ibá

brazilian tree industry

# BIODIVERSITY
## IN THE PLANTED TREE INDUSTRY
## 2022 REPORT

Photo: Irani



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# THE PLANTED TREE INDUSTRY, ON THE PATH TO A GREEN CIVILIZATION

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Like an aura with hostile and harmful implications for life, a climatic convulsion cast a dark shadow over the planet. The toxicity of this tragic layer that is now a part of our habitat only grows, posing a deadly threat to our future.

In response, we urgently need to ensure that we can maintain what we need to keep living on Earth, with an agenda that covers everything from immediate actions to reinventing our behavior and production in the medium and long term.

It is now abundantly clear that massive, unlimited action is needed to address this problem that affects the whole planet. For such complex and crucial issues, we need ethical and political resolve, as well as scientific and technological investments. To transform the current socioeconomic paradigm that led us to this environmental catastrophe, new ways of manufacturing and consuming are urgently needed.

All of these issues are addressed by the Convention on Biological Diversity (CBD). This agreement was established by the United Nations member countries in 2010 to help the world fight biodiversity loss, and is one of the most important international mechanisms related to the environment. It established 20 goals known as the Aichi Targets, but ten years later, not one of these goals has been entirely attained on a global scale.

Because of its unequaled environmental assets, expertise in the bioeconomy, and major potential in the age of decarbonization, Brazil is one of the actors with the ability and the potential to take a leading role in building a sustainable paradigm for humanity.

Relevant actors in the country include the planted tree sector, because of its well-established practices as well as what it still can do for a better world through science, technology, and innovation.

This industry's initiatives include production and conservation, implementing the mosaic planting approach to create ecological corridors by interspersing its planted forests with conservation areas. It has 9.55 million hectares of planted area, and maintains another 6.05 million hectares of conservation areas, an area equivalent to the state of Rio de Janeiro. It is unique in Brazil's manufacturing sector.

And year after year, as a way of restoring social and environmental balance, this industry expands its sustainable use of areas that were previously degraded by other crops or by improper management. In 2020, the sector worked to restore 30,900 hectares of such degraded areas with native vegetation.

As part of this process, for years these companies have been monitoring biodiversity to understand and assess how the environment responds to conservation practices. This knowledge is incorporated into everyday operations in order to effectively protect biodiversity.

In fact, some of these monitoring programs started as early as the 1970s. Since that time, they have generated important data to improve these practices and adopt more efficient production techniques, which also contributes to our natural wealth.

We are very proud to summarize all this quiet, meticulous, and determined work involving millions of inputs by Ibá's member companies in this Report on Biodiversity in the Planted Tree Sector in 2022. For this report, 23 associated companies shared their monitoring data spanning 12 Brazilian states and over 220 municipalities.

They recorded 8,310 species across five biomes: the Amazon, Caatinga, Cerrado, Atlantic Forest, and Pampa. Flora and fauna groups were monitored, including birds, mammals, reptiles, and amphibians. There were 5,450 flora species recorded. The planted tree sector also identified more than 335 species classified as endangered by ICMBio.

These are significant findings, proving that the ecological corridor strategy adopted in mosaic planting, along with various other sustainable management practices and initiatives (which are also described in this report), are making positive contributions to biodiversity conservation.

Even more, all of our assets including innovative practices, accumulated knowledge, and landscape transformation that have very positive effects on the environment indicate the planted tree industry's willingness and dedication to building a path to a green civilization, which is essential for us to keep our Earth livable.

Photo: Irani

# INTRODUCTION

Today there are 1.8 million species known to science, but there are estimates that this number is actually 8 to 10 million species worldwide. Some scientists believe there are over 30 million; others talk of 100 million species of living things on the planet.

Brazil is a megadiverse country, home to rich biodiversity and the largest reserves of fresh water in the world. According to a study by Embrapa Territorial Management (using data from 2020), there are a total of 564 million hectares covered by native vegetation in Brazil. In other words, 66.3% of the country's land is occupied by or set aside for various forms of native vegetation, which vary significantly between the different biomes in terms of characteristics and condition. All this area is home to 20% of the world's biodiversity.

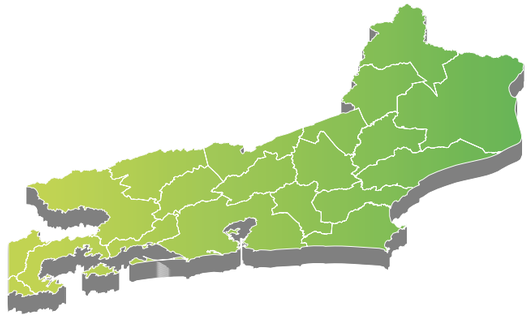
dispersal, pest control, and balancing the food chain, not to mention the microscopic universe comprised of microorganisms like fungi and bacteria that are responsible for decomposition and nutrient cycling.

This whole rich ensemble needs to be in harmony for each element to carry out its role optimally, but this equilibrium is threatened by alarmingly sharp losses in biodiversity. The fifth Global Biodiversity Outlook (GBO), a report published periodically by the Convention on Biological Diversity (CBD), presents the progress made by countries towards implementing the 20 Aichi Biodiversity Targets between 2011 and 2020, and the lessons learned during this process. The most recent version of this document, which is widely recognized by the global scientific community, was published in 2020 and noted that none of the 20 targets were fully attained on a global level. This threatens the reach of the Sustainable Development Goals and undermines efforts to fight climate change.

To avoid further losses in biodiversity, we need to take urgent action together, since species are being rapidly lost and reversing these outcomes and remediating this complex system is a slow process. Furthermore, the Covid-19 pandemic has created many challenges for humanity and raised an alert about our relationship with nature and the consequences for the well-being of future generations. The imbalance in this relationship has led to ongoing losses in biodiversity and degradation of natural systems that could affect the survival of everyone, humans and nature alike.

The World Economic Forum estimates that investments in nature could generate 395 million jobs by 2030. According to the International Monetary Fund, each US$ 1 invested in combating climate change and biodiversity loss could generate US$ 7 in returns.

But there is still a mistaken dichotomy between production and conservation, particularly with regard to sectors that rely on the use of land and natural resources. The adoption of good practices in production is already a reality in the Brazilian planted tree industry; throughout this publication we will show how companies in this sector combine production with conservation, since work in the field is carefully considered and planned to mitigate any potential impacts on biodiversity.



**6 million**

**HECTARES PRESERVED BY THE PLANTED TREE INDUSTRY**

**EQUIVALENT TO THE STATE OF RIO DE JANEIRO**

Photo: Klabin

Photo: Adami

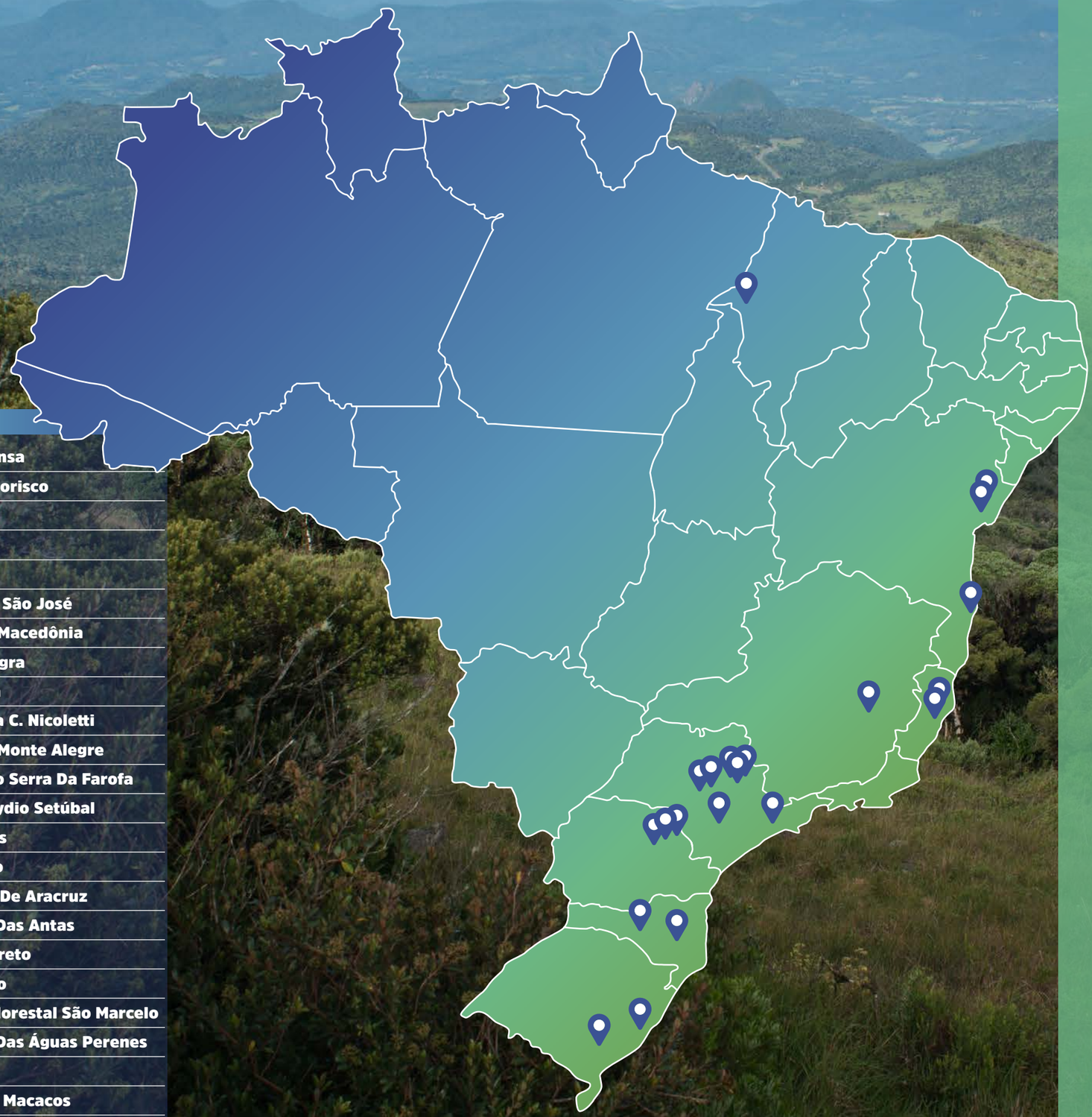
**OF GLOBAL BIODIVERSITY**

**20% IS IN BRAZIL**

Considering the data from Ibá's 2021 Annual Report (obtained in 2020), the planted tree sector was responsible for a total of 6.05 million hectares in permanent preservation areas (PPA), legal reserves (LR), and private natural heritage reserves (PNHR); this area is larger than the entire state of Rio de Janeiro. Of the total preserved by the sector, 4.02 million hectares are LR, 1.58 million are PPA, and 50,000 are PNHR.

