

# i b d

brazilian tree industry



2014

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2014



“WE BELIEVE THAT  
PLANTED TREES ARE THE  
FUTURE OF RENEWABLE  
AND RECYCLABLE RAW  
MATERIAL AND THAT  
THIS ACTIVITY WILL  
PLAY AN ESSENTIAL  
ROLE IN SUSTAINABLE  
DEVELOPMENT  
OF THE PLANET.”

# LETTER TO THE READER

Dear reader,

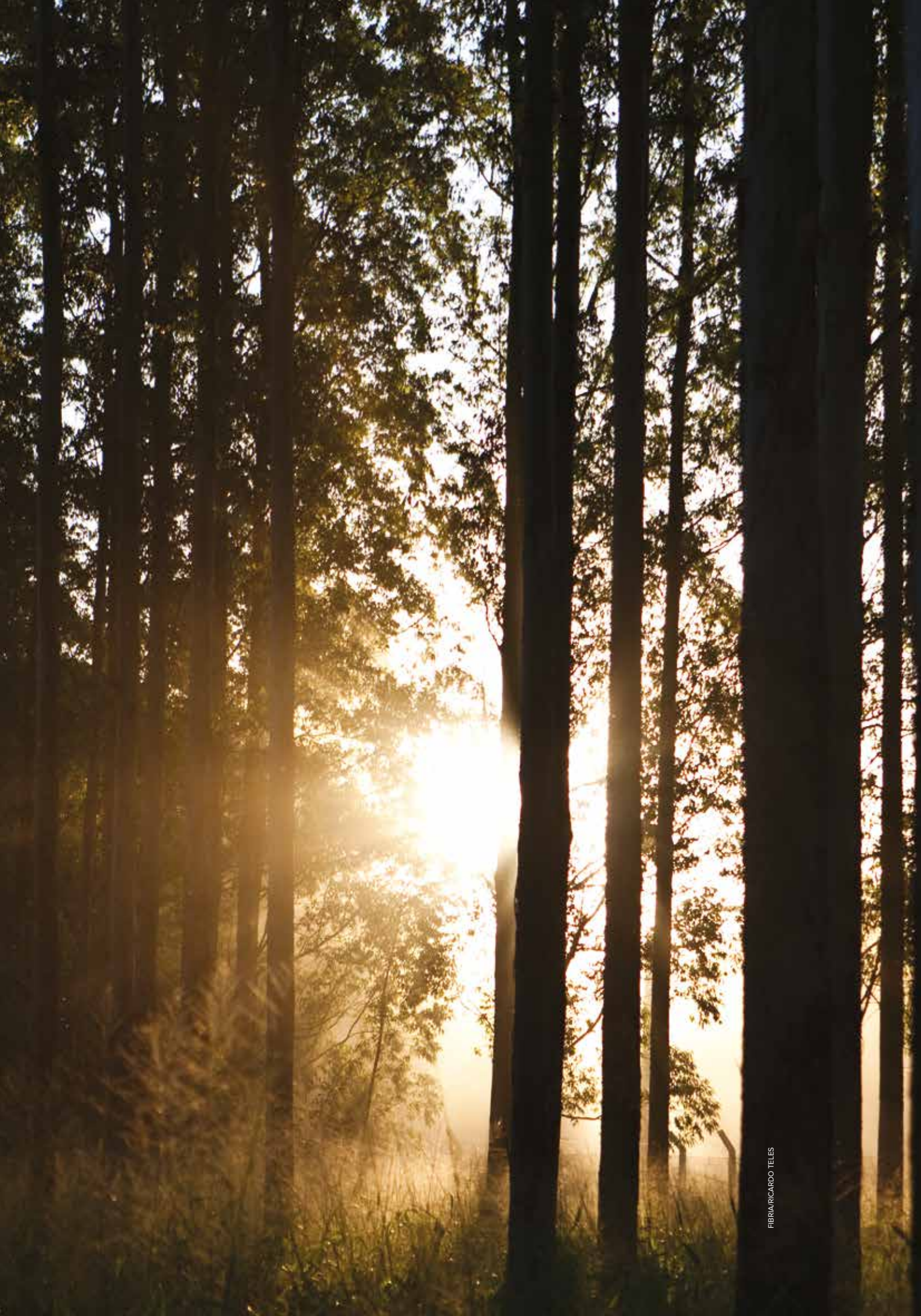
We are proud to present Iba 2014 from the Brazilian Tree Industry; this report contains the 2013 performance indicators for the Brazilian planted tree sector. Important raw materials and products, such as wood panels, laminate flooring, pulp, paper and biomass derive exclusively from Brazilian forest plantations and in turn drive the domestic economy, thereby creating the framework for the sector's growth.

This first edition of the report marks another step in the creation of Iba. Since April 2014, this association, along with its stakeholders in Brazil and abroad, has been institutionally representing a total of 70 companies and state associations which formerly were members of the Association of the Wood Panels Industry (Abipa), the Brazilian Association of the Manufacturers of Laminate Flooring (Abiplar), the Brazilian Association of Forest Plantation Producers (Abraf) and the Brazilian Pulp and Paper Association (Bracelpa). In addition to promoting products that come from planted trees, Iba also works to advocate for independent producers of these plantations and institutional investors in the sector.

Headquartered in Brasília with an office in São Paulo, Iba's mission is to enhance competitiveness in the sector, starting from the 7.6 million hectares of trees planted for industrial purposes - eucalyptus, pine, and other species. We believe that planted trees are the future of renewable and recyclable raw material, and that this activity will play an essential role in sustainable development of the planet, due to its environmental benefits and its role in maintaining biodiversity and communities.

Ongoing and planned investment projects from Iba member companies are also based on the potential of planted trees. Investments are estimated at R\$ 53 billion by 2020, and focus on increasing plantations, expanding factories, and building new units.

Since its launch, Iba has been operating by means of a Goal Plan which has been defined and approved by its Deliberative Council. Among its main points, the creation of a National Policy for Planted Forests (PNFP) deserves special mention; its scope is being debated by the federal Government and the sector. The initiative expects actions that will encourage and invest in research, technical support and rural extension to encourage this economic activity.



Also among Ibá's priorities are negotiations to reduce the tax burden on investments and the offset of tax residuals on exports, which are essential to business competitiveness, along with the need to improve Brazilian infrastructure. The association also seeks to fight unfair competition, especially related to the unlawful use of tax-exempt paper and laminate flooring.

Deepening the debate regarding land acquisition by foreign capital companies and valuing the need for legal security to attract investments also are highlights on Ibá's agenda. We would also like to broaden the debate, in Brazil and international forums, about forestry carbon credit negotiations and planting of genetically modified trees, topics which are on the sector's agenda for the future and must be carefully assessed by all stakeholders.

Ibá promotes the sustainability of its member companies; this occurs through their investments in social programs, forestry management practices, certified plantations, conscientious consumption of natural resources and programs to foster small rural producers. Together, these initiatives generate social value in regions of Brazil that are far from major urban centers, reduce pressure on native forests, and recover degraded soils. Moreover, they diversify local activities, create jobs and income, and contribute to developing the communities in which the plantations and industries are located.

The association will also act to bring member companies into line with the top standards of science, technology, and social and environmental responsibility, seeking innovative solutions for the Brazilian and global markets to face the challenge of supplying future demands for wood-based products which will result from global population growth. These solutions currently translate into the development of products and processes that are becoming ever more advanced and innovative in biotechnology and nanotechnology, aiming at multiple uses of wood and fibers.

Ibá 2014 will replace the Abraf Statistical Yearbook, which was published from 2006 through 2013, and in doing so, will expand its content related to the sector. The report provides industrial data and introduces the topics that are on the agenda for the upcoming years. We believe that this publication will be an important tool for member companies, as well as for the entire planted tree chain and the professionals that dedicate themselves to making the sector more and more of a global reference.

Enjoy your reading.

**Carlos A. Lira Aguiar**

Chairman of the Ibá Deliberative Council

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# THE BRAZILIAN TREE INDUSTRY (Ibá)

## A NEW INDUSTRIAL SECTOR

In April 2014, 70 companies and state associations came together to create a new economic and industrial sector, resulting in the Brazilian Tree Industry (Ibá), an association that represents the wood panel and laminate flooring, pulp and paper, and biomass for energy segments, in addition to independent producers of planted trees and institutional investors.

Ibá members formerly belonged to the Association of the Wood Panels Industry (Abipa), the Brazilian Association of the Manufacturers of Laminate Flooring (Abiplar), the Brazilian Association of Forest Plantation Producers (Abraf) and the Brazilian Pulp and Paper Association (Bracelpa).

These institutions started to discuss creating Ibá in 2011, after a study of the sector indicated planted trees as the main vector for production and economic, social and environmental development for the many segments of forest-based industry. This benchmarking study also highlighted other relevant points such as technology investments for multiple forest-based uses and research in biotechnology and nanotechnology.

The name “Brazilian Tree Industry” is the result of work to build and position the brand as well as to strengthen the base of the business that unites all the companies: the 7.6 million hectares of planted trees in Brazil. Ibá reflects the present and future vision for the sector, as its name comes from the native Tupi-Guarani language and means “fruits”. In addition to the products that come from planted trees, in a broader sense it also includes social aspects such as generation of jobs and income and the development of communities, as well as the creation of environmental services, carbon absorption, maintaining biodiversity, and technological innovations.



### Corporate Governance

Three Councils – the Deliberative, Consultive and Fiscal – are the foundation of the Association’s Corporate Governance. The Consultive Council is chaired by Daniel Feffer, and its main role is to suggest strategies, policies and guidelines for the association’s operations. The Deliberative Council, chaired by Carlos Augusto Lira Aguiar, establishes the strategies for operation and management of the entity which are included in the Goal Plan, seeking to harmonize the interests of the diverse segments in which the member companies operate. The Fiscal Council monitors the entity’s budget.

The nine industrial segments in which Ibá operates are represented in the Deliberative Council by Vice Presidents who are responsible for submitting topics and specific projects for the council's activities. They are as follows:

- Vice President of Pulp
- Vice President of Paper
- Vice President of Paper for Packaging
- Vice President of Paper for Tissue Products
- Vice President of Wood Panels
- Vice President of Biomass for Energy
- Vice President of Independent Producers
- Vice President of State Associations
- Vice President of Medium-Sized Business

### **Thematic Committees**

Within the Governance framework, the Themed Committees, which are comprised of executives from Ibá member companies and representatives, are responsible for monitoring the Goal Plan and contributing to the association's proactive performance. More than 530 executives participate in the Ibá Committees and Task Forces on specific themes, which include: Forestry, Biotechnology, Forestry Certification, Communication, Legal Matters, Climate Change/Forestry Carbon, Technical Quality of Panels/Laminate Flooring, Tax-Exempt Paper, Tax and Fiscal Issues, and Sustainability.



KLAINJOÃO MUSA

## MEMBER COMPANIES AND STATE ASSOCIATIONS

The Brazilian Tree Industry (Ibá) unites 70 companies and state associations from the planted tree sector and its many areas of operation.

### Member Companies

Adami S.A. – Madeiras  
 Ahlstrom Brasil Indústria e Comércio de Papéis Especiais  
 Amata  
 Aperam BioEnergia  
 Arauco Forest Brasil S.A.  
 ArcelorMittal BioFlorestas  
 Arjo Wiggins  
 Berneck S.A. Painéis e Serrados  
 Bignardi Indústria e Comércio de Papéis e Artefatos Ltda.  
 Brookfield (Comfloresta)  
 BSC – Bahia Specialty Cellulose  
 Celulose Irani S.A.  
 Celulose Nipo-Brasileira S.A. - Cenibra  
 CMPC Celulose Riograndense  
 CMPC Melhoramentos  
 Copapa – Cia. Paduana de Papéis  
 Duratex S.A.  
 ECTX S.A.  
 Eldorado Brasil Celulose S.A.  
 Facepa – Fábrica de Papel da Amazônia S.A.  
 Fibraplac Painéis de Madeira S.A.  
 Fibria  
 Floraplac MDF Ltda.  
 Florestal Itaquari  
 Floresteca  
 Gerdau Aços Longos S.A.  
 Guararapes Painéis Ltda.  
 Ibema – Cia. Brasileira de Papel  
 Iguaçu – Celulose, Papel S.A.  
 International Paper do Brasil Ltda.  
 Kimberly-Clark Brasil Indústria e Comércio de Produtos de Higiene Ltda.  
 Klabin S.A.  
 Lwarcel Celulose Ltda.  
 MD Papéis Ltda.  
 Melhoramentos Florestal Ltda.  
 Mili S.A.  
 Munksjö Brasil Ind. e Com. de Papéis Especiais Ltda.  
 MWV Rigesa  
 Oji Papéis Especiais Ltda.  
 Papyrus Indústria de Papel S.A.  
 Pisa Indústria de Papéis Ltda.  
 Plantar  
 Primo Tedesco S.A.  
 Ramires Reflortec  
 RMS do Brasil Administração de Florestas  
 Santa Maria Cia. de Papel e Celulose  
 Santher – Fábrica de Papel Santa Therezinha S.A.  
 Sonoco do Brasil Ltda.  
 Stora Enso Arapoti Indústria de Papel Ltda.  
 Sudati Painéis Ltda.  
 Suzano Papel e Celulose S.A.  
 SWM Schweitzer-Mauduit do Brasil Indústria e Comércio de Papéis Ltda.  
 Trombini Embalagens S.A.  
 TTG Brasil Investimentos Florestais Ltda.  
 Vallourec  
 Veracel Celulose S.A.

### State Associations

Forest Plantation Producers Association of Bahia – ABAF  
 Mato Grosso do Sul Planted Forest Producers and Consumers Association – Reflore MS  
 Paraná Forest Companies Association - APRE  
 Rio Grande do Sul Forest Companies Association – Ageflor  
 Santa Catarina Association of Forestry Enterprises – ACR  
 São Paulo State Forest Plantation Producers Association – Florestar São Paulo  
 The Silviculture Association of Minas Gerais – AMS  
 Tocantins Foresters Association – Aretins

### Partners

Akzo Nobel Pulp and Performance Química Ltda.  
 Albany International Tecidos Técnicos Ltda.  
 ArborGen Tecnologia Florestal  
 FuturaGene Brasil Tecnologia Ltda.  
 Pöyry Tecnologia Ltda.  
 Unipar Carbocloro S.A.



## IBÁ'S INTERNATIONAL PRESENCE

The Brazilian Tree Industry (Ibá) actively takes part in the most important forums and global councils for the forest base, where it presents and advocates topics of interest to the planted tree sector in Brazil. The association's international agenda encompasses forestry topics such as certification, best practices in forestry management, tree biotechnology and innovation; industrial topics such as competitiveness, use of waste and recycling; as well as social and environmental topics such as supporting small forestry producers and carbon absorption by planted trees.

A highlight among the institution's activities is its participation on the steering committee of the International Council of Forest and Paper Associations (ICFPA), which is comprised of over 30 associations from countries that play key roles in the global forestry market, such as the Confederation of European Paper Industries (CEPI), the American Forest & Paper Association (AF&PA), and the Forest Products Association of Canada (FPAC). The ICFPA seeks to promote the cooperation of its members in areas of common interest, in addition to globally advocating for the forest-based product sector through an agenda that contains significantly relevant topics and joint initiatives presented by member-entities. The Steering Committee coordinates this agenda and makes the established projects feasible.

The ICFPA currently represents roughly 60% of global wood production and 90% of paper production worldwide. Its positions in relation to topics such as forest certification, biotechnology, climate change and planted trees, among others, are debated and submitted to the respective forums. The Council also takes part in important events to promote and recognize best practices in the global industry for forest-based products. Every two years, the ICFPA publishes the Sustainability Progress Update, a report that presents performance indicators for the association's members which show the growth and evolution of the global industry towards developing a green and sustainable economy.

To further reinforce its international initiatives, Ibá has assumed Vice President of the ICFPA in June 2014, and is getting ready to chair the Council in May 2015.

### **Integrated initiatives**

The ICFPA is recognized by important global entities such as the Food and Agriculture Organization of the United Nations (FAO), where it carries out supplementary work on the Advisory Committee on Sustainable Forest-based Industries (ACSFI), a statutory body of FAO. The ACSFI is comprised of executives from the industrial private sector in 20 different countries; its main purpose is to provide guidance for the activities and work program of the FAO Forestry Department, on topics that are relevant to the forest-based products sector, supporting the global industry's efforts towards sustainable development.

Ibá also maintains relationships with other organizations that deal with topics of interest for the global forestry industry, such as the Forest Solutions Group of the World Business Council for Sustainable Development (FSG/WBCSD), the main forest certification programs including the Forest Stewardship Council (FSC) and the Programme for the Endorsement of Forest Certification (PEFC), and social and environmental forums and organizations such as The Forest Dialogue (TFD).

In these forums, the main topics of discussion are good forestry management practices, environmental services, innovation and technology, sustainability in the production chain in the sector, and engagement with civil society in decision-making. Ibá holds and takes part in meetings, events and public consultations within these forums, in addition to being part of technical groups and drafting documents to establish a common agenda and represent industry interests in these discussions.

Ibá also takes part in specific projects with stakeholders, such as non-governmental organizations (NGOs). A good example is New Generation Plantations (NGP), an initiative of the World Wildlife Fund (WWF) in partnership with forestry companies. It is based on developing and presenting case studies that collect and share knowledge about good practices in well-managed forest plantations in order to promote effective landscape management and recovery of degraded lands, in addition to encouraging rural development through partnerships with companies and NGOs. Ibá takes part in NGP discussions and technical visits in order to promote Brazilian plantations as part of a new generation of plantations in the world.

### **The importance of certification**

Ibá is part of FSC International and the Brazilian Forest Certification Programme (Ceflor), a PEFC-endorsed system in Brazil. Accordingly, Ibá is actively engaged in constructing a domestic and global forestry certification agenda by engaging with the main decision-making platforms within these systems.

For Ibá, forest certification is a tool for environmentally responsible forestry management that is socially and economically feasible, today and for future generations. Fundamental topics for discussion with the certification systems are the management of chemical product usage, tree biotechnology, plantation scale, and the role of certified plantations in meeting

the demand for fiber, wood and energy, among other issues. In addition to taking part in the FSC and PEFC decision-making processes, Iba also works to continuously disseminate good forestry management practices and the social and economic benefits that are achieved through certification for domestic and international stakeholders

### United Nations Forums

Iba's international initiatives also include monitoring major international negotiations conducted by the United Nations related to climate change and sustainable development. The entity has observer status under the United Nations Framework Convention on Climate Change (UNFCCC) and the United Nations Conference on Sustainable Development (UNCSD), where it follows topics of interest that impact the Brazilian planted tree sector. Additionally, the association promotes cooperation with Brazilian authorities by communicating the sector's initiatives so as to contribute to the international commitments taken on by the government.

### Business Councils

Iba takes part in business councils for the main trade partners in the planted tree sector. These organizations are responsible for promoting the debate on topics of interest to Brazilian industry and governments of participating countries. Currently, it is part of the China-Brazil Business Council (CEBC), Brazil-U.S. Business Council (Cebeu) and the BRICS Business Council representing the bloc made up of Brazil, Russia, India, China and South Africa.

Within this context Iba also is a member of the Brazil Industries Coalition (BIC), an entity that represents many private Brazilian industries in the United States. The purpose is to promote the exchange of information and thus identify business opportunities.

In the area of Trade Defense, Iba is a member of the Brazilian Committee of Technical Trade Barriers (CBTC), a body of the National Institute of Metrology, Quality and Technology (INMETRO), which monitors the creation of non-tariff barriers in the international sphere. The Committee, which is made up of the country's main industrial sectors, supports the Brazilian government in meetings of the World Trade Organization (WTO) Technical Barriers to Trade Committee.

Iba represents the planted tree sector internationally and establishes its position in all of the Brazilian government's negotiations with other countries within this scope. Additionally, the entity's international area works together with the federal government to promote exports and open markets for products from the Brazilian planted tree sector.

The association also works with the International Integration Thematic Council (Cointer) of the National Confederation of Industry (CNI), which is responsible for positioning Brazilian industry in all international negotiations, from multilateral agreements (such as the WTO Trade Facilitation Agreement) to Bilateral Agreements, such as negotiations for the Mercosur-EU Trade Agreement.



IBA/GUILHERME BALCONI





# To strengthen our business is to generate value for society

The eight State Associations from the planted trees production chain are an essential and necessary part for all Ibá – Brazilian Tree Industry actions.

The Associations work with authorities and government bodies, social-environmental entities, universities, schools, consumers and the press, ensuring visibility and representative presence for the planted trees industry in the states where this sector is present.



**The planted trees industry  
is the industry of the future.**



CHAPTER I  
EXECUTIVE SUMMARY



# EXECUTIVE SUMMARY

## Planted area

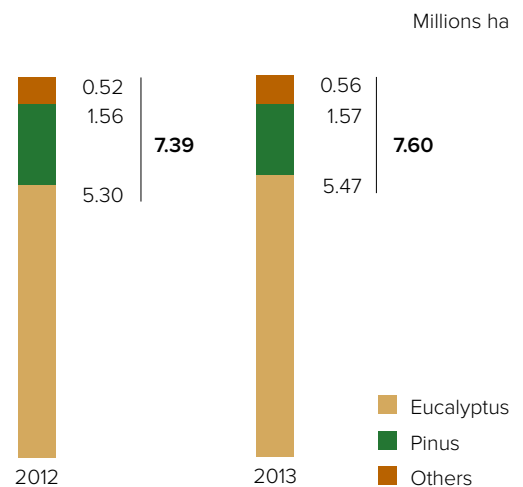
The area of planted trees in Brazil reached 7.6 million hectares in 2013, a 2.8% growth compared to 7.39 million hectares in 2012 (Figure 1). Eucalyptus plantations represented 72% of this total, and pine 20.7%. Acacia, teak, rubber trees and paricá (*Schizolobium amazonicum*) are among the other species planted in Brazil.

## Consumption of Roundwood<sup>1</sup>

In 2013, domestic consumption of wood from planted trees for industrial use was 185.3 million cubic meters (m<sup>3</sup>), an increase of 1.8% compared to 2012.

FIGURE 1

AREA OCCUPIED BY PLANTED TREES IN BRAZIL



SOURCE: ABRAF (2013), ADAPTED BY PÖYRY

TABLE 1

BRAZILIAN CONSUMPTION OF ROUNDWOOD FOR INDUSTRIAL USE PER SEGMENT AND GENUS, 2013

| SEGMENT                         | CONSUMPTION OF ROUNDWOOD (m <sup>3</sup> ) |                   |                  |                    |
|---------------------------------|--|-------------------|------------------|--------------------|
|                                 | EUCALYPTUS                                 | PINUS             | OTHERS           | TOTAL              |
| PULP AND PAPER                  | 56,628,357                                 | 8,067,258         | 498,085          | 65,193,700         |
| WOOD PANELS                     | 6,428,162                                  | 13,457,258        | 378,612          | 20,264,031         |
| LUMBER AND OTHER SOLID PRODUCTS | 6,870,498                                  | 15,295,499        | 357,052          | 22,523,049         |
| CHARCOAL                        | 23,533,724                                 | -                 | -                | 23,533,724         |
| INDUSTRIAL FIREWOOD             | 41,832,528                                 | 3,929,361         | 4,262,239        | 50,024,128         |
| TREATED WOOD                    | 1,824,012                                  | -                 | -                | 1,824,012          |
| WOOD CHIPS AND OTHERS           | 1,129,621                                  | -                 | 781,200          | 1,910,821          |
| <b>TOTAL</b>                    | <b>138,246,903</b>                         | <b>40,749,376</b> | <b>6,277,187</b> | <b>185,273,466</b> |

SOURCE: PÖYRY (2013)

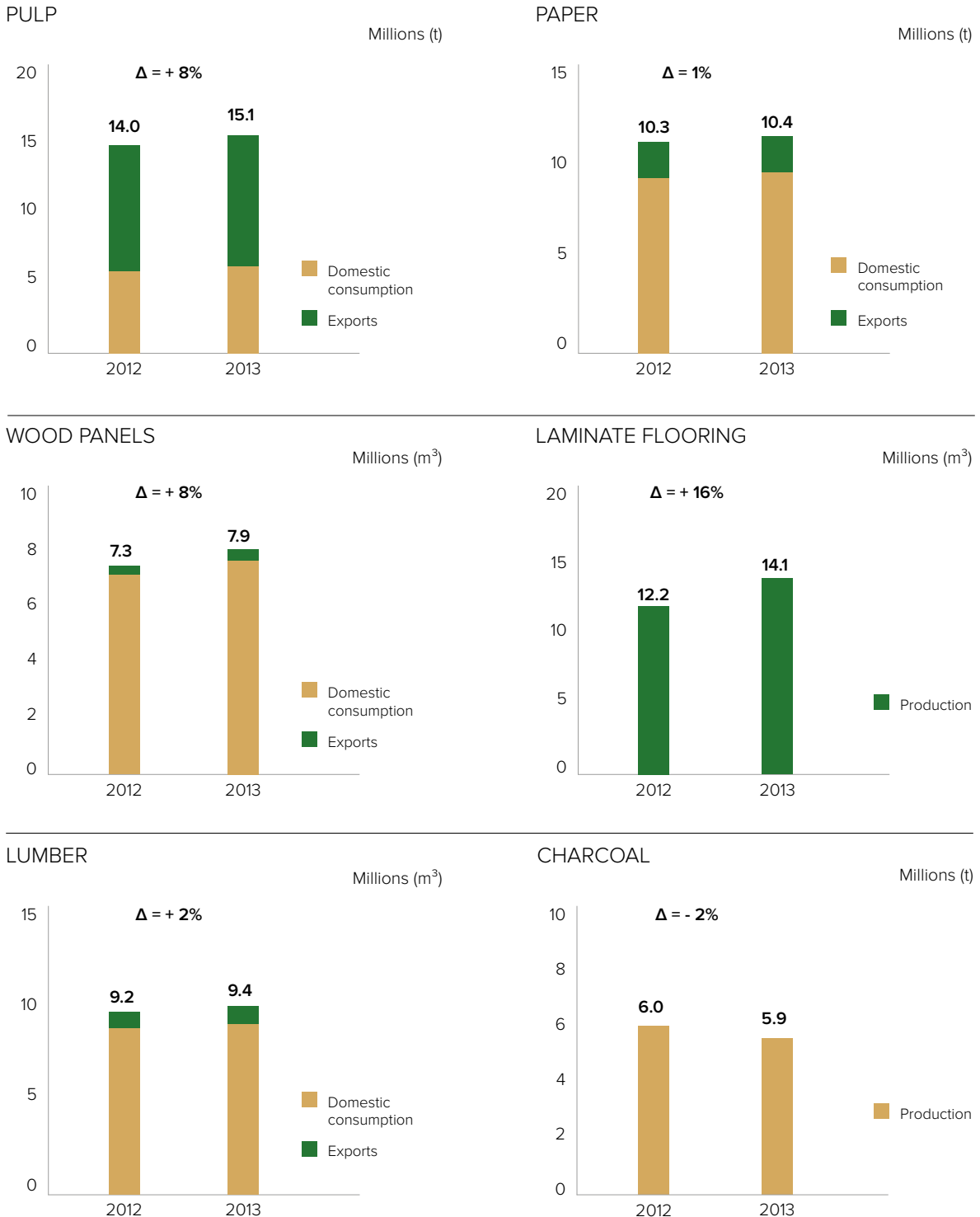
1. Wood harvested from planted trees which has not undergone any industrial processing.

### Performance of the Brazilian Planted Tree Sector

The charts below present indicators for production, domestic consumption and exports of the segments that comprise the Brazilian planted tree sector (Figure 2).

FIGURE 2

PRODUCTION OF MAIN PRODUCTS IN THE BRAZILIAN PLANTED TREE SECTOR, 2012-2013



SOURCE: ABIPA (2013), AMS (2013), BRACELPA (2013), PÖYRY (2013), SECEX (2013), ADAPTED BY PÖYRY.

