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Current expansions in the Brazilian timber market

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ABSTRACT

The attractive financial returns from timberland investments in Brazil, particularly fast-growth tree plantations like pine and eucalyptus, have attracted multiple investors over the last decade. Among the countries with a competitive Pulp and Paper Industry (PPI), pulp and paper investors have expanded substantially in Brazil with new mills and planted areas. This paper presents a comprehensive investigation of the dynamics of the Brazilian pulp and paper industry forest sector in the past decade. We described the current macroeconomic and political environment in Brazil and the expansion of mills and timberland in Brazil. Brazil is, clearly, among the selective countries where a substantial expansion of the forest sector is possible. The regions like Mato Grosso do Sul have impressive scales of productivity and expansion. Other areas, like the states of Maranhão, Piaui, Tocantins and Bahia present potential to expand forest plantation, however, they are limited by weather constraints (extensive drought and fire seasons). Even well-known markets, like the South region of Brazil, have has opportunities to expansion subject to higher land prices. Brazil's attractiveness for timberland investments is underscored by robust economic indicators and extensive natural resources. Yet, navigating the complexities of its political landscape remains a critical consideration for potential investors looking to capitalize on the country's promising forestry sector.

INTRODUCTION

Timberland investments in Brazil, particularly in fast-growth tree plantations such as pine and eucalyptus, have gained significant interest from investors worldwide. Investments in research and development, coupled with favorable soil and climate conditions, have positioned pine and eucalyptus plantations in Brazil as some of the most productive globally. For instance, a pine plantation in Brazil yields approximately 30 cubic meters per year per hectare, outperforming Southern States of the US, where the growth rate averages about 11 cubic meters per year per hectare (Cubbage et al. 2022). Similarly, eucalyptus plantations in Brazil show remarkable growth with 38 cubic meters per year per hectare, surpassing those in Chile (25 to 30 cubic meters per year per hectare) and Spain (20 to 30 cubic meters per year per hectare) (Cubbage et al. 2022). This biological advantage impacts the financial returns, with average Internal Rates of Return (IRR) for pine and eucalyptus plantations in Brazil being 11.8% and 8.6%, respectively, outperforming many of their competitors (Cubbage et al. 2022).

The comparative advantage of fast-growth trees in Brazil is particularly pronounced in the Pulp and Paper Industry (PPI) sector (Klein et al. 2022). PPI companies have a high degree of vertical integration, sourcing a substantial portion of their timber supply from their own forests, with the remainder procured from the market. By leveraging their market diligence and silviculture expertise, these industries effectively reduce costs associated with timber fiber production; this strategy guarantees a sustainable supply of pulpwood. Moreover, when expanding their production capacity or establishing new facilities, they mobilize substantial resources to acquire land and ensure a sustainable supply of timber.

In recent years, the aggressive expansion of PPI industries has attracted significant attention from both local and international timberland investors. Several locations, specifically in the Northeast and Midwest, in Brazil, have transitioned from landscapes dominated by pasture to high-productive tree plantations. The objective of this paper is to describe the most recent expansion in the Brazilian forest sector, with a particular emphasis on the PPI. We summarize the historical growth of the forest sector in Brazil, as well as the challenges faced by domestic and international investors in the country. Our research was based on a collection of information from public information released by forest association, federal and state governments, PPIs and consultant

companies. We also interviewed five consultants and forest practitioners who either are located or have worked on projects in Brazil over the last decade.

The paper is organized as follows: first, we show the Brazilian macroeconomic indicators followed by the political environment and transportation systems. These topics inform the overall macroeconomic, political, and infrastructure in Brazil. These indicators are essential to at least start the conversation about investing in any country. Next, we describe the forest sector in subsections like timber production and demand by product, area planted and historical expansion. We finish by showing the most recent mills' expansion and reflecting on the main challenges and future of the Brazilian sector.

MACROECONOMIC INDICATORS

Brazil is an attractive location for timberland investors due to its abundant land, fertile soil, favorable climate, large domestic markets, and access to international markets through an extensive coast. In 2022, Brazil had a Gross Domestic Product of about $1.8 trillion, making it the largest economy in Latin America and the ninth largest in the world. In the same period, inflation was relatively controlled (~5%) with a high interest rate (~13%). The ratio between the local currency (Brazilian Real) and the dollar is about five reais per dollar, which favors the comparative advantage of exported production, but makes imported products, such as machinery, expensive (Figure 1).

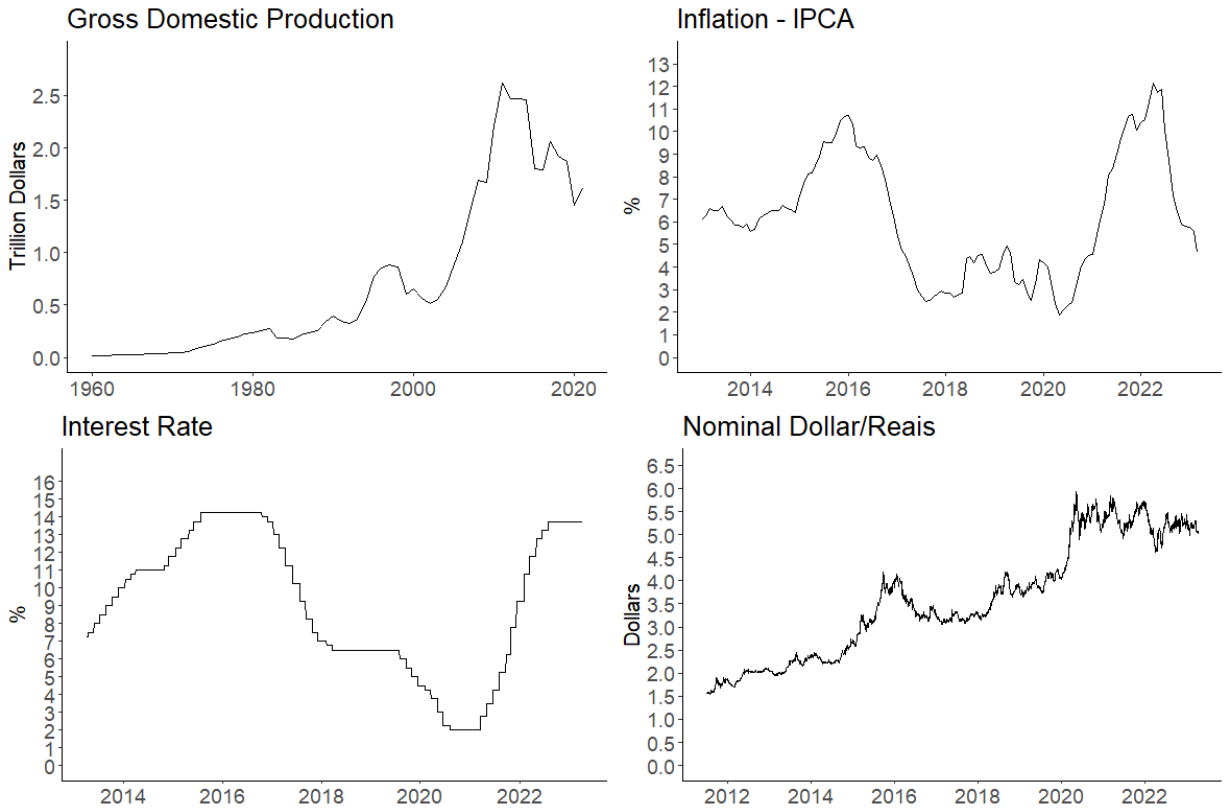

Figure 1. Brazilian Economic Indicators. Source: Banco Central do Brazil, 2023.