There are another 395,000 hectares of high conservation value areas (HCVA); this term is adopted by FSC for areas with exceptional biodiversity, rare ecosystems, and threatened or endangered species that meet the essential needs of local communities or are critical to maintain traditional cultures. The presence of these HCVA in the areas where this sector operates requires companies to redouble their efforts to protect or even improve these reserves.

# PNHR IN THE PLANTED TREE INDUSTRY



| COMPANY | STATE | PNHR |
|---|---|---|
| Arauco | PR | Barra Mansa |
| Arauco | PR | Vale Do Corisco |
| Bracell | BA | Lontra |
| Bracell | BA | Jupará |
| Bracell | BA | Falcão |
| Bracell | BA | Pedra De São José |
| Cenibra | MG | Fazenda Macedônia |
| CMPC | RS | Barba Negra |
| CMPC | RS | Boa Vista |
| Irani | SC | Prof. Yara C. Nicoletti |
| Klabin | PR | Fazenda Monte Alegre |
| Klabin | SC | Complexo Serra Da Farofa |
| Suzano | SP | Olavo Egydio Setúbal |
| Suzano | SP | Entre Rios |
| Suzano | SP | Ecofuturo |
| Suzano | ES | Restinga De Aracruz |
| Suzano | ES | Recanto Das Antas |
| Suzano | ES | Mutum-Preto |
| Suzano | MA | São Bento |
| Sylvamo | SP | Parque Florestal São Marcelo |
| Sylvamo | SP | Floresta Das Águas Perenes |
| Sylvamo | SP | Paineira |
| Sylvamo | SP | Mata Dos Macacos |
| Veracel | BA | Estação Veracel |

Photo: Klabin

Private natural heritage reserves (PNHR): unit that allows sustainable use, voluntarily created by companies or rural landowners. PNHR are mainly intended to preserve biological diversity, ensuring it will be protected in perpetuity. Activities involving recreation, tourism, education, and research are also allowed in these areas, as long as they are authorized by the owner and specified in the PNHR management plan. Ibá's member companies are responsible for maintaining PNHR across the country that total 50,000 hectares combined.

Other indicators that help preserve biodiversity are the 30,900 hectares where the industry worked in 2020 to recover natural vegetation, the R$ 686 million it invested in social and environmental programs that include monitoring, scientific research, environmental education, and ecotourism, as well as the 6.8 million hectares of areas certified by leading international certifying bodies like FSC and Cerflor/PEFC, which include these companies' conservation areas and commercial plantations.

We should also recall that this industry is founded upon the bioeconomy, since it uses renewable raw materials, innovation, and technology to develop sustainable processes and products, including over 5,000 items we use in our daily lives. Many of these products that come from planted trees can replace raw materials from fossil sources, contributing to the climate change and biodiversity agendas.

Participation by the private sector is essential to fulfill global commitments, and for this reason the practices adopted by forest-based companies and their pledges to biodiversity are entirely connected to global targets such as the UN's Sustainable Development Goals (SDG), the targets in the Convention on Biological Diversity (CBD), and the Strategic Plan for Forests by the United Nations Forum on Forests (UNFF). In this context, the Brazilian planted forest sector is working together to build a country guided by the values of a low-carbon and increasingly sustainable economy.

# SUSTAINABLE DEVELOPMENT GOALS (SDG)

In 2015, the United Nations adopted the 2030 Sustainable Development Agenda, which encompasses 17 Sustainable Development Goals (SDG). The SDG reflect long-term challenges intended to guide work by member countries and involve the private sector.

## The United Nations Strategic Plan for Forests

The United Nations Forum on Forests (UNFF) is an intergovernmental body to debate and construct national visions with regard to forest topics, including planted forests. In 2017 the UNFF approved its Strategic Plan for Forests 2017–2030, which established a series of goals to promote sustainable management of all types of forests, combating deforestation and forest degradation. The UNFF Strategic Plan contains six global forest goals that are in line with the SDG, which in turn are related to the Paris Agreement (2015) and the targets set by the Convention on Biological Diversity (CDB).

The sustainable management practices adopted by the planted tree sector, particularly considering the biodiversity agenda, directly contribute to five SDG and three goals in the UNFF plan.


**SDG 2 - Zero hunger and sustainable agriculture:** End hunger, achieve food security and improved nutrition, and promote sustainable agriculture.


**SDG 11 - Sustainable cities and communities:** Make cities and communities inclusive, safe, resilient, and sustainable.


**SDG 12 - Responsible consumption and production:** Ensure sustainable consumption and production patterns.


**SDG 15 - Life on land:** Protect, restore, and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification and halt and reverse land degradation, and stop biodiversity loss.


**SDG 17 - Partnerships for the goals:** Strengthen the means of implementation and revitalize the global partnership for sustainable development.

— GLOBAL —
FOREST
— GOALS —

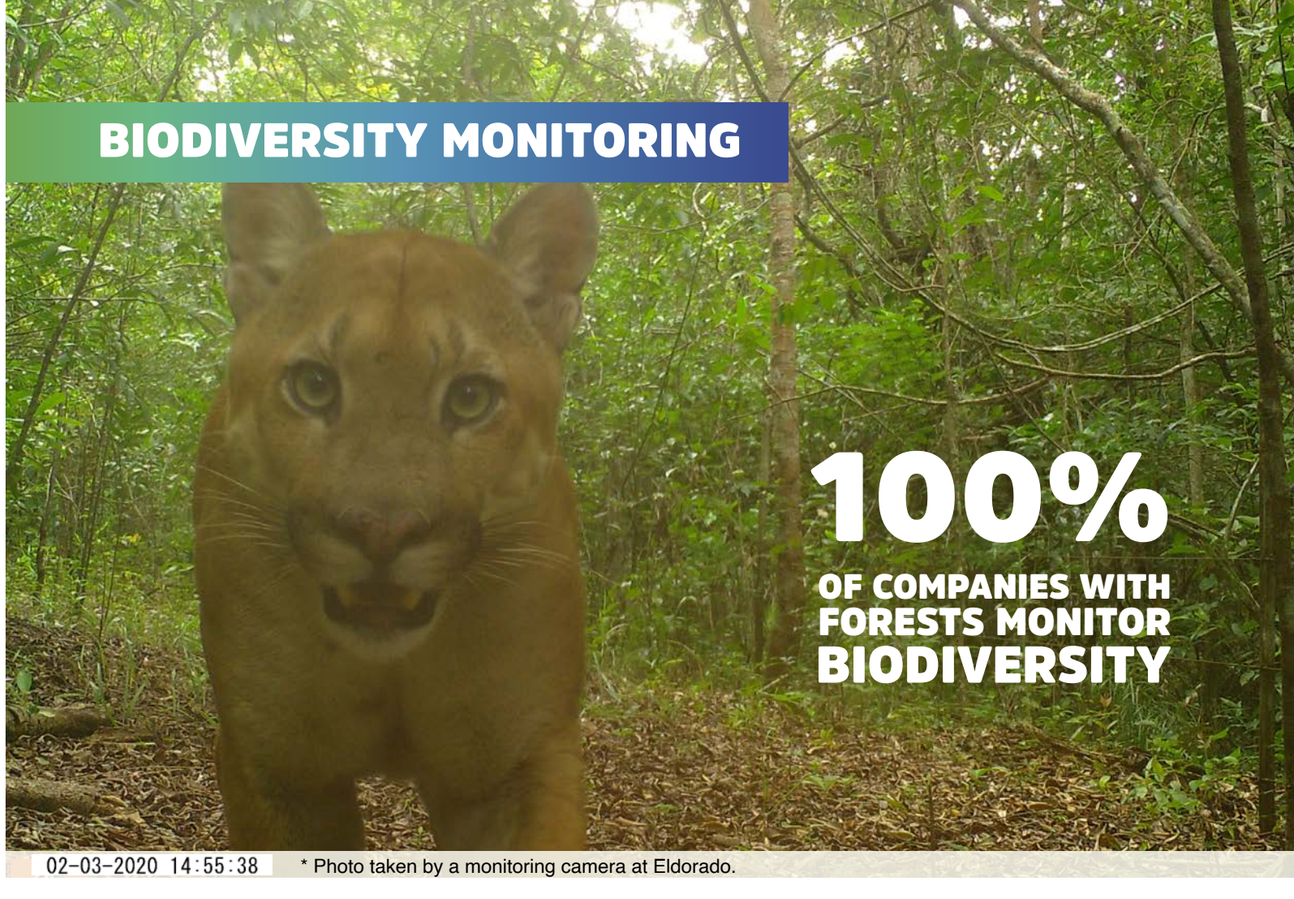
**Goal 1** - Reverse the loss of forest cover worldwide through sustainable forest management, including protection, restoration, afforestation and reforestation, and increase efforts to prevent forest degradation and contribute to the global effort of addressing climate change.

**Goal 3** - Increase significantly the area of protected forests worldwide and other areas of sustainably managed forests, as well as the proportion of forest products from sustainably managed forests.

**Goal 6** - Enhance cooperation, coordination, coherence, and synergies on forest-related issues at all levels, including within the United Nations system and across member organizations of the Collaborative Partnership on Forests, as well as across sectors and relevant stakeholders.



# BIODIVERSITY MONITORING




* Photo taken by a monitoring camera at Eldorado.

According to the Chico Mendes Institute for Biodiversity Conservation (ICMBio), monitoring biodiversity means carrying out a set of long-term activities that allow us to assess the responses of populations or ecosystems to conservation practices and the impacts of external factors like habitat losses, alterations to the landscape, and climate change. Through activities guided by monitoring, strategies can be developed to alleviate the pressures on ecosystems.

Sustainable management and concern for the species that live in these areas as well as their dynamics are an important part of strategy for these companies, and for this reason forestry practice is carefully planned to mitigate any potential impacts on biodiversity. A survey by Ibá found that 100% of companies with their own forests monitor biodiversity. For many years, these companies have invested in monitoring programs (some starting as early as the 1970s) and generated important data to monitor improvements and more sustainable forest management techniques, and also contribute to biodiversity conservation.

