

Biodiversity Conservation and Ecosystem Services Plan



2024

Introduction

For harboring remnants of native vegetation (and consequently a large variety of species of fauna and flora), the private sector plays an important role in the protection and conservation of biodiversity. After all, although the structure of private areas is altered by anthropic actions and the effect of fragmentation, many of them are still suitable habitats for species conservation. However, to ensure long-term sustainability in these areas, it is not enough to protect them. It is necessary to invest in management aimed at the conservation and restoration of biodiversity.

It is important to highlight the interdependence between biodiversity and ecosystemic services. Biodiversity encompasses the variety of life in all its forms (genes, species, and ecosystems) and plays a crucial role in the maintenance and functioning of ecosystems. Thus, it provides ecosystemic services making its protection fundamental for sustainable development and, ultimately, for maintaining forest productivity.

According to the Climate Observatory, the increase in deforestation is the primary driver behind the 17.2% rise in greenhouse gas emissions in Brazil in 2021*.

Therefore, this Biodiversity and Ecosystem Services Conservation Plan has been developed in alignment with Klabin's Climate Transition Plan, and its prioritized risks.

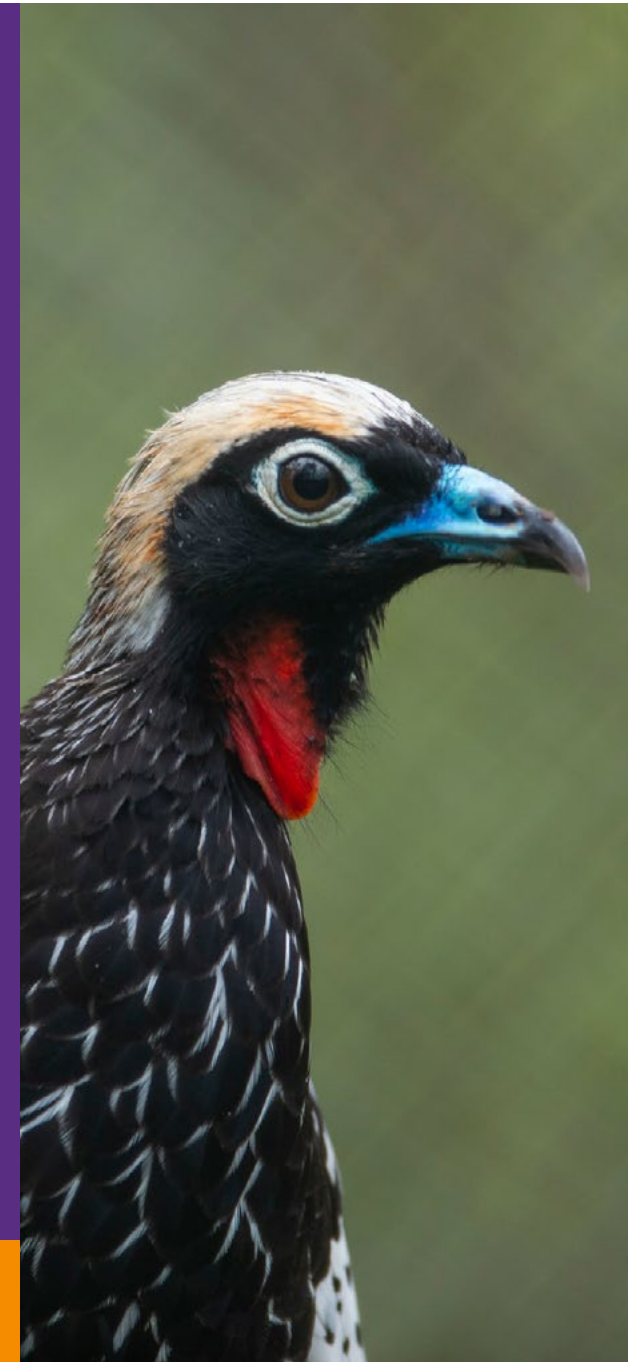
Klabin understands biodiversity as a priority stakeholder integrated into the business strategy, as stated in its Sustainability Policy, item 7.14 transcribed below:

"Promote the conservation of biodiversity through the development of practices that ensure the increase of ecosystem balance, encouraging research and partnerships with academia, and committed to use recognized forest management techniques, which include conserving attributes and avoiding operations in areas of natural heritage preservation and/or areas that contain species relevant to national and global biodiversity."

*Data: ANALYSIS OF EMISSIONS AND THEIR IMPLICATIONS FOR BRAZIL'S CLIMATE TARGETS 1970-2021, Observatório do Clima, 2023

In addition to the Sustainability Policy, the following guidelines were considered in the preparation of this Plan:

- 1 Principles 6 and 9 of the FSC® (Forest Stewardship Council), concerning Environmental Impact and the Maintenance of High Conservation Value Forests, as well as the Requirement for Maintaining an Ecologically Sufficient Network of Conservation Areas;
- 2 IFC's (International Finance Corporation) Guidance Note 6, on Biodiversity Conservation and Sustainable Management of Natural Resources;
- 3 Legal context, including the federal environmental legal system with implications for this Biodiversity Conservation and Ecosystem Services Plan;
- 4 Nature-based Solutions (NbS);
- 5 Taskforce on Nature-related Financial Disclosures (TNFD);
- 6 LEAP Approach (Locate, Evaluate, Assess, Prepare) recommended by the TNFD;
- 7 Exploring Natural Capital Opportunities, Risks and Exposure (ENCORE);
- 8 Science Based Targets Network (SBTN).



Summary

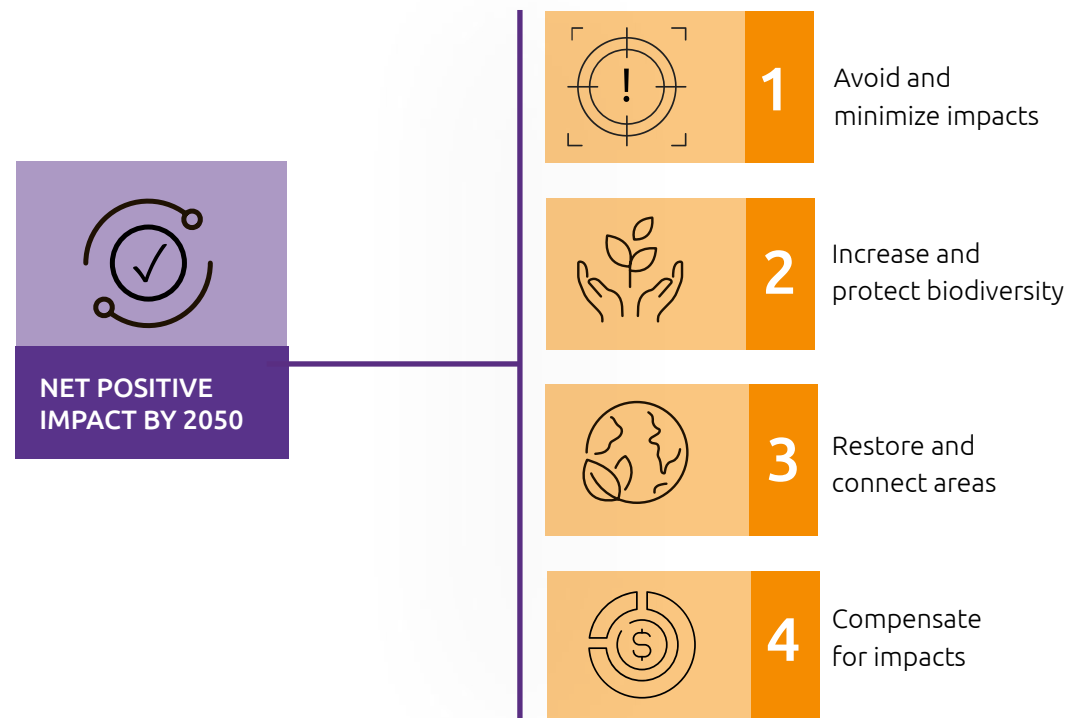
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Objective

The main objective of Klabin's Biodiversity Conservation and Ecosystem Services Plan is to achieve a net gain in biodiversity by 2050, with partial results in 2030 and 2040.

