forests, fossil fuels, minerals) makes the industry vulnerable to ecosystem degradation, overextraction, and regulatory crackdowns.
- **Classification:** *dependency* (on nature for raw inputs) and *risk* (resource volatility, reputational damage, regulation)
- **Materiality:** Unsustainable sourcing practices can lead to loss of supply, community opposition, and future cost increases.
- **Framework relevance:**
 - TNFD/SBTN: Natural capital reliance and risk mitigation

Target 15 - Nature-related Disclosure:

- **Issue:** Limited reporting on biodiversity risks, dependencies, and impacts hinders investor and stakeholder trust.
- **Classification:** *risk* (to capital access and reputation) and *opportunity* (to attract sustainability-linked finance).
- **Materiality:** Lack of transparency may lead to greenwashing claims and exclusion from nature-focused investment portfolios.
- **Framework relevance:**
 - TNFD: LEAP approach for nature-related reporting
 - CSRD/ESRS: Nature-focused disclosure requirements in the EU

Target 16 - Consumer Awareness and Sustainable Choices:

- **Issue:** Low awareness among consumers and suppliers contributes to unsustainable disposal behaviours and demand patterns.
- **Classification:** *risk* (consumer trust erosion) and *opportunity* (market positioning through sustainable branding).
- **Materiality:** Educating stakeholders fosters sustainable consumption, lowers waste leakage, and enhances company credibility.
- **Framework relevance:**
 - SBTN: Demand-side shifts
 - SDG 12: Responsible consumption and production

58. Arguably, sustainable forest management, will significantly reduce any GHG emissions by replanting to replace cut trees

Part II

Recommended Company Actions to help address Biodiversity Loss

Introduction

All companies in the Forestry, Paper and Packaging sector need to have a clear nature strategy to minimise negative biodiversity impacts and contribute to the reversal of biodiversity loss by 2030. This nature strategy should be embedded in the company's overall business and climate strategy and should encompass its supply chain as well as its direct operations. Supply chain traceability is an essential tool for companies that wish to put in place an effective nature strategy, and effective implementation will invariably require collaboration with other companies in the value chain.

The nature strategy should follow the ACT-D framework:⁵⁹ Assess, Commit, Transform, Disclose.⁶⁰

Assess

Measure and prioritise impacts and dependencies on nature to ensure the company is acting on the most material ones.

As a starting point, investors need to ensure that companies understand their supply chains' dependency and impacts on nature, as identified through a assessment of nature-related dependencies, impacts, risks, and opportunities (DIRO), conducted following the TNFD LEAP⁶¹ process.

The assessment needs to encompass biodiversity loss pressures on all relevant biomes, as well as evaluate risks and impacts across the whole supply chain, from indirect raw material and components suppliers to how consumers use and dispose of the company's products. The assessment will allow companies to identify and address the most material biodiversity risks and impacts (using tools such as ENCORE or the SBTN Materiality Screening Tool⁶²), as well as understanding its sphere of influence.

Refer to the previous discussion on impacts and dependencies to identify what might be expected for companies at particular points of the value chain.

Commit (set targets)

Set transparent, time-bound, specific, science-based targets to put the company on the right track towards operating within the Earth's limits and aligning with the Global Biodiversity Framework, with the aim of reversing nature loss by 2030.

59. Developed by a variety of organisations including the Capitals Coalition, Business for Nature, WBCSD, TNFD, Science Based Targets Network, WEF and WWF.

60. <https://capitalscoalition.org/business-actions/>

61. See TNFD's Tool catalogue for Nature-related data tools to help assess nature-related issues and aligned with the TNFD's LEAP approach. <https://tnfd.global/guidance/tools-catalogue/>

62. <https://sciencebasedtargetsnetwork.org/companies/take-action/assess/materiality-screening/>

Targets need to be ambitious (while also being achievable), set against a clear baseline, with specific cut-off dates and measurable KPIs to fulfil the company's biodiversity ambition. The targets should be based upon the company's assessment of its impacts and dependencies on nature, and should focus on the most material factors in its direct operations and those of its value chain.

The Science Based Targets Network (SBTN) provides extensive guidance for companies on how to decide which nature impacts to prioritise and how to develop, measure, set and disclose related science-based targets.⁶³

Transform (take action)

The company should design an action plan using the SBTN's AR3T Action Framework: Avoid, Reduce, Regenerate, Restore, and Transform.

Companies at the start of their nature positive journey will need to focus on avoiding and reducing their negative impacts on nature. However, more mature companies should take actions that will actually regenerate and restore nature, with the ultimate aim of acting to transform the underlying systems that are driving nature loss.

At all stages of the value chain, it is important that companies are not simultaneously supporting business associations or other lobbying efforts that act in opposition to their nature action plans, and are engaging positively with regulators and policy makers to support the transformation of the Forestry, Paper, and Packaging sector.

It is also important that the design and implementation of the plan prioritises rights-based approaches and is developed in collaboration with Indigenous Peoples and local communities when they are affected.

Companies will inevitably need to consider trade-offs when deciding what actions to take. Investors should look for clear, science-based, and evidence-backed, explanations to support such decisions.

Disclose

Track performance and publicly report material nature-related information on a regular and consistent basis.

Companies should use the overall reporting framework provided by the TNFD to guide them when compiling and reporting nature-related information, and their reporting should comply with the relevant sustainability reporting standards such as those provided by the ISSB, EFRAG, and the GRI.

63. <https://sciencebasedtargetsnetwork.org/step-up-for-nature/>

Recommended company actions

The specific actions taken by a company will depend on its position in the value chain, the nature of the products and services it provides, the inputs it depends on, and will be location-specific. However, given the most material impacts discussed earlier, it is possible to identify actions that are likely to be relevant to many companies in the sector.⁶⁴ The actions will apply to companies' direct operations and to activities across their supply chains.

The actions that are appropriate will also depend upon the company's 'maturity level'. In this Sector Brief we have used a scale from 'basic' to 'mature' summarised in Table 3 below. The levels assigned are meant as guidance only and do not represent precise classifications.⁶⁵

Maturity level	Description
Basic	This action should be within the grasp of the majority of companies.
Intermediate	This action is more likely to require a greater level of organisational maturity with respect to nature actions.
Advanced	The prioritisation of strategic actions takes place according to where the company has the most influence or impact on nature and the multiple core benefits.