Monitoring of flora and fauna makes it possible to determine whether forest management is having an impact on biodiversity; if negative changes can be seen, strategies must be reconsidered. The sector has been working this way for quite some time. It is important to note that monitoring is conducted in the areas set aside for preservation as well as in the commercial plantations, since some fauna species that use planted forests to sleep or to move through areas have been identified.

Monitoring is carried out by multidisciplinary teams which may include specialists from the company's own staff or consultants that specialize in the areas, as well as partnerships with universities and other research institutions. Speaking of research partnerships, 70% of companies report that partnerships with teaching and research institutions led to degrees for new professionals and generated data that were published in scientific articles, monographs, and dissertations. Over the past five years, more than 50 texts on biodiversity (articles, theses, and dissertations) were published in partnership with forest-based companies. Species new to science were also described for the first time, such as *Ocotea mantiqueirae, Tocoyena atlantica, Cnesterodon hypselurus,* as well as other flora, and insect species that are still being identified. Monitoring also indicates species that are occurring in regions for the first time, for example the bird species *Forpus sclateri* (the dusky-billed parrotlet), which was recorded in Maranhão, and the threatened primate *Brachyteles arachnoides* (the southern muriqui), which was recorded in Minas Gerais.

## Some forest management practices for biodiversity conservation

**Adjusting the planted area due to proximity to locations where rare, endemic, and/or threatened species have been detected.**

**Planning harvesting activities to make it easier for animals to move between conservation areas.**

**Resizing and repositioning woodpiles after harvest to make it easier for animals to pass through the area.**

**Temporarily halting activities in the field when animals in breeding season or with young are identified in the region.**

**Adjusting the height of slopes and maintaining roadways to make it easier for animals to pass through these areas.**

**Establishing commercial plantations with varying ages that form a mosaic with native vegetation so that fauna can find shelter during different phases of management.**

**Daily harvest limits in certain areas to create temporary corridors for fauna.**

**Redefining priority areas for restoration in order to form ecological corridors.**

**Prioritizing native fruit-bearing species that attract fauna when choosing plant species used in environmental remediation programs.**

The Brazilian planted tree industry holds a major asset in its preserved areas totaling approximately 6.05 million hectares, which makes biodiversity monitoring a challenging task. A variety of techniques and methodologies are utilized to obtain better results, including camera traps, daytime and nighttime filming, various types of traps, capturing individual specimens (of invertebrates), recording noises and vocalizations, analyzing tracks and signs, direct observation, sampling in breeding areas, active search, developing apps and software, phytosocial inventory of plant species, and characterization of vegetation. Professionals working in this area are always looking for innovative methodologies including molecular and genetic approaches to help analyze and apply results, since small adjustments in management practice can make a big difference for local biodiversity.

Although monitoring is done by trained professionals, anyone can spot animals, anytime. To encourage more participation and increase the number of sightings, over 70% of companies have different projects encouraging staff to collaborate by reporting animals they might happen to see. Not only does this engagement assist the trained teams, it is also important to reinforce the importance of biodiversity and environmental conservation, since each person who collaborates becomes a guardian of the forest.

To ensure that forest assets and all the biodiversity they contain are maintained, 80% of companies have programs to combat illegal hunting within their areas, and 100% have programs to monitor, prevent, and combat forest fires. As part of these efforts, 100% of field teams are trained to respond if fires occur.

Photo: Klabin

**When managed well, planted forests in Brazil act as an important element of the landscape to encourage individuals to migrate between remaining areas of native vegetation.**

**Elson Fernandes de Lima**

**Project Manager at Casa da Floresta Ambiental**

“Biodiversity monitoring is a powerful tool to directly verify the positive and negative impacts of forest management on flora and fauna communities. We generally associate data collection and respective analyses with a search for solutions to apply to human activities that negatively affect plants and animals, which is entirely correct. It is in this sense that the work carried out by the Casa da Floresta suggests activities that can reduce or eliminate environmental impacts. On the other hand, there are various positive aspects that can only be observed through evaluations in the field combined with deeper analysis back in the office; for example, the number of species that utilize the understory of eucalyptus plantations for food, reproduction, and to move from place to place. In fact, animals frequently travel along logging trails and roadways used by forest operations. Even if they don’t stay in these spaces for very long, many species (including some endangered ones) use these environments to move between areas of native forests that are present in the landscape.

In this way, when planted forests in Brazil are managed well, they act as an important element of the landscape to encourage individuals to migrate between remaining areas of native vegetation, because many plantations are surrounded by such areas. This is obviously not the case for all species, since most cannot utilize modified environments. But it is wrong to ignore the fact that a significant subset of birds and mammals may benefit from forest stands, or to consider all environments that have been altered by humans to be equally inhospitable regardless of the commodity being produced there or the methods used. For example, just the studies conducted by the Casa da Floresta have involved nearly 170,000 records of nearly 1,000 species of birds and mammals alone (866 and 129 species, respectively) in forest landscapes, that is, in environments containing eucalyptus, pine, and native vegetation.”

# FAUNA AND FLORA SPECIES RECORDED BY THE PLANTED TREE INDUSTRY

With its continent-spanning dimensions, Brazil stands out for its rich species diversity, which accounts for roughly 20% of the world's biodiversity. Considering its 9.55 million hectares of planted areas and 6.05 million hectares set aside for conservation, the planted tree sector accounts for less than 2% of Brazil's area, but the value of the biological diversity found here reinforces the industry's commitment to this agenda.

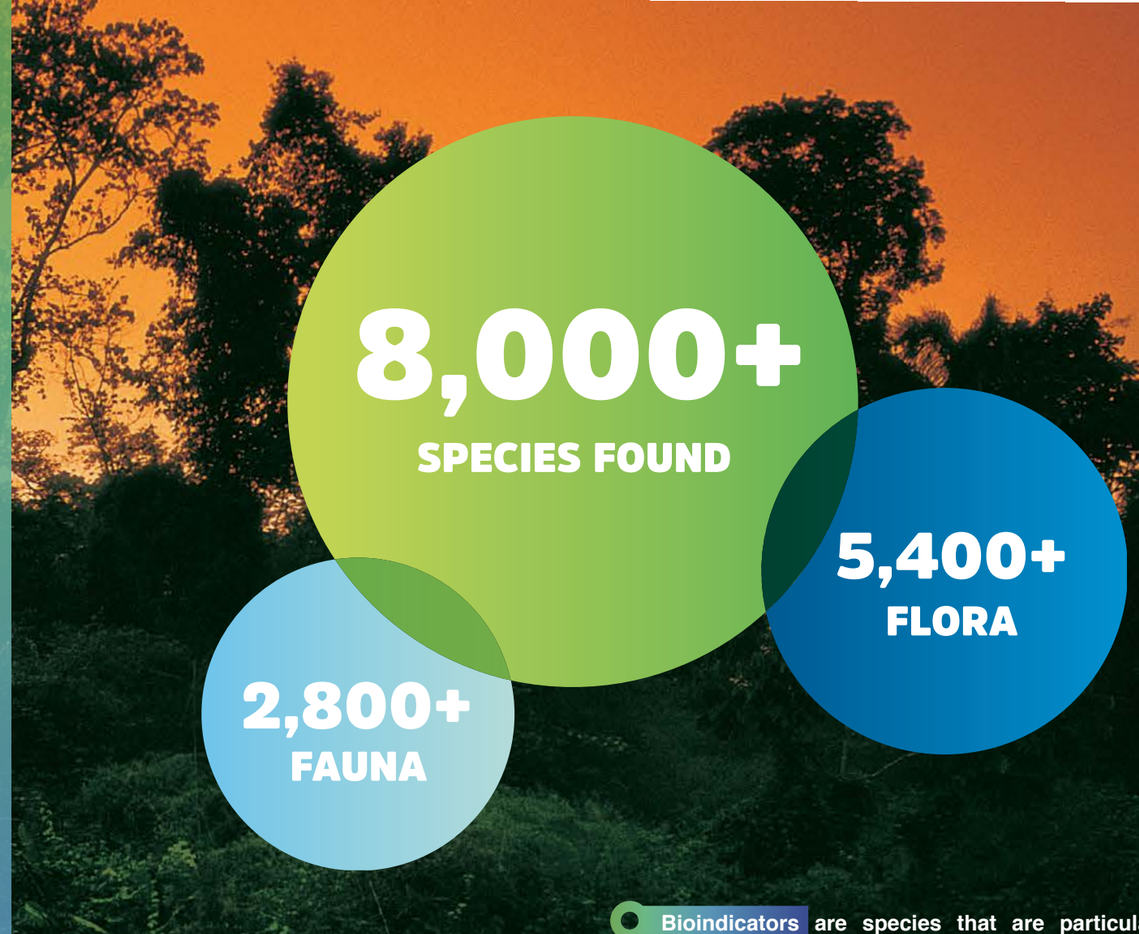
In order to provide more transparency and visibility for the industry's activities, in 2019 Ibá and its member companies began a broad-ranging effort to collect data on biodiversity. The information presented here in this Biodiversity Report is the result of historical data from monitoring programs, some going back as far as 1970. For this survey, 23 Ibá member companies shared their monitoring information, which covers 12 states and over 220 municipalities.

The survey includes records of over 8,310 species (including flora, mammals, birds, fish, reptiles, amphibians, invertebrates, and fungi) distributed across five biomes: the Amazon, Caatinga, Cerrado, Atlantic Forest, and Pampa. Most of the monitored groups were flora and fauna including birds, and mammals, as well as lower numbers of reptiles and amphibians. It is important to note that recording these species requires trained professionals to be directly involved with the various groups being monitored. The species must be carefully identified, and only then can the data be entered into the monitoring program databases.

There were 5,450 flora species recorded. As for fauna, the image below shows the number of species recorded in property belonging to forest companies compared to the total number of species in Brazil, proof of the industry's fundamental role in preserving biodiversity.


