

Executive Summary

KEY MESSAGES:

- Forests are among the most scalable and cost-effective climate solutions available today. They absorb about 1/3 of the annual global greenhouse gas emissions from human activity. Without preserved, managed and restored forests, there is no way the world can meet the targets of the Paris Agreement
- Brazil is the most important player in this equation, as it holds the largest areas of tropical forests in the world and, at the same time, has the greatest potential for forest restoration on the planet
- If deforestation is controlled and forest restoration area and forestry development is maintained, Brazil will be able to reverse the forest loss curve and see an increase in forest cover and growth in carbon stocks
- Brazil has already shown that it is capable of reducing deforestation rates, particularly in the Legal Amazon. Command and control policies, combined with land-use planning and market mechanisms, could lead Brazil to zero illegal deforestation by 2030*
- Through the Forest Code, Brazil has 215 million hectares of preserved forests and reforested areas on rural properties dedicated to food production
- The Tropical Forests Forever Fund (TFFF) and Jurisdictional REDD+ (JREED+) are promising mechanisms for financing the conservation of standing forests.
- Ecosystem restoration is attracting interest from major private sector players and is heading towards a scale of millions of hectares by 2035
- Exotic species forestry in Brazil, the most competitive in the world, expects an increase in planted area from 4 million hectares to 6.2 million hectares in 10 years. The expansion of forestry areas occurs mainly in previously degraded areas, replacing low-productivity pastures with the planting of fast-growing trees that capture carbon from the atmosphere and provide fundamental ecosystem services.

* Literature shows that the 80% reduction in deforestation was a combination of command and control with land-use planning – particularly the creation of protected areas.

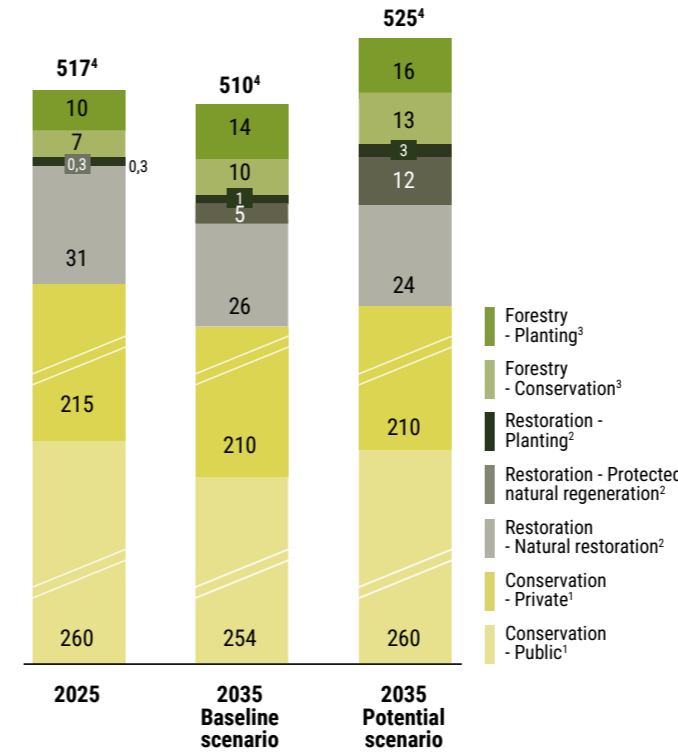
Brazil can increase its forest cover in the near future without competition for land for food production, which has a significant impact on the carbon equation and, consequently, on the contribution to global climate balance. By illustrating the balance between carbon emissions and removal through native forests, forests to be restored and planted, the following charts outline two scenarios considering deforestation rates, forest restoration, and forestry.

The baseline scenario represents a loss of approximately 1% of the carbon stock in national forest formations resulting from deforestation at current average levels. Meanwhile, the potential scenario represents a gain of around 1%, represented by the achievement of zero deforestation targets within the period provided for by Brazil's Nationally Determined Contribution (NDC), by the growth of secondary forest areas that start to be protected and by planting activities for the restoration of native forests and forestry with exotic species.