Table 4: Company maturity levels. Finance for Biodiversity Foundation (2025), derived from WBCSD and Capitals Coalition

More mature companies will be able to extend their actions across the majority of their operations and a larger proportion of their supply chains than less mature companies.

The actions recommended in this Sector Brief align with actions recommended by a number of organisations. In particular, the WBCSD has produced two reports that provide helpful insights into the actions that forestry and packaging companies should take:

64. The 'Assess' and 'Commit' stages of the ACT-D framework obviously involve taking action; in addition, positive policy engagement is an essential tool that should be deployed alongside any set of actions to align with the 'Transform' element of ACT-D. These elements are not included in the action lists in this section to avoid repetition.

65. There are numerous ways to define maturity level – investors can refer to WBCSD's [Roadmaps to Nature Positive - Foundations for all businesses](#) and the Capitals Coalition [Maturity Tool](#) for further guidance.

- [Forest Sector Nature-Positive Roadmap](#) recommends actions grouped into three categories: Avoid, Reduce, Restore and Regenerate.
- [Sustainability in Packaging Holistic Evaluation for Decision-Making](#) (SPHERE) framework identifies six principles to underpin actions by packaging companies: 1) minimise the drivers of climate change; 2) optimise efficiency by considering product protection; 3) optimise circularity by promoting the use of recycled content and renewable content; 4) optimise end-of-life; 5) avoid harmful substances to limit present and future human health impacts due to leakage, ingestion and bioaccumulation; and 6) minimise the drivers of biodiversity loss, including impacts due to leakage.

The recommended actions are grouped into seven categories for ease of reference.⁶⁶

- Reduce water use and improve water stewardship;
- Reduce pollution;
- Reduce GHG emissions;
- Reduce solid waste and expand circularity;
- Reduce land-use impacts and restore ecosystems;
- Sustainable sourcing and lower-impact materials; and
- Building responsible supply chains.

The actions are shown on a heatmap to indicate:

- 1 the subsectors they are most relevant to [no colour indicates less relevance];
- 2 the likely biodiversity benefit from taking the action (higher or lower); and
- 3 the likely feasibility of the action in the near to mid-term (dependent on cost, current technology, regulatory clarity, etc).⁶⁷

Companies should prioritise more feasible actions with a high benefit to nature, as summarised in Table 5.

		Feasibility	
		'Easy'	'Difficult'
Benefit to nature	High	Priority 1 - P1	Priority 2 - P2
	Lower	Priority 3 - P3	Priority 4 - P4

Table 5: Prioritising actions (nature benefit vs feasibility).⁶⁸ Finance for Biodiversity Foundation.

⁶⁶. In practice, many actions will relate to more than one category

⁶⁷. Feasibility is estimated independent of the maturity of the company. However, more mature companies are more likely to be able to undertake actions that are judged to be less feasible ('difficult') where organisational capacity (knowledge, and resources) is an important factor. For example, creating products that are 'safe and sustainable by design' is often challenging, but mature organisations are more likely to have the capacity to achieve this due to stronger leadership, human resources, supplier relationships, etc. Conversely, some 'easy' actions will still be more challenging for organisations with lower capabilities

⁶⁸. Important caveat: the 'feasibility' of a particular action is based on broad judgements, not on detailed analysis, and changes in technologies, regulation, and other factors may significantly change the assessed feasibility of an action in the future

Reduce water use and improve water stewardship

Action	Maturity	Forestry and forest products	Paper and fibre packaging	Plastic packaging	Metal packaging	Glass packaging
Perform water scarcity risk assessments to identify vulnerabilities in water-stressed regions, prioritise actions in those locations, and prepare for potential disruptions	Basic	P1	P1	P1	P1	P1
Conduct regular audits and provide employee training	Basic	P1	P1	P1	P1	P1
Invest in water-efficient technologies and optimise processes to reduce water requirements	Basic	P2	P2	P2	P2	P2
Implement recycling and reuse systems to minimise freshwater demand	Intermediate	P3	P2	P4	P4	P4
Collaborate with stakeholders to strengthen water management practices in priority locations	Intermediate	P2	P2	P4	P4	P4
Install integrated water systems, upgrade treatment to maximise water recovery, introduce closed-loop systems and replace water-cooled with air-cooled processes where feasible	Intermediate	P3	P2	P4	P4	P3
Engage local communities and Indigenous Peoples to ensure that the company is using water in accordance with FPIC principles ⁶⁹	Advanced	P2	P2	P2	P2	P2
Replenish watersheds and remediate water stress in priority basins and supply chains	Advanced	P2	P2	P4	P4	P4

Reduce pollution

Action	Maturity	Forestry and forest products	Paper and fibre packaging	Plastic packaging	Metal packaging	Glass packaging
Ensure all facilities meet site-level emissions regulations	Basic	P3	P3	P3	P3	P3
Deploy technologies to capture and treat harmful emissions to prevent them reaching the environment	Basic	P2	P2	P2	P2	P2
Implement site-level risk assessments and end-of-life management for chemicals and by-products to mitigate ecotoxic and nutrient pollution	Basic	P1	P1	P1	P1	P1
Prevent plastic leakage from operations and supply chains (e.g., pellet/flake loss prevention, spill controls, secondary containment and rapid incident response)	Basic			P1		
Identify and manage persistent and emerging pollutants (including substitution, phase-out where feasible and loss prevention)	Intermediate → Advanced	P4	P2	P2	P2	P2
Collaborate across industry to identify and prioritise the most material and ecotoxic effluents for reduction	Advanced	P2	P2	P2	P2	P2
Partner with wastewater treatment plants to strengthen removal of ecotoxic chemicals and prevent downstream accumulation	Advanced	P4	P2	P2	P2	P2

69.FPIC – Free and Prior Informed Consent

Reduce GHG emissions

Action	Maturity	Forestry and forest products	Paper and fibre packaging	Plastic packaging	Metal packaging	Glass packaging
Increase energy efficiency in manufacturing, storage and distribution (e.g., process optimisation, heat recovery, efficient motors, and logistics improvements)	Basic	P1	P1	P1	P1	P1
Use product-level life-cycle assessment (LCA) to identify priority areas for emission reduction	Basic	P1	P1	P1	P1	P1
Expand the use of renewable energy, electrification and low-carbon feedstocks to reduce fossil fuel dependency	Intermediate	P2	P1	P2	P2	P2
Adopt green chemistry techniques to reduce emissions intensity in manufacturing	Advanced			P2		