To this end, the following specific drivers are considered, aligned with the Company's impact mitigation hierarchy and the SBTN Action Protocol (AR3T). These are related to the programs defined and presented on page 16.

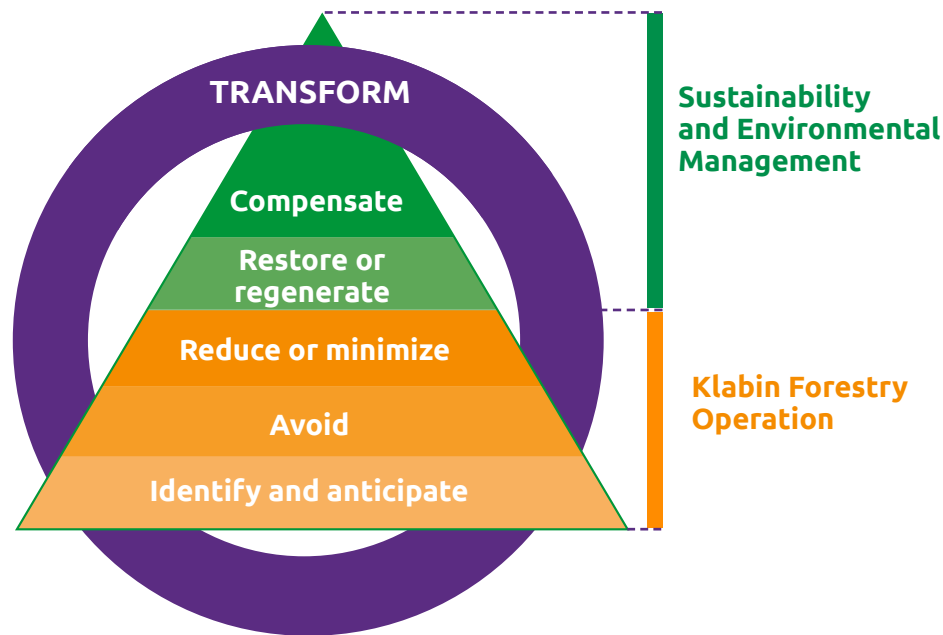


Although the Company already had a series of programs and projects related to biodiversity management, these efforts still presented some dysfunctions and opportunities for improvement, requiring a unified and systemic vision, and mechanisms for continuous improvement. This Plan seeks to address these gaps progressively (therefore, it is not yet complete).



Guidelines

Impact mitigation hierarchy to manage socio-environmental risks and impacts (based on the SBTN Action Protocol Scheme – AR3T)



The guidelines below direct the Biodiversity and Ecosystem Services Conservation Plan:

- 1 Biodiversity inventory involving the identification of natural and critical habitats to determine protection and conservation measures;
- 2 Incentives for the creation of private conservation units on owned and third-party lands;
- 3 Dissemination and support for the adoption of good land use practices;
- 4 Protection and restoration of natural vegetation;
- 5 Adoption of differentiated conservation practices for different phytophysiognomies;
- 6 Use of bioindicator species for monitoring and qualifying ecosystem services;
- 7 Ex-situ conservation of threatened species of regional fauna;
- 8 Control of invasive exotic species;
- 9 Integration of production areas into the Environmental and Ecosystem Services Program.



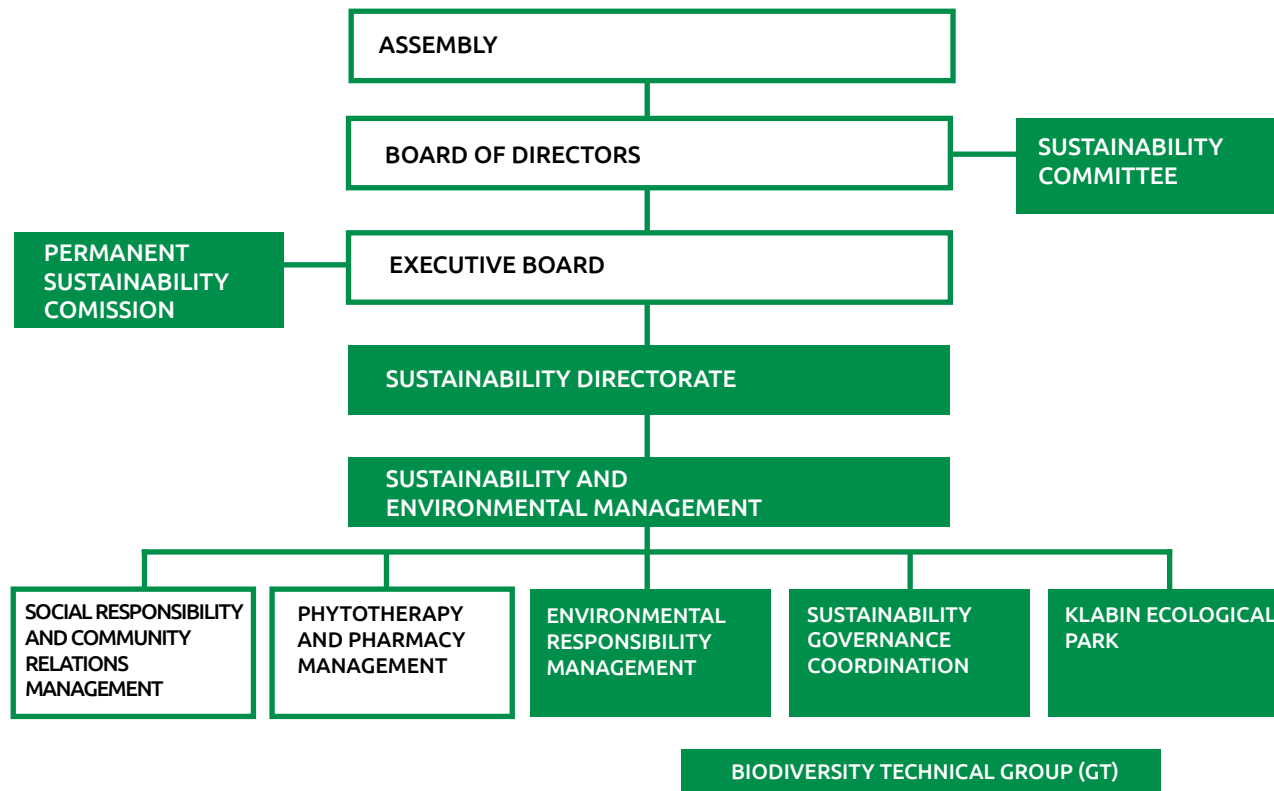
Governance

All the content of this work has been approved by the Sustainability Commission composed of executive directors of the Company.