Photos: Irani (reptiles), Dexco (mammals), Eldorado (birds), Dexco (amphibians)






**Bioindicators are species that are particularly sensitive to changes in the environment, and are consequently considered indicators of environmental quality. For the Cerrado and Atlantic Forest biomes, 26 species (including birds, mammals, and flora) have been classified as bioindicators. In these same two biomes, 7 species of flora and 14 species of fauna were classified as rare.**

It is important to note that because the companies manage very large areas, monitoring of their entire properties is unfeasible, and for this reason they conduct sampling. Limited numbers of some species groups do not indicate their absence in certain areas, but rather that they simply were not seen during the sampling process and/or not included in the sector database. A good example of this is mid-sized and large animal species; their abundance is relatively low, and there are few sightings in the field, and the results in the sampling may consequently be underestimates. On the other hand, it is easy to note the presence of birds, which are considered important in discussions related to connectivity, edge effects, ecological corridors, and other issues, especially those related to landscape ecology.[1]

[1]Cadernos do Diálogo florestal: Silvicultura e Biodiversidade
[2]Can agroforest woodlots work as stepping stones for birds in the Atlantic forest region?
[3]The effect of structural and functional connectivity and patch size on the abundance of seven Atlantic Forest bird species.

Photos: Berneck (background), Irani (butterfly)

# THREATENED SPECIES RECORDED IN AREAS PERTAINING TO THE PLANTED TREE INDUSTRY

According to the study “Contas de Ecossistemas: Espécies ameaçadas de extinção no Brasil 2014” by IBGE, Brazil has over 3,000 threatened animal and plant species, which is 19.8% of the total of 16,645 species classified as vulnerable, endangered, critically threatened, or extinct in the wild.

**335+ threatened species**
**were recorded in areas belonging to the industry. More information can be found in the table below**

| Vulnerable (VU): | Endangered (EN): | Critically endangered (CR): |
|---|---|---|
| FAUNA 105 \| 70 FLORA | FAUNA 51 \| 78 FLORA | FAUNA 20 \| 11 FLORA |
| A species is considered vulnerable when it faces a high risk of extinction in the wild. | A species is considered endangered when it faces a very high risk of extinction in the wild. | A species is critically endangered when it faces an extremely high risk of extinction in the wild. |

**Extinct in the wild (EW):**
a species is considered extinct in the wild when it is known to only survive in cultivation, in captivity, or as a naturalized population (or populations) well outside its past range.

These species were classified according to the IUCN Red List Categories and Criteria as well as the Brazilian Official Endangered Species List published by the Brazilian Ministry of the Environment.

Looking more closely, this means that **38% of threatened mammals and 48% of threatened birds were registered in areas pertaining to forest-based companies.** Furthermore, because of the high level of preservation in areas belonging to the planted tree industry, some species that had been considered possibly extinct were identified in regions of Atlantic Forest, such as the birds *Claravis geoffroyi* and *Neomorphus geoffroyi geoffroyii.*

## 38% OF

**THREATENED MAMMALS WERE REGISTERED IN AREAS PERTAINING TO FOREST-BASED COMPANIES**

## 48% OF

**THREATENED BIRDS WERE REGISTERED IN AREAS PERTAINING TO FOREST-BASED COMPANIES**

Photos: Suzano (mammals), Jacinto Lana (birds)



## ROLL CALL!

**After reading some of the data from the rich variety of fauna and flora species that live in areas pertaining to the planted tree sector, it’s time for roll call!**

**Do you know these animals that are found in various biomes where companies in the planted tree sector work?**

Photo: Klabin

## Maned wolf

***Chrysocyon brachyurus***

This Cerrado species is emblematic of Brazilian fauna, and was chosen to appear on the 200-real bill. On the Brazilian list of threatened species (by ICMBio), it is classified as vulnerable, in other words, facing high risk of extinction in the wild. The maned wolf likes a fruit that was named for it: the wolf apple (*Solanum lycocarpum*). After eating wolf apples, the wolf helps spread the plant's seeds.

## Mandaçaia bee

***Melipona mandacaia***

These stingless bees have a black head and thorax, yellow stripes on their abdomen that fade in the center, and rust-colored wings; they measure 10–11 mm long. They build their nests in hollow trees. These bees are important pollinators for many plants in the Caatinga biome, and produce flavorful honey.

## Giant anteater

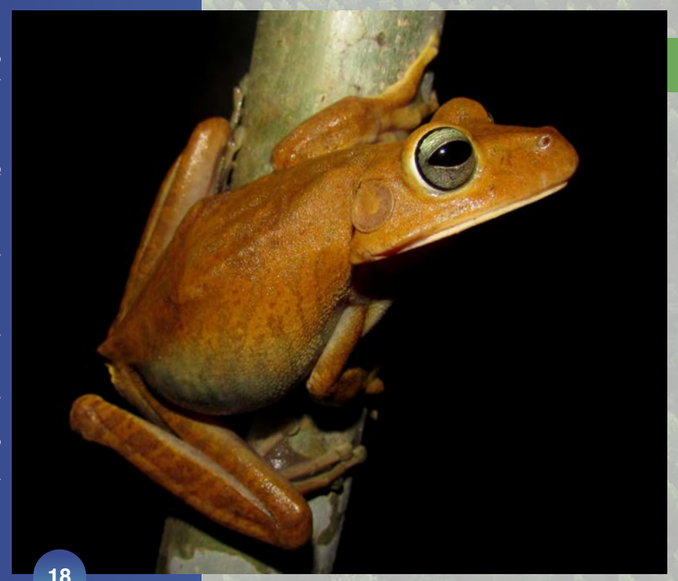
***Myrmecophaga tridactyla***

The giant anteater is around 2.20 meters long and weighs up to 45 kilograms. Its diet includes 30,000 ants and termites each day. This species can be found in various types of environments ranging from forests to grasslands. It is classified as vulnerable according to the Brazilian list (by ICMBio) of threatened species.

## Muriqui monkeys

***Brachyteles hypoxanthus e Brachyteles arachnoides***

These spider monkeys are endemic to the Atlantic Forest and the largest primate in the Americas, and are divided into two species: the northern muriqui (*Brachyteles hypoxanthus*) and southern muriqui (*Brachyteles arachnoides*). The northern muriqui is present in the states of Minas Gerais, Espirito Santo, and Bahia, with an estimated population of 1,000 individuals, leading this species to be classified as critically endangered on the ICMBio list. The southern muriqui is found in the states of Rio de Janeiro, São Paulo, and Paraná. This species faces very high risk of extinction in the wild, since there are just over 1,300 individuals living in the wild (and they are classified as endangered by ICMBio).



## Blacksmith tree frog

***Boana faber***

Occurs throughout Brazil. Its name refers to the sound made by males of this species to attract females during breeding season, which sounds like a hammer striking metal. Unusually, the tadpoles of this species can survive over 24 hours out of water; they also take almost a year to develop into adult frogs.

## Yellow-browed woodpecker

***Piculus aurulentus***

Found in southern and southeastern Brazil. Each species of woodpecker makes a different noise (known as drumming) by tapping the wood with their beaks. It measures approximately 20 cm and weighs between 20 and 70 grams. It is olive green above, and its chest has white bars. The male has a bright red forehead and yellow throat. The female has an olive green crown and yellow stripes on her face. During breeding season, pairs have different courtship rituals as they compete for mates.

Photos: Bracell (background), Klabin (maned wolf), Eldorado (giant anteater), Igor Macedo (frog)

Photos: Sylvamo (bee), Jacinto Lana (monkey), Berneck (bird)

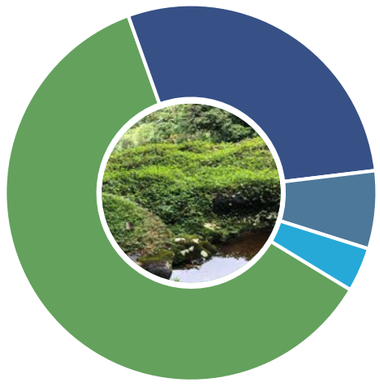
# RESTORATION

2021 was the start of the UN Decade on Ecosystem Restoration, which will extend until 2030. This is an initiative to protect and restore millions of hectares of ecosystems around the world, with participation by global leaders, researchers, and all of the Earth's communities. It is headed by the United Nations Environment Program (UNEP) and the Food and Agriculture Organization of the United Nations (FAO). According to the official website, restoring ecosystems means helping to remediate ecosystems that have been degraded or destroyed, and preserving ecosystems that are still intact. Healthier ecosystems, with richer biodiversity, generate more benefits such as more fertile soils, ecosystem services, greater productivity, regulation of water flows, and carbon storage. Restoration can take place in many ways, including active planting or removing pressure so that nature can recover on its own.

In Brazil there are an estimated 50 million hectares with potential for restoration, an area the size of Spain.[2] One initiative is the Restoration and Reforestation Observatory, a Brazilian platform that combines data from the field with satellite data to provide a panorama of all the biomes in the country. During its first round of reporting, it mapped 79,000 hectares of restoration areas, 11 million hectares of natural regeneration, and over 9 million hectares of reforestation.

**30,900**

**hectares being restored with native vegetation**



- 60.9% Atlantic Forest
- 6.7% Amazon
- 28.6% Pampa
- 3.8% Cerrado

The planted tree industry helps advance this agenda in two ways. First, it plants forests, preferably in previously degraded areas, thus improving soil conditions, nutrient cycling, regulation of water flows, and providing food and shelter for biodiversity.[3]

The second contribution is direct recovery of degraded areas. In 2020, the sector remediated 30,900 hectares of degraded areas to recover the native vegetation, a lengthy and meticulous effort. Of these areas, 60.9% are in the Atlantic Forest biome, 28.6% in Pampas grasslands, 6.7% in the Amazon, and 3.8% in the Cerrado drylands. Restoration is a way to restore biodiversity in areas where other remnants already exist, and especially when it fosters the creation of forest corridors, where planted trees are interspersed with conservation areas. Over time, restoration also permits carbon storage, which can be understood as an important interface between the agendas involving biodiversity and climate change.

In areas that these companies are restoring, records of bird and mammal species obtained during monitoring have been used as an indicator of success and quality in the early stages of restoration. Additionally, by detecting the presence of threatened species, the companies reassess which areas are priorities for restoration, in efforts to establish new and larger ecological corridors that facilitate the movement of animals in the forest fragments, enriching fauna and flora species and providing ecosystem services.

There are various restoration techniques used by companies in this industry, and each area requires specific studies that take local characteristics into account like the degree of degradation, native vegetation, local flora and fauna species, climate, and landscape.

It is important to remember that this is a cost-intensive, complex activity that is slow to yield results, since it is done on a large scale in regions with rich biodiversity. This requires ongoing dialog with neighboring communities to raise awareness and transform degraded areas into productive areas that will help those who live in the region achieve financial independence. This collaborative work provides other benefits, such as restoring bodies of water to reduce pressure from water use by others in the same watershed.

