# ABRAF STATISTICAL YEARBOOK 2008

Base Year 2007

ABRAF
Associação Brasileira
de Produtores de
Florestas Plantadas

A849a ABRAF.
Abraf Statistical Yearbook 2008 : base year 2007 /
ABRAF. -- Brasília, 2008.

90p. : 21 cm

1.Forest Sector. 2. Planted Forest.
3. Statistical Indicators. I. Brazilian Association
of Forest Plantation Producers. II. Title.

CDU 630:31(058)

**ISSN 1980-8550**

Number of copies: 1,000
This edition is accompanied by a CD containing the following digital files in PDF:
Yearbook 2008 – Base Year 2007 (Portuguese and English version)
Yearbook 2007 – Base Year 2006 (Portuguese and English version)
Yearbook 2006 – Base Year 2005 (Portuguese and English version)

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# ABRAF STATISTICAL YEARBOOK 2008

Base Year 2007

# Prefaces

The Brazilian Association of Forest Plantation Producers (ABRAF) renews its contribution to the planted forest sector with the launching of the 2008 ABRAF Yearbook - Base Year 2007. The Yearbook compiles and disseminates statistics on a wide range of topics on the forest-based chain for the year 2007, confirming its relevance to the national economy.

The current cycle of expansion of pulp and paper, wood panels and charcoal-based iron and steel industries follows the retaking of the development of industrial activity in Brazil within the current cycle of the national economy growth.

Nevertheless, the analysis of the data collected relative to 2007 shows that the increase in timber demand from planted forest, resulted from the increase in the demand by timber processing industries. Timber has been supplied not only by the expansion of the companies´ own land areas but also by increasing productivity of planted forests of ABRAF member companies, and by increasing outgrower schemes and special contract/leasing with small and medium-sized rural producers.

This benefit sharing is strengthened by other activities promoted under the social responsibility of ABRAF member companies in areas such as education, health care, social and environmental programs in the municipalities and regions of interest, which are maintained, renewed and expanded every year.

This edition includes a section on the analysis of carbon market and the role of planted forest in the context of global climate change, considering the contribution of planted forest to the carbon fixation in compensation to the emissions of greenhouse effect gases.

Additionally, other two relevant themes covered in the present edition are: the increasing interest of foreign investors in forest undertakings in Brazil through the Timber Investment and Management Organizations (TIMOs); and, the programs for expansion of planted forest area for charcoal-based iron and steel production, preventing the use of timber from natural forests.

In order to keep the technical accuracy on data collection, processing and analysis, the 2008 Yearbook proceeds to necessary adjustments or amendments of the data of the previous editions, aiming to improve the quality of collected information to expand the dissemination and development of the planted forest sector.

Brasília, 1 April 2008
Fernando Henrique da Fonseca
President of ABRAF

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# List of Acronyms

## List of Units

| | |
|---|---|
| # | Number |
| § | Paragraph |
| % | Percentage |
| $CO_2$ | carbon dioxide |
| ha | Hectare |
| $m^3$ | Cubic meter |
| $m^3$/year | Cubic meter per year |
| $m^3$/ha.year | Cubic meter per hectare per year |
| MDC | Cubic meter of charcoal |
| R$ | Brazilian Real (R$) |
| t | Ton |
| US$ | United States Dollar ($) |

## List of Abbreviations

| | |
|---|---|
| ABAF | Forest Plantation Producers Association of Bahia (*Associação de Produtores de Florestas Plantadas do Estado da Bahia*) |
| ABIMCI | Brazilian Association of Mechanically Processed Timber Industry (*Associação Brasileira da Indústria de Madeira Processada Mecanicamente*) |
| ABIMÓVEL | Brazilian Association of the Furniture Industry (*Associação Brasileira das Indústrias do Mobiliário*) |
| ABIPA | Brazilian Association of Wood Panel Industry (*Associação Brasileira da Indústria de Painéis de Madeira*) |
| ABRAF | Brazilian Association of Forest Plantation Producers (*Associação Brasileira de Produtores de Florestas Plantadas*) |
| ACR | Forest Companies Association of Santa Catarina (*Associação Catarinense de Empresas Florestais*) |
| AGEFLOR | Forest Companies Association of Rio Grande do Sul (*Associação Gaúcha de Empresas Florestais*) |
| ALICEWEB | Foreign Trade Information Analysis System (*Sistema de Análise das Informações de Comércio Exterior via Internet*) |
| AMS | Silviculture Association of Minas Gerais (*Associação Mineira de Silvicultura*) |
| APP | Permanent Preservation Area (*Área de Preservação Permanente*) |
| APRE | Forest Companies Association of Paraná (*Associação Paranaense de Empresas Florestais*) |
| AREFLORESTA | Forest Plantation Producers Association of Mato Grosso (*Associação dos Reflorestadores do Estado de Mato Grosso*) |
| ASICA | Pig-Iron Producers Association of Carajás (*Associação dos Produtores de Ferro Gusa do Carajás*) |
| BASA | Bank of Amazonia (*Banco da Amazônia*) |
| BB | Bank of Brazil (*Banco do Brasil*) |
| BNDES | National Economic and Social Development Bank (*Banco Nacional de Desenvolvimento Econômico e Social*) |
| BRACELPA | Brazilian Pulp and Paper Association (*Associação Brasileira de Celulose e Papel*) |
| CAGED | Labor Registry of Employed and Unemployed Workforce (*Cadastro Geral de Empregados e Desempregados*) |
| CCX | Chicago Climate Exchange (*Bolsa do Clima de Chicago*) |
| CDM | Clean Development Mechanisms |
| CEPA | Institute of Harvest and Market Study Center (*Centro de Estudos de Safras e Mercados - Santa Catarina*) |
| CEPEA | Center for Advanced Studies on Applied Economics (*Centro de Estudos Avançados em Economia Aplicada - USP*) |
| CEPEF | Center for Forestry Studies and Research - Federal University of Santa Maria (*Centro de Pesquisas Florestais - UFSM*) |
| CERFLOR | Brazilian Program of Forest Certification (*Certificado Nacional de Qualidade Ambiental de Florestas*) |

# List of Acronyms

## List of Abbreviations

| | |
|---|---|
| CNA | Brazilian Agricultural and Livestock Confederation (*Confederação da Agricultura e Pecuária do Brasil*) |
| CNI | National Confederation for Industry (*Confederação Nacional da Indústria*) |
| COFINS | Contribution for Social Security Financing (*Contribuição para o Financiamento da Seguridade Social*) |
| COP | Conference of the Parties (*Conferência das Partes*) |
| CPMF | Temporary Federal Tax on Financial Movement (*Contribuição Provisória sobre Movimentação Financeira*) |
| EAP | Economically Active Population |
| ECX | European Climate Exchange (*Bolsa Européia do Clima*) |
| EGP | Edge Glued Panel |
| EMATER-MG | Technical Assistance and Rural Extension Company of Minas Gerais |
| EMBRAPA | Brazilian Agricultural Research Corporation (*Empresa Brasileira de Pesquisa e Agropecuária*) |
| EPAGRI | State Agricultural Research and Extension Organization (*Empresa de Pesquisa Agropecuária e Extensão Rural - Santa Catarina*) |
| ESALQ | Luiz de Queiroz College of Agriculture (*Escola Superior Luiz de Queiroz - USP*) |
| FAO | Food and Agriculture Organization of the United Nations |
| FCO | Constitutional Fund for Financing of the West Central (*Fundo Constitucional de Financiamento do Centro-Oeste*) |
| FJP | João Pinheiro Foundation (*Fundação João Pinheiro*) |
| FNE | Constitutional Fund for Financing of the Northeast (*Fundo Constitucional de Financiamento do Nordeste*) |
| FNO | Constitutional Fund for Financing of the North (*Fundo Constitucional de Financiamento do Norte*) |
| FSC | Forest Stewardship Council |
| FUPEF | Forest Research Foundation of Paraná (*Fundação de Pesquisa Florestal do Paraná of the Federal University of Paraná*) |
| GDP | Gross Domestic Product |
| GPV | Gross Product Value (*Valor Bruto da Produção*) |
| GFPV | Gross Forest Product Value (*Valor Bruto da Produção Florestal*) |
| GVIP | Gross Value of Industrial Product (*Valor Bruto da Produção Industrial*) |
| HDI | Human Development Index |
| HDI-M | Municipal Human Development Index (*Índice de Desenvolvimento Humano Municipal*) |
| IAP | Environmental Institute of Paraná (*Instituto Ambiental do Paraná*) |
| IBAMA | Brazilian Institute for Environment and Natural Renewable Resources (*Instituto Brasileiro do Meio Ambiente e dos Recursos Naturais Renováveis*) |
| IBGE | Brazilian Institute of Geography and Statistics (*Instituto Brasileiro de Geografia e Estatística*) |
| IBPT | Brazilian Institute of Tax and Corporate (*Instituto Brasileiro de Planejamento Tributário*) |
| ICMS | Tax over Circulation of Goods and Services (*Imposto sobre Circulação de Mercadorias e Serviços*) |
| IDB | Inter-American Development Bank |
| IEF | State Forestry Institute of Minas Gerais (*Instituto Estadual de Florestas - Minas Gerais*) |
| INCAPER | Research, Technical Assistance and Rural Extension Institute of Espírito Santo (*Instituto Capixaba de Pesquisa, Assistência Técnica e Extensão Rural*) |
| IOF | Federal Tax on Financial Transactions (*Imposto sobre Operações Financeiras*) |
| IPEA | Instituto de Pesquisa Econômica Aplicada |
| IPEF | Forestry Science and Research Institute (*Instituto de Pesquisas e Estudos Florestais - ESALQ*) |
| IRPJ | Corporate Income Tax (*Imposto de Renda de Pessoa Jurídica*) |
| ISS | Municipal Service Tax (*Imposto Sobre Serviços de Qualquer Natureza*) |
| ITR | Federal Rural Property Tax (*Imposto sobre a Propriedade Territorial Rural*) |
| ITTO | International Tropical Timber Organization |

# List of Acronyms

## List of Abbreviations

| | |
|---|---|
| MAI | Mean Annual Increment |
| MAPA | Ministry of Agriculture, Livestock and Supply (*Ministério da Agricultura, Pecuária e Abastecimento*) |
| MDA | Ministry of Agrarian Development (*Ministério do Desenvolvimento Agrário*) |
| MDF | Medium Density Fiberboard |
| MDIC | Ministry of Development, Industry and Foreign Trade (*Ministério do Desenvolvimento, Indústria e Comércio Exterior*) |
| MDP | Medium Density Particleboard |
| MIN | Ministry of National Integration (*Ministério da Integração Nacional*) |
| MMA | Ministry of the Environment (*Ministério do Meio Ambiente*) |
| MTE | Ministry of Labor and Employment (*Ministério do Trabalho e do Emprego*) |
| NCM | Common Mercosur Standards (*Normas Comum do Mercosul*) |
| NWFP | Non-Wood Forest Product |
| OSB | Oriented Strand Board |
| PAC | Growth Acceleration Plan (*Plano de Aceleração do Crescimento*) |
| PASEP | Program for Public Servant Fund (*Programa de Formação do Patrimônio do Servidor Público*) |
| PEVS | Production of Extractivism and Silviculture (*Produção da Extração Vegetal e da Silvicultura*) |
| PIS | Social Integration Program (*Programa de Integração Social*) |
| PRONAF | National Agricultural Family Strengthening Program (*Programa Nacional de Fortalecimento da Agricultura Familiar*) |
| PROPFLORA | Commercial Plantation and Forest Recovery Program (*Programa de Plantio Comercial e Recuperação de Florestas*) |
| R&D | Research and Development |
| REFLORE | Planted Forest Producers and Consumers Association of Mato Grosso do Sul (*Associação Sul Matogrossense de Produtores e Consumidores de Florestas Plantadas*) |
| RL | Legal Reserve (*Reserva Legal*) |
| RPPN | Private Reserve of Natural Protection (*Reserva Particular de Patrimônio Natural*) |
| SAF | Secretary of Family Agriculture (*Secretaria de Agricultura Familiar*) |
| SAG | Agroindustrial Forest System (*Sistema Agroindustrial Florestal*) |
| SEAB-PR | Secretary of Agriculture and Supply of Paraná (*Secretaria da Agricultura e do Abastecimento do Paraná*) |
| SEAPA-MG | Secretary of Agriculture, Livestock and Supply of Minas Gerais (*Secretaria de Agricultura, Pecuária e Abastecimento de Minas Gerais*) |
| SECEX | Secretary of Foreign Trade (*Secretaria do Comércio Exterior*) |
| SEMAD | Secretary of Environment and Sustainable Development (*Secretaria de Meio Ambiente e Desenvolvimento Sustentável*) |
| SFM | Sustainable Forest Management (*Manejo Florestal Sustentável*) |
| SIDRA | IBGE Automatic Retrieval System (*Sistema IBGE de Recuperação Automática*) |
| SINDIFER | State of Minas Gerais Class Association of Iron Industry (*Sindicato da Indústria do Ferro no Estado de Minas Gerais*) |
| TIMO | Timberland Investment Management Organization |
| UC | Conservation Unit (*Unidade de Conservação*) |
| UFLA | Federal University of Lavras (*Universidade Federal de Lavras*) |
| UFPR | Federal University of Paraná (*Universidade Federal do Paraná*) |
| UFSM | Federal University of Santa Maria (*Universidade Federal de Santa Maria*) |
| UFV | Federal University of Viçosa (*Universidade Federal de Viçosa*) |
| UNDP | United Nations Development Program (*Programa das Nações Unidas para o Desenvolvimento*) |
| UNFCCC | United Nations Framework Convention on Climate Change |
| UN | United Nations |
| US | United States of America |
| USP | University of São Paulo (*Universidade de São Paulo*) |
| VAP | Value Added Product |

# ABRAF

## Structure and Members

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Iron and Steel - Mario Sant´anna Jr. (Gerdau Aços Longos S.A.)

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**Aracruz Celulose S.A.**
**(www.aracruz.com.br)**
**ArcelorMittal – Florestas**
**(www.caf.ind.br)**
**Bahia Pulp S.A.**
**(www.bahiapulp.com)**
**Celulose Nipo-Brasileira S.A. - CENIBRA**
**(www.cenibra.com.br)**
**Duratex S.A.**
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**(www.vmtubes.com.br)**
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**(www.vale.com)**
**Veracel Celulose S.A.**
**(www.veracel.com.br)**
**Votorantim Celulose e Papel S.A.**
**(www.vcp.com.br)**

## Collective Members – State Associations

ABAF - Forest Plantation Producers Association of Bahia (*Associação de Produtores de Florestas Plantadas do Estado da Bahia*)
ACR - Forest Companies Association of Santa Catarina (*Associação Catarinense de Empresas Florestais*)
(www.acr.org.br)
AGEFLOR - Forest Companies Association of Rio Grande do Sul (*Associação Gaúcha de Empresas Florestais*)
(www.ageflor.com.br)
AMS - Silviculture Association of Minas Gerais (*Associação Mineira de Silvicultura*)
(www.silviminas.com.br)
APRE - Forest Companies Association of Paraná (*Associação Paranaense de Empresas Florestais*)
FLORESTAR FUND (FUNDO FLORESTAR)
(www.floresta.org.br)
REFLORE MS - Planted Forest Consumers and Producers Association of Mato Grosso do Sul (*Associação Sul Matogrossense de Produtores e Consumidores de Florestas Plantadas*)
(www.reflore.com.br )



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# Chapter 1

## Forest Plantations in Brazil

Forest Plantations with Eucalypt and Pine
Forest Plantations with Other Species
Planted Forests vs. Natural Forests

# 1 Forest Plantations in Brazil

## 1.1 Forest Plantations with Eucalypt and Pine

The total eucalypt and pine planted forest area in Brazil reached 5,560,203 ha in 2007, with an increase of 186,789 ha compared to 2006, or 3.4 %, as shown in Table 1.01. From 2005 to 2007, the total planted area increased 318,428 ha, 1.4% for pine and 10.1% for eucalypt.

Table 1.01 shows pine and eucalypt planted area in Brazil from 2005 to 2007. Table 1.02 compares forest plantation area of the ABRAF member and non-member companies. Table 1.03 compares planted areas of individual companies affiliated to ABRAF [hereinafter ABRAF member companies] and collective members (companies affiliated to state forestry associations, which in turn are members of ABRAF [hereinafter ABRAF collective members]).

### Table 1.01 Pine and Eucalypt Forest Plantation in Brazil (2005-2007)

| UF | Pine (ha) | | | Eucalypt (ha) | | | TOTAL (ha) | | |
|---|---|---|---|---|---|---|---|---|---|
| | 2005 | 2006 | 2007 | 2005 | 2006 | 2007 | 2005 | 2006 | 2007 |
| MG | 153,000 | 152,000 | 144,248 | 1,063,744 | 1,083,744 | 1,105,961 | 1,216,744 | 1,235,744 | 1,250,209 |
| SP | 148,020 | 146,474 | 143,148 | 798,522 | 816,880 | 813,372 | 946,542 | 963,354 | 956,521 |
| PR | 677,772 | 686,453 | 701,578 | 114,996 | 121,908 | 123,070 | 792,768 | 808,361 | 824,648 |
| SC | 527,079 | 530,992 | 548,037 | 61,166 | 70,341 | 74,008 | 588,245 | 601,333 | 622,045 |
| BA | 54,746 | 54,820 | 41,221 | 527,386 | 540,172 | 550,127 | 582,132 | 594,992 | 591,348 |
| RS | 185,080 | 181,378 | 182,378 | 179,690 | 184,245 | 222,245 | 364,770 | 365,623 | 404,623 |
| MS | 38,909 | 28,500 | 20,697 | 113,432 | 119,319 | 207,687 | 152,341 | 147,819 | 228,384 |
| ES | 4,898 | 4,408 | 4,093 | 204,035 | 207,800 | 208,819 | 208,933 | 212,208 | 212,912 |
| PA | 149 | 149 | 101 | 106,033 | 115,806 | 126,286 | 106,182 | 115,955 | 126,387 |
| MA | 0 | 0 | 0 | 60,745 | 93,285 | 106,802 | 60,745 | 93,285 | 106,802 |
| AP | 27,841 | 20,490 | 9,000 | 60,087 | 58,473 | 58,874 | 87,929 | 78,963 | 67,874 |
| GO | 13,330 | 14,409 | 13,828 | 47,542 | 49,637 | 51,279 | 60,872 | 64,045 | 65,107 |
| MT | 43 | 7 | 7 | 42,417 | 46,146 | 57,151 | 42,460 | 46,153 | 57,158 |
| Others | 3,703 | 4,189 | 0 | 27,409 | 41,392 | 46,186 | 31,112 | 45,582 | 46,186 |
| **TOTAL** | **1,834,570** | **1,824,269** | **1,808,336** | **3,407,204** | **3,549,148** | **3,751,867** | **5,241,775** | **5,373,417** | **5,560,203** |

Source: ABRAF, STCP, 2007.

## Table 1.02 Pine and Eucalyptus Plantations in Brazil by State in 2007(ha)[1]

| State | Forest Plantation - Brazil[1] | | | | ABRAF TOTAL [2, 3] | | | | Non-members of ABRAF | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Pine | Eucalypt | TOTAL | % | Pine | Eucalypt | TOTAL | % | Pine | Eucalypt | TOTAL | % |
| MG | 144,248 | 1,105,961 | 1,250,209 | 22.5 | 99,199 | 941,471 | 1,040,669 | 30.0 | 45,050 | 164,490 | 209,539 | 10.0 |
| SP | 143,148 | 813,372 | 956,521 | 17.2 | 11,560 | 447,814 | 459,373 | 13.3 | 131,588 | 365,559 | 497,147 | 23.7 |
| PR | 701,578 | 123,070 | 824,648 | 14.8 | 454,870 | 90,992 | 545,862 | 15.8 | 246,708 | 32,078 | 278,786 | 13.3 |
| SC | 548,037 | 74,008 | 622,045 | 11.2 | 296,999 | 25,056 | 322,055 | 9.3 | 251,038 | 48,952 | 299,990 | 14.3 |
| BA | 41,221 | 550,127 | 591,348 | 10.6 | 1,457 | 492,368 | 493,825 | 14.3 | 39,764 | 57,759 | 97,524 | 4.7 |
| RS | 182,378 | 222,245 | 404,623 | 7.3 | 7,255 | 200,060 | 207,315 | 6.0 | 175,123 | 22,185 | 197,308 | 9.4 |
| MS | 20,697 | 207,687 | 228,384 | 4.1 | 18,179 | 132,973 | 151,152 | 4.4 | 2,518 | 74,714 | 77,232 | 3.7 |
| ES | 4,093 | 208,819 | 212,912 | 3.8 | 0 | 173,902 | 173,902 | 5.0 | 4,093 | 34,916 | 39,009 | 1.9 |
| PA | 101 | 126,286 | 126,387 | 2.3 | 101 | 54,514 | 54,615 | 1.6 | 0 | 71,772 | 71,772 | 3.4 |
| MA | 0 | 106,802 | 106,802 | 1.9 | 0 | 616 | 616 | 0.0 | 0 | 106,186 | 106,186 | 5.1 |
| AP | 9,000 | 58,874 | 67,874 | 1.2 | 0 | 11,474 | 11,474 | 0.3 | 9,000 | 47,400 | 56,400 | 2.7 |
| GO | 13,828 | 51,279 | 65,107 | 1.2 | 0 | 603 | 603 | 0.0 | 13,828 | 50,676 | 64,504 | 3.1 |
| MT | 7 | 57,151 | 57,158 | 1.0 | 0 | 1,500 | 1,500 | 0.0 | 7 | 55,651 | 55,658 | 2.7 |
| Others | 0 | 46,186 | 46,186 | 0.8 | 0 | 1,894 | 1,894 | 0.1 | 0 | 44,292 | 44,292 | 2.1 |
| **TOTAL** | **1,808,336** | **3,751,867** | **5,560,203** | **100** | **889,619** | **2,575,236** | **3,464,856** | **100** | **918,717** | **1,176,630** | **2,095,347** | **100** |

Source: ABRAF Member Companies; STCP, 2007.

[1] Forest plantation areas were compiled from different sources as described in the Methodological Notes (Chapter 5).

[2] ABRAF Member Companies and companies affiliated to the ABRAF Collective Members (see section on ABRAF – Structure and Members).

[3] The areas belonging to the ABRAF members have changed due to increase/reduction of planted area, and adjustments of member profiles.

## Table 1.03 Pine and Eucalyptus Plantations of ABRAF Member Companies and Companies Affiliated to ABRAF Collective Members in 2007 (ha)[1]

| State | ABRAF Member Companies[2] | | | | Companies Affiliated to ABRAF Collective Members[3] | | | | ABRAF TOTAL | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Pine | Eucalypt | TOTAL | % | Pine | Eucalypt | TOTAL | % | Pine | Eucalypt | TOTAL | % |
| MG | 23,441 | 702,273 | 725,713 | 29.4 | 75.758 | 239.198 | 314.956 | 31.5 | 99,199 | 941,471 | 1,040,669 | 30.0 |
| SP | 11,243 | 444,286 | 455,528 | 18.5 | 317 | 3.528 | 3.845 | 0.4 | 11,560 | 447,814 | 459,373 | 13.3 |
| PR | 133,824 | 83,149 | 216,973 | 8.8 | 321.046 | 7.843 | 328.889 | 32.9 | 454,870 | 90,992 | 545,862 | 15.8 |
| SC | 133,845 | 9,456 | 143,301 | 5.8 | 163.154 | 15.600 | 178.754 | 17.9 | 296,999 | 25,056 | 322,055 | 9.3 |
| BA | 1,457 | 472,161 | 473,618 | 19.2 | 0 | 20.207 | 20.207 | 2.0 | 1,457 | 492,368 | 493,825 | 14.3 |
| RS | 285 | 147,457 | 147,742 | 6.0 | 6.970 | 52.603 | 59.573 | 6.0 | 7,255 | 200,060 | 207,315 | 6.0 |
| MS | 5,669 | 117,463 | 123,132 | 5.0 | 12.510 | 15.510 | 28.020 | 2.8 | 18,179 | 132,973 | 151,152 | 4.4 |
| ES | 0 | 172,983 | 172,983 | 7.0 | 0 | 919 | 919 | 0.1 | 0 | 173,902 | 173,902 | 5.0 |
| PA | 0 | 4.110 | 4,110 | 0.2 | 101 | 50,404 | 50,505 | 5.1 | 101 | 54,514 | 54,615 | 1.6 |
| MA | 0 | 616 | 616 | 0.0 | 0 | 0 | 0 | 0.0 | 0 | 616 | 616 | 0.0 |
| AP | 0 | 0 | 0 | 0.0 | 0 | 11,474 | 11,474 | 1.1 | 0 | 11,474 | 11,474 | 0.3 |
| GO | 0 | 0 | 0 | 0.0 | 0 | 603 | 603 | 0.1 | 0 | 603 | 603 | 0.0 |
| MT | 0 | 0 | 0 | 0.0 | 0 | 1,500 | 1,500 | 0.2 | 0 | 1,500 | 1,500 | 0.0 |
| Others | 0 | 1,794 | 1,794 | 0.1 | 0 | 100 | 100 | 0.0 | 0 | 1,894 | 1,894 | 0.1 |
| **TOTAL** | **309,763** | **2,155,747** | **2,465,510** | **100.0** | **579,856** | **419,489** | **999,345** | **100.0** | **889,619** | **2,575,236** | **3,464,856** | **100.0** |

Source: ABRAF Member Companies; STCP, 2007.

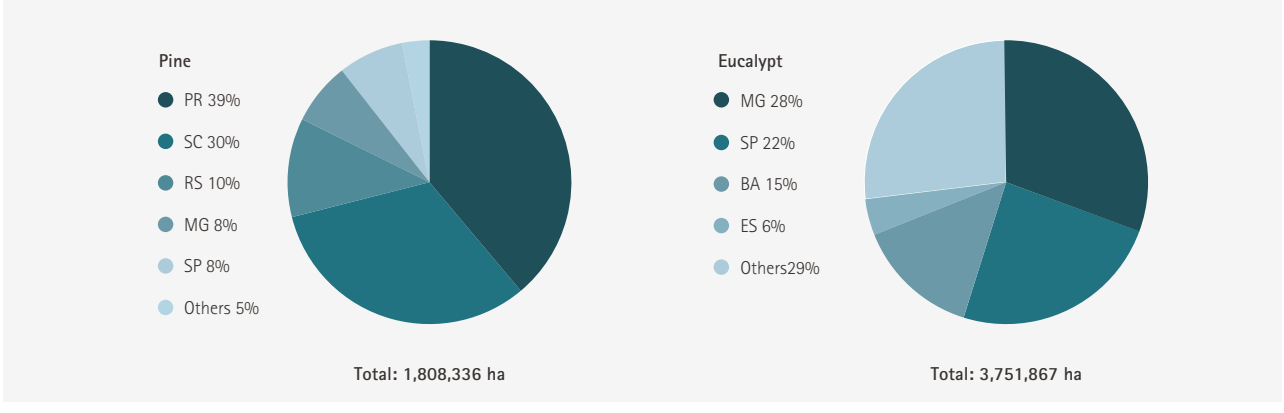
[1] Forest plantation areas were compiled from different sources as described in the Methodological Notes (Chapter 5).

[2] ABRAF Member Companies and companies affiliated to the ABRAF Collective Members (see section on ABRAF – Structure and Members).

[3] The areas belonging to the ABRAF members have changed due to the increase/reduction of planted area, and adjustments of profiles of the members.

Figure 1.01 presents the distribution of forest plantations (pine and eucalypt) among the main states in Brazil.

Figure 1.01 Distribution of Pine and Eucalypt Forest Plantations in Brazil by State (2007)




Source: ABRAF, STCP, 2007.