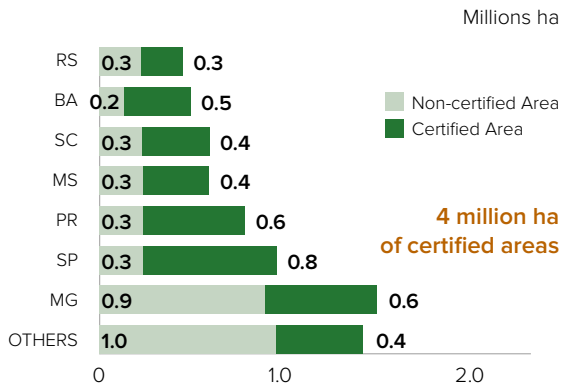
### The importance of the Planted Tree Sector

Trees that are planted for industrial purposes represent an important production chain in Brazil; this chain's greatest benefit to the country could be summarized by the three types of sustainability: economic, social and environmental sustainability.

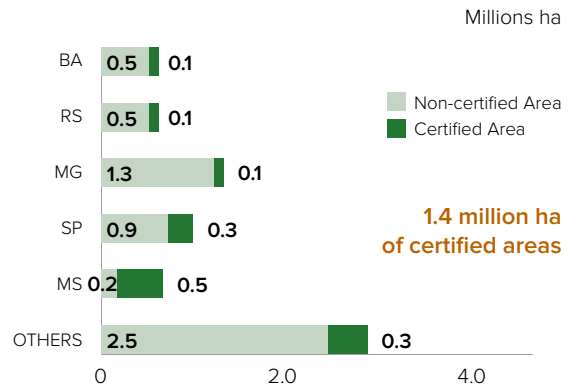
FIGURE 3

#### LEADING ECONOMIC AND SOCIO-ENVIRONMENTAL INDICATORS FOR THE BRAZILIAN PLANTED TREE SECTOR

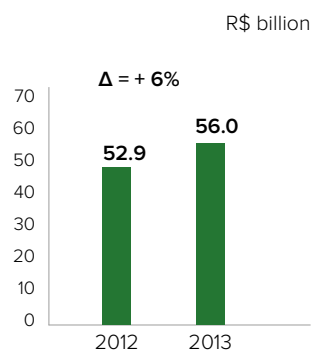
##### FSC CERTIFICATION



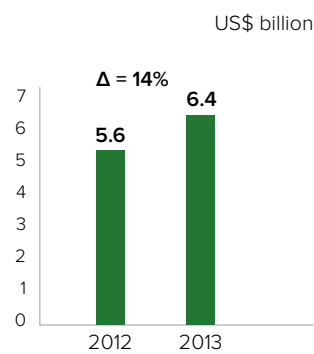
##### CERFLOR/PEFC CERTIFICATION



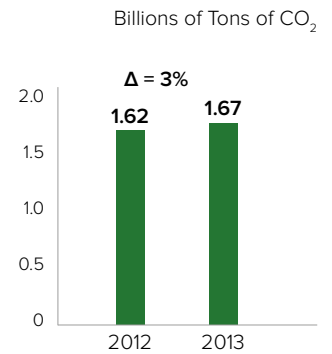
##### INDUSTRY GROSS DOMESTIC PRODUCT



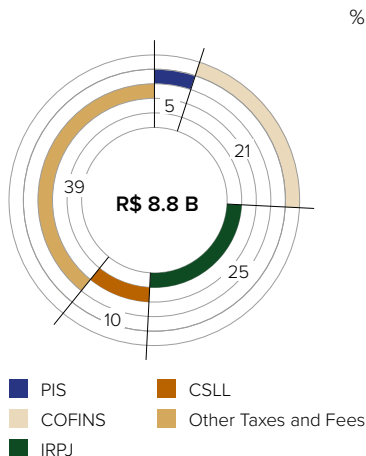
##### BALANCE OF TRADE



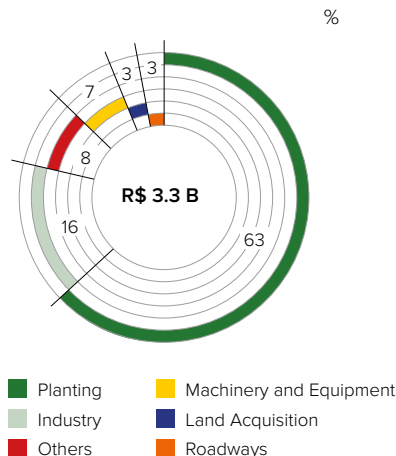
##### CO<sub>2</sub> STOCK



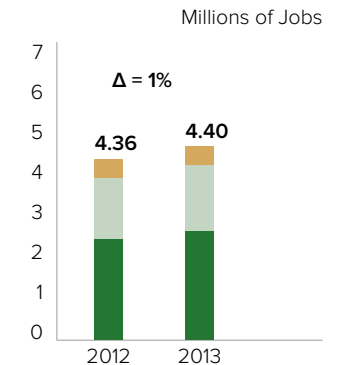
##### TAX COLLECTION



##### INVESTMENTS



##### JOB CREATION



**Brookfield.  
Quatro décadas  
de respeito  
ao meio  
ambiente.**

**Brookfield.  
Four decades  
of respect to  
the environment.**



GACOMETTI®

A Brookfield tem um histórico de 40 anos de investimento e operação de ativos florestais nas Américas do Norte e do Sul. Nosso portfólio florestal global é de, aproximadamente 1,55 milhões de hectares e temos um histórico de gestão sustentável destes recursos.

Hoje, em conjunto com nossos parceiros, administramos, no Brasil, investimentos em mais de 350 mil hectares de florestas de pinus e eucalipto, em sete estados do Brasil atendendo à demanda das indústrias moveleira, siderúrgica, de construção civil, de celulose e papel, de ferro-gusa e gases industriais.

Nossos investimentos em pinus estão situados nos estados do Paraná e Santa Catarina, nas mais competitivas e dinâmicas regiões para o consumo deste tipo de madeira no Brasil, enquanto nossos investimentos em florestas de eucalipto estão distribuídos nos estados da Bahia, Espírito Santo, São Paulo, Minas Gerais e Mato Grosso do Sul.

Em nossas florestas, usamos os melhores materiais genéticos disponíveis, através de mudas produzidas em viveiros certificados, e dedicamos grande esforço na capacitação de nosso pessoal na aplicação de técnicas modernas de operação e gestão de florestas, permitindo ganhos de produtividade, qualidade de vida e elevados níveis de segurança das atividades. Mantemos 170,3 mil hectares de áreas de preservação da flora e fauna originais de cada região, com o acompanhamento permanente da evolução do desenvolvimento da vida selvagem nessas áreas.

*Brookfield has a history of 40 years of investment and operation of forests in North and South America. The global forest portfolio is about 1,55 million hectares and it has a sustainable management history of these resources.*

*In association with our partners, we currently manage in Brazil 350,000 hectares of pine and eucalyptus forests in seven states attending the demand of furniture industries, steel, construction, pulp and paper, pig iron and industrial gases.*

*Brookfield's investments in pine are located in the states of Parana and Santa Catarina, on the most competitive and dynamic region for the consumption of this type of wood in Brazil, while its investments in eucalyptus forests is distributed in the states of Bahia, Espírito Santo, São Paulo, Minas Gerais and Mato Grosso do Sul.*

*In our forests, we use the best genetic material available, through seedlings produced in certified nurseries and dedicates great effort in training staff in the modern forestry management and operational techniques, allowing productivity gains, life quality and high level of security on the activities.*

*Brookfield holds 170,3 thousand hectares of preservation areas of original flora and fauna, with continuous monitoring of the development evolution of wildlife in these areas.*

**Brookfield**





CHAPTER II  
BRAZILIAN AND INTERNATIONAL  
ECONOMIC SCENARIO



# BRAZILIAN AND INTERNATIONAL ECONOMIC SCENARIO

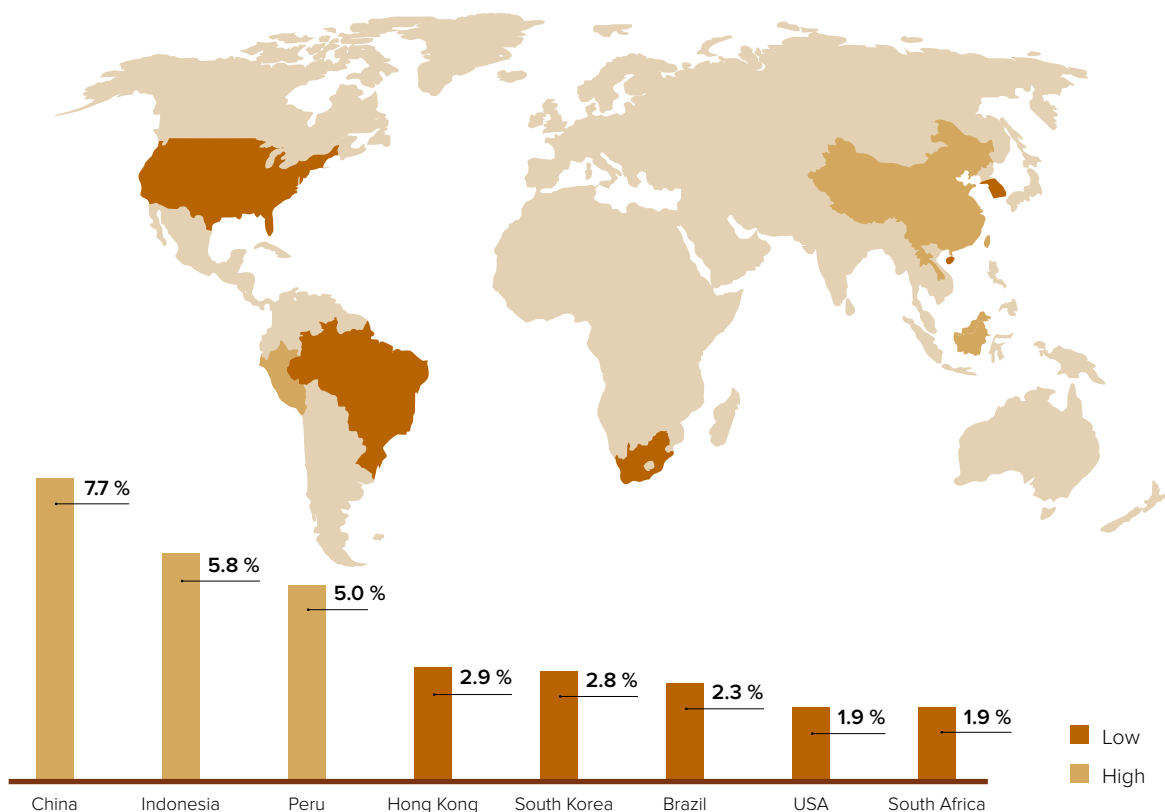
According to data from the International Monetary Fund (IMF), throughout 2013 the largest economies of the world have shown the results of their economic plans that began after the 2008/2009 financial crisis. This crisis was triggered by the North American banking system and later caused a reliability and liquidity crisis in the global credit and financial markets.

Global recovery is still slight, somewhat stronger in the United States, but coming along very slowly in Europe. In addition, the economies of emerging countries such as China and India, which drove worldwide growth between 2009 and 2011, have also been slowing down since 2012.

Brazil is another example of an emerging market with slowing growth. In 2013, the country's Gross Domestic Product (GDP) increased 2.3%, lower than the average growth of economies in Latin America and the Caribbean (3.2%). This figure exceeds the high of 1% in 2012, but shows a third year of weak economic growth— in 2011, the high was 2.7%.

## AROUND THE WORLD

GDP GROWTH IN 2013, IN %

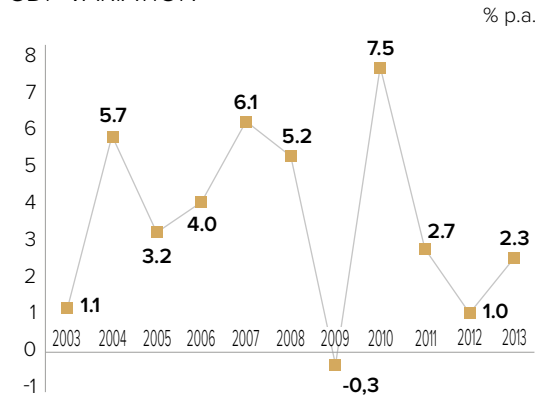


An inflation rate of 5.9%, mainly affecting food and services, constrained family budgets and proved to be a deterrent to consumption, which after a 3.2% increase in 2012 fell to 2.3% in 2013.

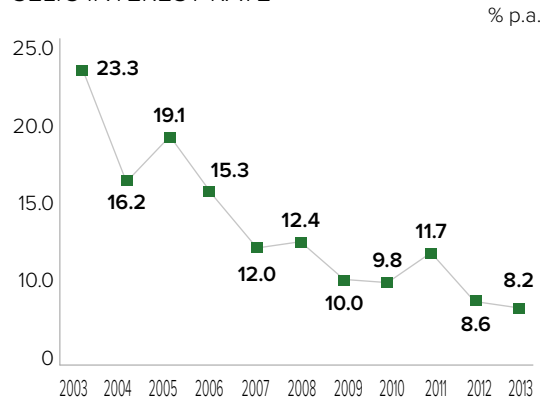
FIGURE 4

EVOLUTION OF THE LEADING INDICATORS OF THE BRAZILIAN ECONOMY, 2003-2013

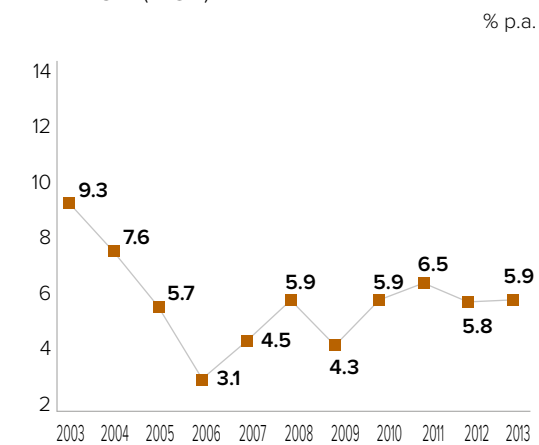
GDP VARIATION



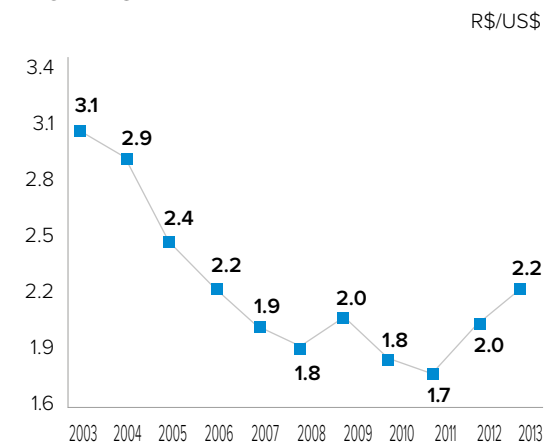
SELIC INTEREST RATE



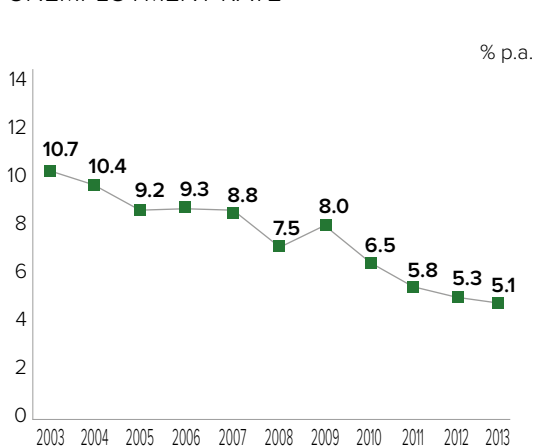
INFLATION (IPCA)



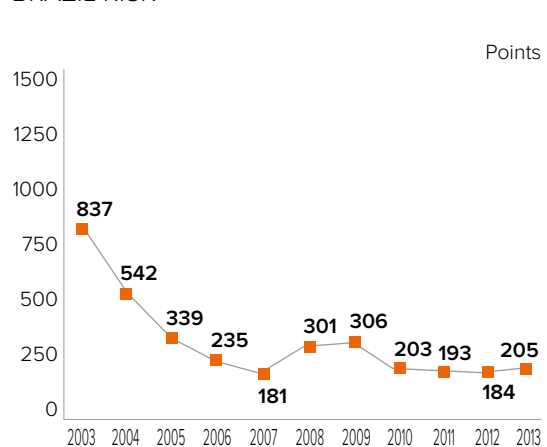
EXCHANGE RATE



UNEMPLOYMENT RATE



BRAZIL RISK



The annual forecast for the Extended National Consumer Price Index (IPCA) exceeded the Brazilian government's goal when the Monetary Policy Committee (Copom) began to raise the interest rate. From April through November 2013, the Selic (short term interest rate) rate increased from 7.25% to 10% per year.

Brazilian government consumption increased 1.9%, while exports advanced 2.5%, a slower pace than import growth, which recorded a high of 8.4%.

The balance of trade deficit and the decrease in foreign investments entering the country caused the average exchange rate for the year to be R\$ 2.2/US\$, a 10% increase compared to the average in 2012.

The unemployment rate, considering the six metropolitan regions included in the Brazilian Institute of Geography and Statistics (IBGE) Monthly Employment Survey (PME) was 5.1%, the lowest point since the beginning of the historical series in 2003.

2013, the Brazil Risk average, which measures the difference between interest paid by North American and Brazilian bonds, increased 11% compared to the 2012 average, reaching 205 points and indicating a downturn in foreign investors' expectations in relation to the country.

Although the Economic Commission for Latin America and the Caribbean (CEPAL) anticipates that Latin America will experience a downturn in economic growth in 2014, the same commission says that the performance expectations for the Brazilian economy in that year will be even worse than the average for the 2011-2013 period. According to CEPAL, since 2012 the foreign scenario has been moving in a direction that is harmful to the economic model that has been in force in Brazil since 2005, which is highly dependent on increased public expenditures and credit far above the GDP.

The Brazilian Central Bank shares CEPAL's view: it predicts that in 2014, the domestic economic scenario will be marked by slow economic growth, price pressure, and deteriorating foreign confidence in the country.



## Life for local people and biodiversity.

Areas preserved by CENIBRA have over 4,500 springs of water that provide clean water for wildlife, flora and use of communities next to Company property.





CHAPTER III  
THE BRAZILIAN  
PLANTED TREE SECTOR





# THE BRAZILIAN PLANTED TREE SECTOR

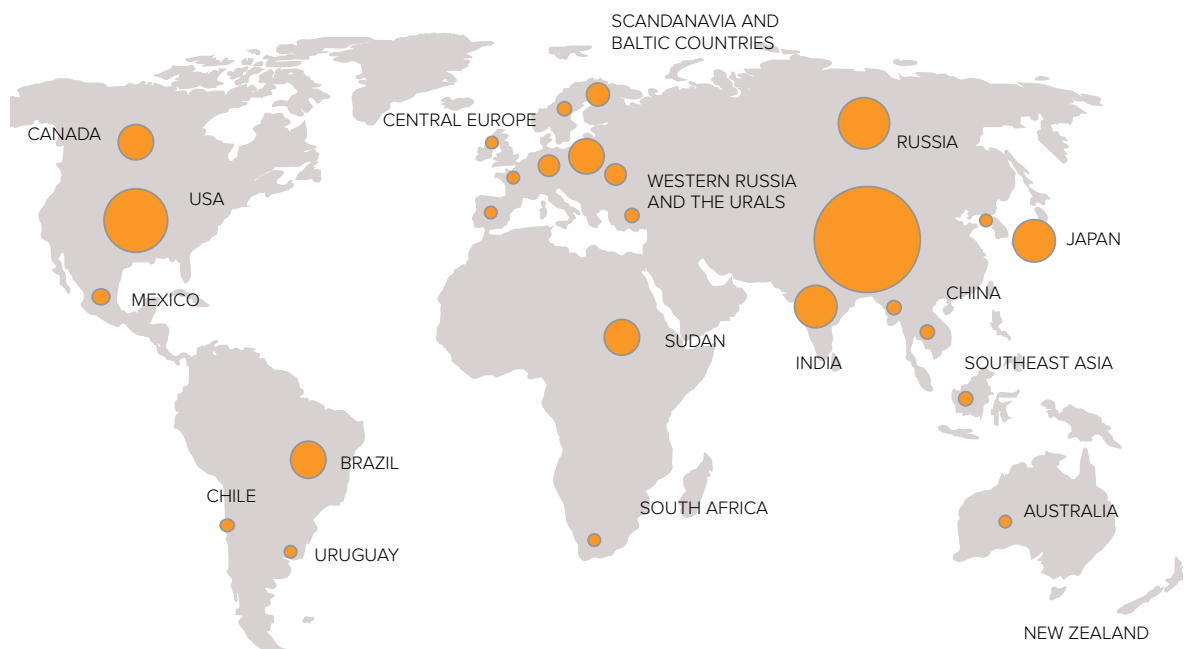
## CHARACTERISTICS AND INTERNATIONAL POSITION

The global area of planted trees is 264 million hectares, representing 7% of all forests worldwide and 22% of forests destined for commercial use.

Most of the area of tree plantations (61%) is located in China, India, and the United States. In Brazil, there are 7.6 million hectares of trees planted for industrial purposes (Figure 5).

FIGURE 5

### LOCATION OF TREE PLANTATIONS AROUND THE WORLD

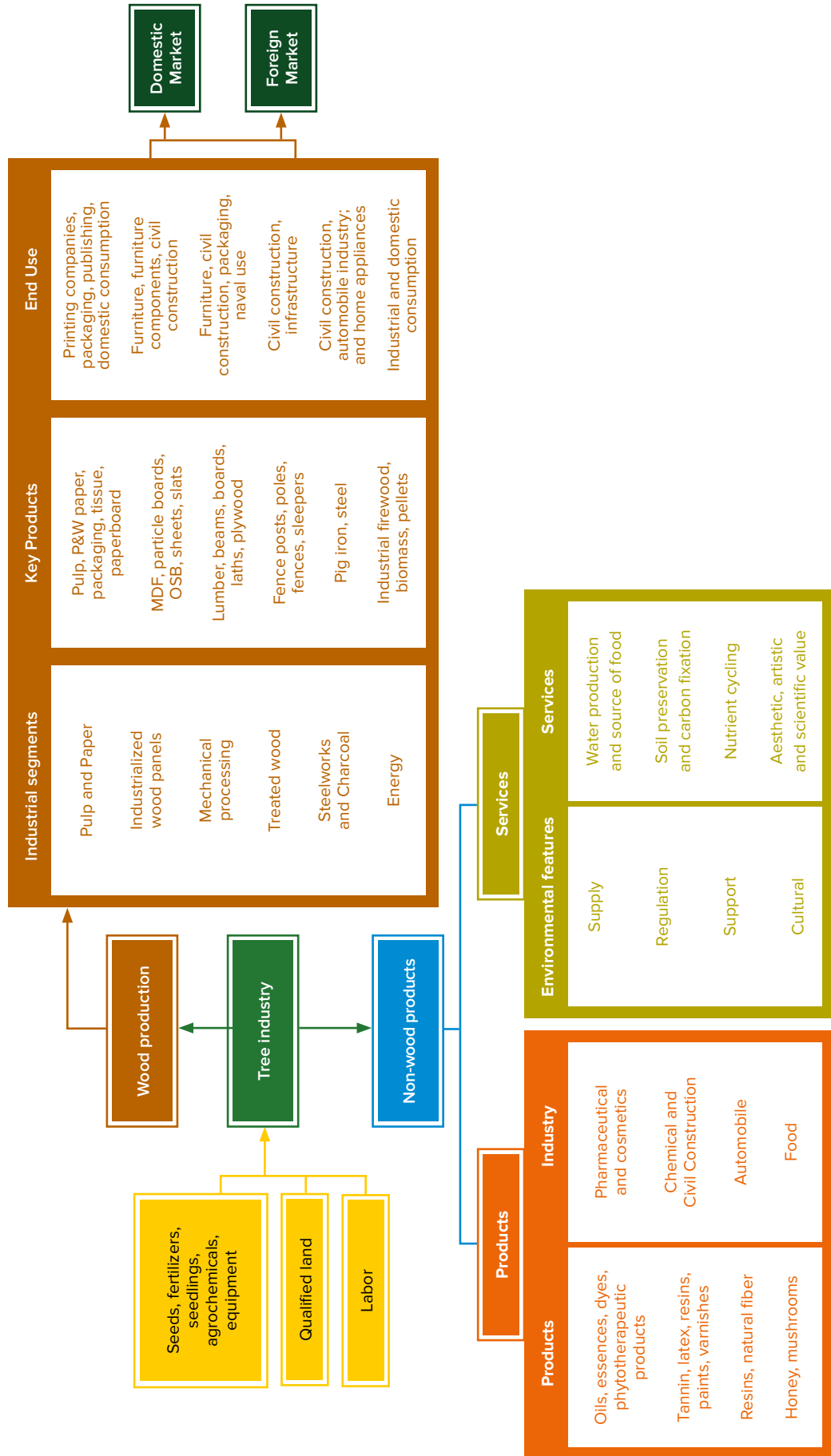


SOURCE: FAO (2011), ADAPTED BY PÓYRY

Although Brazil has only a small portion of the global area of forest plantations, the country is annually responsible for 17% of all harvested timber, as a result of the high productivity seen in the trees planted in the country. China, the United States, and India hold the majority of tree plantations in the world, however, their forest productivity is low.

The Brazilian production chain for planted trees is characterized by its great diversity of products, encompassing a group of activities and segments that include everything from production to transforming roundwood into pulp, paper, wood panels, laminate flooring, lumber, charcoal and furniture, in addition to non-wood products and providing various environmental services (Figure 6).

FIGURE 6  
BRAZILIAN PLANTED TREE SECTOR PRODUCTION CHAIN



SOURCE: ABRAF, 2013

Brazil is the fourth-largest worldwide pulp producer and the ninth-largest producer of paper (Figures 7 and 8).

FIGURE 7

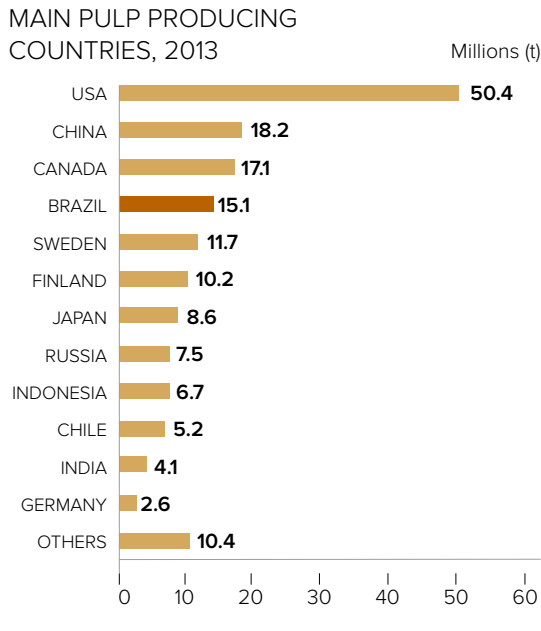
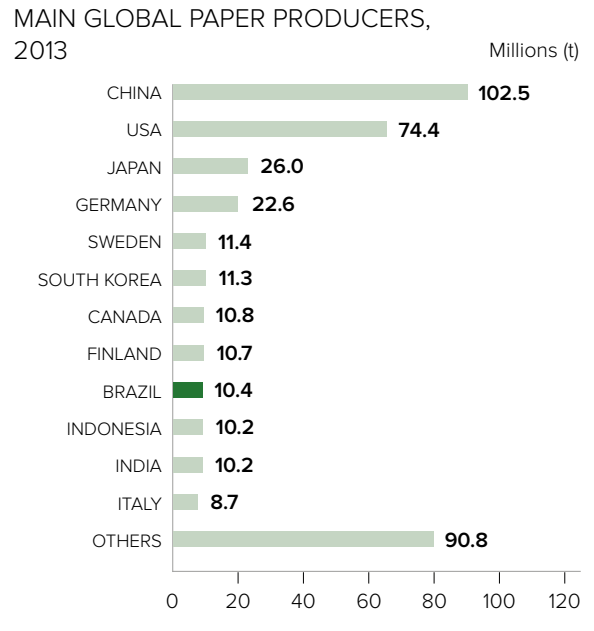


FIGURE 8

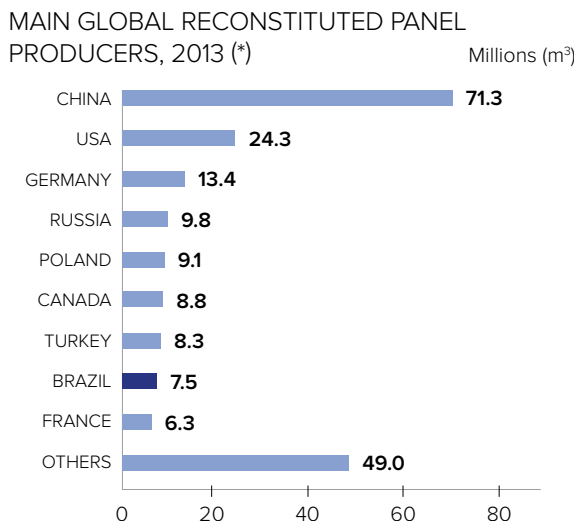


SOURCE: PÖYRY (2013)

Brazil is the eighth-largest worldwide producer of reconstituted wood panels, with just over 3% of the volume produced annually (Figure 9). A similar panorama is seen in the plywood panel market, where China and the US are the main producers and Brazilian production represents 2% of the worldwide volume produced.