The restoration agenda has been growing and gaining speed in Brazil over the past decade, but many challenges still remain, such as establishing efficient indicators that represent the real quality of restored forests. The industry has been investing in innovation and partnerships with universities and startups to develop technological innovations to predict regeneration, quantify results, and reduce costs in order to strengthen this agenda in necessary and desirable directions.

[2]The global tree restoration potential
[3]Plantações florestais: geração de benefícios com baixo impacto ambiental



**Promoting sustainable forest management, restoring ecosystems in general and forests in particular, as well as all the environmental, social, and economic gains, also contributes to our health security.**

**Barbara Tavora Jainchill**

**United Nations Forum on Forests Secretariat. UN Department of Economic and Social Affairs**

"Through resolution A/RES/73/284 of March 6, 2019, the United Nations General Assembly proclaimed 2021–2030 the United Nations Decade on Ecosystem Restoration. In doing so, UN member states emphasized the importance of joint efforts to promote sustainable development in the three dimensions it involves (environmental, social, and economic), as well as the fact that natural ecosystems including forests are essential for sustainable development, reducing poverty, and improving human well-being.

Global Forest Goal 1, which is part of the United National Strategic Plan for Forests 2030, is to reverse the loss of forest cover worldwide, and includes restoration efforts. The first part of this goal is to increase forest area by 3% worldwide. The Covid-19 pandemic clearly showed the correlation between the planet's health, animal health, and human health. Promoting sustainable forest management, restoring ecosystems in general and forests in particular, as well as all the environmental, social, and economic gains, also contributes to our health security. For this reason, let us not view the pandemic as just a challenge, but also an opportunity to change our behaviors and priorities, and also understand that without a healthy planet, our health and well-being are in jeopardy."

# ECOSYSTEM SERVICES

We have briefly introduced all the activities that the planted tree industry utilizes in biodiversity conservation, but what benefits does nature offer? Ecosystem services are the benefits provided by ecosystems and biodiversity for human well-being and economic activities. There are different ways of classifying ecosystem services. The Millennium Ecosystem Assessment (MEA), which was published in 2005, classifies ecosystem services into four categories: provisioning services, regulating services, cultural services, and supporting services (which include habitat). Below are some examples:

To provide an example of the importance of ecosystem services and provisioning services in particular, it is believed that 40% of all prescription and non-prescription drugs used worldwide have active ingredients that were extracted from or originated in plants or animals.[4]

We should note that there is a difference between ecosystem services and environmental services. Ecosystem services were defined above; environmental services are those activities and actions by humans that have a positive impact on ecosystems and diversity, which in turn contribute to ecosystem services.

As we have seen, the industry utilizes various practices that contribute to environmental services, such as preservation of native areas (through PPA, LR, and PNHR), adequate management of the soil, of water resources and inputs, mosaic planting, biodiversity monitoring and preservation, generating energy from renewable sources, management and reduction of the amount of solid waste generated, ecological restoration, and partnership with beekeepers and honey cooperatives.

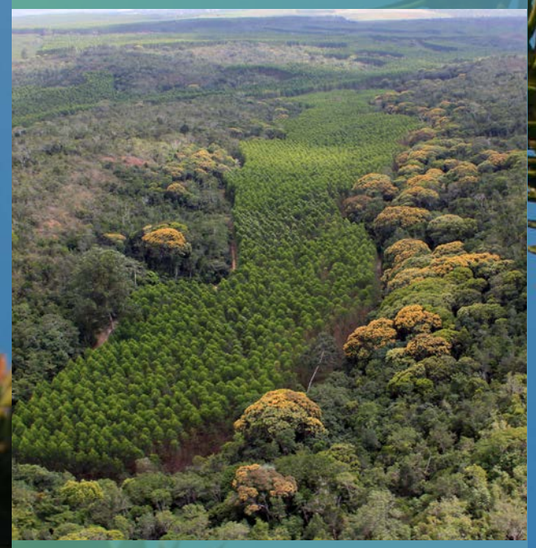
As part of efforts to strengthen the sustainability agenda, in 2021 Brazil ratified Law 14.119, which established the National Policy for Payment for Environmental Services. This policy recognizes fiscal or legal incentives that encourage the maintenance, remediation, or improvement of ecosystem services.

## PROVISIONING SERVICES

**direct products provided by ecosystems like food, wood, fiber, genetic resources, biochemicals, medications, and water.**

## REGULATING SERVICES

**basic processes that moderate ecosystems, like maintaining air quality, regulating the climate and water flows, biological controls, pollination, carbon sequestering and storage, recycling waste materials, and controlling erosion.**

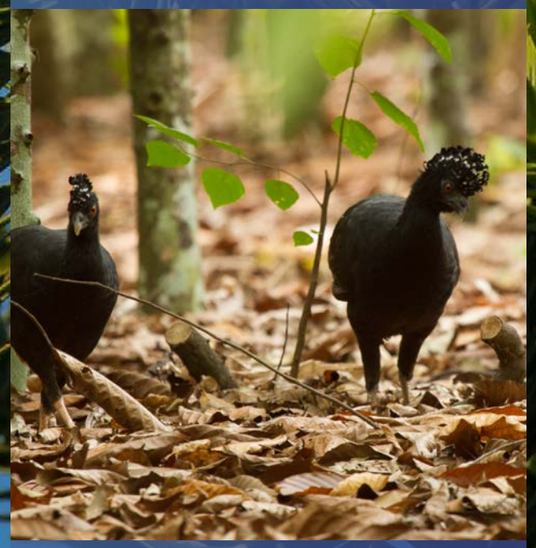


## CULTURAL SERVICES

**non-material benefits provided by ecosystems via recreation, ecotourism, environmental education, research, cultural identity, spiritual and esthetic experiences, and intellectual development.**

## SUPPORTING SERVICES

**essential services to maintain ecosystems, like producing oxygen, dispersing seeds, nutrient cycling, producing water, and providing habitat.**



[4]Ecologia: De Indivíduos a Ecossistemas.

Photos: Klabin (background), Irani (provisioning service), Bracell (regulating service)

Photos: Klabin (cultural service), Suzano (supporting service)

# POLLINATORS AND THE PLANTED TREE SECTOR

In a nutshell, pollination is the process by which plants reproduce, perpetuating flora species. Pollination is a very important ecosystem service.

According to FAO, pollination is a fundamental process for ecosystem survival, since nearly 90% of the world's native flowering plants, 75% of food crops, and 35% of the planet's agricultural land depend on this system for reproduction and development. Pollinators not only directly contribute to our nutritional security, but are essential to preserving biodiversity.

Pollination can take place via wind, water, animals, or even gravity. Brazil has over 338 species of potential vertebrate pollinators: birds, bats, land mammals, and reptiles.[5] Insects like flies, moths, and beetles also play a role in pollination. Bees are the most efficient pollinators, since their bodies are covered with hairs where grains of pollen from the flowers they visit can attach.

The main planted forest species in Brazil (eucalyptus and pine) do not require pollinators in the forest plantations, but forest activities are very closely related to local communities, and one way to strengthen this partnership is through beekeeping. A survey of Ibá member companies found that 87% have partnerships with beekeepers and/or cooperatives. Besides work with the Africanized honeybee (*Apis mellifera*), which is the most common species, some projects also involve producing honey from native bee species (known locally as jataí, mandaçaia, and yellow-uruçú).

These programs, which are distributed across all five regions of Brazil, benefit approximately 2,120 beekeepers and 70 cooperatives. Some beekeepers are independent, without links to cooperatives or associations. Approximately 1.36 million hectares are provided by forest companies as "bee pastures" which include native as well as planted areas. The companies also contribute in other ways like providing materials for beekeeping, infrastructure, access to new markets and public policies, and training on important topics such as current practices, business management, and safety.

These programs produce 1.6 tons of honey per year. Besides honey, other products are also sold like pollen and propolis, and to a smaller extent, cosmetics, drinks, and other products featuring honey and royal jelly.

Strengthening beekeeping through partnerships with forest-based companies helps develop the local community by generating jobs, diversifying the income sources and multiple uses of the forest. Meanwhile, beekeepers become "guardians of the forest," since their presence keeps unauthorized people from entering planted and conservation areas, in turn reducing illegal hunting and fishing, fires, and dumping.

Preserving pollinators and promoting a safe environment for these species is not only essential to maintain the Earth's biodiversity, but also agricultural production as a whole.

[5]Polinizadores Vertebrados: Uma Visão Geral para as Espécies Brasileiras

Photo: Klabin



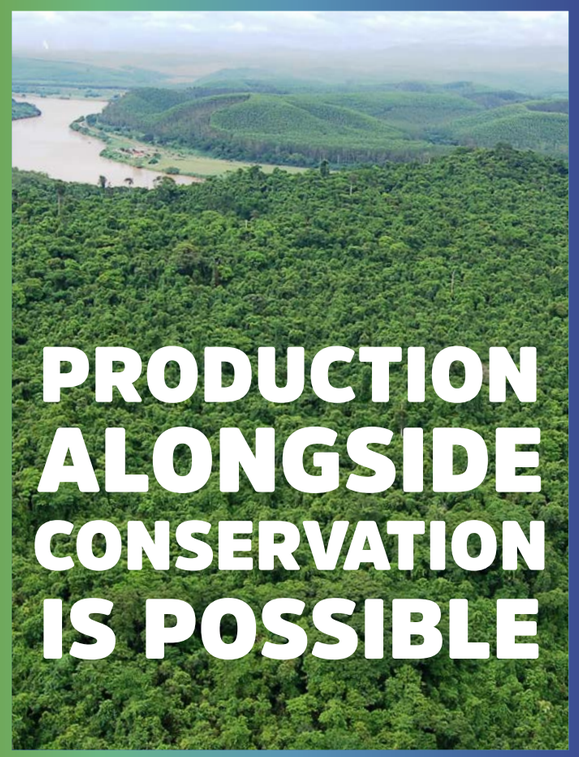
**"And it is increasingly urgent for people, companies, and governments to see forests as something greater, and infinitely more valuable, than just a source of wood.**

**Daniela Teixeira Vilela**

Executive Director of FSC Brazil

"Responsible management ensures that forest cover will be maintained, thus protecting biodiversity, preserving remnants and restoring forest landscapes, as well as contributing to social and economic prosperity. In this sense, by promoting responsible management, FSC certification plays an important role in combating deforestation and degradation, which are crucial elements in the global climate change agenda. In 2018, when FSC developed the procedures for ecosystem services, the goal was to demonstrate the value of sound forest ecosystems, measuring positive impacts from responsible practices and also promoting partnerships that reward them.