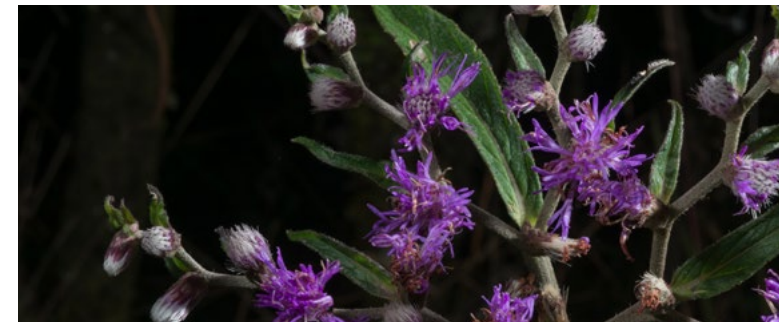
Issues related to biodiversity are approved by the Executive Board, which is advised by the Risk and Internal Controls Commission and the Sustainability Commission. Additionally, sustainability topics are reported to the Board of Directors by the Executive Board and the Sustainability Committee.

The commissions are responsible for evaluating and monitoring the information provided by the Executive Board and management teams responsible for the topic. The Sustainability and Environment Management aims to identify, analyze, address, and monitor risks and opportunities related to the Company's activities and strategy.

The Company is committed to **Zero Deforestation**, a commitment that has been approved by the Board of Directors.



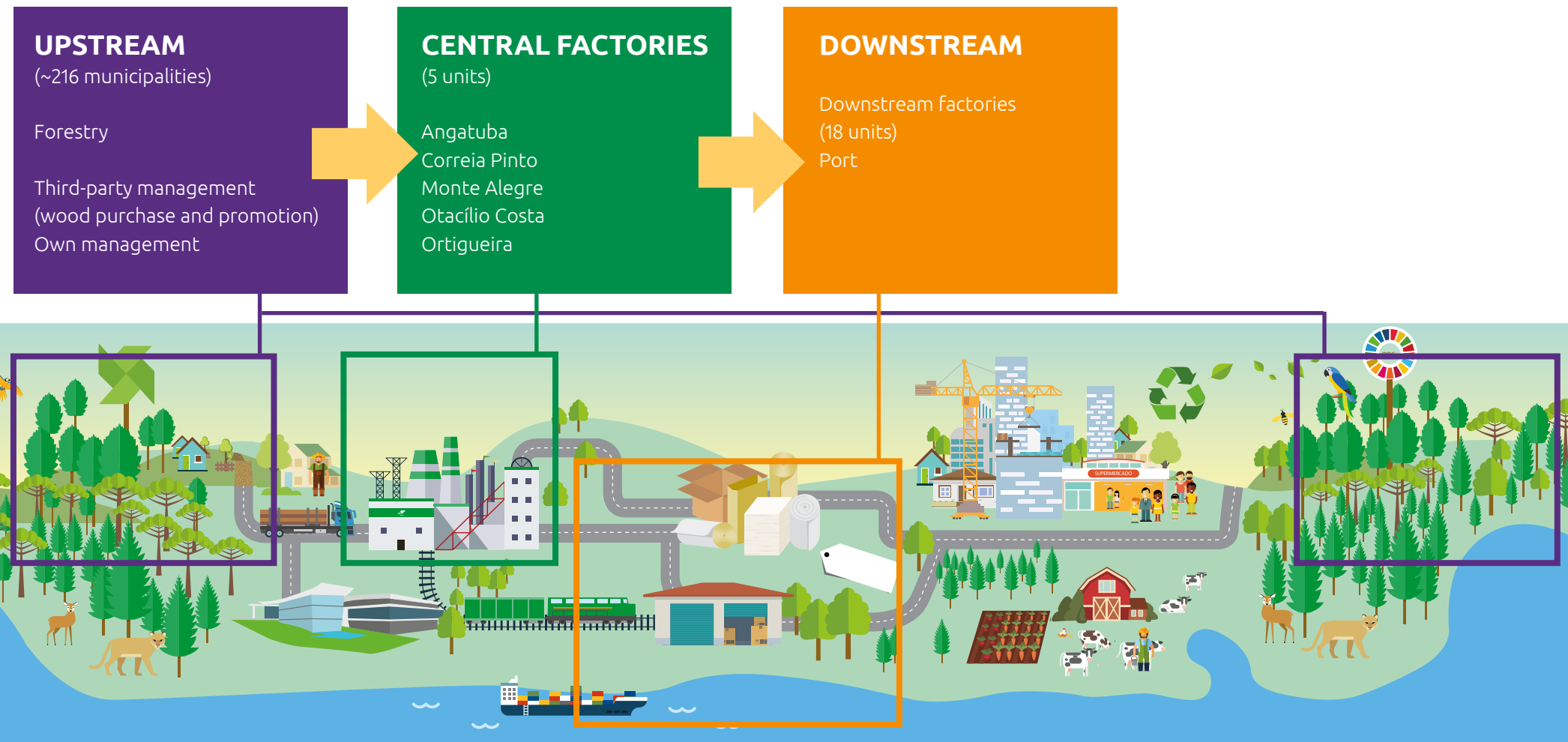
The Biodiversity Conservation and Ecosystem Services Plan is being developed jointly by various areas of the Sustainability and Environmental Management, aiming to guide actions under a unified vision aligned with the Company's business strategy, the Klabin 2030 Agenda, and other voluntary external commitments assumed by Klabin.



Value chain

In 2024, to keep the Biodiversity and Ecosystem Services Conservation Plan aligned with global advances on the topic, Klabin began by applying the LEAP methodology (Locate, Measure, Assess, and Prepare for reporting) to identify risks, dependencies, and impacts. The application is guided by the recommendations of the Taskforce on Nature-related Financial Disclosures (TNFD) and takes into account the **Company's main value chain**.

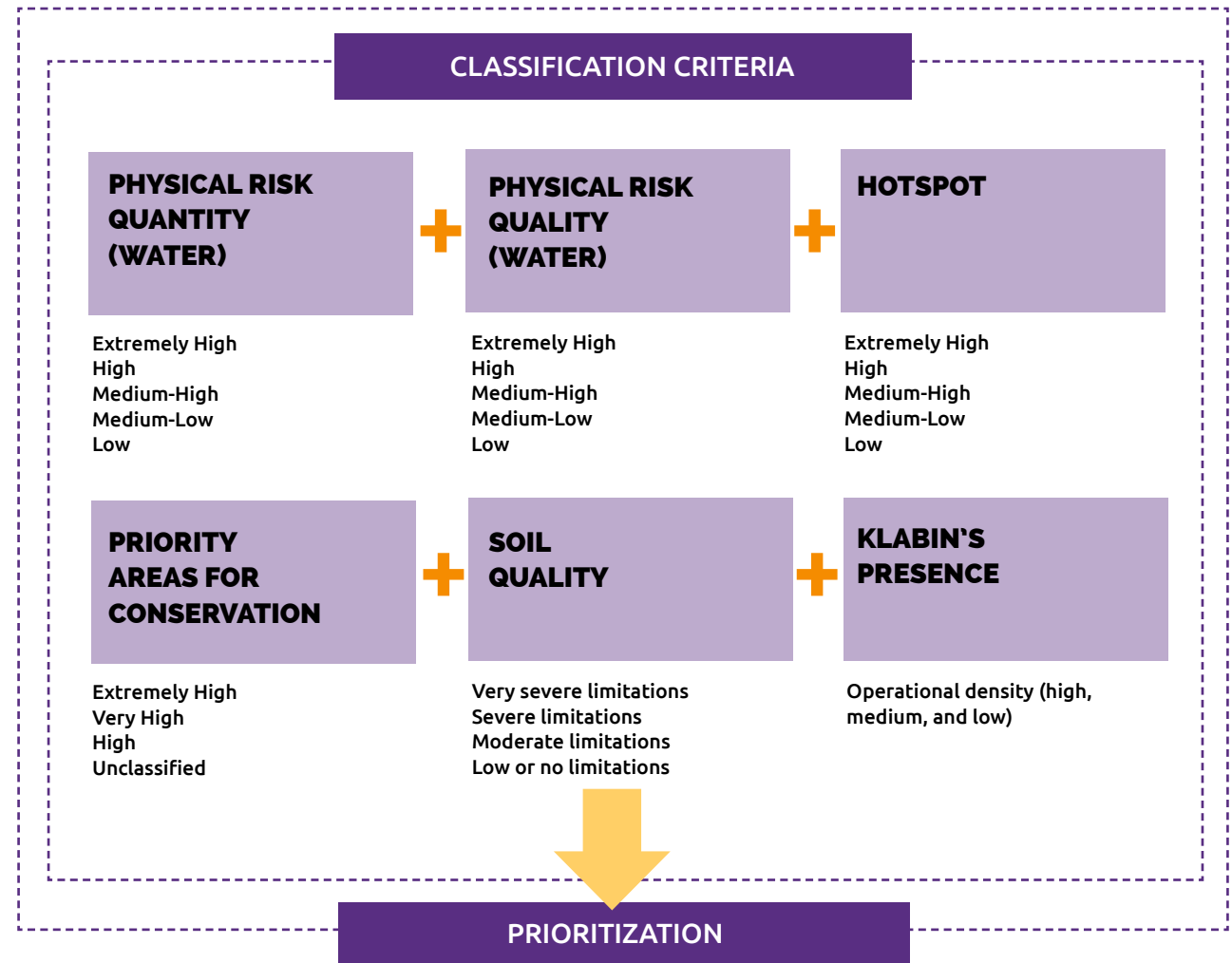
Klabin's main value chain consists of the pulp and paper manufacturing units in the center, the forestry units upstream, the packaging manufacturing units and the port downstream.