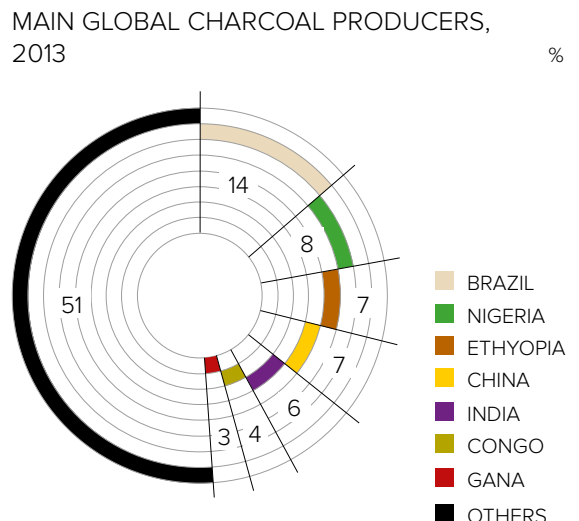
Brazilian charcoal production accounts for approximately 14% of the total produced globally. The main destination for this product is the production of pig iron, steel, ferroalloys and metallic silicon (Figure 10). The other main producers are Nigeria and Ethiopia, countries where charcoal is mainly used for heating dwellings.

FIGURE 9



(\*) This list considers only MDF and MDP, excluding HDF production

FIGURE 10



SOURCE: PÖYRY (2013)



## PLANTING TREES AS AN INVESTMENT

The asset management industry must guarantee maximum return on capital for its investors, always seeking to balance return and risk. Within this context, investments in forestry assets are becoming a more appealing alternative for creating long-term investment portfolios.

One of the main advantages of this asset class is exactly the match between risk and return. As the main component of the return in this case is biological growth, there is a significant level of certainty and predictability in relation to the expected ROI. At the same time, the risks associated with the business, such as climate issues and fires, are also predictable.

Another advantage of investment in forestry assets is the low correlation of their returns with the highly volatile financial market, as trees grow regardless of market conditions. Additionally, the exact time for harvest and the final timber destination can be managed with some flexibility. A third advantage is the strong connection between profitability of the forestry business and inflation in various economic scenarios over time.

Investments in forestry assets began in 1980 in the United States, through Timberland Investment Management Organizations (TIMOs) and Real Estate Investment Trusts (REITs). TIMOs are institutions that manage investments in the forestry sector; these investments originally resulted from fragmented properties and the disposal of forestry assets by the forest-based sector, particularly pulp and paper companies.

Internationally, investments in forestry assets have significantly increased in recent years, mainly supported by the low returns on developed countries' government bonds, market volatility, and inflation concerns. Globally, between 2005 and 2006, estimates show that between US\$ 15 and US\$ 30 billion has been contributed to this asset class. In 2008, the amount invested increased to US\$ 50 billion. In 2013, the estimate was US\$ 70 to US\$ 80 billion, of which over 70% was invested in the United States.



In Brazil, investment funds specialized in forestry assets began operating a little over ten years ago, attracted by the environmental conditions that are ideal for growth, along with the significant availability of productive land with reasonable infrastructure, biological growth rates that are significantly higher than any other place in the world (providing shorter harvest cycles and consequently, earlier generation of cash flow), and strong domestic demand for and consumption of paper, furniture, and other products from the planted tree base. After the ten-year growth cycle described above, the area of planted trees belonging to institutional investors totaled 487,000 hectares in 2013, and the total allocated resources exceeded R\$ 6.0 billion.

This movement has also brought benefits to the planted tree sector, especially to pulp and paper companies. From asset disposal, mainly acquired through TIMOs that manage them with a high level of specialization and at a low cost, these companies have had significant reductions in market risks, and have also had the option to partially or completely outsource wood supply so they can focus on investing in their core business.

Currently, Brazil has a great potential to absorb part of the increasing and ongoing global investments in forestry assets, thereby generating favorable returns for investors along with gains for the overall chain of trees planted for industrial purposes.

In order to speed up this growth cycle, the planted tree sector and other agribusiness activities have held intense negotiations to remove federal measures restricting the purchase of rural properties by foreign capital companies so that the Brazilian government can establish clear rules for investments with international productive capital.

Eliminating the bureaucratic deadlocks that have limited foreign capital investments in forestry assets since 2010 would encourage an increase in investments in the planted tree sector in Brazil, together with domestic projects in the sector. This will play an essential role in meeting the growing demand for planted tree products, which is the result of new technologies, new products and the increasing use of biomass to generate energy.

## MAIN CHALLENGES

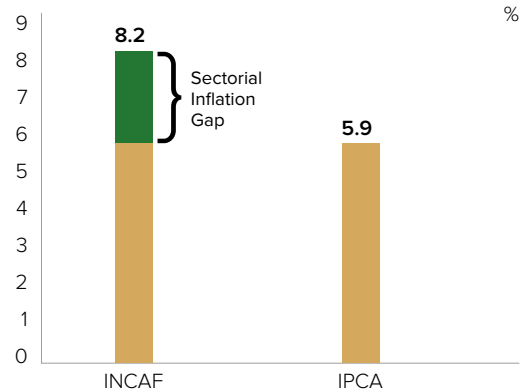
The Brazilian planted tree sector attracts companies and investors from all over the world, especially during this post-crisis period when business profitability rates have been dropping. The opportunities for the sector, however, come up against structural challenges which for many decades have slowed the full development of the domestic planted tree sector.

In 2013, inflation in the planted tree sector as measured by the INCAF-Pöry<sup>2</sup> index was 8.2% p.a., while domestic inflation measured by the IPCA was 5.9% p.a. (Figure 11), which means that costs in the sector increased 2.3% more than the average cost and price increases in the Brazilian economy.

The cost of wood for short fiber pulp production in Brazil increased 93% in USD between 2003 and 2013. In 2013, Chile had the lowest production cost for wood delivered at the mill gate, roughly 18% lower than Brazil.

FIGURE 11

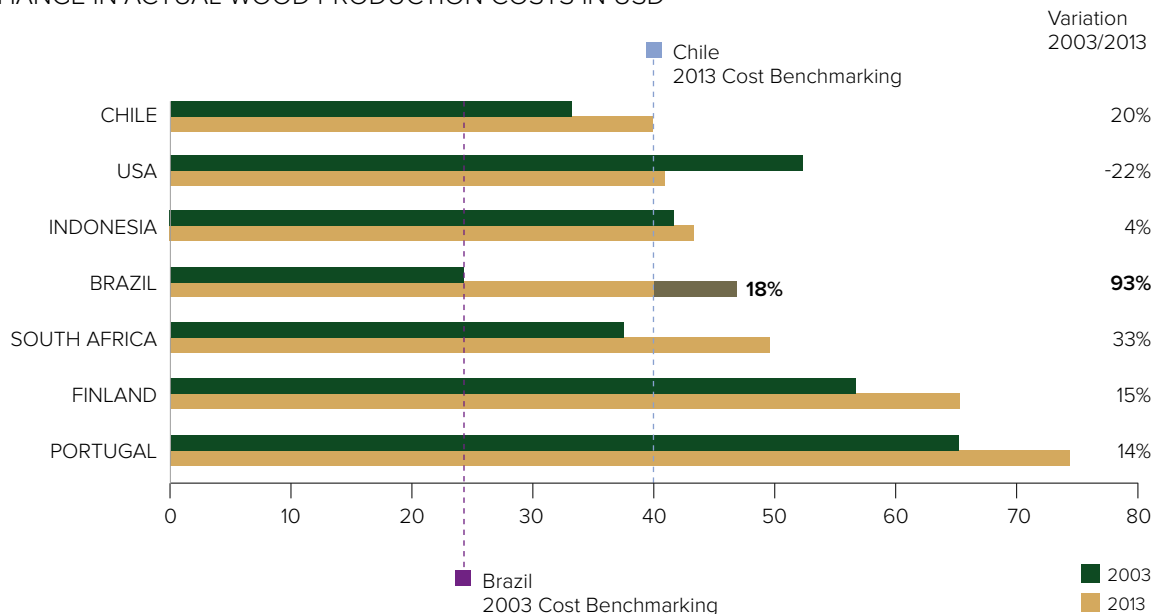
SECTORAL INFLATION (INCAF) VERSUS BRAZILIAN INFLATION (IPCA)



SOURCE: PÖRY (2013) AND IPEA (2013), ADAPTED BY PÖRY

FIGURE 12

CHANGE IN ACTUAL WOOD PRODUCTION COSTS IN USD



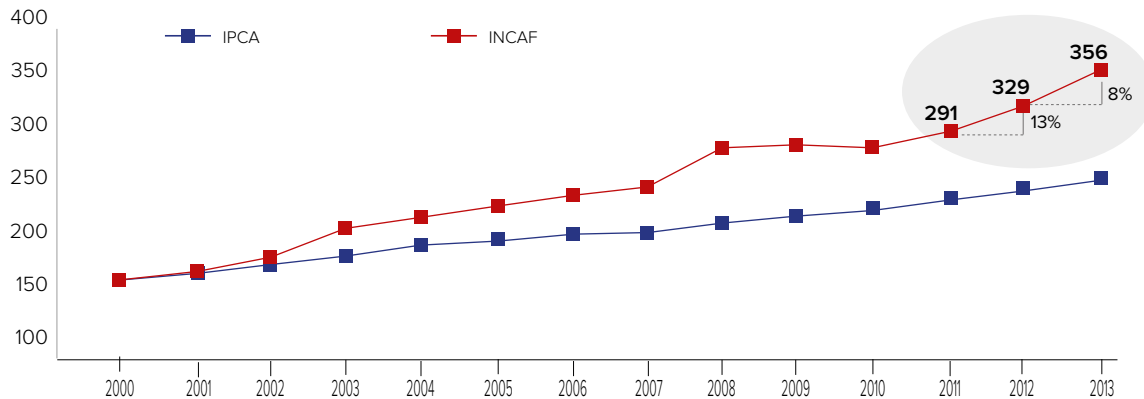
SOURCE: PÖRY (2013)

A positive fact is that despite the higher value compared to 2013, the increase in wood production costs is slowing down. In the previous year, the total costs for the sector increased 13% and in 2011, 11% (Figure 13).

FIGURE 13

## INCAF VERSUS IPCA: 2000-2013

Index - Base Year 2000 = 100



SOURCE: IPEA AND PÖYRY (2013)

The loss of competitiveness not only translates into increased costs for wood, but also lower margins for Brazilian companies in the planted tree sector. For instance, between 2006 and 2013, the average profitability of Brazilian market pulp companies—expressed by the EBITDA/net revenue ratio—went from 48% to 33%, a 15% decrease. In the same period, the average profitability of market pulp companies in the main countries that compete with Brazil went from 28% to 22%, a 6% decrease.

In the wood panel segment, the potential profitability decreased by approximately 6%, and in the lumber segment, approximately 14%.

Within this context, the main challenge faced by the Brazilian planted tree sector translates into the following question: how does the sector guarantee conditions to keep this sector competitive and sustainable in face of the new domestic and global reality?

To support this discussion process, while this publication was being developed, the leaders of the planted tree sector were consulted in order to gather their impressions regarding the reasons why this activity has lost competitiveness in Brazil. Among the most addressed topics, the following stand out:

- **A gap between the actual increase in wages and labor productivity:** salaries have more than doubled in Brazil in the past decade. However, labor productivity only increased by 3%.
- **Insufficient infrastructure and high logistics costs:** the competitiveness of the planted tree sector is directly related to the quality of physical infrastructure for trade. For instance, while Brazil spends an average of US\$ 4.7 to transport one cubic meter of wood 100 kilometers, in the United States this cost does not exceed US\$ 3.
- **High energy power costs:** except for the market pulp segment, which is practically self-sufficient in power generation, the other areas in the planted tree sector consume large amounts of energy to power their processes. Even with the federal government's current efforts to reduce energy prices in the country, the average rates for the sector are still higher than in Mexico and almost double the rates in the United States. The cost of energy in US dollars increased from US\$ 27 to US\$ 120 per megawatt hour in ten years, and it is likely to increase even more.



VERACELUCIO LUCONI

- **Legal insecurity:** restrictions on the purchase of land by foreign capital companies and the lack of solid regulations on the topic significantly compromise the implementation of new projects in the planted tree sector.
- **Bureaucratic environmental licensing:** in Brazil, the average time to obtain the environmental license required to carry out a forest-based industrial project is 120 days. The main reason for the slow pace of the sector's licensing process is the wrongful classification of this activity as highly polluting according to CONAMA resolutions 01/86 and 237/97 from the National Council of the Environment. This is why the processes for granting environmental licenses for productive investments must be improved.
- **Complex and excessive taxation:** Brazil not only has the highest tax burden among emerging countries, but its citizens require significant numbers of hours to pay these taxes. Additionally, the fiscal rules change constantly: on average, there are 46 standards published each day by the Federal Revenue Service. According to the main leaders in this sector, the chaotic Brazilian tax framework absolutely must be simplified.
- **Burdensome interest rates on working capital:** the cost of loans to compose working capital in Brazil is 4% p.a. higher than in its main trading partners.
- **Excessively burdensome labor laws:** the increase in labor costs in Brazil, exceeding the productivity gains for the resources, is the main reason why there was a loss in competitiveness in the domestic industry. This fact, along with high labor costs, make Brazil an expensive country for production. Labor taxes and tributes in Brazil represent an average of 58% of gross salaries, while the global average is 23%.
- **Lack of a sector-specific policy:** despite the efforts which have already been made, Brazil still does not have a structuring policy for the planted tree sector.

In order for the Brazilian planted tree sector to be able to capture the aforementioned investment opportunities, private institutions must articulate the removal of barriers, prioritizing the improvement of industrial and forestry processes, as well as investments in technological innovation. The result of this process will be an increase in sector productivity, reduced production costs, and the country's entrance into a new round of investments in the sector.

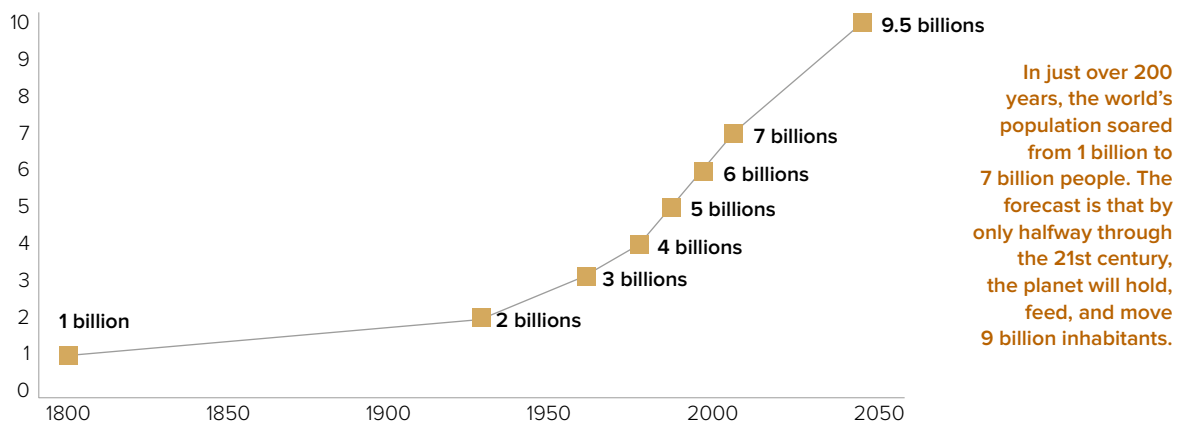


## INNOVATION AND TECHNOLOGY: THE FUTURE OF PLANTED TREES

The global debate on issues that will affect the future of humankind has become more intense in recent years, especially the scarcity of natural resources that are essential to meeting demands for food, water, land and energy.

### POPULATION GROWTH

CHANGE IN THE EARTH'S POPULATION



SOURCE: FAO (2013)

The Food and Agriculture Organization of the United Nations (FAO) forecasts a world population of approximately 9.5 billion inhabitants by 2050. The largest part of this growth will take place in developing countries, where, for various reasons, the birth rates are higher.

This scenario leads to the need to increase food production by 70% over the next 40 years; there will also be increasing demand for land, fiber and energy. Considering current levels of productivity, this increase means approximately 2.5 billion additional hectares will be needed for agricultural crops (17% of the area globally used for agriculture).

FIGURE 14

### EXAMPLES OF WOOD-BASED PRODUCTS CONSOLIDATING THEIR PRESENCE IN THE GLOBAL MARKETPLACE



Flexible Wood Panels



Casings for Electronic Devices



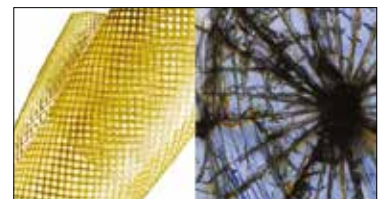
Processed Biomass



Wood Bio-oil



Bioplastic



Super Fiber

SOURCE: PÖYRY (2013)

Still within this scope, FAO estimates that, based on population increases and per capita consumption, demand for timber for industrial use and energy generation will reach 5.2 billion m<sup>3</sup> per year by 2050, an increase of 40%.

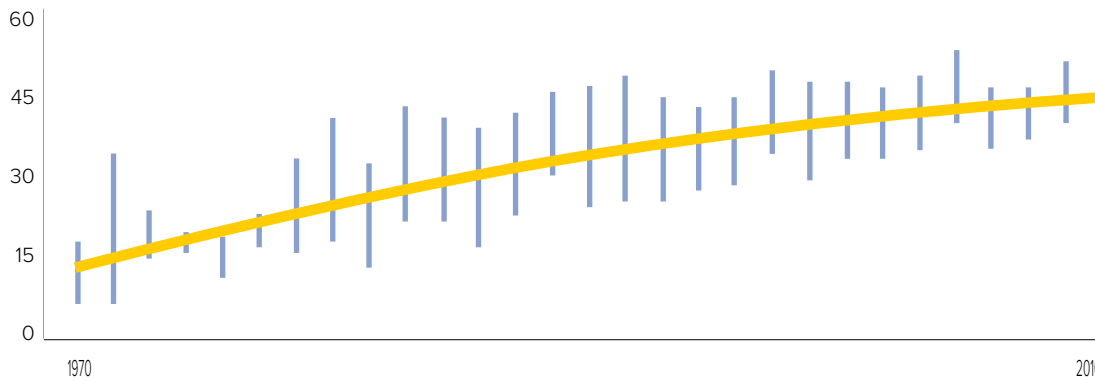
Planted forests are increasingly seen as an important source for research on topics related to the future of humankind. Multiple uses of planted forests in the near future will drive the industry to a new reality, one in which the forestry base will be essential to meeting demands related to global population growth. A good indicator of this is the fact that trees are already the source for more than 5,000 everyday products such as furniture, tools, medical products, cosmetics, and cleaning products, among others. This is, of course, in addition to their use in biofuel production, which has transformed the forest base into a green alternative to oil (Figure 14).

In addition to the soil and climate conditions, another factor that has favored the development of the planted tree sector in Brazil was large investments in technology by companies and research institutions. In only a few decades, domestic research has turned the country into the most productive center of forestry production on the planet (Figures 15 and 16).

FIGURE 15

CHANGE IN EUCALYPTUS PRODUCTIVITY IN THE STATE OF SÃO PAULO, BRAZIL

m<sup>3</sup>/ha/year

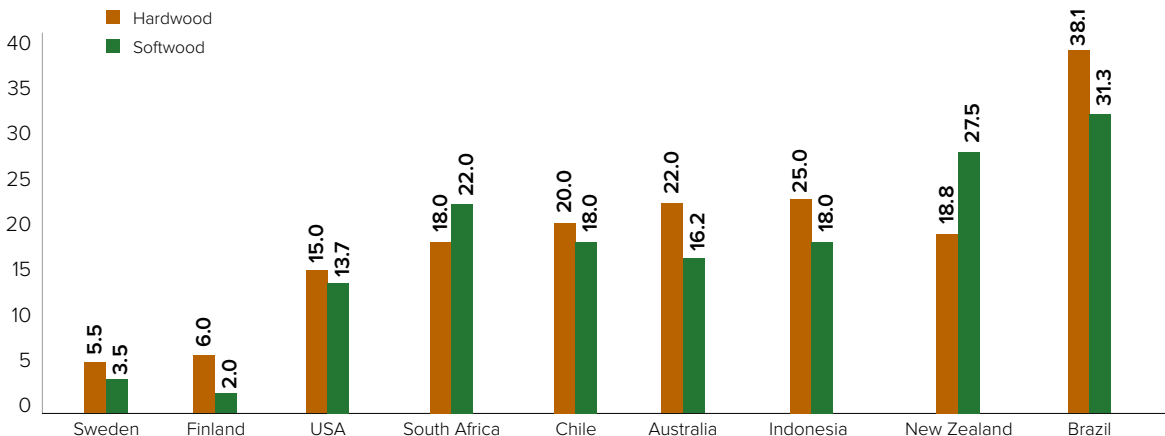


SOURCE: PÖYRY (2013)

FIGURE 16

SOFTWOOD AND HARDWOOD TREE PRODUCTIVITY AROUND THE WORLD

m<sup>3</sup>/ha/year



SOURCE: ABRAF (2013), ADAPTED PÖYRY

A significant advance that has ensured increased productivity for planted trees and gains in industrial competitiveness was the adoption of genetic improvements. The goal was to select trees with the best characteristics for forestry and industrial uses, including strength, shape, resistance to diseases and pests, wood quality, and industrial yield, among others.

Yet there are still many challenges and population demands are ever-larger. Planted forests are a crucial part of this future. However, to continue to supply goods and services today as well as in the future, more advanced and innovative technologies must be developed to increase forest productivity.

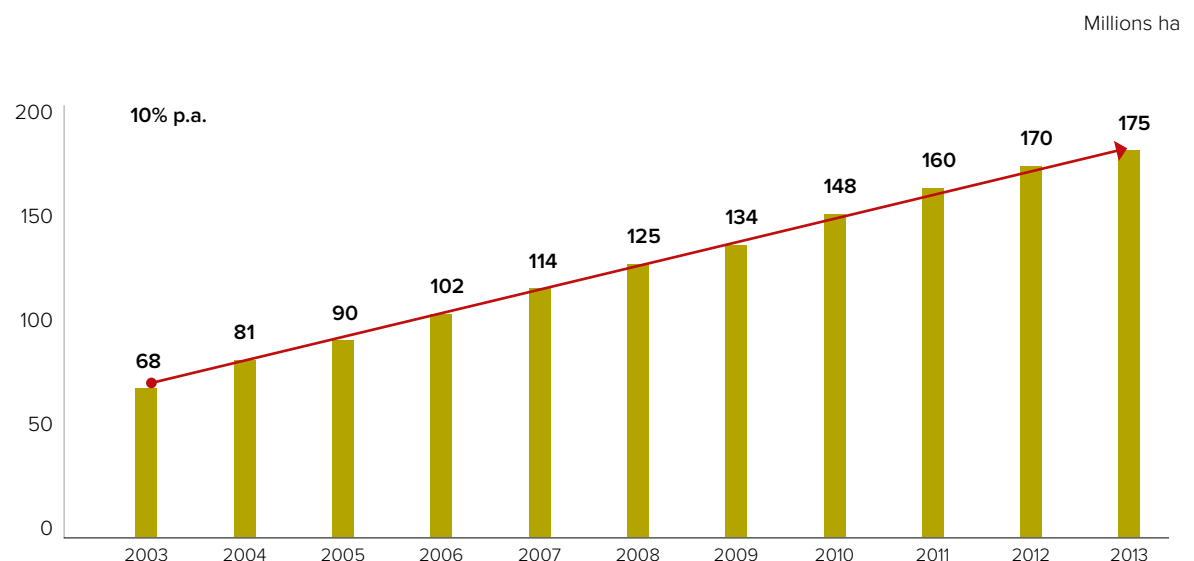
Taking a global perspective, and considering the global ecological footprint, current demand exceeds the Earth's biocapacity to produce renewable resources and absorb CO<sub>2</sub> by 50%. In order to eliminate this ecological disparity, human demand must be balanced against the planet's capacity for regeneration. This means changes in patterns of consumption and production so that people can use natural resources at a rate that the Earth can sustain, in addition to sharing them fairly.

One approach to these challenges requires, in addition to multi-sector dialogues, integrated policies and large investments in innovation and technology, including integrated landscape management, biotechnology, and multiple uses of planted trees.

Biotechnology is the technology that has been most widely adopted over the past ten years. According to data from the International Service for the Acquisition of Agri-Bio-tech Applications (ISAAA) annual report, the area planted with genetically modified crops reached 175 million hectares globally in 2013. Between 2003 and 2013, the area cultivated with these crops grew from 68 million to 175 million hectares, an average increase of 10% per year (Figure 17).

FIGURE 17

## CHANGE IN AREA PLANTED WITH GENETICALLY MODIFIED CROPS WORLDWIDE, 2003 - 2013



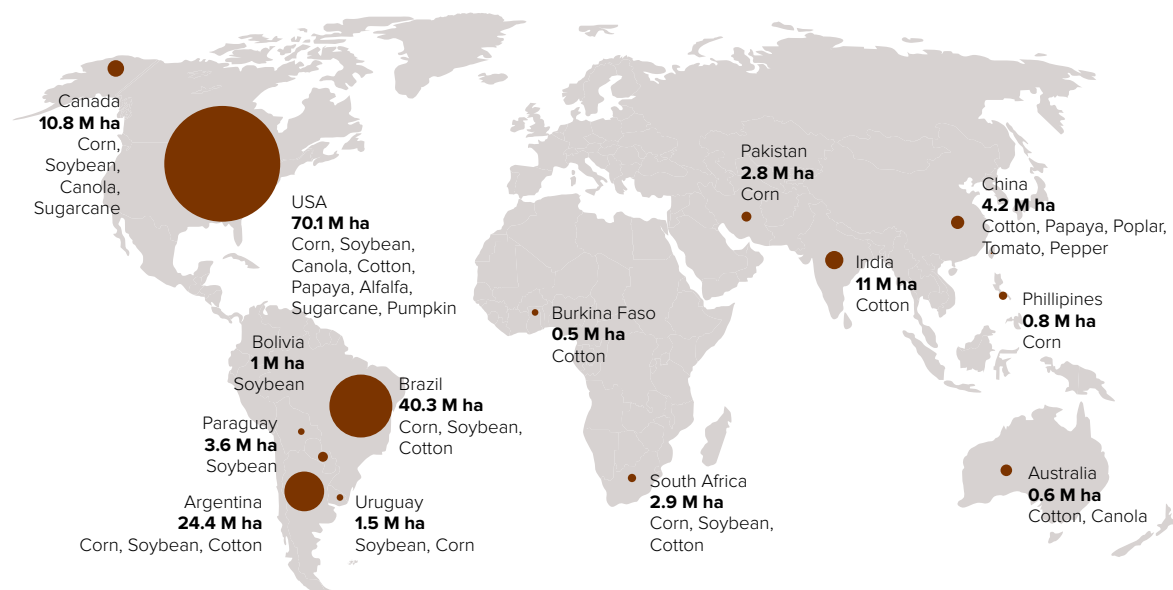
SOURCE: ISAAA, 2013

The main crops in which this technology has been adopted are soybeans, corn, cotton, and canola. The most important characteristics of the genetically modified organisms which are currently on the market are tolerance to herbicides and resistance to insects.