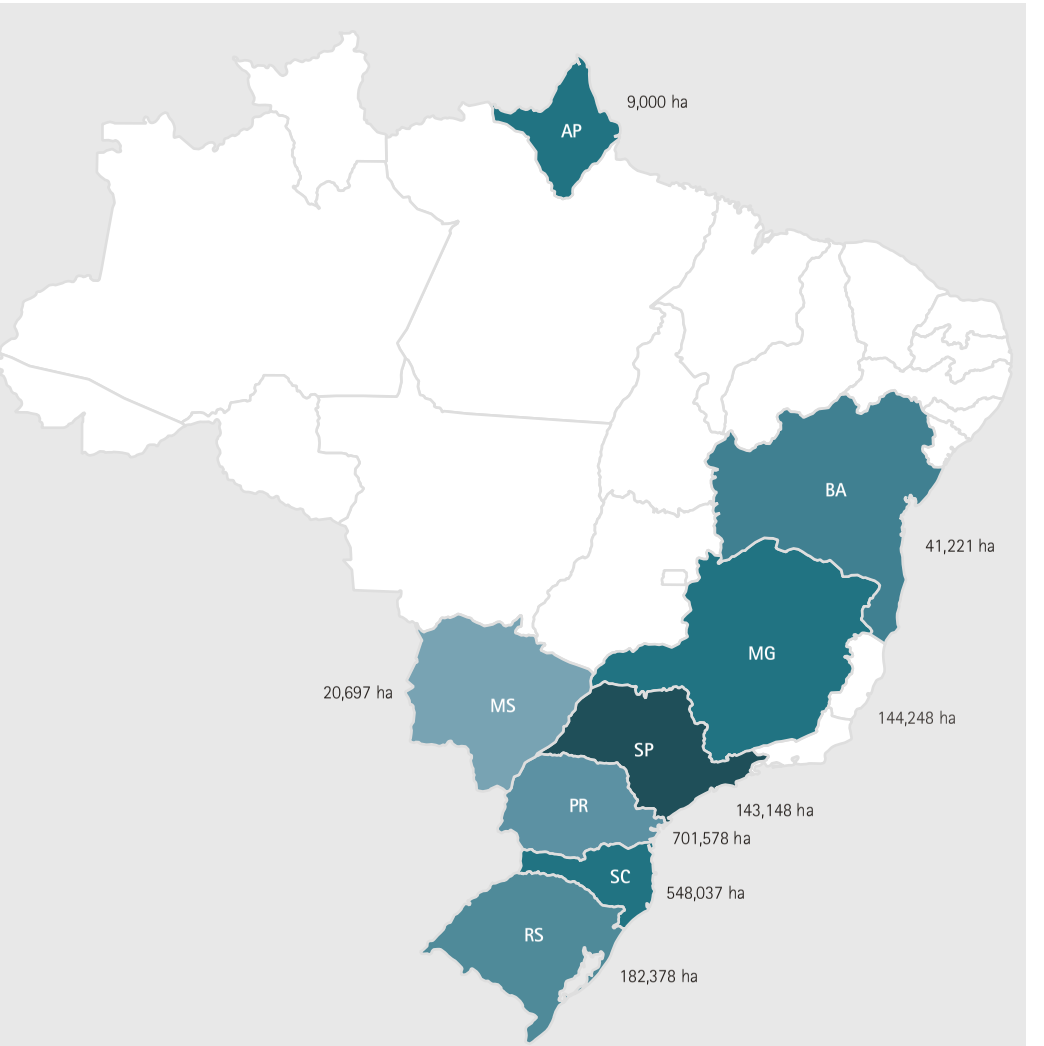
Maps 1.01 and 1.02 show the areas and geographical distributions of planted forests in 2007, with pine and eucalypt, respectively. Map 1.03 presents the total area and distribution of planted forests with these both species in 2007 in Brazil.

## Map 1.01 Area and Distribution of Pine Plantations in Brazil (2005-2007)

**PINE (ha)**

| STATE | 2005 | 2006 | 2007 |
|---|---|---|---|
| Paraná | 677,772 | 686,453 | 701,578 |
| Santa Catarina | 527,079 | 530,992 | 548,037 |
| Rio Grande do Sul | 185,080 | 181,378 | 182,378 |
| Minas Gerais | 153,000 | 152,000 | 144,248 |
| São Paulo | 148,020 | 146,474 | 143,148 |
| Bahia | 54,746 | 54,820 | 41,221 |
| Mato Grosso do Sul | 38,909 | 28,500 | 20,697 |
| Amapá | 27,841 | 20,490 | 9,000 |
| Others | 22,123 | 23,162 | 18,029 |
| **TOTAL** | **1,834,569** | **1,824,270** | **1,808,336** |

Source: Various sources; adapted by STCP (See Methodological Notes, Section 5.1)

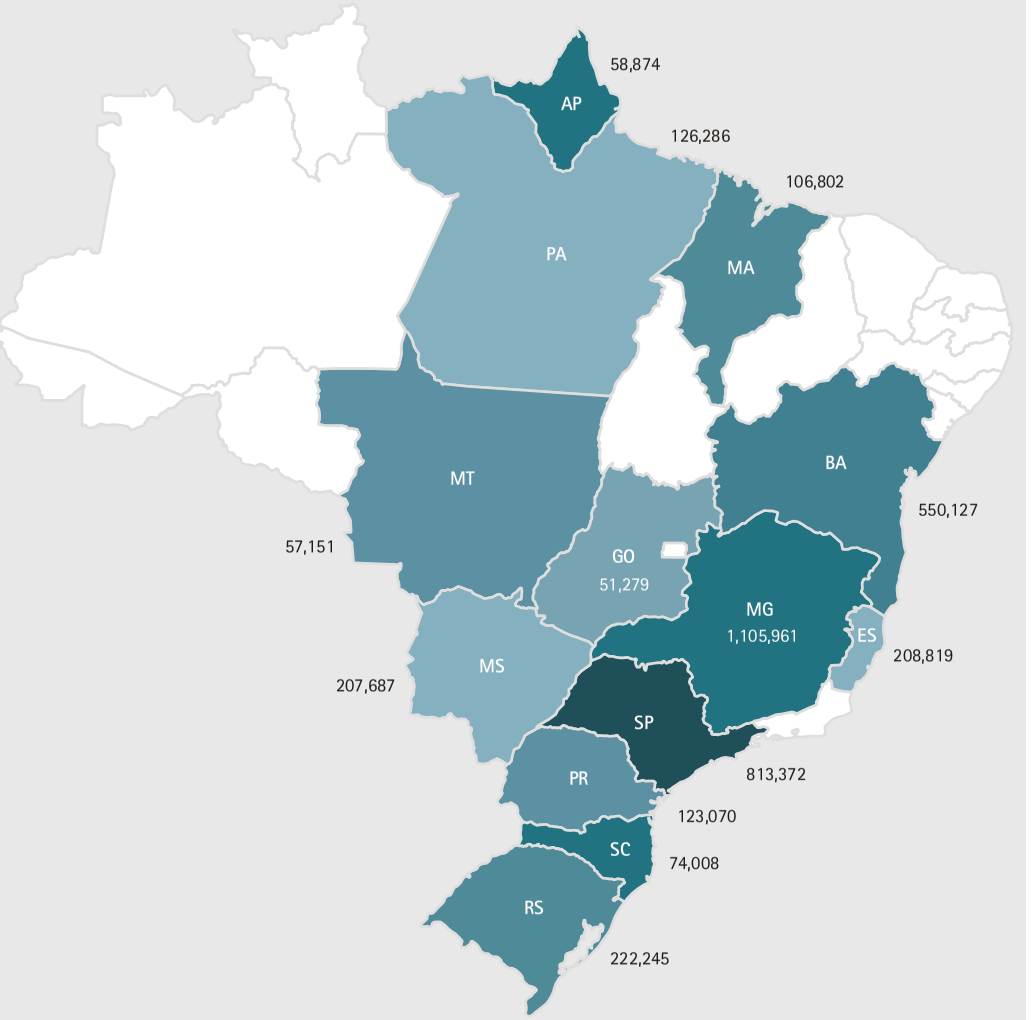


Map 1.02 Area and Distribution of Eucalyptus Plantations in Brazil (2005-2007)

**EUCALYPTUS (ha)**

| STATE | 2005 | 2006 | 2007 |
|---|---|---|---|
| Minas Gerais | 1,063,744 | 1,083,744 | 1,105,961 |
| São Paulo | 798,522 | 816,880 | 813,372 |
| Bahia | 527,386 | 540,172 | 550,127 |
| Rio Grande do Sul | 179,690 | 184,245 | 222,245 |
| Espírito Santo | 204,035 | 207,800 | 208,819 |
| Mato Grosso do Sul | 113,432 | 119,319 | 207,687 |
| Paraná | 114,996 | 121,908 | 123,070 |
| Maranhão | 60,745 | 93,285 | 106,802 |
| Pará | 106,033 | 115,806 | 126,286 |
| Santa Catarina | 61,166 | 70,341 | 74,008 |
| Amapá | 60,087 | 58,473 | 58,874 |
| Mato Grosso | 42,417 | 46,146 | 57,151 |
| Goiás | 47,542 | 49,637 | 51,279 |
| Others | 27,409 | 41,392 | 46,186 |
| TOTAL | 3,407,205 | 3,549,147 | 3,751,867 |

Source: Various sources; adapted by STCP (See Methodological Notes, Section 5.1)



## Map 1.03 Area and Distribution of Total Pine and Eucalyptus Plantations in Brazil (2005-2007)

**TOTAL (ha)[1]**

| STATE | 2005 | 2006 | 2007 |
|---|---|---|---|
| Minas Gerais | 1,216,744 | 1,235,744 | 1,250,209 |
| São Paulo | 946,542 | 963,354 | 956,521 |
| Paraná | 792,768 | 808,361 | 824,648 |
| Santa Catarina | 588,245 | 601,333 | 622,045 |
| Bahia | 582,132 | 594,992 | 591,348 |
| Rio Grande do Sul | 364,770 | 365,623 | 404,623 |
| Mato Grosso do Sul | 152,341 | 147,819 | 228,384 |
| Espírito Santo | 208,933 | 212,208 | 212,912 |
| Maranhão | 60,745 | 93,285 | 106,802 |
| Pará | 106,182 | 115,955 | 126,387 |
| Amapá | 87,928 | 78,963 | 67,874 |
| Goiás | 60,872 | 64,045 | 65,107 |
| Mato Grosso | 42,460 | 46,153 | 57,158 |
| Others | 31,112 | 45,582 | 46,186 |
| **TOTAL** | **5,241,774** | **5,373,417** | **5,560,203** |

Source: Various sources; adapted by STCP (See Methodological Notes, Section 5.1)
[1] Pinus and Eucalypt.

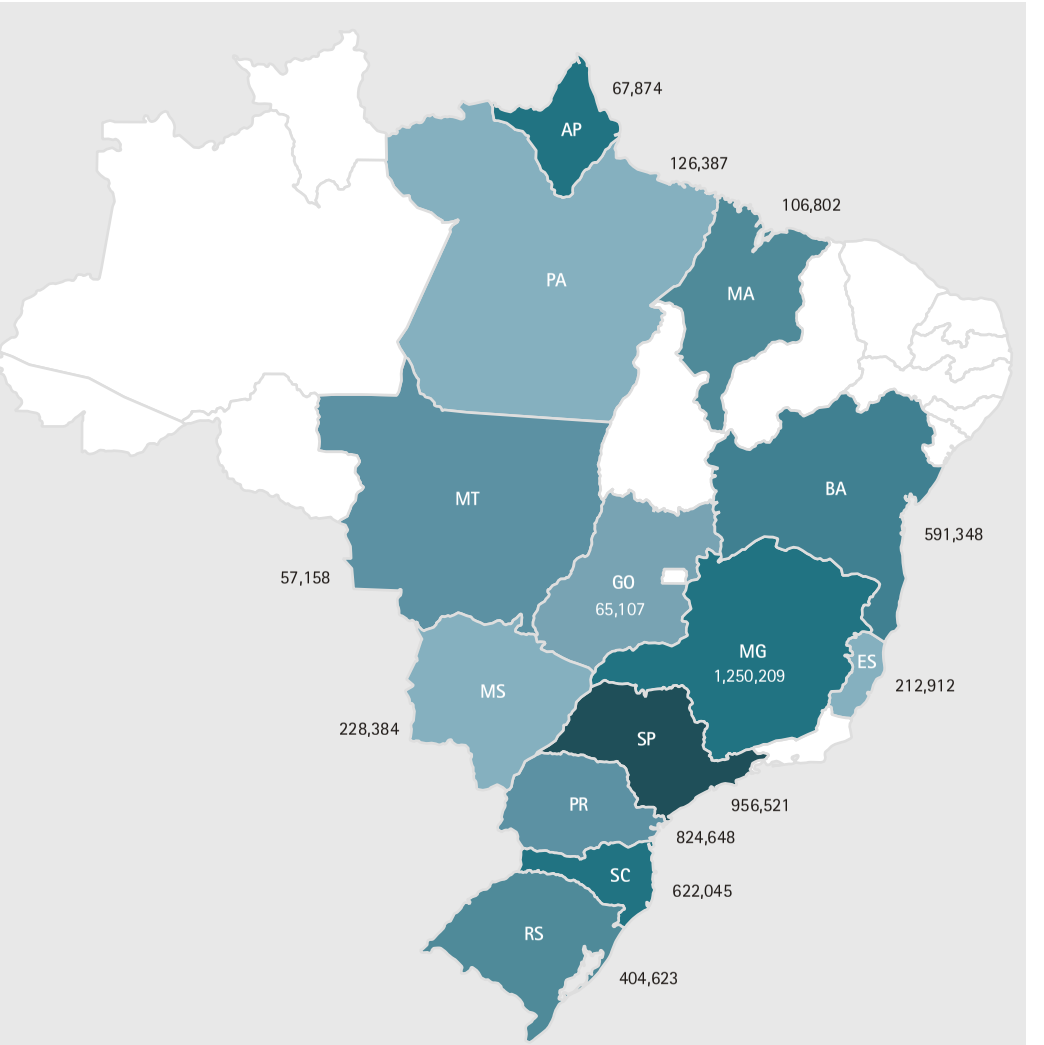
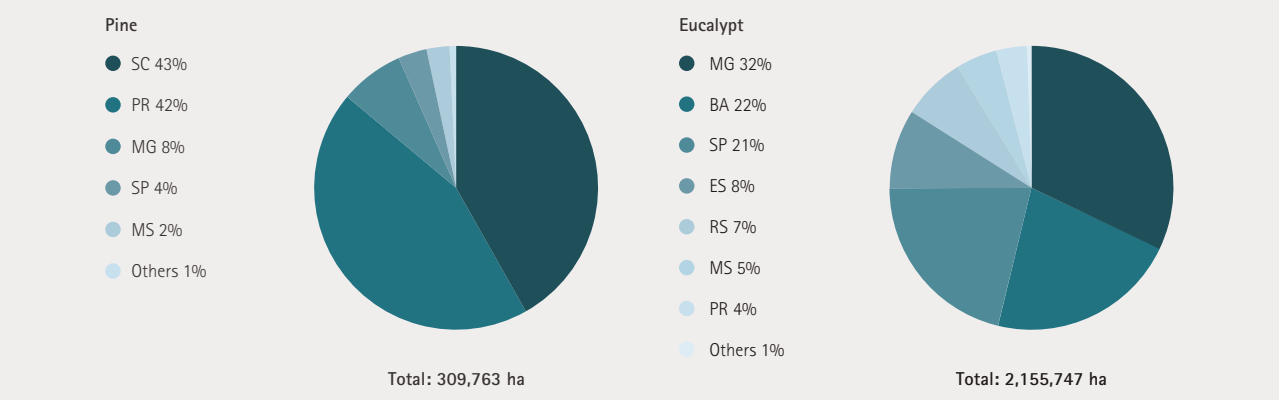


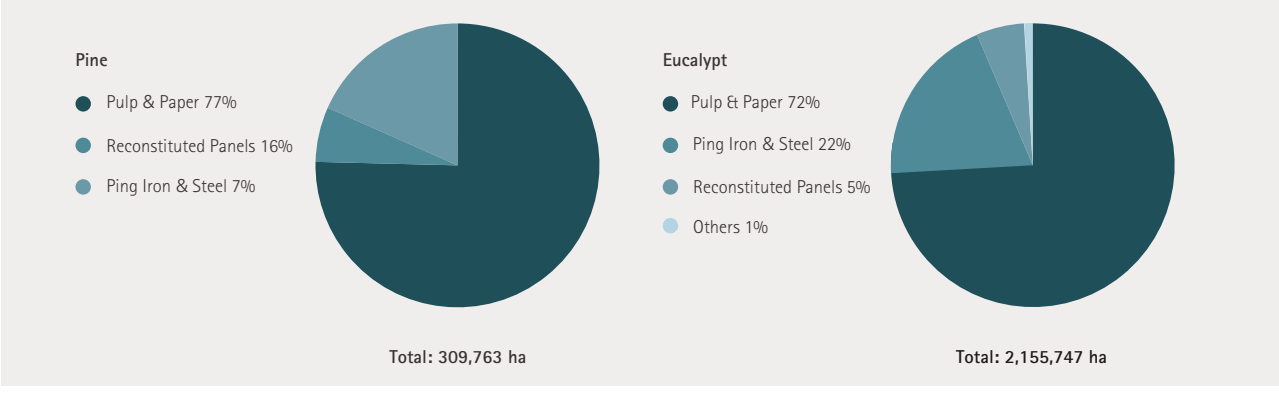
Figure 1.02 presents the distribution of planted forest areas of pine and eucalyptus among the ABRAF member companies in 2007 by state. Figure 1.03 shows the distribution of pine and eucalypt plantations of ABRAF members by industrial segment.

Figure 1.02 Distribution of Pine and Eucalyptus Plantation Area of ABRAF Member Companies by State (2007)




Source: ABRAF Member Companies; STCP, 2007.

Figure 1.03 Pine and Eucalypt Plantation Area of ABRAF Member Companies by Industrial Segment (2007)




Source: ABRAF Member Companies; STCP, 2007.

Analysis and Interpretation of 2007 Data

The ABRAF member companies responded for 44.3% of the total pine and eucalypt planted forest area in Brazil in 2007, while they represented 45.0% in 2006; thus, there was a slight percentile reduction due to reasons that will be discussed below (Table 1.02). Approximately 79% of the total pine plantations are located in Southern Brazil (Figure 1.01). Among ABRAF member companies, the Southern states of Paraná and Santa Catarina concentrate 85% of the pine plantation areas, representing 85% of total (Figure 1.02). In 2007, pine plantation areas belonging to ABRAF member companies dropped 6.7% compared to 2006, from 331,907 ha to 309,763 ha (Table 1.03).

On the other hand, most of the eucalypt plantations are located in the Southeastern region, led by the state of Minas Gerais,

corresponding to 28% of the total area with this species in the country in 2007 (Figure 1.01). Eucalypt plantation area by ABRAF member companies increased 3.3% in 2007 compared to the previous year, growing from 2,087,638 ha to 2,155,747 ha.

Pine and eucalypt plantations of ABRAF member companies in 2007 totaled 2,465,510 ha, increasing 1.9% compared to the previous year (2,419,545 ha), as shown in Table 1.04.

Regarding log utilization by industrial segments among ABRAF member companies (Figure 1.03), the majority of pine and eucalypt forests are owned by pulp and paper companies (77% pine and 72% eucalypt). Pine log for reconstituted panels and pig iron & steel production represents 16% and 7%, respectively. As for eucalypt plantations, this percentage reverses becoming 22% for pig iron & steel companies, and 5% to wood panel companies.

Table 1.04 presents pine and eucalypt planted forests among ABRAF member companies separate by property type and Figure 1.04 shows distribution trend from 2005 to 2007. Figure 1.05 shows the distribution of ABRAF member companies' forest plantations by property type in 2007.

## Table 1.04 Distribution of Pine and Eucalypt Plantations of ABRAF Member Companies by Property Type (2006-2007)

| UF | Forest Plantation Area (ha) - 2006 | | | | Forest Plantation Area (ha) - 2007 | | | | Percentage Change (2006-2007) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Own land | Outgrower scheme | Leasing | TOTAL | Own land | Outgrower scheme | Leasing | TOTAL | Own land | Outgrower scheme | Leasing | TOTAL |
| AP | 59,674 | 0 | 0 | **59,674** | 0 | 0 | 0 | **0** | -100% | - | - | **-100%** |
| BA | 346,602 | 89,598 | 7,495 | **443,695** | 363,982 | 101,836 | 7,799 | **473,618** | 5% | 14% | 4% | **7%** |
| ES | 129,987 | 39,196 | 1,303 | **170,486** | 130,076 | 41,634 | 1,274 | **172,983** | 0% | 6% | -2% | **1%** |
| MG | 593,076 | 61,011 | 38,538 | **692,625** | 609,681 | 75,424 | 40,609 | **725,713** | 3% | 24% | 5% | **5%** |
| MS | 80,943 | 0 | 21,668 | **102,611** | 90,716 | 0 | 32,416 | **123,132** | 12% | - | 50% | **20%** |
| PR | 151,408 | 44,169 | 16,514 | **212,091** | 139,217 | 56,974 | 20,782 | **216,973** | -8% | 29% | 26% | **2%** |
| RS | 83,586 | 29,690 | 24,678 | **137,954** | 103,519 | 27,250 | 16,973 | **147,742** | 24% | -8% | -31% | **7%** |
| SC | 100,355 | 18,766 | 14,261 | **133,382** | 99,876 | 29,299 | 14,126 | **143,301** | 0% | 56% | -1% | **7%** |
| SP | 339,417 | 39,592 | 84,970 | **463,979** | 306,259 | 47,933 | 101,337 | **455,528** | -10% | 21% | 19% | **-2%** |
| Others | 1,390 | 116 | 1,542 | **3,048** | 1,171 | 141 | 5,208 | **6,520** | -16% | 21% | 238% | **114%** |
| **TOTAL** | **1,886,438** | **322,138** | **210,969** | **2,419,545** | **1,844,498** | **380,490** | **240,522** | **2,465,510** | **-2%** | **18%** | **14%** | **2%** |

Source: ABRAF Member Companies; STCP, 2007.
Note: In addition, forest plantations with other species (mainly Araucaria spp – Paraná pine) owned by ABRAF member companies totaled 3,036 hectares in 2007.

Regarding the forest plantation distribution by property type among ABRAF member companies, the total plantation area on their own land reduced 2% from 2006 to 2007, but forest outgrowing scheme and leasing land areas increased 18% and 14%, respectively (Table 1.04). It should be noted that the increasing timber demand by ABRAF member companies has been supplied not only by expanding their own planted forest area, but also by the increasing forest productivity (MAI – Mean Annual Increment), by conducting stand reform, incorporating new technologies, introducing seeds from selected species and cloned seedlings. Besides that, ABRAF member companies have been searching new areas for leasing and forest outgrowing scheme to supply their increasing log demand.

ABRAF member companies in the state of Amapá responded for 5% of ABRAF plantations in 2006 (60,000 ha), while in 2007 the participation dropped to zero. That is due, partly, to the fact that forest areas of an ABRAF member company was sold in 2006 to a non-ABRAF member company in 2007.

São Paulo, Bahia and Amapá have shown reduction in the total forest planted area among ABRAF member companies, as presented in Table 1.01. Area with eucalypt plantations in São Paulo remained almost unaltered in 2007, in comparison with 2006 figure, with a slight reduction of only 0.4% This fact is, partly, explained by the reduction of areas in the state for some companies which have invested in new forest areas in other regions of Brazil.

On the other hand, Bahia and Amapá presented significant reductions in pine areas in 2007, decreasing 24.8% and 56.1%, respectively, compared to the previous year. These refer to old, not properly managed pine plantation areas. It is worth to mention that these pine plantations have been gradually replaced by eucalypt due to their low pine productivity in those regions.

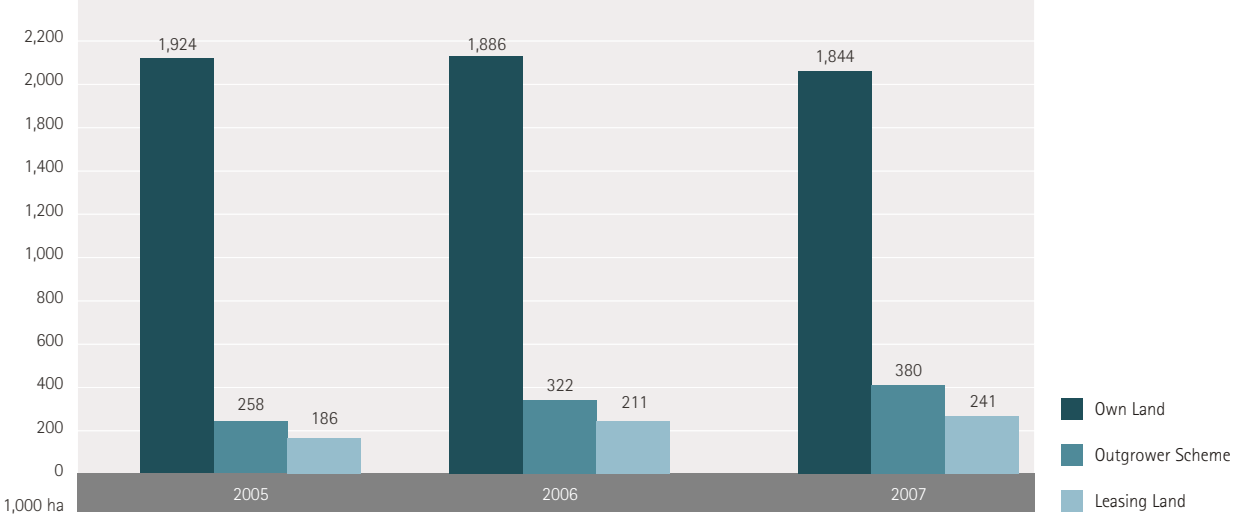
In Rio Grande do Sul and Mato Grosso do Sul, there was a significant increase in forest plantations on own land by ABRAF member companies, 24% and 12%, respectively, in view of ongoing new planting and Greenfield projects by some members.

As for the forest plantations under outgrowing scheme, Santa Catarina presented the highest rate of increase with 56% from 2006 to 2007. Among the states, the forest outgrowing area reduced only in Rio Grande do Sul state (-8%) among ABRAF members. On the other hand, Mato Grosso do Sul stood out with the highest increase of plantations in leased land, reaching a 50% increase in 2007 compared to 2006.

Figure 1.04 shows the trend of distribution of pine and eucalypt plantations among ABRAF member companies by property type. The data show a gradual reduction of forest plantations in own land, and the consequent increase in leased land areas and forest outgrower schemes.

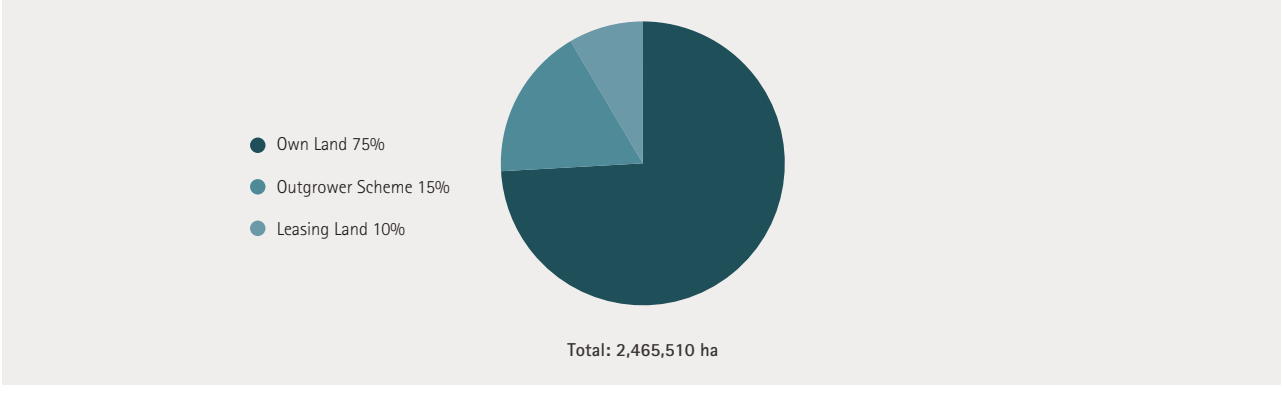
In 2007, the area distribution by property type was 75% on own land, 15% under outgrower schemes, and 10% with special contracts/leasing areas, as shown in Figure 1.05.

Figure 1.04 Distribution of Pine and Eucalyptus Planted Forest Areas of ABRAF Member Companies by Property Type (2005-2007)




Source: ABRAF Member Companies; STCP, 2007.

Figure 1.05 Distribution of Forest Plantation Areas of ABRAF Member Companies by Property Type in 2007




Source: ABRAF Member Companies; STCP, 2007.