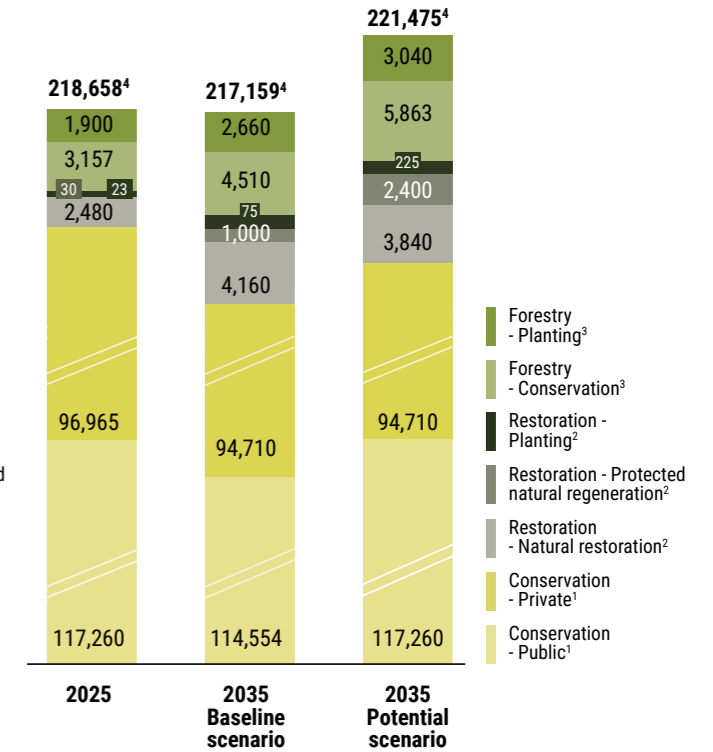
DEFORESTATION, PLANTING AND CARBON STOCK SCENARIOS IN BRAZILIAN FOREST FORMATIONS – 2025 AND 2035

		2025			2035 – Baseline scenario			2035 – Potential scenario		
		Area (million ha)	t CO ₂ e/ha	Total carbon stock (million t CO ₂ e)	Area (million ha)	t CO ₂ e/ha	Total carbon stock (million t CO ₂ e)	Area (million ha)	t CO ₂ e/ha	Total carbon stock (million t CO ₂ e)
Conservation ¹	Public	260	451	117,260	254	451	114,554	260	451	117,260
	Private	215	451	96,965	210	451	94,710	210	451	94,710
Restoration ²	Natural restoration	31	80	2,480	26	160	4,160	24	160	3,840
	Protected natural regeneration	0,3	100	30	5	200	1,000	12	200	2,400
	Planting	0,3	75	23	1	75	75	3	75	225
Forestry ³	Conservation	7	451	3,157	10	451	4,510	13	451	5,863
	Planting	10	190	1,900	14	190	2,660	16	190	3,040
Total⁴		517		218,658	510		217,159	525		221,475

AREA (million ha)



TOTAL CARBON STOCK (million tCO₂e)