Brazil, with 40.3 million planted hectares, is the second-largest producer of genetically modified crops, ahead of Argentina (24.4 million ha) and behind the US (70 million ha), as shown in Figure 18.

FIGURE 18

DISTRIBUTION OF AREA PLANTED WITH GENETICALLY MODIFIED AGRICULTURAL CROPS WORLDWIDE, 2013



SOURCE: ISAAA, 2013

Forest biotechnology has shown promising results and has consequently been in the international spotlight. For instance, the United States and China have already approved its use in papaya and poplar trees. Over 800 tests and studies have been undertaken around the world by scientists, research institutes, and companies.

Brazil has much to contribute to this debate, given its recognized excellence in forestry management and its well-known capacity for agriculture production, with land available to meet a significant portion of the global demand for fibers, energy, and food. The planted tree sector wants this debate to occur in a transparent manner between its domestic and international stakeholders. Furthermore, its goal is for this discussion to be based on scientific evidence, and for the topic to be considered by the government, universities, and civil society in order to create a positive agenda in pursuit of sustainable development.



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And it also reflects the future we want to build.**



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CHAPTER IV  
INDICATORS IN THE BRAZILIAN  
PLANTED TREE SECTOR





# INDICATORS IN THE BRAZILIAN PLANTED TREE SECTOR

## AREA OF PLANTED TREES IN BRAZIL

Figure 19 illustrates the distribution of tree plantations belonging to the principal Brazilian companies across Brazil's states, by size class.

FIGURE 19

DISTRIBUTION OF THE MAIN PLANTED FOREST CLUSTERS BY STATE, 2013

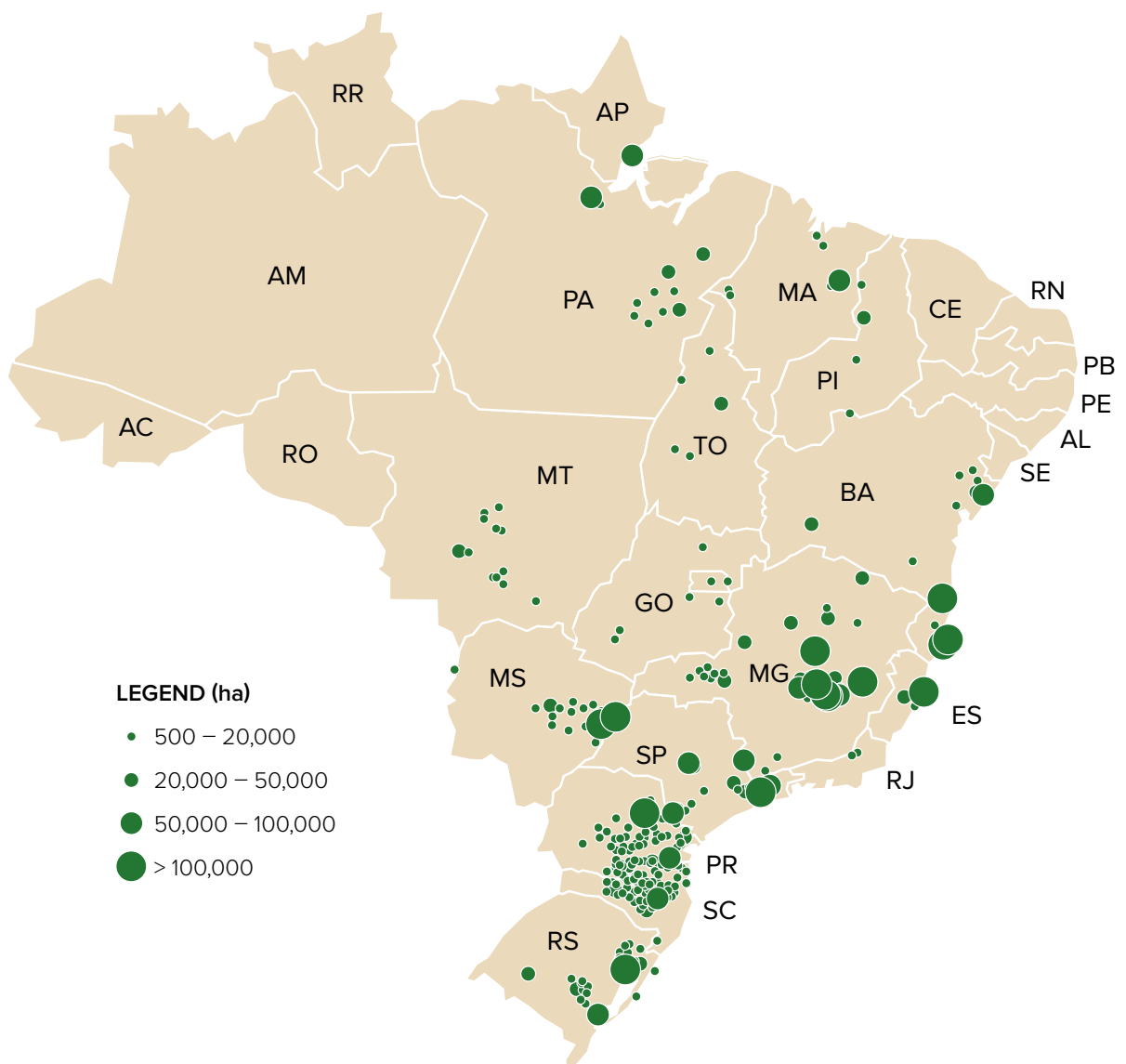
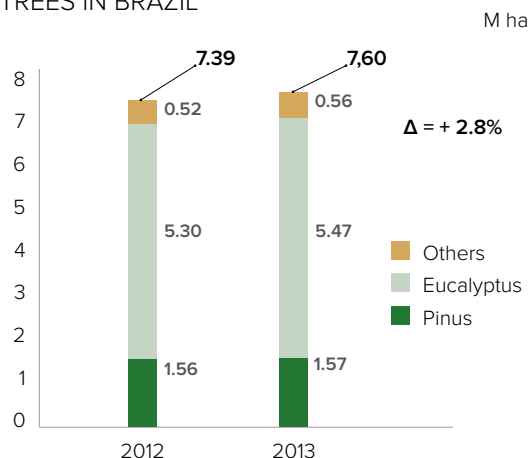


FIGURE 20

## AREA OCCUPIED BY PLANTED TREES IN BRAZIL



SOURCE: ABRAF (2013), ADAPTED BY PÓRY

The area of planted trees in Brazil reached 7.6 million hectares in 2013, a growth of 2.8% compared to the 7.39 million hectares<sup>3</sup> registered in 2012 (Figure 20). Eucalyptus plantations represent 72% of this total and pine, 20.7%. Acacia, teak, rubber trees and paricá are among the other planted species in Brazil.

The area occupied with eucalyptus trees totaled 5,473,176 hectares, representing a 3.2% growth (169,012 ha) compared to the 2012 indicator (Table 2).

The area occupied with pine trees in 2013 totaled 1,570,146 hectares, 0.5% (7,364 ha) greater than the 2012 indicator. Compared to 2006, the area planted with pine

TABLE 2

## AREA OCCUPIED BY EUCALYPTUS TREES, 2006-2013

| STATE                    | AREA OCCUPIED BY EUCALYPTUS TREES (ha) |                  |                  |                  |                  |                  |                  |                  |
|--------------------------|--|------------------|------------------|------------------|------------------|------------------|------------------|------------------|
|                          | 2006                                   | 2007             | 2008             | 2009             | 2010             | 2011             | 2012             | 2013             |
| MINAS GERAIS             | 1,181,429                              | 1,218,212        | 1,278,210        | 1,300,000        | 1,400,000        | 1,401,787        | 1,438,971        | 1,404,429        |
| SÃO PAULO                | 915,841                                | 911,908          | 1,001,080        | 1,029,670        | 1,044,813        | 1,031,677        | 1,041,695        | 1,010,444        |
| MATO GROSSO DO SUL       | 119,319                                | 207,687          | 265,250          | 290,890          | 378,195          | 475,528          | 587,310          | 699,128          |
| BAHIA                    | 540,172                                | 550,127          | 587,610          | 628,440          | 631,464          | 607,440          | 605,464          | 623,971          |
| RIO GRANDE DO SUL        | 184,245                                | 222,245          | 277,320          | 271,980          | 273,042          | 280,198          | 284,701          | 316,446          |
| ESPÍRITO SANTO           | 207,800                                | 208,819          | 210,410          | 204,570          | 203,885          | 197,512          | 203,349          | 221,559          |
| MARANHÃO                 | 93,285                                 | 106,802          | 111,120          | 137,360          | 151,403          | 165,717          | 173,324          | 209,249          |
| PARANÁ                   | 121,908                                | 123,070          | 142,430          | 157,920          | 161,422          | 188,153          | 197,835          | 200,473          |
| MATO GROSSO <sup>4</sup> | 113,770                                | 114,854          | 132,922          | 147,378          | 150,646          | 175,592          | 184,628          | 187,090          |
| PARÁ                     | 115,806                                | 126,286          | 136,290          | 139,720          | 148,656          | 151,378          | 159,657          | 159,657          |
| GOIÁS <sup>5</sup>       | 98,765                                 | 102,032          | 113,177          | 115,286          | 116,439          | 118,636          | 115,567          | 121,375          |
| TOCANTINS                | 13,901                                 | 21,655           | 31,920           | 44,310           | 47,542           | 65,502           | 109,000          | 111,131          |
| SANTA CATARINA           | 70,341                                 | 74,008           | 77,440           | 100,140          | 102,399          | 104,686          | 106,588          | 107,345          |
| AMAPÁ                    | 58,473                                 | 58,874           | 63,310           | 62,880           | 49,369           | 50,099           | 49,506           | 57,169           |
| PIAUI                    | -                                      | -                | -                | -                | 37,025           | 26,493           | 27,730           | 28,053           |
| OTHERS                   | 27,491                                 | 31,588           | 27,580           | 28,380           | 4,650            | 9,314            | 18,838           | 15,657           |
| <b>TOTAL</b>             | <b>3,862,546</b>                       | <b>4,078,168</b> | <b>4,456,069</b> | <b>4,658,924</b> | <b>4,900,949</b> | <b>5,049,714</b> | <b>5,304,164</b> | <b>5,473,176</b> |

SOURCE: ABRAF (2013), ADAPTED BY PÓRY

3. The area occupied with planted trees in 2012 was corrected according to a survey carried out by the Agriculture and Livestock Federation of Mato Grosso (FAMATO) and based on an update to the area survey carried out in the state of Goiás.

4. The historical series of the area of planted trees in the state of Mato Grosso was corrected as a result of the area survey carried out by the Agriculture and Livestock Federation of the State of Mato Grosso (FAMATO).

5. The historical series of the area of planted trees in the state of Goiás was corrected as a result of adjustments to the area survey in the state.

TABLE 3

## AREA OCCUPIED BY PINE TREES, 2006-2013

| STATE              | AREA OCCUPIED BY PINUS TREES (ha) |                  |                  |                  |                  |                  |                  |                  |
|--------------------|-----------------------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|
|                    | 2006                              | 2007             | 2008             | 2009             | 2010             | 2011             | 2012             | 2013             |
| PARANÁ             | 686,453                           | 701,578          | 714,890          | 695,790          | 686,509          | 658,707          | 619,731          | 662,296          |
| SANTA CATARINA     | 530,992                           | 548,037          | 551,220          | 550,850          | 545,592          | 538,254          | 539,377          | 540,542          |
| RIO GRANDE DO SUL  | 181,378                           | 182,378          | 173,160          | 171,210          | 168,955          | 164,806          | 164,832          | 164,174          |
| SÃO PAULO          | 214,491                           | 209,621          | 172,480          | 167,660          | 162,005          | 156,726          | 144,802          | 127,693          |
| MINAS GERAIS       | 146,000                           | 143,395          | 145,000          | 140,000          | 136,310          | 75,408           | 52,710           | 46,807           |
| GOIÁS              | 14,409                            | 13,828           | 15,200           | 15,200           | 12,160           | 10,760           | 16,432           | 9,151            |
| MATO GROSSO DO SUL | 28,500                            | 20,697           | 18,800           | 16,870           | 13,847           | 11,871           | 9,825            | 8,330            |
| BAHIA              | 54,820                            | 41,221           | 35,090           | 31,040           | 26,570           | 21,520           | 11,230           | 7,298            |
| ESPÍRITO SANTO     | 4,408                             | 4,093            | 3,990            | 3,940            | 3,546            | 2,546            | 2,546            | 2,801            |
| TOCANTINS          | -                                 | 700              | 850              | 850              | 850              | 850              | 853              | 609              |
| AMAPÁ              | 20,490                            | 9,000            | 1,620            | 810              | 15               | 445              | 445              | 445              |
| MATO GROSSO        | 7                                 | 7                | 10               | 10               | -                | -                | -                | -                |
| MARANHÃO           | -                                 | -                | -                | -                | -                | -                | -                | -                |
| PARÁ               | 149                               | 101              | 10               | -                | -                | -                | -                | -                |
| PIAUI              | -                                 | -                | -                | -                | -                | -                | -                | -                |
| OTHERS             | 4,189                             | -                | -                | 490              | -                | -                | -                | -                |
| <b>TOTAL</b>       | <b>1,886,286</b>                  | <b>1,874,656</b> | <b>1,832,320</b> | <b>1,794,720</b> | <b>1,756,359</b> | <b>1,641,892</b> | <b>1,562,782</b> | <b>1,570,146</b> |

SOURCE: ABRAF (2013), ADAPTED BY PÓYRY

TABLE 4

## AREA OCCUPIED BY OTHER PLANTED TREES, 2010-2013

| CULTURE      | AREA OCCUPIED BY OTHER CROPS (ha) |                |                |                |
|--------------|-----------------------------------|----------------|----------------|----------------|
|              | 2010                              | 2011           | 2012           | 2013           |
| RUBBER TREE  | 159,500                           | 165,648        | 168,848        | 172,448        |
| ACACIA       | 127,600                           | 146,813        | 148,311        | 146,903        |
| TEAK         | 65,440                            | 67,693         | 67,329         | 88,270         |
| PARICA       | 85,470                            | 85,473         | 87,901         | 87,519         |
| ARAUCARIA    | 11,190                            | 11,179         | 11,343         | 11,360         |
| POPLAR       | 4,221                             | 4,220          | 4,216          | 4,216          |
| OTHERS       | 8,969                             | 8,256          | 33,183         | 46,937         |
| <b>TOTAL</b> | <b>462,390</b>                    | <b>489,282</b> | <b>521,131</b> | <b>557,652</b> |

SOURCE: ABRAF (2013), ADAPTED BY PÓYRY

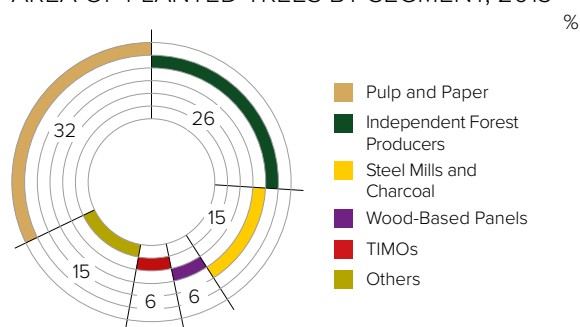
trees has decreased by 16.8% (Table 3).

The area occupied by acacia, teak, rubber trees, paricá and other species reached 557,652 hectares in 2013 (Table 4).

The area occupied by planted trees in Brazil is composed of the pulp and paper segment (32%), independent forest producers (26%), steelworks and charcoal producers (15%), the wood panel segment (6%), and institutional investors and investors belonging to other segments, mostly agribusiness (Figure 21).

FIGURE 21

## AREA OF PLANTED TREES BY SEGMENT, 2013



SOURCE: ABRAF (2013), ADAPTED BY PÓYRY

## CONSUMPTION OF ROUNDWOOD<sup>6</sup>

In 2013, the domestic consumption of roundwood from planted trees for industrial use was 185.3 million cubic meters (m<sup>3</sup>), which represents an increase of 1.8% compared to 2012.

TABLE 5

BRAZILIAN ROUNDWOOD CONSUMPTION FOR INDUSTRIAL USE BY SEGMENT AND TYPE, 2013

| SEGMENT                         | ROUNDWOOD CONSUMPTION (m <sup>3</sup> ) |                   |                  |                    |
|---------------------------------|---|-------------------|------------------|--------------------|
|                                 | EUCALYPTUS                              | PINUS             | OTHERS           | TOTAL              |
| PULP AND PAPER                  | 56,628,357                              | 8,067,258         | 498,085          | 65,193,700         |
| WOOD PANEL                      | 6,428,162                               | 13,457,258        | 378,612          | 20,264,031         |
| LUMBER AND OTHER SOLID PRODUCTS | 6,870,498                               | 15,295,499        | 357,052          | 22,523,049         |
| CHARCOAL                        | 23,533,724                              | -                 | -                | 23,533,724         |
| INDUSTRIAL FIREWOOD             | 41,832,528                              | 3,929,361         | 4,262,239        | 50,024,128         |
| TREATED WOOD                    | 1,824,012                               | -                 | -                | 1,824,012          |
| WOOD CHIPS AND OTHERS           | 1,129,621                               | -                 | 781,200          | 1,910,821          |
| <b>TOTAL</b>                    | <b>138,246,903</b>                      | <b>40,749,376</b> | <b>6,277,187</b> | <b>185,273,466</b> |

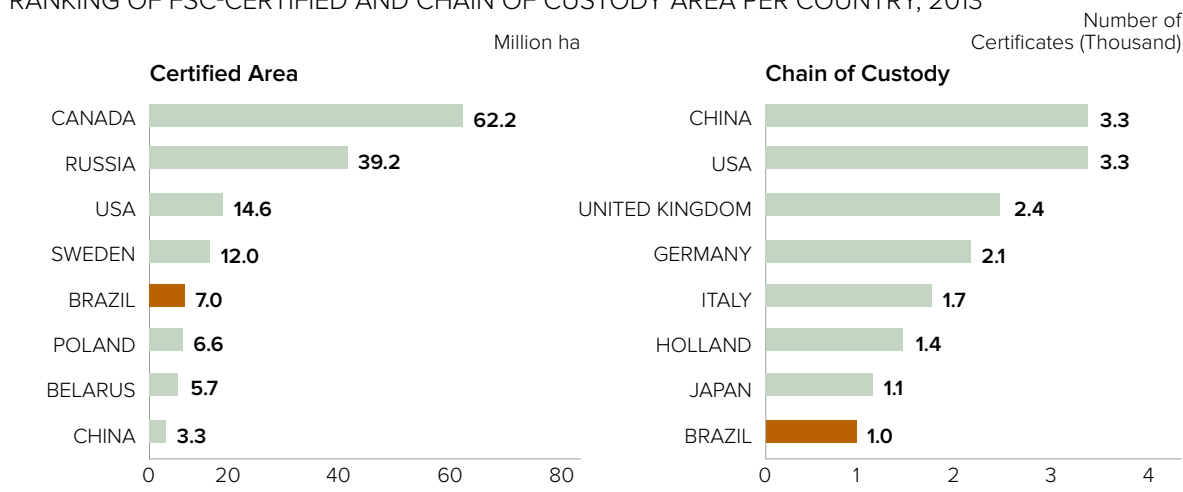
SOURCE: PÖYRY (2013)

## FORESTRY CERTIFICATION

In 2013, Brazil ranked 5<sup>th</sup> in area certified by the Forest Stewardship Council (FSC) forestry certification system, behind only Canada, Russia, United States and Sweden. As for the Chain of Custody certification modality (CoC), Brazil has 1,030 registered certificates and is 8<sup>th</sup> in the overall ranking. The countries with the most CoC certificates, which enable wood tracking throughout the entire production chain, are China, the United States, and the United Kingdom (Figure 22).

FIGURE 22

RANKING OF FSC-CERTIFIED AND CHAIN OF CUSTODY AREA PER COUNTRY, 2013



SOURCE: FACTS AND FIGURES FSC, JANUARY 2014

6. Wood harvested from planted trees, which has not undergone any industrial processing.

An area of 4 million hectares of planted trees is FSC-certified, which represents 57% of the entire certified area in Brazil. Figure 23 shows the share of certified area by state.

With regard to the Brazilian Forest Certification Program (Cerflor), which represents the Programme of Endorsement for Forest Certification (PEFC), Brazil has 1.6 million hectares certified for forestry management of planted and native trees. The country ranked 18<sup>th</sup> overall. For CoC, Brazil has 59 registered certificates and is ranked 22<sup>nd</sup> overall (Figure 24).

FIGURE 23

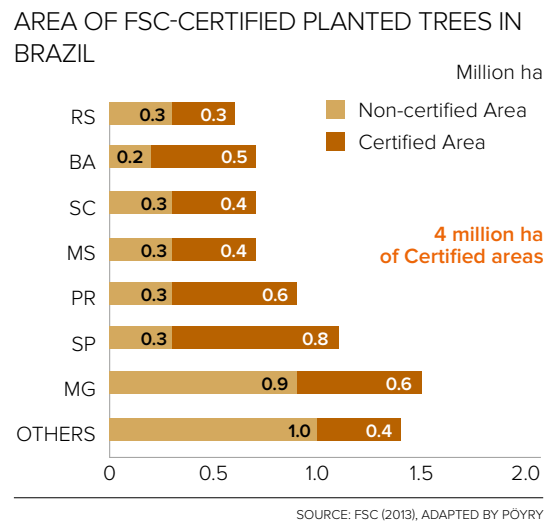
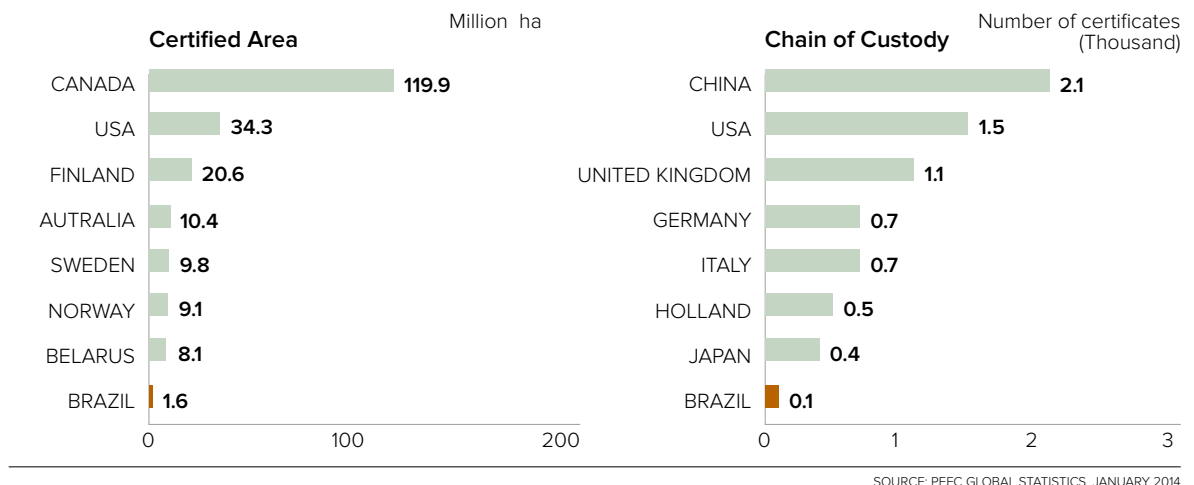


FIGURE 24

RANKING OF CERFLOR/PEFC-CERTIFIED AREA AND CHAIN OF CUSTODY PER COUNTRY, 2013

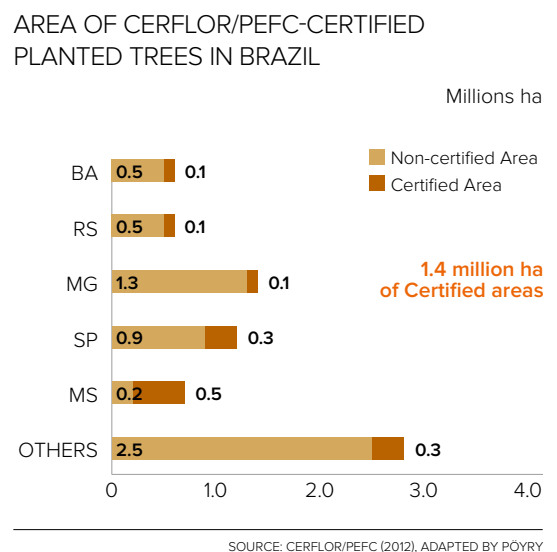


In Brazil 1.4 million hectares of planted trees are certified by the Cerflor/PEFC system. Figure 25 shows the share of certified area per State.

It is important to point out that most of the areas that are not Cerflor/PEFC-certified are certified by the FSC. Furthermore, forest companies can hold both certifications at the same time.

In 2013, the Small and Low Intensity Managed Forests (SLIMF) certification standard was approved to certify forest management in small and mid-sized forest producers. In Brazil, the area of planted and native trees certified through this standard totals 36,900 hectares and 8,000 hectares, respectively.

FIGURE 25



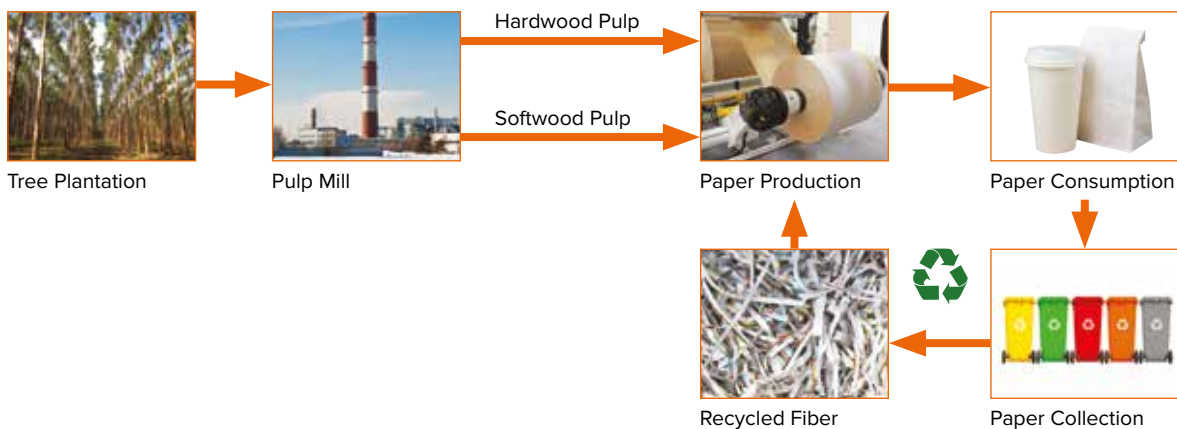
## PERFORMANCE OF THE BRAZILIAN PLANTED TREE SECTOR

### Pulp and Paper

Pulp is the principal raw material for paper production. There are two types of pulp: hardwood (short fiber) and softwood (long fiber). The manufacturing process for each type of paper uses a different type of fiber, since soft and hardwood fibers have different mechanical properties. Generally speaking, printing & writing paper, tissue and some types of paperboard are made from hardwood pulp, which provides greater opacity and softness. Packaging papers, corrugated cardboard and other types of paperboard are made from softwood pulp, which makes them physically stronger. Additionally, recycled fibers are another important source of raw material for the paper industry, and are mainly used in corrugated cardboard and tissue paper production. There are also high-yield pulps that are used in newsprint and magazine paper production.

