Forestry Department
Food and Agriculture Organization of the United Nations

Global Forest Resources Assessment 2010

Brazil

Country Report

July 2009

The Forest Resources Assessment Programme

Sustainably managed forests have multiple environmental and socio-economic functions important at the global, national and local scales, and play a vital part in sustainable development. Reliable and up-to-date information on the state of forest resources - not only on area and area change, but also on such variables as growing stock, wood and non-wood products, carbon, protected areas, use of forests for recreation and other services, biological diversity and forests' contribution to national economies - is crucial to support decision-making for policies and programmes in forestry and sustainable development at all levels.

FAO, at the request of its member countries, regularly monitors the world's forests and their management and uses through the Forest Resources Assessment Programme. This country report forms part of the Global Forest Resources Assessment 2010 (FRA 2010).

The reporting framework for FRA 2010 is based on the thematic elements of sustainable forest management acknowledged in intergovernmental forest-related fora and includes variables related to the extent, condition, uses and values of forest resources, as well as the policy, legal and institutional framework related to forests. More information on the FRA 2010 process and the results - including all the country reports - is available on the FRA Web site (www.fao.org/forestry/fra).

The Global Forest Resources Assessment process is coordinated by the Forestry Department at FAO headquarters in Rome. The contact person for matters related to FRA 2010 is:

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Acronym List- Institutions

ABIMCI	Brazilian Association of the Mechanically Processed Wood Industry	INPA	Amazon Research Institute
ABIPA	Brazilian Association of Panel Wood Industries	INPE	National Institute of Space Research
ABRAF	Brazilian Association of Forest Plantation Producers	MMA	Ministry of the Environment
APA	Environmental Protection Area	PNF	National Forestry Program
APNE	Plants of the Northeast Association	PNUD / UNDP	United Nations Development Program
APP	Permanent Conservation Area	PREVFOGO	National System for Fire Fighting and Prevention of Forest Fires
CAPES	Coordination for the Improvement of Higher Level Education	PROBIO	Project for Conservation and Use of the Brazilian Biological Diversity
CNAE	National Classification of Economic Activities	PRODES	INPE's Legal Amazon Deforestation Assessment Project
CONAMA	National Council for the Environment	RAIS	Annual List of Social Information
DFLOR	Forest Department	RDS	Sustainable Development Reserve
DAP	Protected Areas Directorate	ROI	Fire Occurrence Records
EMBRAPA	Brazilian Company for Agricultural Research	SBF	Secretariat of Biodiversity and Forests
FAO	Food and Agriculture Organization	SBS	Brazilian Silviculture Society
FLONAS	National Forests	SECTMA	Secretariat of Science, Technology, and Environment of Pernambuco
FRA	Global Forest Resources Assessment	SNUC	National System of Conservation Units
FUNAI	National Indian Foundation	SEPPIR	Special Secretariat for the Promotion of Racial Equality
IBAMA	Brazilian Institute for Renewable Natural Resources and the Environment	SISNAMA	National System for the Environment
IBGE	Brazilian Institute of Geography and Statistics	SISPROF	Integrated Monitoring and Control System of Forest Products
ICMBIO	Chico Mendes Institute for the Conservation of Biodiversity	UC's	Conservation Units
IMA	Mean Annual Increment	UFPR	Federal University of Paraná
INEP	National Institute of Educational Studies and Research	UnB	University of Brasília

Introduction

Since the Rio 92 Global Conference on Environment, there has been increasing awareness of the importance of the multiple functions of forests. In the case of Brazil, which holds the world's second largest forest area, the topic of forests has recognized importance at the national and global levels, both due to the extent of its forests and for its associated values, and particularly for the biodiversity reposited in Brazilian forests.

Brazil has participated in global forest resources assessments coordinated by FAO, but most of the country's forest resources information is still spread out, produced at the sub-national level, and not centrally organized by a single institution. The FRA2005 fostered an institutional effort coordinated by the Ministry of Environment involving different national institutions according to FRA themes, which grouped together, organized, and validated the information contained in the country report.

In 2006, the Brazilian Forest Service was established to, among other responsibilities, create and maintain the National Forest Information System. This system is still under design and will have the objective of collecting, producing, organizing, storing, processing, and disseminating data, information, and knowledge on forests and on the forestry system to subsidize projects and policies that combine the use and conservation of forests in Brazil.

A significant achievement since the FRA2005 was the completion of a vegetation map conducted by the Ministry of Environment and executed by institutions which were hired to map out each of the Brazilian biomes. This map, known as the PROBIO or Map of the Vegetable Cover of Brazilian Biomes (MMA, 2007), was prepared based on the year 2002 and designed in the scale of 1:250,000. There were significant changes resulting from the use of this information in relation to previous data, such as for the FRA2005. However, it represents significant progress for the country, and has been used to prepare Table 1 and correlated tables in the FRA2010. The PROBIO map and the deforestation rates available for each biome were used as the main input to determine the forest areas in Brazil for the years required by the FRA2010.