It is essential to encourage not only meticulous and sustainable work, but also to stimulate markets that recognize, value, and pay for the ecosystem services that sustainable management helps preserve. It is increasingly urgent for people, companies, and governments to see forests as something greater, and infinitely more valuable, than just a source of wood. Various products and services can be obtained, and many are still unknown or barely utilized. For this reason, tools like FSC that make it possible to measure, verify, and report the positive impacts of responsible management can help add value to companies and to their projects, boosting market confidence, which tends to facilitate access to investments and subsidies."



## PRODUCTION ALONGSIDE CONSERVATION IS POSSIBLE

Photos: Gleison Rezende / Bracell (background) - Klabin, Dexco, Veracel, Cenibra



# BRACELL SP DISCOVERS AND EXPANDS BIODIVERSITY-RELATED VALUES IN BRAZIL'S MOST THREATENED BIOMES

Bracell

Conservation of Nature (IUCN), the Brazilian Ministry of the Environment, and the state of São Paulo; it is endemic to the region between the Tietê and Paranapanema Rivers. The monitoring efforts allow us to learn about, identify, and monitor the development of local biodiversity, as well as assess the effects of forest management on the environment and take measures for protection and awareness.

SP is located in Brazil's most threatened biomes, the Atlantic Forest and Cerrado, and has taken on an important role in maintaining the species present where it works, particularly the Cerrado in São Paulo state, which is considered critical for conserving biodiversity because of how it has been fragmented in the past. The company carries out various activities related to biodiversity and the landscape as part of its sustainability strategy, which is in line with the UN's SDG that help preserve animals and their habitats. Bracell has been monitoring local flora and fauna for 15 years, and compiled important data showing success maintaining these species in its areas in São Paulo. The more than 600 species identified include very important individuals such as the black lion tamarin (*Leontopithecus chrysopygus*), one of the world's rarest and most endangered primates which is classified as endangered by the International Union for

**The more than 600 species identified include very relevant individuals such as the black lion tamarin, one of the world's rarest and most endangered primates.**

# RECOVERY OF NATIVE PLANT SEEDLINGS


**199,000 hectares**
**of native vegetation**

CMPC Brasil has 199,000 hectares of native vegetation, 45% of which required some type of intervention to improve environmental conditions. Today, the models and techniques recognized as the most effective for restoring degraded areas are those that were used, based on succession paradigms. Central among these measures is the recovery of native seedlings, since it maximized the potential resilience (self-generation) of the site. In practical terms, this means recovering young plants that sprout in the understory below the commercial stands of planted eucalyptus trees. Recovering these plants means they get a new chance at life, enriching areas where native vegetation is being restored. This operation involves technical and logistical challenges and is still not widely used as a restoration technique by other companies in the forest sector. CMPC Brasil has been investing in this modality because it believes in the benefits of using these young plants and species adapted to the local conditions. Today, 80% of all seedlings planted in remediation areas are obtained through this process. The recovery technique is simple and can be copied on any rural property, but it is essential to respect environmental legislation; seedlings cannot be removed from permanent preservation areas, for example.

After they are collected, the seedlings are carefully transported to a nursery, where the species are identified and the plants are watered and fertilized regularly until they are ready to be planted. This period of time can vary according to species and the size of each seedling when it was removed from the plantations.



# FOUR DECADES OF STUDIES AND MONITORING

Learning about the biodiversity that lives in our environments is part of Dexco's history. And as part of this history, the company has been surveying and researching fauna and flora species since the 1970s.

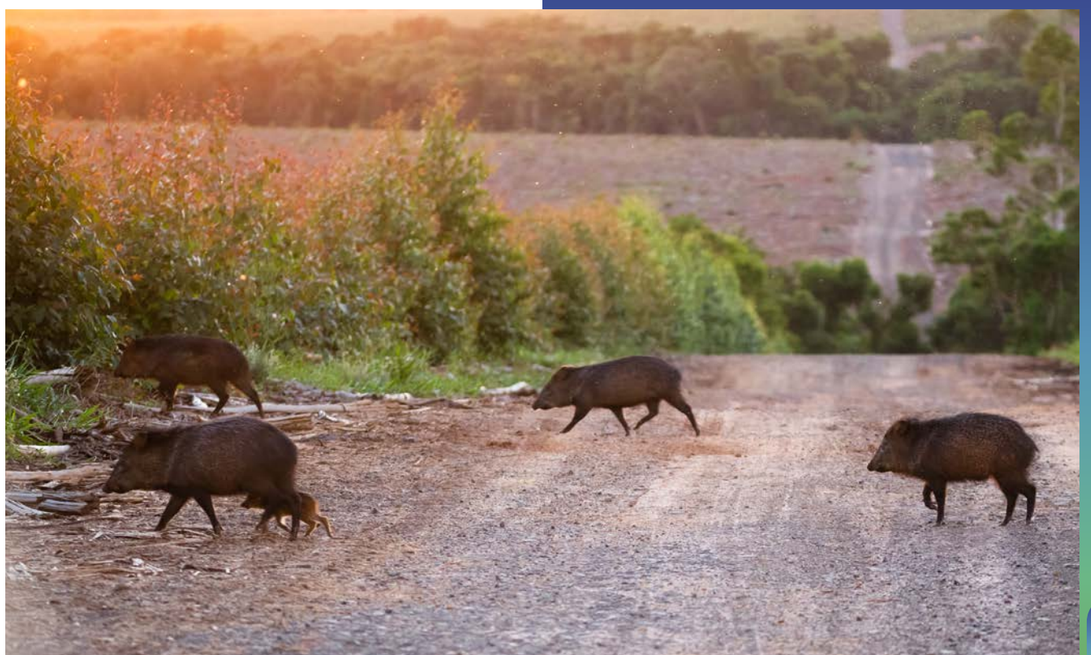
The nearly 100 studies conducted over these four decades have made it possible to identify 1,157 species of fauna and 1,494 species of flora, 38 of which are found on the IUCN endangered list. These studies are more than just numbers: they have generated scientific knowledge shared through monographs, theses, and dissertations and produced value for the scientific community.

These efforts have driven the development and refinement of new techniques that later became references, such as the study of birds via bioacoustics, which was developed by Jacques Vielliard in areas owned by the company in Lençois Paulista (SP).

Today, technology is our ally in creating databases that allow use to analyze results over time in the study areas. These resources are utilized to monitor natural regeneration, classifying stages and priorities for conservation, and in the Lente Animal ("Animal Lens") program where staff, visitors, and the community can report fauna sightings through an online form. These applications are important to broaden studies on biodiversity.

This history of monitoring has broadened understanding of the dynamics of the species present in the forests, allowing Dexco to adapt its forest management and offer solutions for better living.

**1,157 fauna species and 1,494 flora species identified in the company's areas**



# SNAPSHOTS: PRESERVATION ALLIES

Biodiversity management includes frequent monitoring and evaluation of ecosystems in the areas where companies operate. One of these programs involving camera traps began in 2017 in order to survey mid-sized and large mammal species to record biodiversity in the region and assess its relationship with forest operations.

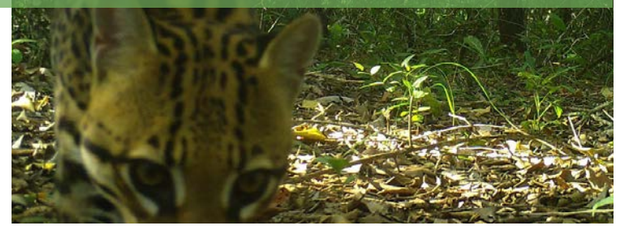
This efficient, non-invasive method is ideal for long-term studies of species that are not well known, as well as those that are endangered. Notable points in the main results of this program are:

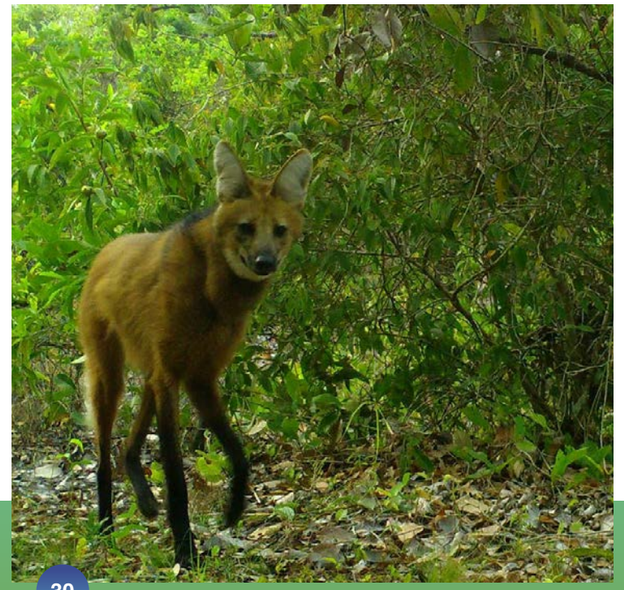
• 6,649 days of monitoring, during which there were 7,303 records of wildlife, including 24 species of mid-sized and large mammals (11 of these threatened species).

• Forest management helped create ecological corridors, protecting conservation areas and connecting fragments.

• The diversity (variety of species in a certain habitat or region) found exceeded the results from previous research conducted in Mato Grosso do Sul. Rare species like the bush dog (*Spathose venaticus*), paca (*Cuniculus paca*), and giant armadillo (*Priodontes maximus*) were found, and some individuals like tapirs (*Tapirus terrestris*) and cougars (*Puma concolor*) were recorded with young, demonstrating that the environment has the equilibrium needed for these species to develop and reproduce, strengthening the role of responsible forest management in protecting conservation areas. Important seed-spreading species like the tapir (*Tapirus terrestris*), collared peccary (*Dicotyles tajacu*), white-lipped peccary (*Tayassu pecari*), crab-eating fox (*Cerdocyon thous*), maned wolf (*Chrysocyon brachyurus*), and Azara's agouti were also registered.