Reduce solid waste

Action	Maturity	Forestry and forest products	Paper and fibre packaging	Plastic packaging	Metal packaging	Glass packaging
Enhance material efficiency by maximising yield, adopting continuous manufacturing and redesigning product systems to minimise waste	Basic	P1	P1	P1	P1	P1
Work with recyclability standard-setters and regulators to ensure comprehensive guidance and enable timely adoption	Basic	P1	P1	P1	P1	P1
Review and redesign product packaging and components to reduce material use, increase recycled content and move away from virgin plastics and paper	Basic		P1	P2	P1	P1
Eliminate unnecessary or problematic packaging formats/materials and standardize towards recyclable designs (e.g., mono-materials, avoid problematic additives)	Basic		P1	P1	P1	P1
Support circularity-friendly policies by working with policymakers on waste-reduction initiatives	Intermediate	P2	P2	P2	P2	P2
Minimise hazardous waste generation, implement closed-loop systems and invest in recycling infrastructure	Intermediate	P3	P2	P2	P3	P3
Scale reuse/refill/return packaging models where viable (including pooled systems and reverse logistics)	Intermediate		P2	P2	P2	P2
Strengthen collection, sorting and recovery systems (e.g., EPR/DRS participation, infrastructure investment and offtake agreements for recyclate)	Intermediate	P2	P2	P2	P2	P2
Increase recycled content and closed-loop sourcing (fibre, polymers, aluminium/steel, glass cullet) with quality, safety and performance controls	Intermediate		P2	P2	P2	P2
Collaborate across the value chain to design out waste and promote circular business models	Advanced	P2	P2	P2	P2	P2

Reduce land-use impacts and restore ecosystems

Action	Maturity	Forestry and forest products	Paper and fibre packaging	Plastic packaging	Metal packaging	Glass packaging
Adopt procurement approaches requiring deforestation- and conversion-free sourcing and sustainable forest management (e.g., FSC/PEFC and AFI-aligned requirements) for land-based inputs	Basic	P1	P1	P3	P3	P3
Ensure site selection and raw material sourcing respects Indigenous and local community rights and is supported by FPIC	Basic	P2	P2	P4	P4	P4
Integrate biodiversity into site selection and planning; use spatial planning tools (e.g. IBAT) to avoid Key Biodiversity Areas	Intermediate	P2	P2	P4	P4	P4
Support ecosystem conservation and restoration within and beyond value chains, and advocate for progressive nature-positive policy	Advanced	P2	P2	P2	P2	P2

Sustainable sourcing and lower impact materials

Action	Maturity	Forestry and forest products	Paper and fibre packaging	Plastic packaging	Metal packaging	Glass packaging
Identify key material inputs (fibre, polymers, metals, glass, chemicals/additives) and evaluate nature-related impacts and risks (land use, water, pollution and biodiversity)	Basic	P1	P1	P1	P1	P1
Require responsible sourcing of raw materials, including certification where available and compliance with Access & Benefit Sharing rules	Basic	P1	P1	P2	P2	P2
Improve supply chain traceability, ideally to raw-material level	Intermediate	P1	P2	P2	P2	P2
Reduce dependency on high-impact commodities such as petrochemicals and virgin plastics	Advanced	P2	P2	P2		
Develop lower-toxicity, biodegradable and “safe-and-sustainable-by-design” products	Advanced	P3	P3	P2	P3	P3

Building responsible supply chains

Action	Maturity	Forestry and forest products	Paper and fibre packaging	Plastic packaging	Metal packaging	Glass packaging
Include human rights safeguards in supplier agreements, aligned with the UN Guiding Principles on Business & Human Rights	Basic	P1	P1	P1	P1	P1
Support supplier capacity building through training, joint improvement plans and knowledge-sharing	Intermediate	P2	P2	P2	P2	P2
Enhance supply chain transparency by mapping to lower-tier suppliers and identifying critical raw material sources	Intermediate	P2	P2	P2	P2	P2
Integrate environmental stewardship requirements into supplier contracts (e.g. GHG reduction, water efficiency, pollution control)	Intermediate	P1	P1	P2	P2	P2
Work with suppliers to ensure nature and climate plans incorporate just transition principles	Advanced	P2	P2	P2	P2	P2

Part III

Finance for Biodiversity Foundation's Call to Action: Questions for Investors to Engage Companies on Nature

As investors enter into engagements with companies from the Forestry, Paper and Packaging sector, we propose the list of questions below to evaluate companies' performance and push for more ambitious actions. The questions have been organised following the structure of the [Nature Action 100 Investors Expectations](#), covering ambition, assessment, targets, implementation, governance and engagement with stakeholders.

A number of the questions are cross-sectoral and have been applied across all of our briefs. **The questions coloured in blue are specific to the sector focus of this particular brief.** The questions are divided into those that are likely to be answered in company reports (assuming adequate disclosure), and those that are more likely to be answered during the engagement process.⁷⁰

The relevance of a question to a particular part of the sector has been indicated using icons.



Forestry



Fibre



Plastic



Metal



Glass



70. The extent to which questions can be answered from company reports is a potential indicator of the company's maturity



Forestry



Fibre



Plastic



Metal



Glass

1. Ambition

Companies need to publicly commit to minimise contributions to key drivers of nature loss and to conserve and restore ecosystems at the operational level and throughout value chains by 2030.

Disclosure-based questions (from reports)

- | | |
|--|---|
| <p> 1A Does the company publicly commit to minimising contributions to key drivers of nature loss and to conserving and restoring ecosystems across its operations and value chain by 2030?</p> <p> 1B How is nature integrated and positioned within the company's overall sustainability strategy?</p> <p> 1C Has the company committed to reporting regularly on nature using frameworks such as TNFD?</p> | <p> 1D Has the company publicly committed to achieving deforestation- and conversion-free fibre supply chains?</p> <p> 1E Has the company committed to transitioning to circular packaging systems that prioritise reuse, recyclability, and increased recycled material content?</p> <p> 1F Has the company committed to producing packaging that is biodegradable?</p> <p> 1G Has the company committed to establishing or participating in take-back or deposit schemes?</p> |
|--|---|

Potential follow-up questions (for engagement interactions)

- | | |
|---|--|
| <ul style="list-style-type: none"> ● How does the company define success in achieving its nature commitments by 2030? ● How are nature considerations integrated into long-term strategy and capital allocation decisions? ● How does the company balance growth objectives with the need to reduce impacts on ecosystems? | <ul style="list-style-type: none"> ● What are the biggest barriers to achieving deforestation- and conversion-free fibre supply chains? ● How is the company approaching the transition toward circular packaging systems across its product portfolio? ● What are the company's ambitions to move away from non-bio-based products to bio-based? |
|---|--|



Forestry



Fibre



Plastic



Metal



Glass

2. Assessment

Companies need to assess and publicly disclose nature-related dependencies, impacts, risks, and opportunities at the operational level and throughout value chains.