POLITICAL ENVIRONMENT

Since the re-democratization in 1989, Brazil's macroeconomic policies have exhibited a persistent oscillation between conservative and liberal approaches. While a comprehensive survey of Brazil's economic history surpasses the scope of this paper, it remains imperative to underscore several pivotal events from the last decade that have left an indelible imprint on Brazilian society, thus shaping the present economic landscape. Notably, these events encompass aspects concerning interest rates, inflation, and the acquisition of land by foreign entities, all of which warrant further detailed analysis.

In the mid-1990s, Brazil experienced hyperinflation, with an alarming surge in inflation rates peaking at an unprecedented 5,000%. Though inflation has since been below the 15% annual

threshold, it was not until 2021 that the central bank became independent from executive oversight, thus allowing a more rigorous use of interest rates to control fluctuations in inflation.

In the 2000s, the Brazilian economy expanded significantly, achieving an impressive annual growth rate of 4.5% under the left-wing administration led by President Luiz Inacio Lula da Silva (2003 – 2011). This remarkable economic surge was significantly attributed to the commodities prices boom and progressive social programs implemented in that era. During Lula's administration, the Brazilian lawmakers-imposed restrictions on land acquisition by foreign capital, based on a new administrative interpretation of the Constitution. This ruling required foreign investors to partner with Brazilian companies in land purchases with the latter owning more than 50% of the fund capital invested. This requirement has limited the potential expansion of the forest sector in Brazil and limited it to national or risk-accepting investors

The mismanagement of the federal government between 2012 to 2015, plunged the nation into a prolonged recession, thereby contributing to election of a new administration (2018-2022) in the subsequent election. Nonetheless, the new government refrained from embarking on any revisions to the prevailing policy framework governing constitutional interpretations related to foreign acquisition constraints.

This concise assessment of recent Brazilian economic trends yields two critical conclusions. First, the nation's historical battle with inflation has necessitated a substantial elevation of interest rates. In Brazil's social context, heightened inflation carries greater political repercussions than elevated interest rates or the potential for an economic slowdown. Second, the imposition of limitations on land acquisition by foreign entities is likely to endure, as even a business-friendly administration like that of Jair Bolsonaro refrained from revising this law despite wielding significant political influence.

TRANSPORTATION SYSTEMS

Brazil's diverse geography presents both advantages and challenges for commodities transportation. The logistics sector in Brazil contains cargo and passenger rail, logistics

infrastructure, roads, ports, public transportation, and a certain level of urban mobility. Although the country has a relatively efficient transportation infrastructure that includes highways, railways, ports, and airports, Brazil still faces logistical barriers to boosting its economic growth. Domestic and international investors have seen stagnant road infrastructure since the 1990s, resulting in low logistics performance (World Bank 2023). In addition, projected increases in fuel and other raw material prices, inland transportation, port and storage issues, credit limitations, and fertilizer shortages may limit Brazil's full agricultural production and trade potential.

The success of large-scale investments in tree planting in Brazil is heavily dependent on access to the export markets, which requires a reliable and efficient port structure. The largest port in Brazil, located in Santos in the state of São Paulo (SP), is a crucial hub for exporting cellulose products to China and other international markets (Figure 2). Other ports, such as Barra do Riacho (Espirito Santo - ES), Rio Grande (Rio Grande do Sul - RS), and Itaqui (Maranhão - MA), also play important roles in the export of cellulose. The limited capacity of these ports is not the main challenge; the primary obstacle is finding a dependable means of transportation for commodities from the production site to the port. A large share of the PPI relies on a restricted rail system that connects only some parts of the country. To overcome this limitation, PPI companies try to diversify their transportation system, combining rail and river transportation. For example, Eldorado, a pulp mill located in Mato Grosso do Sul (MS), uses a mix of the river (Rio Parapanema) and rail transportation to move their products to the Port of Santos and other ports in the south.

Most of the rail systems are a combination of private and federal investments. Rail companies normally have long-term contracts in which they can manage the rail for a certain time. However, the risk related to possible changes in governments and economic slowdown limits the participation of foreign capital in the expansion of the rail system, mainly in the Northeast and Central of Brazil.

Figure 2. Transportation systems in Brazil. Source: Brazilian Institute of Geography and Statistics (IBGE 2021).

FORESTRY SECTOR

We provide an overview of Brazil's forest sector with information from publicly available datasets (Brazilian Institute of Geography and Statistics - IBGE) and representatives of companies involved in the industry. The Brazilian forest sector is broadly categorized into two forest management groups: planted forests and native forests. Planted forests are owned by private landowners, which employ advanced technology resulting in high productivity rates; most of the planted areas are owned by vertically integrated mills. On the other hand, native forests are less

developed technologically and face several legal challenges. This paper primarily focuses on planted forests since it is less risky and has less government intervention in comparison to natural forest management.

Planted area

Currently, there are 9.4 million hectares of forest plantations in Brazil with eucalyptus (mostly clones of *E. urophylla, E. grandis, E. resinifera* and *E. pellita*) occupying 7.2 million hectares, followed by 1.8 million hectares of pine (*P. taeda* and *P. elliotti*) plantations and 380 thousand hectares of other species (e.g., teak and Populus) (IBGE 2021). Eucalyptus production is mainly used by pulp and processing mills, while pine markets are more diverse with multiple pulp mills, sawmills, and processing industries. Pine plantations are mostly found in the states of Paraná (PR) and Santa Catarina (SC), and eucalyptus plantations are more prevalent in states with warmer weather (Figure 3 and Table 1).