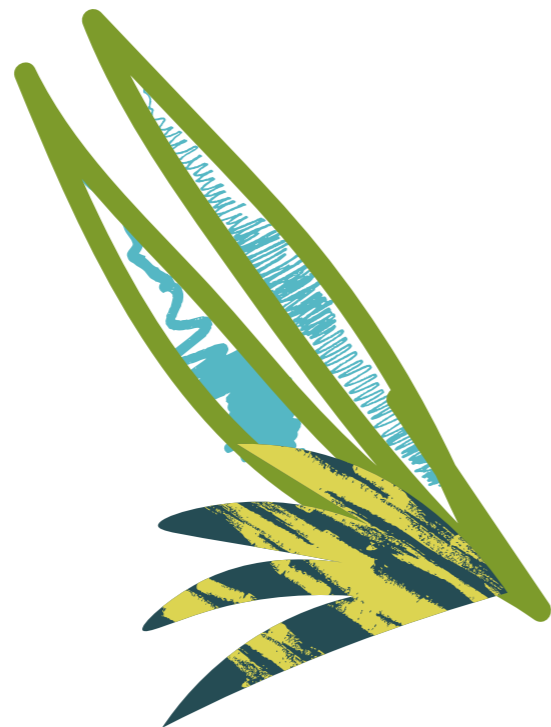


1. The total forest area of Brazil in all its biomes was considered. Areas of shrub and grassland vegetation present in the Cerrado (scrubland), Pampa (prairie), Pantanal (wetland), Caatinga (woodland) and, to a lesser extent, in the Amazon and high-altitude fields of the Atlantic Forest are not included. For public areas, the following were considered: (i) Conservation Units registered in the National Registry of Conservation Units, excluding Private Natural Heritage Reserves (RPPN) and Environmental Protection Areas (APA), (ii) public land and/or non-designated public forests, (iii) Indigenous Lands, (iv) military areas. For private areas, official information from the Rural Environmental Registration File (CAR), rural settlements, quilombola community lands and unregistered public lands was used. The distinction between public and private areas was made based on the Land Atlas, generated by the *Cartas da Terra* (Letters from Earth) project, which consolidates information from Inbra, Funai, MMA and ICMBio, among others. For the baseline scenario in 2035, a loss of 11 million hectares due to deforestation was considered in the period from 2025 to 2035, equally divided between public and private areas. For the potential scenario in 2035, it was assumed that gross deforestation will be close to zero in 2030 and, in the following years until 2035, losses will be replaced or offset by restoration. Thus, the amount of forests in public areas will not change and, in private areas, the accumulated deforestation of 5 million hectares will be maintained, practically derived from the period from 2025 to 2030. Carbon volumes (tCO₂e/ha) were calculated based on the application of carbon factors from the National Inventory of Greenhouse Gas Emissions for the forest formations considered, divided by the total forest area.

2. For natural restoration, data from MapBiomass was used, which indicated that, in 2024, Brazil had 31.2 million hectares of secondary forests (in recovery). For the baseline scenario in 2035, it was considered that part of the natural restoration (5 million hectares) will start to be protected, reaching, in the potential scenario in 2035, the target of 12 million hectares. For restoration by planting, the quantities indicated by the Brazilian Coalition on Climate, Forests and Agriculture and the Pre-Competitive Forest Restoration Movement (Floraz Movement) were considered, including targets announced by companies for the base and potential scenarios. To calculate the carbon volumes (tCO₂e/ha) used, an average annual growth of 8 tCO₂e/year was assumed for the forests, considering the removal factors of the National Inventory of Greenhouse Gas Emissions for the forests in each biome. Considering that natural restoration will take place over the course of 10 years (2025 to 2035), the average age of the forests will be 5 years and, therefore, the average additional stock of these areas will be 80 tCO₂e/ha, reaching 160 tCO₂e/ha for the base and potential scenarios. For protected natural regeneration, the average annual growth will increase to 10 tCO₂e/ha, reaching a total of 200 tCO₂e/ha in both scenarios in 2035. For planting, an average annual growth of 15 tCO₂e/ha was considered. For existing plantations in 2024, the average forest age was estimated at 5 years and, therefore, 75 tCO₂e/ha. The base and potential scenarios considered that, in 2035, plantations will also have an average of 5 years and, therefore, the same 75 tCO₂e/ha.

3. For forestry, data from the Brazilian Tree Industry (IBA) and BM2C Consultoria were assumed. For 2025, the actual planting and conservation areas were assumed according to IBA data. For 2035, in the baseline scenario, 14 million hectares were assumed and, in the potential scenario, 16 million hectares, due to the increase in demand. Data on carbon stocks refer to the average of existing plantations, considering the different growth stages of these forests.

4. According to the Brazilian Institute of Geography and Statistics (IBGE), the Brazilian Forest Service (SFB), and MapBiomass, Brazil has more than 500 million hectares of natural forests; the most recent MapBiomass survey (Collection 10) indicates 507 million hectares of forests in 2024. The total presented in the table also includes the amounts for forestry planting and excludes the amounts related to conservation in forestry, which are already included in native vegetation areas in private land.



These scenarios reaffirm not only Brazil's calling as a forested country but also its decisive role in the world by contributing to the mitigation of climate change, particularly in a scenario of increased forest cover by 2035 in the potential scenario. Furthermore, Brazil's forests make a superlative contribution to biodiversity conservation and provide diverse ecosystem services that sustain life on Earth and support all social and economic activities.

In the Conservation, Forest Restoration, and Forestry fronts, Brazil is a leading player, with a solid legal framework for forest protection and advances in the field of forest restoration, including opportunities for the private sector, and greater competitiveness in the production of exotic trees. The areas designated for the maintenance of the original plant cover – the vast majority as preserved forest – represent 66.3% of the national area

This document addresses these three fronts from the perspective of the forest continuum. This is a concept used internationally, which encompasses a view of the different landscapes with forest physiognomy across an area. The continuum begins with the permanent preservation of untouched forest massifs; continues with increasing human intervention with native forests under a sociobioeconomic management system; goes through the recovery of native forests affected by forest degradation; continues with forestry enrichment; advances in forest restoration (that is, planting native trees and/or natural regeneration) of deforested areas; passes through reforestation with the planting of long-cycle exotic species (possibly combined with native species); and ends, at the extreme, with the reforestation of species such as eucalyptus and pine or other species, whether native or not, for economic purposes with well-defined markets, inserted in agribusiness or traditional forestry, and

which maintain conservation areas upon compliance with the Forest Code (Law No. 12,651/2012).