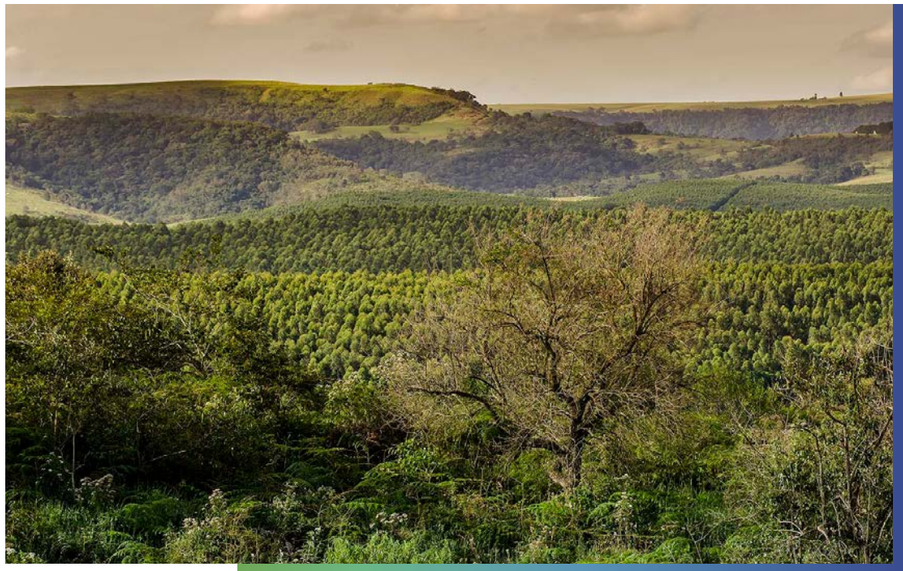
**6,649 days of monitoring**
**24 recorded mammal species**
**11 threatened species**







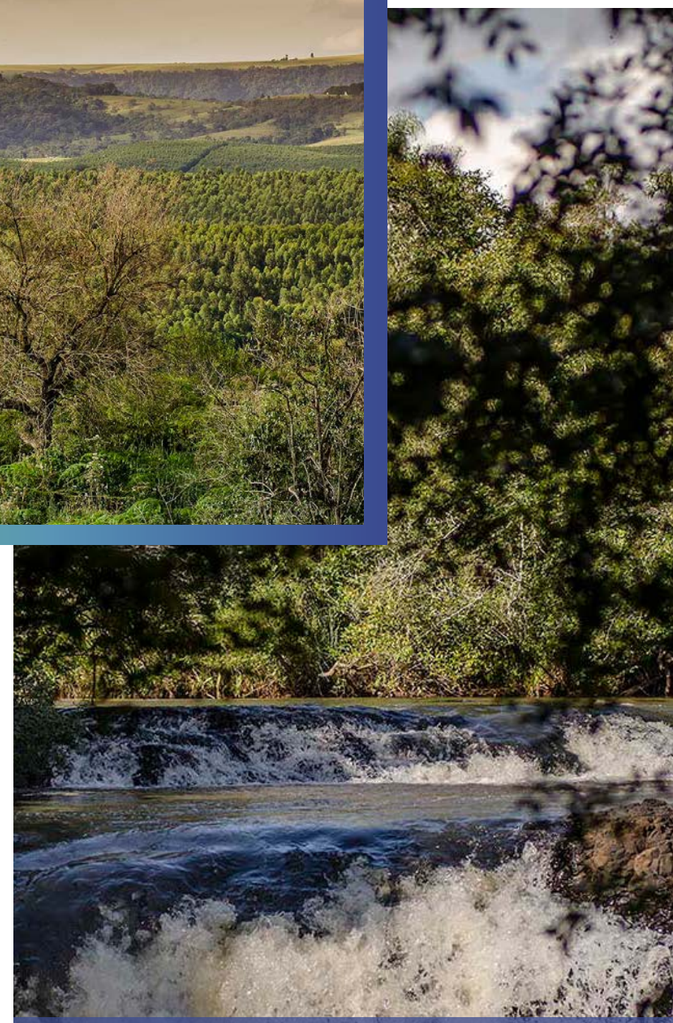
# RESTORING FORESTS FOR THE ENVIRONMENT



In accordance with its mission and vision and with social and environmental responsibility, Eucatex plans and carries out a number of forest restoration activities that involve gains for the environment and biodiversity; these include connecting fragments of natural habitats by what are known as ecological corridors. The goal is to allow animals to move, increasing seed dispersal and vegetation cover, and permit genetic flows for fauna and flora species by reducing fragmentation of natural ecosystems.

In 2019, at the Santa Terezinha farm in Bofete, SP, the company planted over 1,500 seedlings of seasonal semideciduous forest species over approximately 10,000 m² in order to connect one isolated 13-hectare fragment of late-second-stage vegetation with a similar 600-hectare area.

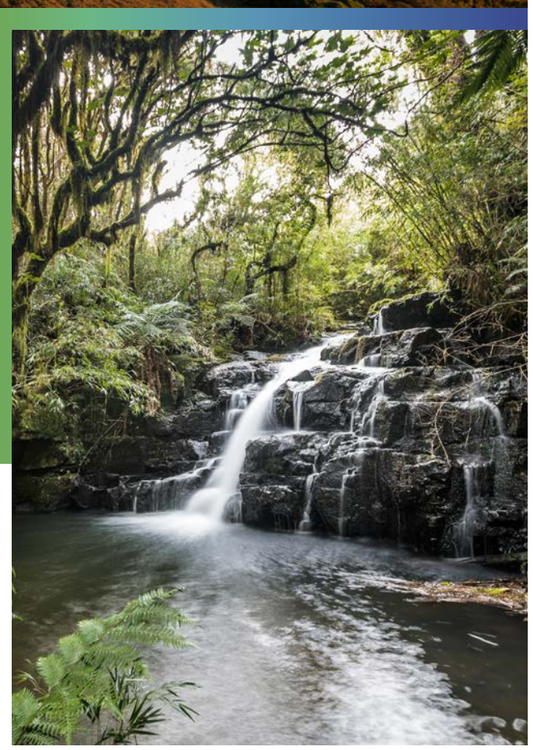
Flora and fauna monitoring two years later showed a 43% increase in the number of bird species and a 170% increase in mammal species; this is because these corridors encourage land mammals to circulate more as they search for food and shelter in new places, broadening their ranges and their niches. The Santa Teresina farm also has the company's greatest native flora biodiversity, with over 80 plant species in around 1,420 hectares of both Cerrado and Atlantic Forest vegetation.



**42% increase in the number of bird species sighted, and 170% increase in mammal species**

# BRAZIL'S FIRST COMPANY WITH THREE FSC® CERTIFICATIONS

**Klabin's Complexo da Farofa PNHR has nearly 5,000 hectares of Atlantic Forest remnants**



In November 2021, Klabin obtained FSC certifications in ecosystem services, biological diversity conservation, carbon sequestration and storage, and watershed services for the Nascentes Farm, located within the Complexo Serra da Farofa PNHR in Santa Catarina. After an audit by the Institute for Forest Management and Certification (IMAFLORA), the company became the first in Brazil to simultaneously achieve three seals. The private natural heritage reserve contains approximately 5,000 hectares of remaining Atlantic Forest, including araucaria and highland forests. The Canoas and Caveiras Rivers, which provide water for the cities of Painel and Lages, also originate within the PNHR.

Ecosystem services like carbon sequestering and storage and watershed services are directly related to ecosystem services for biodiversity conservation, and together they maintain and preserve biodiversity as well as various benefits for the environment as well as the community in the region. This takes place because different indicators directly impact quality of life, health, and well-being for the native population and for the more than 570 species of flora and 357 species of fauna that have already been identified and are on endangered species lists. This certification reflects the company's efforts in the area of sustainable development and is in line with the company's own sustainable development goals (KODS).

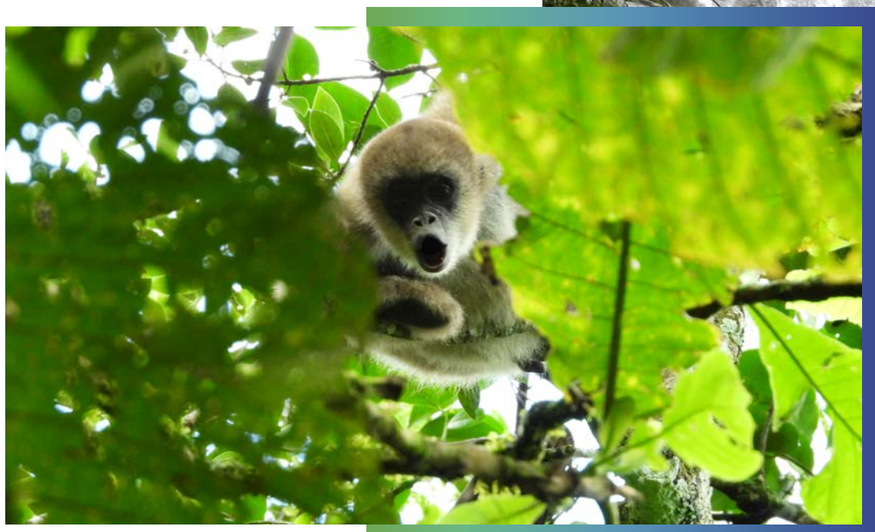


# THE "PRESERVING ENDANGERED PRIMATES" PROJECT

For over a decade, Suzano has been monitoring the southern muriqui monkey (*Brachyteles arachnoides*), one of the largest neotropical primates. It is essential to assess primate conservation status in order to identify the dangers they face, understand their population dynamics, and find solutions to protect them.

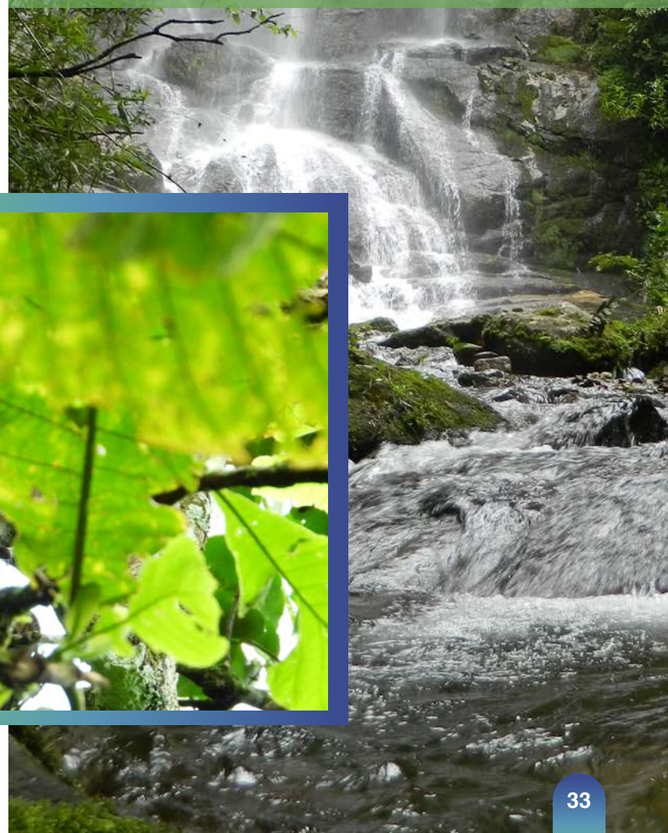
In 2021, the company signed an agreement with the Federal University of Viçosa (UFV) to carry out this project on the São Sebastião do Ribeirão Grande Farm in Pindamonhangaba and Neblinas Park in the towns of Mogi das Cruzes and Bertioga in São Paulo state. Together, these farms contain a total of 8,589.45 hectares set aside for preservation.