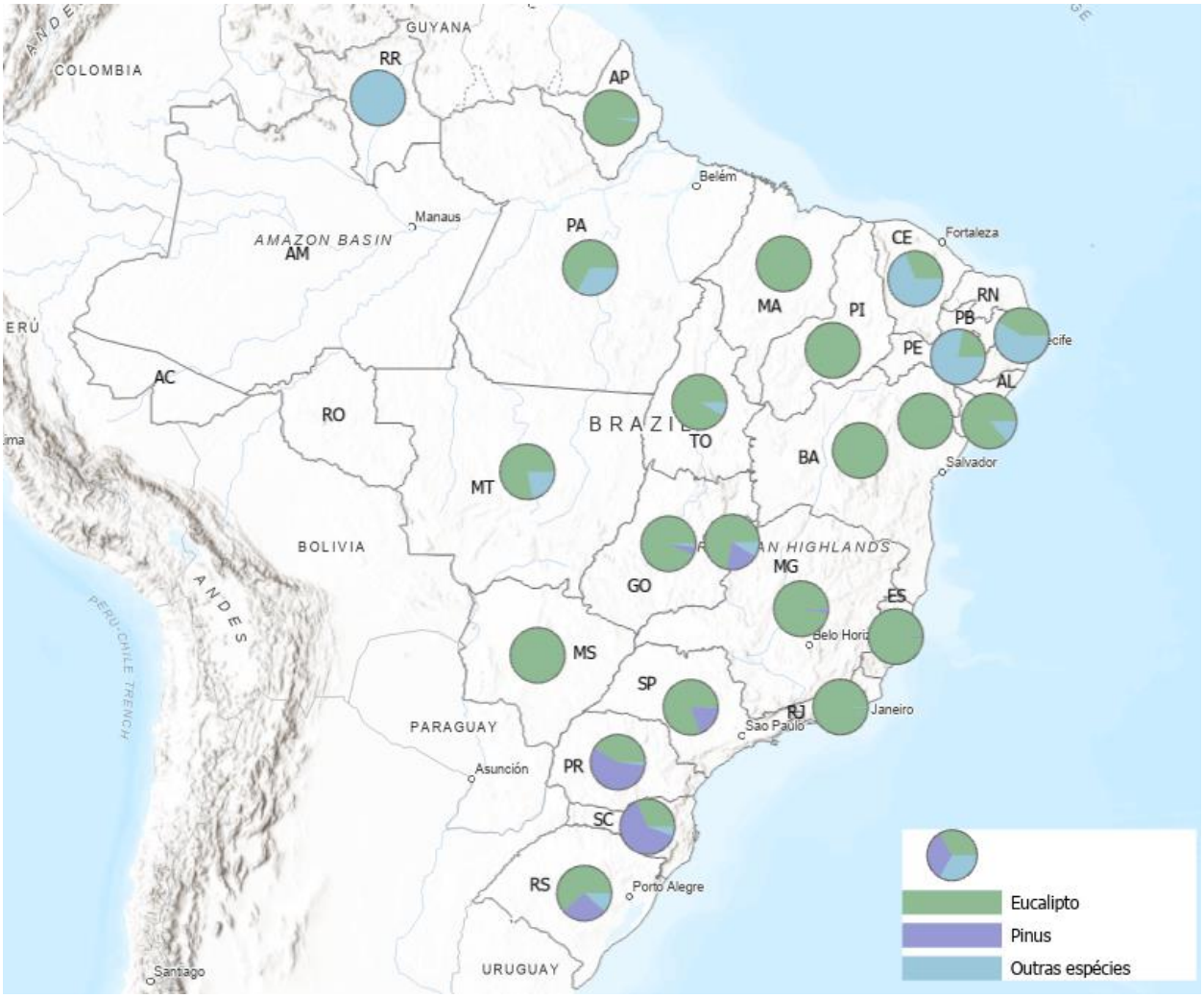

Figure 3. Spatial distribution of planted forest in Brazil. Source: Brazilian Institute of Geography and Statistics (IBGE, 2021). Note: eucalipto – eucalyptus, pinus – pine, outras espécies – other species.

Table 1. Area of planted forest by species and state in Brazil (hectares).

Code	Name	Eucalyptus	Pinus	Other species	Total
MG	Minas Gerais	2,021,562	47,964	7,726	2,077,252
SP	São Paulo	983,760	231,359	4,313	1,219,432
PR	Paraná	463,053	631,118	21,997	1,116,168
MS	Mato Grosso do Sul	1,045,765	2,720	-	1,048,485
RS	Rio Grande do Sul	612,471	271,413	115,102	998,986
SC	Santa Catarina	308,283	617,294	53,225	978,802
BA	Bahia	576,428	-	3	576,431
MT	Mato Grosso	218,883	-	61,212	280,095
ES	Espírito Santo	275,486	2,298	213	277,997
MA	Maranhão	272,157	-	6	272,163
PA	Pará	142,306	-	70,669	212,975
GO	Goiás	119,300	6,118	2,568	127,986
TO	Tocantins	112,095	78	10,128	122,301
AP	Amapá	56,029	40	1,478	57,547
RJ	Rio de Janeiro	28,832	18	199	29,049
PI	Piauí	27,427	-	-	27,427
AL	Alagoas	20,989	17	3,290	24,296
RR	Roraima	-	-	21,528	21,528
SE	Sergipe	6,161	-	24	6,185
PE	Pernambuco	1,109	-	3,913	5,022
PB	Paraíba	1,092	-	1,543	2,635
DF	Distrito Federal	1,500	400	185	2,085
CE	Ceará	621	-	1,371	1,992
	Total	7,295,309	1,810,837	380,693	9,486,839

Source: IBGE (2021).

From 2013 to 2021, the total planted area in Brazil expanded by 14.33%. During the same period, eucalyptus plantations expanded by 15.52%, pine plantations by 12.38%, and other species by 2.68% (Figure 4 – A). Among the states with an area greater than 200 thousand hectares, Mato Grosso do Sul (MS) and Maranhão (MA) recorded a large increase of 44% and 61%, respectively, in their eucalyptus plantations during the same period (Figure 4 – B). As for the pine market, the planted area in Paraná (PR) reduced by 21%, while in Santa Catarina (SC), the planted area of pine saw an impressive 106% increase (Figure 4 – C)[1]. The reduction of pine plantations in the state of Paraná (PR) is related to a consolidation of high productive sites, and the closure of small sawmills.

[1] The authors believe there was an increase on the area of pine plantation in Santa Catarina during the period investigated, however, the rapid expansion observed between 2013 and 2014 might indicate some inconsistent data and possible underestimation of the area of pine plantation in 2013.

In addition, the expansion of soybean production to areas that were not considered appropriate has incentivized forest landowners to convert some areas to crops.