Common to the different landscapes along the forest continuum are trees. Trees are highly efficient at converting carbon into biomass and therefore contribute significantly to carbon storage throughout their growth cycles and even when processed. Additionally, trees provide numerous environmental services and are key to preserving biodiversity. Without standing trees, the world cannot comply with the Paris Agreement, a necessary step to address the climate crisis – which is essential to ensure to humanity and other species the conditions to survive on Earth. And forests are the home and the social, economic and cultural foundation for tens of millions of people around the world.

Forests are among the most scalable and cost-effective climate solutions available today. They absorb about 1/3 of the annual carbon emissions from human activity and are absolutely essential to achieve global climate targets. Tropical forests influence the climate by storing carbon, shaping rainfall patterns, regulating climate (regional and global), and harboring superlative biodiversity. Particularly in the case of tropical forests, the benefits are not only climatic but also ecological and social. Tropical forests are home to more than 50% of all terrestrial species, making them the most biodiverse ecosystems on Earth.

Among the holders of tropical forests, Brazil stands out, as it is home to the largest of them – the Amazon

– and one of the main biodiversity hotspots – the Atlantic Forest – which combines a high incidence of species diversity in one of the most devastated biomes in Brazil. This report also includes cases of forest restoration and forestry carried out in the Cerrado (Brazilian scrubland) biome. The approach in the field of business solutions addressed in this document focuses on the conservation fronts of the Amazon and Atlantic Forest biomes, forest restoration activities with native species and forestry of exotic species (although the latter two are carried out in the Cerrado biome).

Although Brazil is still the champion in deforestation, it has the greatest potential for carbon capture (particularly through forest restoration) and for generating income and creating jobs associated with this capture. Brazil has already shown that it knows how to protect forests and fight deforestation. Between 2004 and 2012, for example, the deforestation rate fell 80% as a result of a successful monitoring, command and control policy and the creation of protected areas. It should be noted that this reduction occurred even while agricultural and livestock production in the Amazon region practically doubled.

Although deforestation increased in subsequent years – mainly from 2018 onwards – the resumption of the policy to fight deforestation in 2023 was able to generate a further reduction in the rate. In fact, according to the report by Prodes, a satellite deforestation monitoring system of the National Institute of Space Research (Inpe), there was a 30.6% reduction between

August 2023 and July 2024, reaching the lowest rate since 2016. Fighting deforestation, combined with expanding the native forest area in Brazil, will not come at the expense of productive activities such as agribusiness – which, in fact, depends on the rainfall patterns provided by forests through the “flying rivers” phenomenon. In Brazil, there is enough land in unused and underutilized deforested areas to meet all the demand from agribusiness expansion in the region, and there are still areas left for forest restoration, reforestation of areas for pulp or paper products, and for palm oil plantations.

Brazil already has a legal framework for forest protection that few other countries in the world have. Forests are one of the pillars of the environmental and land-use regulatory framework. The Forest Code, the main reference in this field, establishes rules for the use and protection of native vegetation on rural properties, including Permanent Preservation Areas (APP) and Legal Reserves (RL). The law arose from the need to reconcile agricultural and livestock production with environmental conservation, following a long process of legislative and social debate. Brazil also has a legal framework for Protected Areas, whether through the National System of Conservation Units (SNUC), or through Indigenous Lands and Quilombola Community Territories.

Based on this framework, it is up to Brazil to make the command and control policy as effective as possible at the same time as it develops market systems that reward conservation, forest restoration, and industrial

planting of forests, such as mechanisms linked to carbon credits and funds for financing tropical forests.

Other important actions include protecting indigenous peoples and traditional populations that live off the forest, as well as developing a low-carbon, forest-based economy (bioeconomy) and improving well-being indicators for populations inhabiting the most anthropized areas of the Amazon – considering that most of the Amazonian population is urban – so that they are not driven away by predatory activities or even activities linked to organized crime, which has increased its presence in the region. The Amazon region shows indicators of social progress that are lower than the rest of Brazil.

With respect to forest restoration, it can be considered a promising frontier of the Brazilian economy. In addition to being a hub for attracting international capital, it is one of the strategic pillars for achieving national climate (NDCs), biodiversity and sustainable development targets. And with comparative advantages: Brazil has vast areas that are suitable for forest recovery, accumulated technical capacity, and growing public and private engagement, although it still needs to solve critical points to scale up. Demands from the carbon market, food production, and timber supply drive opportunities.

