



Native Forests

# THE SUPPLY CHAIN OF NATIVE FORESTS

INDUSTRY MEETING FOR SUSTAINABILITY



**CNI – NATIONAL CONFEDERATION OF INDUSTRY – BRAZIL**

*Robson Braga de Andrade*  
President

**EDUCATION AND TECHNOLOGY DIRECTORSHIP – DIRET**

*Rafael Esmeraldo Lucchesi Ramacciotti*  
Education and Technology Director

**NATIONAL FORUM OF FOREST-BASED ACTIVITIES – FNABF**

**Administrative Council**

*Geraldo Bento (CIPEM)*  
President

*Rafik Hussein Saab (SINDIMASP)*  
Secretary General

**Counselors**

*Serafin Quissini (SINDIMADEIRA-RS)*  
*Dimitrios Paleologos (SINDIMASP)*  
*Justiniano de Queiroz Netto (AIMEX)*  
*Bruno Baranek (ANPM)*

**Executive Supervision**

*Ramiro Azambuja da Silva*  
Superintendent



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**CNI**

National Federation of Industries

**Headquarters**

Setor Bancário Norte  
Quadra 1 – Bloco C  
Edifício Roberto Simonsen  
70040-903 – Brasília – DF  
Phone: (61) 3317-9000  
Fax: (61) 3317-9994  
[www.cni.org.br](http://www.cni.org.br)

**FNABF**

National Forum of Forest-based Activities

**Headquarters**

Setor Comercial Norte  
Quadra 1 – Bloco E  
Edifício Central Park – Sala 1401  
70711-903 – Brasília – DF  
Phone: (61) 3327-1967 / 3326-8767  
Fax: (61) 3326-8767  
<http://www.forumflorestal.org.br/website/>



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## CNI PRESENTATION

The diversity of the national industry and the significant availability of natural resources reveal excellent opportunities for the sustainable development of Brazil, combining economic growth, social inclusion and environmental conservation. The materialization of concerns related to sustainability in the strategic agenda of enterprises and governments is a reality. Apart from isolated cases of success, the consequences of this attitude are felt in entire sectors of the economy. Further advances are still needed, but the path has already been identified and going back is impossible.

After coordinating an unprecedented critical thinking process on sustainability with 16 industry associations, the National Industry Confederation (CNI) delivers to the Brazilian society a wide range of information on progress, challenges and opportunities yet to come. The results presented here may not portray the significance of the discussion process experienced by the industry in preparing these documents. Developments on the process will be beyond the Rio +20 Conference, and are definitely incorporated on the daily lives of companies.

The subject of sustainability is inserted differently in each of the industrial sectors. However, some elements are common to all. The continuous pursuit for efficiency in use of resources and the need to increase industrial competitiveness are on the agenda of all the sectors. Encouraging innovation and scientific and technological development is strategic on the transition to more sustainable patterns of production.

Strategies to intensify actions coordinated internally in the industrial sectors and with governments and civil society organizations are no less important. The dissemination of sustainable practices by means of the supply chain and incentives for companies to undertake the role of integrated management of the territories are powerful tools.

The sectorial volumes developed by industry associations are valuable contributions to addressing subjects such as sustainability and competitiveness of domestic industry. One of the most representative results of this process will certainly be the strengthening of structured programs of action with a focus on promoting sustainability in the

production. These initiatives will act as raw materials so that the industries involved and CNI are able to systematically publish documents presenting the national industry's developments towards the goals of sustainable production.

The documents presented here are intended to be a valuable contribution to enhance the debate on sustainability. Each of the sectorial associations is to be congratulated for their efforts.

**Robson Braga de Andrade**

President of the National Confederation of Industry – Brazil



## SECTORIAL PRESENTATION

This study provides a detailed look at sustainability issues surrounding the forest sector in the Brazilian Amazon, a region that accounts for 60% of the country. The study provides an overview of some essential environmental and economic aspects of this vastly complex region, and explores some scenarios going forward.

The forest sector comprises a broad array of activities, ranging from sustainable forest management to the harvest, processing, industrialization, and use of timber. Forestry also plays a key role in advancing knowledge about and use of biodiversity, which helps generate advances in medicine, pharmaceuticals, cosmetics, and other fields. It is also a source of biomass for energy production, a leader in research on natural essences, Brazil nuts and other non-timber forest products, and a vital economic partnership that is slowly but surely taking shape.

Brazil's National Forum of Forest-Based Activities (FNABF), which represents the interests of the country's forest sector, recognizes that the forest sector's strength and diversity can contribute significantly to boosting the competitiveness of the Brazilian economy. However, a series of barriers are currently preventing advances in innovation, legal regulations, certification and standardization, competitiveness, and a sustainable national political strategy for the Amazon.

The current excess of laws and regulations stands in the way of sustainable development and prevents business ventures from achieving their full potential. As described in this report, command-control regulation, a weak infrastructure for economic activities, a challenging social context, and tax policies undermine large-scale production and reduce competitiveness in national and international markets.

Given the restrictiveness of current policy, the forest sector favors the implementation of a new, well-defined national forest policy. Updated policy is especially important considering the vast size and impressive diversity of Brazil.

Tax policy deserves special attention, particularly in the Amazon region, which is home to 20 million Brazilians who depend directly on all aspects of the region's development.

The Amazon represents a unique case within Brazil and as such requires special public policies, especially in the case of taxation, to ensure that sustainable development takes place hand-in-hand with the necessary social sustainability. Exemptions of the PIS/Cofins and IPI taxes are examples of policy that addresses the region's unique situation. Reforms of the ICMS tax should also be discussed, even though this will require coordination between federal, state, and municipal governments.

Incentives for sustainable forest management should take into account both natural and planted forests, which help preserve privately held forests, restore degraded areas, and sequester carbon.

Finally, considering the international situation, Brazil's new role on the world stage, the immense potential of the forest sector, and the consolidation of sustainability as a new paradigm for global development, it is our hope that Brazil's National Confederation of Industry (CNI) and a wide range of partners will initiate discussions at the Rio+20 Conference to construct the Brazilian Forest System. The potential for production and sustainability in the forest sector is extraordinary, and everything we have learned over years of experience and development in the Amazonian region represents a valuable and important part of Brazil's national heritage.

**Geraldo Bento**

President

National Forum of Forest-Based Activities (FNABF)



# 1 INTRODUCTION

Brazil's National Forum of Forest-Based Activities (FNABF) consists of ten representative bodies in the states of Acre, Pará, Mato Grosso, São Paulo, Paraná, and Rio Grande do Sul. Together, these bodies have 1,174 associated companies representing more than 7,000 production, industry, trade, and export operations involved in forestry in Brazil's natural forests.

Established in 1999 with the objective of defending and representing forest companies in their relations with the government, institutions, and civil society, FNABF has focused on its role as a representative body and on the development of the forest sector. Since 2005, it has worked together with the Brazilian Forest Coalition Movement (Movimento de Coalizão Florestal Brasileiro) to coordinate and champion the needs of the forest sector. The following groups are members of FNABF:

- i. ABIMCI (Brazilian Association of the Mechanically Processed Wood Industry);
- ii. ABRAMADE (Brazilian Association of Producers, Wholesalers, and Retailers of Wood Products);
- iii. AIMEX (Association of Wood Export Industries of the State of Pará);
- iv. ASIMMANEJO (Association of Managed Timber Industries of the State of Acre);
- vi. CIPEM (Center for Timber Producers and Exporters of Mato Grosso);
- vii. ANPM (National Association of Wood Flooring Producers);
- vii. SINDIMADEIRA (Syndicate of Joinery, Sawmill, Carpentry, and Cooperage Industries of Caxias do Sul);
- vii. SINDIMASP (Syndicate of Timber Wholesalers of the State of São Paulo);
- ix. SINDUSMAD (Syndicate of Timber Industries of the State of Acre);
- x. UNIFLOR (Union of Forest Bodies of the State of Pará);

As a contribution to discussions at the Rio +20 Conference, FNABF prepared this publication to justify and explain its support for incentives to strengthen and develop the sustainably managed natural forests industry, with the long-term goal of guaranteeing a constant production of wood from natural forests under sustainable cycles. The economic benefits of responsible forest management derive from increased productivity in the sector, reductions in waste, and increased valuation of wood on the international market, in addition to the preservation and improvement of natural forests.

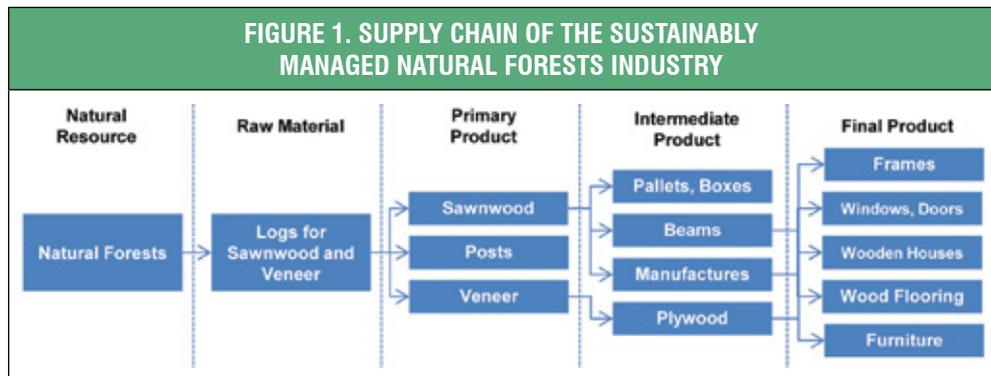


## 2 OVERVIEW OF THE SECTOR

### 2.1 Economic aspects

Sustainable forest management is the management of forests for economic and social benefits in a way that respects the natural mechanisms that sustain the ecosystem under management. The practice, which is now common in developed countries but only recently taking root in Brazil, guarantees a continuous production of timber while simultaneously preserving forest biodiversity. Sustainable forest technology also permits a 30-year cutting cycle, compared to the 60-year cycle in conventional management.