Localization and prioritization

To select priority application locations, criticality classification criterias were created, developed based on references indicated by internal and external Klabin experts.

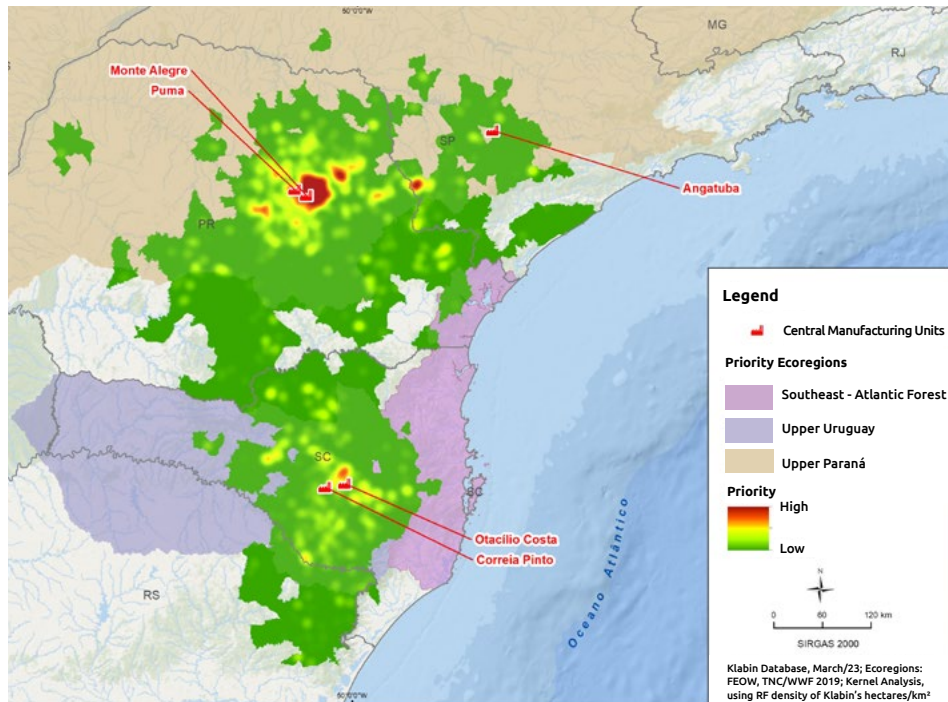
Five general classification criteria were applied to the Downstream Manufacturing Units (see figure). The Forestry Base Units also consider Klabin's operational density criterion. It is worth mentioning that the Central Manufacturing Units (pulp and paper) are considered priority by definition.



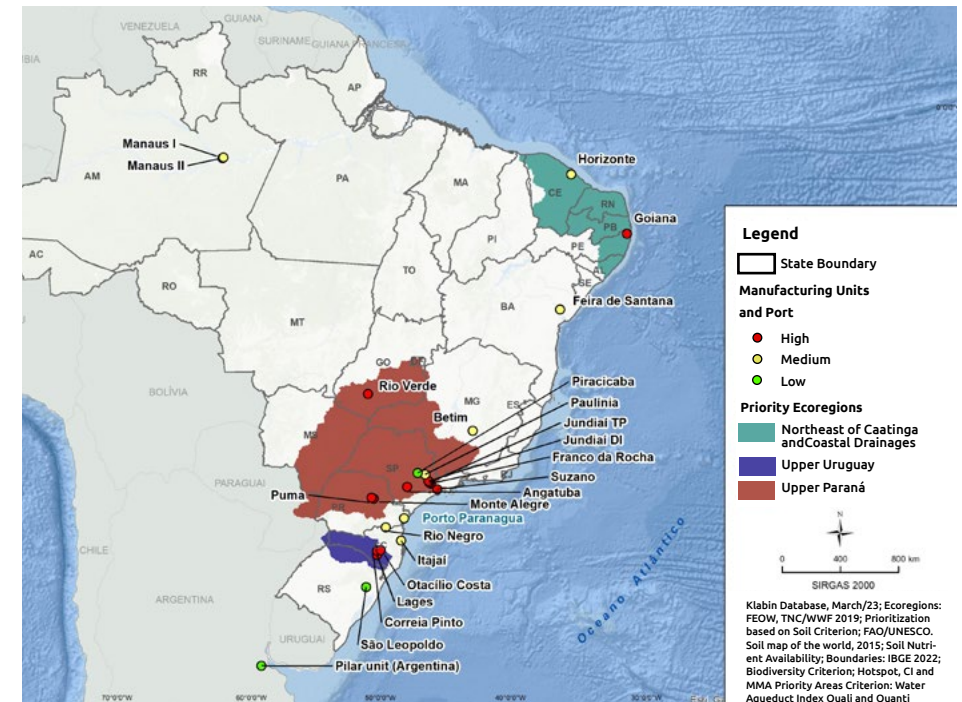
1. Water Resource Management Units – ANA 2021; Municipalities IBGE 2022; Freshwater Ecoregions of the World (FEOW), WWF/TNC 2019; Aqueduct Water Risk, 4.0, WRI; Biodiversity Hotspot: CI 2016; Brazilian Biomes: MMA 1:250,000; Priority areas for conservation MMA 2018; Biosphere Reserve Phase VI, 2008; FAO/Unesco Soil Map of the World, 2015.