FIGURE 26

PULP AND PAPER SEGMENT PRODUCTION CHAIN



SOURCE: PÖYRY

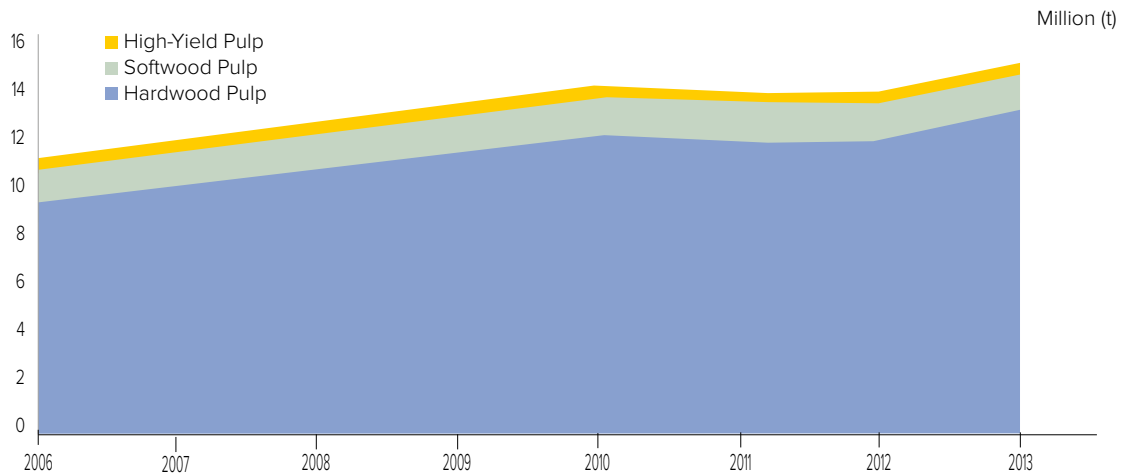


CELLULOSE IRANI / MARIO ÁGUAS

In 2013, Brazilian pulp production increased 8.2% and paper production increased 1.8% compared to 2012. Last year, 15.1 million tons of pulp and 10.4 million tons of paper were produced. The production of hardwood pulp grew by 8.4%, and softwood pulp by 9.9%, and production of high-yield mechanical pulp fell by 1.1% (Figure 27).

FIGURE 27

CHANGE IN BRAZILIAN PULP PRODUCTION

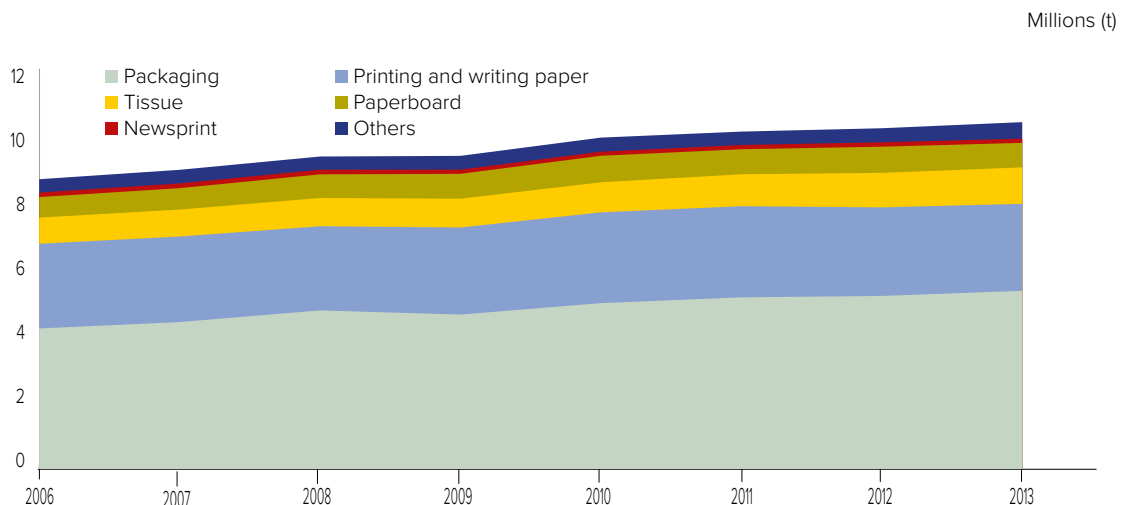


SOURCE: BRACELPA (2013), ADAPTED BY POYRY

Production of tissue, packaging paper, and other papers increased by 5.4%, 3.0%, and 2.5%, respectively. On the other hand, the volume of paperboard, newsprint, and printing and writing paper production has fallen by 2.3%, 0.5% and 2.9%, respectively (Figure 28).

FIGURE 28

CHANGE IN BRAZILIAN PAPER PRODUCTION

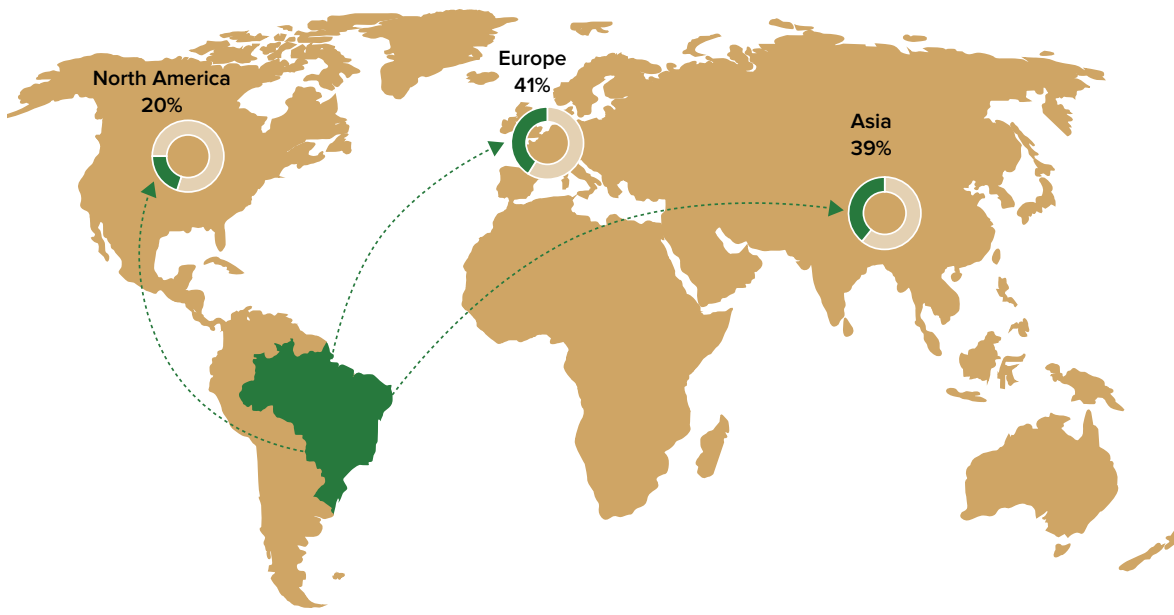


SOURCE: BRACELPA (2013), ADAPTED BY POYRY

Exports from the pulp and paper segment totaled US\$ 7.2 billion, a 7.5% increase compared to 2012. In terms of volume, 9.4 million tons of pulp and 1.9 million tons of paper were exported.

Europe is still the main destination for Brazilian pulp, importing 41% of exported volume, followed by Asia and North America, importing 39% and 20%, respectively (Figure 29).

FIGURE 29  
DESTINATION OF BRAZILIAN PULP EXPORTS, BY VOLUME



SOURCE: SECEX (2013), ADAPTED BY PÖYRY

In the international market, the main use for Brazilian pulp is tissue paper production (Figure 30).

FIGURE 30  
PRINCIPAL USES OF BRAZILIAN PULP EXPORTS



SOURCE: BRACELPA (2013), ADAPTED BY PÖYRY

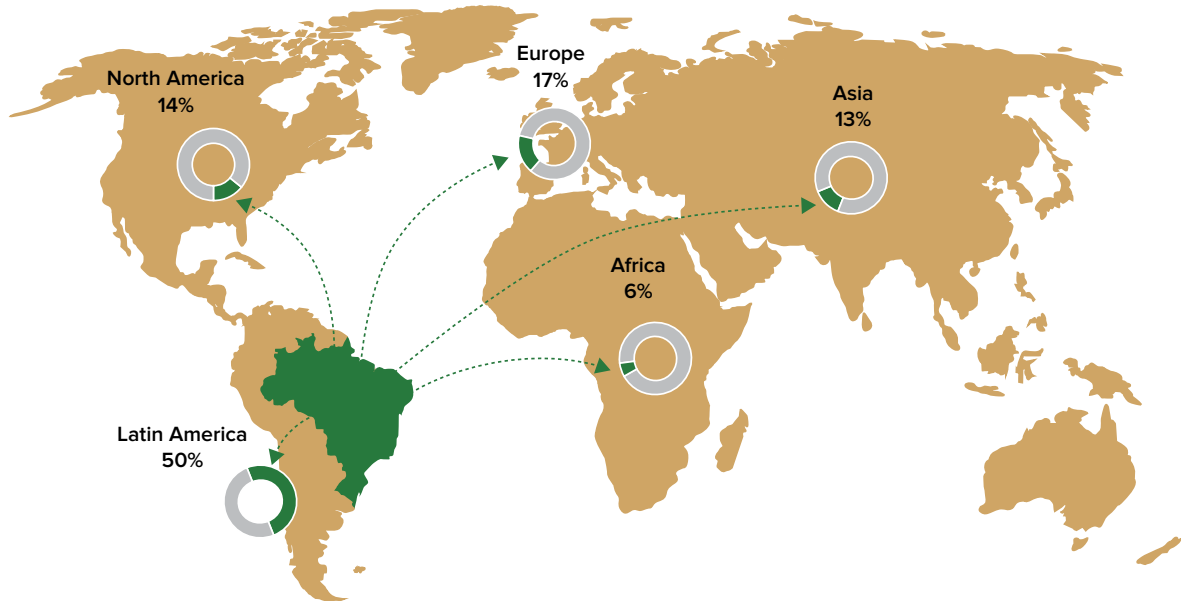


As for paper, Latin America continues to be the main market, and is responsible for consuming 50% of exported volume (Figure 31).



FIGURE 31

DESTINATION OF BRAZILIAN PAPER EXPORTS BY VOLUME



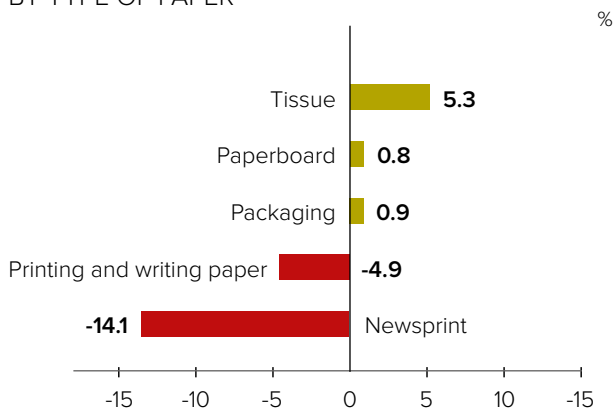
SOURCE: SECEX (2013), ADAPTED BY POYRY

Apparent pulp consumption (an indicator that measures domestic demand) increased 4.3% in 2013. Paper sales in the Brazilian market totaled 5.7 million tons and were 2.8% higher than 2012.

Despite the modest growth in consumption of all types of paper, tissue sales have increased 5%. The consumption of newsprint and printing and writing paper decreased by 14% and 5%, respectively (Figure 32).

FIGURE 32

DOMESTIC CONSUMPTION VARIATION BY TYPE OF PAPER



SOURCE: BRACELPA (2013), ADAPTED BY POYRY

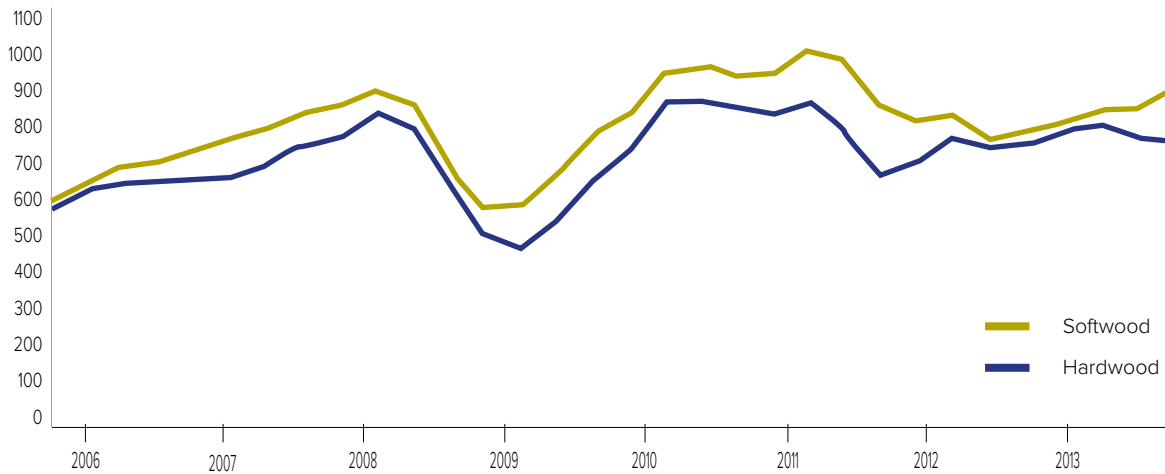


In 2013, the average listed price for bleached eucalyptus kraft pulp (BEKP) in Western Europe reached US\$ 795 per ton, 4.8% higher than the 2012 average (US\$ 758/ton), as shown in Figure 33.

FIGURE 33

CHANGE IN HARDWOOD AND SOFTWOOD PULP PRICES

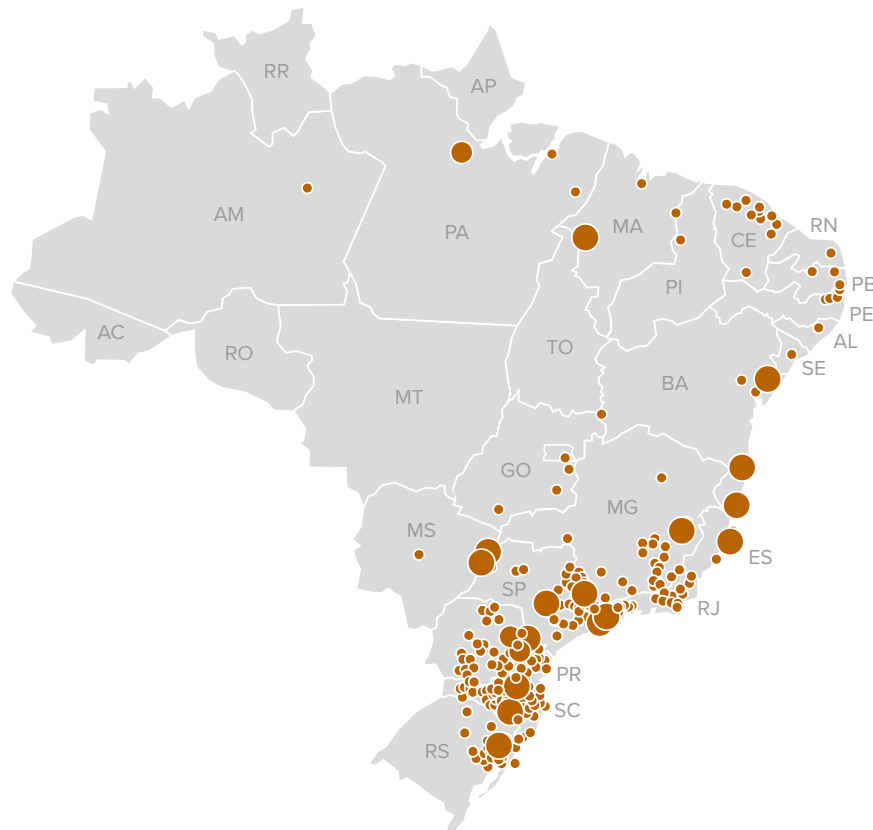
US\$/t



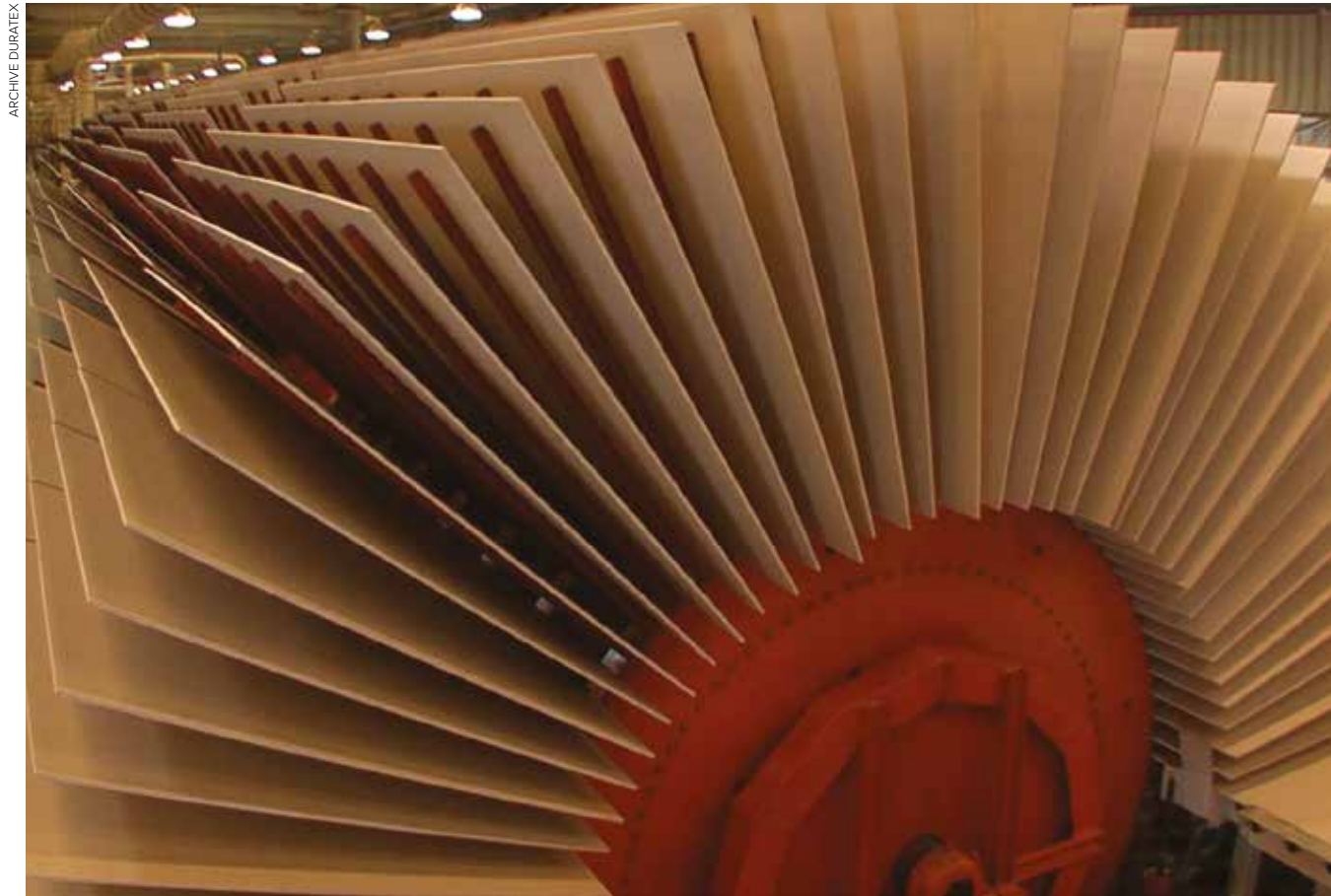
SOURCE: FOEX (2013), ADAPTED BY PÖYRY

FIGURE 34

LOCATION OF BRAZILIAN PULP AND PAPER PRODUCERS



SOURCE: PÖYRY (2013)

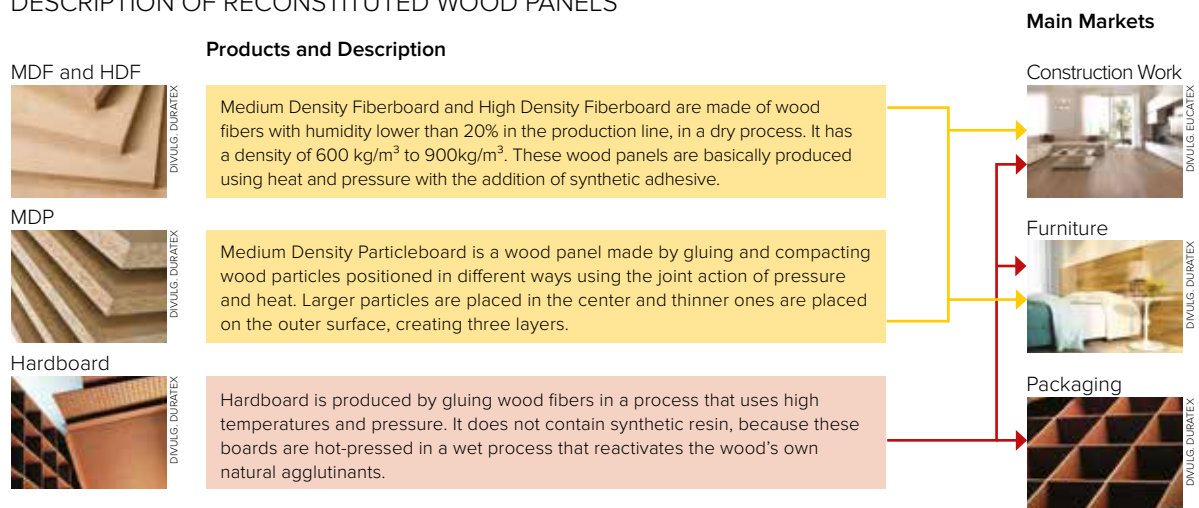


### Wood Panels and Laminate Flooring

Wood panels are divided into two groups. The first group is defined as reconstituted wood panels, which are basically produced from wood fibers or particles. The second group is plywood, which is produced from wood veneers. Figure 35 shows the main types of wood panels and their uses.

FIGURE 35

#### DESCRIPTION OF RECONSTITUTED WOOD PANELS



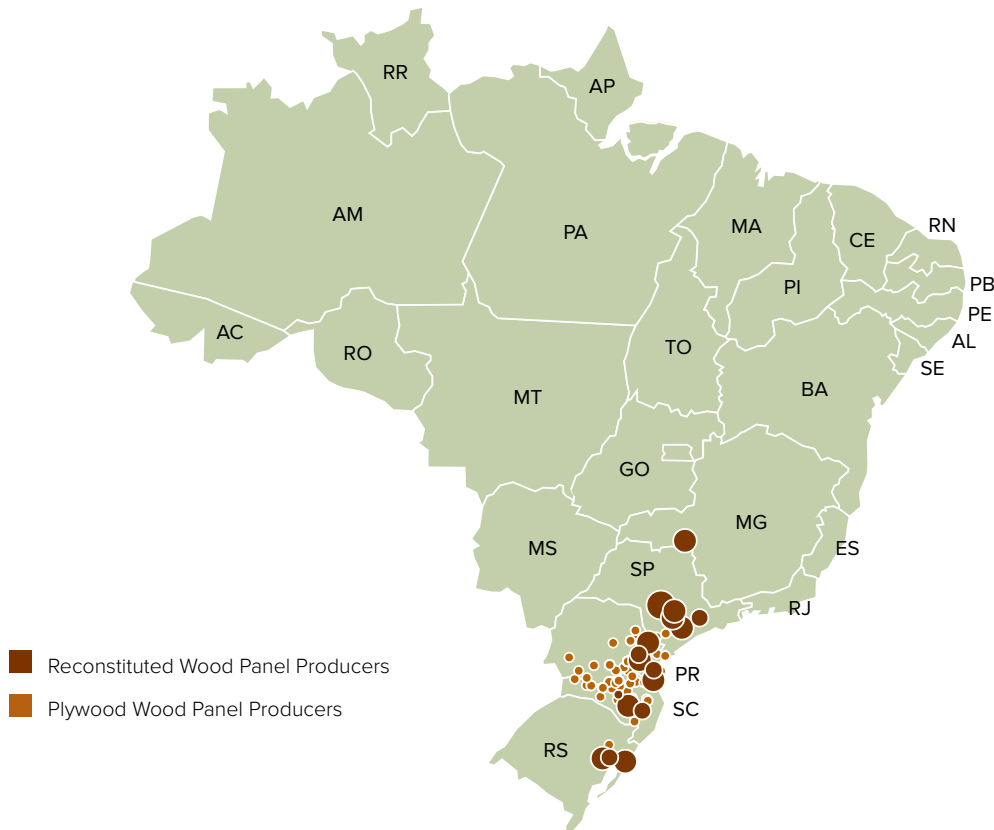


ARCHIVE EUCATEX

Wood panel companies are mostly located in states in the South and Southeast regions of Brazil (Figure 36). Companies that make reconstituted wood panels are characterized by large annual production volumes. This is not the case with plywood companies, which are usually small.

FIGURE 36

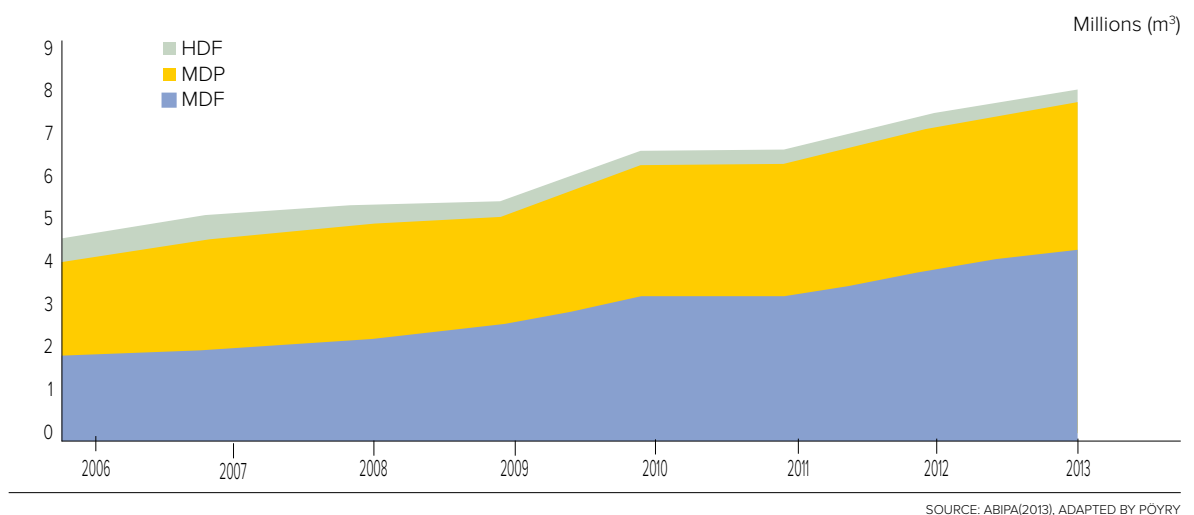
LOCATION OF WOOD PANEL PRODUCERS



Dynamics in the market for reconstituted wood panels and laminate flooring—another one of the important products in this segment—are strongly connected to the domestic economic scenario, where the Brazilian population’s increased income and growth in the civil construction industry are factors that drove consumption of these products in past years. On the other hand, dynamics in the plywood segment are related to the foreign market, especially the pace of growth in the US and European real estate markets.