The sustainably managed natural forests industry depends on the natural resource base of natural forests, which therefore must be harvested sustainably. The industry's primary products are sawnwood, while its finished, value-added products include construction material and even entire wooden houses, which are increasingly popular in the Brazilian market.



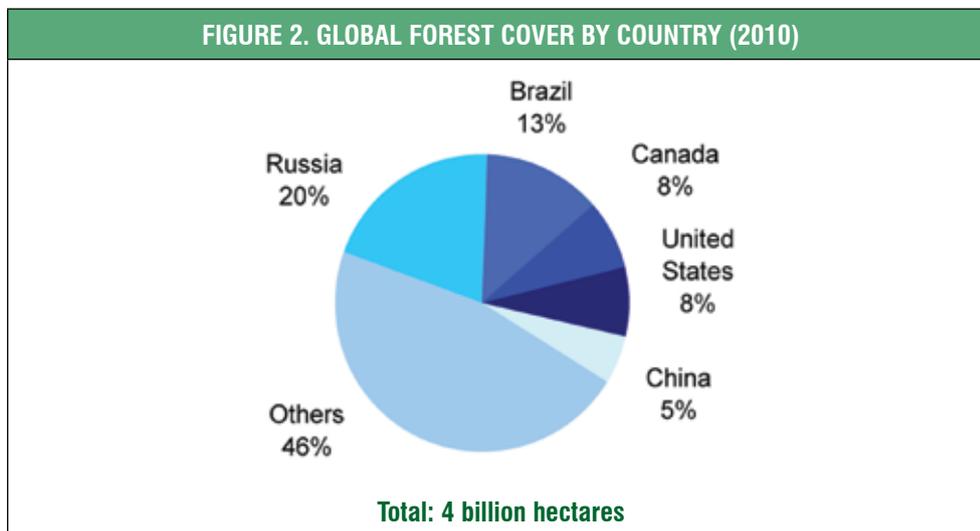
Source: STCP

## 2.1.1 Forests



### WORLDWIDE

Global land area totals approximately 13 billion hectares, of which about 4 billion hectares (31%) were covered by forests in 2010. In 2010 the country with the largest forested area was Russia (809 million hectares), followed by Brazil (520 million hectares). Between 1990 and 2010 global forest coverage decreased by an average of 6.8 million hectares/year (-0.16% decrease annually). The greatest gross loss occurred in Brazil (-2.8 million hectares/year), and the greatest gross increase in China (+2.5 million hectares/year).



Source: FAO (2010).

### BRAZIL

#### Biomes

Brazil's natural vegetation is officially classified into six different biomes: Amazonian Forest, Cerrado, Atlantic Forest, Caatinga, Pampa, and Pantanal. Each biome includes a forested component in its advanced successional stages, but these are seriously degraded at present. Anthropogenic deforestation has steadily diminished forest cover in these biomes, and the natural remnants are typically fragmented and threatened by fires, illegal logging and ranching, among other impacts. These forest fragments account for 60% of Brazil's original vegetation coverage, for a total of 510 million hectares. However, 70% of remnants (355 million hectares) are located in the Amazon, the best-conserved Brazilian biome, with 85% of its total area still intact.

TABLE 1. PRINCIPAL BRAZILIAN BIOMES (2010)				
Biome	Area (million ha)		% Remaining	% Total
	Original	Remaining		
Amazonian Forest	420	355	85%	70%
Cerrado	204	66	32%	13%
Atlantic Forest	111	30	27%	6%
Caatinga	84	47	56%	9%
Pampa	18	3	17%	1%
Pantanal	15	9	60%	2%
<b>TOTAL</b>	<b>852</b>	<b>510</b>	<b>60%</b>	<b>100%</b>

Source: SFB (2010).

### Brazil's Amazonian Forests

Brazil's Amazonian states also include the Cerrado biome, which in its undisturbed form is also considered a forest formation. The estimated forested area of the Brazilian Amazon currently totals 416 million hectares, representing 82% of the total area of these states. These numbers are estimates, however, given that exact figures do not exist. The numbers presented here put the Amazonian deforestation rate at 18%, but other sources put it at 15-21%.

TABLE 2. FOREST COVER BY STATE IN THE BRAZILIAN AMAZON (2011)			
State	Forest Cover (million ha)	% Area of State	% of Amazon Forest
Amazonas	153	98%	37%
Pará	96	77%	23%
Mato Grosso	67	74%	16%
Roraima	22	96%	5%
Tocantins	20	71%	5%
Rondônia	17	71%	4%
Amapá	14	99%	3%
Acre	14	86%	3%
Maranhão	14	41%	3%
<b>TOTAL</b>	<b>416</b>	<b>82%</b>	<b>100%</b>

Source: SFB (2010); INPE (2011).

The primary driver of deforestation is the conversion of forested areas for ranching and agriculture. The illegal activities of some timber companies are a secondary driver; these activities include purchases of timber from areas previously deforested by ranchers or farmers and the construction of roads to extract timber from unoccupied areas. Most land in the Brazilian Amazon does not have clear land titling, a problem that echoes throughout supply chains in the region, and especially that of the forest industry. For this reason, ending illegal activities such as deforestation in the Amazon will require a major push from the government to resolve titling issues, and this has not yet happened.

### Productive Potential of Forests in the Brazilian Amazon

Because dense natural forests have a more attractive forestry potential in terms of both quantity and quality, these areas are the most sought after by mechanical processing industries. However, of the total 412 million hectares of forests with forestry potential in the Brazilian Amazon, only 214 million hectares (52%) are considered effectively available for the private initiative. The remnants are public forests, including Indian Reserves and National Parks. With a 30-year cutting cycle, and a harvest of 25 m<sup>3</sup> per hectare, this area could sustainably generate an annual volume of sawlogs and veneer logs on the order of 270 million m<sup>3</sup>. This volume is 10 times the volume that Brazil currently produces.

TABLE 3. COMMERCIAL VOLUME OF SAWLOGS AND VENEER LOGS IN THE BRAZILIAN AMAZON				
State	Forest Area (1,000 hectares)	Volume (1,000 m <sup>3</sup> )		%
		Stock	Sustainable Production*	
Acre	9,931	450,649	12,518	5%
Amapá	7,762	352,238	9,784	4%
Amazonas	79,104	3,589,572	99,710	37%
Maranhão	4,332	196,555	5,460	2%
Mato Grosso	29,423	1,335,157	37,088	14%
Pará	71,143	3,228,341	89,676	33%
Rondônia	11,261	510,992	14,194	5%
Roraima	325	14,739	409	0%
Tocantins	1,200	54,444	1,512	1%
<b>TOTAL</b>	<b>214,480</b>	<b>9,732,687</b>	<b>270,352</b>	<b>100%</b>

\*30-year cycle, harvest of 25 m<sup>3</sup> per hectare.

Source: PNUD (2002).

Approximately 84% of the 214 million hectares of productive natural forests are located in the states of Amazonas, Pará, and Mato Grosso. It has been estimated that the total timber stock of the Brazilian Amazon is roughly 60 billion m<sup>3</sup>. However, if one takes into account just the timber species that are currently used by the industry, with DBH greater than 45 cm, the total volume of available timber that can be considered commercial is estimated at 9.7 billion m<sup>3</sup>.

## Private Lands under Sustainable Management in the Amazon

In 2010 the principal companies that managed natural forest areas under sustainable forest management in the Brazilian Amazon together had roughly 3 million hectares of productive forests, as shown in Table 4. ORSA and CIKEL were the largest of these companies.

TABLE 4. PRINCIPAL COMPANIES MANAGING NATURAL FOREST AREAS UNDER SUSTAINABLE MANAGEMENT IN THE BRAZILIAN AMAZON (2010)			
Company	State	Area under Management (ha)	%
Orsa	PA	453,335	15%
Cikel	PA	304,658	10%
Amaplac	AM	205,000	7%
Precious Woods	PA, AM	143,390	5%
Brascomp	PA	125,000	4%
Gethal	PA	94,724	3%
SM	MT	80,000	3%
Manoa	RO	60,689	2%
Guavirá	MT	59,248	2%
Eidai	PA	57,852	2%
Others		1,373,604	46%
<b>TOTAL</b>		<b>2,957,500</b>	<b>100%</b>

Source: STCP (2011).

## Public Forest Concessions in the Amazon

Forest Concessions are mechanisms by which the government grants a company or consortium of companies the right to sustainably manage a given piece of forest in order to generate products and services. Concessions are awarded via bid processes, and only to companies that meet the requirements of the respective bid and demonstrate the ability to manage the concession, at their own risk and for a specified period of time. The Law of Public Forest Management (Law 11.284/2006) regulates the management of these forests with a view to protecting ecosystems, promoting and disseminating research, respecting traditional usage rights, and above all promoting activities that promote the efficient and rational use of forests.

The first forest concession in Brazil was established in 2007, in the Jamairi National Forest in the state of R ndonia. The second was established in 2009, in the Sarac -Taquera National Forest in the state of Par . In April 2010 the preliminary bid for a new concession in Par , in the Amana National Forest, was announced. In 2010, approximately 259,000 hectares of public forests were in the bidding process and/or under forest management in the Brazilian Amazon. Current contracts establish 40-year concessions intended to generate revenues of approximately USD 6.8 million per year (Table 5). This value will increase as new forests are opened to private initiative as concessions, increasing the volume of legal timber in the market.

TABLE 5. NATIONAL FORESTS WITH CURRENT OR PLANNED FOREST CONCESSIONS IN THE BRAZILIAN AMAZON (2010)						
Public Forest	State	Total Area (ha)	Management Units	Area Under Concession (ha)	Area to be Concessed (ha)	Estimated Revenue (USD 1,000/ Year)
Jamari National Forest	RO	222,303	3	96,361	--	2,132
Saracá-Taquera National Forest	PA	441,147	3	--	48,857	1,266
Amana National Forest	PA	542,553	5	--	210,152	3,409
<b>Total</b>		<b>1,206,003</b>	<b>11</b>	<b>93,361</b>	<b>259,009</b>	<b>6,807</b>

Source: Imazon (2010).