## 1.2 Forest Plantations with Other Species

Although pine and eucalypt are the most significant species in terms of planted area in Brazil, other species such as parica (*Schizolobium amazonicum*), wattle (*Acacia spp.*), teak (*Tectona grandis*), rubber tree (*Hevea brasiliensis*), araucaria (*Araucaria angustifolia*) and poplar (*Populus spp.*) are also important to the solid wood sector in Brazil. Among them, parica is native from the Amazon region with wood quality appropriate to plywood production; and teak, originally from Southeast Asia is used for solid wood production, mainly oriented for the international market.

Table 1.05 shows that wattle is the most planted species after pine and eucalypt in Brazil. Its planted area increased 2.9% in

2007 compared to the previous year, followed by rubber tree plantations with a total planted area of 85,768 ha. Parica plantations concentrate mainly in state of Pará and have experienced the highest growth rate in planted area (92.6%) from 2006 to 2007.

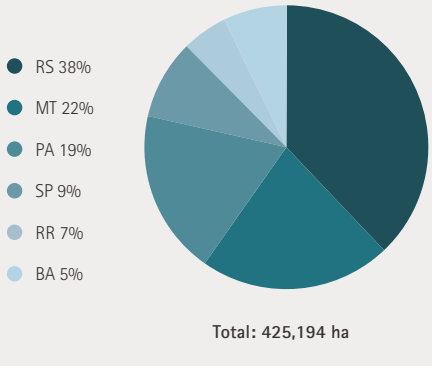
Table 1.05 Planted Area with Other Forest Species in Brazil (2006-2007)

| Species | 2006 Area (ha) | 2007 Area (ha) |
|---|---|---|
| Wattle | 184,363 | 189,690 |
| Rubber Tree | 81,312 | 85,768 |
| Teak | 42,496 | 48,576 |
| Parana Pine | 18,275 | 17,500 |
| Poplar | 2,972 | 2,800 |
| Parica | 41,100 | 79,159 |
| Others[1] | - | 1,701 |
| **TOTAL** | **370,519** | **425,194** |

Source: ABRAF Member Companies; Parica Research Center; Various Companies; STCP, 2007.
[1] Forest plantations with species such as ipê-roxo (*Tabebuia spp.*), fava-arara, jatobá (*Hymenaea courbaril*), mahogany (*Swietenia macrophylla*), acapu (*Pericopsis elata*), among others.

Regarding the geographical distribution of plantations with other species in Brazil, Figure 1.06 shows that they concentrate in Rio Grande do Sul, mainly with black wattle (*Acacia mearnsii*). This species is mostly used for tannin extraction and production, with timber used as a by-product, and other uses including wood chips for exports, and for reconstituted wood panels. Teak, poplar and araucaria add approximately 69,000 hectares of planted area; teak plantation concentrates in Mato Grosso; araucaria concentrates in Southern Brazil, mainly in Paraná and Santa Catarina, while poplar is only planted in Paraná as the relatively cold climate is favorable for the species.

Figure 1.06 Geographical Distribution of Planted Forests with Other Species in Brazil (2007)




Source: ABRAF Member Companies; Parica Research Center; Various Companies; STCP, 2007.

Summary of Planted Forests in Brazil in 2007

There are a total of 5,985,396 ha of forest plantations in Brazil, including plantations with pine, eucalypt and others species. In sum, Table 1.06 shows the total planted forests in 2007, with pine and eucalypt together representing 92.8% of the total plantation, while in 2006 both species combined reached 93.5%.

## Table 1.06 Total Forest Plantations with Pine, Eucalypt and Other Species in Brazil (2006-2007)

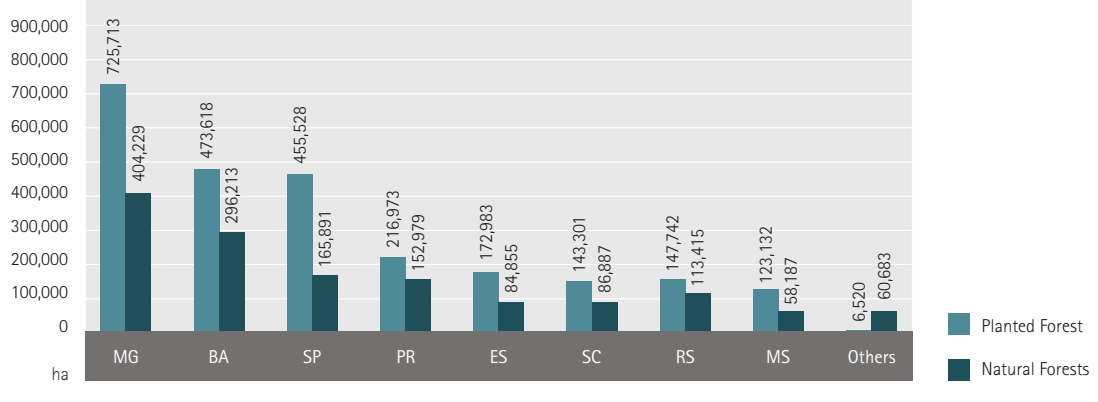
| Species | 2006 Area (ha) | 2007 Area (ha) |
|---|---|---|
| Pine | 1,824,270 | 1,808,336 |
| Eucalypt | 3,549,147 | 3,751,867 |
| Other Species | 370,519 | 425,194 |
| **TOTAL** | **5,743,936** | **5,985,396** |

Source: ABRAF Member Companies; Parica Research Center; Various Companies; STCP, 2007.

## 1.3 Planted Forests vs. Natural Forests

The ABRAF member companies protected about 1.4 million hectares of natural forests in 2007, representing a 5.8% growth over the protected area informed by those companies in 2006. Among the states with the largest protected areas by ABRAF member companies are Minas Gerais and Bahia, as shown in Figure 1.07.

## Figure 1.07 Protected Natural and Planted Forest Areas by ABRAF Member Companies by State (2007)




Source: ABRAF Member Companies; STCP, 2007.

## Table 1.07 Distribution of Protected Natural and Planted Forest Area by ABRAF Member Companies by State (2006-2007)

| State | 2006 | | 2007 | |
|---|---|---|---|---|
| | Own Forest Plantations (ha) | Protected Natural Forests[1] (ha) | Own Forest Plantations (ha) | Protected Natural Forests[1] (ha) |
| AP | 59,674 | 180,932 | - | - |
| BA | 346,602 | 250,398 | 363,982 | 296,213 |
| ES | 129,987 | 82,837 | 130,076 | 84,855 |
| MA | 742 | 63,660 | 616 | 53,631 |
| MG | 593,076 | 370,500 | 609,681 | 404,229 |
| MS | 80,943 | 47,185 | 90,716 | 58,187 |
| PR | 151,408 | 120,878 | 139,217 | 152,979 |
| RS | 83,586 | 47,190 | 103,519 | 113,415 |
| SC | 100,355 | 77,722 | 99,876 | 86,887 |
| SP | 339,417 | 103,519 | 306,259 | 165,891 |
| Others | 648 | 0 | 555 | 7,052 |
| **TOTAL** | **1,886,438** | **1,344,822** | **1,844,498** | **1,423,338** |

Source: ABRAF Member Companies; STCP, 2007.

[1]Including Natural Patrimony Private Reserve (RPPN), Permanent Preservation Area (APP), Legal Reserve (RL) and others.

Table 1.07 shows the increase in protected forest area (natural forests) by ABRAF member companies, from 1,35 thousand ha in 2006 to 1,43 thousand ha in 2007.

In view of the fact that planted areas belonging to an ABRAF member company in Amapá in 2006 were sold to a non-member company in 2007, resulting in the reduction of natural forest and planted area among ABRAF member companies in that state. Similar fact was observed in the state of Maranhão.

# Chapter 2

## Silviculture of Planted Forests

### Highlights of Silviculture in 2007

Expansion of Forest Plantations and Forest-Based Industry

Perspectives for Charcoal-Based Iron and Steel Industry in Brazil

Potential for Institutional Investments - Timber Investment Management Organization (TIMO)

Carbon Market

Trends of Incorporating Production Forestry Activities into State Administration

### Annual Planting Area

### New Technologies and Forest Productivity

### Investments

# 2 Silviculture of Planted Forests

## 2.1 Highlights of Silviculture in 2007

The most relevant issues discussed in the Brazilian forest plantation sector in 2007 were:

- Expansion of Forest Plantations and the Forest-Based Industry;
- Perspectives for Charcoal-based Iron and Steel Industry in Brazil;
- Potential for Institutional Investments - Timber Investment Management Organization (TIMO);
- Carbon Market; and,
- Trends of Incorporating Production Forestry Activities in State Administration.

### 2.1.1 Expansion of Forest Plantations and Forest-Based Industry

Brazil experiences a new expansion cycle of the existing forestry-based industrial projects and the announcement of new forest projects, the majority utilizing wood from planted forests.

The main factors for the expansion of new forestry-based industrial plants and growing production capacity of the existing plants are the increasing demand, attractive prices of some forest products, and the competitive and comparative advantages of the forest sector in Brazil. These advantages result mostly from research and development on forestry, and the consequent improvement of forest productivity. These projects have been implemented or announced mainly in for the South, Northeast, Southeast, and West-Central Brazil. The segments benefited from these projects are mainly pulp and paper, reconstituted wood panels, and the charcoal-based iron and steel industry.

The investments for those projects come from both national and foreign investors. International investors have been attracted by the competitive advantages of the Brazilian forest sector. Overall, investments of about US$ 12 billion was made over the past 10 years.

Only the ongoing or recently-established pulp and paper projects in Brazil represent an increase in log consumption of about 10 million $m^3$/year, especially with eucalypt. Companies that traditionally have used pine species have shift to include a mix of eucalypt and pine fibers due to improvements in the production process, higher fiber quality for certain processes, shorter rotation and higher productivity of eucalypt. Furthermore, the pulp and paper sector have announced that there are expansion of existing plants and new Greenfield projects announced mainly in Rio Grande do Sul, Minas Gerais, Bahia and Mato Grosso do Sul. These projects combined will represent in the mid-run an additional consumption of around 13 million $m^3$/year.

Another segment facing a strong expected expansion is the reconstituted wood panel, especially those of Medium Density Fiberboard (MDF) and Medium Density Particleboard (MDP - a variation of high quality particleboard), due to increasing domestic consumption, principally by the furniture industry. Such expansion represents an additional 3 to 4 million $m^3$/year of log for processing and energy generation over the next 8 to 10 years. These mills will locate their investments in the South and Southeast regions of Brazil, especially in Santa Catarina and Rio Grande do Sul, besides Minas Gerais.

The charcoal-based iron and steel industry has increased more than 50% its charcoal consumption over the last 10 years, but only half of the charcoal supply comes from planted forests. The largest increase of charcoal-based iron and steel production has been in the Carajás pig-iron cluster, located in the states of Maranhão and Pará, and more recently in a smaller scale in Mato Grosso do Sul.

The planted area has been increasing on average of 2.5 to 3.0% per year over the past few years. Brazil has slight over 5.5 million ha of planted pine and eucalypt forests. The increase in planted area is still non-sufficient to meet the growing wood demand from different segments of the forest sector; however, it has been counter-balanced by gains in forest productivity of plantation forests, which allows producing larger wood volume per area unit.

Due to the need to increase the area with forest plantation, large-scale companies have launched sizeable projects, with

innovative concepts based partially or totally on timber supply from partnerships with small and medium-sized independent producers and small companies. These partnerships aim at fostering forest plantations, particularly in small properties, by supplying seedling, inputs and technical assistance to producers, guaranteeing future timber purchase. Currently, such schemes offer higher profits to producers compared to traditional crops and land uses such as cattle, cocoa, corn and some fruit trees.

Another aspect that favors this trend is the timber requirement for industrial processing. As they are oriented for shredding and grinding, non-thinned and non-pruned logs of small-diameter can be used, thus, reducing the forest formation cost.

Moreover, the rotation period can be reduced, and with gain in MAI due to high Research and Development (R&D) investments, a larger wood volume is produced per unit area. Such timber can also be produced with lower costs, increasing profitability, and the attractiveness of the forest business would induce the expansion of planted forest areas and further investments in industrial projects.

### 2.1.2 Perspectives for Charcoal-Based Iron and Steel Industry in Brazil

#### Expected Expansion

The Brazilian iron and steel industry is growing. Investments in new industrial plants and the expansion of existing plants will increase the annual steel production capacity from 33 million to 57 million ton over the next ten years. The National Development Bank (BNDES) foresees investments of about R$ 32 billion from 2008 to 2011 in the iron and steel sector. The new plants are expected to use coke as thermal reductor, although only one of the new mills – currently being established with start-up planned for 2011 – will increase the domestic demand for charcoal from planted forest in nearly 10%.

#### Pig-Iron and Charcoal Production

The charcoal-based pig-iron production remained stable over the last three years. The largest pig-iron cluster in Brazil, located in Minas Gerais, has reduced its production. In late 2007, approximately 50% of charcoal-based pig-iron ovens were inactive. The companies have faced problems to supply charcoal from planted forests, difficulties for railway transportation and loading of pig-iron to export, besides environmental control. These problems escalated by the appreciation of the Brazilian Real, negatively affecting the competitiveness of the Brazilian product in international markets. This has also been affected by the shrinkage of the US consuming market, the major consumer of pig-iron from Brazil. The export has declined and the domestic consumption increased. The domestic production was not affected because the production increased in 2007 in the Carajás pig-iron cluster and in Mato Grosso do Sul.

Currently approximately 1/3 of the Brazilian pig-iron production (32.5 million ton in 2006) has been based on charcoal, as thermal reductor, from forest plantations and from natural forests' residues (estimated at 50/50 in 2006). However, due to the increasing social and environmental pressures against the utilization of wood from natural forest, chiefly initiatives from the public and the private sectors came up aiming at substituting wood consumption from natural forests in favor of forest plantations for charcoal production.

Two outstanding initiatives arise. First, the State Government of Minas Gerais in a public-private partnership aims to stimulate and search for new financing sources to boost forest plantations in the state, from currently 1.2 to 1.8 million hectares in the next 8 years, representing a 50% growth. This is an answer to the charcoal shortage problem from planted forest and to the needed preservation of the remaining natural forests. The newly-established Sectoral Chamber for Silviculture under the coordination of the State Secretary of Agriculture, Livestock and Supply of Minas Gerais (SEAPA-MG) has discussed this urgent initiative internally and with the civil society.

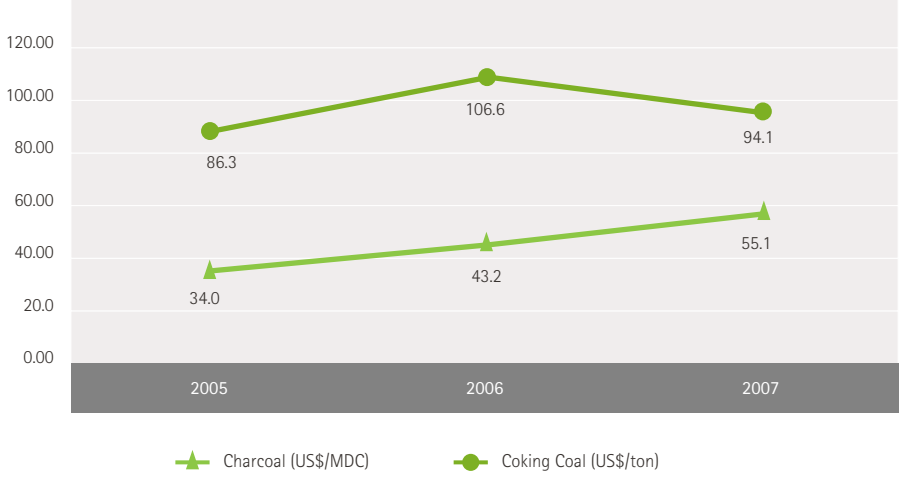
Second, a private initiative by mining and iron/steel companies of the Northern states, Pará and Maranhão, relies on investing and promoting large-scale forest planting in the Carajás mining cluster. This initiative has been led by Vale company through the so-called "*Vale Florestar Amazonia*" project with a budget of USD 200 million up to 2010. It aims to promote the plantation of 150,000 hectares of eucalypt forests in degraded land in the region and to recover 50,000 hectares of natural forests.

Consumption of Coal/Coke[1]

The world market of coking coal has gone through major changes. The input market is strongly and positively correlated to the world steel and iron production (5% growth per year between 2000 and 2005), resulting in significant price increase of coking coal.

Figure 2.01 shows a slight fall in the prices of imported coal in 2007. According to the Ministry of Development, Industry and Foreign Trade (MDIC), it should be emphasized that the coal prices are not traded in stock exchanges, but in direct negotiation rounds among companies and countries. Due to ongoing negotiations, prices in the spot market have doubled and analysts anticipate the continuous growing trend between 50 and 100% in coal prices in the coming years. The main reasons for the price increase are the higher demand for coal and difficulties in expanding the supply.

Figure 2.01 Average Prices of Charcoal and Coking Coal in Brazil (2005-2007)[2]




Source: Charcoal; AMS; Coking Coal: Import data MDIC/ Aliceweb.
Note: Annual prices of coking coal are imported price from MDIC/ Aliceweb, classified by the Common Nomenclature of Mercosur (code 27011900 – other coals, including powder, but not agglomerated). Charcoal is domestic price at the main markets (originally in R$).

Traditionally, China, a large coal producer, has increased its domestic demand, shifting from a net exporter to a net importer of coal. Other countries, due to increase in oil price have been substituting oil for coal, and new coking coal-based thermoelectric power plants are under construction. These factors, in addition to the increasing coal-based steel production, have helped to boost coal prices.



[1] The coking coal is the raw material for coke production, used in the iron reduction process for pig-iron production. This high quality coal, different from that used to generate energy, presents high carbonization grade and ash content with binding properties.
[2] Although there is a difference between the calorific value of charcoal and coking coal, such technical coefficient is not discussed since it is beyond the scope of this Yearbook.

Impacts on the National Steel Production

The new large-scale integrated steel and iron plants being established in Brazil will be based on coke as thermal reductor despite the increase of the input price, once there is no enough charcoal from forest plantations to meet the current and future demand of these projects.

Currently, as a result of the growing environmental restrictions and shortage of charcoal from planted forest, some independent pig-iron producers in the Carajás cluster, are substituting part of charcoal to coking coal imported from Venezuela. In 2007, the imports were benefited by the Brazilian Real appreciation over the American dollar. Nevertheless, the coal price boosting will likely change the pig-iron and steel industry (the existing and newly planned plants) in the medium and long-run, especially medium and small-sized plants. As a result, opportunities exist for these mills to benefit from carbon credit.

In this context, the consumption of charcoal from planted forest is expected to increase in Brazil, which will certainly stimulate the expansion of forest plantations through new technologies and alternative financing schemes, besides the consequent increase in charcoal prices. In Brazil, the charcoal-based pig-iron and steel production presents several advantages compared to coal utilization: charcoal is a renewable resource, cleaner, with low ash content, basically sulfur- and phosphorus-free, more reactive, requires decentralized transportation and production process, consolidated production technology, and contributes to improve the trade balance.

### 2.1.3 Potential for Institutional Investments - Timber Investment Management Organization (TIMO)

Over the last few years, the interest for forest asset investments is growing all over the world. Forest plantations are recognized as an attractive asset for long-term investments due to the promising financial return and the reverse relationship with the volatility of capital markets.

In the Mercosur countries, especially in Brazil, forest plantations have gained attention of international investors due to high forest productivity (MAI) and competitive production cost compared to other countries. These advantages provide more attractive returns compared to management of natural forests located in temperate and tropical regions. A recent study carried by the Inter-American Development Bank (IDB) has ranked Brazil as the most attractive country for forest investments in Latin America.

In the last decade, various financial instruments have been developed to direct and promote investments in forest plantations and in forest-based industry all over the world. Among the mechanisms for institutional investors, TIMOs are an example of forest asset management and investment funds. TIMO was originally developed with focus on insurance companies in the U.S., and is currently associated with other economic sectors such as the forest-based industry, linking investors to forest investments. These organizations work in the areas of fund-raising, forest market analysis, acquisition of forest properties and land, and management of forests to maximize investors' returns.

TIMOs in Brazil have been working with forest asset managing since the late 1990s. They initially started operations in the South, expanding recently to other regions such as the Northeast (Bahia) and Southeast (Minas Gerais). They have been working in the acquisition of planted forest assets and timber trade near established markets. TIMOs consider a minimum profitability of the forestry activity, compared to other alternative land uses or businesses, considering only net profits, discounting the inflation.

In the US, where TIMOs were originally established and concentrate most of their activities, they are about 20 institutions, the majority created in the past few years. In 2007, these organizations had approximately US$ 24 billion of timber assets under management; US$ 17.4 billion in 2006, and less than US$ 4 billion in 1996. The projections show that despite the concentration of forest assets in the US, with some in New Zealand, Australia and South America, it is expected higher investments outside the US, due to opportunities abroad and also taking into consideration the recent and drastic reduction of civil construction activities in the country.

There are other mechanisms of investments in forest plantations in Brazil. For instance, forest asset transfers between companies in line with their business strategies (focusing on industry or on planted forests), investments of associations dealing with planting and legal forest replacement, and establishment of institutional investor groups (national or foreign) focusing on

plantation forests by independent producers not associated to the forest-based industry in Brazil.

The search for institutional investors (in the capital market, investment funds, and others) in forest assets is an important strategy for the forest sector to finance and manage the expansion of forest plantations n Brazil. A recent article of the Exame[3] magazine, published in February 2008, pointed out that the financial resources expected to be invested in Brazil by foreign investors may reach US$ 2.0 billion by 2012.

### 2.1.4 Carbon Market

General concerns on climate change over the last decades have prompted the international community to coordinate efforts to create global mechanisms capable to revert the current situation. As a result, the United Nations Framework Convention on Climate Change (UNFCCC) was established in 1992 with the objective to stabilize the concentrations of greenhouse gases in the atmosphere at the level to reduce negative anthrophic interference in the climate balance of the planet.

The UNFCCC is a legal mechanism that establishes principles complemented by decisions and resolutions of the Conference of the Parties (COP), which is the regular meeting of signatories to the Convention. At the Third COP of UNFCCC, carried out in Kyoto, Japan, the Kyoto Protocol was established, which determines, in its third article, the goals to reduce the emission level of greenhouse gases by developed countries.

The Kyoto Protocol established tree mechanisms to help developed countries to meet the requirements to reduce negative economic impact resulting from the emission reduction. These mechanisms are: Carbon Emission Trade, Joint Implementation, and the Clean Development Mechanisms (CDM).

Among these mechanisms, CDM is the only accessible mechanism to developing countries such as Brazil. CDM enables that developed countries invest in projects for reduction of greenhouse gases emissions or atmospheric carbon dioxide sequestration (main responsible for the greenhouse effect) in developing countries. These investments generate credits to meet the commitments assumed by the developed countries as for the requirement of reduction of greenhouse gases emissions.

The Kyoto Protocol was created in 1997, but entered into force only in February 2005. This delay resulted in the establishment of parallel carbon credit markets (Non-Kyoto), such as the Chicago Climate Exchange (CCX) and its European subsidiary, the European Climate Exchange (ECX) abide by their own rules, differing from the Kyoto Protocol and UNFCCC. The agreements on these parallel markets are established between private companies, without governmental participation, while in the Kyoto Protocol market, the agreement is set between countries. In the Kyoto Protocol, the evaluation and approval of the projects have the participation of governments of the project host country and the carbon credit buyer country.

Forests play an important role in mitigating the effects of climate change. Although the main focus of international negotiations is the reduction of gas emissions in industrialized countries, the attention over developing countries has increased in recent years, once deforestation responds for 35% of the emissions of these countries. If conservation of natural forests is fundamental for the maintenance of the climatic conditions in developing countries, the maintenance and expansion of planted forests is equally important. For instance, it is estimated that one hectare of pine or eucalypt plantations can fix about 30 ton of $CO_2$ per year, generating an additional revenue of about US$ 200 per hectare/year.

CDM forest projects aim to reduce the concentration of carbon dioxide through forest plantations, which could fix $CO_2$ gas during the tree grow process. Although Brazil has unquestionable capability for implementing CDM forest projects, current projects being developed under this category is below the country´s real potential as well as other projects for reduction of gas emission.

Current rules for CDM forest projects have limited the participation of large-scale forest companies in this market. Among the difficulties are the additionality criterion, which define that the CDM forest plantation project must fulfill additional reductions in emissions to the usual activity practiced by the company, this last named baseline (scenario that represents the concentration of $CO_2$ in the absence of the certified CDM project activity), to which it was adopted the year of 1990. Currently, only 14 forest projects, out of the total 3,000 CDM projects under evaluation, have been already certified by the CDM Executive Committee of the United Nations (UN).

Project CDM 2498 utilizes a methodology that considers commercial/industrial utilization of timber (methodology AR-

[3] Exame Magazine, issue 13 February 2008, (911), 102-104 pp.

AM5) was developed by a Brazilian company, affiliated to ABRAF, based on a national experience with plantations. This is an important fact, in such scenario of adverse market, as it shows positive conditions to the establishment of projects to capture and fix atmospheric carbon in Brazil.

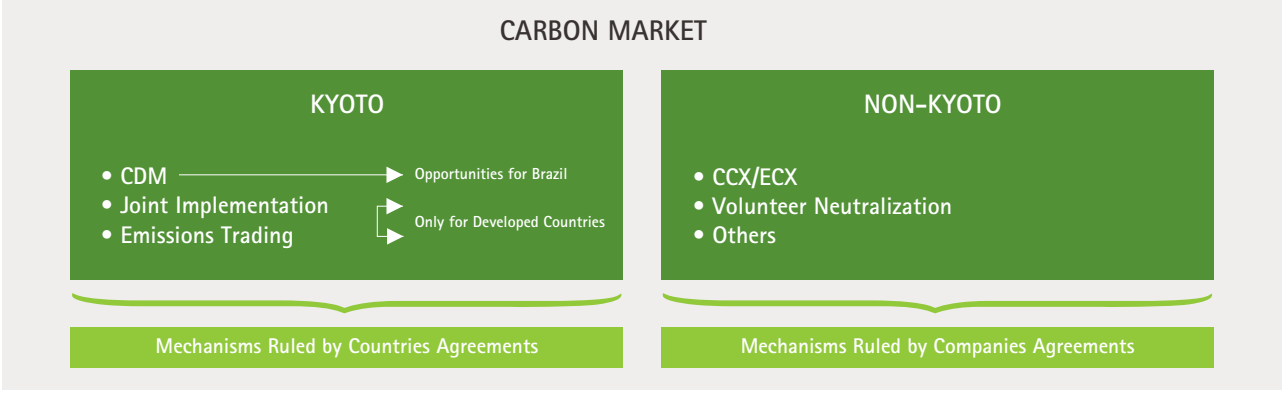
Some Brazilian forest companies have concerted efforts in the climate change for the Chicago Climate Exchange (CCX) as an alternative to the CDM, once CCX rules enable the generation and trade of carbon credits in some situations that may not be not eligible under the CDM rules. Currently, five Brazilian companies, some affiliated to ABRAF, have negotiated carbon credits generated from planted forests.

Besides the CCX, the "Non-Kyoto" carbon market has other voluntary initiatives, as the market for emission neutralization, which intends to neutralize emissions from industrial/commercial businesses through tree planting. Although these market activities have been disseminated by the media, these voluntary schemes of carbon neutralization do not have the same credibility and transparency of that established by the Kyoto Protocol; so companies interested in such mechanism may take such fact into consideration.

Although the carbon market is incipient for Brazilian forest companies, they should be aware of two reasons that may increase its attractiveness: (i) the results of COP 13, held in December 2007 in Bali, Indonesia, points out the need of stricter goals for emission reduction after 2013, which will boost the carbon market and widen the possibility for CDM projects; and (ii) the increasing market interest not only for the financial profit from the carbon credit sale, but also for medium- and long-term benefits from investment in sustainably climate actions.

Figure 2.02 shows a schematic representation of the carbon market and the current opportunities for the forest sector based on planted forests.

Figure 2.02 Carbon Market and Alternatives for the Planted Forest-Based Sector




Source: STCP Database.

## 2.1.5 Trends of Incorporating Production Forestry Activities into State Administration

The public administration and management responsibility for the development of forest resource activities, previously under the Environment Secretary in most of the states, has been gradually transferred to the State Secretary Agriculture in some states. This has taken place in cases such as Minas Gerais and Paraná states.