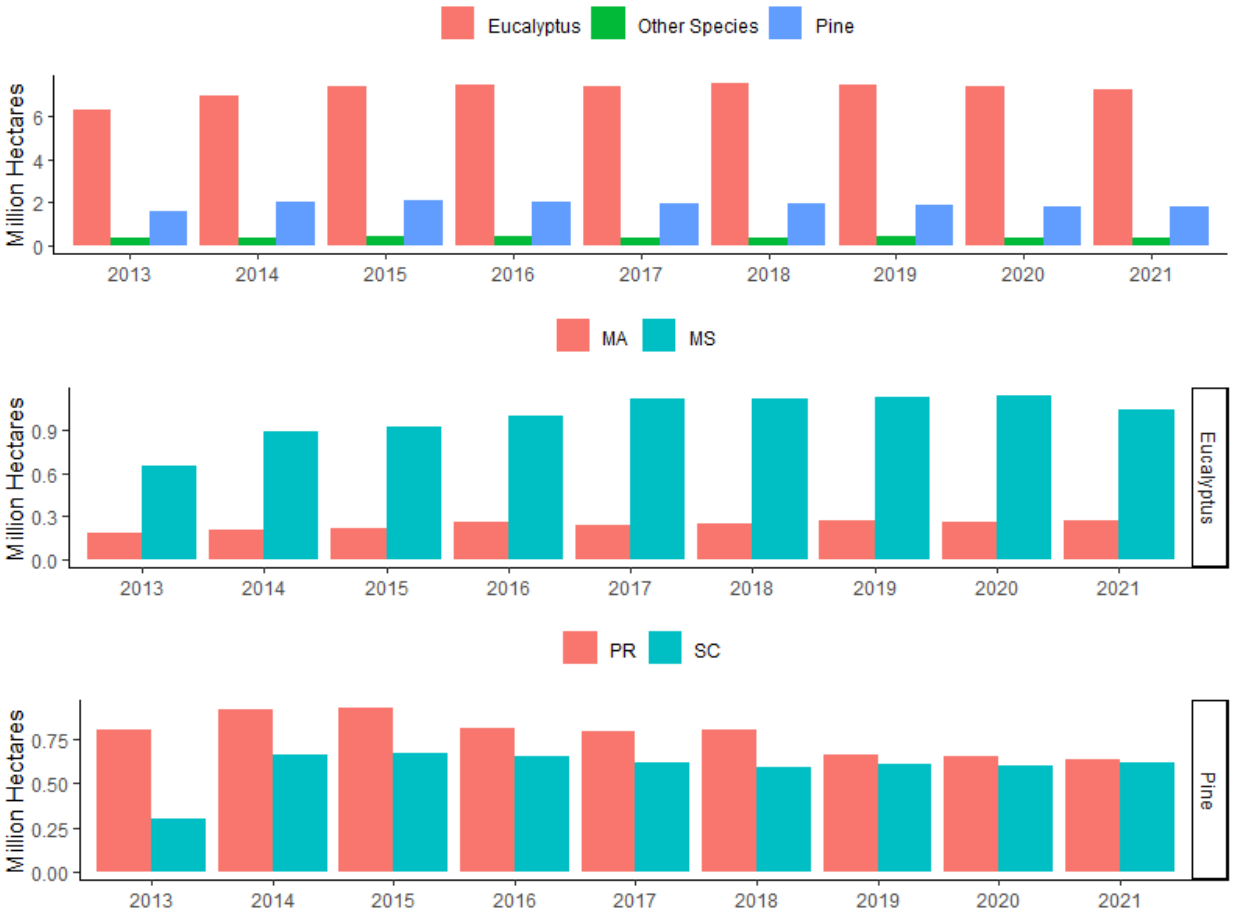

Figure 4: (A) Total area of planted forest in Brazil. (B) Area of eucalyptus in two of the fast expansionist states, MA = Maranhao and MS = Mato Grosso do Sul, (C) Area of pine in the two main producers, PR = Paraná and SC = Santa Catarina. See more information attached in the Excel file (Attachment A). Source: IBGE (2021).

Timber production

Like the planted area, the volume harvested also increased in the past decade. Between 2013 and 2021, the total volume harvested grew by 9.2% in Brazil, at a different rate for eucalyptus (7.9%) and pine (13.3%) (Figure 5). Pulpwood (PW) volume represents the largest share of eucalyptus production, with 73 million cubic meters harvested in 2021, or 73% of the total share. Sawtimber (ST) shares 27% or 27 million cubic meters. On the other hand, pine production is more focused on sawtimber classes, with 29 million cubic meters harvested (65% of the total harvested) in 2021, while pulpwood shares 35% (15 million cubic meters).

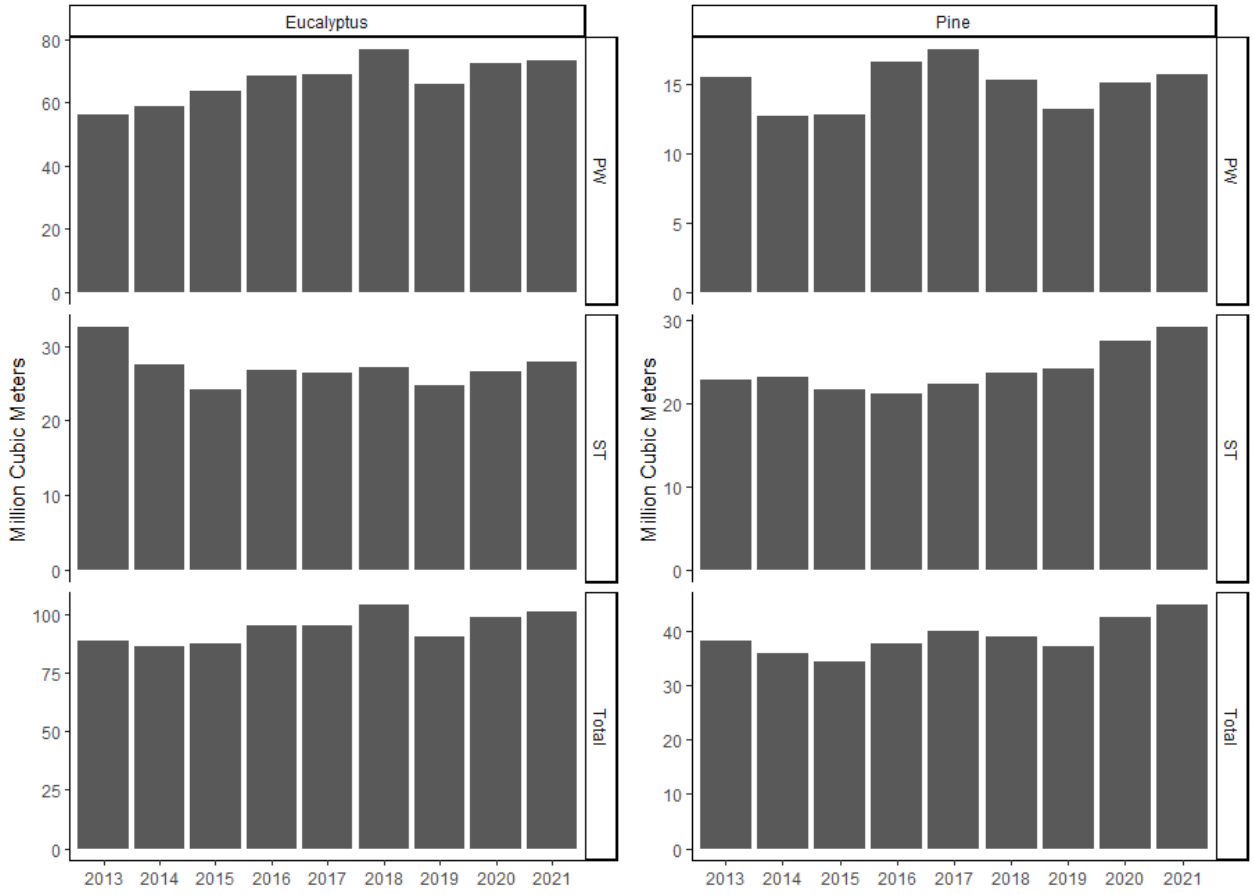

Figure 5. Timber production by species and product. PW = Pulpwood, ST = Sawtimber classes. See more information attached in the Excel file (Attachment B). Source: IBGE (2021).

This production is spatially distributed according to mills' location (Figure 6 and 7) since transporting timber is relatively expensive. The largest production is in Tres Lagoas (Mato Grosso do Sul – MS), where most of the new and large pulp mills (Suzano and Eldorado) are located (see Wood Industry section). Although Figure 6 shows some level of sawtimber harvesting in that region, this volume might have been consumed by a pulp mill since there is no sawmill located there. The pine mills are concentrated in a few clusters in Paraná (PR) and Santa Catarina (SC) (Figure 7), with the largest consumer being Klabin and Berneck. In that region, however, there are several small- and medium-size sawmills that do compete for timber with large-diameter classes.