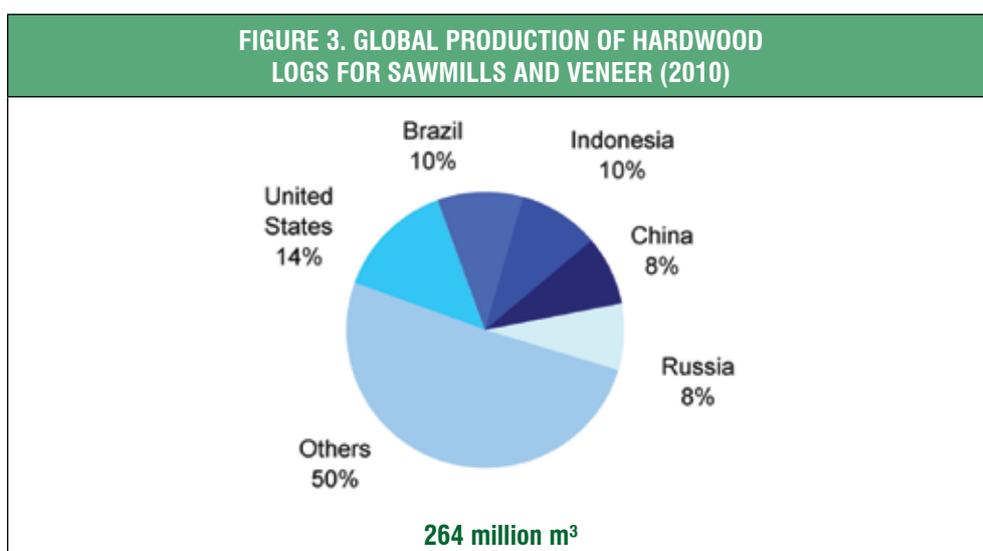
## 2.1.2 Roundwood



Photo: Maroia

### WORLDWIDE

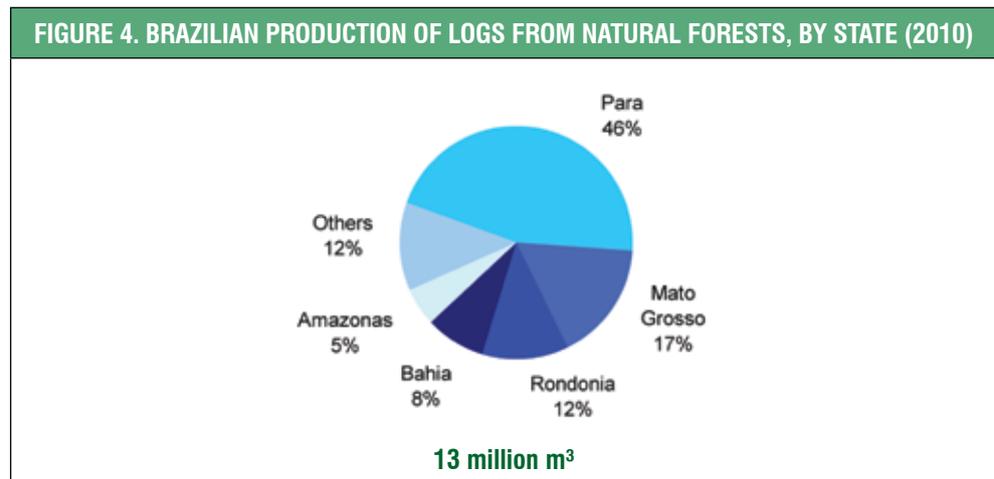
The sustainably managed natural forests industry in Brazil produces roughly 26 million m<sup>3</sup> of hardwood logs for sawmills and veneer, and accounts for 10% of the global market. Brazil is the second largest producer globally, after the United States. Roughly half of Brazilian production comes from natural Amazonian forests.



Source: FAO (2012).

## BRAZIL

Brazil's production of logs from natural forests, which according to IBGE totaled roughly 13 million m<sup>3</sup> in 2010, was concentrated in the country's Amazonian states. Together, Para, Mato Grosso, and Rondonia, the three largest producers in Brazil, accounted for 75% of total production. Between 2000 and 2010 production declined 42%, largely due to aggressive governmental policing against the transportation of timber extracted from natural forests. During this crackdown, because government agencies lacked the technical capacity to determine whether the origin of timber was legal or illegal, various companies with legal activities were forced out of the market.



Source: IBGE (2012).

The primary driver of illegal logging in the Brazilian Amazon is the lack of clear land titling in the region. A major initiative to resolve the titling problem should be launched by the government, but this has not yet been done. As a result, an entire important sector of the economy is threatened by the government's unfocused struggle against the effects of illegal activities (i.e., the illegal harvest and sale of timber) but not its causes (i.e., the lack of adequate land titling). Sustainable forestry in the Amazon depends on land titling reforms in order to prosper – reforms that can convert forestry into a pillar of sustainable development in the region.

### 2.1.3 Sawnwood

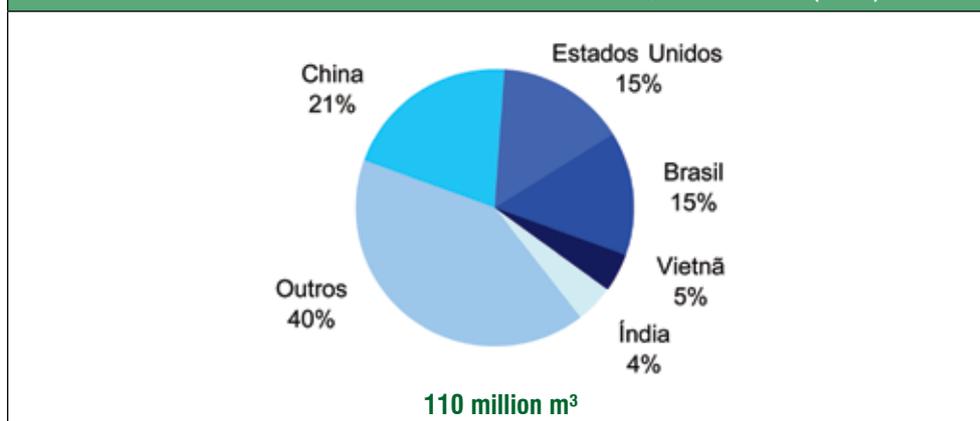
#### PRODUCTION



#### Worldwide

Global sawnwood production totaled 110 million m<sup>3</sup> in 2010. That same year, Brazil produced 16 million m<sup>3</sup> of sawnwood, or 15% of global production, and was the third largest producer in the world, behind China and the United States.

**FIGURE 5. GLOBAL PRODUCTION OF SAWNWOOD, BY COUNTRY (2010)**



Source: FAO (2012).

## Brazil

According to data compiled by STCP, sawnwood production in the Brazilian Amazon in 2010 totaled 15.5 million m<sup>3</sup>. The largest sawnwood producer in the Brazilian Amazon is Precious Woods Amazon (previously Mil Madeireira), located in Itacoatiara (AM), with a production capacity of 75,000 m<sup>3</sup>/year.

**TABLE 6. PRINCIPAL SAWNWOOD-PRODUCING COMPANIES IN THE BRAZILIAN AMAZON (2010)**

Company	Township	State	Production (m <sup>3</sup> /year)	%
PRECIOUS WOODS Amazon	Itacoatiara	AM	75,000	0.5%
ORSA Florestal	Almeirim	PA	50,000	0.3%
PALMASOLA Madeiras e Agricultura	Nova Ubiratã	MT	42,000	0.3%
IBL (Izabel Madeiras do Brasil)	Breu Branco	PA	40,000	0.3%
CIKEL Brasil Verde	Ananindeua	PA	40,000	0.3%
JURUÁ Florestal	Ananindeua	PA	32,000	0.2%
GUAVIRÁ Industrial e Agroflorestal	Nova Maringá	MT	31,000	0.2%
OURO VERDE Importação e Exportação	Rio Branco	AC	30,000	0.2%
ROHDEN Indústria	Juruena	MT	30,000	0.2%
MANOA	Cujubim	RO	21,600	0.1%
Others			15,063,400	97.5%
<b>TOTAL</b>			<b>15,455,000</b>	<b>100.0%</b>

Source: STCP (2011).

The level of technology used by the Amazonian sawnwood industry is quite different from that of most industries in southern Brazil. This difference is partly explained by the type of raw material being processed. Processing tropical woods requires working with a large number of timber species with a broad range of wood attributes, which can be a limitation compared to operations that process wood from plantation forests. However, the lack of investments to modernize equipment and the production process reduce product quality, productivity, and competitiveness in the market. Table 7 illustrates the basic differences between the different levels of technology currently existing in the Brazilian Amazon sawnwood industry.