These initiatives are in response to the requests of forest companies and state forest associations linked to planted forests' production sector. Such transfer has been well-received as a way of making institutional adjustments at the state government level. This was an old demand of the forest plantation segments to incorporate silviculture activities within the scope of state agencies responsible for fostering the activity in the country, recognizing planted forests as a forest crop/agriculture.

SEAPA-MG is responsible for the state forest development since January 2005. According to the Administrative Ordinance (Lei Delegada) 114, SEAPA´s competence includes planted forests with exotic and native species; on the other hand, environmental protection and preservation continue under the responsibility of the Secretary of Environment and Sustainable Development (SEMAD).

In state of Paraná, the responsibility for the development of silviculture activities were transferred from the State Secretary of Environment to the State Secretary of Agriculture in May 2006, with a simultaneous launching of the Paraná Forest Production Program, which defined the scope of silvicultural activities for the state for the next 100 years. Forest companies has praised this change in the responsibility, as forest production activities are now under the responsibility of an institution with the purpose to foster silviculture activities, including planting, development and harvesting.

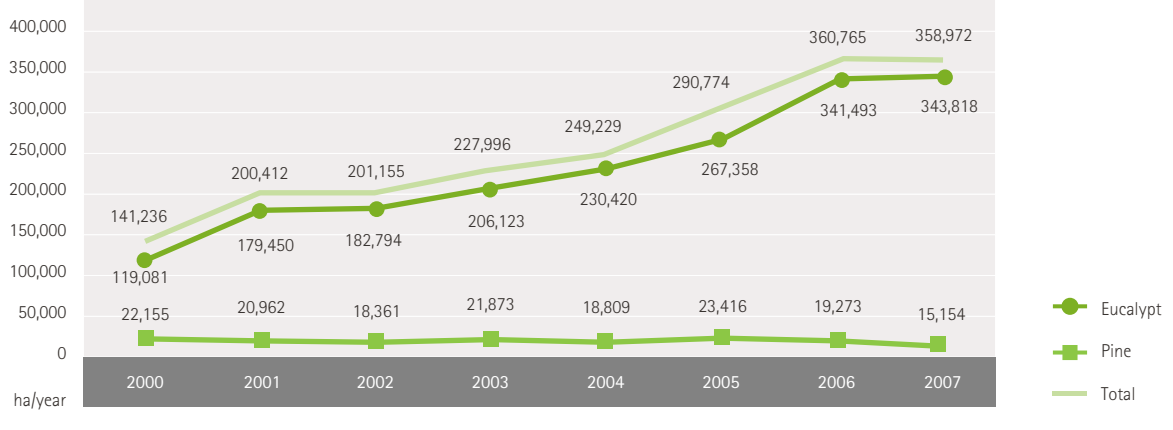
The forest sector is pleased with these changes, considering that production is the main purpose of planted forests activities, and therefore requires to be under the auspices of agencies that promote and foster production and forest plantations. Nevertheless, the responsibilities of environmental agencies should be regulation and control of activities. There is an expectation by the forest sector that such change will eventually take place at the federal level.

## 2.2 Annual Planting Area[4]

Data on forest plantation area were not available by the Ministry of the Environment (MMA) for the closing date of the ABRAF Yearbook 2008 edition. Nevertheless, after analyzing current data on planted area of the Brazilian states, it is estimated that the annual planting area in 2007 may have ranged from 600,000 to 700,000 ha, which will be confirmed after the official publication by the Ministry.

Figure 2.03 shows the evolution of the total eucalypt and pine planting area by ABRAF member companies from 2000-2007. The total pine and eucalypt planting area among ABRAF MEMBERS increased 149.4% from 2000 to 2007; eucalypt planting increased 183.0% and pine planting dropped 31.6% in the period.

Figure 2.03 Evolution of Annual Planting of Forest Plantations[1] by ABRAF Member Companies by Species (2000-2007)



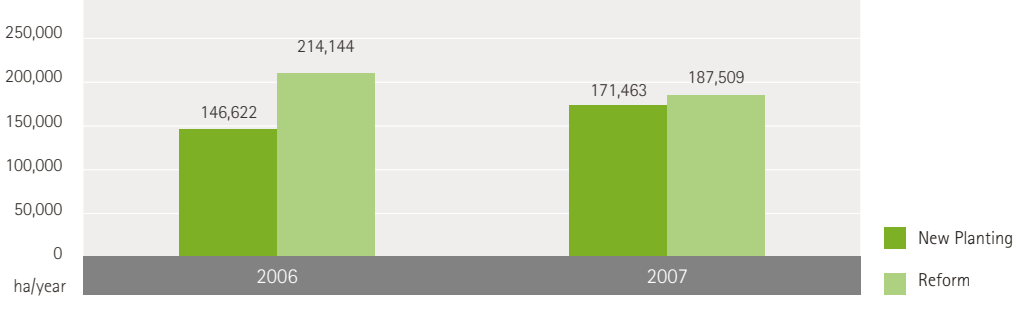

Source: ABRAF Member Companies; STCP, 2007.
[1] It includes forest expansion and reform.

[4] The *annual planting area* encompasses expansion of new areas and reforms (clearcut followed by planting between harvested rows) within one-year period. The *planted area (or forest plantation area)* of a given year refers to the total accumulated area with forest plantation, that is the forest plantation area of the previous year minus the harvested area during the year, plus the reformed area, coppicing area (from management of sprouts from the base of the stump of eucalypt after the clearcut, as conducted by some forest companies), expansion of new areas and acquisition of existing planted areas from other companies in that particular year.

As presented in Chapter 01 of this Yearbook, ABRAF member companies' accumulated forest plantations increased 3.3% in 2007 compared to 2006. This growth is a result of planting (in own or outsourced land areas) and acquisition/merging of other forest companies. However, the 2007 planting followed the planting area of 2006 (360,765 ha planted in 2006 and 358,972 in 2007). As for the planting by species, eucalypt planting increased 0.7% while pine planting reduced 21.4%. In this way, the increase of the total forest plantation area of ABRAF member companies in 2007 may be a result from acquisition of existing planted forests from other non-ABRAF member companies, added to the total accumulated plantation area.

Figure 2.04 shows the evolution of the annual planting area by planting type during the period 2006-2007 by ABRAF member companies: forest expansion area (new planting) and forest reform. Reform decreased 12.3% in 2007 (a fall of 26.6 thousand ha), compared to 2006, while new planting increased 16.9% during the period (24.8 thousand ha). It is important to notice that some companies manage eucalypt forests by coppicing[5]; which, although not quantified in this Yearbook, contribute to the overall company' wood production/supply.

Figure 2.04 Evolution of Annual Planting Area of ABRAF Member Companies by Type: New Planting and Forest Reform (2006-2007)




Source: ABRAF Member Companies; STCP, 2007.

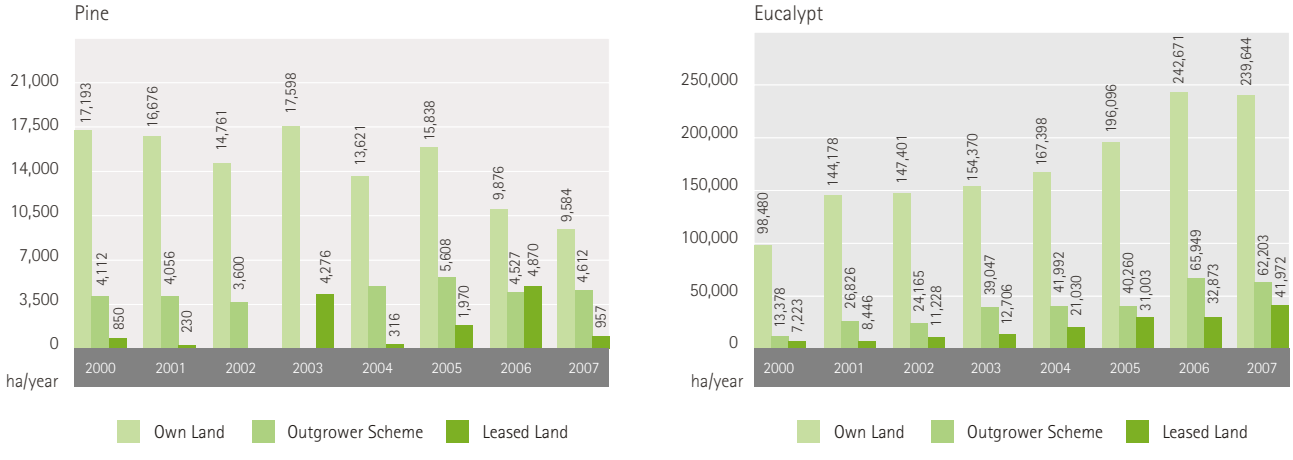
The increased eucalypt planting from 2000 to 2007, as showed in Figure 2.05, is a result of the continuous expansion of own planting by ABRAF member companies, besides the growth of forest outgrower scheme and leased land area.

As for pine, the decreasing trend of planting between 2000-2007 was marked by oscillation of planting in own areas by ABRAF member companies, with a significant reduction of 44.3% over the period. Such situation results from decreased pine planting or substitution of this species group by eucalypt, to meet their industrial strategies. On the other hand, some companies (ABRAF member and non-member) have expanded their annual pine planting. However, these expansions do not compensate the reduction in planting areas.



[5]Coppicing does not result in increase of planted area although it impacts the forest management regime and the wood production.

Figure 2.05 Evolution of Annual Planting by ABRAF Member Companies by Type




Source: ABRAF Member Companies; STCP, 2007.

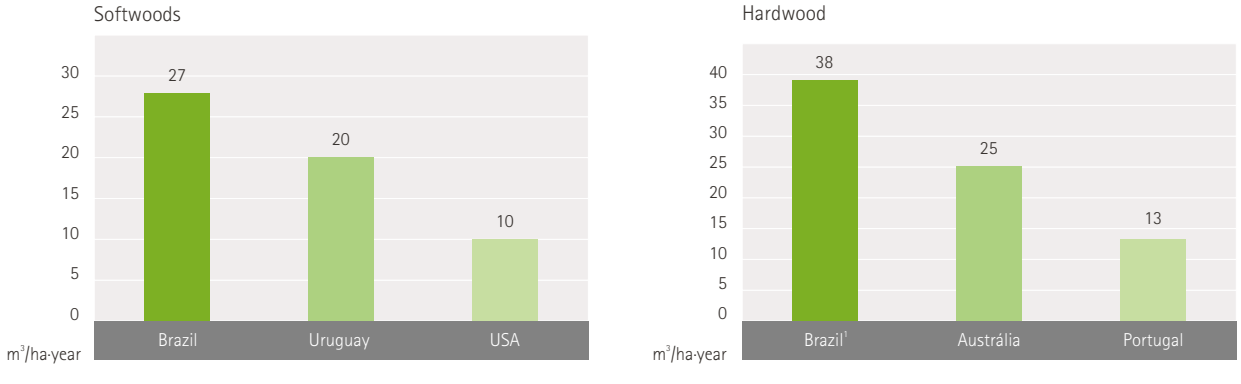
## 2.3 New Technologies and Forest Productivity

The Brazilian forest sector has evolved significantly over the last few years due to the utilization of new technologies aiming to improve the productivity of forest plantations.

The use of *Eucalyptus* clones and genetically-improved pine seedlings for forest planting is increasing to meet adaptive climate and soil requirements (genotype-environmental interaction), among other adversities.

The continuity of forestry research over the past several years has allowed Brazilian companies to reached high forest productivity of coniferous species such as pine, higher than those obtained in countries such as Uruguay and the US. Figure 2.06 shows also high productivity of hardwood species in Brazil (e.g., eucalypt) notably higher than those of Australia and Portugal.

Figure 2.06 Comparison of Softwood and Hardwood Forest Productivity in Brazil and in Selected Countries




Source: STCP Database.

[1] *Eucalyptus spp (hybrid).*

Currently, ABRAF member companies have prioritized gains of MAI by promoting reforms of planted areas with low productivity. Old planted areas have been replaced with high productivity clonal material, which will contribute to increasing MAI over the next few years.

ABRAF member companies have increased MAI over the last few years due to investments in R&D through genetic improvement techniques (biotechnology, hybridization, cloning, transgenic, others), which is a way to optimize the utilization of forest species in terms of fiber size, reduction of lignin content and pulp quality, mostly important for timber, energy and paper mills.

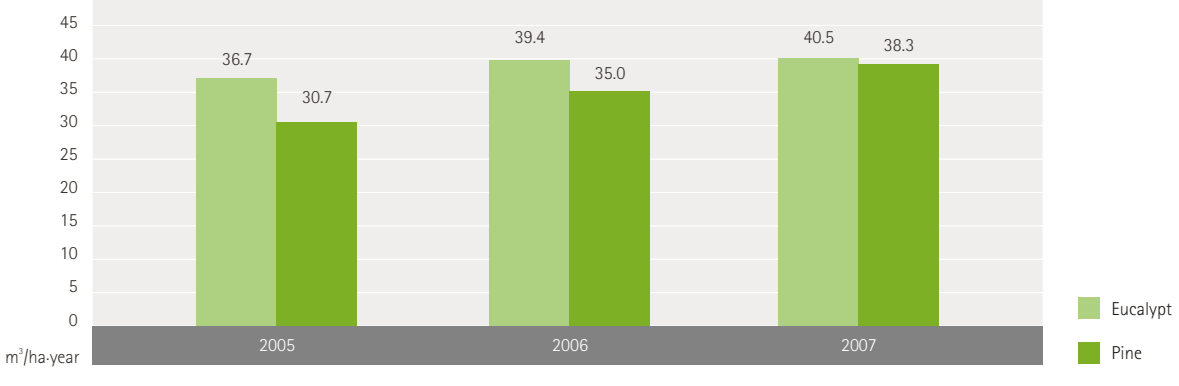
Moreover, companies have selected high-quality improved seedlings for diverse climate and soil conditions, resulting in higher wood production and better wood utilization according to the plantation purpose (pulp, energy, solidwood), such as higher yield for pulp or higher wood density for charcoal.

In general, the main advantages of genetic improvement are: (i) increased growth rate; (ii) tolerance to pest and diseases; (iii) tolerance to herbicides; (iv) improved shape of trees; (v) adaptability to climate and soil conditions; (vi) tolerance to drought and cold; (vii) improved wood quality such as wood density; (ix) lignin reduction and extraction; and (x) fiber quality.

These features and factors have led clones/species to adapt better in selected planting conditions. As a result, it is possible to obtain higher productivity in small plantation areas, which explains the fact that the expansion of new plantation areas has been reduced. Figure 2.07 shows the MAI evolution of pine and eucalypt that are traditionally used species for industrial purposes by ABRAF member companies.

ABRAF member companies have the highest MAI for pine and eucalypt in Brazil, as shown in Figure 2.06. The average weighted productivity (by planted area) of eucalypt plantations increased from 36.7 $m^3$/ha.year in 2005 to 40.5 $m^3$/ha.year in 2007, indicating a significant improvement over the period. Similarly, pine plantation productivity also increased from 2005 to 2007, reaching 38.3 $m^3$/ha.ano in 2007. The high MAI of pine is due to R&D efforts by Southern Brazilian forest companies. On the other hand, the average MAI of eucalypt is affected by the great variability of MAI still found among the ABRAF member companies (the lowest and highest rates are, respectively, 20.1$m^3$/ha.year and 53.0$m^3$/ha.year).

Figure 2.07 Evolution of Mean Annual Increment (MAI) of Forest Plantations by ABRAF Member Companies




Source: ABRAF Member Companies; STCP, 2007.

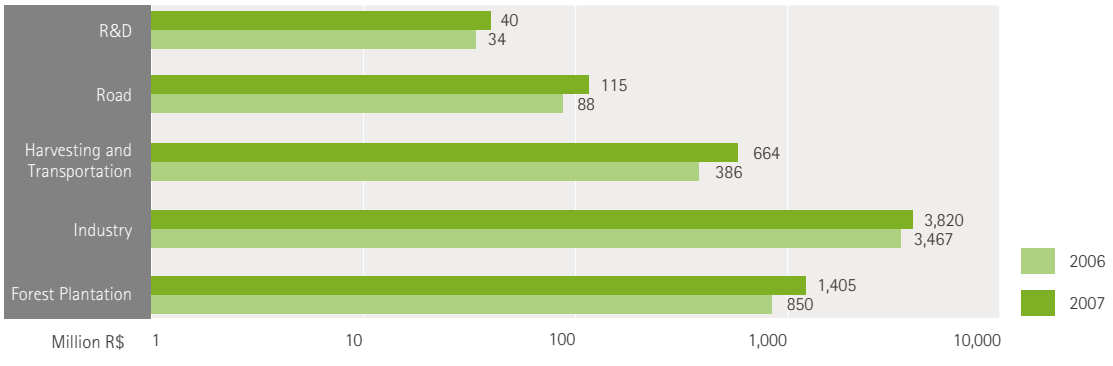
## 2.4 Investments

The Brazilian forest sector has made major investments over the last few years compared to other countries. However, the current real estate crisis in the US and the appreciation of the Brazilian Real against the US dollar made some export-oriented companies of the forest sector to postpone investments due to the decrease in profitability and in demand of their products.

On the other hand, the increase of international wood product prices, the boosting of the civil construction sector and other wood-consuming segments in Brazil - benefited from the "Growth Acceleration Plan (PAC)" of the federal governmental - have stimulated new investments in the domestic forest sector. The domestic civil construction sector increased 7.9% in 2007, exceeding the growth of the country's GDP. In 2007, the PAC invested only R$ 1.9 billion in the civil construction sector in spite of R$ 15 billion designated to the sector, with the difference set to be invested in 2008.

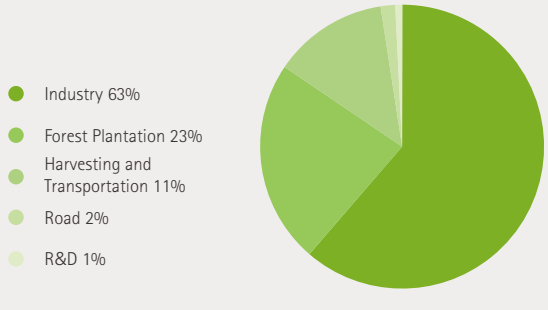
The ABRAF member companies invested R$ 6 billion in the Brazilian forest sector in 2007, a nominal increase of 25.3% in comparison to 2006, as shown in Figure 2.08 and 2.09.

Figure 2.08 Investments in Industrial-Forestry Activities by ABRAF Member Companies (2006-2007)




Source: ABRAF Member Companies; STCP, 2007.
[1] Total approved and ongoing investments.

Figure 2.09 Distribution of Investments by ABRAF Member Companies in 2007

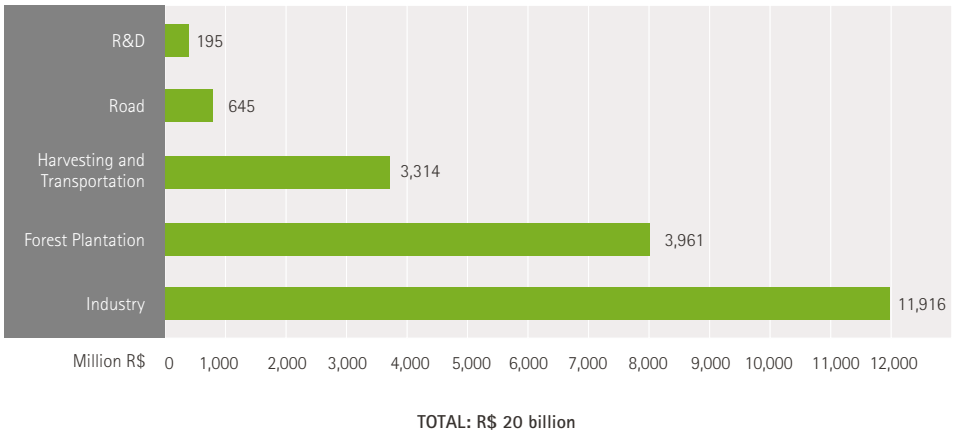



TOTAL: R$ 6.04 billion

Source: ABRAF Member Companies; STCP, 2007.

The perspectives of investments of ABRAF member companies up to 2012 are BRL 20 billion as presented in Figure 2.10.

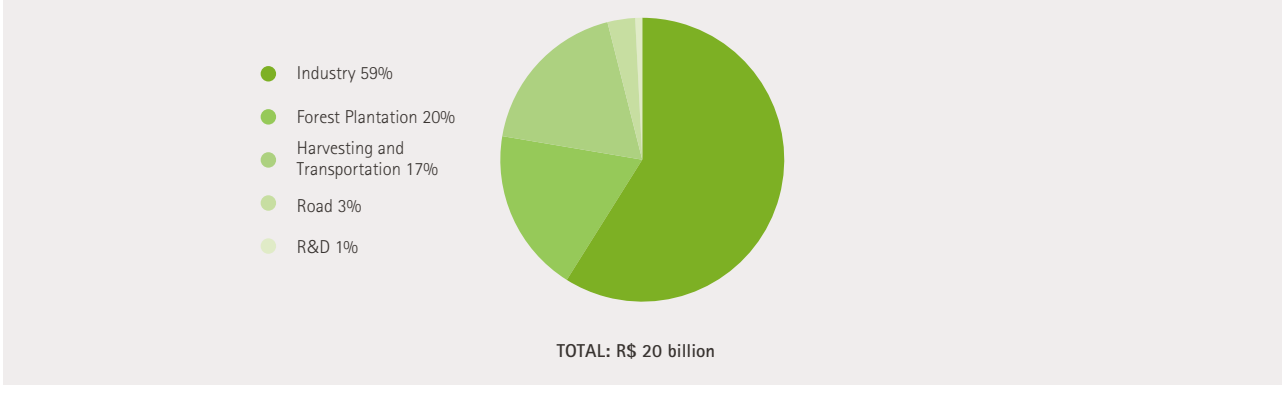
Figure 2.10 Perspectives of Investments by ABRAF Member Companies in Forest and Industrial Activities up to 2012




Source: ABRAF Member Companies; STCP, 2007.

The investments in forest reform and in new forest planting may reach approximately R$ 3.9 billion, while harvesting and transport activities may get R$ 3.3 billion. Due to gains in forest production, the industrial investments may reach R$ 11.9 million; R$ 645 million in road investment, and R$ 195 million in R&D.

Figure 2.11 Distribution of Future Investments by ABRAF Member Companies up to 2012




Source: ABRAF Member Companies; STCP, 2007.

Figure 2.11 shows future investments by ABRAF member companies up to 2012. The total estimated investment by 2012 is BRL 20 billion; out of which 59% will be oriented to industrial plants; 20% for forest plantation, 17% for harvesting and transportation, and 4% for roads and R&D.

# Chapter 3

## Forest Products Market

### Roundwood

#### Roundwood Production

#### Roundwood Consumption

### Main Products Derived from Planted Forests

#### Production and Consumption

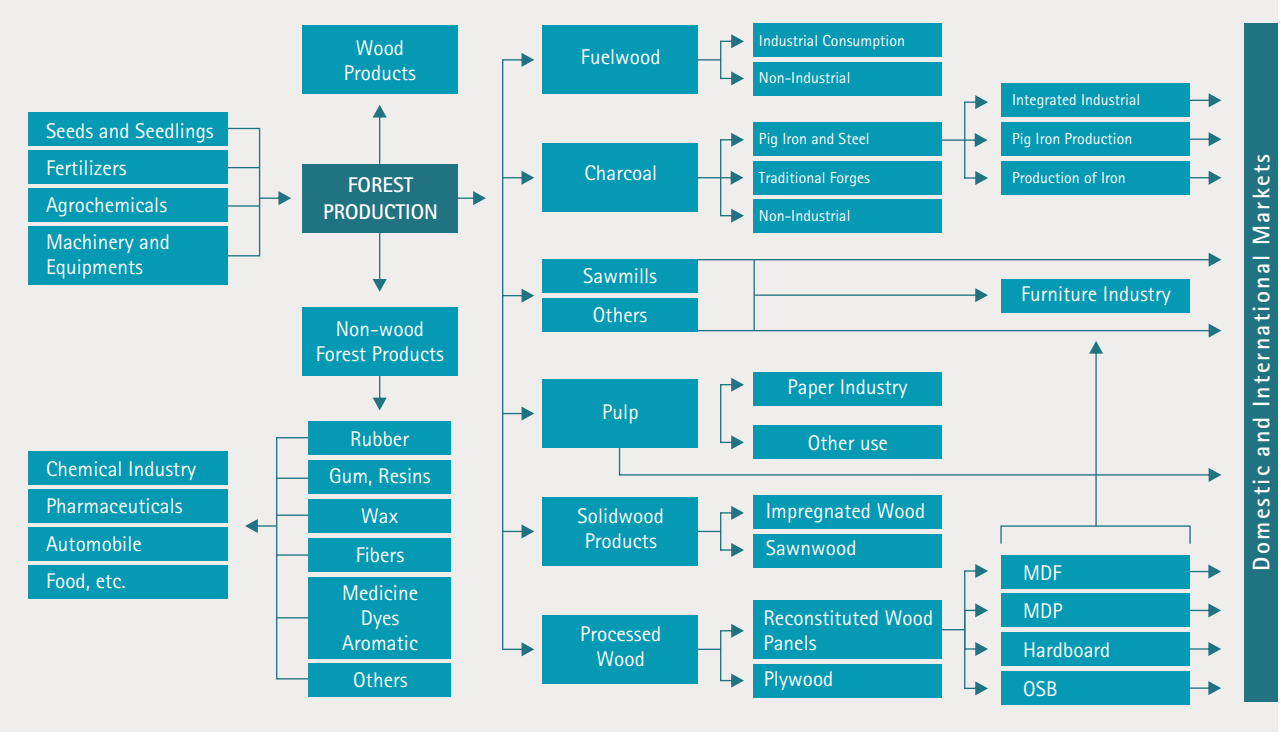
#### International Trade

# 3 Forest Product Market

The Federal Government has recently adopted measures to halt illegal logging in the Legal Amazon. These measures were widely disseminated by the media, and also contributed to draw attention to the forest plantation sector. Forest plantation is a sound option to avoid clear cutting of natural forests, it also contributes to recovering permanent preservation areas and degraded legal reserve areas. Planted forest is, currently, the main source of raw material for pulp and paper, wood panels, charcoal-based pig-iron and steel industry, solidwood products and furniture. In addition, it has been used as renewable energy source for a wide range of activities and provides raw material for non-wood forest products (NWFP).

Figure 3.01 presents the Agribusiness Forest System (SAG-Florestal), which consists of seven large production chains, being six of wood products, such as energy, charcoal, sawnwood, pulp and paper, solidwood products and processed wood. The non-wood sector is represented by only a large production chain composed by a group of small chain linked to the industrial and chemical processing sector, pharmaceutical products and foodstuff.

Figure 3.01 Agribusiness Forest System (SAG-Florestal)




Source: VIEIRA, L. *Setor Florestal em Minas Gerais: Caracterização e Dimensionamento.* Belo Horizonte – Universidade Federal de Minas Gerais, 2004. Adapted ABRAF/SCTP.

## 3.1 Roundwood

### 3.1.1 Roundwood Production

Sustainable forest production of pine and eucalyptus in Brazil was 191.4 million m³/year in 2007, increased 4.0% compared to 2006. It should be noted that "sustainable production" of species is the potential growth calculated by the planted area and its MAI rate. Eucalypt represents 74% of the total production and pine 26%, as presented in Table 3.01.