Disclosure-based questions (from reports)

- | | |
|--|---|
| <p> 2A Does the company disclose priority locations under TNFD for its direct operations and, where material, for upstream and downstream activities in its value chain?</p> <p> 2B What proportion of the supply chain can the company trace (including Tier 1 suppliers and beyond)?</p> <p> 2C Does the company disclose the proportion of wood fibre sourced from certified forests (e.g., FSC or PEFC) and the production unit origin of this fibre?</p> <p> 2D Does the company disclose the proportion of wood fibres that are deforestation- and conversion-free?</p> <p> 2E Does the company disclose recycled content levels for packaging materials such as fibre, plastics, metal, or glass?</p> | <p> 2F Does the company disclose water withdrawal, consumption, and discharge data for pulp, paper, metal, and glass manufacturing facilities?</p> <p> 2G Does the company measure and disclose existing biodiversity on managed lands or sourcing landscapes and how it trends over time?</p> <p> 2H Does the company measure and disclose habitat quality and ecosystem function on managed lands or priority sourcing regions?</p> <p> 2H 2.I. Does the company disclose High Conservation Value/High Conservation Priority locations (including the area set aside) and report management outcomes (connectivity, monitoring results)?</p> |
|--|---|

Potential follow-up questions (for engagement interactions)

- | | |
|---|--|
| <ul style="list-style-type: none"> ● Which regions or operations pose the greatest nature-related risks to the business? ● How frequently are nature-related risk assessments updated and reviewed by management? ● What tools or methodologies does the company use to assess nature dependencies? ● How does the company monitor biodiversity in its forests (including habitat quality, soil integrity, etc)? ● Which sourcing regions present the highest deforestation or ecosystem conversion risk for fibre inputs, and what steps is the company taking to mitigate risk in these regions? | <ul style="list-style-type: none"> ● How does the company verify that products are deforestation and conversion-free? ● How does the company assess the biodiversity risks of fibre sourcing in the context of local regulation and enforcement (i.e., jurisdictional risk assessment beyond certification labels)? ● What proportion of packaging materials sold by the company is actually recycled in the markets where they are used? |
|---|--|



Forestry



Fibre



Plastic



Metal



Glass

3. Targets

Companies need to set time-bound, context-specific, science-based targets informed by risk assessments on nature-related dependencies, impacts, risks and opportunities, and disclose annual progress against targets.

Disclosure-based questions (from reports)

 3A Has the company published science-based targets on nature with baselines, milestones, and transparent methodologies?	 3F Has the company set targets to reduce GHG emissions from production processes including pulp mills, furnaces, and packaging manufacturing?
 3B Has the company set time-bound targets to eliminate deforestation and ecosystem conversion from fibre sourcing across its operations and supply chain?	 3G Has the company set targets to increase the share of wood fibre issued from sustainably managed forests (e.g., FSC or PEFC)?
 3C Has the company set targets to increase recycled material content (e.g., recycled fibre, recycled polymers, aluminium scrap, or glass cullet)?	 3H Has the company set targets to maintain or improve ecosystem condition on managed lands (e.g., no net soil degradation, regeneration success, watershed integrity) with baselines, milestones and annual disclosure?
 3D Has the company set targets to eliminate plastic leakage and pellet loss across its operations and supply chain?	 3I Has the company set outcome-based “nature-positive” targets for restoration or net improvement (linked to priority locations), and disclosed methodology including realistic benchmarks/counterfactuals?
 3E Has the company set targets to reduce water consumption and improve wastewater quality in production processes?	 3J Has the company set a target to phase out or reduce the use of virgin fossil fuel as feedstock?

Potential follow-up questions (for engagement interactions)

- How were the company’s nature-related targets determined and what scientific frameworks informed them?
- What milestones will indicate that the company is on track to achieve its nature commitments?
- What internal incentives exist to ensure business units meet nature-related targets?
- What proportion of fibre sourcing is currently verified as deforestation-free, and what are the company’s plans for scaling this to 100% or keeping this at 100%?
- What are the main technical or economic barriers to increasing recycled content in packaging materials?
- What measures are being taken to eliminate plastic leakage or pellet loss across the supply chain?
- Where relevant, what science-based outcome metrics (e.g., IUCN STAR or equivalent) does the company use to quantify contributions to reducing extinction risk?



Forestry



Fibre



Plastic



Metal



Glass

4. Implementation

Companies need to develop a company-wide plan on how to achieve targets. The design and implementation of the plan should prioritise rights-based approaches and be developed in collaboration with Indigenous Peoples and local communities when they are affected. Progress against the plan should be disclosed annually.

Disclosure-based questions (from reports)

- | | |
|---|---|
| <p> 4A Does the company have a Nature Action Plan linked to its impact and dependency assessments?</p> <p> 4B What processes ensure traceability of fibre sourcing to forest origin and prevent sourcing from deforested or converted land?</p> <p> 4C What steps is the company taking to redesign packaging to improve recyclability, reuse, or material efficiency?</p> | <p> 4D How is the company supporting collection, recycling, and recovery systems for packaging materials in key markets?</p> <p> 4E What measures are in place to increase the use of recycled inputs packaging materials?</p> <p> 4F What actions are being taken to reduce pollution and improve wastewater treatment from pulp and paper manufacturing operations?</p> |
|---|---|

Potential follow-up questions (for engagement interactions)