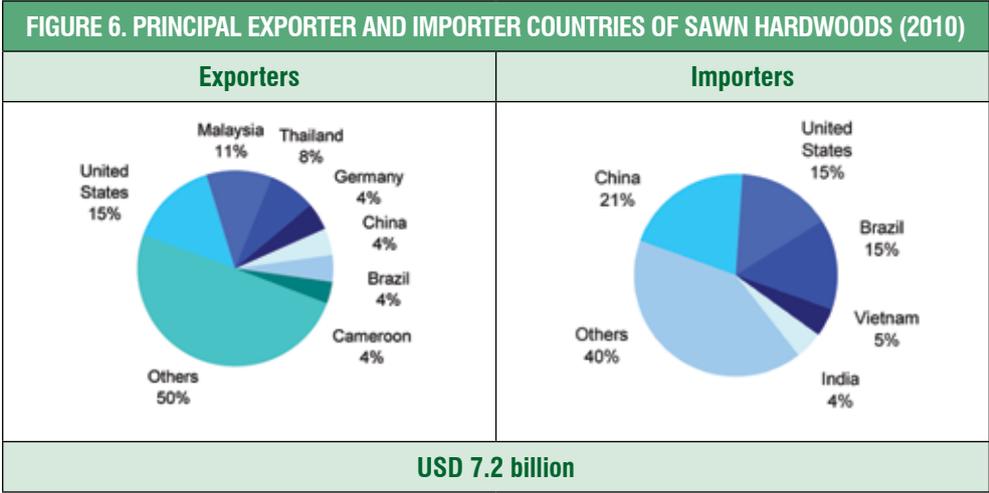
<b>TABLE 7. TECHNOLOGICAL LEVELS IN THE BRAZILIAN AMAZON SAWNWOOD INDUSTRY</b>			
<b>Activity</b>	<b>Technological Level</b>		
	<b>Low</b>	<b>Intermediate</b>	<b>High</b>
Production	Up to 100 m <sup>3</sup> /month	100 – 2.000 m <sup>3</sup> /month	Above 2.000 m <sup>3</sup> /month
Harvest	Chainsaw	Both traditional and modern equipment	Modern equipment: skidders
Mill yard operation	Manual equipment	Manual and mechanized equipment	Loader and conveyor belts
Sawmill	Chainsaw	Low-quality bandsaw	Integrated mechanized loading bandsaw and high-quality auxiliary equipment
Treatment	None	Occasional	Always
Drying	None	Air-drying or driers	Driers
Classification	None	Occasional	Quality control

Source: PNUD (2002).

## INTERNATIONAL TRADE

### Worldwide

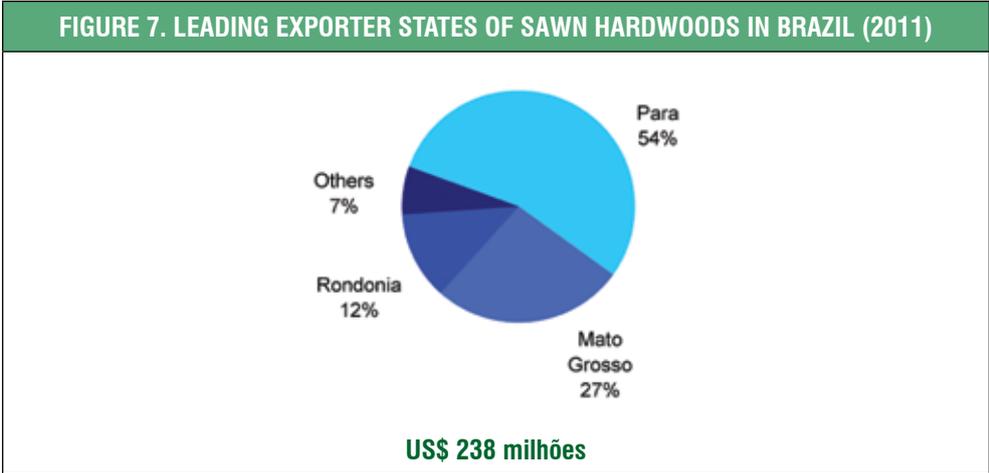
In 2010, global trade in sawn hardwoods totaled roughly USD 7.2 billion. That same year, China was the world's largest importer of sawn hardwoods, accounting for 26% of the total, while the United States were the largest exporter, with 15% of the total. While most Brazilian sawn hardwoods are destined for the domestic market, the country remains an important player at the global level, accounting for 4% of world exports, or USD 264 million in 2010.



Source: FAO (2012).

**Brazil**

Brazilian exports of sawn hardwoods, which in 2011 totaled USD 238 million, mostly originate in Amazonian states. Together, Pará, Mato Grosso, and Rondônia account for 93% of the total. After reaching their highest level in 2007, of roughly USD 600 million, exports dropped steeply due to a number of internal and external factors. The main external factor was reduced demand for wood products in the United States, due to the housing market crisis in that country. The increasing value of the Brazilian Real with regard to the U.S. Dollar also led to decreasing competitiveness.



Fonte: MDIC (2011).

A large number of Brazilian sawnwood producers are shifting their focus towards products with higher added value, such as hardwood flooring, which are less sensitive to foreign exchange fluctuations.

## 2.1.4 Wood Flooring

### WORLDWIDE

Photo: Wilson Custom Tree

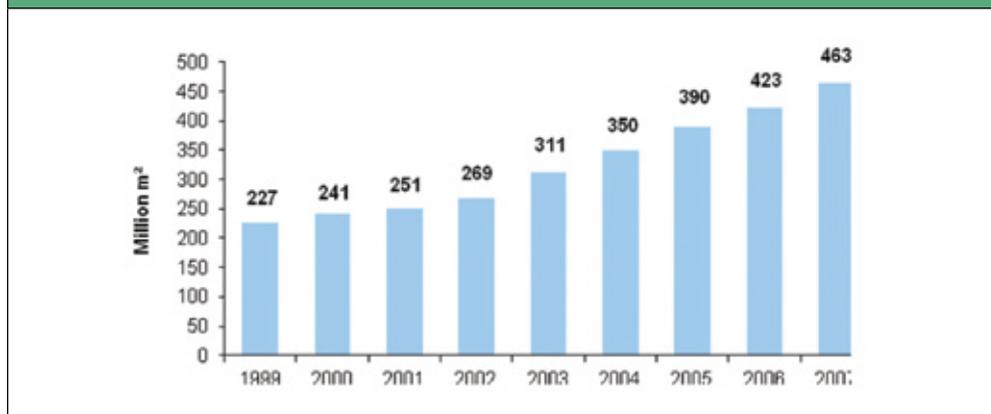


#### Production

Flooring is a generic term for a permanent, smooth-surfaced floor covering. Flooring can be made of various materials, the most common of which is wood. In the case of wood flooring, it can be engineered or solid. The Brazilian Amazon is currently a major producer of solid wood flooring. World production of wood flooring grew from 227 million m<sup>2</sup> in 1999 to 463 million m<sup>2</sup> in 2007, for a mean annual increase of 9% during that period (see Figure 8).

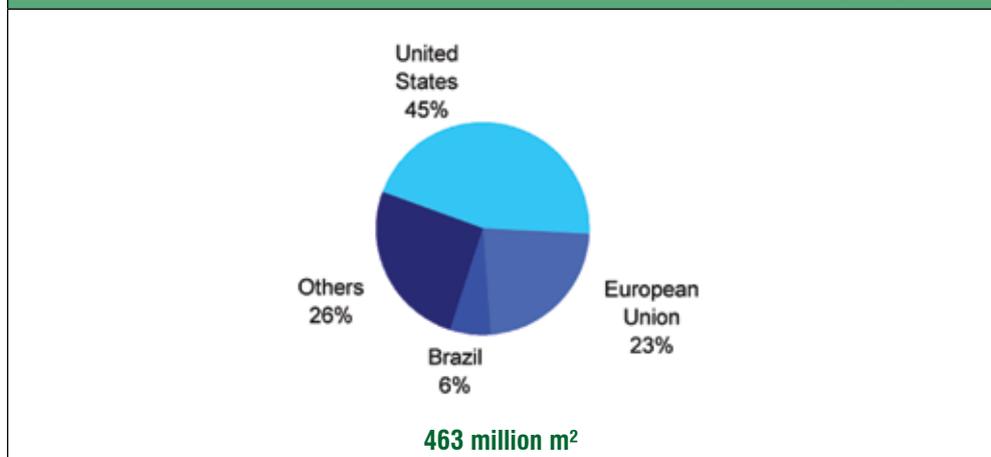
lion m<sup>2</sup> in 1999 to 463 million m<sup>2</sup> in 2007, for a mean annual increase of 9% during that period (see Figure 8).

**FIGURE 8. ANNUAL GLOBAL PRODUCTION OF WOOD FLOORING 1999-2007**



Source: ANPM (2010).

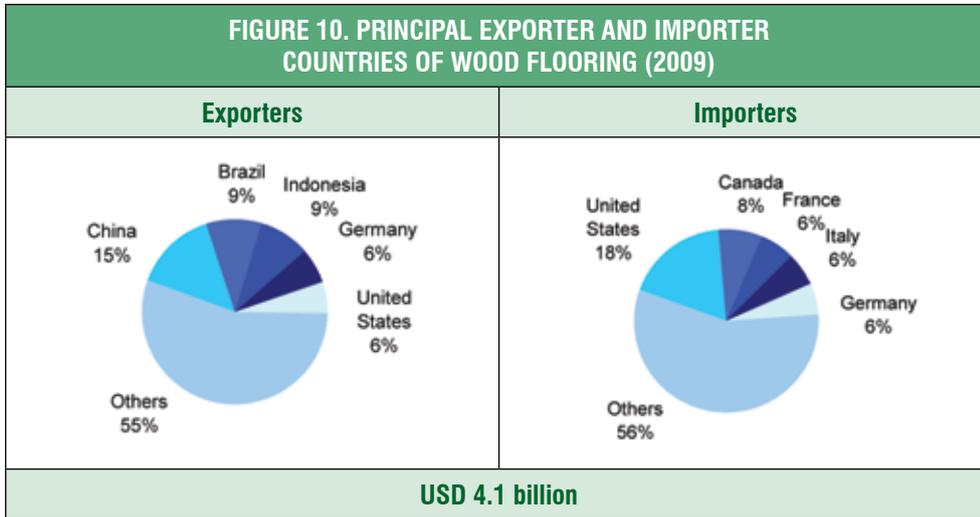
**FIGURE 9. LEADING PRODUCERS OF WOOD FLOORING, BY COUNTRY (2007)**



Source: ANPM (2010).

## International Trade

In 2009 China was the world's largest exporter of wood flooring, accounting for 15% of the total, followed by Brazil and Indonesia, with 9% each. That same year, the United States were the largest importer of flooring, accounting for 18% of all imports (see Figure 10).