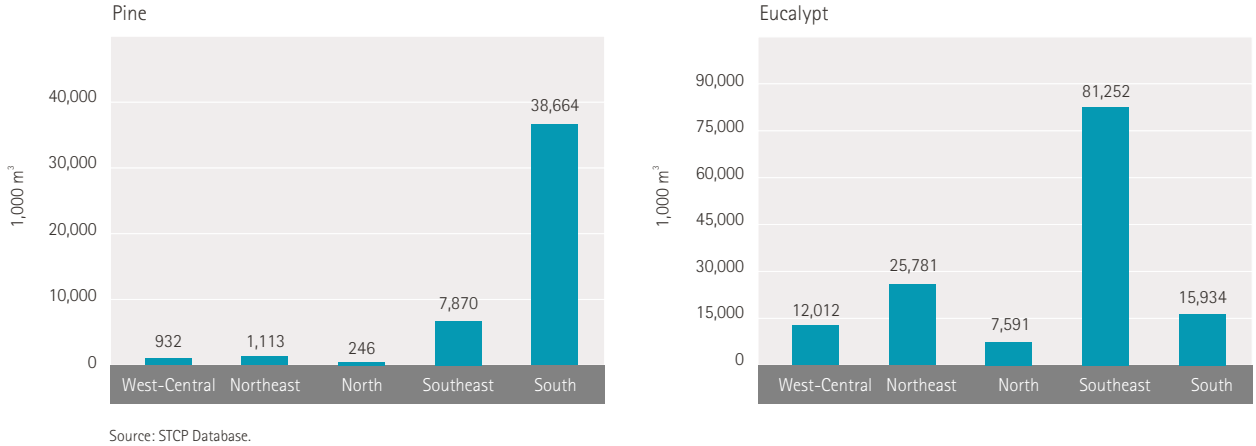
Table 3.01 Estimate of Sustainable Production of Pine and Eucalypt Roundwood in Brazil (2007)

| Species | 2006 | | | | 2007 | | | |
|---|---|---|---|---|---|---|---|---|
| | Planted Area (1,000 ha) | MAI[1] (m³/ha.year) | Sustainable Production (1,000 m³/year) | % | Planted Area (1,000 ha) | MAI[1] (m³/ha.year) | Sustainable Production (1,000 m³/year) | % |
| Pine | 1,824 | 27 | 49,225 | 27 | 1,808 | 27 | 48,825 | 26 |
| Eucalypt | 3,549 | 38 | 134,868 | 73 | 3,752 | 38 | 142,571 | 74 |
| **TOTAL** | **5,373** | **-** | **184,123** | **100** | **5,560** | **-** | **191,396** | **100** |

[1] MAI – Mean Annual Increment
Source: FAO; STCP, 2007.

Figure 3.02 shows that 95.3% of pine roundwood production concentrates in the South and Southeast regions of Brazil. This concentration is due to the advanced development level of timber industry in these regions, which produce principally sawnwood, plywood and reconstituted panels.

Figure 3.02 Estimate of Sustainable Production of Forest Plantation by Region in Brazil

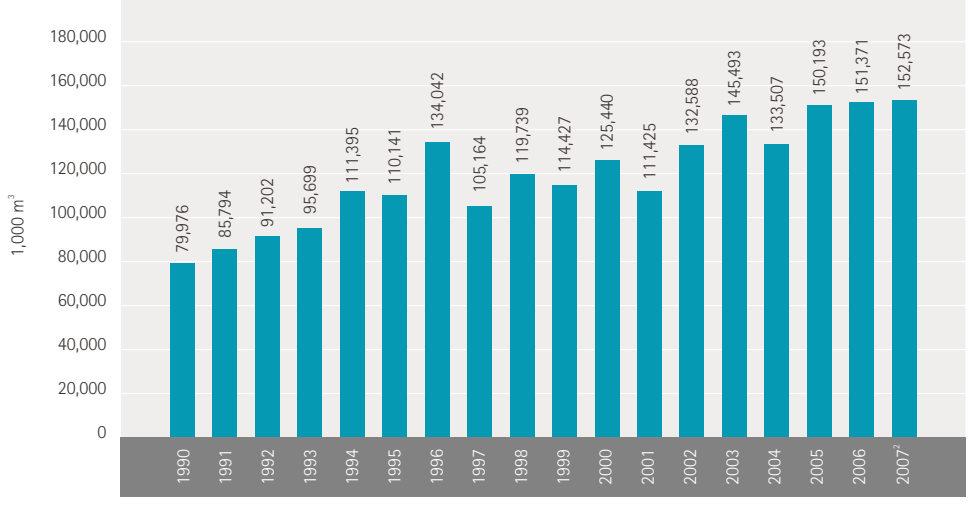



Source: STCP Database.

Regarding eucalypt roundwood sustainable production, approximately 86.3% of the national sustainable production concentrates in the South, Northeast, and Southeast regions of Brazil. These forest plantations are associated to pulp and paper industry, charcoal-based pig-iron and steel production, and reconstituted panel industry in these regions.

Figure 3.03 shows a slight growing trend for roundwood production from forest plantation in 2007. Estimated annual roundwood production for industrial use is 0.8% increase in 2007 compared to 2006, increasing from 151.4 million to 152.6 million $m^3$.

Figure 3.03 Annual Roundwood Production from Forest Plantations for Industrial Use in Brazil (1990-2007)[1]

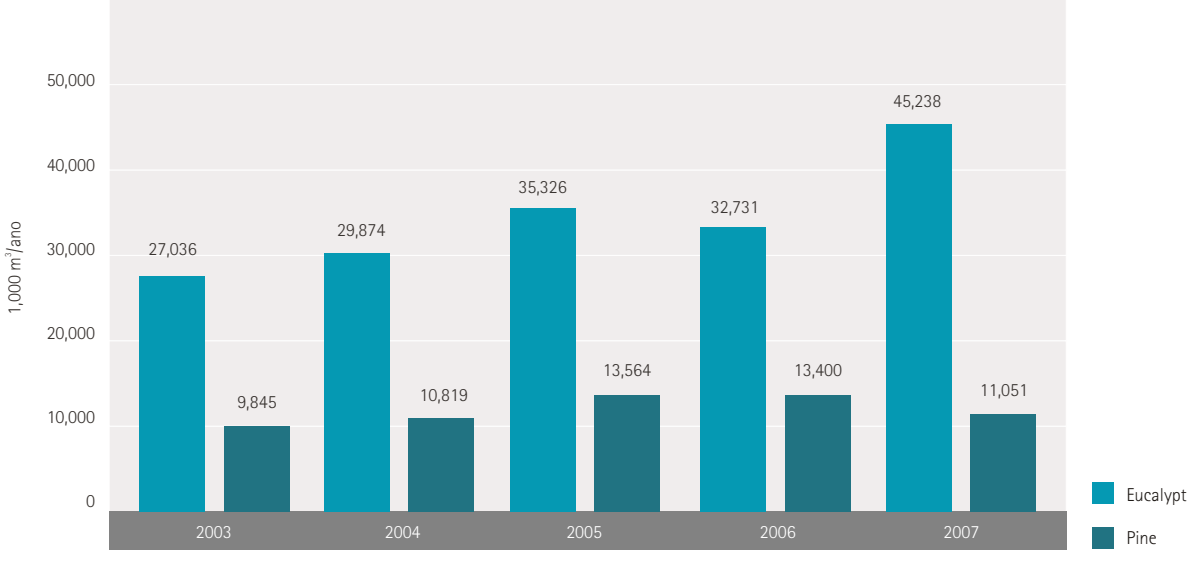



Source: IBGE, 2008.
[1] It includes charcoal, fuelwood and log for energy, pulp, sawnwood and veneer.
[2] STCP estimate.

It should be noted that timber companies have made efforts to increase their forest outgrowing schemes as an alternative for the expansion of their forests, aiming to increase their production capacity.

Figure 3.04 presents pine and eucalypt roundwood production during the period 2003-2007, according to information provided by ABRAF member companies. Despite 7.3% drop in eucalypt roundwood production in 2006 compared to 2005, the production improved increasing 38.2% in 2007 compared to the previous year. On the other hand, pine production that dropped 1.2% in 2006 compared to 2005 continued dropping in 2007, decreasing 17.5% in relation to the previous year.

Figure 3.04 Roundwood Production by ABRAF Member Companies (2003-2007)



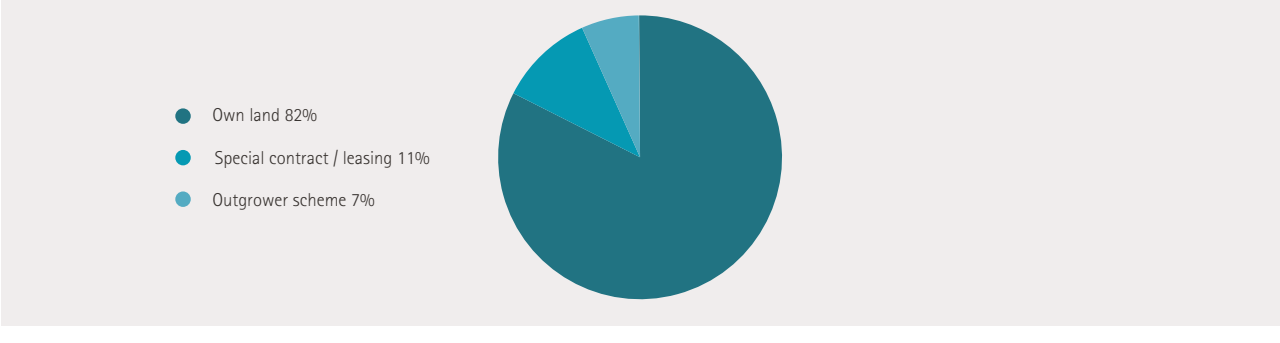

Source: ABRAF Member Companies; STCP, 2007.

Regarding the source of raw material utilized by ABRAF member companies in 2007, 82% came from their own plantations, 11% from special contracts and leasing, and 7% from outgrower schemes, as shown in Figure 3.05.

The percentage of forest plantations on their own lands was 84% in 2006, decreasing 2% in 2007. This percentage reduction was compensated by timber from outgrower schemes, leasing land and outsourcing, which increased from 5% in 2006 to 7% in 2007. The companies have developed outgrower schemes and forest partnership programs as alternatives to expand their forest base to supply their industry production capacity increase.

The expansion of outgrower schemes, leasing land and outsourcing is a common trend among ABRAF member companies for several reasons; for instance, benefit sharing with small and medium-sized rural producers.

Figure 3.05 Source of Raw Material for ABRAF Member Companies (2007)




Source: ABRAF Member Companies; STCP, 2007.

### 3.1.2 Roundwood Consumption

Major roundwood consumers are large-scale companies, especially those related to pulp and paper industry and reconstituted panel production, which use modern technologies for forest activities and industrial processing plants. On the other hand, small and medium-sized companies consume roundwood for sawnwood, plywood and furniture production. The majority of these small-sized companies are family-run business, without modern technologies and with low level of mechanization.

Considering that international trade in roundwood from planted forests is insignificant for Brazil, so that the total production is equal to domestic consumption. Figure 3.02 presented above summarizes the trend of planted forest roundwood annual consumption for industrial use in Brazil.

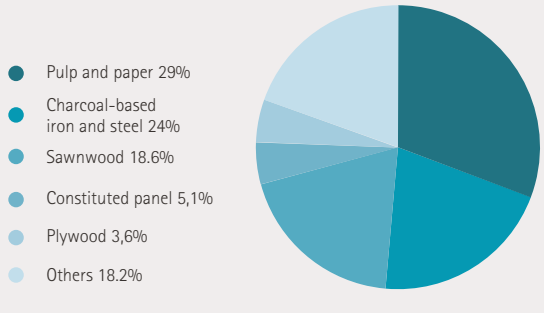
In 2007, the total roundwood consumption from forest plantations was 155.7 million $m^3$; of which 32.1% pine and 67.9% eucalypt. The pulp and paper industry is the main user consuming 30.5% of the total production, iron ore and steel industry 24.0%, sawnwood 18.6%, and plywood and reconstituted panel 5.1 %, as shown in Table 3.02 and Figure 3.06.

Table 3.02 Roundwood Consumption for Industrial Use in Brazil by Segment and Timber Species (2006-2007)[1]

| Segment | Roundwood Consumption (1,000 $m^3$) - 2006 | | | Roundwood Consumption (1,000 $m^3$) - 2007[2] | | |
|---|---|---|---|---|---|---|
| | Pine | Eucalipt | TOTAL | Pine | Eucalipt | TOTAL |
| 1. Pulp and Paper | 7,185 | 39,576 | 46,761 | 7,231 | 40,271 | 47,502 |
| 2. Reconstituted panels | 5,803 | 1,546 | 7,349 | 6,194 | 1,737 | 7,931 |
| 3. Wood Industry[3] | | | | | | |
| - Plywood | 6,531 | 144 | 6,675 | 5,445 | 154 | 5,599 |
| - Sawnwood[3] | 25,418 | 2,992 | 28,410 | 25,928 | 3,052 | 28,980 |
| 4. Charcoal | 0 | 34,537 | 34,537 | 0 | 37,352 | 37,352 |
| 5. Others[3] | 5,189 | 22,987 | 28,176 | 5,215 | 23,075 | 28,290 |
| TOTAL (Silviculture) | **50,126** | **101,782** | **151,908** | **50,013** | **105,641** | **155,654** |

Source: STCP; AMS, 2004.
[1] Estimated values based on factors (see Methodological Notes, Chapter 05, Section 5.3).
[2] STCP estimate.
[3] It includes Value-Added Product (flooring, door, window, moulding, tools and *Edge Glued Panel* - EGP).
4 It includes chips and fuelwood from forest plantation for exports.

Figure 3.06 Roundwood Consumption from Forest plantations by Segment (2007)



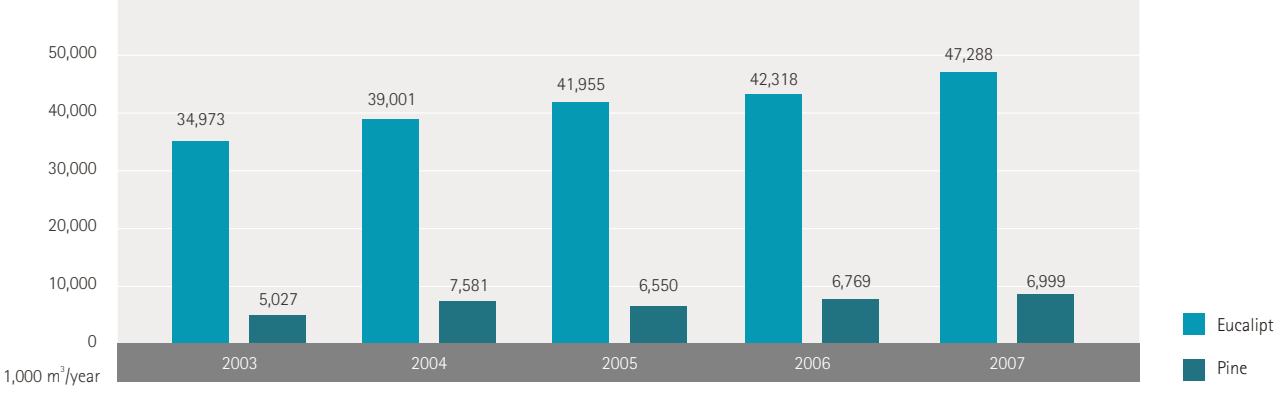

**TOTAL: R$ 155,7 million $m^3$**

Source: STCP, ABIPA, BRACELPA, AMS, 2007.

In 2007, the roundwood consumption by ABRAF member companies was 54,3 million $m^3$, representing 10.6% increase in relation the previous year.

Eucalypt roundwood consumption increased over the last few years, growing 11.4% in 2007 compared to 2006. However, pine roundwood consumption has oscillated, decreasing 13.6% in 2005 and increasing 3.3% in 2006, and 3.4% in 2007 compared to the previous year (Figure 3.07).

Figure 3.07 Roundwood Consumption by ABRAF Member Companies (2003-2007)



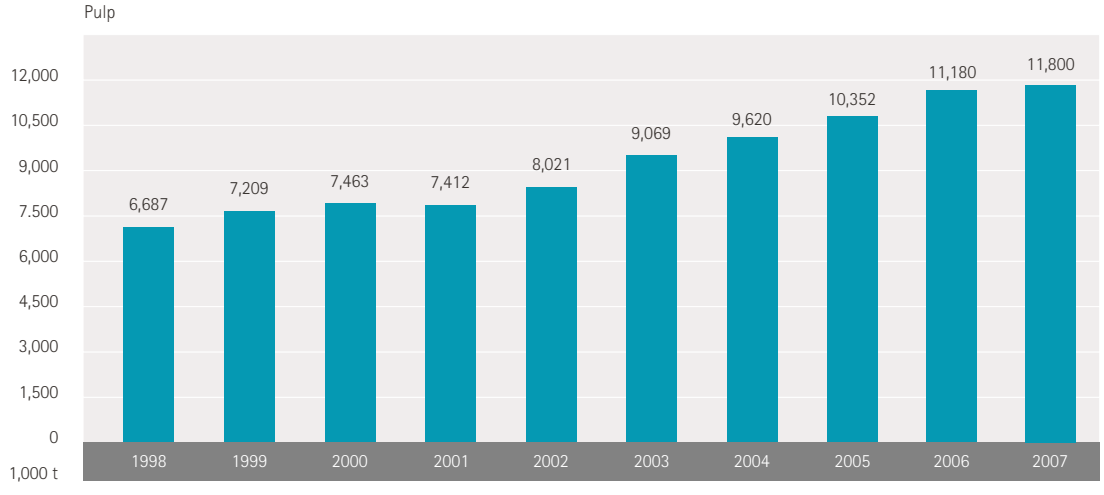

Source: ABRAF Member Companies; STCP, 2007.

## 3.2 Main Products Derived from Forest Plantations

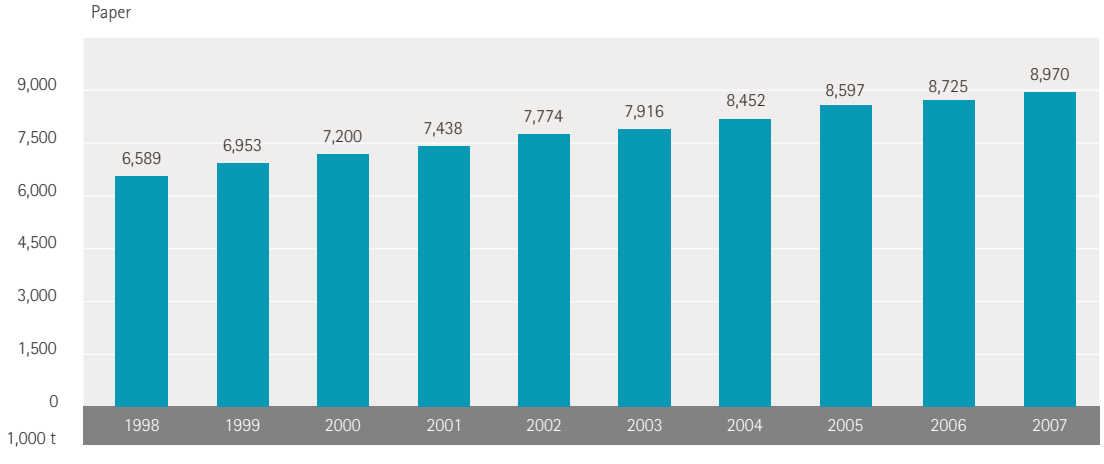
### 3.2.1 Production and Consumption

Figure 3.08 and Figure 3.09 present, respectively, production and consumption of pulp and paper, reconstituted panels (for furniture industry and civil construction), solidwood products and charcoal (consumption) that is part of the SAG – Florestal, which is integrated to the forest plantation sector.

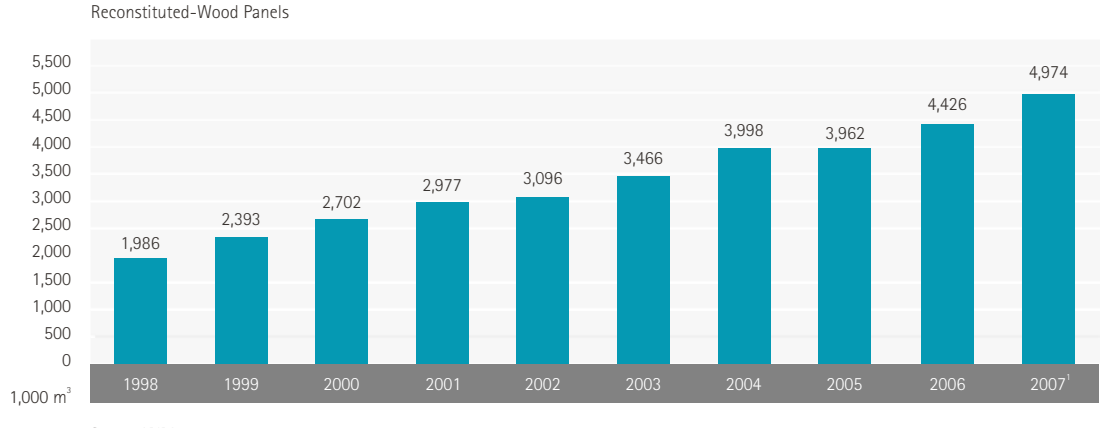
Figure 3.08 Production of Main Products from Forest Plantations in Brazil (1998-2007)




Source: BRACELPA, 2007.

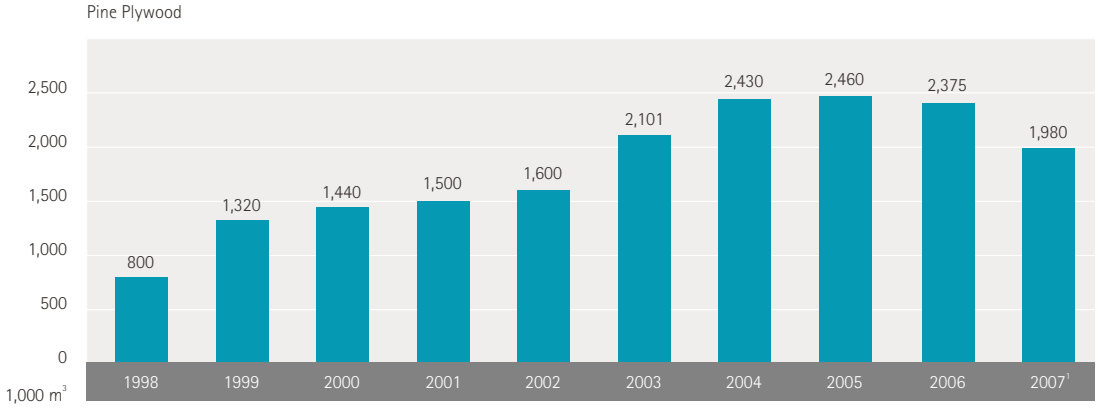



Source: BRACELPA, 2007.

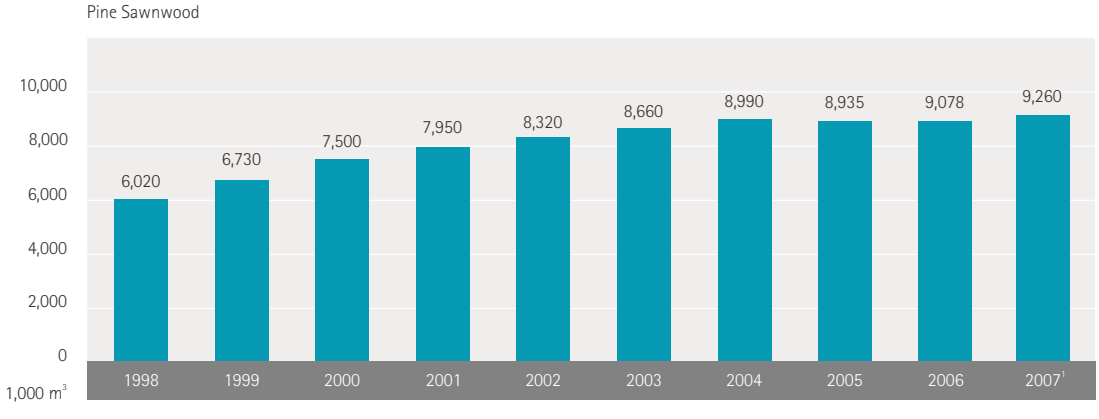



Source: ABIPA, 2007.
[1] Estimated Data.

Figure 3.08 Production of Main Products from Forest Plantations in Brazil (1998-2007) Continued




Source: ABIMCI, 2007.
[1] Estimated Data.




Source: ABIMCI, 2007.
[1] Estimated Data.

The pulp production in Brazil has presented constant growth, increasing 76.5% from 1998 to 2007, corresponding to an average 6.5% increase per year. Thus, pulp production increased from approximately 11.2 million tons in 2006 to 11.8 million tons in 2007; similarly, pulp consumption increased from 5.3 million tons in 2006 to 5.6 million tons in 2007. The total domestic consumption grew 3.1% per year during the period, which represented 47.1% of the total production in 2007 (Figure 3.08 and Figure 3.09).

The paper production was approximately 9.0 million tons in 2007, representing an increase of 36.1% compared to 1998. The average growth from 1998 to 2007 was 3.5% per year. The main types of paper produced in Brazil are packaging, printing, cardboard and sanitary papers. On the other hand, paper consumption increased from 7.7 million in 2006 to 8.0 million tons in 2007, a 4.1% growth in the period.

The Wood panel production presented remarkable growth, reaching 4.9 million m³ in 2007, representing 10.7% increase per year (during the period 1998-2007); the wood panel consumption was comparable to its production in 2007, which is mainly destined to supply the domestic furniture industry.

The Pine plywood production has gone through difficulties in 2007 due to a strong dependence on exports, mainly to the US. Thus, the production dropped 16.6% during 2006-2007 following the previous year (2006) in that the production rate dropped 3.5% compared to 2005. On the other hand, the pine plywood consumption increased 13.1% in 2006 and 1.9% in 2007,

compared to the previous years, respectively. It should be noted that pine plywood consumption is considerably lower than its production in Brazil. This is due to the fact that the majority of the production goes to exports.

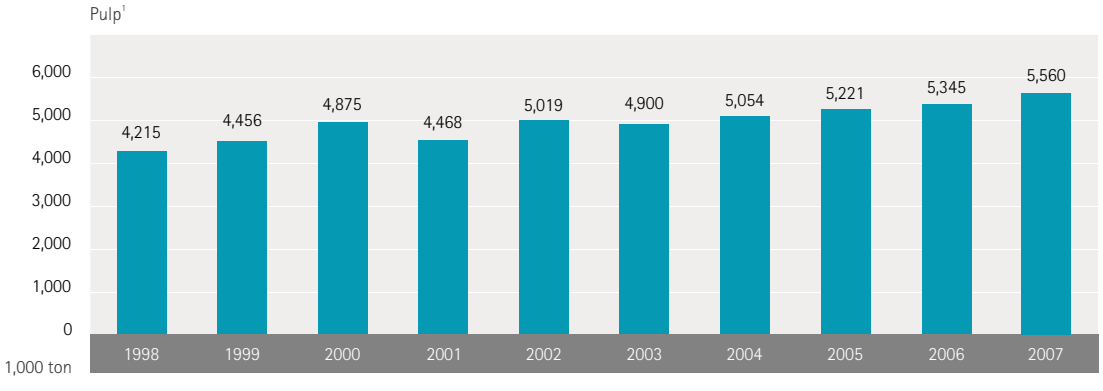
The pine sawnwood production, which is mainly for the domestic market, increased 2% in 2007 compared to the previous year, producing approximately 9.3 million $m^3$. Similarly, pine sawnwood consumption increased 2.5% in 2007 in relation to 2006, reaching approximately 8 million $m^3$, as presented in Figures 3.08 and 3.09.

The main charcoal consumer state in Brazil is Minas Gerais, followed by the Carajás pig-iron and steel industry cluster (Maranhão and Pará). The estimated charcoal domestic consumption in 2007 was 17.5 million cubic meter of charcoal (MDC), as shown in Figure 3.08. It should be noted 2.4% drop in charcoal consumption from forest plantation from 2006 to 2007; this is partially explained by the decrease in pig-iron production in Minas Gerais.