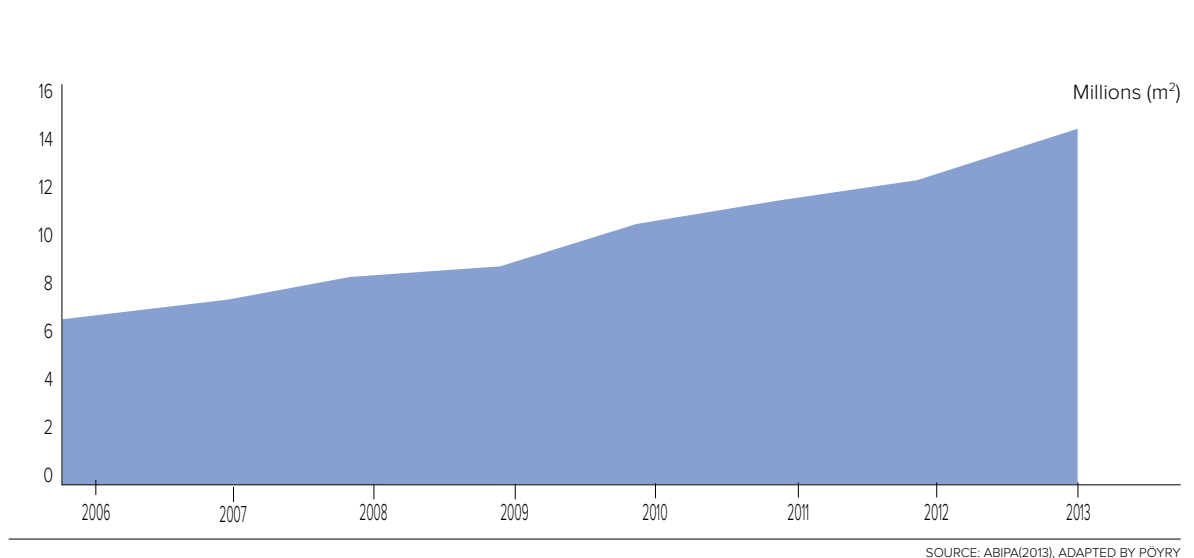
In 2013, Brazilian production of reconstituted wood panels (MDF, MDP, and HDF) was 7.9 million cubic meters (m<sup>3</sup>), an 8% increase compared to 2012 (Figure 37).

FIGURE 37  
CHANGE IN BRAZILIAN RECONSTITUTED WOOD PANEL PRODUCTION



Laminate flooring production reached 14.1 million square meters (m<sup>2</sup>) in 2013, a 15.5% increase compared to 2012. In the 2006-2013 period, laminate flooring production accumulated a growth of approximately 116.8%, due to the strong growth in Brazilian civil construction (Figure 38).

FIGURE 38  
CHANGE IN BRAZILIAN LAMINATE FLOORING PRODUCTION

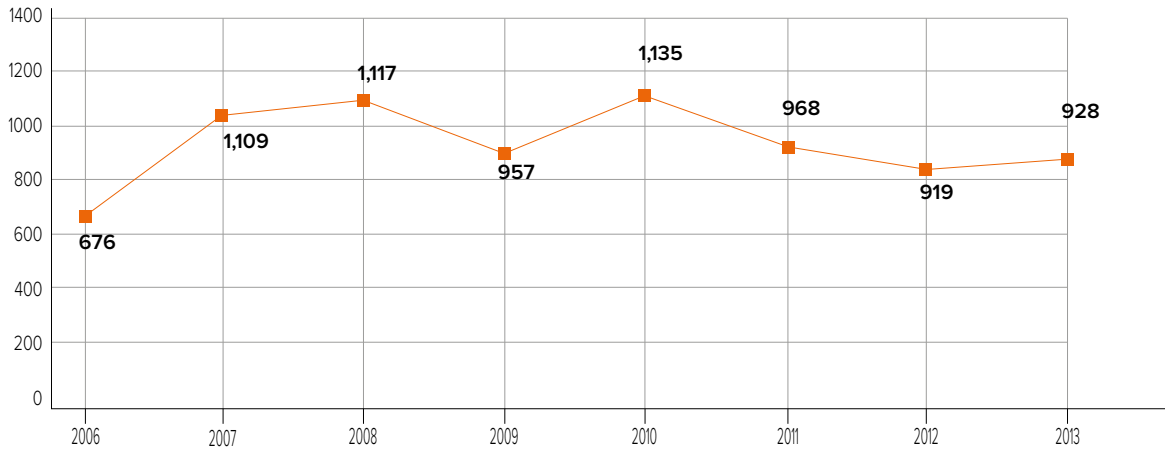


Plywood production was 2.3 million m<sup>3</sup>, a 9.5% increase compared to 2012, and production of oriented strand board (OSB<sup>7</sup>) totaled about 350 thousand m<sup>3</sup>.

The average nominal price for reconstituted wood panels showed a 1% rise between 2012 and 2013 (Figure 39).

FIGURE 39

AVERAGE NOMINAL PRICE FOR RECONSTITUTED WOOD PANELS IN THE BRAZILIAN MARKET R\$/m<sup>3</sup>



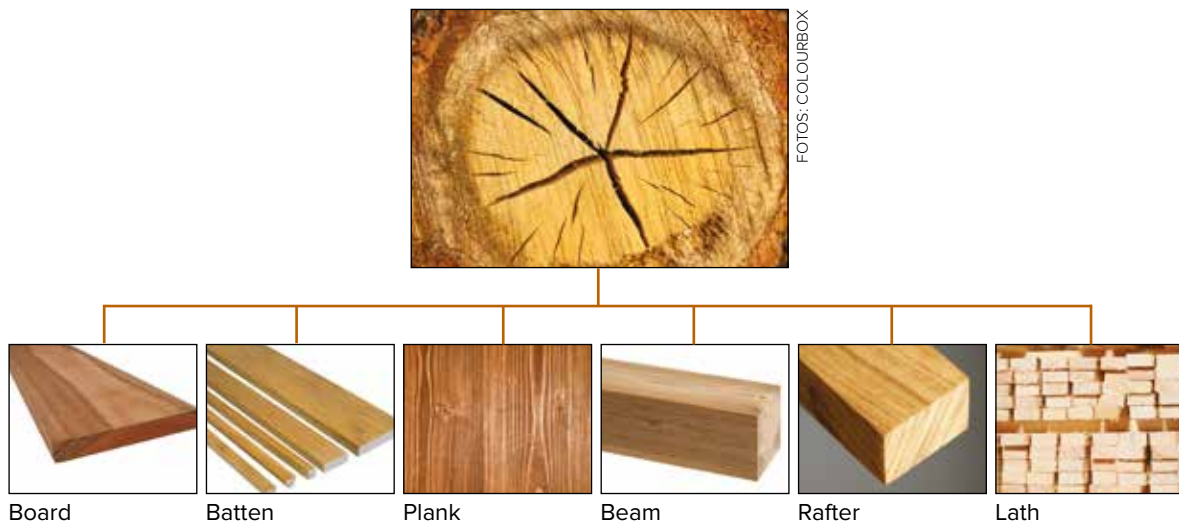
SOURCE: ABIPA (2013), ADAPTED BY PÖYRY

### Lumber

The lumber industrial segment comprises products that are obtained by processing roundwood, such as boards, planks, rafters, battens, beams, laths, and joists. These products are usually employed in civil construction, in transporting goods, and in building all types of furniture and decorative objects.

FIGURE 40

MAIN PRODUCTS IN THE LUMBER SEGMENT



SOURCE: PÖYRY (2013)

7. OSB is a wood derivative made from small flakes of wood which are placed in specific orientations. This product is widely used in wooden buildings, as it is affordable and easy to use.

There are approximately 1,600 sawmills in Brazil that process planted trees; 75% of them are located in the South of the country, 17.3% in the Southeast, 4.5% in the Mid-West and 2.9% in the Northeast region (Figure 41).

FIGURE 41

LOCATION OF BRAZILIAN LUMBER PRODUCERS



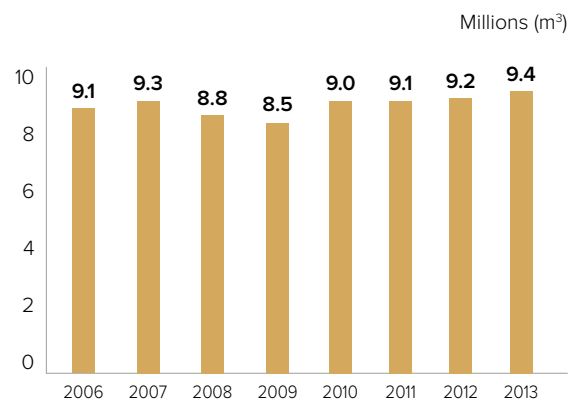
SOURCE: PÖYRY (2013)

The global demand for lumber has grown 18% in 2013 due to the improvement in the global economy (modest as that improvement may be). Almost all large wood markets in Asia, Europe and North America have experienced higher demand compared to the previous year. Brazil did not follow the same pace as other countries; in 2013, lumber production from planted trees totaled 9.4 million m<sup>3</sup>, a 2% growth compared to the 9.2 million m<sup>3</sup> produced in 2012 (Figure 42).

Domestic consumption for this product has reached 8.5 million m<sup>3</sup>, 2% higher than 2012 (8.3 million m<sup>3</sup>).

FIGURE 42

CHANGE IN BRAZILIAN LUMBER PRODUCTION BY VOLUME



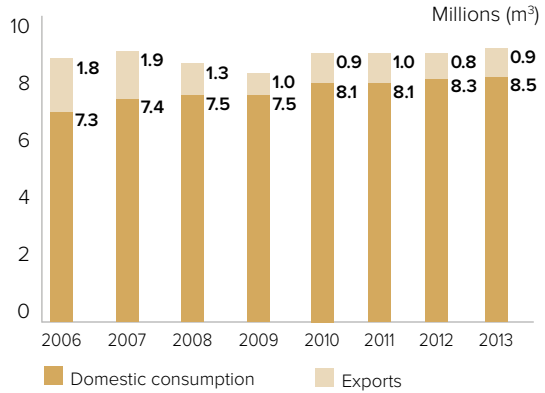
SOURCE: ABIPA (2013), ADAPTED BY PÖYRY

The 4% increase in exports was the main leverage that boosted domestic production of lumber from planted trees in 2013. During that year, the main importers were United States, Saudi Arabia, China, Vietnam and Thailand.

Between 2006 and 2011, lumber prices in the domestic market remained devalued due to the US real estate crisis and the devaluation of the US dollar in relation to the Brazilian real. In 2013, the price of lumber reached R\$ 390/m<sup>3</sup>, an 8% increase compared to the average price in 2012 (R\$ 361/m<sup>3</sup>).

FIGURE 43

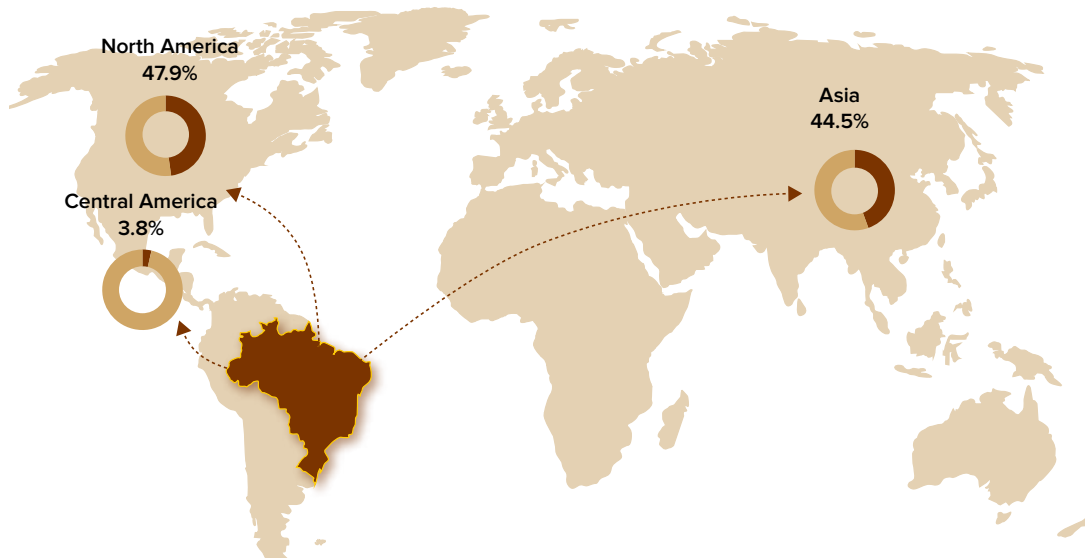
DOMESTIC CONSUMPTION AND EXPORTS OF LUMBER, 2006-2013



SOURCE: PÖYRY (2013)

FIGURE 44

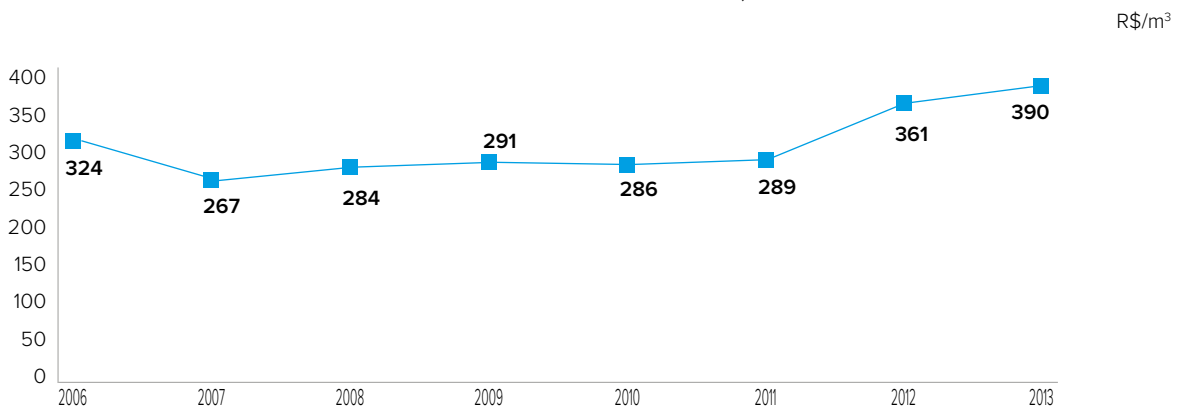
MAIN DESTINATIONS FOR BRAZILIAN EXPORTS OF LUMBER BY VOLUME



SOURCE: SECEX (2013), ADAPTED BY PÖYRY

FIGURE 45

AVERAGE PRICE FOR PINE LUMBER IN THE BRAZILIAN MARKET, 2006 – 2013



SOURCE: PÖYRY (2013)

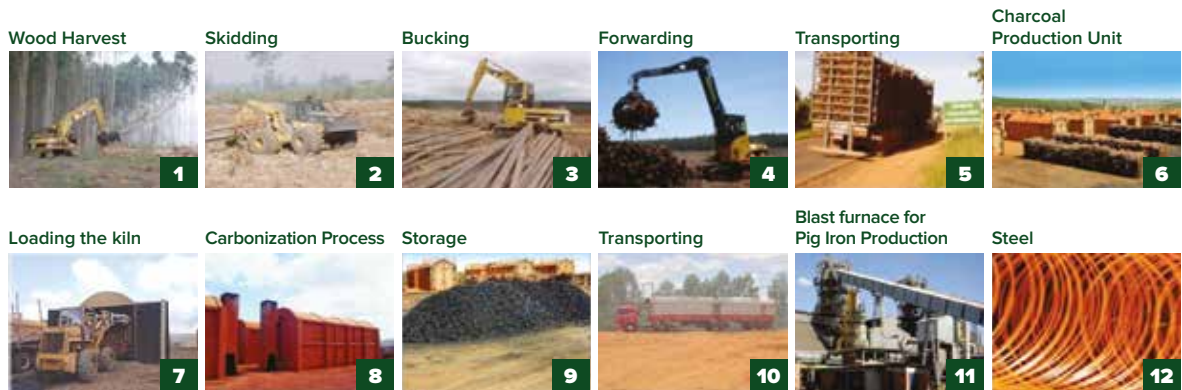


### Charcoal-Fired Steelworks

The charcoal-fired steelworks segment includes all processes involved, from harvesting wood through charcoal production, and using this product as a thermal reducer to produce pig iron, metal alloys, and steel (Figure 46).

FIGURE 46

ACTIVITY FLOW IN THE CHARCOAL-FIRED STEELWORKS SEGMENT

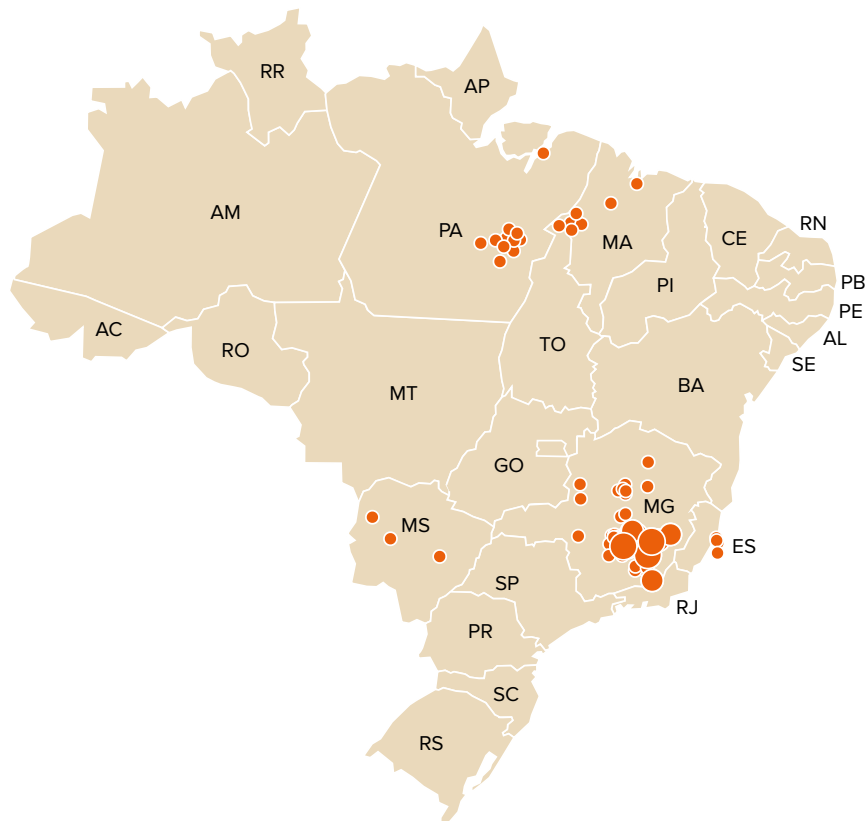


SOURCE: PÖYRY (2013)

Currently, approximately 125 mills use charcoal to produce pig iron, ferroalloys and steel. Of this total, 80% are concentrated in the state of Minas Gerais (Figure 47).

FIGURE 47

LOCATION OF CHARCOAL-FIRED STEEL MILLS



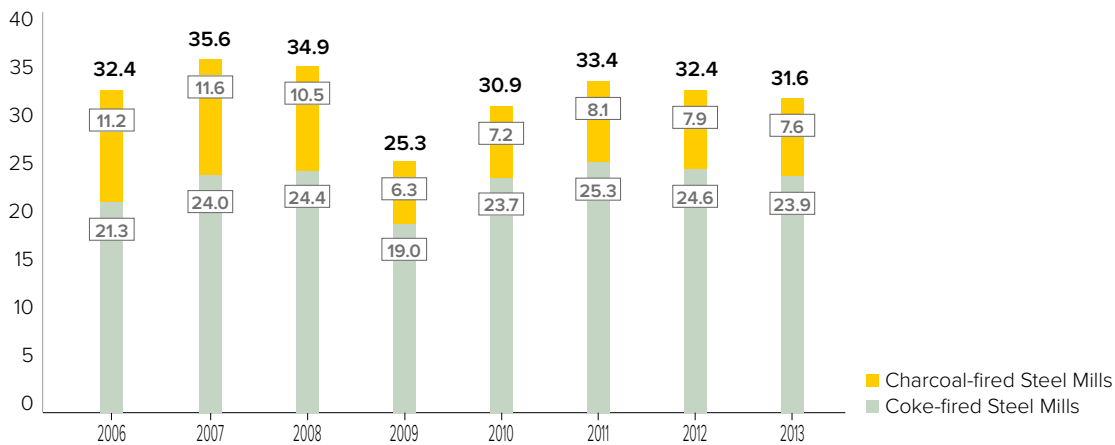
SOURCE: PÖYRY (2013)

In 2013, Brazilian production of pig iron was 31.6 million tons, 2.4% lower than 2012. Charcoal-fired pig iron production reached 7.6 million tons, 3.8% lower than 2012 (Figure 48).

FIGURE 48

BRAZILIAN PIG-IRON PRODUCTION

Millions (t)



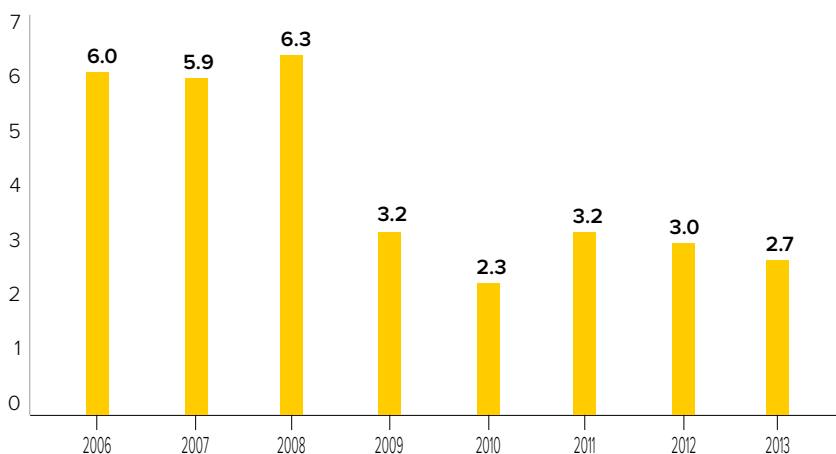
SOURCE: SINDIFER, 2013

Brazilian pig iron exports dropped 10% in 2013. Brazilian pig iron producers exported 2.7 million tons, compared to 3.0 million tons in 2012. In recent years, pig iron exports were affected by the global financial crisis. However, it is expected that Brazilian pig iron will gain competitiveness as the dollar appreciates against the Brazilian real.

FIGURE 49

DEVELOPMENT OF BRAZILIAN PIG-IRON EXPORTS

Millions (t)

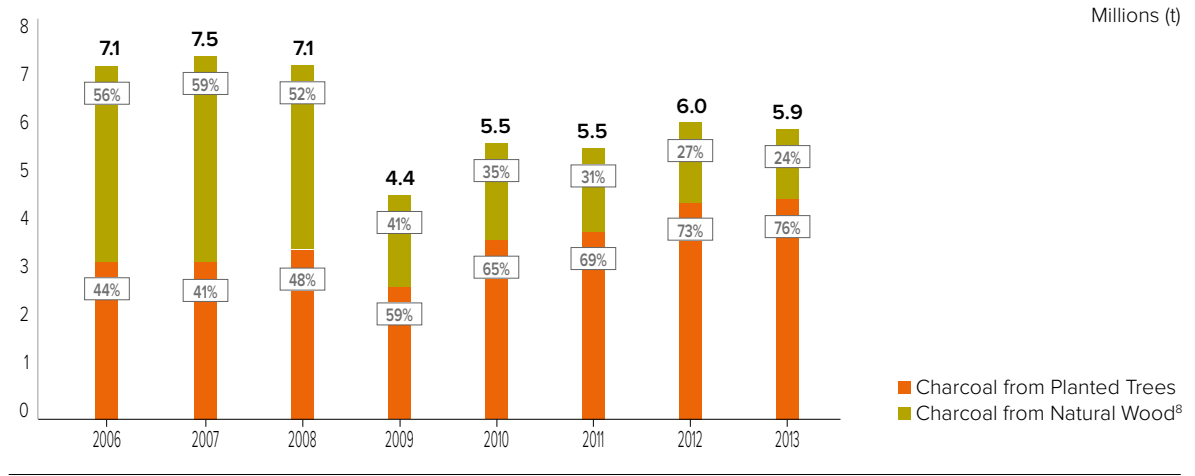


SOURCE: SECEX (2013), ADAPTED BY PÓRY

Charcoal is one of the most important thermal reducers in the Brazilian steelworks industry. In 2013, charcoal consumption in Brazil reached 5.9 million tons, 76% of which came from wood from planted trees (Figure 50).

FIGURE 50

CONSUMPTION OF CHARCOAL FROM PLANTED TREES, 2006-2013

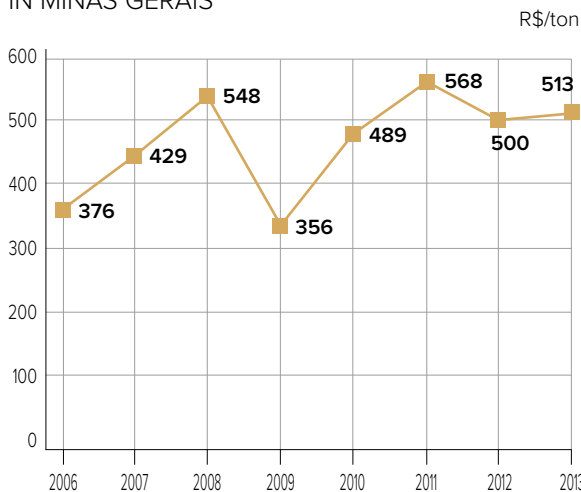


SOURCE: AMS AND PÖYRY (2013)

In 2010 and 2011, charcoal prices in the state of Minas Gerais showed some recovery after the global financial crisis. Pig iron price reductions in the international market made charcoal prices drop 12% in 2012. However, the average charcoal price in the Minas Gerais market increased by 2.6% (Figure 51).

FIGURE 51

CHANGE IN NOMINAL PRICES FOR CHARCOAL IN MINAS GERAIS



SOURCE: SECEX (2013), ADAPTED BY PÖYRY



8. Wood from legalized forestry management areas.

# 2

WORLD WARS.

# 33

BRAZILIAN PRESIDENTS.

# 20

WORLD CUPS.

# 10

DIFFERENT BRAZILIAN CURRENCIES.

**And a company that for 115 years has never stopped reinventing itself.**

Klabin makes paper and packaging that are part of the daily lives of millions of people. It plants and harvests its own raw materials. It preserves over 200,000 hectares of native forests. It's the leader in the pulp and paper industry. And it all began in a small printing shop and paper importer in 1899. Now, with the Puma Project, the new pulp mill that is being built in Ortigueira, Paraná (Brazil), Klabin will double its production capacity within three years and reinvent itself once again.

It's the start of a new cycle. A leap forward into the future that is already here.



Klabin

[klabin.com.br](http://klabin.com.br)

THE LARGEST PAPER PRODUCER AND EXPORTER IN BRAZIL. **115 YEARS** AND STILL WITH THE ENERGY TO REINVENT ITSELF.



CHAPTER V  
THE VALUE OF  
THE PLANTED TREE SECTOR



# THE VALUE OF THE PLANTED TREE SECTOR

Eucalyptus, pine, and other species of planted forests used for industrial purposes represent an important production chain in Brazil. Its greatest benefit to the country can be summarized in the three types of sustainability: economic, social and environmental.

In the economic area, Brazilian plantations (which occupy less than 1% of the country's productive area), have shown impressive results in the balance of trade, decisively contributing to the forest-based sector's third-place ranking in its level of importance to the agribusiness balance of trade, behind soybean and meat production.

From the social standpoint, these impacts are directly related to the increase in regional economic activity and its consequent effects on income levels and quality of life, as well as regional infrastructure. Since wood production tends to be located in areas with low economic and human development, these impacts are usually clearly seen by the communities that directly benefit from them.

As for the environmental aspects, the Brazilian planted tree sector is highly committed to complying with legislation and certification criteria, and to promoting practices that foster the recovery of degraded areas and create green corridors.

Below we present the main economic and social and environmental indicators from the Brazilian planted tree sector for 2013.

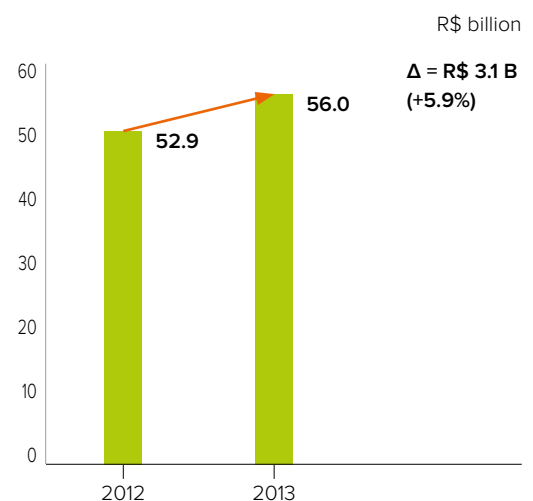
## FOREST INDUSTRY GROSS DOMESTIC PRODUCT

In 2013, the Brazilian planted tree sector added about R\$ 56 billion to Brazil's gross domestic product (R\$ 4.8 trillion), which represents 1.2% of all the wealth generated in the country and is approximately 24% of the amount added to the GDP by the agribusiness industry. Compared to 2012, the industry grew 5.9%, while Brazil grew 2.3% that same year (Figure 52).