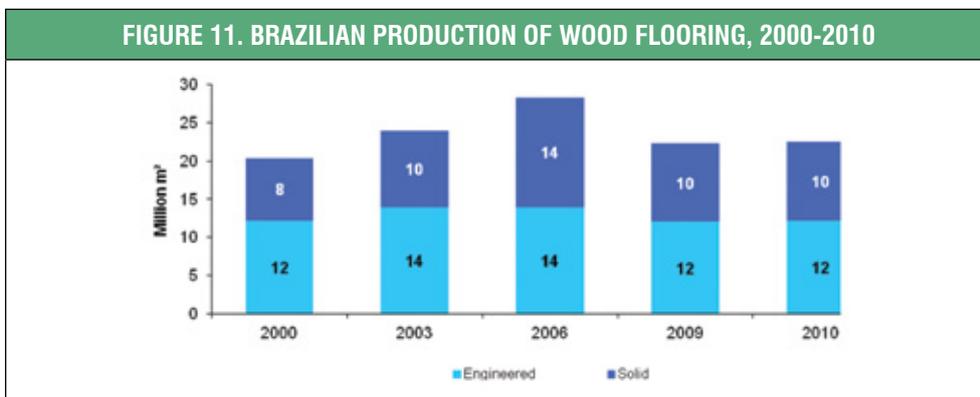


Source: ITC (2011).

## BRAZIL

### Production

The Brazilian production of wood flooring was of 20 million m<sup>2</sup> in 2000, and grew to 23 million m<sup>2</sup> in 2010, a 15% increase during this period. The share of solid wood floorings over the total went from 40% in 2000 to 46% in 2010. The solid wood floorings are mostly produced in the Amazon, generally for exports. There was a decrease in the total wood flooring production between 2006 and 2009 due to the world economic crisis (see Figure 11).



Source: ANPM (2010).

Photo: STCP



Of the total Brazilian solid wood flooring production, of roughly 10.3 million m<sup>2</sup>, approximately 7.7 million m<sup>2</sup> (75%) came from companies located in the Amazon. In 2010 the largest industry producing wood flooring in the Brazilian Amazon was Juruá Florestal, which produced 1 million m<sup>2</sup> (see Table 8). The photo on the left shows the production line of the Pampa company, located in Belém (PA). This flooring

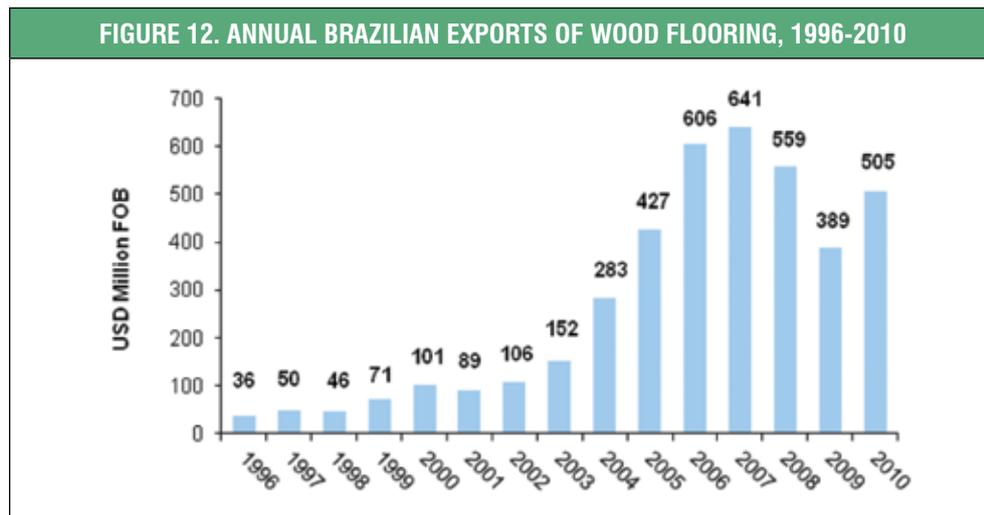
factory, the third largest in the Amazon, is largely supplied by sawnwood that is produced in Rondonia and transported to Belem on barges that travel down the Madeira and Amazonas rivers.

TABLE 8. PRINCIPAL PRODUCERS OF WOOD FLOORING IN THE BRAZILIAN AMAZON (2010)				
Juruá Florestal	State	City	Production (m <sup>2</sup> /year)	%
Exman	PA	Belém	1,000	13%
Pampa Exportações	PA	Belém	800	10%
Nordisk Timber	PA	Belém	630	8%
Tradelink	PA	Belém	580	8%
Amazônia Florestal	PA	Belém	500	6%
Industrial Madeireira Curuatinga	PA	Belém	450	6%
Forex	PA	Santarém	440	6%
MG Madeiras	PA	Belém	400	5%
Cikel Brasil Verde	PA	Belém	400	5%
Guavirá Industrial e Agroflorestal	PA	Ananindeua	250	3%
Ouro Verde Imp. e Exportação	MT	Nova Maringá	165	2%
Rohden Ind. Lígnea	AC	Rio Branco	150	2%
Rohden Ind. Lígnea	MT	Juruena	150	2%
Others			1,810	23%
<b>TOTAL</b>			<b>7,725</b>	<b>100%</b>

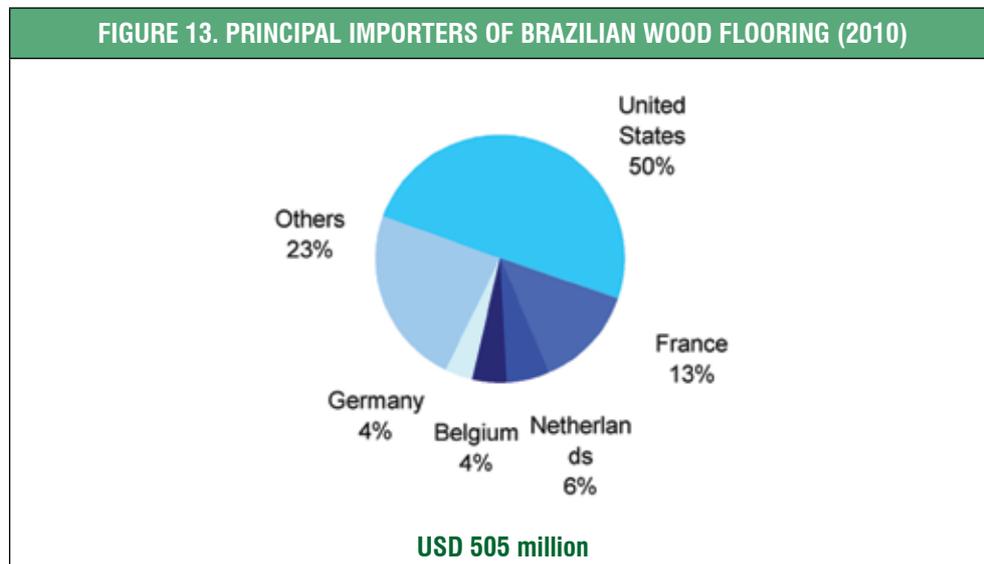
Source: (2011); ANPM (2010).

## Exports

Brazilian exports of wood flooring grew from USD 36 million in 1996 to USD 505 million in 2010, for a mean annual increase of nearly 21%. The decline in 2008 and 2009, a result of the world economic crisis, was reversed in 2010. In 2010 the United States were the leading destination for Brazilian exports of hardwood flooring, accounting for 50% of the total (see Figure 12).



Source: MDIC (2011).



Source: MDIC (2011).

## 2.2 Social aspects

The Amazon region is currently home to the largest number of sustainably managed natural forest companies in Brazil, with 71 production centers harboring 2,200 companies. In 2009 these companies reported revenues of nearly USD 2.5 billion, and generated more than 200,000 direct or indirect jobs. The states with the largest numbers of companies are Para (48%), Mato Grosso (27%), and Rondonia (16%).

In 2009, the Brazilian Amazon timber industry generated approximately 204,000 jobs. Nearly 67,000 of these were direct employment in the forest and wood-processing industries, while 137,000 were indirect employment. Each direct job was thus responsible for creating, on average, 2.06 additional forest-related jobs (Table 9).

<b>TABLE 9. DIRECT AND INDIRECT EMPLOYMENT GENERATED BY THE TIMBER INDUSTRY IN THE BRAZILIAN AMAZON (2009)</b>				
<b>State</b>	<b>Empregos diretos</b>		<b>Indirect Employment</b>	<b>Total</b>
	<b>Timber Industry</b>	<b>Logging</b>		
Acre	946	572	3,123	4,641
Amapá	351	145	1,020	1,516
Amazonas	1,549	586	4,390	6,525
Maranhão	884	417	2,675	3,976
Mato Grosso	12,217	6,407	38,308	56,932
Pará	20,265	9,970	62,189	92,424
Rondônia	7,828	3,565	23,433	34,826
Roraima	636	301	1,928	2,865
<b>Brazilian Amazon</b>	<b>44,676</b>	<b>21,963</b>	<b>137,066</b>	<b>203,705</b>

Source: Imazon (2011).

According to data compiled by IMEA (2012), the forest sector in Mato Grosso created a total of nearly 94,000 jobs, including direct and indirect employment as well as other related jobs. Direct and indirect employment created by the timber industry in the Brazilian Amazon accounted for approximately 2% of the economically active population of the region. In Pará, Mato Grosso, and Rondonia, the main timber-producing states, this percentage varied between 2.5% and 5.0%.





## 3 FOREST-RELATED REGULATIONS

### 3.1 General aspects

The principal regulations that govern sustainably managed natural forest operations in the Brazilian Amazon are listed in Table 10. The most important are Law 4,771/1965 (Forest Code) and CONAMA Resolution 406/2009 (Sustainable Forest Management Plans in the Amazon).