Localization and Prioritization

Priority ecoregions for water, soil, and biodiversity (Klabin's presence in municipalities)

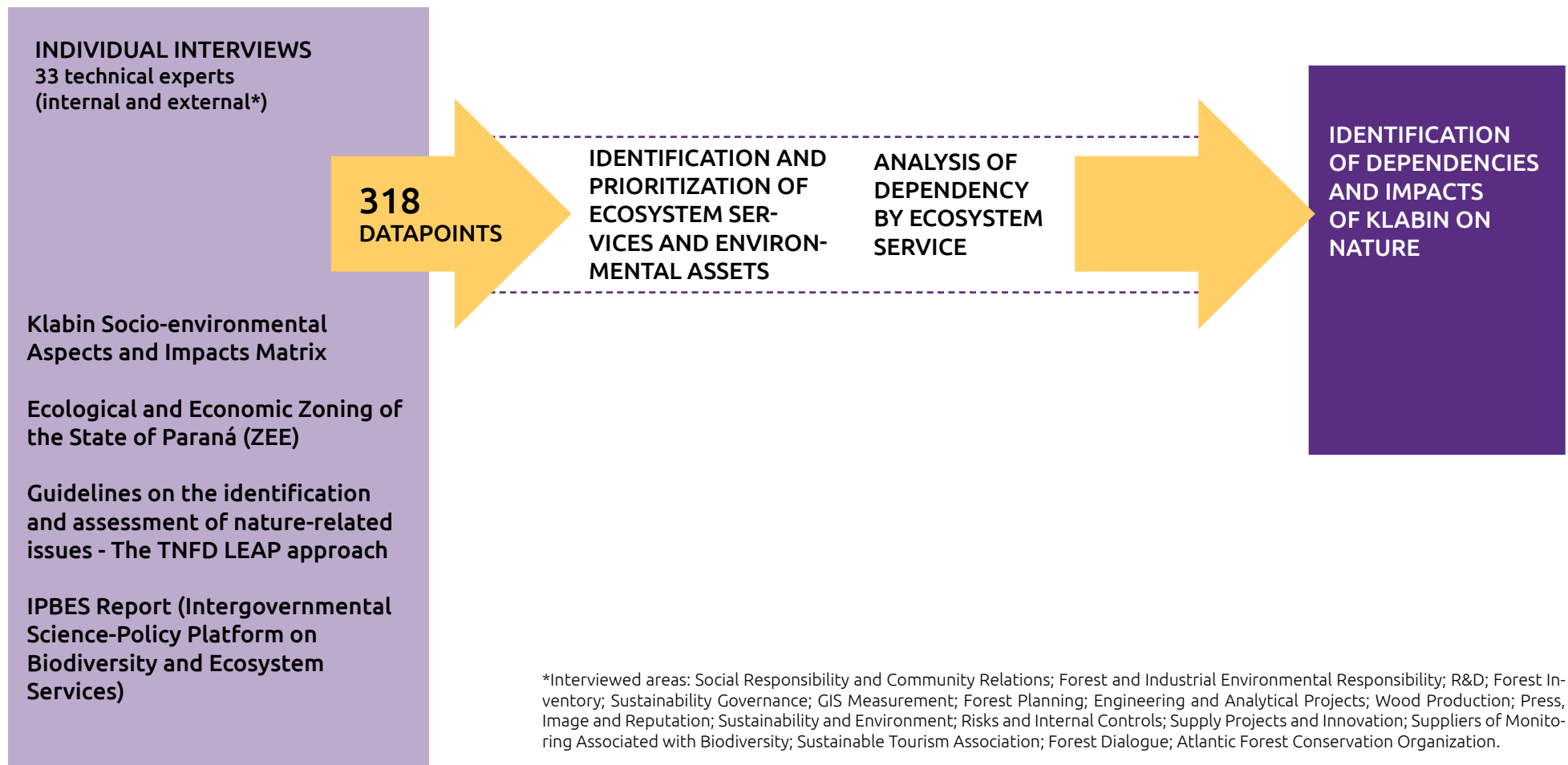


Priority ecoregions only for water management (geopolitical division)



Identification of Dependencies and Impacts

The analysis of dependency and impacts on ecosystem services was conducted through semi-structured interviews with members of Klabin's technical and operational team, as well as other stakeholders. The relevance of different ecosystem services to Klabin was identified and evaluated, and the company's impacts on biodiversity and ecosystem services within its area of influence were analyzed.



Dependencies

Below is the dependency matrix of priority ecosystem services for the Forestry, Paper, and Packaging sector based on data from the Exploring Natural Capital Opportunities, Risks, and Exposure (ENCORE).

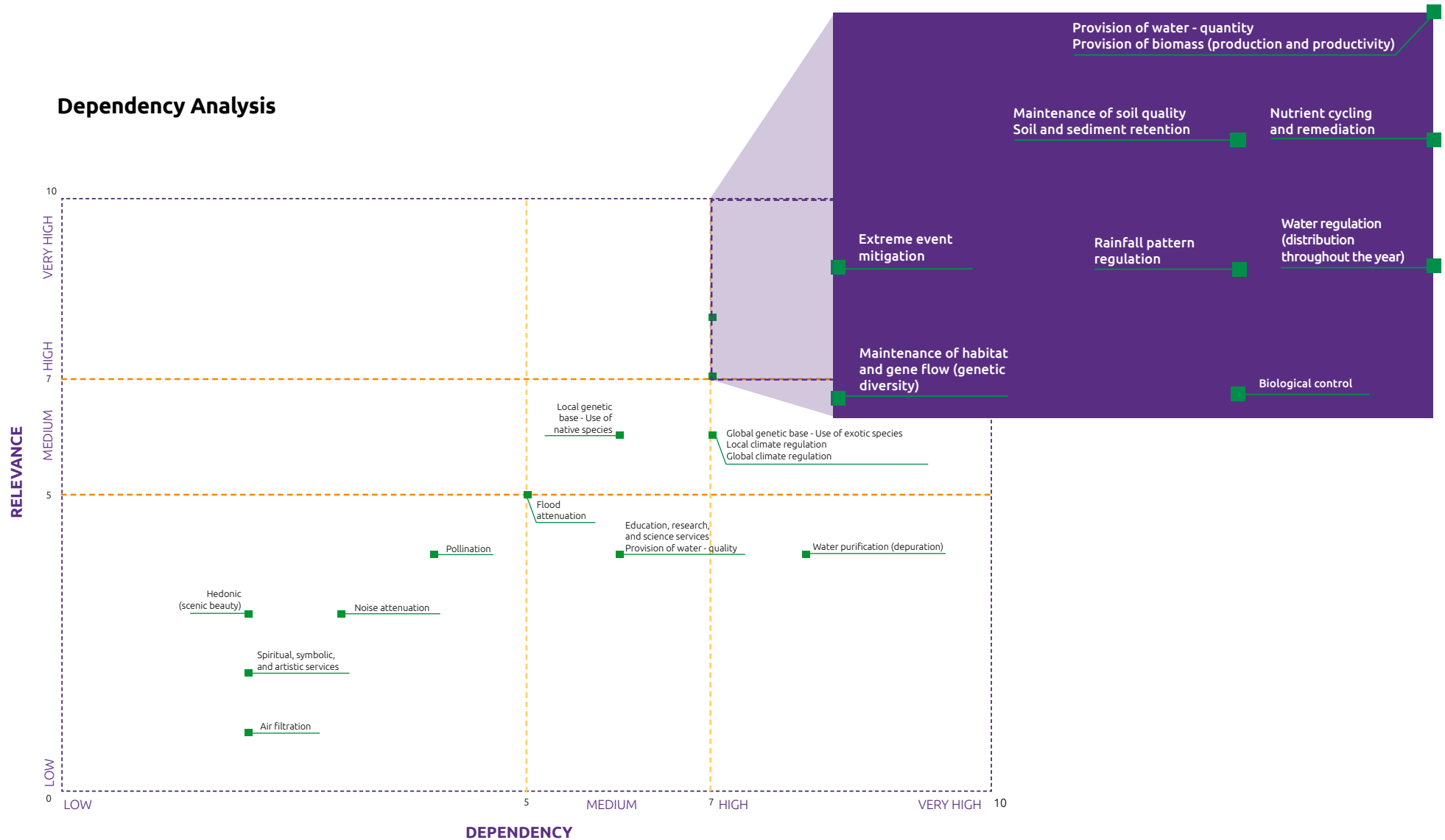
Materiality classifications of ecosystem services specifically relied upon by the forestry and paper sector (based on the 2024 version of ENCORE).