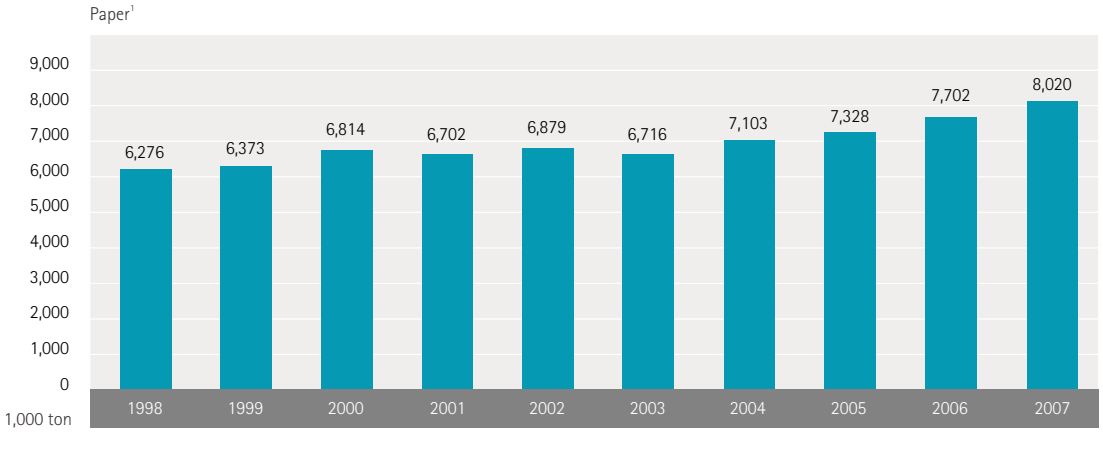
The consumption data is based on apparent consumption, considering that the Brazilian charcoal consumption is equal to its production. In Brazil, there is no reliable data on charcoal production due to its migratory, temporary and widespread characteristics, which is largely produced in small-scale charcoal ovens. This makes it difficult to have a systematic data survey.

There is a trend to increase the domestic consumption of charcoal from forest plantations by some sectors of the economy, which have partly replaced fossil fuels to charcoal.

Figure 3.09 Domestic Consumption of Forest Products Derived From Forest Plantation (1998-2007)




Source: BRACELPA, 2007.
[1] Apparent Consumption = Production + Imports– Exports + Stock.

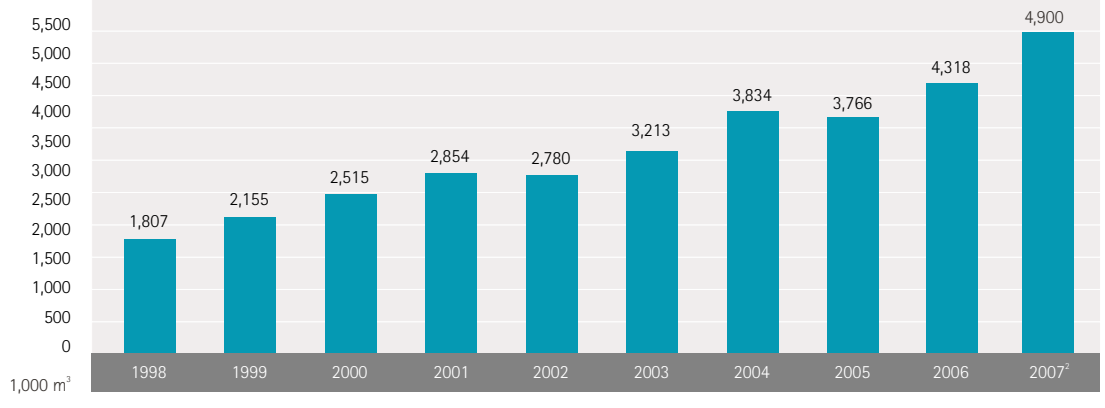



Source: BRACELPA, 2007.
[1] Apparent Consumption = Production + Imports– Exports + Stock.

## Figure 3.09 Domestic Consumption of Forest Products Derived From Forest Plantation (1998-2007)

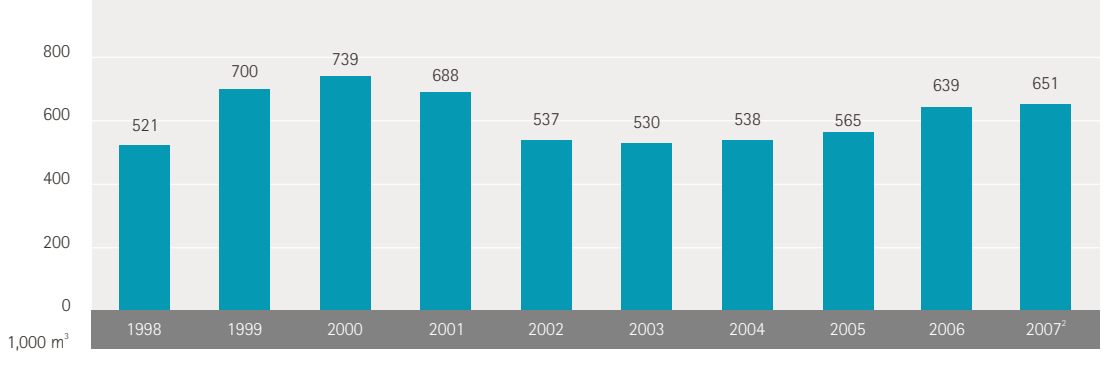
Continued

Reconstituted-wood Panels[1]



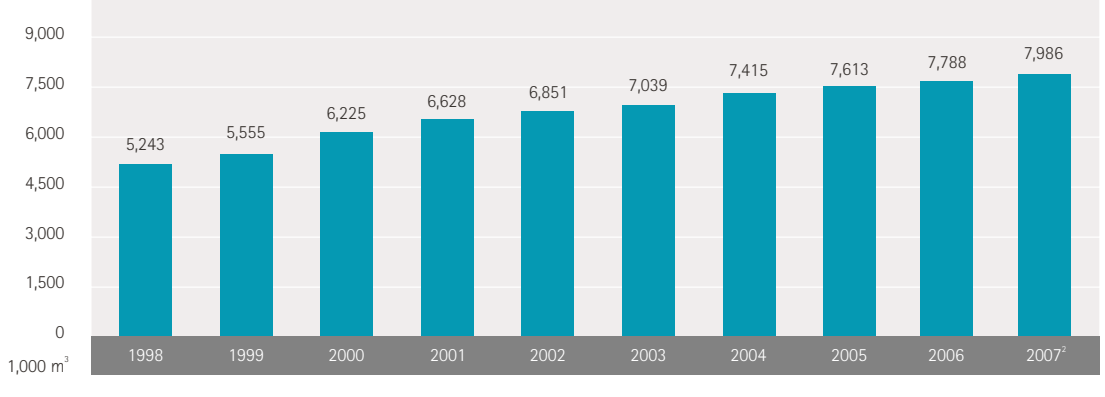

Source: ABIPA, 2007.
[1] Apparent Consumption = Production + Imports– Exports + Stock.
[2] Estimated Data.

Pine Plywood[1]



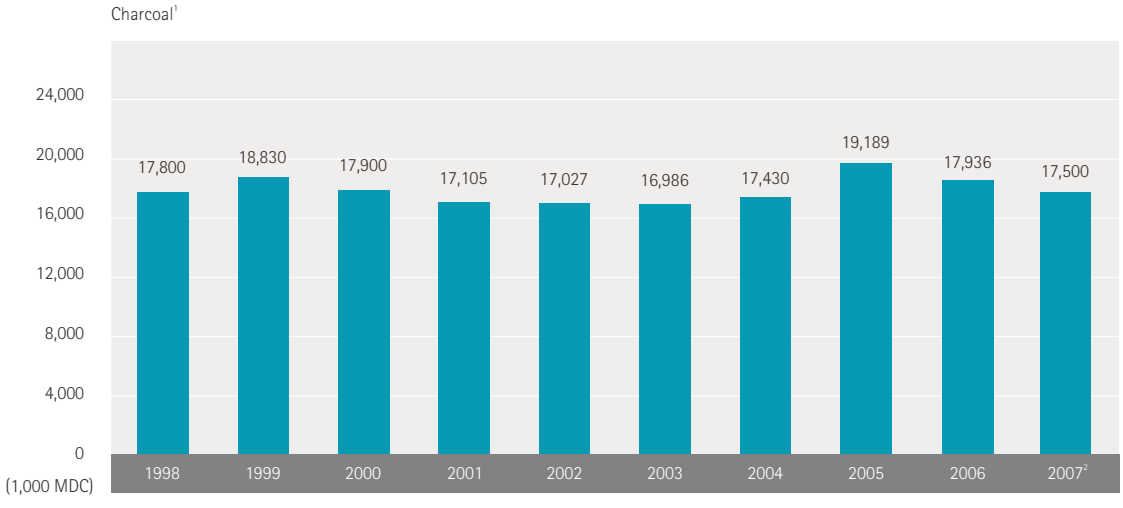

Source: ABIMCI, 2007.
[1] Apparent Consumption = Production + Imports– Exports + Stock.
[2] Estimated Data.

Pine Sawnwood[1]




Source: ABIMCI, 2007.
[1] Apparent Consumption = Production + Imports– Exports + Stock.
[2] Estimated Data.

Figure 3.09 Domestic Consumption of Forest Products Derived From Forest Plantation (1998-2007) Continued

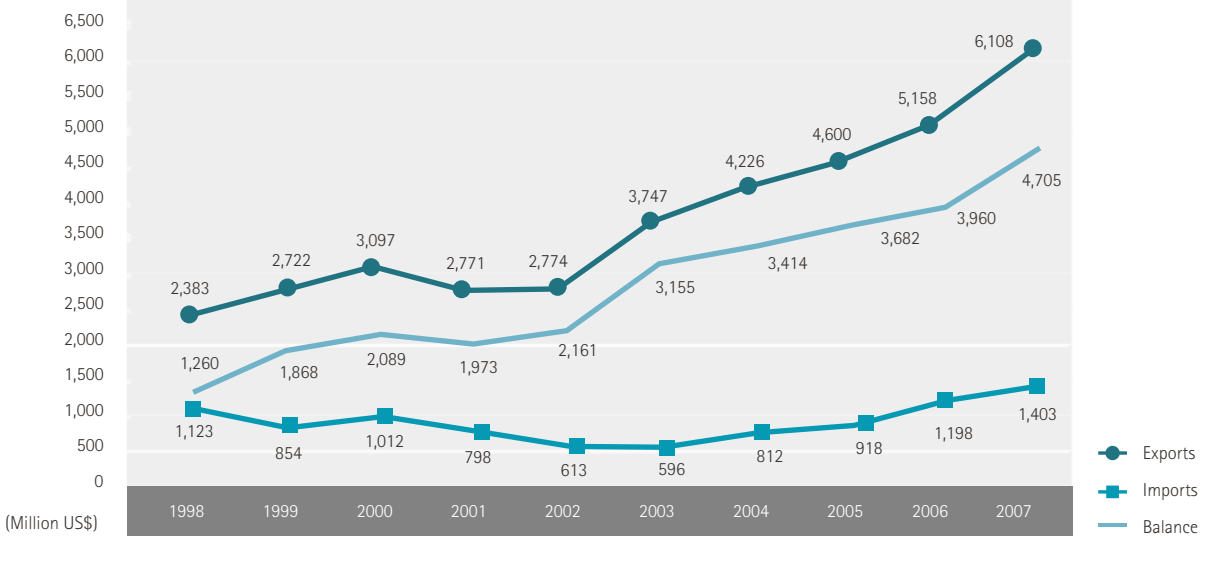



Source: AMS, SINDIFER, 2007.
[1] Apparent Consumption = Production + Imports– Exports + Stock.
[2] Estimated Data.

## 3.2.2 International Trade

The Brazilian exports reached US$ 160.6 billion in 2007, beating the 2006 record, when US$ 137.5 billion were exported. Following this trend, the foreign sales of forest products increased 12.4% in 2007, while the exports of products from forest plantations reached US$ 6.1 billion, exceeding the 2006 sales, representing 18.4%. The imports of products from forest plantations increased 17.1% from 2006 to 2007, reaching US$ 1.4 billion although the volume is much lower than the exported volume (Figure 3.10).

Figure 3.10 Trade Balance of Forest Plantation-Based Products in Brazil (1998-2007)




Source: SECEX, 2007.

Although the Brazilian currency appreciation has affected the competitiveness of forest products, the exports continued to increase over the last few years, which reflect the conscious efforts of the producers to continue in the international market overcoming the exchange rate disadvantage.

Table 3.03 shows the trend of exported forest products from forest plantations during the period 2001-2007. The most representative product is pulp and paper, 49.5% and 32.8%, respectively, together represent 82.4% of the total exports. Other products such as sawnwood, reconstituted-wood panels, plywood and charcoal have low participation in the exports because they are mainly oriented for the domestic market.

## Table 3.03 Exports of Brazilian Forest Products from Forest Plantations

| | Exports (US$ Million) | | | | | | |
|---|---|---|---|---|---|---|---|
| Product | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 |
| Pulp | 1,247 | 1,160 | 1,744 | 1,722 | 2,034 | 2,484 | 3,024 |
| Paper | 943 | 894 | 1,087 | 1,187 | 1,371 | 1,521 | 2,006 |
| Sawnwood[1] | 229 | 245 | 255 | 294 | 304 | 275 | 257 |
| Reconstituted Panels | 71 | 97 | 121 | 161 | 176 | 175 | 146 |
| Plywood[1] | 156 | 211 | 344 | 521 | 510 | 438 | 422 |
| Charcoal | 2 | 2 | 2 | 6 | 4 | 3 | 3 |
| Others | 124 | 165 | 194 | 335 | 201 | 262 | 250 |
| **TOTAL[2]** | **2,771** | **2,774** | **3,747** | **4,226** | **4,600** | **5,158** | **6,108** |

Source: SECEX, 2007; adapted by STCP.

[1] It includes only Pine.

[2] The total exports of the forest sector (natural and planted forests).

# Chapter 4

## Importance of Forest Plantations for Brazil

Taxes
Gross Forest Product Value (GFPV)
Job Generation
Financing Mechanisms for Forest Plantations in Brazil
Human Development Index (HDI)
Environment
Social Responsibility
Forest Outgrower Scheme
Health Care Programs
Non-Wood Forest Products
Environmental Programs
Education and Culture

# 4 Importance of Forest Plantations for Brazil

The forest plantation sector in Brazil has an important social and economic role, contributing to job creation, foreign currency and taxes, as well as income generation through value-added timber products. The diversification of the productive chain of forest plantation activities has resulted in an accelerated multiplying effect to the national economy.

The information presented in this chapter was collected and analyzed applying methodologies developed and described in Chapter 5 of this Yearbook.

## 4.1 Taxes

The forest plantation sector generates government revenue in form of taxes, contributions and fees. The main federal, state and municipal taxes paid by the forest-based sector are the Corporate Income Tax (IRPJ), the Tax over Circulation of Goods and Services (ICMS), the Contribution for Social Security Financing (COFINS), the Social Integration Program (PIS), the Program for Public Servant Fund (PASEP), the Municipal Service Tax (ISS), the Federal Tax on Financial Transactions (IOF), the Temporary Tax on Financial Movement (CPMF)[1] and the Federal Rural Property Tax (ITR).

The contribution of forest plantation sector as for tax collection in 2007 was R$ 8.45 billion, representing 0.9184 % of the total collected taxes by the Brazilian National Treasury in that year (R$ 920.4 billion), as shown in Table 4.01. There was a slight percentile reduction in the total amount of collated taxes in comparison to 2006. The 2007 ABRAF Yearbook - Base Year 2006 has been revised as described in the Methodological Notes of Chapter 5.

Table 4.01 Estimate of Taxes Collected by the Forest Plantation Sector in Brazil (2006-2007)

| Segments | 2006[1] | | 2007[2] | |
|---|---|---|---|---|
| | R$ (million) | % | R$ (million) | % |
| Forest Industry (Forest Plantation) | 7,916 | 0.9713 | 8,452 | 0.9184 |
| Brazil (Federal, State and Municipal Taxes) | 815,070 | 100 | 920,360 | 100 |

Source: IBPT (Brazil 2008), BRACELPA, ABIMCI, ABIPA, SINDIFER (2007); adapted by STCP, 2008.
[1] Revised Data, based on ABRAF 2007 Yearbook - Base Year 2006, available at www.abraflor.org.br
[2] Estimated by STCP.

## 4.2 Gross Forest Product Value (GFPV)

The Gross Product Value (GPV) measures the value of gross revenue from different sectors of the economy. The GFPV of the forest plantation sector in 2006 was R$ 48.7 billion, but the estimate for 2007 reached R$ 49.8 billion, including values generated by the forest plantation productive chain, as presented in Table 4.02 (see methodological notes referred to GFPV, Chapter 5, Section 5.4). This estimate includes gross production values of the primary forest sector.

The total tax revenue of the pulp and paper segment reached R$ 24.0 billion in 2007, increasing 2.8% in comparison to 2006. On the other hand, the revenue of the solidwood industry dropped 21.5% in the same period. Since 2004, the solidwood exports slowed down due to the appreciation of the Brazilian Real over the American dollar, to the increase of raw-material and production costs in Brazil, and escalating tariff barriers of some major importing countries, thus, negatively affecting the GFPV. The reconstituted panel's GFPV in 2007 reached approximately R$ 4.5 billion; while the charcoal-based iron and steel industry's GFPV increased 11.1% in 2007, reaching R$ 1.1 billion. The furniture industry's GFPV, in turn, grew from R$ 5.8 billion, in 2006, to R$ 8.5 billion in 2007, representing a 47.0% increase. Such growth is partially due to the boosting of domestic demand for these products, and the increase of civil construction.

The GFPV of the furniture industry includes value-added products within the segment, but excludes reconstituted-wood panels and solidwood to avoid double counting.

[1] Tax extinct since January 1st, 2008.

Table 4.02 Estimate of Gross Product Value for the Forest Industry Productive Chain of Planted Forests (2006-2007)

| Segmento | 2006 | | 2007 | |
|---|---|---|---|---|
| | R$ (million) | (%) | R$ (million) | (%) |
| Pulp and paper | 23,346[1] | 48.0 | 24,000 | 48.2 |
| Solidwood Industry [2, 3] | 14,846[4] | 30.5 | 11,655 | 23.4 |
| Reconstituted-wood panels [2,5] | 3,700[6] | 7.6 | 4,510 | 9.1 |
| Charcoal-based Iron and Steel [2] | 1,000 | 2.1 | 1,111 | 2.2 |
| Furniture[2] | 5,786[7] | 11.9 | 8,506 | 17.1 |
| **TOTAL** | **48,678** | **100.0** | **49,782** | **100.0** |

Sources: AMS, BRACELPA, IBGE, ABIPA, SINDIFER, STCP, 2007.

[1] Adjusted GPFV provided by BRACELPA in mid-2007 used to correct the value of the 2007 ABRAF Yearbook – 2006 Base Year.

[2] It includes only products from planted forests.

[3] Solidwood industry includes sawnwood, plywood (veneer) and Value-Added Product (VAP) (flooring, door, window, moulding, Edge Glued Panel (EGP)), and others.

[4] Adjusted GFPV provided by ABIMCI, after publishing the 2007 ABRAF Yearbook – 2006 Base Year.

[5] Reconstituted-wood panels include: *Medium Density Particleboard* (MDP), *Medium Density Fiberboard* (MDF) – particleboard panel types, fiberboard and *Oriented Strand Board* (OSB).

[6] Adjusted GFPV due to misprinting in the 2007 ABRAF Yearbook – 2006 Base Year.

[7] Adjusted GFPV based on methodology change, deducting reconstituted-wood panels and solidwood GFPVs.

## 4.3 Job Generation

The job creation from the economic activities associated to planted forests, including harvesting and industrial processing play a significant role in the overall job market in Brazil. The Forest Agroindustrial System, particularly the forest plantation sector (primary and industrial processing) created nearly 4.6 million jobs in 2007, including direct (655,542), indirect (1.8 million) and income-effect jobs (2.1 million), as presented in Table 4.03 (see Methodological Note, Chapter 5, Section 5.7).

Table 4.03 Estimated Number of Direct, Indirect and Income-Effect Jobs of the Planted Forest Sector in 2007

| Segment | | Number of Jobs – Forest Plantation Sector | | | |
|---|---|---|---|---|---|
| | | Direct | Indirect | Income-Effect | **TOTAL** |
| Planted Forests | Silviculture[1] | 239,165 | 937,592 | 613,959 | **1,790,716** |
| Industry | Charcoal-based Iron & Steel | 21,179 | 357,397 | 685,673 | **1,064,249** |
| | Solidwood Products[2] | 148,421 | 110,936 | 148,928 | **408,285** |
| | Furniture | 126,524 | 94,569 | 126,955 | **348,048** |
| | Pulp and paper | 120,253 | 315,919 | 552,349 | **988,520** |
| **TOTAL** | | **655,542** | **1,816,413** | **2,127,864** | **4,599,819** |

Source: Estimate by ABRAF/STCP, 2008.

[1] See the Methodological Notes, Section 5.4 about the methodology used to calculate the number of jobs in Silviculture.

[2] Solidwood products include sawnwood, plywood and veneer, and value-added products (VAP) (flooring, doors, windows, moldings, tools and Edge-Glued Panel (EGP)), reconstituted-wood panels such as Medium Density Particleboard (MDP), Medium Density Fiberboard (MDF), fiberboard and Oriented Strand Boarding (OSB).

The job creation by the planted forest sector has been significant as shown in Table 4.04. A BNDES study entitled the "Estimate of BNDES Job Generation Model" ranks the sawnwood and furniture sectors as the 5th largest in job generation among 41 sectors of the economy. Table 4.04 shows that for each R$ 10 million investments in that sector a total of 293 direct jobs, 219 indirect jobs and 294 jobs resulting from the income-effect in other sectors of the economy are generated. The pulp and paper, and the pig-iron and steel sectors rank in 20th and 27th positions, respectively.

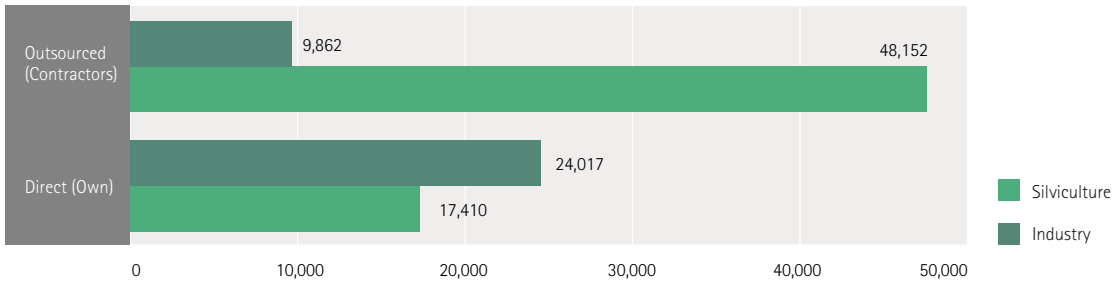
## Table 4.04 Ranking of Major Industries as Job Generators (R$ 10 Million Investments)

| *Ranking* | Economic Sectors | Number of Jobs | | | |
|---|---|---|---|---|---|
| | | Directs | Indirects | Income-Effect | **TOTAL** |
| 1st | Family assistance | 665 | 104 | 311 | **1,080** |
| 2nd | Clothing | 613 | 136 | 250 | **1,000** |
| 3rd | Agriculture and livestock | 393 | 131 | 303 | **828** |
| 4th | Commerce | 449 | 84 | 278 | **810** |
| 5th | Sawnwood and Furniture | 293 | 219 | 294 | **805** |
| 6th | Coffee industry | 41 | 356 | 323 | **719** |
| 7th | Shoemaking | 246 | 174 | 290 | **711** |
| 8th | Sugar industry | 32 | 307 | 337 | **677** |
| 9th | Meat | 36 | 358 | 270 | **664** |
| 10th | Support to business service | 293 | 63 | 288 | **645** |
| 20th | Pulp and Paper | 59 | 155 | 271 | **485** |
| 27th | Pig-Iron and Steel | 8 | 135 | 259 | **402** |

Source: BNDES, 2004; adapted by STCP, 2007.

Figure 4.01 shows that ABRAF member companies generated 99.4 thousand direct jobs (own and outsourced) in 2007, representing a 7.9% increase over the 2006 figure (92.2 thousand). The number of employees in the forest and industrial activities, in 2007, totaled respectively 65,562 and 33,879, including own and outsourced employees.

## Figure 4.01 Number of Jobs Generated by ABRAF Member Companies (2007)




Source: ABRAF Member Companies, 2007.
Note: Data provided by ABRAF Member Companies..

The job generation forecast of the forest plantation sector by 2018 is approximately 1.806 million new jobs, including direct, indirect and jobs resulting from the income-effect, taking into consideration the perspectives of R$ 37 billion to be investment, over the period. Table 4.05 shows the job estimation of 219.7 thousand direct jobs, including own and outsourced employees.

Table 4.05 Estimate of Job Generation by the Forest Plantation Sector by 2018

| Setor | Estimated Investments (million R$) | Job Generation | | | |
|---|---|---|---|---|---|
| | | Direct | Indirect | Income-Effect | TOTAL |
| Pulp and Paper | 23,243 | 137,135 | 360,269 | 629,890 | **1,127,294** |
| Solidwood Industry | 6,000 | 175,800 | 131,400 | 176,400 | **483,600** |
| Charcoal-based Pig-Iron and Steel Industry | 8,000 | 6,400 | 108,000 | 207,200 | **321,600** |
| **TOTAL** | **37,243** | **219,735** | **577,269** | **1,009,290** | **1,806,294** |

Source: STCP, 2006; BNDES, 2004.

## 4.4 Financing Mechanisms for Forest Plantations in Brazil

There are several financing mechanisms for forest plantations in Brazil available by the Ministry of Agrarian Development (MDA) and the Ministry of Agriculture, Livestock and Supply (MAPA), which are operated by federal banks. The main credit lines are the Commercial Plantation and Forest Recovery Program (PROPFLORA - MAPA) and the National Agricultural Family Strengthening Program (PRONAF – MDA/MMA). PROPFLORA aims at the implementation of livestock and silviculture projects (cattle ranching and forest) and agroforestry projects (agriculture and forest); recovering and maintenance of Permanent Preservation and Legal Reserve areas. PRONAF offers two credit lines for family agriculture: PRONAF Forest and the PRONAF Renewable Energy and Environmental Sustainability (PRONAF ECO).

PRONAF ECO was created in mid-2007 by the Secretary of Family Agriculture (SAF) of MDA, through the PRONAF´s rural credit policy, launching a new credit line within the Family Agriculture Harvest Plan 2007/2008. PRONAF ECO´s purpose is to finance the establishment, utilization and/or recovery of renewable energy technologies, such as the use of wind and solar energy, and biomass, mini-plants for biofuels, including the replacement of fossil fuel technology to renewable energy in agricultural equipment.

This new credit line (PRONAF ECO) incorporated the financing of forest monoculture, which was previously part of the PRONAF Forest credit line. The main purpose of this change is to support the forest sector with adequate mechanisms for each activity. The Federal Government aims, through the PRONAF Forest credit line (at Federal Governments risk), to support sustainable forest activities, such as agroforestry systems, extractivism and forest management, which requires differentiated incentives to forestry activities. On the other hand, the PRONAF ECO (Bank's risk) supports activities mainly directed to companies' needs, which usually have a well-structured and integrated productive chain. Thus, both credit lines, PRONAF Forest and PRONAF Eco, offer different types of incentives to forestry activities to benefit family agriculture.

Only PRONAF Forest and PROPFLORA have been analyzed and incorporated to this Yearbook since MDA had not published the data of PRONAF ECO by the closing date of this Yearbook. PRONAF Forest and PROPFLORA programs disbursed R$ 64.6 million for planted forest-related activities in 2007 (Table 4.06). However, it should be noted that data on PRONAF Forest refers only to the 2006/2007 harvest year since updated information for 2007 was not available.

Besides the above-mentioned funds and programs, there are specific credit lines for forest activities in different regions and states of Brazil, including bank loans and transfer of financial resources from the legal Forest Reposition fee.