TABLE 10 – REGULATIONS THAT GOVERN SUSTAINABLY MANAGED NATURAL FOREST OPERATIONS			
Legislation	Number	Year	Content
Law	4,504	1964	Land Code
	4,771	1965	Forest Code
	5,709	1971	Acquisition of Rural Properties by Foreigners
	5,868	1972	National System of Rural Registry
	5,889	1973	Rural Work
	6,938	1981	National Environmental Policy
	8,171	1991	Agricultural Policy
	9,393	1996	Rural Property Tax (ITR)
	9,433	1997	National Policy on Water Resources
	9,985	2000	National System of Nature Conservation Units

Continue >>>

>>> Continuation

TABLE 10 – REGULATIONS THAT GOVERN SUSTAINABLY MANAGED NATURAL FOREST OPERATIONS			
Legislation	Number	Year	Content
Lei	10,650	2003	National Environmental System
	11,284	2006	Management of public forests for sustainable production
	12,187	2009	National Policy on Climate Change (PNMC)
Decree	24,643	1934	Water Code
	3,420	2000	National Program for Forests (PNF)
	5,795	2006	Commission for the Management of Public Forests
	5,975	2006	Regulations of the National Environmental Policy
	6,040	2007	Traditional Peoples and Communities
	6,063	2007	Management of public forests for sustainable production
	6,514	2008	Environmental infractions and administrative sanctions
	6,874	2009	Community-based and Family-based Forest Management
CONAMA Resolutions	406	2009	Sustainable Forest Management Plans in the Amazon
SFB Resolutions	2	2007	National Registry of Public Forests
	4	2008	National System of Permanent Forest Plots (SisPP)
	5	2011	Bidding process for federal forest concessions

Source: Imazon.

## 3.2 The Forest Code

The primary topics treated by the Forest Code (Law 4,771/1965) are Permanent Preservation Areas (APP) and Legal Reserves.

### 3.2.1 Permanent Preservation Areas (APP)

Permanent Preservation Areas (APP) are protected areas that serve to preserve water resources, landscapes, geological stability, biodiversity, genetic flow of plants and animals, and soils, and ensure the well-being of the human population.

These protected areas are those located: (i) along rivers or other bodies of water; (ii) around lakes, ponds, or natural or artificial reservoirs; (iii) around springs; (iv) at the tops of hills, mountains, or ridges; (v) on the slopes of hills, mountains, or ridges; (vi) in coastal areas, to stabilize dunes and mangroves; (vii) along the edges of table mountains; (viii) at elevations above 1,800 meters. It is not permitted to use forest resources in APPs, and alterations to their vegetation are only authorized when judged to be in the public interest.

### 3.2.2 Legal Reserves

A Legal Reserve is defined as an area located within a rural property or landholding, not including permanent preservation areas, which are vital for: (i) the sustainable use of natural resources; (ii) the preservation and recuperation of ecological processes; (iii) the conservation of biodiversity; (iv) sheltering and protecting the natural flora and fauna. Managed natural forest areas must always be Legal Reserves. Sustainable forest management is only permitted in these areas, as long as the management plan is approved by the government.

Brazil's Forest Code mandates that lands identified as Legal Reserves should occupy: (i) at least 80% of the rural properties covered with Amazonian Forest located in the Amazon Region; (ii) at least 35% of the rural properties covered with Cerrado located in the Amazon Region; (iii) at least 20% of the rural properties located in other regions of Brazil.

### 3.3 Sustainable Forest Management Plan (PMFS)

The Sustainable Forest Management Plan (PMFS) is the technical document that presents the guidelines and procedures to be followed during the management of a forest. Utilizing forests and recovering forest formations under sustainable forest management requires prior approval of the PMFS by the environmental agency, regardless if the forests are public or private.



Photo: STCP

The PMFS must: (i) describe the physical and biological landscape; (ii) determine the existing timber stock; (iii) guarantee that the planned harvest intensity is compatible with the forest's regeneration capacity; (iv) guarantee that the planned cutting cycle is compatible with the time necessary to regenerate the volume of timber extracted from the forest; (v) guarantee the promotion of natural regeneration in the forest; (vi) demonstrate appropriate

silvicultural and harvest systems, monitoring of remnant forest development, and mitigation of environmental and social impacts.

According to the PMFS norms currently applied in Brazil regarding Amazonian Forests, the cutting cycle for forests under sustainable management must be of at least 25 years, with a maximum harvest of 30 m<sup>3</sup>/hectare/year. The approval of a PMFS provides the plan's owner with an environmental license to practice sustainable forest management. The owner must then file an Annual Operation Plan (POA) with the environmental agency and provide annual reports describing the area under sustainable forest management, the operations undertaken, and the effective volume harvested during the previous 12 months.



## 4 BUSINESS PRACTICES FOR SUSTAINABLE DEVELOPMENT

### 4.1 Sustainable forest management

Sustainable Forest Management (SFM) is the management of forests for economic and social benefits, while respecting the mechanisms that sustain the ecosystem under management. SFM is intended to operate in such a way that forests provide increasing economic, ecological, and social benefits deriving from high-quality forestry operations.



Photo: STCP

In broader terms, SFM is a tool for using forests without the risk of ecological, economic, or social losses, thereby ensuring the long-term availability of resources for future generations. A crucial requirement before a Sustainable Forest Management Plan (PMFS) can be put into practice, whether or not the final product is timber, is that managers adopt silvicultural techniques appropriate for the areas under management, in order to guarantee long-term productivity, preserve the flora and fauna, and minimize harvest impacts.

SFM practices result in lower environmental impacts, thereby ensuring that a logged forest can continue to develop and grow like a natural forest. Reduced Impact Harvest (RIH) also offers additional benefits such as reduced waste, lower levels of damage to unlogged trees, increased operational efficiency, and higher profitability accruing from all of the above benefits.

In the Brazilian Amazon, the Forest sector finds itself in a paradoxical situation. On one hand, the industry suffered the most serious crisis in its history following the cancellation of hundreds of PMFS's, largely due to land titling problems, which had serious socioeconomic consequences for the region. On the other hand, the recent passage of the Law of Public Forest Management represents a unique opportunity for large-scale reform of the forest industry, provides an important incentive for adopting modern forest management practices, and recognizes companies that have respected legal regulations and carried out their operations in harmony with the long-term maintenance of natural resources.

Against the background of long-standing conflicts regarding land titling problems, more and more forest companies have taken steps to ensure that their operations are entirely lawful, by drawing up effective management plans and developing improved management techniques that are suitable to the special conditions in the Amazon. This constant innovation has won these companies increasing respect on the Brazilian and international markets, with the result that they now represent models of sustainable practices in timber production.

## 4.2 Principal advances in technology, innovation, and management incorporated into timber production

Motivated by the demands of the market and by the increasing global interest in investing in sustainable production, the forest industry has continued to modernize its operations in order to achieve production models that are economically, environmentally, and socially sustainable.

Given that much of the industry's technology was first installed in the 1980s, many companies are now making an effort to transform their operations with higher-precision equipment and more efficient harvest practices. Guided by Brazil's current forest legislation, the country's forest companies are continuously adapting to market demands, feeding a virtuous circle of high production efficiency, technological innovation, and sustainable practices.

## CASE STUDY 1 – GUA VIRÁ

The Guavirá company, founded in 1986 as a single small sawmill, is today one of the largest single line sawmill operations for tropical timber in Brazil. The company's growth accelerated in the late 1980s and early 1990s, following the construction of two new small industrial plants. In those years, Guavirá's industrial plants relied on simple technology and had a low level of mechanization and automation, and these factors limited product quality and operational efficiency.

Following a company review in 1997, Guavirá decided to restructure its operations from top to bottom. The decision allowed the company to transform its primary processing unit, invest in secondary processing, and set itself the goal of reaching the international market. Making these changes required a new, more efficient approach to primary processing and industrial operations.

The primary motives that led the company to invest in these changes were a reduction in costs, an increase in production and productivity, and the implementation of improvements in general conditions of the work environment, including a new focus on worker health and safety. The company concentrated its resources into one high-capacity, high-tech primary processing unit, and another unit for the secondary processing of raw material.

Meeting the company's objectives not only increased Guavirá's competitiveness in the Brazilian market, but also added value to its products and provided its entry into the international market. Additional gains came from a reduction in the use of raw materials, a reduction in the volume of waste, and the construction of an energy plant that generated energy from the waste wood produced as a by-product of the production units.

### 4.3 Information-sharing initiatives and transparency regarding the social and environmental impacts of forestry

Initiatives to share and publicize information about the sustainably managed natural forest industry are typically led by private companies or organizations with an interest in maintaining the sector's public image and documenting its dedication to environmental conservation. In addition to sharing institutional information and publishing promotional folders that describe the daily operations of the forest industry and forest companies' constant drive towards sustainability, companies have also supported initiatives that are not focused on the forest industry but also encompass allied sectors such as the civil construction, agricultural and livestock management, and processing industries. The Ação Verde (Green Action) Institute was created precisely to address such communication challenges.

#### *CASE STUDY 2 – THE AÇÃO VERDE INSTITUTE*

The Ação Verde Institute is a non-governmental, non-profit organization whose mission is promoting a balance between environment, social well-being, and economic production.

With a primary focus on balancing environmental and industrial interests in the state of Mato Grosso, the Institute helps promote, implement, and certify activities in productive sectors of the economy. Together with the forest industry and other allies, the Institute helps publicize information, encourage best practices among companies, and champion the restoration of degraded lands. With its portfolio of communication projects, the Ação Verde Institute has succeeded in transmitting its message of growth and sustainable development to a broad audience.

Since its establishment in 2007, which brought together representatives of industry, agriculture, livestock management, energy, and forestry, the Institute has published a steady stream of economic news on its website, as well as leading projects focused on sustainable development and the distribution of information about the social and environmental performance indicators of economic activities.

In order to further increase commitment to sustainable development in companies across Mato Grosso, the Institute developed a project focusing on environmental consciousness. The project included activities to mobilize both members of the forest industry and those of other industries in the state. After leading 9 workshops on the topic, the Institute carried out a research project to measure the strength of environmental consciousness in the state's businesses and published a booklet titled "Information for the Environmentally Correct Businessmen", which includes tips on environmental legislation, legal obligations, and sustainable development. This booklet continues to be distributed to businessmen working in various sectors of the economy across Mato Grosso state.