	ISIC group/class	Silviculture and other forestry activities	Support services to forestry	Sawmilling and planing of wood	Manufacture of furniture	Manufacture of paper and paper products	Other land transport
Provisioning services	Water supply	High	High	Low	Medium	Medium	Very low
	Other provisioning services	Low	Low	N/A	N/A	N/A	Medium
	Biomass provisioning	Very high	Medium	N/A	N/A	N/A	N/A
	Genetic material	Very high	Medium	N/A	N/A	N/A	N/A
Regulating & maintenance services	Solid waste remediation	Medium	Very low	Medium	Medium	Medium	ND
	Soil and sediment retention	Very high	Medium	Low	Low	Low	Low
	Water purification	Very high	Very high	N/A	Medium	N/A	ND
	Soil quality regulation	Very high	N/A	N/A	N/A	N/A	N/A
	Other regulating and maintenance service	ND	N/A	Low	Low	Low	Very low
	Biological control	High	Low	Very low	N/A	Very low	ND
	Air filtration	Medium	ND	Medium	Very low	Very low	Very low
	Flood control	High	Very low	Medium	Medium	Medium	Medium
	Global climate regulation	Very high	Very low	Very low	Very low	Very low	Medium
	Nursery population and habitat maintenance	High	ND	N/A	N/A	N/A	N/A
	Noise attenuation	N/A	N/A	Very low	Very low	Very low	Very low
	Other regulating and maintenance service	N/A	N/A	N/A	Very low	N/A	N/A
	Local (micro and meso) climate regulation	Very high	Medium	Low	Low	Low	Low
	Pollination	Medium	N/A	N/A	N/A	N/A	N/A
	Storm mitigation	Medium	Very low	Medium	Medium	Medium	Medium
	Water flow regulation	Medium	Medium	Medium	Medium	Medium	Low
	Rainfall pattern regulation	Very high	Very high	Very low	Very low	Medium	Medium
Cultural services	Visual amenity services	N/A	N/A	N/A	N/A	N/A	Very high
	Spiritual, artistic and symbolic services	ND	N/A	N/A	N/A	N/A	N/A

Data: TNFD – Taskforce on Nature-related Financial Disclosure (2024) Additional sector guidance – Forestry, pulp and paper P.22-23

Dependencies

Based on the previous matrix, the Company conducted its own dependency analysis during consultations to verify the adherence of dependency and relevance of ecosystem services. This led to the prioritization of the following services:



Dependencies

Each ecosystem service is provided by a type of environmental asset. Therefore, the association of dependency to them in the production chain can be illustrated as follows:

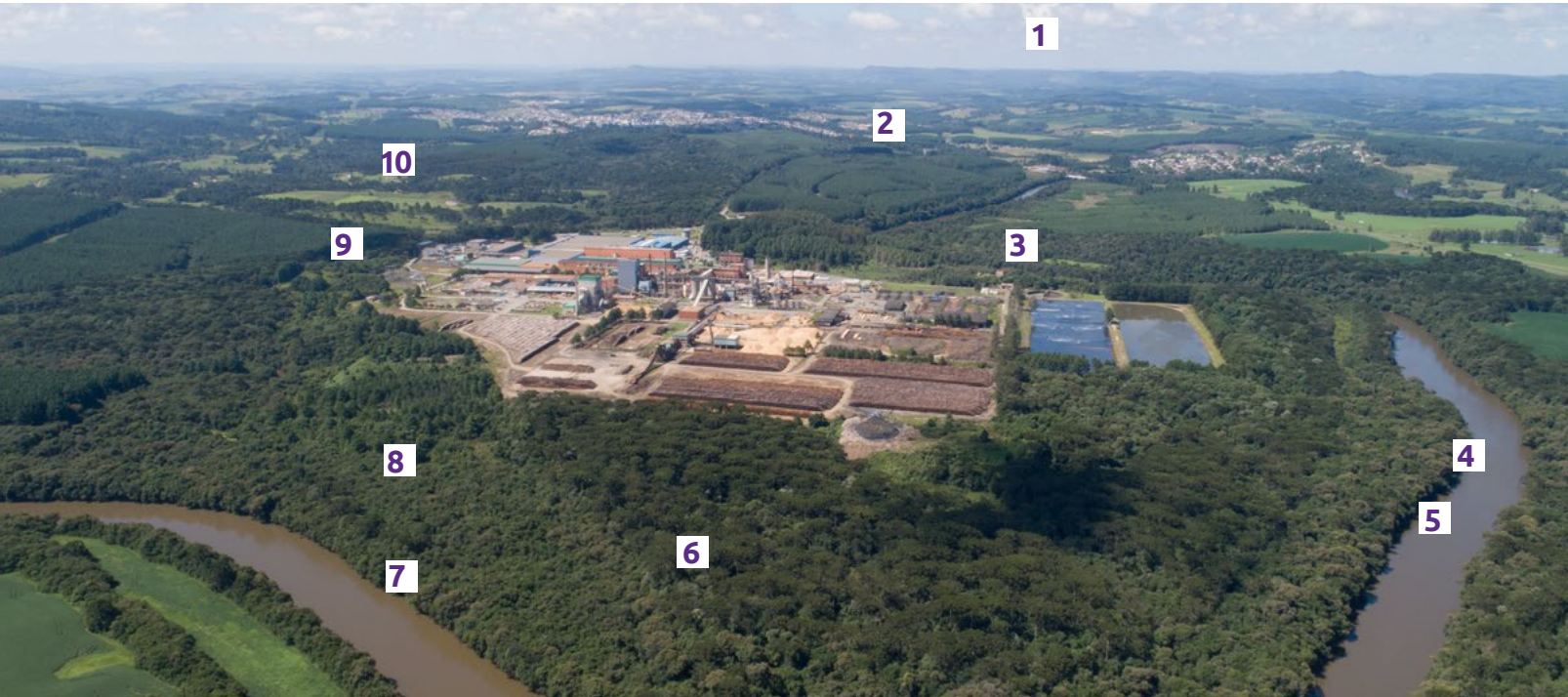
Ecosystem Service		Dependencies				
		Environmental Asset				
		Water	Soil and Sediment	Atmosphere	Habitats	Species
Provision	Provision of water (quantity)					
	Provision of biomass (wood)					
Regulation and Support Services	Nutrient cycling and remediation					
	Soil quality maintenance					
	Soil and sediment retention					
	Water regulation (distribution throughout the year)					
	Rainfall pattern regulation					
	Mitigation of extreme events (rain and winds)					
	Biological control					
	Habitat and nursery maintenance					

High

Medium

Low

Just Paraná



- 1. Rainfall Pattern Regulation
- 2. Mitigation of Extreme Events (Rain and Winds)
- 3. Provision of Biomass (Wood)
- 4. Water Provision
- 5. Water Regulation
- 6. Recycling and Nutrient Cycling (Remediation)
- 7. Soil and Sediment Retention
- 8. Habitat and Nursery Maintenance
- 9. Soil Quality Maintenance
- 10. Biological Control