In general terms, each hectare planted with trees in Brazil has added about R\$ 7,400/year to the GDP. For comparative purposes, soybeans (an important national reference) have added R\$ 4,800/year per planted hectare, and livestock raising, R\$ 2,500/year.

FIGURE 52

### INDUSTRY GROSS DOMESTIC PRODUCT AT MARKET PRICES



SOURCE: PÖYRY (2013)

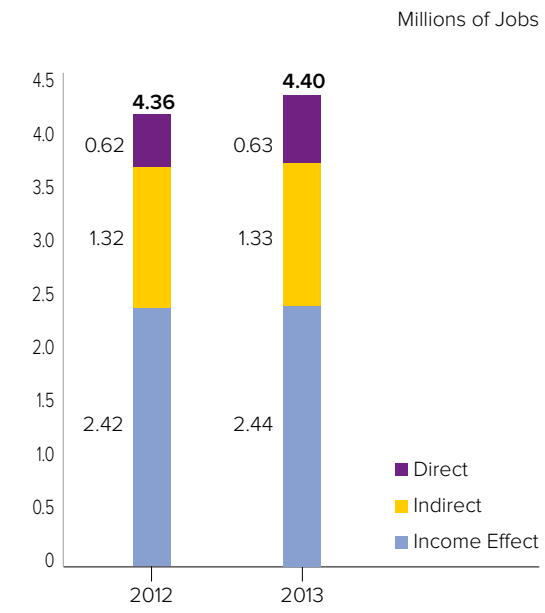
## JOB CREATION

The Brazilian planted tree sector has provided direct jobs to approximately 630,000 people in 2013, a 1.6% growth compared to the number of jobs in 2012 (620,000). Considering the multiplication factors from the 1999 BNDES job creation model<sup>9</sup>, it is estimated that in 2013 the total number of job positions that forest activity creates directly, indirectly, and through the income effect is about 4.4 million (Figure 53).

It's important to highlight that the synergy existing between the different branches of the planted tree product sector enables creating productive arrangements in regions distant from large urban centers, which significantly supports the development of the country's interior. Some good examples of municipalities benefiting from this effect are Telêmaco Borba (PR), Rio Negrinho (SC), and Itapeva (SP), due to the large concentration of companies in those regions.

FIGURE 53

NUMBER OF DIRECT AND INDIRECT JOBS CREATED BY THE BRAZILIAN PLANTED TREE SECTOR



Millions of Jobs

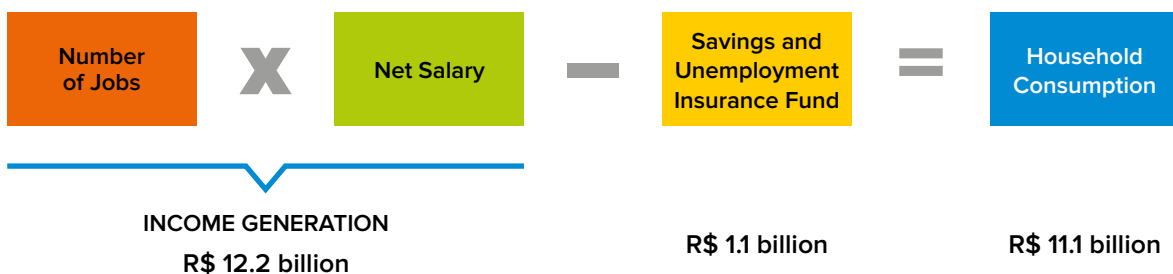
SOURCE: PÖYRY (2013)

## INCOME GENERATION

Based on the number of jobs generated directly by the Brazilian planted tree sector, and the net salaries for workers in this industry, the income directly generated by this activity in 2013 was R\$ 12.2 billion, of which R\$ 11.1 billion was added to Brazilian household consumption, and R\$ 1.1 billion to domestic savings (Figure 54).

FIGURE 54

DIRECT INCOME GENERATION BY THE BRAZILIAN PLANTED TREE SECTOR



SOURCE: PÖYRY (2013)

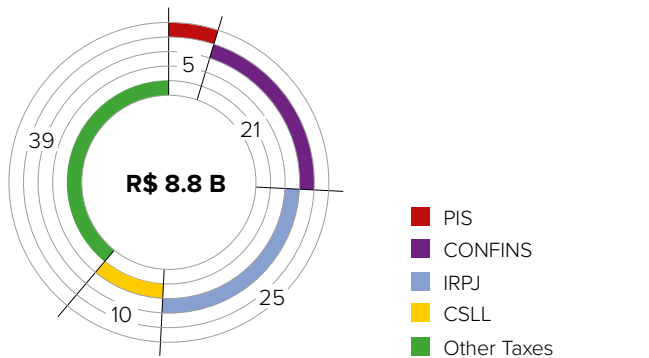
9. A detailed explanation of the methodology for the job creation model can be found in Najberg and Ikeda (1999), Modelo de Geração de Empregos: Metodologia e Resultados. Textos para Discussão.nº 72. Rio de Janeiro, BNDES.



## TAX COLLECTION

In 2013, taxes collected by the planted tree sector added up to R\$ 8.8 billion, which equals 0.8% of taxes collected domestically. The actual value adjusted by the IPCA (consumer price index) was 9.4% higher than that collected in 2012 (Figure 55)..

FIGURE 55  
SHARE OF TAXES COLLECTED FROM THE PLANTED TREE SECTOR %



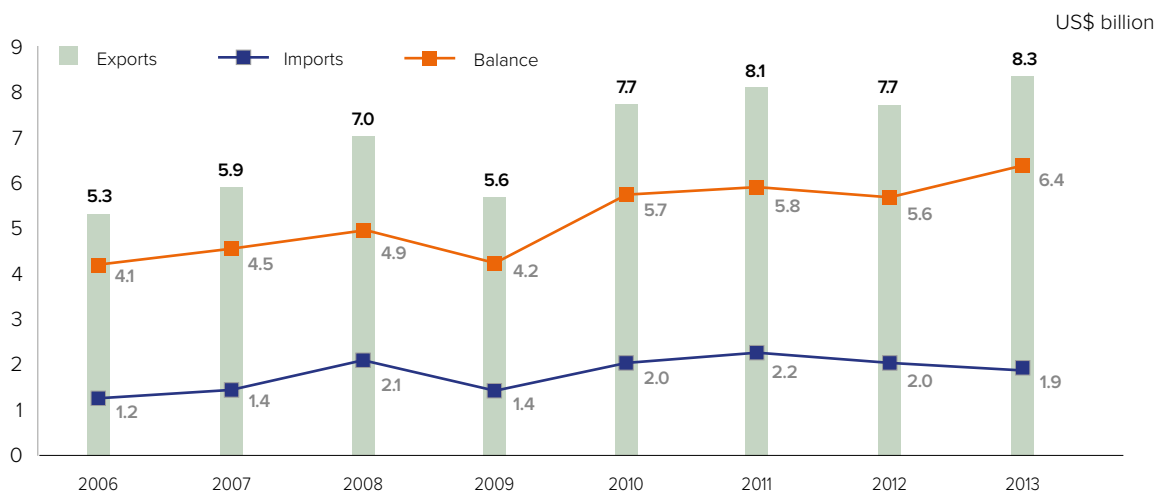
SOURCE: PÓYRY (2013)

## CONTRIBUTION TO THE BALANCE OF TRADE

In 2013, Brazilian exports totaled US\$ 242.2 billion, which represented a 0.2% drop compared to 2012 (US\$ 242.6 billion). On the other hand, imports increased by 7.4%, totaling US\$ 239.6 billion. In this context, the Brazilian balance of trade for 2013, although positive by US\$ 2.6 billion, decreased 87% compared to 2012.

Contrary to the general trend in the Brazilian economy, even in an unfavorable macroeconomic environment (due to low external demand and the appreciated exchange rate), the balance of trade for the planted tree sector closed 2013 with a surplus of US\$ 6.4 billion—a 14% increase compared to 2012, when exports exceeded imports by US\$ 5.6 billion (Figure 56).

FIGURE 56  
CHANGE IN SECTORAL TRADE BALANCE



SOURCE: SECEX (2013), ADAPTED BY PÓYRY

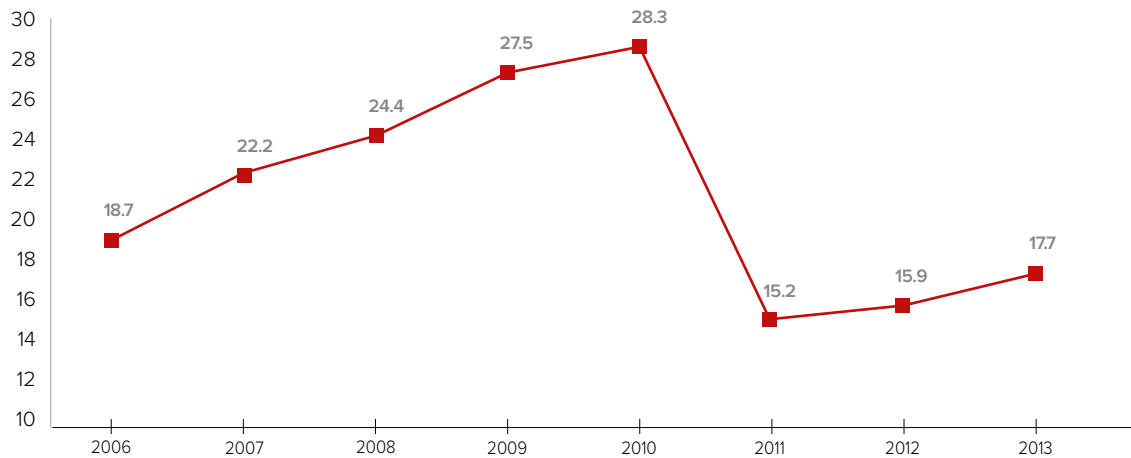
## INCOME INCREASE FOR SMALL FORESTRY PRODUCERS

In 2013, approximately 8% of all the wood consumed in the country was supplied by independent small rural producers, or from producers participating in outgrower programs. During that same year, about 18,000 families benefited from outgrower and forestry partnership programs (Figure 57).

FIGURE 57

CHANGE IN NUMBER OF HOUSEHOLDS BENEFITING FROM OUTGROWER PROGRAMS

Number of households (Thousand)



SOURCE: ABRAF (2013), ADAPTED BY POYRY

The income generated for small producers by the planted tree sector reached R\$ 451 million in 2013. The average profitability for this activity for the same year was approximately R\$ 791/ha.year.



BSC/GLEISON REZENDE



KLABINZIG KOCH

## CONTRIBUTION TO FIGHTING CLIMATE CHANGE<sup>10</sup>

Together with various civil society organizations, the Brazilian planted tree sector participates in the Brazilian Initiative for Sustainable Forests, the goal of which is to value the climate benefits which are associated with the Brazilian forest base, in addition to promoting sustainable land development. One of the essential elements in this activity is cooperation with government policies. It is expected that this initiative will provide a good platform for developing a balanced plan for the sector, one that is in line with the mechanisms for dialogue between the sector and organized civil society.

The Initiative's activities are developed based on the premise that the Brazilian planted tree sector has huge potential to contribute to fighting climate change, considering the mitigation opportunities offered by expanding plantations, native forests, and their production chains. On the other hand, this expansion and the respective potential for mitigation depend on overcoming many barriers. Increasing the economic value of forest carbon plays a fundamental role within this context. This is a renewable-base sector and its role in building climate policies should be consistent with this structural characteristic.

This economic activity consists of two main parts: the forestry component, which is the area of planted trees and associated native forest preservation areas, and the manufacturing component, which is made up of the structures to process wood (for example, to produce pulp and paper, renewable charcoal, pig iron, ferroalloys, steel, panels and flooring, treated wood for civil construction, lumber, energy, etc.).

In relation to climate change, both components bring distinctive implications that should be analyzed together. Within the manufacturing component, emissions or positive flows of greenhouse gases (GHG) can occur. Several segments in this sector are alrea-

<sup>10</sup> Source: Iba/Plantar Carbon

dy approaching self-sufficiency using renewable energy, which is characterized by minimal emissions. The forest component, on the other hand, is based on creating and maintaining carbon stocks by means of planted trees destined for production and associated preservation areas; this results in removal of greenhouse gases (emissions or negative flows), contributing to a reduction in the concentration of these gases in the atmosphere during the entire time the stock is maintained.

The scale of removals and capacity to maintain stocks over the long term provide very high mitigation potential for the forest component, especially in the next two decades, when the country will seek to reduce its overall amount of emissions. Therefore, maintaining and expanding stocks (additional removals) can play a significant role in balancing emissions from the productive sector in Brazil as a whole.

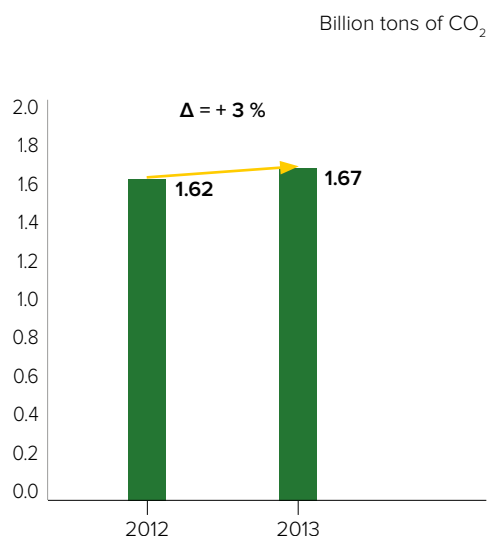
In regards to the planted tree sector's contribution to this process, in 2013 Brazil's 7.6 million hectares of forest plantations were responsible for a stock of approximately 1.67 billion tons of CO<sub>2</sub>, a 3% variation compared to 2012, when 7.38 million hectares of planted trees stocked approximately 1.62 billion tons of CO<sub>2</sub>.

In addition to maintaining or increasing carbon stocks, each product that originates from planted trees can also prevent or reduce emissions associated with using products made from fossil fuels or non-renewable raw materials. Therefore, there are two types of potential climate benefits directly associated with the planted tree sector: carbon stocks in plantation and preservation areas, and prevention of potential emissions by using well-managed products from this industry, instead of products from fossil or non-renewable sources, in different steps of the production chain. Any initiative from the spheres of public policy or specific regulation must take these two dynamics into account when making efforts to count net emissions.

However, the sector's mitigation potential is directly related to overcoming the main hurdles to its development in Brazil. In addition to structural issues, which affect all of Brazilian industry (need for tax reform, exemptions for investments, etc.), the main challenges to expanding this sector are strongly linked to the planted base. Consequently, deepening the existing mechanisms such as carbon markets with strong environmental integrity and developing new alternatives that bring economic value to climate benefits generated by the industry represent positive synergies with great value for sustainable growth in Brazil.

Within this context, it is important to have governance systems in place that are capable of integrating public policies related to this sector with actions from the National Policy for Climate Change (PNMC), and to make use of opportunities created internationally, especially by the United Nations Framework Convention on Climate Change (UNFCCC). Below are presented the main issues affecting the forest-based sector that should be coordinated within the domestic and international scope:

FIGURE 58

BRAZILIAN STOCK OF CO<sub>2</sub> IN PLANTED TREES

SOURCE: IBÁ/PLANTAR CARBON (2013)



CENIBRA/JOÃO RABELO

### **Domestic Level**

Considering the magnitude of the forest-based production chain and the heterogeneity in growth efforts during the planning phase, it is essential that all mitigation and adjustment plans from this sector related to the planted tree base be coordinated or integrated within the scope of the Brazilian National Policy for Climate Change. It is also important that the abovementioned plans be coordinated with the National Policy for Planted Forests.

Currently, several industrial mitigation plans which have already been announced at the federal level have some connection with the planted tree sector, such as the Amazon Deforestation Prevention and Control Plan (PPCDAM), the Brazilian Savanna Deforestation and Ground-Clearing Fire Prevention and Control Plan (PPCerrado), the Ten-year Energy Expansion Plan (PDE), the ABC Plan—Low Carbon Agriculture, the Charcoal-Fired Steelworks Plan and the Industry Plan. In many cases, the analysis of estimates and forecast measures must be deepened.

Although each segment of the planted tree sector has its own social, economic and environmental dynamics, it is important that the synergies between segments and different

industrial plans be identified and taken advantage of. In addition to optimizing the sector's potential to mitigate by valuing carbon and avoiding overlapped efforts, a process to identify synergies can make it easier to create integrated economic and environmental zones and a coordinated industrial policy agenda. Lastly, it is also important to have coordination between federal policies and the different state policies.

### **International Level**

Within the international scope, it is essential to take advantage of the mechanisms that already exist or are being developed, including the evolution of the Clean Development Mechanism (CDM) from the Kyoto Protocol. Approved CDM methodologies, which are often developed by companies in a groundbreaking manner, already exist and are applicable to the sector. It is equally important to use initiatives from REDD+ and new market mechanisms without damaging the environmental integrity of the Climate Convention and its regulations.

Full use of these mechanisms by Brazil and other developing countries depends on improving fundamental aspects. In some cases it is necessary to adjust multilateral regulations and increase coordination with domestic initiatives, which should be addressed in a way that corresponds with the characteristics of the country's industry and corresponding domestic policy. The following aspects are noteworthy and directly affect the country's ability to use the aforementioned mechanisms:

- End unilateral restrictions on forest credits, including those in the EU Emissions Trading Scheme.
- Return to the issue of 'non-permanence' with regard to forest credits; this includes strengthening the current temporary credit approach and defining alternatives that respect the principle of environmental integrity.
- Render areas eligible for CDM projects.
- Take advantage of opportunities related to REDD+ initiatives.
- Take advantage of opportunities within the scope of new potential market and funding mechanisms.

It's important to bear in mind that REDD+ initiatives and market mechanisms, including the CDM, can be used not only to establish new areas of planted trees areas in Brazil, but also to reforest degraded areas with native species, and even to comprise Permanent Preservation Areas (APP) and Legal Reserve Areas (LR). In addition to multilateral initiatives, Brazil must also pursue potential opportunities at the regional or bilateral levels.

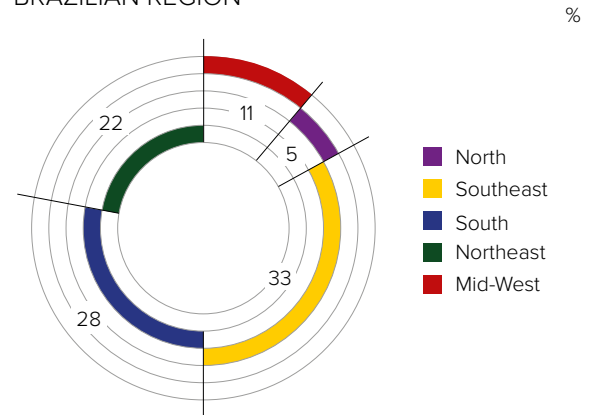
## PROTECTION OF NATURAL HABITATS

Ibá member companies from the planted tree sector have contributed to preserving ecosystems and recovering degraded areas by protecting 2.1 million hectares as Legal Reserves (LR), Permanent Protection Areas (APP) and Private Reserves of Natural Heritage (RPPN).

Most of the area preserved by the planted tree sector is concentrated in the Southeast and South regions of the country (Figure 59).

FIGURE 59

PRESERVATION AREA IN THE SECTOR, BY BRAZILIAN REGION



SOURCE: ABRAF (2013), ADAPTED BY PÖYRY

## REGIONAL DEVELOPMENT

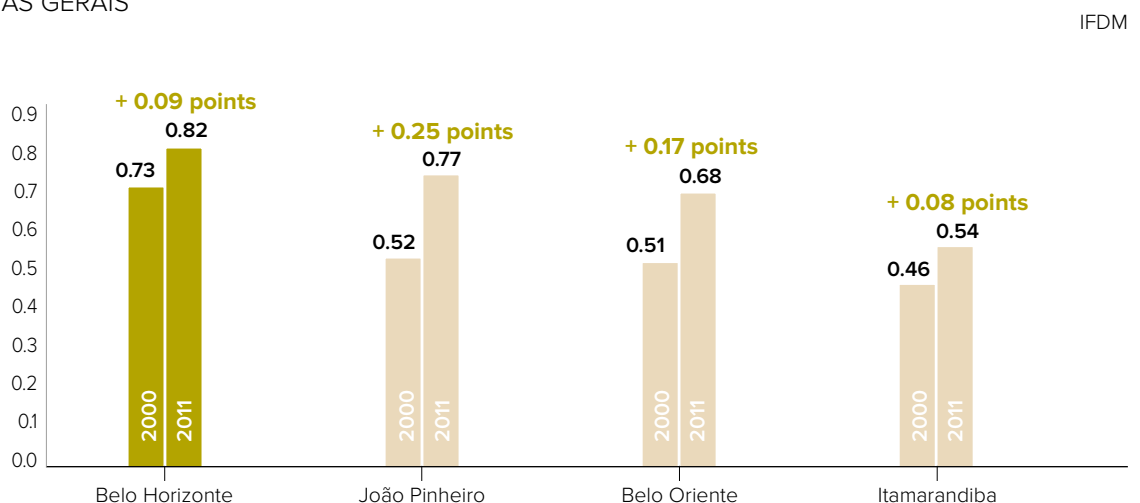
The importance of the planted tree sector goes far beyond the products it can provide. The dynamic nature it has brought to the economy has significantly contributed to social and economic development in the regions where these companies are located.

Looking at the evolution of the Firjan Social Development Index (IFDM)—which annually monitors social and economic development in over 5,000 Brazilian municipalities in three different areas: Jobs & Income, Education and Health—it can be seen that municipalities with a propensity for forestry have obtained better results when compared to their respective state capitals.

In the state of Minas Gerais, for example, the Firjan Index for Belo Horizonte went from 0.73 to 0.82 (+0.09 points) between 2000 and 2011. In cities where forest activity prevails, the average variation was 16 points (Figure 60).

FIGURE 60

COMPARISON OF THE FIRJAN INDEX 2000/2011 IN BELO HORIZONTE AND FORESTRY CITIES IN MINAS GERAIS

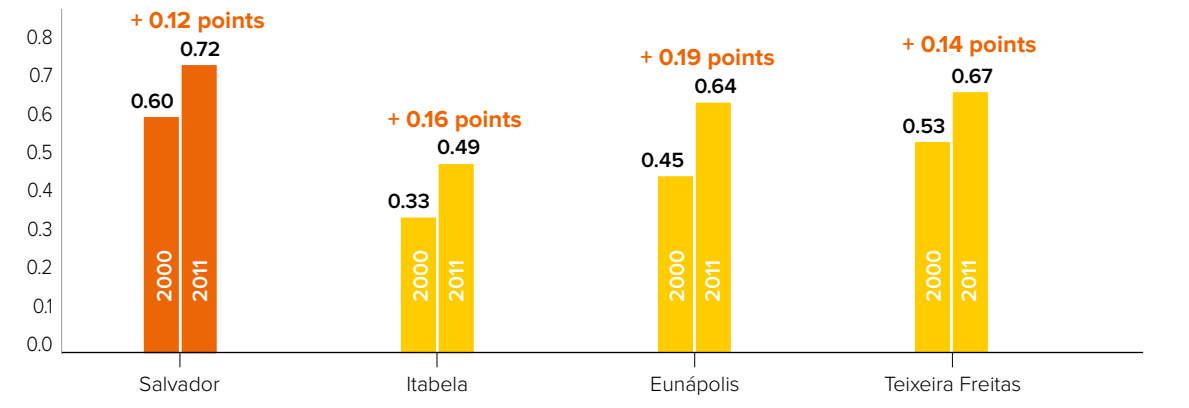


SOURCE: FIRJAN SYSTEM (2014), ADAPTED BY PÖYRY

In the state of Bahia, the Firjan Index for Salvador went from 0.60 to 0.72 (a variation of 0.12 points). During the same period, the main cities in the state that participate in forestry such as Itabela, Eunápolis, and Teixeira de Freitas showed variations of 0.16, 0.19, and 0.14, respectively (Figure 61).

FIGURE 61

COMPARISON OF THE FIRJAN INDEX 2000/2011 IN SALVADOR AND FORESTRY CITIES IN BAHIA IFDM

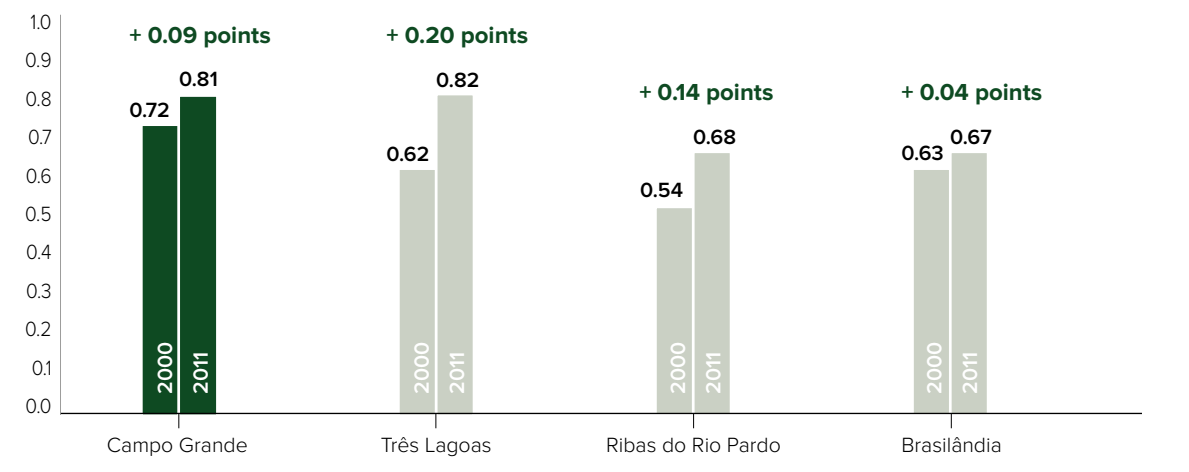


SOURCE: FIRJAN SYSTEM (2014), ADAPTED BY PÖYRY

In the state of Mato Grosso do Sul, while the overall index for the state capital Campo Grande increased from 0.72 to 0.81 (0.09 points), the index for Três Lagoas registered an impressive hike of 0.20 points, going from 0.62 to 0.82, surpassing the index for the capital (Figure 62).

FIGURE 62

COMPARISON OF THE FIRJAN INDEX 2000/2011 IN CAMPO GRANDE AND FORESTRY CITIES IN MATO GROSSO DO SUL IFDM



SOURCE: FIRJAN SYSTEM (2014), ADAPTED BY PÖYRY





ARCHIVE SUZANO

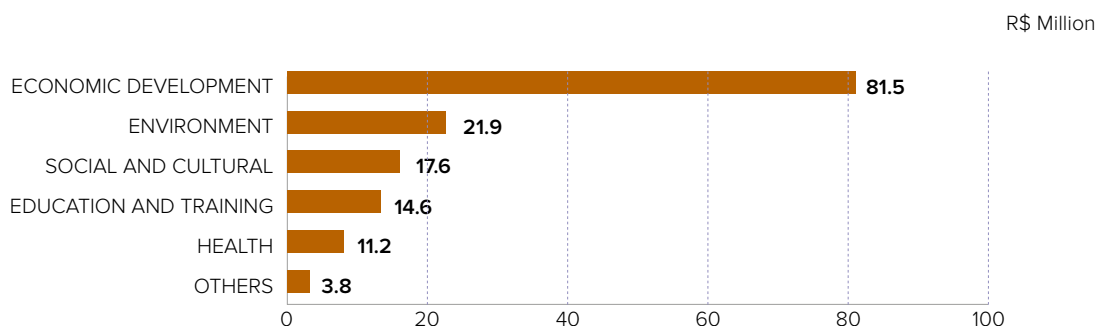
## SOCIAL RESPONSIBILITY AND ENVIRONMENTAL PROGRAMS

In 2013, Iba member companies have invested a total of R\$ 150.5 million in Social Programs, benefiting 1.4 million people and more than 1,400 municipalities.