## 4.4 Certification and self-policing initiatives developed by the forest sector

Sustainable Forest Management (SFM) includes a number of activities that reflect a constant effort to improve forest management practices. This includes monitoring of forest growth and natural regeneration, tracking of timber volume, estimates of the number of trees that will be managed over a planning horizon of approximately 30 years, and studies to determine the final destination of harvested wood.



In recognition of the careful monitoring carried out by companies whose production is based on SFM, the global market currently endorses two large-scale certification systems for forestry, encompassing both production and the chain of custody of operations: the Forest Stewardship Council (FSC), which has a global reach, and the Brazilian Program of Forest Certification (CERFLOR), a national program that has been internationally recognized by the Program for the Endorsement of Forest Certification (PEFC). Both evaluate

the operations and behavior of forest companies against a set of ecological, social, and economic guidelines.

The Brazilian Council of Forest Management (FSC Brazil), through independent certification organizations, evaluates the extent to which forestry ventures operate in line with FSC principles and criteria. The evaluation process is divided into five different steps, each of which analyzes a certain aspect of the forest operation. The FSC seal of certification is not conferred by the Council, but rather by the certifying organizations responsible for the evaluation of the forest management operations and the chains of custody. Between 1997 and 2007 only 13 privately owned Brazilian companies obtained FSC certification for forestry operations in natural forests. Of the roughly 2.7 million hectares of natural forests that have been certified, 1.5 million hectares (56%) are accounted for by a single site: the Kayapó Community in the Baú Indian Territory (TI-BAÚ), located in Altamira (PA), as shown in Table 11.

<b>TABLE 11. PRINCIPAL NATURAL FOREST AREAS UNDER FSC-CERTIFIED SUSTAINABLE MANAGEMENT IN THE BRAZILIAN AMAZON (2010)</b>			
<b>Company</b>	<b>Township</b>	<b>Year of Certification</b>	<b>Certified Area (ha)</b>
Kayapó Community in the Baú Indian Territory (TI-BAÚ)	Altamira (PA)	2006	1,543,460
ORSA Florestal	Almeirim (PA)	2004	545,335
CIKEL Brasil Verde	Paragominas (PA)	2006	256,614
PRECIOUS WOOD Amazon	Itacotiara (AM)	1997	128,729
Indústria de Madeiras MANOA	Cujubim (RO)	2005	73,079
FUNTAC	Bujari (AC)	2005	47,061
JURUÁ Florestal	Novo Repartimento (PA)	2002	30,652
Others			88,334
<b>TOTAL</b>			<b>2,713,264</b>

Source: FSC (2011).

The Brazilian Program of Forest Certification (CERFLOR) was developed within Brazil's National System of Industrial Metrology, Standardization, and Quality (SINMETRO). Its main executive body is the National Institute of Industrial Metrology, Standardization, and Quality (INMETRO), the official certifying body of the Brazilian government.



CERFLOR began to regulate operations in the sustainably managed natural forests industry five years after FSC began working with that sector of the Brazilian forest industry. The Brazilian Association of Technical Norms' (ABNT) NRB regulation 15789, which established guidelines, criteria, and indicators for the sustainable management of natural forests, was drafted as part of a partnership with various stakeholders in the forest sector.

As part of a project of the International Tropical Timber Organization (ITTO) in partnership with the Brazilian Association of the Mechanically Processed Wood Industry (ABIMCI), the National Institute of Industrial Metrology, Standardization, and Quality (INMETRO), and ABNT, norms for managing natural forests were drafted and pilot programs to test them carried out.

These pilot programs to test norms for Sustainable Forest Management in natural forests were carried out in partnership with two forest companies that had already oriented their operations towards sustainable management. In 2003 the tests were carried out together with Cikel Brasil Verde S.A., a company whose forest management operations are located in Paragominas (PA), and the Indústria de Madeiras Manoa Ltda., which had a forest management project in Cujubim (RO). In 2007, Manoa was awarded the CERFLOR seal of approval for its operations in sustainably managed natural forests.

### CASE STUDY 3 – MANOA



Photo: Manoa

Created in 1983 by the Grupo Triângulo, following its acquisition of 73,000 hectares of tropical natural forests in the township of Cujubim (RO), the Manoa company has long been a pioneer in the adoption of Sustainable Forest Management practices in Brazil. In addition to supplying tropical timber to roughly 20

regional companies, the company also processes raw material in its own industrial plant, which has an annual production capacity of 21,600 m<sup>3</sup>. The plant's output is then transported to the Grupo Triângulo's flooring and deck factory in Curitiba (PR).

Following years of research aimed at developing efficient forest management techniques, in 1994 the company had its first Sustainable Forest Management Plan approved by IBAMA—the first management plan approved for Amazonian operations.

Over the next few years local forest workers were selected and trained in new methods focused on sustainability, and in 1998 sustainable forest management operations began.

In the following years Manoa continued to improve its forest management practices, and in 2005 its efforts were recognized by FSC, which provided its seal of approval for the company's Sustainable Forest Management (SFM) and Chain of Custody operations. Two years later, in 2007, motivated by an interest in the Brazilian system of forest certification, the company's SFM operations were certified by the Brazilian Program of Forest Certification (CERFLOR). These breakthroughs reaffirmed Manoa as a true pioneer in the industry, making it the first Brazilian company to obtain two certifications for the same forest operation.

The Triângulo Pisos e Painéis Ltda. company's industrial unit in Curitiba has an annual production capacity of approximately 1.6 million m<sup>2</sup>, and is supplied by its partner plant in Cujubim. Products made by the Grupo Triângulo are currently exported to 16 countries that require best practices in environmental management, preferentially corroborated via independent certification, as prerequisites for the establishment of trade relations.





## 5 CHALLENGES AND OPPORTUNITIES FOR THE FOREST SECTOR ON THE ROAD TO SUSTAINABILITY

### 5.1 Challenges

The primary challenges for Brazil's forest sector are: (i) the low technical capacity of the governmental agencies, which leads to problems such as delays in the approval of management plans, (ii) lack of skilled labor, due to low governmental investments in education; (iii) weak or absent infrastructure, which increases production costs and weakens competitiveness; and (iv) legal uncertainties, primarily due to titling problems that affect most Amazonian lands.

#### 5.1.1 Weak Technical Capacity of Government Agencies

The weak technical capacity of government agencies is primarily the result of low investment in information technology and in training government employees. In addition, the regulations that concern the forest sector are in large part both seriously outdated and technically weaker than those applied in developed countries.

A large number of government institutions oversee the forest sector under a large number of overlapping government policies. There is little coordination between these institutions, which leads to a duplication of efforts in some areas and no efforts in others. The lack of synergy between institutions and policies is the result of weak investment in information technology and organization. Agencies have postponed such investments while continued to hire more staff, many of whom are poorly trained in forestry issues, and are neither productive nor effective due to their lack of appropriate tools and knowledge.

The situation calls for a government initiative to restructure these institutions and regulations, a move that would improve the business climate of sustainable forest management and attract more investments to the sector.

### 5.1.2 Shortages of Skilled Labor

The shortage of skilled labor is a serious problem in the Amazon. The low capacity of workers is a major barrier for Amazonian companies interested in improving the quality of their products. The region still lacks a sufficient number of technical schools that can train workers. The overall level of education remains poor, and worker training is typically carried out by the private companies themselves. A lack of training in business administration is also an important obstacle for the further development of the forest sector.

### 5.1.3 Infrastructure

Brazil's Amazonian region has the poorest infrastructure of the entire country, and this has serious consequences for the region's development. Urgent infrastructure needs include investments for public health, education, energy, and transportation. In the energy sector, the national government is currently investing in the incorporation of the Amazonian region into Brazil's National Integrated Electrical Energy System (SIN), via the construction of large transmission lines in all of the country's Amazonian states. At the same time, large hydroelectric plants are currently being constructed in the Amazonian region, at sites including Belo Monte (PA), Jirau (RO), and Santo Antonio (RO).

In the transportation sector, a key project is the Tucuruí locks, in the state of Para, which is a critically important step towards increasing the competitiveness of companies throughout the Tocantins watershed. This waterway will link the northern and mid-western regions of Brazil with the Atlantic Ocean via one of the most cost-competitive methods for transporting cargo.

### 5.1.4 Legal Uncertainties

The lack of clear land titling is one of the most critical barriers to the development of the Brazilian Amazon, since production efficiency depends to a large extent on clear land titles. The reason is that raw materials are primarily extracted from lands, and these lands must have clear titles if the origin of the extracted raw-material is to be legal. Land titling is the exclusive responsibility of the government. However, it is estimated that just 20% of properties in the Brazilian Amazon have been titled to date by the federal government.

## 5.2 Trends

The leading trends in the forest industry revolve around environmentally sustainable technologies, knowledge, and political policies, including: (i) increasing scientific know-how; (ii) a growing role for traditional forest knowledge; (iii) high-precision forest management; (iv) integrated information management systems; (v) sustainable forest management practices; (vi) new technologies in silviculture, harvest, and processing; (vii) recycling programs for wood products; and (viii) wood-based energy production.

### 5.2.1 Scientific Know-How

The knowledge and experience generated by Sustainable Forest Management practices allow companies to develop and apply technical improvements in timber extraction that benefit both production and environmental preservation. This know-how also improves the public's perception of the costs and benefits of the forest industry. The primary incentives for applying technical improvements of sustainable forest management are:

- i. Long-term production: sustainable management practices ensure timber production in a given forest for the foreseen future;
- ii. Profitability: sustainable management generates economic benefits that outweigh the costs, largely due to increased worker productivity and reduced waste;
- iii. Workers Safety: the rate of work-related accidents declines with the sustainable use of forests, compared to conventional logging operations;
- iv. Respect for the Law: because sustainable management is required by law, managing forests under other schemes exposes companies to a variety of sanctions;
- v. Market Opportunities: the international market's demand for certified wood means that companies with sustainable management operations have easier access to markets in developed countries;
- vi. Forest Conservation: sustainable management guarantees forest cover, which maintains the original plant diversity and reduces environmental impacts on animals, when compared to conventional logging;
- vii. Environmental Services: sustainably managed forests help maintain a balance in regional and global climate, primarily because they preserve the water cycle and maintain carbon stocks.