- | | |
|--|--|
| <ul style="list-style-type: none"> What investments are planned over the next five years to reduce the company's impact on nature? How does the company ensure operational teams implement nature-related commitments in practice? What partnerships are in place to support ecosystem restoration or conservation projects? How does the company verify that suppliers comply with fibre sourcing policies? What steps is the company taking to ensure that its actions are eliminating deforestation and not pushing it into other areas? What packaging redesign initiatives are underway to reduce material use, improve recyclability, and/or biodegradability? | <ul style="list-style-type: none"> How does the company support recycling infrastructure or waste collection systems in key markets? What steps are being taken to increase the use of recycled inputs such as PET, cullet or metal scrap? To what extent does the company strategy incorporate a move away from non-bio-based materials? How does the company manage biodiversity at landscape scale (age-class mosaic, corridors, riparian buffers, connectivity), rather than only 'stand-level' measures? How does the company identify and mitigate leakage risk (e.g., if local supply is reduced, does procurement shift to higher-risk regions) and how does it apply avoided-impact logic? |
|--|--|



Forestry



Fibre



Plastic



Metal



Glass

5. Governance

Companies need to establish Board oversight⁷⁰ - which is key to ensuring biodiversity is embedded in strategic decisions and implementation - and disclose management's role in assessing and managing nature-related dependencies, impacts, risks, and opportunities.

Disclosure-based questions (from reports)

- | | |
|---|---|
| <p> 5A What governance structures ensure the achievement of the company's nature commitments and targets?</p> <p> 5B Does the Board oversee nature-related dependencies, impacts, risks, and opportunities?</p> | <p> 5C Are procurement policies aligned with requirements for certified fibre sourcing and responsible raw material supply chains?</p> |
|---|---|

Potential follow-up questions (for engagement interactions)

- | | |
|--|--|
| <ul style="list-style-type: none"> ● How often does the board review nature-related risks and progress toward environmental targets? ● How are nature-related KPIs incorporated into executive performance evaluation? | <ul style="list-style-type: none"> ● What governance mechanisms ensure accountability for sustainability commitments? ● How does the procurement process ensure compliance with certified fibre sourcing requirements? |
|--|--|

⁷¹ Board oversight involves the continual inquiry by directors into whether the board's delegation of authority to management is reasonable, and whether the board has received sufficient and accurate information from management to make that determination. See: <https://corpgov.law.harvard.edu/2022/01/05/board-oversight-key-focus-areas-for-2022/>



Forestry



Fibre



Plastic



Metal



Glass

6. Engagement with Stakeholders

Companies need to engage with external parties, including actors throughout value chains, trade associations, policymakers, and other stakeholders, to create an enabling environment for implementing the plan and achieving targets.

Disclosure-based questions (from reports)

- | | |
|---|---|
| <p> 6A Has the company published a sustainable procurement code or policy?</p> <p> 6B To what extent does the company participate in collective initiatives to improve sustainability performance and environmental outcomes?</p> | <p> 6C How does the company engage suppliers to eliminate deforestation from fibre supply chains?</p> <p> 6D How does the company collaborate with governments, recyclers, and waste management providers to strengthen packaging collection and recycling systems?</p> |
|---|---|

Potential follow-up questions (for engagement interactions)

- | | |
|---|---|
| <ul style="list-style-type: none"> How does the company collaborate with suppliers to reduce environmental impacts across the value chain? What role do partnerships with governments or NGOs play in achieving nature-related goals? How does the company engage with local communities affected by its operations? What support is the company providing to assist suppliers in eliminating deforestation from fibre supply chains? | <ul style="list-style-type: none"> What procurement and supplier engagement mechanisms ensure sustainable fibre sourcing beyond certification, including audits, grievance mechanisms and corrective action plans? How does the company collaborate with recyclers, governments, and waste management companies to improve recycling systems? What demand or pressure is coming from customers to move towards more nature-friendly practices? |
|---|---|

Supporting Resources for Company Analysis

This section provides various supporting tools in the form of recommended resources and collaborative engagements covering issues in the sector, as well as sector-specific and cross-sectoral data sources. These supporting tools help to access more information and build further knowledge to mobilise when engaging with companies: examples of KPIs to monitor, additional resources, existing collaborative investor engagements on key topics for the sector, and data sources.

Recommended resources

We recommend the following resources to help investors gather more information about the sustainable transformation of the sector toward the protection of biodiversity:

- TNFD's [Additional sector guidance: Forestry, pulp and paper](#) provides sector-specific additional guidance covering assessment and disclosure of nature-related issues and metrics.
- The [New Plastics Economy](#) by the Ellen MacArthur Foundation is a vision of a circular economy for plastic, where plastic never becomes waste. It offers a root cause solution to plastic pollution with profound economic, environmental, and societal benefits.
- The [Forest Stewardship Council](#) (FSC) sustainable forestry standards translate into tangible actions that make a positive impact on the world's forests. This certification system verifies sustainable sourcing of forest products and ecosystem services at every step of the value chain, from forest to consumer. The most visible symbol of certification is the FSC label, which can be found on [millions of products](#) and is widely recognised by consumers around the world.
- The [Sustainability in Packaging Holistic Evaluation for Decision-Making \(SPHERE\)](#) framework was conceptualised to support decision-making for packaging strategies spanning company departments. The framework collects all the aspects required to evaluate packaging from an environmental sustainability perspective and distils an approach that facilitates a holistic assessment.
- [Planet Tracker](#) has published a number of detailed reports on the environmental harms and unsustainable business practices within the plastics value chain (including plastic packaging manufacturers), as well as a report on '[The Plastic Recycling Deception](#)'.
- PRI's [Guide to investor engagement on plastic packaging: containers and packaging producers](#) aims to equip investors with the information they need to constructively engage with companies in the plastic packaging value chain on the issue of plastic waste and pollution, focusing on the Forestry, Paper and Packaging sector.
- WBCSD's [Forest Sector Nature-Positive Roadmap](#) aims to offer a shared definition of nature-positive for the forest sector as a bedrock for subsequent guidance and tools to support forest companies in the implementation of nature-positive strategies.
- WWF's '[Everything from Wood](#)' report examines in detail the extent to which wood can be used to support the transition from a fossil-based economy to a bio-economy. It examines the trends relating to global forests and production and consumption of wood products, and sets out the key issues (particularly consumption) that need to be considered when developing a benchmark for sustainable wood consumption within planetary boundaries.

Collaborative investor engagements covering issues in the sector

In its [Guide on Engagement with Companies](#), the FfB Foundation built an [Overview of biodiversity-related collaborative engagements](#), to help investors discover engagement initiatives relating to the Forestry, Paper and Packaging Sector that they can join.