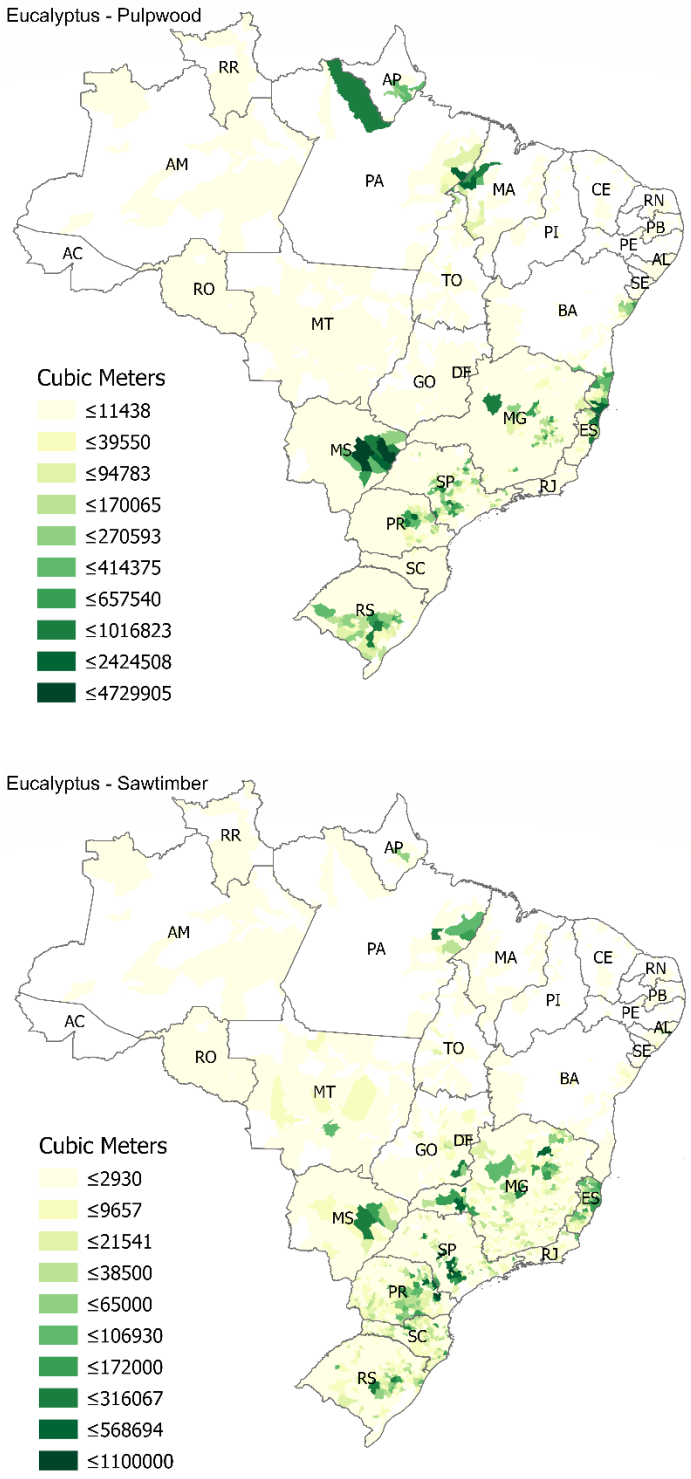

Figure 6. Eucalyptus production- spatial distribution of timber production (IBGE 2021).

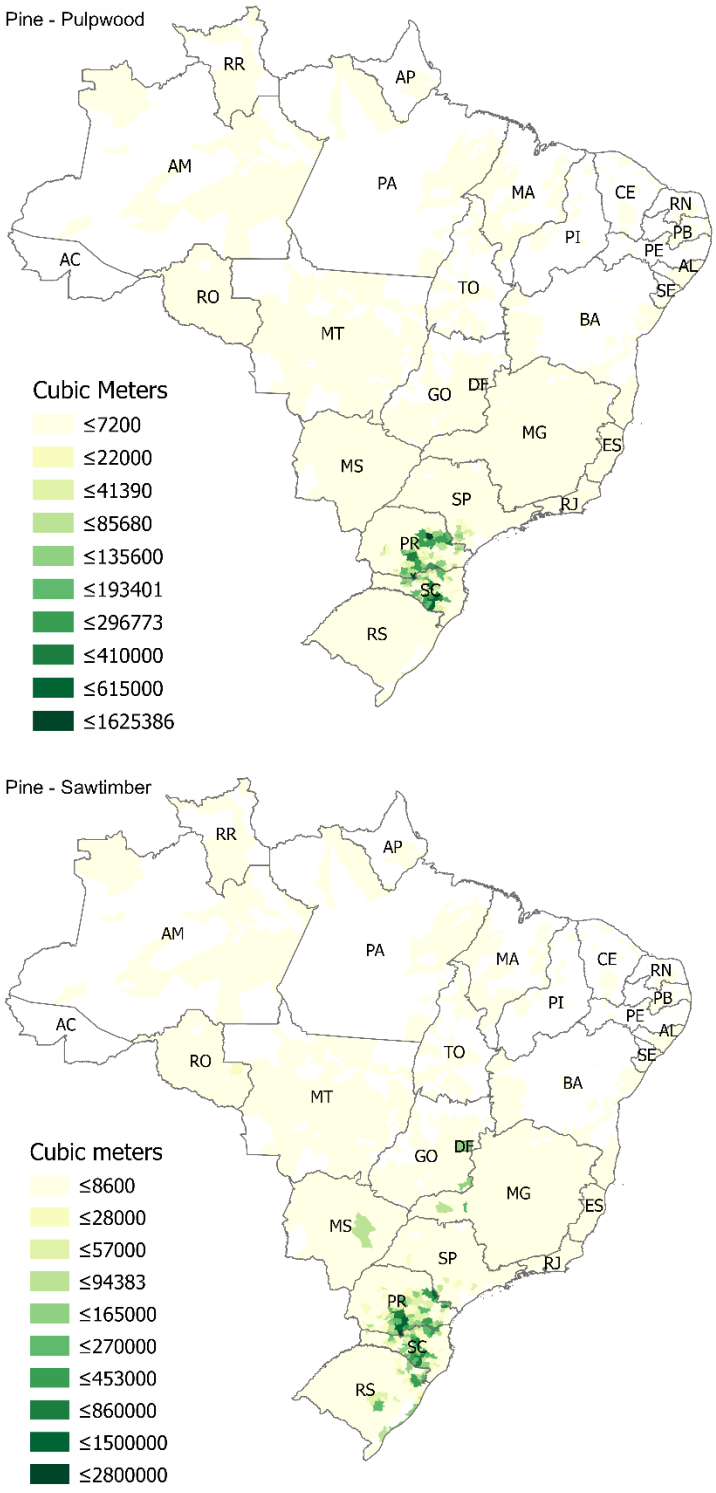

Figure 7. Pine plantation - spatial distribution of timber production (IBGE 2021).

Land use

In this section, we discuss the land use dynamics — specifically land that can be converted to forest production. Since the forest companies in Brazil are commonly vertically integrated, availability and cost of land are among the main drivers of investors' decisions. In the recent expansion of the forest sector in Brazil, the establishment of forest plantations comes either from the conversion of natural forest formations, natural pasture, or low-productive pasture and agriculture. Between 2010 and 2020, around one million hectares were converted from pasture to forestland, followed by 719 thousand hectares from natural forests and 619 thousand hectares from a mosaic between agriculture and pasture.