## 5.2.2 Traditional Forest Knowledge

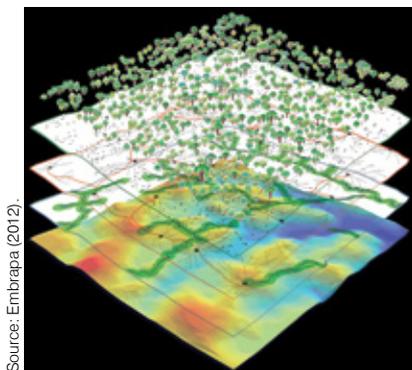
Traditional knowledge includes a vast and varied range of insights relevant to forestry, including: (i) techniques for managing natural resources, and (ii) knowledge of a broad range of ecosystems. From the late 20<sup>th</sup> century onwards, traditional knowledge has been increasingly valued by science and technology for its contribution to developing new technologies and its strong potential for generating sustainable economic returns.

The Convention of Biological Diversity (CBD) establishes that many local communities and indigenous peoples with traditional lifestyles depend to a large extent on natural resources, and that it is important to share fairly any benefits derived from the use of traditional knowledge, including innovations and practices relevant to the conservation of biological diversity, and the sustainable use of plants and animals. In Brazil, this has led directly to the creation of a normative framework that ensures the rights of traditional societies to their traditional knowledge of biodiversity.

## 5.2.3 High-Precision Forest Management

Remote sensing technology allows high-resolution topographic mapping of properties and forest inventories based on direct measurements of forest height, density, and structure. In turn, information on terrain and timber stocks permit foresters to draft very precise plans for silviculture, harvest, skidding, and transport, resulting in a dramatic reduction of operational costs, because operational plans are better prepared and monitoring is more precise.

Another technological innovation in high-precision management is based on Digital Forest Models, which integrate Global Positioning Systems (GPS), Geographic Information Systems (SIG), and Remote Sensing (SR) in order to plan, execute, and monitor forest management operations with a high level of precision. These tools allow managers to explore with computer software the spatial aspects of the forest they are managing. A complete management plan database may include the locations of trees and springs, streams, permanent preservation areas (APPs), contour lines, and terrain, as well as other key data.



Source: Embrapa (2012).

Digital Forest Models allow a micro-zoning of the area under management, and are capable of generating maps down to a scale of 1.15 meters. This makes it possible to draft operational plans that take into consideration a broad range of environmental features of the landscape, leading to lower impact in logging operations and increased productivity due to faster forest regeneration, which also tends to increase timber volume and benefit biodiversity over the long term.

## 5.2.4 Integrated Information Management Systems

Integrated Information Management Systems (SGI), a feature of Enterprise Resource Planning (ERP), is increasingly popular among companies active in the Brazilian market. ERP automates a company's operations, with the goal of integrating information throughout the organization, thereby eliminating complicated and expensive mechanisms to link company databases that were not designed to work together. Under ERP, information on all of an organization's processes is stored in the same system and the same environment. These systems are an outgrowth of Material Requirements Planning (MRP) and Manufacturing Resource Planning (MRP II), and aim to integrate business processes. ERP allows sectors such as sales, marketing, production, logistics, accounting, tax management, and human resources to work together in an integrated fashion. This provides benefits such as reductions in activities that offer no added value, overtime hours, and even employees. ERP also offers intangible benefits, such as greater client satisfaction due to the speed and precision with which information is available, and greater confidence in decision-making.

## 5.2.5 Sustainable Forest Management Practices

Sustainable Forest Management (SFM) is a tool for using forests without the risk of ecological, economic, or social losses, thereby ensuring the long-term maintenance and improvement of forest resources for future generations. A crucial requirement before a Sustainable Forest Management Plan (PMFS) can be put into practice, whether or not the final product is timber, is that managers adopt silvicultural techniques appropriate for the areas under management, in order to guarantee long-term productivity, preserve the flora and fauna, and minimize harvest impacts.

Sustainable Forest Management practices, such as Reduced Impact Harvests (RIH), result in lower environmental impacts, thereby ensuring that a logged forest can continue to develop and grow like a natural forest. In addition to reducing ecological impacts, RIH's offer benefits such as reduced waste, lower levels of damage to unlogged trees, increased operational efficiency, and higher profitability accruing from all of the above benefits.

## 5.2.6 Processing Technologies

The mechanical processing of timber is one of the most important stages in the use of logs, since it is this stage that reveals whether all of the previous activities, from management planning through log harvest and transport, are economically viable or not.

For many years, conventional practices in sawmills made poor use of tropical timber logs, wasting valuable raw material and creating large amounts of waste that was disposed of by burning.

In searching for a solution that would maximize the potential of raw material, companies and researchers adapted a technology used in forest plantations, where logs have standard dimensions. Under this new model, the dimensions of each log are measured before it enters the cutting line, so that sawing can be planned to maximize the usable portions of logs based on their shape and size.

## 5.2.7 Recycling of Wood Products

All industrial processes create wastes, and how those wastes are disposed of can make an important difference in terms of sustainable production. In the forest industry, wastes typically consist of sawdust and wood chips. In sawmills that process timber from natural forests, waste may also include logs that are discarded because of irregular density or dimensions.

The most common use of sawdust and wood chips is generating energy for the very industries that generate the waste, but this is not the only possible disposal method. The sale of waste wood products for energy production or processing at other sites is also a growing business. As one example of the versatility of wood product recycling, some companies that produce Medium Density Fiberboard (MDF) use sawdust waste from industrial processes as a raw material for their large-scale production units.

At a slightly smaller scale, some companies produce boards, panels, and decorative inserts from wood chips and natural forest logs rejected by sawmills. These value-added products are sold on the national and international markets, where they have been highlighted by professional decorators as unique, high-quality consumer products that are also a prime example of sustainable development.

## 5.2.8 Wood-Based Energy Generation

Growing global demand for energy and the limitations of fossil fuels have driven a search for new sources of energy, and this has led to a growing market of energy generation based on forest biomass. Brazilian law mandates that the wastes generated by the industrial processing of timber must be used in an economically valuable fashion. Generating energy with these wastes increases the profitability of forest-related businesses. Using this biomass not only ensures that industrial processing wastes are disposed of safely and with a low environmental impact, but also reduces consumption of traditional fuel sources. Biomass is transformed in electric power plants and the final product returned to power a portion of industrial processes, or even sold on the energy market.

Photo: Central Wood Pellets



Over the last decade, the Brazilian forest industry began to produce wood pellets and briquettes, both for companies' internal use and to sell on the national and international markets. Pellets consist of sawdust that is compacted at high pressure and temperature, while briquettes are made by compacting sawdust, wood chips, and other forest biomass.

Both products are typically cylindrical or rectangular in shape, come in varying dimensions, and have a high density and calorific value per unit weight (between 4,000 and 4,500 kcal/kg). Currently, the majority of pellets and briquettes produced are composed of wood from forest plantations, but studies have shown that industrial wastes of natural species harvested legally can also be used the same way, especially given the high density and calorific value of tropical timber species.

Pellets are typically used to generate energy in industry, while briquettes are destined for a range of domestic (fireplaces and wood stoves) and industrial uses (energy generation and heating of boilers).

## 5.3 Opportunities

The primary opportunities for the sustainably managed natural forests industry concern the role of forests in mitigating climate change. The growth of forests, in both land cover and volume, is the most practical, natural, and efficient method of mitigating climate change. For this reason, governments are increasingly adopting policies to pay forest managers for the environmental services standing forests provide, via mechanisms such as the REDD (Reduced Emissions from Deforestation and Degradation). Likewise, taxes may increasingly focus on products that emit Greenhouse Gases (GHG), a policy trend that will increase the competitiveness of forest products, which are capable of generating negative emissions (i.e., absorbing) of GHG's.

### 5.3.1 REDD

With the goal of reducing deforestation and forest degradation, the REDD mechanism was developed as a tool to leverage Payments for Environmental Services (PES) offered by forests. Underlying REDD is an intention to reduce the emissions of carbon dioxide caused by the destruction and degradation of natural forests, by providing financial incentives for the owners and managers of forests to preserve them.

There are currently two programs that use the REDD mechanism to establish funds to maintain and increase forest cover in developing countries: UN-REDD, an initiative of the United Nations, and REDD+, an initiative of the developed countries. Both have created funds, such as the Amazon Fund (sponsored by the Norwegian and German governments), with the goal of making payments for environmental services a mechanism for increasing the value of standing forests, thereby avoiding their conversion to pastureland and agriculture.

In Brazil, work on REDD has focused on preparing the country to receive resources based on this new model of forest financing. The primary problem is the poor state of land titling for most forested land in Brazil. For this reason, the Amazon Fund is currently sponsoring land titling initiatives in selected areas of the Amazon, as part of the "Terra Legal Amazonia" Program of the Brazilian Ministry of Agrarian Development (MDA).

Following the conclusion of this first requirement for establishing payments, the Brazilian government faces the challenge of establishing the specific conditions under which REDD will operate in the country. This requires establishing financing initiatives, defining standard procedures and definitions, creating monitoring, communication, and verification methods, and establishing mechanisms that ensure the inclusion of indigenous peoples in the program.

### 5.3.2 Greenhouse Gas Taxes

Another mechanism developed to provide payments for environmental services provided by companies are Greenhouse Gas (GHG) Taxes, an outgrowth of discussions on Carbon Taxes and Ecological Footprints. GHG Taxes are a mechanism under which any product produced by a company, from food to automobiles, is taxed at a rate proportional to the quantity of greenhouse gases that will be emitted during the product's lifetime, including its production and use.

In addition to providing an incentive for sustainable production, this system allows companies that emit fewer GHG to pay fewer taxes, thereby increasing their competitiveness. Reaching agreements on the specific methods for determining the values of such taxes and their relationship with existing taxes still require more detailed studies, especially studies to define a standard methodology for measuring the quantity of gases that are emitted and sequestered by individual activities.





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