- [Deforestation Investor Group](#) – launched by IIGCC in January 2026 to build on the foundations laid by the [Finance Sector Deforestation Action](#) (FSDA) which concluded its mandate at the end of 2025. DIG provides capacity-building, tools, and peer learning to support investors wherever they are on their journey to address deforestation and land use change.
- Ceres: [Valuing Water Finance Initiative](#) - The Valuing Water Finance Initiative is a global investor-led effort to engage companies with a high water footprint to value and act on water as a financial risk and drive the necessary large-scale change to better protect water systems.
- PRI: [Spring, a stewardship initiative on Nature](#) - The initiative aims to maximise the investment community's contribution to the global goal of halting and reversing biodiversity loss by 2030, including commodity-driven deforestation.
- [Investor Policy Dialogue on Deforestation \(IPDD\)](#): An investor-led sovereign engagement initiative, focusing on public policy, that aims to halt deforestation in the most vulnerable biomes of the world.

Sector-relevant sustainability initiatives

When assessing companies in the sector, investors can also refer to various sustainability initiatives that are relevant for companies in the Forestry, Paper and Packaging sector. These not only demonstrate what is already happening within and among companies in the sector, but it also shows the level of ambition that is needed from the companies that investors are engaging with to effectively halt and reverse biodiversity loss.

Examples of relevant commitments and initiatives for companies in the Forestry, Paper and Packaging sector

- Forest Stewardship Council (FSC): [Forest Management Certification](#) and [Chain of Custody Certification](#) are globally recognised standards that demonstrate responsible forest management and traceability of forest-based products. They provide assurance to investors and customers that operations preserve biodiversity, water quality, and ecosystem integrity.
- [Programme for the Endorsement of Forest Certification \(PEFC\)](#): an umbrella organization endorsing national forest certification systems that have been developed through multi-stakeholder processes and tailored to local priorities and conditions.
- [Sustainable Forestry Initiative \(SFI\)](#): SFI is a non-profit organisation providing standards and education to promote sustainable forestry. SFI works with the forest sector, brand owners, conservation groups, resource professionals, landowners, educators, local communities, Indigenous Peoples, governments, and universities. SFI's certifications cover 150 million hectares of forests and the SFI Fiber Sourcing Standard covers over 11 billion cubic feet of wood fiber procured through certified mills.

- [Accountability Framework Initiative](#): offers a roadmap for achieving ethical supply chains that protect forests, natural ecosystems, and human rights, and gives consensus-based guidelines for companies in the agriculture and forestry sectors. They have published an explainer on [setting and implementing no-deforestation commitments under SBTi FLAG](#).
- [4evergreen](#) is a cross-industry alliance of over 100 members representing the entire lifecycle of fibre-based packaging – from forests to producers, designers, brand owners and recyclers. Their goal is to reach a 90% recycling rate for fibre-based packaging by 2030.
- The Science-based targets for Nature ([SBTN](#)) [Forest, Land and Agriculture climate targets \(FLAG\)](#) provide guidance for companies in land-intensive sectors setting science-based targets to reduce their emissions and enhance carbon removals. on setting scientific land targets.
- Led by the Ellen MacArthur Foundation, the [New Plastics Economy Global Commitment](#) united more than 500 organisations behind a common vision of a circular economy for plastics. Driven by the goal of tackling plastic pollution at its source, companies representing 20% of all plastic packaging produced globally committed to ambitious 2025 targets to help realise that common vision. The Global Commitment has now been superseded by the [2030 Plastics Agenda for Business](#). The Agenda focuses on plastic packaging and offers an ‘evidence-based, practical 2030 agenda for business to tackle plastic waste and pollution. It looks beyond companies’ efforts on their own footprints, to how they can collectively shape wider market conditions.’⁷²

Leading sustainability initiatives in the Container and Packaging sector

- The [Business Coalition for a Global Plastics Treaty](#) brings together businesses and financial institutions committed to supporting the development of an ambitious, effective and legally binding UN treaty to end plastic pollution. The coalition is convened by the Ellen MacArthur Foundation and WWF, in collaboration with aligned businesses and supported by strategic NGO partners.
- The [Food & Beverage Carton Alliance](#) formed through the merger of ACE (The Alliance for Beverage Cartons and the Environment) and EXTR:ACT in January 2025. This new body aims to strengthen the role of beverage cartons as essential, renewable, and circular packaging solutions. The FBCA seeks to unite carton manufacturers and board suppliers in a global effort to enhance food safety, reduce waste, and support low-carbon circular economies.
- Canopy’s [Pack4Good](#): a collaborative initiative encouraging companies in the packaging sector to scale solutions that reduce waste, mitigate supply chain risk, and protect critical and endangered forests.
- The [Sustainable Packaging Coalition](#) is a membership-based collaborative with over 500 members. The SPC’s mission is to bring sustainable packaging stakeholders together to catalyse actionable improvements to packaging systems and lend an authoritative voice on issues related to packaging sustainability.

72. <https://content.ellenmacarthurfoundation.org/m/2e6a5f376f0b0af9/original/2030-Plastics-Agenda-for-Business-4th-Nov.pdf>

Sector-specific and cross-sectoral data

Investors looking for data specific to the Forestry, Paper and Packaging Sector can turn to the following sources:

- [Plastic Risk Dashboard](#) - Planet Tracker measured the risk as perceived by corporate management by scrutinising management filings and statements from 2018 to 2022. They analysed 8,245 reports and transcripts of 59 corporates across the plastic value chain by using a natural language processing (NLP) algorithm.
- Open Oceans is empowering global communities through sharing and visualising accurate information and solutions, starting with ocean plastic with the map of [coastal areas pervasively fouled by plastic](#).
- The [Understanding Packaging](#) (UP) Scorecard by the Food Packaging Forum measures commonly used foodware and food packaging materials with a single yardstick to offer the first-ever, free, and comprehensive tool for making sustainable purchasing decisions for these products based on the latest available science. Scores are provided for plastic pollution, chemicals of concern, climate, water use, sustainable sourcing, and recoverability.
- The [EcoPaper Database \(EPD\)](#) developed by Canopy is a listing of over 1,100 paper and paper packaging options available to help businesses reduce their impact on ancient and endangered forests.
- Environmental Paper Network has produced an interactive [EPN Pulp Mills Capacity Expansion Map](#), identifying the location of significant paper mills in relation to areas of deforestation fronts and Intact Forest Landscapes.
- [Global Forest Watch](#) provides data and maps giving near real-time information on forest change, including deforestation.
- [Forest Clarity](#) provides tools and information to inform investor engagement around forest degradation linked to the forestry, paper and pulp industries.