According to local foresters and consultants, there will be two strategies for the next expansion in the forest sector: (1) investors will target pasture and low-productive agriculture land since converting natural forest formation to plantation does require additional licenses and must satisfy complex rules from forest certification systems; (2) investors will acquire timberland in consolidated markets. According to discussions with local foresters, the first approach is possible in most regions in Brazil; it is less likely in the states of São Paulo (SP), Paraná (PR) and Santa Catarina (SC), where the agricultural land provides much higher returns than timberland, and most of the low productive land area already converted to timberland.

Table 2 summarizes the three land-use types that are more likely to be converted to forest plantation: (1) Pasture, (2) Savanna Formation and (3) Grassland. States with large areas of these land types are likely to have opportunities to expand the forest sector. The majority are in regions apt for eucalyptus plantation, like Pará (PA), Mato Grosso (MT), and Minas Gerais (MG). It is important to note that while these land types may support new planted forests well, there is also substantial environmental criticism of using these lands for plantations due to carbon losses caused by conversion, native grassland biodiversity losses, and other environmental issues.

Table 2. Area of Savanna, Savanna Formation and Grassland by state.

Code	State	Pasture		Savana and Grassland	
		area (ha)	%	area (ha)	%
PA	Pará	21,121,997	13.97%	4,417,006	2.82%
MT	Mato Grosso	20,212,066	13.37%	16,052,235	10.25%
MG	Minas Gerais	19,325,005	12.79%	13,018,241	8.32%
BA	Bahia	15,438,827	10.21%	27,156,239	17.35%
MS	Mato Grosso do Sul	13,621,047	9.01%	7,098,929	4.53%
GO	Goiás	12,816,853	8.48%	7,243,316	4.63%
RO	Rondônia	8,635,507	5.71%	1,195,213	0.76%
MA	Maranhão	7,328,358	4.85%	10,253,615	6.55%
TO	Tocantins	6,394,545	4.23%	13,230,761	8.45%
SP	São Paulo	4,276,032	2.83%	90,877	0.06%
PR	Paraná	2,484,963	1.64%	33,438	0.02%
ES	Espírito Santo	1,974,654	1.31%	0	0.00%
PI	Piauí	893,558	0.59%	18,338,837	11.71%
SC	Santa Catarina	651,502	0.43%	0	0.00%
RS	Rio Grande do Sul	230,694	0.15%	0	0.00%
	Others	15,736,761	10.41%	31,057,157	19.84%
	Total	151,142,369	100%	156,546,763	100%

Source: MapBIOMAS (2021).

WOOD INDUSTRY

The majority of the wood-consuming mills are located in the Southeast, mainly in the state of São Paulo, Paraná and Santa Catarina; historically, the sector expanded in states with more land availability and favorable logistics.

Figure 8. Main wood-consuming mills in Brazil. This map does not include pig iron mills, which consume eucalyptus in the state of Minas Gerais (MG).

Timber consumption expansion (last 10 years and forward)

Eucalyptus plantations

Over the past decade, the PPI had a significant expansion in Brazil, with various regions experiencing growth. Suzano, a leading PPI, constructed new pulp mills during the 2010s in the states of Maranhão (MA) and Mato Grosso do Sul (MS), namely Imperatriz and Três Lagoas, respectively. Três Lagoas has a production capacity of 3.25 million tons of cellulose per year, and Imperatriz has 1.65 million tons per year. In 2024, Suzano will launch a new pulp mill in Ribas do Rio Pardo (MS), boasting an annual capacity of 2.2 million tons of cellulose, while Arauco is

expected to build a pulp mill in the state in 2027 with an annual capacity of 2.3 million tons of cellulose (Figure 9).

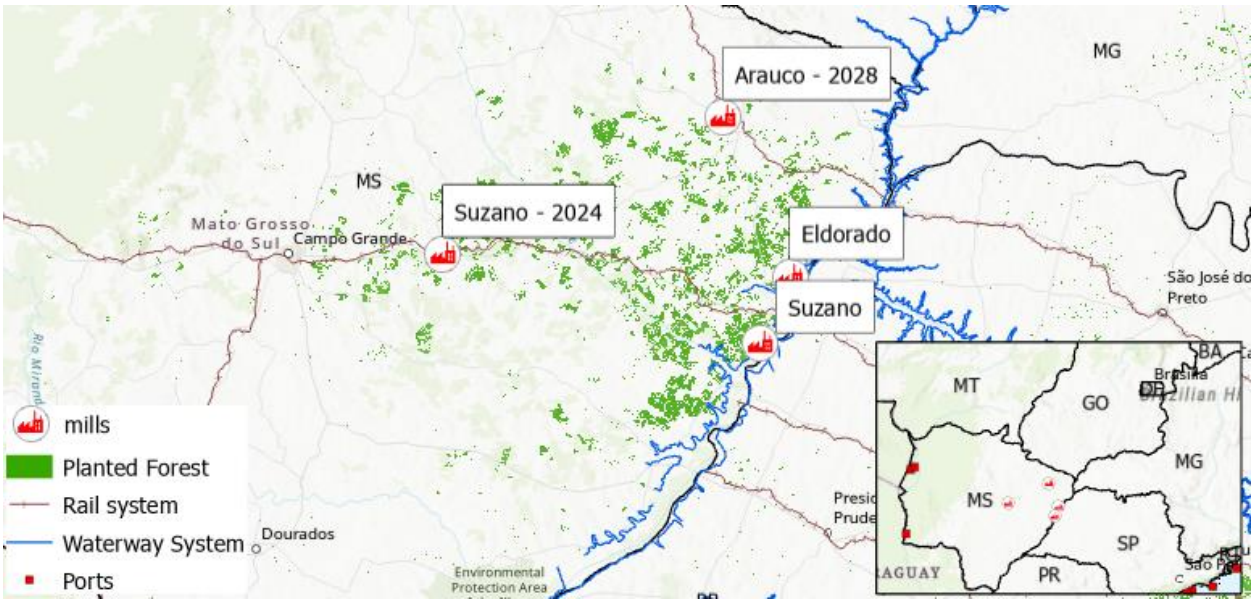

Figure 9. Expansion of the pulp mills in Mato Grosso do Sul (MS).

Timber procurement specialists in the region are concerned about the sustainability of the wood fiber market in the coming years. Mills such as Suzano and Eldorado are already procuring timber up to 400km away. An initial analysis by Kimura and Silva (2022) reveals that to sustain the projected timber consumption, the state's current planted area of approximately 700 thousand hectares needs almost to double. This has put immense pressure on land prices, which have increased substantially from Brazilian real (R$) 5,750 to R$ 6,500 per hectare for low-productivity pasture between 2015 and 2020 (Agrianual 2020). According to local sources, the prices of tracts with desirable size and location may be much higher, ranging between R$ 15,000 and R$ 20,000 ($3,000 - $4,000) per hectare.

It is very unlikely to have another new mill in the Mato Grosso do Sul within the next ten years. The competition with agriculture and pasture production will increase land prices even further, thus making investments in timberland unfeasible. In addition, the problem with wood-fiber shortage will not be solved fast, nor easily since the conversion from pasture to planted forest is not likely to occur at the same rate as observed in previous years. An analyst mentioned that vertically integrated companies are already bidding land prices above the market value to build their own forest base and guarantee wood-fiber supply.

Another new pulp mill started operating in 2022 in the west region of the state of Minas Gerais (MG) owned by Lenzing (Figure 10). The possibility of a new mill in the next 10 years in MG is higher than in MS, but not certain as well. The Lenzing mill was the first mill in the state for decades and has a capacity of 500 thousand tons of cellulose per year. The market is already saturated with the pig iron mills that consume a fair amount of eucalyptus production. In addition, the hilly terrain makes it difficult for a tree plantation to be as productive and cost-effective as in Mato Grosso do Sul, requiring a larger forest base.