Dependencies of Klabin - The priority ecosystem services

Ecosystem Services	Description Klabin's Dependency
Water provision - quantity	Water is essential for maintaining the productivity of planted forests, ensuring a continuous supply of wood for the industry. During the pulp and paper production process, water plays a crucial role in various operations. It is used in wood washing, pulp bleaching, equipment cooling, and chemical dilution.
Biomass provision (Wood)	Biomass from planted forests is the main source of raw material for pulp and paper production.
Nutrient cycling and remediation	The productivity of eucalyptus and pine plantations is directly linked to nutrient availability in the soil, soil quality, and rainfall patterns. Ecosystem services such as nutrient cycling, soil remediation, and climate regulation play critical roles in the sustainability and productivity of these forests, especially in a scenario of fertilizer scarcity.
Soil quality maintenance	Soil plays a crucial role in nutrient cycling, essential for the continuous supply of nutrients to plants, making water and soil conservation practices essential. Ecosystem services like organic matter decomposition and microbial activity contribute to nutrient availability in the soil, directly impacting tree health and growth.
Soil and sediment retention	Maintaining soil cover and proper land structuring are essential to minimize the loss of fertile soil. Soils that retain sediments tend to be more stable and less prone to sheet or gully erosion, helping to maintain land stability and reduce the need for corrective interventions.
Water regulation	Healthy soils have a greater capacity to infiltrate and retain water, crucial for regulating the hydrological cycle. This not only benefits plantations by providing available water but also contributes to erosion mitigation and water quality control in nearby rivers and aquifers.
Rainfall pattern regulation	Rainfall patterns directly affect the quantity and temporal distribution of water available in the company's operational areas. This is crucial for the irrigation of eucalyptus and pine plantations, as well as for the water supply needed during industrial processing.
Mitigation of extreme events (rain and winds)	The ability of ecosystems to mitigate extreme events is essential for improving the climate resilience of the company's operations. Extreme events such as heavy rainfall and strong winds can cause significant damage to the company's infrastructure, such as roads, industrial facilities, and planting areas. Prolonged droughts or intense rainfall can negatively affect plantations, soil quality, and water availability for industrial operations.
Biological control	Biological control helps maintain plant health by controlling pest populations that could compromise the productivity of planted forests. The biological diversity promoted by biological control can increase the resistance of plantations to pests and diseases over time, reducing the need for corrective interventions and improving system stability. It can reduce the need for pesticide application, which can have adverse environmental impacts such as soil and water contamination and effects on non-targeted organisms.
Habitat and nursery maintenance	Well-conserved natural areas and habitats play a fundamental role in maintaining local biodiversity. This includes not only plants and animals directly related to the company's operations but also native species that contribute to the overall health of ecosystems. Natural habitats and nursery areas contribute to the provision of essential ecosystem services such as pollination, pest regulation, air and soil purification, and water quality maintenance. These services are fundamental to the sustainability of the company's operations and the well-being of local communities.

Impacts

For each priority ecosystem service, potential negative and positive impacts were identified and grouped by categories of impact drivers, as shown in the table below. The next step will be to analyze the impacts along the value chain, following the model presented in the Additional Guidance for the Forest, Pulp, and Paper sector of the TNFD (first row of the table).

Provisão	IMPACT DRIVERS CATEGORY											
	LAND/WATER USE CHANGES			CLIMATE CHANGES		RESOURCE USE ¹		INVASIVE SPECIES		POLLUTION ²		
	Impact Significance Level for the sector ³	Terrestrial Ecosystem Use	Freshwater Ecosystem Use	Marine Ecosystem Use	GHG Emissions	Water Use	Disturbance	Biological Changes	Non-GHG Air Pollution	Water Pollution	Soil Pollution	Solid Waste
	ECOSYSTEM SERVICE	Negative		Positive	Negative	Positive	Negative	Positive	Negative	Positive	Negative	Positive
Water Provision (quantity)	Excessive water consumption by plantations			Maintenance of organic matter in the soil	Extreme events	Maintenance of conservation areas	Destruction of fragile areas, excessive water extraction	Rational use of water	Reduction in water production and ecosystems in grassland and cerrado physiognomies	Mosaic and hydrosolidary management		
Biomass Provision	Export of nutrients and loss of organic matter			Maintenance of organic matter in the soil	Loss of productivity (water scarcity and temperature increase)	Advancement in R&D (new adaptable clones)	Loss of productivity; Dependence on non-renewable fertilizers	Rational use of water and fertilizers	Reduction in productivity and/or production (e.g., brachiaria)	Mosaic and hydrosolidary management		

Significance of the impact

Very low
 Low
 Medium
 High
 Very high
 No data

Stages of the forestry sector value chain

Forest Production Downstream

Processing and Manufacturing

1 - Water; fertilizers and soil amendments; fuels and lubricants; use and extraction of mineral products.

2 - Pesticides; fertilizers; fuels and lubricants; solid waste.

3 - Presented in the document "Additional Guidance for the Forest, Pulp, and Paper Sector" by TNFD, June 2024.

Regulation and support	IMPACT DRIVERS CATEGORY																		
	LAND/WATER USE CHANGES			CLIMATE CHANGES		RESOURCE USE¹		INVASIVE SPECIES		POLLUTION²									
	Impact Significance Level for the sector³	Terrestrial Ecosystem Use	Freshwater Ecosystem Use	Marine Ecosystem Use	GHG Emissions		Water Use		Disturbance	Biological Changes	Non-GHG Air Pollution	Water Pollution	Soil Pollution	Solid Waste					
	ECOSYSTEM SERVICE	Negative		Positive	Negative	Positive	Negative	Positive	Negative	Positive	Negative		Positive						
	Nutrient Cycling and Remediation	Export of nutrients and loss of organic matter		Reduced Tillage (minimum tillage)	Erosion and sedimentation of watercourses				Alteration of soil quality										
	Maintenance of soil quality	Soil compaction		Maintenance of soil organic matter			Soil Contamination	Practices for water and soil conservation	Alteration of soil quality		Soil contamination		Environmental education program; Support for solid waste management						
	Soil and sediment retention	Erosive Processes		Soil protection and conservation practices			Erosion and sedimentation of watercourses	Practices for water and soil conservation	Alteration of soil quality										
	Water regulation (distribution throughout the year)	Extension of land occupation with forest plantations		Mosaic planting			Excessive or conflicting use of water during scarcity periods	Mosaic and hydrosolidary management											
	Regulation of Rainfall Pattern																		
	Mitigation of extreme events (rain and winds)	Habitat fragmentation		Maintenance and protection of areas designated for conservation															
	Biological control	Use of pesticides		Maintenance and protection of areas designated for conservation					Biological Invasion		Inadequate use of pesticides								
	Maintenance of habitat and nursery	Habitat Fragmentation		Landscape connectivity			Excessive water intake	Adequate use of water	Competition, reduction, and displacement of native species		Inadequate use of pesticides								

Significance of the impact

Stages of the forestry sector value chain

Forest Production Downstream

Processing and Manufacturing

1 - Water; fertilizers and soil amendments; fuels and lubricants; use and extraction of mineral products.

2 - Pesticides; fertilizers; fuels and lubricants; solid waste.

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Resilience Strategy

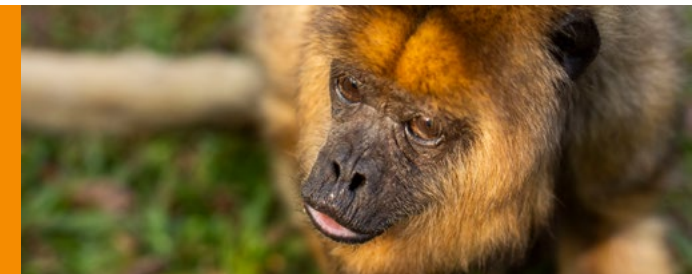
Klabin's resilience strategy includes the Biodiversity and Ecosystem Services Conservation Plan, subdivided into programs and action plans that enable the 2050 goal. The programs, their main actions, and their relationship with the mitigation hierarchy and the SBTN Action Protocol are presented in the table below.