For cross-sector information, we recommend turning to the following data sources:

- [Aqueduct Water Risk Atlas tool](#) - Managed by the World Resources Institute, Aqueduct's tools use open-source, peer-reviewed data to map water risks such as floods, droughts, and stress. It helps to analyse water risks and identify activities that withdraw and consume water in locations with very high baseline water stress.
- Carbon Disclosure Project or [CDP](#) (Forest, Land, Water) provides companies, investors, states, and regions with opportunities to measure and manage their nature-related dependencies, impacts, risks and opportunities. Companies can [disclose their environmental data](#) and investors can [sign up](#) to request this data.
- Exploring Natural Capital Opportunities, Risks and Exposure ([ENCORE](#)) is a free, online tool that helps organisations explore their exposure to nature-related risk and take the first steps to understand their dependencies and impacts on nature.

Part IV

- [Forest 500](#) by Global Canopy ranks the 500 ranking the most influential companies driving tropical deforestation.
- The Global Biodiversity Information Facility ([GBIF](#)) is an international network and data infrastructure funded by the world's governments and aimed at providing anyone, anywhere, open access to data about all types of life on Earth.
- [IBAT Alliance](#) – the Integrated Biodiversity Assessment Tool (IBAT) provides authoritative geographic information about global biodiversity.
- The [SBTN Natural Lands Map](#) of “Core Natural Lands” is intended to be used in the Science Based Targets Network target on ‘no conversion of natural ecosystems’.
- [WWF Biodiversity Risk Filter](#) - Corporate and portfolio-level screening tool to help companies and investors to prioritise action on what and where it matters the most to address biodiversity risks.
- WWF [Water Risk Filter](#) - Corporate and portfolio-level screening tool to help companies and investors to prioritise action on what and where it matters the most to address water risks.



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Original version

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Expert review

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Join the Finance for Biodiversity Foundation

This publication is one of the many practical guides developed by the Finance for Biodiversity (FfB) Foundation in collaboration with its members, to support financial institutions on their journey towards fully integrating nature into their businesses. FfB Foundation membership allows financial institutions to take part in our active working groups which bring together leading banks, investors and insurers to independently share perspectives and best practices. The many guidance documents we produce are the result of these collaborations. We welcome all financial institutions to join the Foundation and fast track alignment of their financial activities and investments with nature recovery. There are now two options to work with us: membership and Hub participation. Visit [Finance for Biodiversity Foundation | Join us](#) to find out more.

Appendix 1

ENCORE Impacts Database – Forestry, Paper and Packaging

Below are listed the main potential impacts and dependencies identified in [ENCORE](#) for the Forestry, Paper and Packaging sector (on a scale from Very Low to Very High materiality). Impacts and dependencies where the ENCORE result is Medium or below have been excluded.

ENCORE sets out how the economy - sectors, subsectors and activities - depends and impacts on nature. Financial institutions in particular can use data from ENCORE to identify nature-related risks they are exposed to through their lending, underwriting and investment in high-risk industries and sub-industries.

ENCORE Potential Impacts Database

Disturbances: **HIGH**

- Logging and silviculture activities (e.g., tree thinning or transplanting) generate prolonged periods of intense noise, which can disturb local species and lead to habitat avoidance or temporary abandonment.
- Manufacturing of wood, cork, straw and plaiting materials also carries similar risks.

Emission of non-GHG air pollutants: **VERY HIGH / HIGH**

- Logging releases pollutants from heavy machinery, including NO_x, N₂O, SO₂, and CO, contributing to acidification and smog.
- Fertilisers and pesticides in managed forests release air pollutants.
- Pulp mills emit large volumes of VOCs and particulates, contributing to air, water, and land pollution and are rated High for this potential impact.

Emissions of toxic pollutants to water and soil: **VERY HIGH / HIGH**

- Herbicide and pesticide use in managed forests leads to water contamination. Rated High.
- Discharges from plastics and aluminium packaging manufacturing can introduce toxic chemicals (e.g., solvents, acids, colourants) into water bodies, harming aquatic species and altering water chemistry. Rated Very High.

Solid Waste: **HIGH**

- Manufacturing of paper and paper products generates large volumes of potentially hazardous solid waste, including toxic sludge from production processes.

Emissions of nutrient pollutants to water and soil: **VERY HIGH**

- Nutrient runoff from fertilisers (nitrates and phosphates) in managed forests can cause eutrophication in nearby water bodies, threatening aquatic species.

Introduction of invasive species: **HIGH**

- Introduction and spread of non-native species through silviculture activities (e.g., tree planting for specific purposes (e.g. feedstock for paper or biofuel), improper waste disposal, contaminated machinery) can undermine forest biodiversity and ecosystem integrity. This is a particular risk when specific tree species are desired.

2. ENCORE Dependencies Database

The manufacturing activities in the forestry, paper and packaging sector all have ratings of Medium or lower across all the dependencies analysed in ENCORE and so are not discussed in this Appendix.

Many of the nature dependencies analysed in ENCORE are both important to the wellbeing of forestry activities (logging and silviculture) and also are ecosystem services provided by the forests themselves. This feedback loop provides a strong incentive to forestry companies to manage their forestry assets in a sustainable fashion, since failure to do so can have direct (negative) economic consequences.

Water Supply: **HIGH**

- Forestry sector operations such as silviculture, and forestry support services depend heavily on ecosystems for reliable, high-quality water supply. Water flow regulation and purification services are essential for sustainable operations, particularly where water is used for irrigation, processing, and facility maintenance.

Biomass Provisioning Services: **VERY HIGH**

- Logging and silviculture are directly dependent on ecosystems for timber and fibre. Over-extraction can threaten ecosystem regeneration, making sustainable harvesting practices essential to avoid long-term supply risk.

Genetic Material Services: **VERY HIGH**

- Silviculture and forestry activities rely on access to genetic diversity in trees and plants for breeding, adaptation, and resilience. This dependency is critical for developing robust strains and adapting to environmental stressors, especially in the face of climate change.