The largest investments were made in economic development programs (R\$ 81.5 million), followed by environmental projects (R\$ 21.9 million) and social and cultural projects (R\$ 17.6 million) (Figure 63).

FIGURE 63

INVESTMENTS IN SOCIAL PROJECTS CONDUCTED BY IBA MEMBER COMPANIES IN 2013

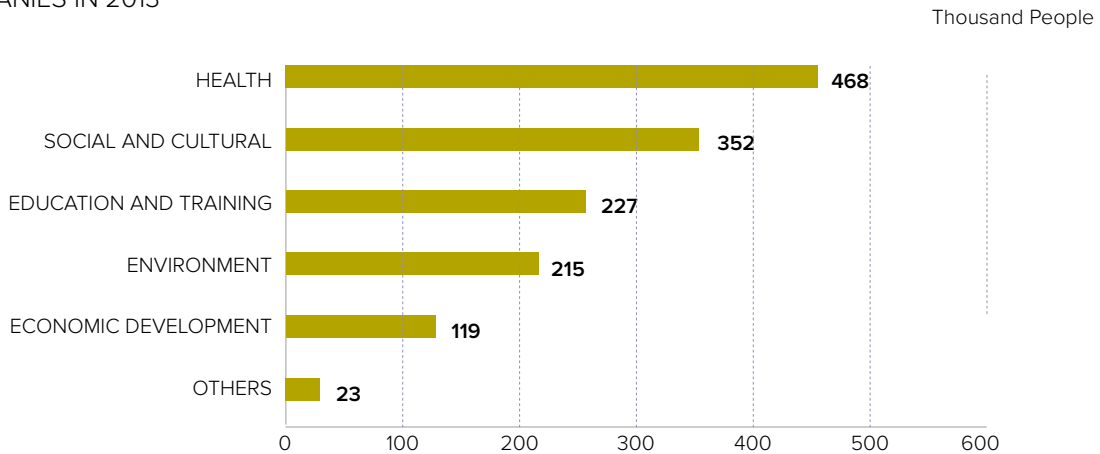


SOURCE: ABRAF (2013), ADAPTED BY POYRY

Health projects served the largest number of people (468,000), followed by social and cultural (352,000) and education and training projects (227,000) (Figure 64).

FIGURE 64

NUMBER OF PEOPLE BENEFITED BY SOCIAL PROJECTS CONDUCTED BY IBÁ MEMBER COMPANIES IN 2013

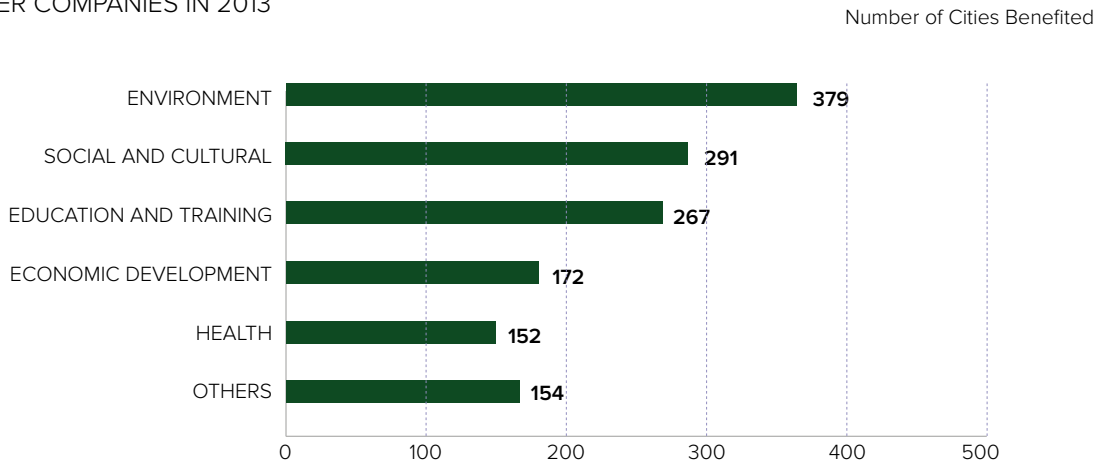


SOURCE: ABRAF (2013), ADAPTED BY PÓYRY

Environmental projects were the ones which benefited the largest number of cities (379), followed by social and cultural (291) and education and training projects (267) (Figure 65).

FIGURE 65

NUMBER OF CITIES BENEFITED BY SOCIAL PROJECTS CONDUCTED BY IBÁ MEMBER COMPANIES IN 2013



SOURCE: ABRAF (2013), ADAPTED BY PÓYRY

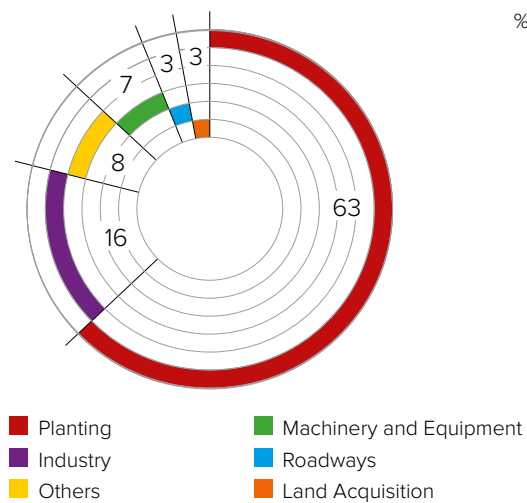
## INVESTMENTS

Investments made by Ibá Member Companies in 2013 totaled R\$ 3.3 billion. The areas that benefited the most from investments were plantation renovation and maintenance and industrial enhancements.

Ongoing and forecasted investments by 2020 total R\$ 53 billion. Most of this amount will go towards creating new plantations, expanding mills, and building new units.

FIGURE 66

INVESTMENTS MADE BY IBÁ MEMBER COMPANIES IN 2013



SOURCE: ABRAF/IBÁ (2013), ADAPTED BY PÖYRY



## RESEARCH AND DEVELOPMENT

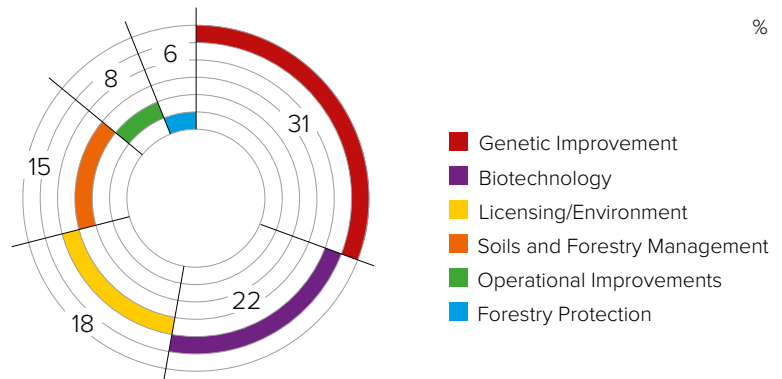
Investments made by Ibá member companies in 2013 for research and development totaled R\$ 50 million. The largest investments were made in genetic improvement, biotechnology, and licensing/environment (Figure 67).



ARCHIVE DURATEX

FIGURE 67

INVESTMENTS MADE IN RESEARCH AND DEVELOPMENT BY IBÁ MEMBER COMPANIES IN 2013



SOURCE: ABRAF (2013), ADAPTED BY PÖYRY





NOTES ON  
METHODOLOGY

## 1. AREA OF PLANTED TREES IN BRAZIL

The area of planted trees in Brazil was estimated using data obtained from:

- Questionnaires answered by member companies and state association members of the Brazilian Tree Industry (Ibá);
- Official documents and data from government institutions and local authorities such as state departments, institutes, foundations, and universities;
- Contact with companies in the planted tree production chain that are not Ibá members.

Since the information about the area of planted trees in Brazil was provided by the states themselves, the methodology used to collect these estimates is detailed below, state by state:

- Amapá: Area estimated through direct contact with companies in the planted tree production chain that are not Ibá members. The margin of error is estimated at  $\pm 10\%$ .
- Bahia: Area estimated through questionnaires answered by Ibá member companies and direct contact with companies in the planted tree production chain that are not Ibá members. The margin of error is estimated at  $\pm 10\%$ .
- Espírito Santo: Area estimated through questionnaires answered by Ibá Member Companies and direct contact with companies in the planted tree production chain that are not Ibá members. The margin of error is estimated at  $\pm 10\%$ .
- Goiás: Area estimated through direct contact with companies in the planted tree production chain that are not Ibá members. The margin of error is estimated at  $\pm 10\%$ .
- Maranhão: Area estimated through questionnaires answered by Ibá Member Companies and direct contact with companies in the planted tree production chain that are not Ibá members. The margin of error is estimated at  $\pm 10\%$ .
- Mato Grosso: Area estimated through questionnaires answered by Ibá Member Companies and direct contact with companies in the planted tree production chain that are not Ibá members. The margin of error is estimated at  $\pm 10\%$ .
- Mato Grosso do Sul: Area estimated through questionnaires answered by Ibá Member Companies, by Reflore, and direct contact with companies in the planted tree production chain that are not Ibá members. The margin of error is estimated at  $\pm 15\%$ .
- Minas Gerais: Area estimated through questionnaires answered by Ibá Member Companies and direct contact with companies in the planted tree production chain that are not Ibá members. The margin of error is estimated at  $\pm 10\%$ .
- Pará: Area estimated through questionnaires answered by Ibá Member Companies and direct contact with companies in the planted tree production chain that are not Ibá members. The margin of error is estimated at  $\pm 20\%$ .
- Paraná: Area estimated through questionnaires answered by Ibá Member Companies, by Apre, by Afubrae, and direct contact with companies in the planted tree production chain that are not Ibá members. The margin of error is estimated at  $\pm 15\%$ .

- Piauí: Area estimated through questionnaires answered by Ibá Member Companies and direct contact with companies in the planted tree production chain that are not Ibá members. The margin of error is estimated at  $\pm 10\%$ .
- Rio Grande do Sul: Area estimated through questionnaires answered by Ibá Member Companies, by Ageflor, by Afubrae, and direct contact with companies in the planted tree production chain that are not Ibá members. The margin of error is estimated at  $\pm 18\%$ .
- Santa Catarina: Area estimated through questionnaires answered by Ibá Member Companies, by ACR, by Afubrae, and direct contact with companies in the planted tree production chain that are not Ibá members. The margin of error is estimated at  $\pm 20\%$ .
- São Paulo: Area estimated through questionnaires answered by Ibá Member Companies, by IEA, and direct contact with companies in the planted tree production chain that are not Ibá members. The margin of error is estimated at  $\pm 20\%$ .
- Tocantins: Area estimated through questionnaires answered by Ibá Member Companies, by Aretins, and direct contact with companies in the planted tree production chain that are not Ibá members. The margin of error is estimated at  $\pm 20\%$ .
- Other remaining states: Area estimated through questionnaires answered by Ibá Member Companies and direct contact with companies in the planted tree production chain that are not Ibá members. The margin of error is estimated at  $\pm 15\%$ .

## 2. CONSUMPTION OF ROUNDWOOD

The consumption of roundwood was estimated using data provided by Ibá member companies and direct contact with several non-member companies.

## 3. PERFORMANCE OF THE BRAZILIAN PLANTED TREE SECTOR

To put together the history of production and consumption from the planted tree sector, data published by the institutions listed below was used:

- Pulp and Paper: Brazilian Tree Industry (Ibá) / Brazilian Pulp and Paper Association (Bracelpa);
- Reconstituted Wood Panels: Brazilian Tree Industry (Ibá) / Association of the Wood Panels Industry (Abipa);
- Plywood: Survey carried out by Pöyry;
- Lumber: Survey carried out by Pöyry;
- Charcoal-Fired Steelworks the Silviculture Association of Minas Gerais (AMS), Union of Pig Iron Producers in the State of Minas Gerais (SINDIFER) and Pöyry.

## 4. FOREST INDUSTRY GROSS DOMESTIC PRODUCT

The Forest Industry Gross Domestic Product (PIBS) is the index that measures sales in the Brazilian planted tree sector.

## 5. JOB CREATION

To estimate the number of direct, indirect, and income-effect jobs from the Brazilian planted tree sector, the BNDES Job Creation Model (MGE) was used. It considers that the number of jobs created is proportional to the increase in production in each industry of the economy. According to this model, jobs can be classified into three categories:

- **Direct Jobs:** Labor used by the segment to make a given product. Any increase in demand means a production increase of the same magnitude in the industry where this increase was detected, assuming productivity is constant.
- **Indirect Jobs:** Labor used by the segments that make up the entire production chain (intermediate goods) for a given product. Increased demand in a specific sector causes an increase in production throughout the entire production chain, re-fueling the job creation process.
- **Income-Effect Jobs:** Labor used in producing diverse goods and in various services. Part of the income received by workers and executives as salaries and/or dividends is converted into private consumption, which boosts production in other industries of the economy, re-fueling the job creation process. Thus, increased production provides an increase in income, which in turn generates an increase in private consumption.

## 6. INCOME GENERATION

Income directly generated by the sector was estimated using the number of jobs created by Brazilian planted tree companies and the average net salaries for workers in the forest-based sector.

## 7. TAX COLLECTION

Estimates in regards to tax collection were made using the PIBS estimates and the percentage related to tax collection, in order to estimate the amount of taxes collected by the Brazilian planted tree sector.

## 8. CONTRIBUTION TO THE BALANCE OF TRADE

Data on the trade balance for forest products, in monetary values for exports and imports, were obtained from the Alice Web System, and from the Foreign Trade Secretariat (SECEX) within the Ministry of Development, Industry and Foreign Trade (MDIC). The obtained statistics were extracted using the Mercosur Common Nomenclature (NCM) relative to forest products for the year 2013, thus obtaining export numbers for products considered to be derived specifically from planted trees.



## 9. INCOME INCREASE FOR SMALL FORESTRY PRODUCERS

The income generated by the planted tree sector for small producers was estimated from a field survey.

## 10. CONTRIBUTION TO FIGHT CLIMATE CHANGE

Estimates calculated by Plantar Carbon.

## 11. REGIONAL DEVELOPMENT

The Firjan Index for Municipal Development (IFDM) is an indicator of the human, economic, and social development of a city. It is annual, calculated for each city, and encompasses the entire country. Since it only uses official primary statistics, there is a time lag of two years between its data and the date of its publication.

This index addresses the main fields of human development in Brazil, namely employment & income, education, and health. The parameters taken into account for employment & income consider formal job creation and inventory, as well as average salary levels. Likewise, education is analyzed considering enrollment rates in early childhood education, school dropout rate, and the age-grade distortion rate, as well as percentage of faculty in higher education, daily hour/class average, and the results from the Basic Education Development Index (IDEB). Health is verified by the number of pre-natal appointments and the number of child deaths from preventable and poorly defined causes.

The mathematic analysis of these parameters creates a final index that can vary between 0 and 1, which consequently ranks the cities from low stage of development ( $0 < IFDM < 0.4$ ), fair development ( $0.4 < IFDM < 0.6$ ), moderate development ( $0.6 < IFDM < 0.8$ ) to high stage of development ( $0.8 < IFDM < 1.0$ ).





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## LIST OF ACRONYMS

| ACRONYM          | MEANING   |
|------------------|---|
| <b>ABAF</b>      | FOREST PLANTATION PRODUCERS ASSOCIATION OF BAHIA            |
| <b>ABIPA</b>     | ASSOCIATION OF THE WOOD PANELS INDUSTRY                     |
| <b>ABIPLAR</b>   | BRAZILIAN ASSOCIATION OF MANUFACTURERS OF LAMINATE FLOORING |
| <b>ABRAF</b>     | BRAZILIAN ASSOCIATION OF FOREST PLANTATION PRODUCERS        |
| <b>AC</b>        | STATE OF ACRE   |
| <b>ACR</b>       | SANTA CATARINA ASSOCIATION OF FOREST ENTERPRISES            |
| <b>ACSGI</b>     | ADVISORY COMMITTEE ON SUSTAINABLE FOREST-BASED INDUSTRIES   |
| <b>AF&amp;PA</b> | AMERICAN FOREST & PAPER ASSOCIATION                         |
| <b>AFUBRA</b>    | BRAZILIAN TOBACCO GROWER'S ASSOCIATION                      |
| <b>AGEFLOR</b>   | RIO GRANDE DE SUL FOREST COMPANIES ASSOCIATION              |
| <b>AL</b>        | STATE OF ALAGOAS  |
| <b>AM</b>        | STATE OF AMAZONAS   |
| <b>AMS</b>       | THE SILVICULTURE ASSOCIATION OF MINAS GERAIS                |
| <b>AP</b>        | STATE OF AMAPA  |
| <b>APP</b>       | PERMANENT PRESERVATION AREA                                 |
| <b>APRE</b>      | PARANÁ FOREST COMPANIES ASSOCIATION                         |
| <b>ARETINS</b>   | TOCANTINS FORESTERS ASSOCIATION                             |
| <b>B</b>         | BILLION   |
| <b>BA</b>        | STATE OF BAHIA  |

|                       |  |
|-----------------------|--|
| <b>BCB</b>            | CENTRAL BANK OF BRAZIL   |
| <b>BEKP</b>           | BLEACHED EUCALYPTUS KRAFT PULP   |
| <b>BHKP</b>           | BLEACHED HARDWOOD KRAFT PULP   |
| <b>BIC</b>            | BRAZIL INDUSTRIES COALITION  |
| <b>BNDES</b>          | BRAZILIAN DEVELOPMENT BANK   |
| <b>BRACELPA</b>       | BRAZILIAN PULP AND PAPER ASSOCIATION   |
| <b>BRICS</b>          | BRICS BUSINESS COUNCIL   |
| <b>BSKP</b>           | BLEACHED SOFTWOOD KRAFT PULP   |
| <b>CBTC</b>           | COMMITTEE OF COORDINATION FOR TECHNICAL BARRIERS TO TRADE                        |
| <b>CDM</b>            | CLEAN DEVELOPMENT MECHANISM  |
| <b>CE</b>             | STATE OF CEARA   |
| <b>CEBC</b>           | CHINA-BRAZIL BUSINESS COUNCIL  |
| <b>CEBEU</b>          | BRAZIL-U.S. BUSINESS COUNCIL   |
| <b>CEPAL</b>          | ECONOMIC COMMISSION FOR LATIN AMERICA AND THE CARIBBEAN                          |
| <b>CEPI</b>           | CONFEDERATION OF EUROPEAN PAPER INDUSTRIES                                       |
| <b>CERFLOR</b>        | BRAZILIAN FOREST CERTIFICATION PROGRAMME   |
| <b>CNI</b>            | NATIONAL CONFEDERATION OF INDUSTRY BRAZIL  |
| <b>CO<sub>2</sub></b> | CARBON DIOXIDE   |
| <b>COC</b>            | CHAIN OF CUSTODY   |
| <b>COFINS</b>         | CONTRIBUTION TO SOCIAL SECURITY FINANCING  |
| <b>COINTER</b>        | THEMATIC COUNCIL FOR INTERNATIONAL INTEGRATION                                   |
| <b>CONAMA</b>         | NATIONAL ENVIRONMENT COUNCIL   |
| <b>COPOM</b>          | MONETARY POLICY COMMITTEE  |
| <b>CPI</b>            | EXTENDED NATIONAL CONSUMER PRICE INDEX   |
| <b>CSLL</b>           | SOCIAL CONTRIBUTION ON NET PROFITS   |
| <b>EBITDA</b>         | EARNINGS BEFORE INTEREST, TAXES, DEPRECIATION AND AMORTIZATION                   |
| <b>ES</b>             | STATE OF ESPÍRITO SANTO  |
| <b>FAMATO</b>         | MATO GROSSO FEDERATION OF AGRICULTURAL PRODUCERS                                 |
| <b>FAO</b>            | FOOD AND AGRICULTURE ORGANIZATION FOR THE UNITED NATIONS                         |
| <b>FGTS</b>           | UNEMPLOYMENT INSURANCE FUND  |
| <b>FLORESTAR</b>      | SÃO PAULO STATE FOREST PLANTATION PRODUCERS ASSOCIATION                          |
| <b>FPAC</b>           | FOREST PRODUCTS ASSOCIATION OF CANADA  |
| <b>FSC</b>            | FOREST STEWARDSHIP COUNCIL   |
| <b>FSG/WBCSD</b>      | FOREST SOLUTIONS GROUP OF THE WORLD BUSINESS COUNCIL FOR SUSTAINABLE DEVELOPMENT |
| <b>GDP</b>            | GROSS DOMESTIC PRODUCT   |
| <b>GO</b>             | STATE OF GOIÁS   |
| <b>HA</b>             | HECTARES   |
| <b>HDF</b>            | HIGH DENSITY FIBERBOARD  |

|                      |  |
|----------------------|--|
| <b>IBÁ</b>           | BRAZILIAN TREE INDUSTRY (IBÁ)  |
| <b>IBGE</b>          | BRAZILIAN INSTITUTE OF GEOGRAPHY AND STATISTICS                        |
| <b>ICFPA</b>         | INTERNATIONAL COUNCIL OF FOREST AND PAPER ASSOCIATIONS                 |
| <b>IDEB</b>          | BASIC EDUCATION DEVELOPMENT INDEX                                      |
| <b>IEA</b>           | INSTITUTE OF AGRICULTURAL ECONOMICS                                    |
| <b>IFDM</b>          | FIRJAN INDEX FOR MUNICIPAL DEVELOPMENT                                 |
| <b>IMF</b>           | INTERNATIONAL MONETARY FUND  |
| <b>INCAF</b>         | NATIONAL INDEX FOR FOREST ACTIVITIES COSTS                             |
| <b>INMETRO</b>       | NATIONAL INSTITUTE OF METROLOGY, QUALITY AND TECHNOLOGY                |
| <b>IPCA</b>          | EXTENDED NATIONAL CONSUMER PRICE INDEX                                 |
| <b>IPEA</b>          | INSTITUTE FOR APPLIED ECONOMIC RESEARCH                                |
| <b>IRPJ</b>          | CORPORATE INCOME TAX   |
| <b>ISAAA</b>         | INTERNATIONAL SERVICE FOR THE ACQUISITION OF AGRI-BIOTECH APPLICATIONS |
| <b>K</b>             | THOUSAND   |
| <b>KG</b>            | KILOGRAM   |
| <b>LR</b>            | LEGAL RESERVE  |
| <b>M</b>             | MILLION  |
| <b>M<sup>2</sup></b> | SQUARE METERS  |
| <b>M<sup>3</sup></b> | CUBIC METERS   |
| <b>MA</b>            | STATE OF MARANHÃO  |
| <b>MAI</b>           | MEAN ANNUAL INCREMENT  |
| <b>MBRE</b>          | BRAZILIAN MARKET FOR EMISSIONS REDUCTION                               |
| <b>MDF</b>           | MEDIUM DENSITY FIBERBOARD  |
| <b>MDIC</b>          | MINISTRY OF DEVELOPMENT, INDUSTRY AND FOREIGN TRADE                    |
| <b>MDP</b>           | MEDIUM DENSITY PARTICLEBOARD   |
| <b>MG</b>            | STATE OF MINAS GERAIS  |
| <b>MGE</b>           | JOB CREATION MODEL   |
| <b>MS</b>            | STATE OF MATO GROSSO DO SUL  |
| <b>MT</b>            | STATE OF MATO GROSSO   |
| <b>NCM</b>           | MERCOSUR COMMON NOMENCLATURE   |
| <b>NCREIF</b>        | NATIONAL COUNCIL OF REAL ESTATE INVESTMENT FIDUCIARIES                 |
| <b>NGP</b>           | NEW GENERATION PLANTATIONS   |
| <b>OSB</b>           | ORIENTED STRAND BOARD  |
| <b>P.A.</b>          | PER ANNUM  |
| <b>PA</b>            | STATE OF PARA  |
| <b>PB</b>            | STATE OF PARAIBA   |
| <b>PDE</b>           | TEN-YEAR ENERGY EXPANSION PLAN   |
| <b>PE</b>            | STATE OF PERNAMBUCO  |
| <b>PEFC</b>          | PROGRAMME FOR THE ENDORSEMENT OF FOREST CERTIFICATION                  |



|                  |   |
|------------------|---|
| <b>PI</b>        | STATE OF PIAUI  |
| <b>PIBS</b>      | FOREST INDUSTRY GROSS DOMESTIC PRODUCT  |
| <b>PIS</b>       | SOCIAL INTEGRATION PROGRAM  |
| <b>PME</b>       | MONTHLY EMPLOYMENT STUDY  |
| <b>PNFP</b>      | NATIONAL POLICY ON PLANTED FORESTS  |
| <b>PPCDAM</b>    | AMAZON DEFORESTATION PREVENTION AND CONTROL PLAN                                      |
| <b>PPCERRADO</b> | BRAZILIAN SAVANNA DEFORESTATION AND GROUND-CLEARING FIRES PREVENTION AND CONTROL PLAN |
| <b>PR</b>        | STATE OF PARANA   |
| <b>R\$</b>       | BRAZILIAN REAL  |
| <b>REDD+</b>     | PROGRAM ON REDUCING EMISSIONS FROM DEFORESTATION AND FOREST DEGRADATION               |
| <b>REFLORE</b>   | MATO GROSSO DO SUL PLANTED FOREST PRODUCERS AND CONSUMERS ASSOCIATION                 |
| <b>REITS</b>     | REAL ESTATE INVESTMENT TRUSTS   |
| <b>RJ</b>        | STATE OF RIO DE JANEIRO   |
| <b>RN</b>        | STATE OF RIO GRANDE DO NORTE  |
| <b>RO</b>        | STATE OF RONDONIA   |
| <b>RPPN</b>      | PRIVATE NATURAL HERITAGE RESERVE  |
| <b>RR</b>        | STATE OF RORAIMA  |
| <b>RS</b>        | STATE OF RIO GRANDE DO SUL  |
| <b>SC</b>        | STATE OF SANTA CATARINA   |
| <b>SE</b>        | STATE OF SERGIPE  |
| <b>SECEX</b>     | FOREIGN TRADE SECRETARIAT   |
| <b>SINDIFER</b>  | UNION OF PIG IRON PRODUCERS IN THE STATE OF MINAS GERAIS                              |
| <b>SLIMF</b>     | SMALL AND LOW INTENSITY MANAGED FORESTS   |
| <b>SP</b>        | STATE OF SÃO PAULO  |
| <b>T</b>         | TONS  |
| <b>TFD</b>       | THE FOREST DIALOGUE   |
| <b>TIMOS</b>     | TIMBER INVESTMENT MANAGEMENT ORGANIZATIONS  |
| <b>TO</b>        | STATE OF TOCANTINS  |
| <b>UF</b>        | FEDERATED STATE   |
| <b>UKP</b>       | UNBLEACHED KRAFT PULP   |
| <b>UNCSD</b>     | UNITED NATIONS CONFERENCE ON SUSTAINABLE DEVELOPMENT                                  |
| <b>UNFCCC</b>    | UNITED NATIONS FRAMEWORK CONVENTION ON CLIMATE CHANGE                                 |
| <b>US</b>        | UNITED STATES   |
| <b>US\$</b>      | US DOLLAR   |
| <b>USA</b>       | UNITED STATES OF AMERICA  |
| <b>USD</b>       | UNITED STATES DOLLAR  |
| <b>WTO</b>       | WORLD TRADE ORGANIZATION  |
| <b>WWF</b>       | WORLD WILDLIFE FUND   |



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#### **Coordination**

Ibá Corporate Communication Team, supported by the following areas: Forestry/ Foreign Affairs, Statistics, International Negotiations, Government Relations, International Relations and Sustainability and member companies.

#### **Developed by**

Pöyry Consultoria em Gestão e Negócios Ltda.

#### **Translation**

Transdiscovery

#### **Revision**

Tracy Smith Miyake

#### **Design and DTP**

Studio 113

#### **Addresses**

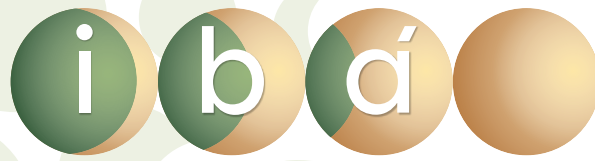
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