Program	Relationship with the Mitigation Hierarchy and SBTN Action Protocol	Program Description	Related Impact
Protection and Recovery of Native Vegetation	Avoid Identify and Anticipate Restore Regenerate	Recovery of degraded areas and protection of native vegetation areas aiming at: The restoration of Permanent Preservation Areas (PPA), Control of Invasive Exotics, Protection of Native Areas against fire and threats to biodiversity.	Habitat fragmentation Expansion of land occupation with forest plantations Biological invasion Destruction of fragile areas Specific target: Not only the company is committed to achieving zero deforestation of native areas, but also to maintaining their conservation status. This includes controlling invasive exotic species, covering both grassland and cerrado areas, by 2040
Conservation of priority areas	Identify and Anticipate Restore Regenerate Transform Compensate	Management and Conservation of priority areas: Analysis of conserved areas and forest fragments in the landscape, aiming at their maintenance and increased connectivity; In-situ conservation of fauna species: Implementation of conservation projects for fauna species within conservation areas.	Habitat fragmentation Competition, reduction, and displacement of native species Expansion of land occupation with forest plantations.
Connectivity	Avoid Restore Reduce and Minimize Regenerate Transform Compensate	Connection Project: Landscape-level connection (beyond Klabin's areas); Kaigang Corridor*: Connection between the areas of the Ecological Park and the Indigenous Lands of Queimadas and Mococa (Ortigueira municipality); Road Ecology: Increase landscape connectivity through infrastructure that helps reduce animal collisions; Legal Forests and Social Forests: Support for producers in environmental reorganization and production diversification.	Habitat fragmentation Competition, reduction, and displacement of native species

*Ecological corridor that connects the areas of the Klabin Ecological Park (Telêmaco Borba municipality) and the indigenous lands of Mococa and Queimadas (Ortigueira municipality).

Resilience Strategy

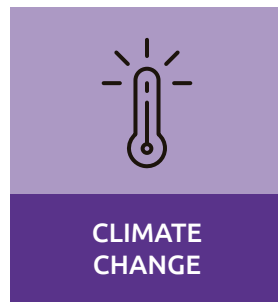
Program	Relationship with the Mitigation Hierarchy and SBTN Action Protocol	Program Description	Related Impact
Environmental and Ecosystem Services	Avoid Identify and Anticipate Transform Compensate	<p>Valuation of ecosystem services: Biodiversity Valuation Protocol developed at Klabin;</p> <p>Forest management under water security guidelines: The methodology of Hydrosolidarity Forest Management focusing on territorial water security, implemented by Klabin as a pioneer in the sector, aims to contribute to the protection of micro-watersheds and to the water security of communities surrounding the forest units.</p> <p>Ecosystem Services Certification: Seek Ecosystem Services Certification standard from certifying bodies.</p>	<p>Excessive water consumption by plantations</p> <p>Erosion and siltation of watercourses</p> <p>Excessive or conflicting water use during periods of scarcity</p> <p>Nutrient exportation and loss of organic matter</p> <p>Erosive processes</p> <p>Soil compaction</p> <p>Alteration of soil quality</p> <p>Excessive water abstraction</p> <p>Reduction of water production and ecosystems in grassland and savanna physiognomies</p>
Education and Research	Avoid Reduce and Minimize Restore Regenerate Transform	<p>Klabin Ecological Park: Klabin's zoo that promotes biodiversity conservation, the maintenance and rehabilitation of wildlife, and environmental education;</p> <p>Caiubi Program: Environmental education program focused on teacher training;</p> <p>Bacia escola: Experimental Microbasin applied for scientific research and environmental education activities</p>	Competition, reduction, and displacement of native species
Sustainable Uses of Biodiversity	Avoid Reduce and Minimize	Under Construction	



Risks

Based on the identified impacts, the Company is mapping the nature-related risks based on those already identified by the **Taskforce on Climate-related Financial Disclosure (TCFD)**. Additionally, the Company is conducting a double materiality assessment in line with other material aspects. Therefore, the positive and negative impact indicators below are **examples of monitoring methods**. Klabin intends to disclose the priority risks and financial impacts by early 2025.

EXAMPLES OF INDICATORS



4% Increase in Energy Intensity in 2023

Four additional endangered species identified in 2022

30.4% of plants in water stress areas in 2023, 0.76% of water withdrawn in water-stressed areas

15% increase in NOx emissions in 2023

26% of the area covered by at least one initiative (invasion and reinvasion) for controlling invasive exotic species since 2017



17.8% Reduction in GHG Emissions Scope 1+2 in 2023

1 of 2 locally extinct species reintroduced in 2022

22 thousand hectares under restoration/demarcation by the Matas Legais and Matas Sociais Programs since 2005

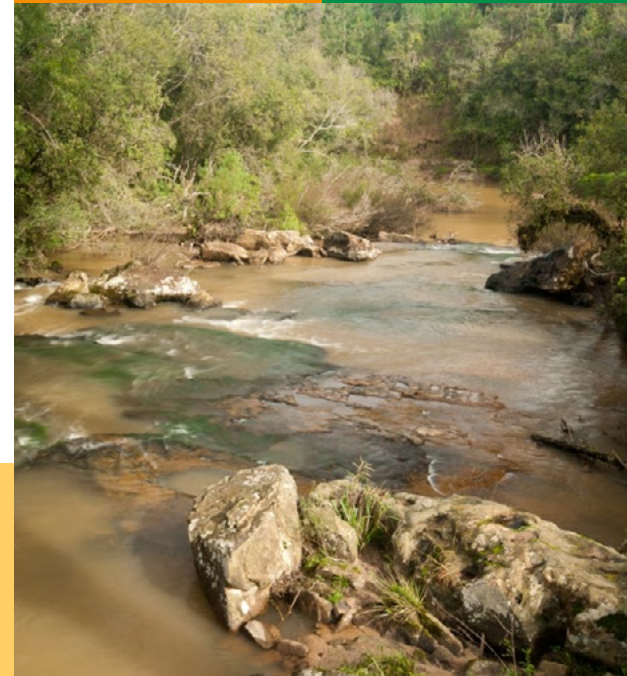
27% reduction in atmospheric particulate matter emissions in 2023

Commitment to remove invasive exotic species

Goals and Metrics

Although in the process of reevaluating its goals and metrics based on the prioritization of risks, Klabin already maintains long-term goals that include public commitments to enabling a net positive impact. With the new goals, it will be possible to update the current framework:

THEME TARGET	KODS 2030	RELATIONSHIP WITH THE PROGRAMS
Biodiversity	Map 100% of wildlife roadkill hotspots and implement initiatives to reduce accidents	2 - Conservation of priority areas
	Maintain and enhance the number of fauna species dependent on high-quality environmental forests	2 - Conservation of priority areas
	Maintain at least six partnerships/researches per year based on nature conservation and biodiversity studies	5 - Education and research
	Conduct the reintroduction of at least two species that are proven to be locally extinct and promote population reinforcement of another four endangered species	2 - Conservation of priority areas
	Provide 1 million native tree seedlings for the recovery of degraded areas	1 - Protection and Recovery of Native Vegetation
Water Use	100% of forestry operations under own management with hydrosolidary management	4 - Environmental and ecosystem services





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