Global Climate Regulation: **VERY HIGH**

- Silviculture depends on global climate regulation by ecosystems to mitigate climate change, maintain the climatic conditions necessary for the cultivation of woodlands, and reduce the frequency and intensity of major climate events that could damage the cultivation site, buildings or infrastructure.

Water Purification: VERY HIGH

- Forest ecosystems help remove pollutants and maintain water quality. Activities like silviculture and forest product gathering depend on this function to sustain the healthy hydrological systems required to support tree growth.

Water Flow Regulation: HIGH

- Forestry operations rely on ecosystems to regulate stream flows and water tables. This helps prevent droughts or floods, ensuring stable supply and reducing risks such as fire.

Rainfall Pattern Regulation (Sub-continental Scale): VERY HIGH

- Silviculture and other forestry activities are dependent on rainfall pattern regulation by ecosystems to ensure sufficient levels of rainfall for productive cultivation and to reduce fire risk. In turn, forest vegetation plays a vital role in maintaining regional rainfall through evapotranspiration. Deforestation or forest degradation can disrupt local and regional precipitation cycles, increasing the risk of drought or reduced productivity.

Local Climate Regulation: VERY HIGH

- Silviculture and other forestry activities depend on the capacity of ecosystems to regulate the microclimate in the locations of silviculture activities (e.g. stabilising local temperatures, regulating local humidity levels), providing stable conditions for tree growth and supporting worker welfare and efficiency by mitigating the effects of extreme heat.

Soil Quality Regulation: VERY HIGH

- Soil fertility and decomposition of organic material are essential to forest health. Forestry activities like planting and harvesting rely on ecosystems to maintain productive soils, which underpin both short-term yields and long-term ecosystem viability.
- This is rated as High for Logging.

Soil and Sediment Retention: VERY HIGH

- Logging and other forestry practices depend on the stabilising effect of vegetation to prevent erosion and landslides. This is essential for maintaining site integrity, reducing disaster risk, and ensuring operational continuity in hilly or degraded terrain.

Flood Mitigation: HIGH

- Forest vegetation and soil structure reduce the severity of river flooding, protecting infrastructure and communities near forestry operations as well as the forestry operations themselves. This helps lower physical risks and insurance costs for businesses operating in flood-prone areas.

Biological Control Services: **HIGH**

- Logging and silviculture depend on biological pest control to maintain conditions for tree growth, to enable the maintenance of wood condition, and to reduce diseases. Natural pest control reduces the need for chemical inputs and mitigates associated health and environmental risks.

Nursery Population & Habitat Maintenance: **HIGH**

- Forestry depends on ecosystems to sustain breeding grounds and habitats for both commercial and ecologically important timber species. Healthy forest ecosystems are essential for natural regeneration, species diversity, and long-term resource availability.

Air Filtration: **HIGH**

- Forests filter airborne pollutants, supporting air quality and reducing exposure risks for workers and nearby communities. Logging operations depend on this function to maintain a safe working environment.



Appendix 2

Comparing different economic classification systems

Table 1 below presents the different classifications and scope of the Forestry, Paper and Packaging sector that have been developed by various actors operating in this space. These systems and their accompanying codes per sector are meant to help investors manage and track the progress of the companies in their portfolio as well as determine which specific type of activities the companies in their portfolio are involved in; and, thus, the biodiversity risks, impacts and dependencies they face. Indeed, it is particularly important for investors engaging with companies to know this information so that they can be aware of the companies' economic sector's supply chains and also be able to understand where the impacts are occurring and which actors can have the most influence to transform practices for the overall processes in the sector.

Global Industry Classification Standard ⁷³ (GICS) Level 3	151030 – Containers & Packaging 15105010 – Forest products
International Standard Industrial Classification ⁷⁴ (ISIC)	A2_21 - Silviculture and other forestry activities A2_22 - Logging A2_24 - Support services to forestry C16 - Manufacture of products of wood, cork, straw and plaiting materials (ex furniture) C17 - Manufacture of paper and paper products C22_222 - Manufacture of plastics products C23_231 - Manufacture of glass and glass products C25_259 - Manufacture of other fabricated metal products
Nomenclature of Economic Activities ⁷⁵ (NACE)	A2.1 – Silviculture and other forestry activities A2.2 - Logging A2.4 - Support services to forestry C16 – Manufacture of products of wood, cork, straw and plaiting materials (ex furniture) C17 - Manufacture of paper and paper products C22.22 - Manufacture of plastic packing goods C25.92 - Manufacture of light metal packaging
Sustainable Industry Classification System ⁷⁶ (SICS)	Containers & Packaging Forestry Management Pulp & Paper Products

Table 6: Classification and scope of the Forestry, Paper and Packaging Sector

^[1] The Global Industry Classification Standard (GICS) is an industry taxonomy developed in 1999 by MSCI and Standard & Poor's (S&P) for use by the global financial community.

^[1] The International Standard Industrial Classification of All Economic Activities (ISIC) is the international reference classification of productive activities.

^[1] The Statistical Classification of Economic Activities in the European Community, commonly referred to as NACE, is the industry standard classification system used in the European Union.

^[1] SASB Standards use the Sustainable Industry Classification System® (SICS®) to group companies based on shared sustainability risks and opportunities (as opposed to other economic classification systems which use factors such as business activities and revenue streams).

Appendix 2

Investors generally use the [Global Industry Classification Standard](#) (GICS) to manage and track the progress of the companies in their portfolio as well as determine which specific type of activities the companies in their portfolio are involved in.

The ISIC system is used by a number of tools that help organisations explore their exposure to nature-related risk and take the first steps to understand their dependencies and impacts on nature such as the Science Based Targets Network (SBTN) [Materiality Screening Tool](#) (MST)⁷⁷ and ENCORE⁷⁸

The NACE system is frequently used by governments and other related organisations, when classifying economic activities.

The Sustainable Industry Classification System (SICS) was developed by the Sustainable Accounting Standards Board (SASB, now incorporated into the International Sustainability Standards Board (ISSB). It is used by the Nature Action 100 investor initiative to group the companies that it focuses on into eight sectors.



77. The SBTN's MST is designed to help users carry out a first screening of the types of environmental impacts that are potentially materially relevant to the direct and upstream operations of a sector and a company's activities

78. ENCORE (Exploring Natural Capital Opportunities, Risks and Exposure)

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