The goal is to assess the conservation status of threatened primate groups to determine priority measures for preservation, considering the southern muriqui as an emblematic species. The program involves five fronts: I. Monitoring primate populations via traditional methods (census and audio call playback); II. Demographic survey to better understand the behavior patterns and area used by the southern muriqui, using camera traps; III. Using a special drone that incorporates heat-sensing and high-resolution digital cameras; IV. Analyzing the populational viability of the groups of muriquis to predict the risk they face; V. Ecological restoration via research in order to connect or expand their forest habitats.



This project is an example of how new technologies can be harnessed to preserve biodiversity. The project will also provide data for ICMBio's National Action Plan to Preserve Atlantic Forest Primates and Maned Sloths (PAN PPMA).

**The project is an example of how new technologies can be harnessed to preserve biodiversity.**



# ESTAÇÃO VERACEL: BEAUTY AT THE SERVICE OF THE GLOBAL ECOSYSTEM

As a result of its intensive and conscientious environmental work, the biodiversity conservation efforts at the Estação Veracel PNHR earned Veracel Celulose S.A. the FSC C017612 Ecosystem Services Procedure® seal, granted in Brazil by IMAFLORA. FSC certification recognizes and values the work of companies and organizations that use natural resources without depleting them. The Estação Veracel PNHR (which was recognized by Ordnance 149 of November 5, 1998) is the largest private reserve of Atlantic Forest in northeastern Brazil, and the second largest reserve of the Atlantic Forest biome. There are 6,069 hectares covered with forest that also have historical value; the Portuguese explorer Pedro Álvares Cabral and his fleet resupplied their ships with fresh water from the Mutari River, which originates within the reserve. Since 1999, the Estação Veracel PNHR has been recognized by UNESCO as part of a Natural World Heritage Site.

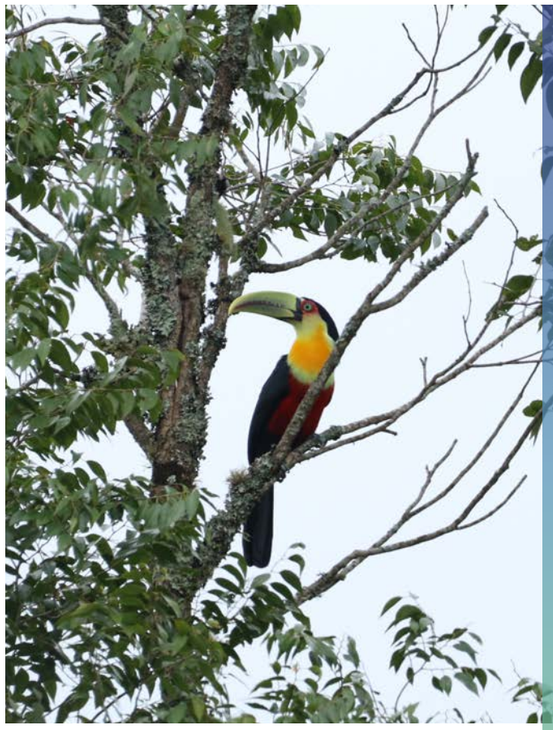
Thanks to technology, the monitoring data are increasingly precise; 25 species of mid-sized and large mammals, 229 bird species, and 242 flora species have been recorded so far.

Ecosystem services for biodiversity conservation are essential for maintaining ecological equilibrium in the region. They also contribute to water quality and quantity, since the existing relationships between flora and fauna are important for biological cycles. tries to keep the environment in balance. The main beneficiaries are immediate neighbors, but the results are part of a large-scale effort towards global well-being and for the economy in general by addressing climate change.

**The Estação Veracel PNHR is the largest private reserve of Atlantic Forest in northeastern Brazil.**



# OVER 27 YEARS MONITORING FAUNA AND FLORA



**607 flora and fauna species were identified, and at least 41 of these are threatened**

WestRock's sustainable forest management and double certification help preserve biodiversity and natural habitats in the regions where the company has forests. Planting pine and eucalyptus in a mosaic with preservation areas forms ecological corridors, which help preserve the forests that provide food, shelter, and breeding areas for flora and fauna species.

To continue improving, flora and fauna here have been monitored for over 27 years. During this period 607 flora and fauna species were identified, and at least 41 of these are threatened.

The monitoring data include a record of a brown brocket deer, which according to the IUCN faces predatory risk, primarily from hunting and environmental degradation. Birds and other mammals like tayras, pacas, ocelots, and pumas have also been sighted.

Since 2020, a new program has been conducting long-term monitoring on plants and animals present in farms in Bela Vista do Toldo (SC), Antônio Olinto (PR), and Três Barras (SC). This provides a more detailed vision of the benefits of forest management for biodiversity conservation in the region. The study makes it possible to compare data from different periods but similar climates, in conservation areas as well as those that combine planted and native forests. The program also diagnoses indicators for fauna and flora on eight other farms. The idea is to determine whether these areas are also important to the landscape and biodiversity in order to incorporate them into more detailed monitoring in the future.

# A WORD FROM THE LEADERS

**Carmine de Siervi Neto**
CEO of Eldorado Brasil Celulose

"Sustainability is in our DNA at Eldorado. This is why we dedicate over a third of our land to conservation, and why we implement a series of measures in our planted eucalyptus forests for harmonious coexistence and appropriate forest management, such as fauna monitoring and creating ecological corridors, in collaboration with government, academia, and the private sector. This is all done to defend natural resources and biodiversity."

**Ronaldo Isac Werthajm**
CEO of the Formitex Group – MD Papéis

"It is always important to remember that biodiversity conservation does not run counter to human advancement; rather, it ensures that future generations will have the same resources we enjoy today. Our role is to care for the future, making current processes more circular and sustainable, and this is our commitment at MD Papéis."

**Nilton Saraiva**
CEO of Ibema

"Protecting biodiversity is part of the choices we make every day. It is important to prioritize the circular economy, being careful about our environmental impact, replacing plastic and emphasizing recyclable raw materials like paper: all this means being in line with our goal of protecting the future for caring for the next generations."

**Sérgio Ribas**
Director-President of Irani Papel e Embalagem

"Forests are the heart of our industry, and to extend the longevity of our business and the future of our planet, there must be a balance between use of natural resources and sustainable production, as well as control and monitoring of the entire process. Only in this way can we be sure that our operations will run properly, controlling environmental impacts and preserving biodiversity."

"The forest-based sector is a global reference for sustainable management of its forests, which involves intensive efforts in biodiversity conservation that provide ecosystem services. Klabin has a history of commitments to sustainability, and works to expand the uses of wood and develop new business from planted trees through sustainable and restorative management of its forests, integrating the values of ecosystems and biodiversity to improve the company's capacity to generate and share benefits with society."

**Cristiano Teixeira**
Director-General of Klabin

"Biodiversity is one of the most important issues for us. Recently a group of threatened primates, southern muriquis, was identified in our forests. This finding was only possible because of our work with certified management practices and preservation of the fauna, flora, and water in our areas of native forests. Furthermore, our forest planting techniques preserve the soil and natural resources, minimizing environmental impacts. This rigorous control allows us to carry out new activities to protect and preserve species, protecting them from extinction."

**Rafael Gibini**
CEO da Melhoramentos

"Biodiversity conservation is essential for life on Earth, and should be a founding principle for every actor that transforms society, through a collaborative and ongoing effort. In this sense, we understand that this is also our role. To help protect biodiversity at Suzano, we have committed to connecting half a million hectares of priority conservation areas in the Cerrado, Atlantic Forest, and Amazon biomes by 2030, an area four times the size of the city of Rio de Janeiro."

**Walter Schalka**
President of Suzano

Photo: Klabin

# GLOSSARY

**ECOLOGICAL CORRIDOR**
A strip of vegetation that connects two or more similar habitat blocks

**ENDEMIC SPECIES**
Species limited to a certain geographical region

**RARE SPECIES**
Species that are uncommon, scarce, or infrequently encountered in nature

**PHYTOSOCIAL INVENTORY**
A survey to quantify the flora in a region, as well as its structure, function, dynamics, and distribution

**MOSAIC**
A forest management technique in which areas of planted forests are interspersed with native vegetation

**AGE MOSAIC**
Ensures heterogeneity through vertical stratification (different growth stages); the strata have different resource requirements and serve as habitat for many types of flora and fauna that live in the same environment

**SLOPE**
Inclined area, often as part of earthworks

Cover photos:

1 - Bracell
2 - Klabin
3 - Bracell
4 - Klabin
5 - Eldorado
6 - Klabin
7 - Dexco
8 - Klabin
9 - Cenibra
10 - Klabin
11 - Nathália Granato
12 - Klabin
13 - Klabin
14 - Jacinto Lana
15 - Klabin
16 - Sylvamo
17 - Klabin
18 - Bracell
19 - Nathalia Granato
20 - Veracel
21 - Klabin
22 - Klabin
23 - Klabin
24 - Klabin
25 - Sylvamo
26 - Sylvamo
27 - Klabin
28 - Klabin

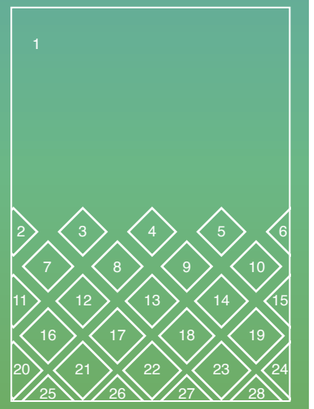





Photo: Jacinto Lana

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