Table 4.06 Disbursement by PRONAF Forest and PROPFLORA (2006-2007)

| State | 2006 | | | | 2007 | | | |
|---|---|---|---|---|---|---|---|---|
| | PRONAF Forest | PROPFLORA | TOTAL | % | PRONAF Forest | PROPFLORA | TOTAL | % |
| | (1,000 R$) | (1,000 R$) | (1,000 R$) | | (1,000 R$) | (1,000 R$) | (1,000 R$) | |
| BA | 1,069 | 113 | 1,182 | 2.0 | 443 | 72 | 515 | 0.8 |
| ES | 2,738 | 3,901 | 6,639 | 11.0 | 1,828 | 3,164 | 4,993 | 7.7 |
| GO | 73 | 4 | 77 | 0.1 | 87 | 422 | 509 | 0.8 |
| MT | 46 | 85 | 131 | 0.2 | 50 | 442 | 492 | 0.8 |
| MS | 0 | 0 | 0 | 0.0 | 14 | 36 | 50 | 0.1 |
| MG | 2,579 | 7,087 | 9,666 | 16.0 | 2,054 | 20,382 | 22,436 | 34.7 |
| PR | 1,449 | 8,920 | 10,369 | 17.1 | 1,923 | 10,404 | 12,328 | 19.1 |
| RJ | 38 | 0 | 38 | 0.1 | 18 | 0 | 18 | 0.0 |
| RS | 4,358 | 17,613 | 21,971 | 36.3 | 2,522 | 9,831 | 12,353 | 19.1 |
| SC | 2,415 | 4,136 | 6,551 | 10.8 | 2,124 | 5,095 | 7,219 | 11.2 |
| SP | 1,176 | 2,134 | 3,310 | 5.5 | 1,219 | 1,876 | 3,095 | 4.8 |
| Others | 443 | 143 | 586 | 1.0 | 206 | 379 | 584 | 0.9 |
| **TOTAL** | **16,383** | **44,136** | **60,519** | **100.0** | **12,489** | **52,102** | **64,591** | **100.0** |

Source: MDA, BNDES, 2007.
[1] PRONAF Forest values refer to 2006/2007 harvest-year data since the updated information for the year 2007 was not available.

The Bank of Brazil (BB) manages the credit line for forest management and plantations, through the so-called BB Forest Program. Such program aims to increase and improve timber production from forest plantation areas within a 5-year period (2005-2009), besides financing the recovering and maintenance of Permanent Preservation and Legal Reserve areas. The BB Forest Program consists primarily of financial transfers from other institutions and credits that are made available by the Bank of Brazil.

In 2007, the BB Forest Program approved over 6,290 contracts that summed R$ 569.1 million (own financial resources and resources from other institutions for investment, commercialization and funding of the program). Out of this total, about 74% were destined to state of São Paulo, the second largest state with planted forest in Brazil.

## 4.5 Human Development Index (HDI)

The Human Development Index (HDI) measures the well-being of a country, region, or municipality. The GDP (Gross Domestic Product) per capita is frequently used as an indicator of standard of living, which assumes the connection between the economic growth within a country and human well-being.

The HDI is composed by three sub-indexes: longevity, education and (per capita) income. The longevity index is calculated by life expectancy at birth, the education index is measured by the adult illiteracy rate and the student enrollment rate in all educational level, and the income index considers the per capita GDP. These three sub-indexes are equally relevant to the HDI. HDI varies from 0 to 1; lower than 0.5, represents low human development; between 0.5 and 0.79, medium human development; and, higher than 0.8 represents high human development.

The HDI is calculated for a country or state taking as reference the average attainment of the three basic needs: longevity, education and income. The HDI at municipal level is referred as HDI-M, which is not directly comparable to the HDI of a region or state.

Table 4.07 presents the IDH-M for major municipalities with forest plantations by different wood-based segments. Municipalities with forest plantation activities linked to processing industry usually presents higher HDI-M growth than the average growth observed in selected State capitals. This is noticed for both the HDI-M Total and the HDI-M Income. Furthermore, the index growth rates in municipalities with forest activities associated with forest plantations is in general higher (and double digit) than those municipalities without these activities.

## Table 4.07 HDI-M for Selected States, Capitals and Municipalities with Forest Plantations

| State Capitals and Municipalities | HDI-M (1991) | HDI-M (2000) | % de Change HDI-M (1991-2000) | HDI-M Income[1] (1991) | HDI-M Income[1] (2000) | % de Change HDI-M (1991-2000) |
|---|---|---|---|---|---|---|
| Salvador | 0.751 | 0.805 | 7.2 | 0.719 | 0.746 | 3.8 |
| Vitória | 0.797 | 0.856 | 7.4 | 0.793 | 0.858 | 8.2 |
| Belo Horizonte | 0.791 | 0.839 | 6.1 | 0.779 | 0.828 | 6.3 |
| Curitiba | 0.799 | 0.856 | 7.1 | 0.793 | 0.846 | 6.7 |
| Porto Alegre | 0.824 | 0.865 | 4.9 | 0.818 | 0.869 | 6.2 |
| Florianópolis | 0.824 | 0.875 | 6.2 | 0.803 | 0.867 | 7.9 |
| São Paulo | 0.805 | 0.841 | 4.4 | 0.822 | 0.843 | 2.6 |
| **Selected Municipalities with Forest Plantations** | | | | | | |
| Pulp and Paper | | | | | | |
| Caravelas - BA | 0.488 | 0.667 | 36.7 | 0.487 | 0.644 | 32.2 |
| Brasilândia - MS | 0.643 | 0.757 | 17.7 | 0.611 | 0.705 | 15.4 |
| Luís Antônio - SP | 0.717 | 0.795 | 10.9 | 0.676 | 0.717 | 6.1 |
| **Iron and Steel Industry and Forest Plantations** | | | | | | |
| João Pinheiro[2] - MG | 0.659 | 0.748 | 13.5 | 0.599 | 0.650 | 8.5 |
| Ribas do Rio Pardo - MS | 0.654 | 0.734 | 12.2 | 0.647 | 0.661 | 2.2 |
| **Solidwood Products** | | | | | | |
| Caçador - SC | 0.720 | 0.793 | 10.1 | 0.660 | 0.711 | 7.7 |
| Rio Negro - PR | 0.710 | 0.801 | 12.8 | 0.659 | 0.706 | 7.1 |
| Palmas - PR | 0.677 | 0.760 | 12.3 | 0.617 | 0,682 | 10.5 |
| **Reconstituted-wood panels** | | | | | | |
| Piên - PR | 0.669 | 0.753 | 12.6 | 0.581 | 0.669 | 15.1 |
| União da Vitória - PR | 0.715 | 0.793 | 10.9 | 0.643 | 0.717 | 11.5 |
| Glorinha - RS | 0.684 | 0.785 | 14.8 | 0.603 | 0.690 | 14.4 |
| BRAZIL | **0.696** | **0.766** | **10.1** | **0.751** | **0.850** | **13.2** |

Source: Atlas do Desenvolvimento Humano no Brasil [Brazil Human Development Atlas] (PNUD).

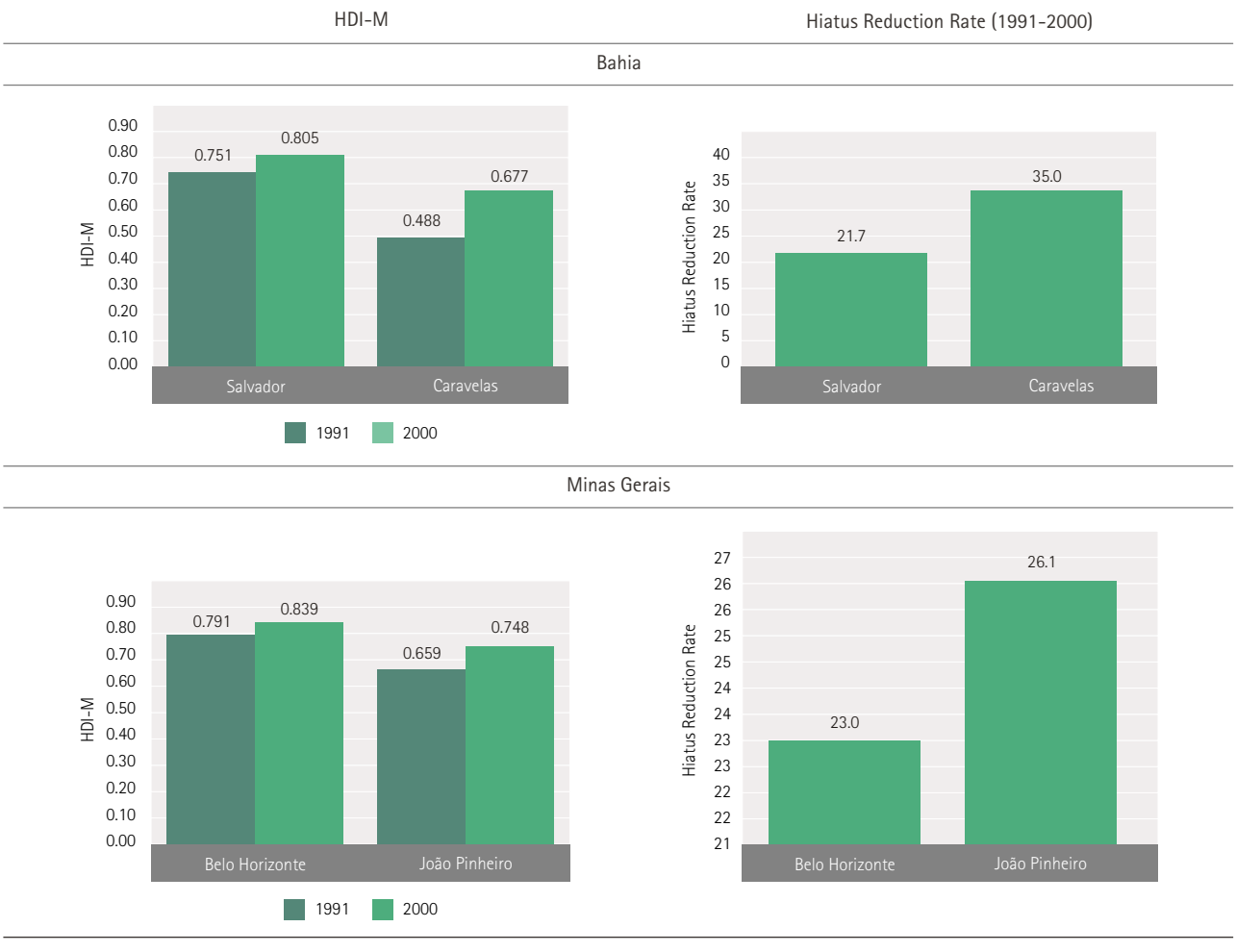
[1] HDI-M Income analyses the access of population to needed resources in order to achieve a decent standard of living (IPEA/PNUD, 1996).

[2] João Pinheiro Municipality has the largest eucalypt planted area in Minas Gerais State (over 100,000 ha).

The HDI-M hiatus reduction rate evaluates the evolution of life quality in municipalities, considering the gap between the initial condition of a municipality and the maximum HDI-M rate (1.00). When the hiatus between the starting condition and maximum rate is large, the improvement is more visible; for instance, *"the adoption of relatively simple policies such as increasing the number of children attending schools, to distribute homemade serum to reduce child mortality"* may have significant impact in the HDI-M growth. But, when the starting condition is good, that is, when the distance from the minimum and the maximum rate of HDI-M is small, *"its growth depends on more complex policies, which may have limited impact or the results may be uncertain*[2]*"*. Thus, the reduction in the HDI-M hiatus takes into account the fact that it is more difficult to increase the HDI, when the index is high. The higher the index, the higher the development of the HDI-M, taking into account its initial distance to the maximum index value.

Figure 4.02 shows the HDI-M (1991-2000) and the hiatus reduction rate of the selected state capitals and municipalities with forest plantation activities. The hiatus is higher in municipalities where Agroindustrial Forest System (SAG) activities predominate.

## Figure 4.02 HDI-M and Hiatus Reduction Rate (1991-2000) in the Selected State Capital and Municipalities with Forest Plantation Activities




[2] Muniz, J.N.; Rezende, J.B.; Bressan, V.F. *The Public Extension and Its Impacts on Municipal Sustainable Development.* Brasília: ASBRAFER / Coleção Semear 3, 2007 (*in* press).

Figure 4.02 HDI-M and Hiatus Reduction Rate (1991-2000) in the Selected State Capital and Municipalities with Forest Plantation Activities

Figure 4.02 HDI-M and Hiatus Reduction Rate (1991-2000) in the Selected State Capital and Municipalities with Forest Plantation Activities


Source: Atlas do Desenvolvimento Humano no Brasil (PNUD); adapted by STCP, 2008.

## 4.6 Environment

Natural forests in Brazil cover originally 538.7 million hectares, out of which nearly 1% is preserved by forest plantation companies as Permanent Preservation Areas (APP), Legal Reserve (RL) and Natural Protection Private Reserves (RPPN), among other environmental forms of protection, as shown in Table 4.08. The total area protected by ABRAF member companies increased from 1.3 million ha, in 2006, to 1.4 million ha, in 2007. ABRAF member companies respond for 32.6% of the total protected area by the forest plantation sector.

### Table 4.08 Participation of the Forest Plantation Sector and ABRAF Member Companies in Protection of Natural Forests (2006-2007)

| Environmental Preservation by Sector | Protected Area – Natural Forests (2006) | | Protected Area – Natural Forests (2007) | |
|---|---|---|---|---|
| | ha (1,000) | % | ha (1,000) | % |
| Forest Plantation - TOTAL | 3,795 | 0.7 | 4,360 | 0.8 |
| - ABRAF Member Companies | 1,345 | - | 1,423 | - |
| Other Segments | 534,952 | 99.0 | 534,387 | 99.2 |
| **TOTAL – Brazil** | **538,747** | **100** | **538,747** | **100** |

Source: FAO, 2004, ABRAF and STCP, 2007.
[1] See Methodological Notes.

### Forest Certification

Brazil has two forest certification systems for forest plantations and natural forests: (i) the Forest Stewardship Council (FSC), and (ii) the Brazilian Program of Forest Certification (CERFLOR). In 2007, the total certified forest area in Brazil reached 6.2 million hectares under both certification systems, the majority of the area being certified by FSC. Approximately 55% of the total or equivalent to 3.4 million hectares, corresponded to pine and eucalypt forests. Nearly 57.9% of the total certified area with forest plantations in Brazil belongs to ABRAF member companies, which correspond to 1.97 million hectares. The ABRAF member companies have a total of approximately 2.5 million hectares of planted forests, out of which 82.5% is certified by the above-mentioned systems.

## 4.7 Social Responsibility

The ABRAF member companies have been investing in social responsibility, including their own initiatives and other programs in partnership with the civil society and government, to contribute to the development of communities within their areas of influence (plantation forests and production units).

The contributions include family agriculture programs to promote income and job generation in areas under *commodatum* contract of companies, partnership programs for the production of added-value products, and professional training programs.

In 2007, the investments in social programs were BRL 77.8 million, even though the number of benefited municipalities has decreased. On the other hand, the number of benefited people grew 44% from 2006 to 2007.

According to ABRAF member companies, there was a significant increase in the social program investments, which doubled from 2005 (BRL 36.3 million) to 2007 (BRL 77.8 million), as shown in Table 4.09.

Table 4.09 Main Results of Social Programs Promoted by ABRAF Member Companies (2005-2007)

| Year | Number of Benefited People | Number of Benefited Municipalities | Investments (BRL 1,000) |
|---|---|---|---|
| 2005 | 652,827 | 579 | 36,334 |
| 2006 | 1,088,457 | 742 | 76,264 |
| 2007 | 1,567,244 | 704 | 77,764 |

Source: ABRAF Member Companies; adapted by STCP.
Note: Data provided by ABRAF Member Companies.

### 4.7.1 Forest Outgrower Scheme

Companies of the forest sector have promoted forest outgrower schemes to complement timber supply to processing facilities, reducing fixed land assets, and directing investments to industrial activities, and especially creating additional income for small and medium-sized rural producers in municipalities under the influence of their forest plantations. For rural producers, forest outgrower scheme represents an opportunity to guarantee their production payoff, and anticipation of the initial planting disbursement either exempting or delaying the payment, such as the seedling and other input costs. For the local economy, outgrower scheme as a horizontal integration system, contribute to financial and economic benefits, generating jobs, revenues and taxes to the municipalities, therefore promoting local development. Table 4.10 shows that in 2007, 4,250 new forest outgrower contracts benefited a total of 4,093 people, adding an area of 66.7 thousand ha.

Table 4.10 Results of Forest Outgrower Programs by ABRAF Member Companies (2007)

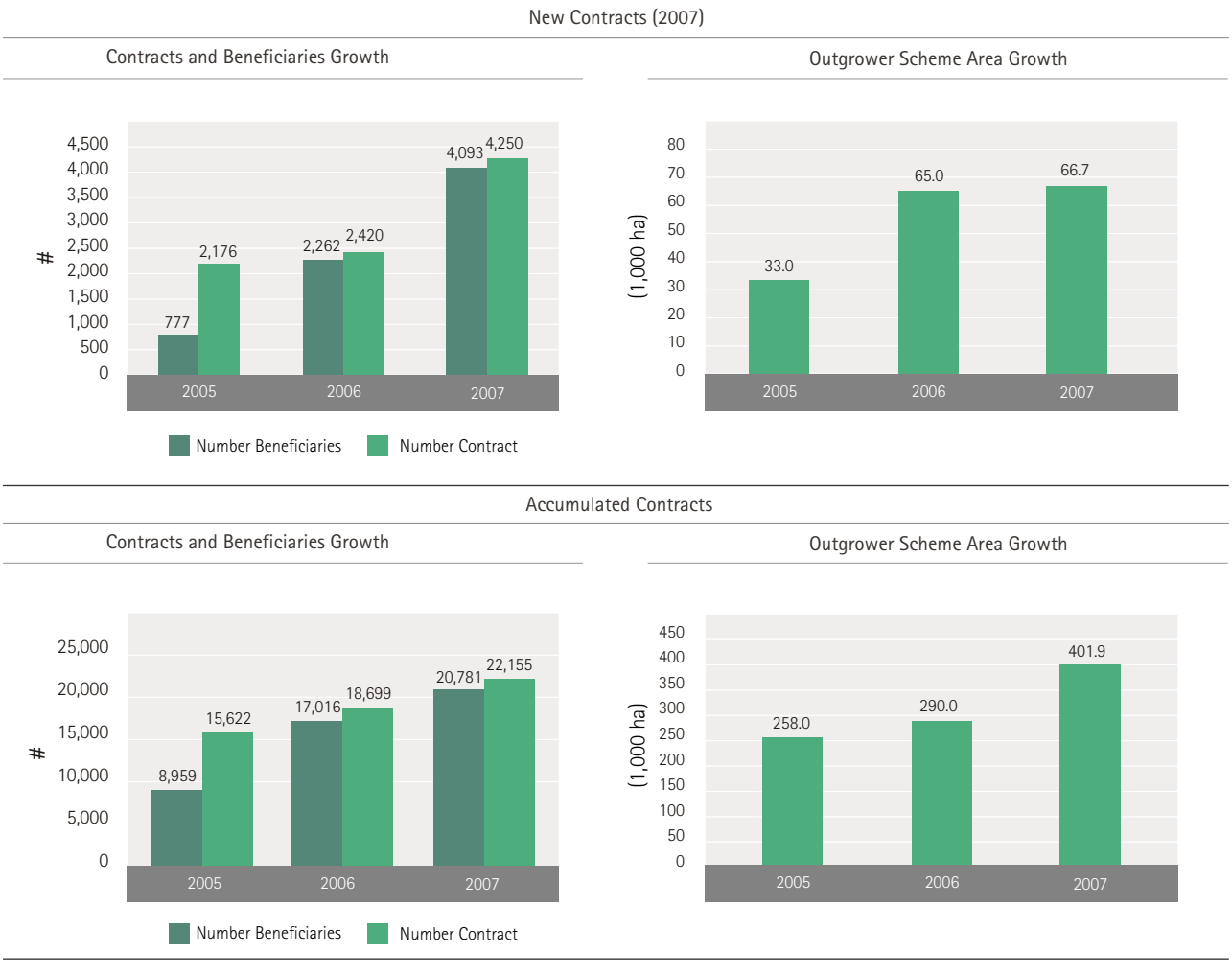
| Type | Total Beneficiaries | Number of Forest Outgrowing Contracts | TOTAL Planted Area (1,000 ha) |
|---|---|---|---|
| Up to 2007[1] | 20,781 | 22,155 | 402.0 |
| New Contracts (2007) | 4,093 | 4,250 | 66.7 |

Source: ABRAF Member Companies; adapted by STCP.
[1] Statistics for 2007 also included.
Note: Data provided by ABRAF Member Companies.

The expansion of forest outgrower schemes over the last few years among ABRAF member companies (Figure 4.03) shows that from 2005 to 2006, although the increase in the contract was only 11.2%, the number of beneficiaries almost tripled. From 2006 to 2007, the number of beneficiaries was similar to new contracts, 80.9% and 75.6%, respectively.

The area under forest outgrower schemes doubled from 2005 to 2006, while increased 2.6% in 2007 compared to 2006. The total area of outgrower scheme under contracts with ABRAF member companies was 401,900 ha up 2007, while in 2006 it reached 290,000 ha, therefore increasing 38.6% over the period.

Figure 4.03 Growth in the Number of Contracts, Beneficiaries and Planted Area of ABRAF Member Companies' Forest Outgrower Schemes – New (2007) and Accumulated Contracts




Source: ABRAF Member Companies; adapted by STCP.

## 4.7.2 Health Care Programs

The ABRAF member companies provide medical and dental care, and disease prevention programs to employees, contributing to maintain the health care in their regions of influence. Table 4.11 presents the results of these programs, which benefited 205,000 people in 2007, in 59 municipalities, with investments totaling BRL 21.6 million.



Table 4.11 Results of Health Care Programs of ABRAF Member Companies (2005-2007)

| Year | Total Beneficiaries (1,000) | Number of Municipality | Annual Investment (BRL 1,000) |
|---|---|---|---|
| 2005 | 63 | 137 | 7,311 |
| 2006 | 364 | 100 | 23,636 |
| 2007 | 205 | 59 | 21,578 |

Source: ABRAF Member Companies; adapted by STCP.
Note: Data provided by ABRAF Member Companies.

Despite the considerable growth in number of beneficiaries and investments from 2005 to 2006, (477% and 223%, respectively) among ABRAF member companies, the number of beneficiaries and investments reduced 43% and 19%, respectively, in 2007 compared to 2006.

### 4.7.3 Non-Wood Forest Products

Non-wood forest products (NWFP), which include products such as medicinal plants, resins, honey, essential oils, rubber, and tannin, are an alternative to timber production from forest plantations. NWFP has conquered new markets due to its growing value and appeal to sustainable production.

According to Table 4.12, the production of NWFP among ABRAF member companies benefited 3,445 people in 2007, a 156.9% increase in comparison to 2006. The number of benefited municipalities grew from 30 in 2006 to 80 in 2007; the investment has increased four-fold over the amount invested in 2006, reaching BRL 336,900 in 2007, nearly the value of 2005.

### Table 4.12 – Production of NWFP in Areas of ABRAF Member Companies (2005-2007)

| Year | Total Beneficiaries | Number of Municipalities | Investments (BRL 1,000) |
|---|---|---|---|
| 2005 | 1,310 | 35 | 353.8 |
| 2006 | 1,342 | 30 | 71.8 |
| 2007 | 3,448 | 80 | 336.9 |

Source: ABRAF Member Companies; adapted by STCP.
Note: Data provided by ABRAF Member Companies.

### 4.7.4 Environmental Programs

The ABRAF member companies have developed various environmental programs, such as fauna and flora conservation programs, and environmental education in local communities. Through these programs, the companies have contributed for the conservation of natural forest resource and its biodiversity.

Environmental measures adopted by ABRAP member companies have preserved 1.42 million ha of natural vegetation, including important endemic biomes. It also includes water areas and other protected areas under the Brazilian legislation, such as the Permanent Preservation and Legal Reserve areas.

These areas have been topics of studies carried out in partnership with research institutes and universities, including programs for environmental protection and environmental education. Furthermore, they provide society with a wide range of environmental services, including water supply, biodiversity conservation and soil quality.

Among various environmental programs and actions carried out by ABRAF members, the most significant are the fauna and flora conservation, and environmental education programs with communities.

In 2007, a total of 209,900 people were benefited by these programs in 191 municipalities, with investments of BRL 30.9 million, as shown in Table 4.13. Overall, field research is coordinated in partnership with the Brazilian Institute for Environment and Natural Renewable Resources (IBAMA); with special focus in the recovery and reintroduction of wildlife into their natural habitats.

Table 4.13 Environmental Programs Undertaken by ABRAF Member Companies (2005-2007)

| Year | Total Beneficiaries (1,000) | Number of Municipalities | Investment (BRL 1,000) |
|---|---|---|---|
| 2005 | 167.3 | 98 | 11,156 |
| 2006 | 131.2 | 232 | 26,912 |
| 2007 | 209.9 | 191 | 30,904 |

Source: ABRAF Member Companies; adapted by STCP.
Note: Data provided by ABRAF Member Companies.

Investments in environmental programs by ABRAF members have been gradually increasing from 2005 to 2007, with a total grow of 177% over the period.

Some ABRAF member companies, in partnership with universities and international conservation organizations, have established non-profit institutes focusing on environmental conservation. The main objective of these institutes has been to encourage environmental conservation on private property in various Brazilian biomes and ecosystems. Another outstanding scientific work undertaken with the support of ABRAF member companies is the assessment of wild birds as bio-indicators of environmental quality in eucalyptus plantations. This is an example of pioneering research project with a high strategic value for future plantations in interaction with natural vegetation, RL and APP.

Regarding wildlife recovery and reintroduction, it is worth mentioning the work carried out by ABRAF member companies in partnership with wildlife research institutions in RPPN. In one wildlife project, various endemic birds and mammals have naturally been bred in forest plantations. Some projects have received awards for their efforts undertaken for biodiversity conservation.

In addition to the above-mentioned programs, environmental education is another key carried out by all ABRAF member companies in order to promote knowledge and awareness towards environmental protection and conservation. For instance, it can be cited programs that encourage the use of ecological trails for environmental education for students and teachers of middle and elementary schools. Other activities developed under such program include recycling, selective collection of solid waste, rational use of water, and rehabilitation of degraded areas.

### 4.7.5 Education and Culture

The ABRAF member companies have also contributed to the educational and cultural development, not only of their employees and families, but also of communities in their region of influence. Companies have invested in educational programs to reduce illiteracy and improve the education quality. The activities range from education loans to infrastructure, through reforms and donation of equipment to schools, and scholarship to employees' children. In 2007, the number of benefited people exceeded 1.1 million, in 319 municipalities, with total investments of about BRL 21.2 million (Table 4.14).

Table 4.14 Results of Educational and Cultural Programs of ABRAF Member Companies (2005-2007)

| Year | Total Beneficiaries (1,000) | Number of Municipality | Investments (BRL 1,000) |
|---|---|---|---|
| 2005 | 397.4 | 296 | 14,615 |
| 2006 | 308.9 | 273 | 20,454 |
| 2007 | 1,136.7 | 319 | 21,162 |

Source: ABRAF Member Companies; adapted by STCP.
Note: Data provided by ABRAF Member Companies.

There was a 16.8% increase in the number of beneficiaries of these programs from 2006 to 2007. The investments in educational and cultural programs by ABRAF member companies also increased significantly, from 14.6 million in 2005 to 21.2 million in 2007.

# Chapter 5

## Methodological Notes

Forest Plantation Area in Brazil

Total Preservation Area Associated to Planted Forests

Forest Product and Roundwood Production and Consumption Balance

Gross Forest Product Value (GFPV)

Tax Collection

Trade Balance of Forest Products

Job Generation

# 5 Methodological Notes

The Brazilian Association of Forest Plantation Producers (ABRAF) adopted the same methodological accuracy applied to the previous editions in the preparation of this Yearbook. This was a necessary condition to make it a solid reference for the sector, using information from reliable sources or estimates from experts of the forest plantation sector in Brazil, by comparing information and developing alternate methods to analyze global values, and presenting the results in a transparent manner.

The strict accuracy of procedures and calculus applied to the consecutive editions of the Yearbook has driven to revise evaluation methods of some indicators, with the corresponding explanatory notes for each case inserted in the corresponding chapters. These revisions lead to continuous improvement of indicators to well-process and disseminate information on the forest plantation sector.

This Chapter presents a summary of the methodological procedures used for data compilation, tabulation, comparison, data analyses and evaluation.

Due to difficulties in accessing primary data necessary for the preparation and update of this Yearbook, ABRAF relied on close collaboration with several forest companies and institutions, which can be grouped as: (i) sectoral contacts: ABRAF member and non-member companies, consulting companies related to the forest sector, and also experts and representatives of the forest sector, and independent consultants; (ii) institutional contacts: state secretaries and state agencies, foundations, research institutes, universities, associations and unions of the forestry sector, and associations for forest reposition, among others.