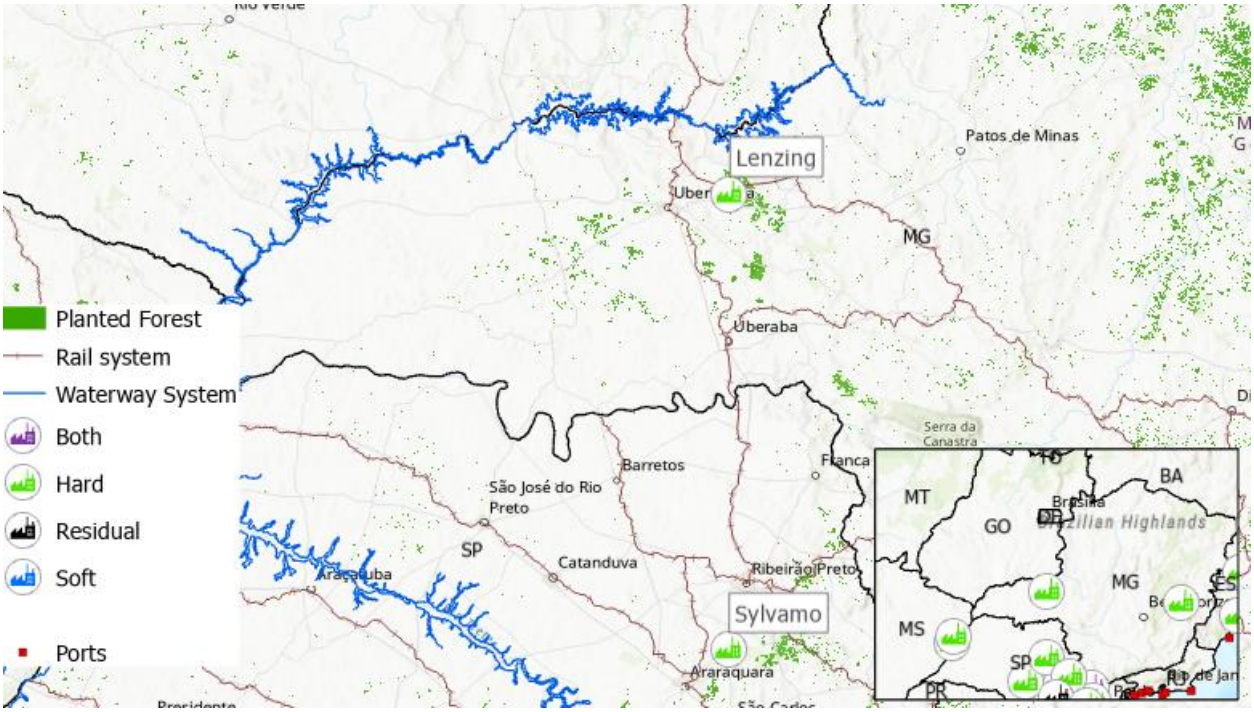

Figure 10. Location of the Lenzing pulp mill.

In the Northeast and North, the forest sector's expansion may not face competition from other wood-consuming mills. However, it may encounter local challenges, such as a lack of infrastructure, labor, and biological productivity. Regions like MAPITOBA (Figure 11) have land available for one or even more pulp mills, but exporting such production requires an enormous effort. Additionally, long dry seasons might increase the risk of mortality and wildfires. There were a few announcements for further investment in this region; Bracell announced investments in the South of Tocantins (TO) in 2010 but never followed through; the same goes for Suzano in Piaui (PI). These areas are still on investors' radar, but not in the short run.

Figure 11. MAPITOBA – Maranhao, Piaui, Tocantins and Bahia.

Pine plantations

In the last ten years, vertically integrated companies in Paraná and Santa Catarina have expanded less intensively than those located in the Central West and North of Brazil. In 2019, Klabin built a new pulp mill in the north of Paraná, near their old mill in Telêmaco Borba (PR) – Figure 12. This mill has a capacity of 920 thousand tons of containerboard per year.

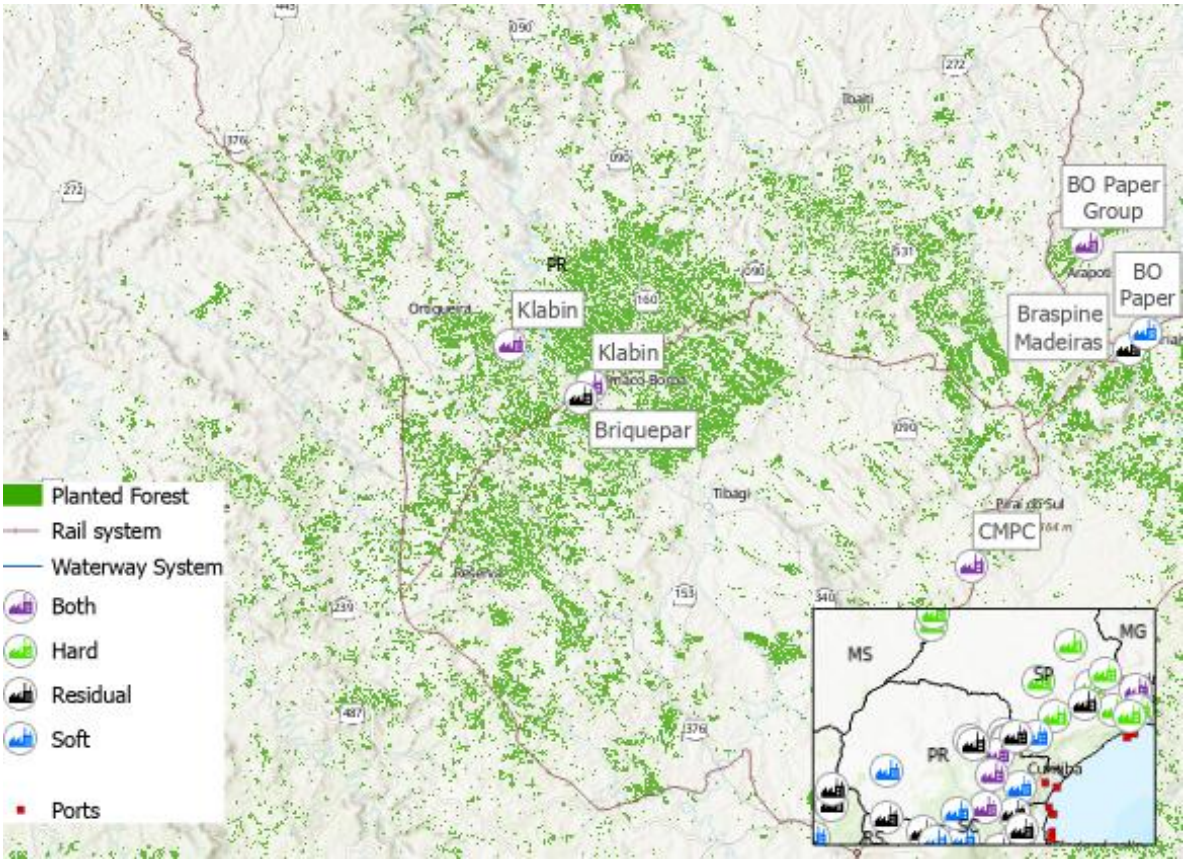

Figure 12. Location of the new Klabin mill.