The forestry sector already operates projects in the voluntary carbon market, prioritizing production and ecological diversity, with environmental and social co-benefits and the generation of high-integrity credits

that attract important financial and business players. This is a capital-intensive agenda with a strong territorial impact and a long-term vision, with the perspective of planting today to deliver robust results from 2030 onwards. Forest restoration of private and public areas (concessions for forest restoration), complementary to public conservation policies, can be an essential lever for the ecological transition – and, with the Climate COP 30 in Belém, the opportunity grows for Brazil to consolidate its global leading position in Nature-based Solutions (NbS).

Expansion depends above all on adequate financing appropriate to the characteristics of the sector, regulatory and tax improvements, access to titled land and strengthening of the supply chain and the creation of consumer markets for the products. Furthermore, greater integration is needed with sector policies that borders on the issue, as well as the productive inclusion of family farmers and traditional peoples and communities in the agenda.

The future outlook is that the forest restoration segment using native species will gain similar strength to that which exists today in the exotic species forestry market. To this end, there are a number of challenges to overcome in the segment’s main pillars: technological, market, financial, land access, and social development.

The planted forest industry has a positive effect on climate and a regenerative effect on the environment. Its environmental and social results can go far



beyond the ambitions of most productive activities, which need to operate in the field of reducing and compensating impacts.

In forestry activities involving exotic species, which in Brazil uses mostly eucalyptus and pine, the cycle of beneficial effects begins with the removal of carbon from the atmosphere, which is accentuated in young, rapidly growing forests; it continues to store carbon at many levels, in roots, soil, and aboveground forest biomass; and advances with the retention of carbon in end products as diverse as books, flooring, poles, furniture, plywood, lumber for construction, and biochar. The latter, an increasingly important input for other agribusiness sectors to protect the soil efficiently, operates in a sustainable manner, and be perceived as such in the global market.

The forestry industry allows for varied arrangements, in agroforestry systems (SAF) and integrated with livestock and other crops, which can be planned for maximum value creation and the most necessary nature-based solutions for the surroundings, from food security to thermal regulation. Thus, forest cultivation is characterized by offering a rare and valuable combination – carbon removal, forest conservation, diverse environmental services, and intensive production, with high value and job creation.

The potential of the forestry sector as a provider of environmental services, for Brazil and the world, is leveraged by the high productivity achieved in Brazil. Like the technology of other sectors of tropical agriculture, the technology of planted forests needed

to be developed or adapted to Brazilian conditions, which vary between regions of Brazil and are different from those known in temperate climate countries, where techniques for planting trees for industrial purposes originated.

The European Institute of Planted Forest (IEFC) defines “fast-growing trees” as those with a Mean Annual Increase (MAI) of 10 cubic meters or more per hectare per year (m³/ha/year) or more. The average MAI in planted forests in Brazil is 31 m³/ha/year, in the case of pine, and more than 34 m³/ha/year, in the case of eucalyptus. This is an extraordinary difference compared to the rate found in other parts of the world for these two genera of trees.

This equation includes the forestry’s sector expertise in fields such as the domestication of exotic species, genetic improvement, mechanization, integrated pest management, and forest management in general, as well as Brazil’s strong tradition in high-productivity tropical agriculture.

Currently, planted forests form an asset class with their own standardization, return prospects, and risk management. The set of planting and maintenance technologies, as well as the consolidated management experience, could also be applied to the restoration of native forests – which, also as an asset class with predictable returns, would gain new potential to attract international investments.

Below are some of the progresses already made in the Conservation, Restoration and Forestry fronts, as well as the points yet to be achieved.

Conservation

PROGRESSES ALREADY MADE:

- Protection defined by law: the National System of Conservation Units covers 42% of Brazilian territory, along with Indigenous Lands. Conservation Units and Indigenous Lands have the lowest deforestation rates in Brazil
- Advanced technological apparatus for monitoring and inspecting deforestation using satellite imagery, territorial intelligence, and inspection
- Consolidated legal framework. Of particular note is the Forest Code, which protects a significant portion of forest (although the implementation of the Rural Environmental Registration File (CAR) is necessary to enable restoration projects)
- Institutional capacity to fight deforestation through public command and control policies

FUTURE TO CONQUER:

- Illegal deforestation must be eliminated and incentives have to be created to bring legal deforestation close to zero, considering that the expansion of the agricultural and livestock frontier can occur in already deforested and degraded areas.
- If Brazil does not achieve near-zero deforestation by 2030, the country and the world risk losing one of the most important systems for absorbing carbon on a large scale. The Amazon is especially important in this equation because it represents half of the world’s tropical forests.
- Therefore, the development of the Amazon, which presupposes the elimination of deforestation and the flourishing of a forest-based and low-carbon economy, depends on the well-being and human development of its population.
- Viewing the forest as an economic asset will be essential for its conservation. This presupposes a new financial model, based on two systems: one to reward regions for avoiding emissions resulting from deforestation and degradation (Jurisdictional REDD+) and reward the protection of existing forests (such as TFFF and REDD), and, the other, to ensure the forest restoration of degraded areas, either through natural regeneration or the planting of native trees.
- Expansion of legal timber management, forest bioeconomy, and biobusinesses associated with innovative agroforestry systems that are beginning to be developed in the Amazon.

Restoration

PROGRESSES ALREADY MADE:

- The legal framework is expanding, notably through the National Plan for the Recovery of Native Vegetation (Planaveg) and the National Program for the Conversion of Degraded Pastures (PNCPD), aimed at recovering 40 million hectares by 2030, including forest restoration, formation of productive pastures, and planting of grains
- Forestry companies are attracting investments from global corporations in carbon credits to restore large-scale degraded areas in the Amazon and Atlantic Forest
- This sector is already operating projects in the voluntary carbon market, prioritizing high integrity of credits, ecological diversity, and generation of environmental and social co-benefits
- Consolidation of regional collectives, networks, and alliances to support the demand for restoration and monitoring of the areas
- Launch of a pre-competitive Native Species Forestry program to boost the sector with timber production and carbon credits

FUTURE TO CONQUER:

- The future outlook is that the forest restoration segment using native species will gain similar strength to that which exists today in the exotic species forestry market
- New resources to promote forest restoration have been announced by major financial institutions
- There are a number of challenges to overcome in the segment's main pillars: technological, market, financial, titled land access, and social development
- The activity is in a process of maturation towards a scale of one million hectares by 2035. Private restoration companies are already planting today to deliver concrete results as of the next decade
- Restoration of private areas, complementary public conservation policies, can be an essential lever for ecological transition, enabling Brazil to consolidate its global leading position in Nature-based Solutions (NbS)
- Regulation of national and international mechanisms for access to the international carbon market, such as corresponding adjustments and international transfers of credits

Forestry

PROGRESSES ALREADY MADE:

- Planted forests in Brazil already form an asset class with their own standardization, return prospects and risk management, counting on significant participation from international and domestic investors via TIMOs (timber investment management organizations)
- Advanced planting techniques. The mosaic system, which alternates areas of trees cultivated for industrial purposes with conservation areas, offers a double benefit: greater productivity in the planted area and protection for the preserved area, with the resulting environmental services
- This sector is one of the most adapted in Brazil to extreme weather events, although there is room for improvement. Genetic improvement of species (important for crops to achieve high productivity in all regions of Brazil) increases resilience to climate change and its consequences, such as water deficit
- The use of digital technology and robotics in forestry enables the early detection of risks that could affect the productivity and production of forest plantations. Examples include machinery specifically designed for tree cultivation areas, the use of UAVs (unmanned aerial vehicles), online monitoring of wildfire outbreaks, digital measurement of timber volume, and real-time monitoring of field activities
- The sector supplies more than 5,000 bioproducts, which include timber items and a range of non-timber products

FUTURE TO CONQUER:

- Appropriate public policies on land tenure, logistics, water use, and science and technology issues that contribute to the sustainable expansion of the activity, its climate adaptation, and its coexistence with communities and other sectors.
- Production of second-generation ethanol, which can be obtained from forest waste such as tree trimmings, wood, and sawdust. The expansion of the ethanol production base is part of a broader context: the consolidation of Brazil as a global leader in the use of biofuels, with the benefits of these value chains being well distributed throughout Brazil's territory.
- Diversification of the forestry economy in Brazil. With the application of the concepts of forest mosaic and forest continuum, contiguous areas – each with adequate forest cover and mutually reinforced protection structure – can be dedicated to different purposes, such as food, oil and fiber production, livestock activity (through Integrated Livestock-Forestry), extractivism and ecotourism.
- Generating carbon credits as an essential and integrated activity within the industry's processes, based on clear rules within Brazil's carbon legal framework and capable of stimulating this practice, in order to maximize the environmental services provided by tree cultivation.