The methodologies used for data compilation and analysis of Base Year 2007 are presented as follow, according to the main topics of the 2008 Statistical Yearbook - Base Year 2007: forest plantation areas in Brazil; protected forest areas linked to forest plantations; roundwood production and consumption balance; Gross Forest Product Value (GFPV); tax collection; forest products trade balance; and job generation.

## 5.1 Forest Plantation Area in Brazil

Reference: Table 1.02 – Chapter 1

The Yearbook used the following sources of information to estimate the area with forest plantations in Brazil:

- Information presented in the Statistical Yearbook 2007 – Base Year 2006 has been helpful, to a large extent, in updating the current Yearbook. In some cases, data were obtained from state surveys on forest plantations (Mato Grosso State), and compilation of State Forest Associations (REFLORE – Mato Grosso do Sul, and AGEFLOR – Rio Grande do Sul);
- Questionnaire survey carried out among ABRAF member companies and non-member forest companies;
- Studies, annual reports and yearbooks of various forest-industry associations, such as ABIPA, ABIMCI, ABIMÓVEL, AMS, BRACELPA and SINDIFER;
- Official documents published by governmental institutions and agencies when available (State Secretaries, institutes, foundations, among others); and,
- Other sources, including forest-based companies and institutions.

Primary data necessary for the preparation of this Yearbook was obtained through the application of a questionnaire to ABRAF member companies, which was prepared by ABRAF and the STCP Engenharia de Projetos Ltda. Besides targeting ABRAF individual member companies, the ABRAF collective members also participated in the data collection, applying a simplified questionnaire survey on planted area by species to their affiliated members (total of 182 companies in 2006). In order to update the information, especially on the planted forest area, ABRAF collective members were consulted, as well as, forest sector specialists, forestry-related companies in some states, and various segments of the forest industry.

When necessary, several governmental institutions such as environmental agencies and State Secretaries of natural resources, environment and agriculture of some states were also consulted to improve the quality of information. The results of data collection and analysis of information was followed up by a validation process with representatives of the forest sector, whose results are presented by state and species in Chapter 1 of the Yearbook.

During the data collection and compilation of forest plantation areas in Brazil, information obtained from different sources was cross-checked in order to avoid errors and double-counting calculation. By the closing date of this Yearbook, the Ministry of Environment (MMA) had not made available up-to-date data on the annual planting area for 2007 by state in Brazil.

Tables 1.02 and 1.03 of Chapter 1 present total planted forest area separated by state in 2007, which is the result of a balance between new planting and, reformed areas, besides information on increase or reduction in total area.

To keep the confidentiality of information provided by the companies, statistics are aggregated by State, region or country. A summary of sources consulted in each major state with forest plantations and the methodology used to estimate the total planted forest area by species is presented as follows:

- Amapá
  A direct contact with forest companies (non-ABRAF member) was carried out as for existing planted forest areas on December 31st, 2007. In Amapá, an ABRAF member company sold its planted forest assets to a non-ABRAF member, what zeroed the planted area of 2007 of the ABRAF member companies.
- Goiás
  Data on forest plantation area in the state of Goiás for 2007 were obtained from a telephone survey carried out with a few forest companies (all non-member of ABRAF.) that hold plantations in the state.
- Bahia e Espírito Santo
  Major sources of information in both states, Bahia and Espírito Santo, were the results of questionnaire survey applied to ABRAF members, and from direct contact with non-member companies. In addition, planted area from governmental forest plantation programs, such as PRONAF *Florestal*, *PROPFLORA* and *BB Florestal* were taken into consideration.
- Maranhão e Pará
  Data update on planted forests in Maranhão and Pará were obtained mostly through contact with the Carajás Pig-Iron Producer Association (ASICA - *Associação dos Produtores de Ferro Gusa do Carajás*). Moreover, data on planted forests from ABRAF members, and non-member companies of ASICA were also obtained. It should be noted that besides pine and eucalyptus, there are significant plantations with other species, such as *"paricá"* and teak.
- Mato Grosso
  Information from the recently published "2007 Diagnostic of Forest Plantations in Mato Grosso", by Mato Grosso Forest Plantation Producer Association (AREFLORESTA - *Associação dos Reflorestadores do Estado de Mato Grosso*) was used to update the statistics on planted area by species in 2007.
- Mato Grosso do Sul
  Data on existing forest plantation area in Mato Grosso do Sul was obtained from the Mato Grosso do Sul Association of Planted Forest Producers and Consumers (*Associação Sul Matogrossense de Produtores e Consumidores de Florestas Plantadas* - REFLORE). REFLORE carried out compilation survey and consultation with

companies holding planted forests in the sate. Furthermore, results of the questionnaire survey applied to ABRAF member companies were useful to validate the information and the plantation area growth trend. It is worth observing the significant increase of the total planted forest area in the state in 2007 compared to 2006, as a result of the expansion of new areas and adjustments to areas not included in the last Yearbook related to legal Forest Reposition between 2000 and 2007, and recent planting carried out between 2006-2007, according to REFLORE.

- Minas Gerais

  Planted forest areas in Minas Gerais in 2007 were estimated from the results of the data validation with sector representatives, which involved the João Pinheiro Foundation, the Minas Gerais Secretary of Agriculture, Livestock and Supply, and the Minas Gerais Silviculture Association (AMS). The official updated data on planted forests will be available only in late 2008.

- Paraná

  The estimate of planted forest areas in Paraná in 2007 were obtained from the results of the questionnaire survey applied to ABRAF member companies and through direct contact with non-member forest companies. The total estimated pine planted area for the surveyed companies is a representative sample of companies in the state. In this case, extrapolation of the planted area was estimated for the state according to planted area established in the previous year (ABRAF Statistical Yearbook 2007 – Base Year 2006), and planting decision of forest-based companies based on market trends. The Forest Companies Association of Paraná (APRE - *Associação Paranaense de Empresas Florestais*) provided significant contribution to estimate the state planted forest area, through consultations with its affiliated companies as for forest planting in 2006 and 2007.

- Rio Grande do Sul

  According to estimates on consolidated planted forest area provided by the Forest Companies Association of Rio Grande do Sul (AGEFLOR - *Associação Gaúcha de Empresas Florestais*), the total forest plantation area in the state in 2007 was 182,378 ha for pine, 222,245 ha for eucalypt, and 158,961 ha for black wattle, summing up 563,584 ha.

- Santa Catarina

  Pine and eucalypt planted forest areas in Santa Catarina were estimated from forest plantation data provided by ABRAF member companies, consultations with the Forest Companies Association of Santa Catarina (ACR - *Associação Catarinense de Empresas Florestais*), and the State Agricultural Research and Extension Institute (EPAGRI - *Empresa de Pesquisa Agropecuária e Extensão Rural*). Data collection also included the forest expansion promoted by forest outgrower schemes of small and medium-sized landowners from statistics of disbursement of PRONAF Florestal, PROPFLORA and BB Florestal. The ABRAF Statistical Yearbook 2007 was used as a reference for updating data on planted forest area in Santa Catarina.

- São Paulo

  In order to update the total planted forest area in São Paulo State, the area of the previous year (based on the state forest inventory carried out in the early 2000s) was taken into consideration. It also included forest plantation areas (expansion and reduction) obtained from the questionnaire survey applied to ABRAF member companies, and consultations with non-member companies.

- Planted Forest Areas of ABRAF Member Companies

  In order to update planted forest areas of ABRAF member companies for 2007, the following aspects were taken into consideration:

  - Areas of ABRAF member companies: primary data were obtained from questionnaire survey applied to each company; aggregation and compilation of data were done directly from the results of the survey; and,
  - Area of companies affiliated to the Collective Member of ABRAF: besides the information from REFLORE (Mato Grosso do Sul) and APRE (Paraná), further contacts with the collective members were carried out, which allowed to estimate total planted area in 2007, taking as a reference the 2006 data.

## 5.2 Total Preservation Area Associated to Planted Forests

Reference: Table 4.08 – Chapter 4

The total protection and preservation areas associated to planted forests in Brazil was estimated based on the total planted area with pine, eucalypt and other species (approximately 5.9 million ha in 2007) and in the proportion of protected areas of natural forests by ABRAF members. The average percentage of protected areas was 32.6%, according to the results of questionnaire survey applied to ABRAF member companies.

A brief explanation of legal definition of the protection and preservation areas considered in this Yearbook is provided below separated into three categories: Legal Reserve (Reserva Legal – RL), Permanent Preservation Areas (Áreas de Preservação Permanente – APP), and Natural Protection Private Reserve (Reserva Particular do Patrimônio Natural – RPPN).

- Legal Reserve (RL – *Reserva Legal*)

  The Brazilian Forest Code (Law 4.771/65) defines the Legal Reserve as: *"area located in a property or rural pos session, except that of permanent preservation area, necessary for the sustainable use of natural resources, preservation and rehabilitation of ecological processes, biodiversity preservation and sheltering and protection of natural flora and fauna."*

  The definition of Legal Reserve was revised by the Law Nº 7.803 of 18 July 1989, which requires that legal reserve must be recorded in the land title, thereby prohibiting *"change of its use, in case of sale, for any purpose, or dismember the area"*, (Art. 16, § 2º).

  Specific legislation establishes the percentage of the property to be allocated as Legal Reserve depending on the region and types of vegetation.

- Permanent Preservation Area (APP - *Área de Preservação Permanente*)

  Permanent Preservation Area is an area protected by the Brazilian Forest Code (Law Nº 4.771/65, Articles 2 and 3 overruled by the Federal Law Nº 7.803/89), which is area *"covered or not by natural vegetation, with environmental function of preserving water resources, landscape, geological stability, biodiversity, and the gene pool of flora and fauna, as well as soil protection and ensuring the well-being of human population."*

  Riparian forests or gallery forests are part of APP, which by law is the forest and other natural vegetation located along the river banks or any other water courses, depending on their width.

- Natural Protection Private Reserve (RPPN-*Reserva Particular do Patrimônio Natural*)

  RPPN, as defined in Decree Law 1.922/96, is a Conservation Unit located in private area. Its goal is the preservation of biological diversity. It is based on a voluntary measure in that a property or part of it is converted into RPPN without loss of the ownership rights.

  RPPN is one of the first initiatives to involve civil society in the conservation of biological diversity in Brazil. It is an instrument by which private properties contribute to environmental protection.

  These types of reserve are important as environmental conservation units, mainly to: (i) helping to increase protected areas nationwide; (ii) ensuring ecological corridors around Conservation Units (UCs); (iii) making private initiatives easier towards conservation efforts; and (iv) contributing to biodiversity conservation of the Brazilian biomes. Many benefits are assured to institutions/property owners who establish RPPNs.

  Several ABRAF member companies announced the creation of new RPPNs during 2007.

## 5.3 Forest Product and Roundwood Production and Consumption Balance

Reference: Figure 3.02 – Chapter 3

Data on roundwood production from planted forests were obtained from the Automatic Retrieval System (SIDRA - *Sistema de Recuperação Automática*) of the Brazilian Institute of Geography and Statistics (IBGE) database, and data provided by the Extractivism and Silviculture (PEVS - *Produção da Extração Vegetal e da Silvicultura*) of IBGE as well. The main information was on production from silviculture, which refers to roundwood from planted forests in 2006, as 2007 data were not available from the Institute by the closing date of this Yearbook. Therefore, the roundwood production from planted forests was estimated for industrial use in 2007, taking into account past 3-year trend.

Industrial roundwood consumption was estimated from production of manufactured forest products, provided by different planted forest segments, and converted to roundwood-equivalent using conversion factors for each forest industrial process (see Table 5.01). Depending on the process, a specific factor was used to estimate only consumption of planted forest roundwood, separating the consumption of natural forest roundwood.

### Table 5.01 Conversion Factors Used in the Statistical Yearbook ABRAF 2007

| Segment | Unit | Roundwood Volume/Industrial Production ($m^3$/industrial unit) |
|---|---|---|
| Short-fiber pulp | t | 4.56 |
| Long-fiber pulp | t | 4.60 |
| High-yield pulp | t | 2.66 |
| Sawnwood | $m^3$ | 2.80 |
| Charcoal | MDC | 1.33 |
| Particleboard | $m^3$ | 1.70 |
| Plywood | $m^3$ | 2.75 |
| MDF | $m^3$ | 2.10 |

Source: STCP and others.

## 5.4 Gross Forest Product Value (GFPV)

Reference: Table 4.02 – Chapter 4

The estimation of the Gross Domestic Product (GDP) of the Brazilian forest sector is difficult due to the lack of proper characterization of the forest sector and its interrelations as a whole. For this reason, the calculation of the Gross Forest Product Value (GFPV) indicator was used in this Yearbook to measure the forest sector performance, as it has been also used to calculate major livestock and agriculture products.

The Gross Product Value (GPV) for the different planted forests segments in Brazil was obtained through different methods depending on data availability.

The GFPV calculated in this Yearbook measures the sum of the net industrial revenues by the aggregation of the revenue of each industrial segment associated to forest plantations. Such value differs, in a certain way, from the Gross Value of Industrial Product (GVIP), calculated by IBGE for different sectors of the economy. The GVIP has not been updated for 2006-2007, and it is not separated by wood product-consuming segment.

In order to estimate the GPV of the primary forest plantation sector in this Yearbook, a methodology developed by the Brazilian Agricultural and Livestock Confederation (CNA) was used, by multiplying the production of each industrial segment

associated to the forest plantations by the average unit price of the respective product. To obtain forest product volumes and the average weighted prices of primary forest products, IBGE, AMS, and STCP database were consulted.

The GFPV of the productive chain of the forest plantation sector was obtained, when available, from the National Sectoral Associations, which periodically reports sector information in their publications, such as statistical yearbooks and sector studies. In this case, the following organizations were contacted: the Brazilian Association of the Mechanically-Processed Timber Industry (ABIMCI), the Brazilian Association of the Furniture Industry (ABIMÓVEL), the Brazilian Association of Wood Panel Industries (ABIPA), the Brazilian Pulp and Paper Association (BRACELPA), and the Minas Gerais Pig-Iron Industry Union (SINDIFER).

The GFPV of the Agribusiness Forestry System constitutes the sum of the gross product values of the five main productive chains associated to forest plantations (pulp and paper, solidwood industry, reconstituted-wood panels, charcoal-based pig-iron and steel industry and furniture). It should be pointed out that in order to avoid double-counting, the GFPV calculation deducted the corresponding GFPV of the reconstituted-wood panels and solidwood segment (R$ 1.6 billion and R$ 2.8 million, respectively, for 2007) from the GFPV of wooden furniture from forest plantations (R$ 12.9 billion, for 2007), since those wood products (properly accounted as for their participation) are used as inputs by the furniture industry.

As explained in the footnote of Table 4.02 (Chapter 04 of this Yearbook), the product values relative to the 2006 GFPV of the segments were updated and adjusted in this Yearbook, according to information on official total revenues made available by sector associations (ABIMCI, ABIPA and BRACELPA) in 2007, after the publication of the 2006 Yearbook. In addition, some adjustments and corrections in the table were made, besides change in the methodological approach (as for sector aggregation) for wooden furniture from forest plantations.

## 5.5 Tax Collection

Reference: Table 4.01 – Chapter 4

Currently, there are about 60 taxes applicable over economic activities in Brazil. Generally, they are classified as general taxes, fees and contributions charged by federal, state and municipal governments. The difficulty in calculating tax contributions is the high number of regulatory rules (300/year), containing 55,000 articles and 34,500 paragraphs. The distribution of the tax load on companies is another factor that makes the calculation more burdensome: 33.25% on revenues, 47.14% on costs, and 52.23% on profit.

Furthermore, the geographic location of companies have also influence on the tax incidence. The Tax Over Circulation of Goods and Services (ICMS), which represents on average 22% of the tax load of companies, differs depending on the state at stake. Information related to taxes collected by companies of the planted forests sector was primarily obtained from publications by the national sectoral associations, such as the sector studies and Statistical Yearbooks.

Two methodologies were used in this Yearbook to obtain the estimate of taxes collected by the forest plantation sector:

- **Methodology 1** – Taking the Gross Product Value as the basis for each segment associated to forest plantations, a percentage related to the estimated contribution of taxes collected by each segment was applied to estimate the taxes collected by the forest plantation sector. These percentages (factors) were obtained from a study published by the *Folha de São Paulo* newspaper, in 2005 for different sectors of the economy. For forest segments, not indicated in that study, the percentage of closely- related segments was used. For roundwood (silviculture) and charcoal, the percentage was that from the agribusiness (0.0994), while for the solidwood and furniture industry, the percentage was an average of several industries (0.2300). The exception was for pulp and paper segment and reconstituted-wood panels, which assumed the estimate of total collected taxes informed by BRACELPA and ABIPA in 2007, R$ 2.32 billion and R$ 1.18 billion, respectively. The total estimate for tax collection by the forest plantation sector through this methodology was R$ 8.9 billion in 2007 (see Table 5.02).

Table 5.02 Estimated Paid Taxes by Forest Plantation Manufacturing Segments (2007) – Methodology 1

| Products/Segments | GFPV (R$) | Factor | Estimation of Collected Taxes – Methodology 1 (R$) | Source of Information |
|---|---|---|---|---|
| Roundwood (Silviculture) | 5,219,099,845 | 0.0994 | 518,778,525 | IBGE/Folha de São Paulo |
| Pulp and Paper | 24,000,000,000 | 0.0967 | 2,320,000,000 | BRACELPA |
| Solidwood Industry | 11,655,125,508 | 0.2300 | 2,680,678,867 | ABIMCI/IBGE/FOLHA |
| Reconstituted-Wood Panels | 4,510,000,000 | 0.2300 | 1,183,000,000 | ABIPA/STCP/FOLHA |
| Furniture | 8,505,656,872 | 0.2300 | 1,956,301,081 | ABIMÓVEL/SECEX/FOLHA |
| Pig-Iron & Steel | 1,110,755,018 | 0.2163 | 240,256,310 | SINDIFER/AMS/FOLHA |
| **TOTAL** | **55,000,637,244** | - | **8,899,014,783** | - |

Source: ABIMÓVEL, ABIPA, FOLHA de São Paulo, SECEX, SINDIFER; adapted by STCP, 2008.

- **Methodology 2** – This methodology for estimating the taxes collected by the forest plantation sector took into consideration the total taxes of each segment, informed by each sector association of forest products segments, according to data availability. For each segment, a factor relative to the contribution exclusively of forest plantations within each segment was applied. These factors were estimated by STCP for each segment: for pulp and paper and wood panels 100% of their taxes were considered to be originated from planted forests. For the solidwood industry, the ratio between the timber production from planted forests (silviculture) and the total timber production, from IBGE was used. For the pig-iron and steel industry, the factor used was the percentage of charcoal from planted forests consumed in relation to the total charcoal consumption for pig-iron production, as informed by SINDIFER. According to AMS, the share of charcoal from planted forest in relation to the total charcoal consumption in 2007 was 51.1%. The total estimated taxes collected by the forest plantation sector, using this method, was approximately R$ 8.5 billion in 2007 (Table 5.03). When data from tax collection were not available, the value of the estimated taxes through the methodology 1 was used.

Table 5.03 Estimated Taxes Collected by the Planted Forest Processing Segment (2007) – Methodology 2

| Products/Segments | TOTAL Collected Taxes by Segment (R$) | Planted Forests Tax Factor | Estimate Collected Taxes – Methodology 2 (R$) | Source |
|---|---|---|---|---|
| Pulp and Paper | 2,320,000,000 | 1.00000 | 2,320,000,000 | BRACELPA |
| Timber industry | 4,037,990,682 | 0.70910 | 2,863,319,270 | ABIMCI |
| Reconstituted Panels | 1,183,000,000 | 1.00000 | 1,183,000,000 | ABIPA |
| Furniture | 1,956,301,081 | 1.00000 | 1,956,301,081 | ABIMÓVEL |
| Charcoal-based Steel Industry | 738,000,000 | 0.17585 | 129,779,074 | SINDIFER |
| **TOTAL** | **10,235,291,763** | - | **8,452,399,425** | - |

Source: ABIMCI, ABIMÓVEL, ABIPA, BRACELPA, SINDIFER; adapted by STCP, 2008.

The results from both methodologies converged to a total R$ 8.9 billion and R$ 8.5 billion of collected taxes through methodologies 1 and 2, respectively. It is worth mentioning that the 2007 data informed by the associations of industries are preliminary, however the values obtained through Methodology 2 may be higher after the confirmation of final data by the respective associations.

Thus, the difference obtained between the Methodologies 1 and 2 can be lower. The Methodology 2 has been adopted for the analysis in this Yearbook, since it uses information on total taxes informed by associations of industries, in most cases.

## 5.6 Trade Balance of Forest Products

Reference: Table 3.10 – Chapter 3

Data on export and import of forest products were obtained from the ALICEWEB System of the Secretary of Foreign Trade (SECEX) of the Ministry of Development, Industry and Trade (MDIC). The data is available according to the Common Mercosur Standards (NCM) for forest products from planted forests. It should be noted that there was a change in the aggregation of NCMs for part of SECEX/MDIC in January 2007. The export data for 2006 and 2007 does reflect on new NCMs.

## 5.7 Job Generation

Reference: Table 4.03 – Chapter 4

In order to estimate the number of jobs generated by the forest plantation sector, the methodology utilized was that published in a study undertaken by the National Bank of Economic and Social Development (BNDES). BNDES considered the job generation as a result of investments made in different industrial sectors of the economy. The methodology took into account the total direct, indirect and income-effect jobs for investments that result in an increase in production of about R$ 10 million in each industrial and/or rural segment.

The jobs generated by the sector can be classified, according to the BNDES methodology of the Job Generation Model, into three categories:

- Direct Jobs: needed labor force compatible with the production of the financed companies;
- Indirect Jobs: jobs generated due to the increase in production resulting from the growth in demand for inputs used by the financed companies (jobs in the forest products productive chain);
- Income-Effect Jobs: the increase in production generates a growth in income for workers and companies, which results in an increasing demand for consumable goods and services, generating an increase in the demand for additional labor force in other sectors of the economy.

To calculate the number of jobs generated in the forest plantation sector for the pig-iron & steel, solidwood products and furniture, and pulp and paper industries, the BNDES methodology was applied to calculate indicators of the direct, indirect and income-effect job generation (Table 5.04). For the primary forest sector, job generation factors for the year 2004 were utilized.

Table 5.04 Percentage of Job Generation of Forest Plantation (Silviculture) and Pig-Iron & Steel, Solidwood, Furniture, Pulp and Paper Segments

| Segment | Source | Jobs | | | TOTAL |
|---|---|---|---|---|---|
| | | Directs | Indirects | Income-Effect | |
| Forest Plantation Sector (AMS) | AMS-Yearbook | 13% | 52% | 34% | **100%** |
| Pig-Iron & Steel | BNDES | 2% | 34% | 64% | **100%** |
| Solidwood Products & Furniture | BNDES | 36% | 27% | 36% | **100%** |
| Pulp and Paper | BNDES | 12% | 32% | 56% | **100%** |

Source: AMS and BNDES; adapted by STCP, 2008.

The total direct jobs in the pig-iron and steel, solidwood, furniture, and pulp and paper segments were estimated from the Labor Registry of Employed and Unemployed Workforce (CAGED - *Cadastro Geral de Empregados e Desempregados*) of the Ministry of Labor and Employment (MTE - *Ministério do Trabalho e Emprego*) for 2007. Based on indicators and numbers of direct jobs, the total indirect and income-effect jobs were estimated; consequently, the total jobs of the forest-industry segments and the forest plantation segment was calculated (Table 5.05).

In order to estimate the total number of jobs for the planted and natural forest segments, industrial segment-specific factors that identify only the forest component within the planted and natural forest segments were used. For pig-iron and steel, a 34.4% factor was applied which corresponds, according to the 2007 AMS Yearbook, to the pig-iron & steel parcel relative to charcoal (excluding the consumption of coal). For solidwood and pulp and paper production, a 100% factor was applied, assuming that the entire segment consumes wood fiber in its production. In the case of furniture, an 85.2% factor was applied, estimated as the parcel within the segment only related to wood products for 2007 shown in Table 5.05.

Table 5.05 – Estimated Job Generation by Forest-Industry Segments (Planted and Natural Forests)

| Segment | Segment (TOTAL) | | | | Forest Sector | |
|---|---|---|---|---|---|---|
| | Direct[1] | Indirect | Income-Effect | TOTAL | Factor | TOTAL |
| Pig Iron & Steel | 120,437 | 2,032,369 | 3,899,138 | 6,051,943 | 34.4% | 2,084,174 |
| Solidwood Industry | 209,311 | 156,447 | 210,025 | 575,784 | 100% | 575,784 |
| Furniture | 209,311 | 156,447 | 210,025 | 575,784 | 85.2% | 490,833 |
| Pulp & Paper | 120,253 | 315,919 | 552,349 | 988,520 | 100% | 988,520 |
| **TOTAL** | **659,312** | **2,661,183** | **4,871,537** | **8,192,031** | **-** | **4,139,311** |

Source: Various sources; adapted by STCP.
[1] From MTE.

In order to determine the number of jobs generated only within the forest plantation sector, that is, to distinguish jobs generated from natural forests and planted forests, specific factors were used that distinguish between the parcels related to natural and planted forests. For the primary segment of silviculture, three calculation methods were applied, which are briefly described as follows:

- Method 1 – Estimated based on the average of ABRAF member companies, totaling proportionately 240,940 direct jobs related to forest plantations in Brazil in 2007;
- Method 2 – Estimate based on average jobs generated by the forest plantation segment in Minas Gerais, obtained from the 2005 AMS Yearbook, totaling proportionately 239,165 direct jobs related to planted forests in Brazil;
- Method 3 – Estimate based on an assumed average of 2 ha per job (according to an estimate adopted by companies of the forest plantation sector in Minas Gerais) totaling 399,700 jobs.

Table 5.06 shows the final results of job generation for the forest plantation sector, according to the three methodologies estimated for silvicultural jobs. The factors applied were 100% for silviculture (formed by plantation forests only) and pulp and paper production. For pig-iron & steel, the AMS/SINDIFER factor of 51.1% for planted forest charcoal was used, and for solidwood products and furniture, a factor of 70.91% was applied based on a ratio of extractivism and silviculture production of IBGE/SIDRA – the ratio of roundwood production from silviculture in relation to the total roundwood production (Table 5.06).

The silviculture section in Table 5.05 (Methodology 1, 2 and 3) provide the direct, indirect and income-effect jobs and the grand total estimated jobs for this segment. The totals 1, 2 and 3 of the table represent the total direct, indirect and income-effect jobs adding jobs from each industrial segment (iron & steel, solidwood products, furniture and pulp and paper) to the jobs from silviculture (respectively through the Methodologies 1, 2 and 3).

## Table 5.06 Estimated Jobs in Silviculture and Forest-Industrial Segments linked to Forest Plantations According to Different Methods

| Segmento | Forest Plantation Segment | | | | |
|---|---|---|---|---|---|
| | Direct | Indirect | Income-Effect | TOTAL | Factor |
| | | | **Silviculture** | | |
| **1. Methodology**[1] | 240,940 | 944,548 | 618,515 | 1,804,003 | 100% |
| **2. Methodology**[2] | 239,165 | 937,592 | 613,959 | 1,790,716 | 100% |
| **3. Methodology**[3] | 399,700 | 1,566,931 | 1,026,067 | 2,992,698 | 100% |
| | | | **Forest Industry** | | |
| Iron & Steel | 21,179 | 357,397 | 685,673 | 1,064,249 | 51.06% |
| Solidwood Industry | 148,421 | 110,936 | 148,928 | 408,285 | 70.91% |
| Furniture | 126,524 | 94,569 | 126,955 | 348,048 | 70.91% |
| Pulp & Paper | 120,253 | 315,919 | 552,349 | 988,520 | 100% |
| **TOTAL 1** | **657,317** | **1,823,369** | **2,132,419** | **4,613,105** | **-** |
| **TOTAL 2** | **655,542** | **1,816,413** | **2,127,864** | **4,599,819** | **-** |
| **TOTAL 3** | **816,077** | **2,445,752** | **2,539,972** | **5,801,800** | **-** |

Source: Various Sources; adapted by STCP.

In the preparation of ABRAF Yearbook 2008, the total estimate of job generation through methodology 2 (Silviculture – Methodology 2 and TOTAL 2) was adopted, as it is assumed to presents the most reasonable scenario for the segment of forest plantation in the country in 2007.