In Santa Catarina (SC), Berneck built a wood-based panel mill with a capacity of 570 thousand cubic meters of MDF and 450 thousand cubic meters of sawtimber (Figure 13). According to local consultants, all its timber supply "imported" from the Rio Grande do Sul (RS) in the South.

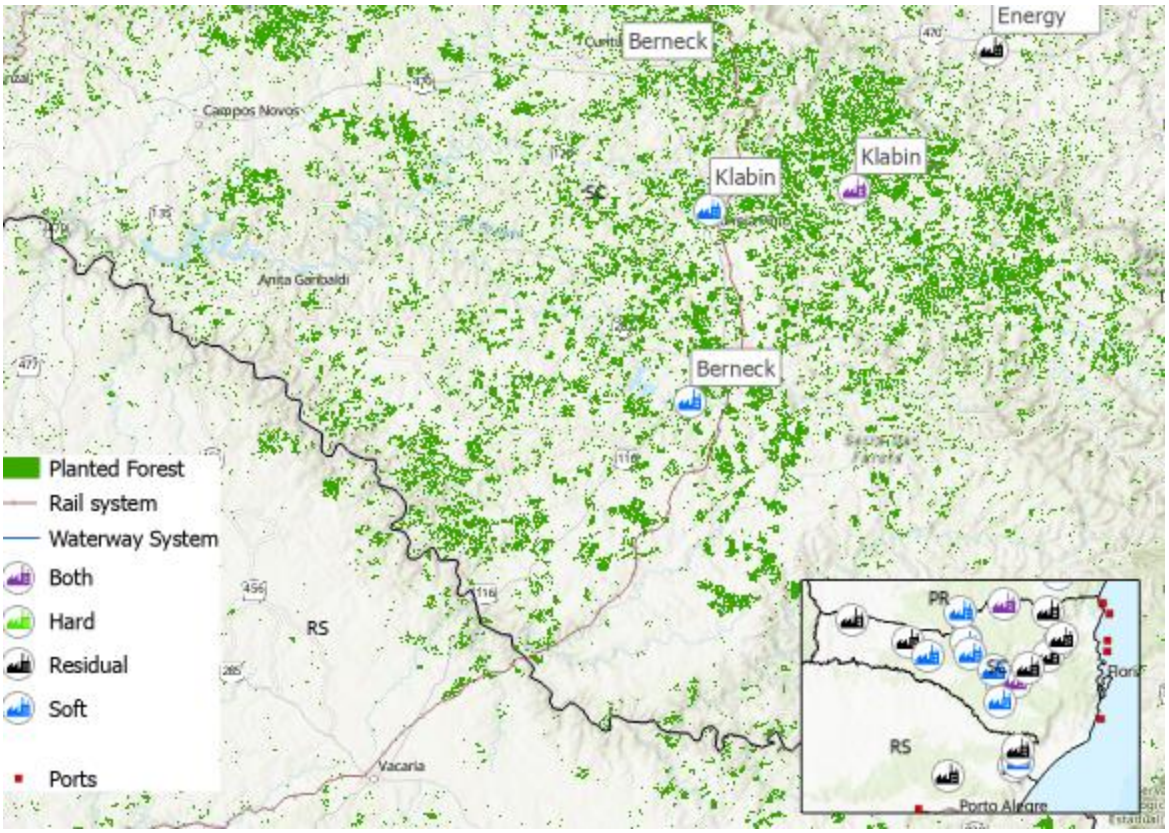

Figure 13. Location of the new Berneck mill (the one in the South) in Santa Catarina (SC).

These companies adopt the strategy of building timberland from timberland investment management organizations (TIMOs), and independent landowners. In both regions, the expected land prices can reach R$ 30,000 per hectare. Local consultants are concerned about the timber availability soon since the wood base area has been stable in the last years. “Building Berneck was a risky investment”, mentioned one source.

DISCUSSION AND CONCLUSIONS

Given Brazil’s expansive territory, there is considerable potential for the establishment of new wood-consuming mills. However, our analysis has unveiled a series of barriers that require consideration to guarantee the sustainable development of the Brazilian sector.

Infrastructure deficiencies, notably in selected areas, such as the south and southeast regions, pose a pertinent challenge, as the absence of robust rail and road networks undermines the economic

feasibility of new manufacturing endeavors. While these regions offer strategic advantages, including proximity to pivotal ports such as Santos in São Paulo and a viable labor pool, prospective investors must contend with the established presence of incumbent market entities, encompassing both timberland and agriculture stakeholders.

Furthermore, the flourishing expansion of the forest base by vertically integrated mills has inflated land prices within prime candidate regions. As an illustration, the land prices in SC exhibit a notable range, oscillating between R$30,000 to R$40,000 ($6,000 to $8,000) per hectare depending on geographic location and land utilization. Considering the substantial area required for a pulp mill—around 80 thousand hectares of cultivated forest—the capital allocated exclusively for land acquisition could potentially escalate to a substantial sum ranging from R$2.4 billion to R$3.2 billion, contingent upon market availability.

The intricate policy landscape, notably characterized by mandating predominant ownership by Brazilian companies, is a constraint to foreign investors aspiring to engage in the Brazilian timberland market. Despite instances of collaborative ventures between Brazilian and international entities, like in the Lenzing mill in Minas Gerais facilitated by Lenzing Ground and Duratex, such synergies are less common among timberland investors. These restrictions limit the expansion through independent timberland owners and favor vertically integrated domestic mills. In addition, the current elevated land prices restrict the entry of new investors in the timberland market; regions with lower land prices may offer better financial returns, even in the face of weaker timber markets and prices.

Furthermore, regions marked by favorable conditions for forest planting, like pasture, savanna, and grassland landscapes, are subjected to escalating demands from diverse stakeholders, encompassing public sentiment, non-governmental entities, and governmental bodies alike, advocating for heightened environmental safeguards. These collective pressures combined will impede the conversion of such lands for alternative utilization.

Despite increasing challenges for PPI and concomitant timberland investments, Brazil has achieved the largest industrial wood fiber and processing expansion in the world in recent decades. The expanded PPI mills will need more timber plantations to supply their anticipated wood fiber needs, so more timberland investments and capital will be required. These could come by partnerships of foreign investors such as TIMOs and Brazilian owners—such as majority Brazilian

land ownership and TIMO timber ownership—or other creative investment or fiber production vehicles. Brazil does want to continue the expansion of its PPI sector and has been aggressive and innovative already. Other alternatives might include more focus on small private outgrower systems, or even larger public forest plantations, or agroforestry and silvopasture systems. To close with an idiom, Brazil has always used "jeitinho"[2] to find ways to get things done and work around its extensive rules or perceived challenges. The timber production sector may well be a case where this is needed and can be achieved in the future.

CONFLICTS OF INTEREST

The authors confirm there are no conflicts of interest.

ATTACHMENTS

A. Forest area by species and region.

B. Timber production by region, year, product type, and tree species.

[2] "Jeitinho" is a word in Portuguese commonly used for quickly adapting to a certain situation; sometimes providing clever solutions, and others just procrastinating the solution for the problem.

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