Brazil is currently implementing its National Forest Inventory, headed by the Brazilian Forest Service, which will then become an important source of forest information for the country and for different international efforts involving forests, such as conventions on climate, biodiversity, and threatened species.

The work strategy used to prepare the FRA2010 was similar to the one adopted in the FRA2005, with the important participation of a team from the Brazilian Forest Service, which helped experts in designing some of the tables (T1, T6, T7, T8) and also fully prepared some other tables (T2, T3, T4, T9, T11, T12, T13, T14, T15, T16, and T17). Despite the difficulties found and the consequent delay in concluding the country report, the Forest Service team's participation also represents significant progress in the production of forest resources information for the country.

Table T1 – Extent of Forest and Other wooded land

1.1 FRA 2010 Categories and definitions

Category	Definition
Forest	Land spanning more than 0.5 hectare with trees higher than 5 meters and a canopy cover of more than 10 percent, or trees able to reach these thresholds *in situ*. It does not include land that is predominantly under agricultural or urban land use.
Other wooded land	Land not classified as "Forest", spanning more than 0.5 hectare; with trees higher than 5 meters and a canopy cover of 5-10 percent, or trees able to reach these thresholds *in situ*; or with a combined cover of shrubs, bushes and trees above 10 percent. It does not include land that is predominantly under agricultural or urban land use.
Other land	All land that is not classified as "Forest" or "Other wooded land".
Other land with tree cover (Subordinated to "Other land")	Land classified as "Other land", spanning more than 0.5 hectare with a canopy cover of more than 10 percent of trees able to reach a height of 5 meters at maturity.
Inland water bodies	Inland water bodies generally include major rivers, lakes and water reservoirs.

1.2 National data

1.2.1 Data sources

References to sources of information	Quality (H/M/L)	Variable(s)	Year(s	Additional comments
MMA/PROBIO 2007	M	Natural Forests	2002	Mapping of vegetation in the scale 1:250,000 based on Landsat images, using the year 2002 as reference.
INPE/PRODES	M	Amazon deforestation rate	1988-2007	
Mantovani e Pereira (1998)	M	Cerrado deforestation rate	1990	
Machado et al. (2004)	M	Cerrado deforestation rate	2000	
Ferreira et al. (2007)	M	Cerrado deforestation rate	2005	
FAO 2005	M	Forest Plantations	2000, 2003	
ABRAF 2006	M	Forest Plantations	2005	
ABRAF 2007	M	Forest Plantations	2006	
ABRAF 2008	M	Forest Plantations	2007	
ABRAF 2009	M	Forest Plantations	2008	
IBGE 2008	M	*Hevea brasiliensis* plantation	1990-2008	

1.2.2 Classification and definitions

The classification of vegetation typologies into the categories of "Forest" and "Other wooded land" used by FAO was defined by experts on each biome, who were involved in the preparation of the FRA 2005. The definitions of each typology are described in the IBGE Vegetation Manual. The table below presents a list of the vegetation typologies included in each class.

National classes and vegetation typologies defined by IBGE Vegetation Manual.

National Classes	Definition (IBGE vegetation typologies)
Forests	**D-Dense Humid Forest:** Da – Alluvial Dense Humid Forest Db – Lowland Dense Humid Forest Ds - Submontane Dense Humid Forest Dm - Montane Dense Humid Forest Dl- High montane Dense Humid Forest **A-Open Humid Forest**: Aa –Alluvial Open Humid Forest Ab – Lowland Open Humid Forest As – Submontane Open Humid Forest Am – Montane Open Humid Forest **M-Mixed Humid Forest:** Ma – Alluvial Mixed Humid Forest Mm- Montane Mixed Humid Forest Ml – Montane Mixed High Humid Forest Ms – Submontane Mixed High Humid Forest **F- Semi deciduous Seasonal Forest** Fa – Alluvial Semi deciduous Seasonal Forest Fb - Lowland Semi deciduous Seasonal Forest Fs - Submontane Semi deciduous Seasonal Forest Fm - Montane Semi deciduous Seasonal Forest **C- Decidual Seasonal Forest:** Ca – Alluvial Deciduous Seasonal Forest Cb - Lowland Deciduous Seasonal Forest Cs - Submontane Deciduous Seasonal Forest Cm - Montane Deciduous Seasonal Forest **L- Campinarana:** Ld – Forested Campinarana La – Wooded Campinarana **S-Savannah:** Sd – Forested Savannah Sa – Wooded Savannah **T-Steppe Savannah**: Td - Forested Steppe Savannah Ta - Wooded Steppe Savannah **E-Steppe:** Ea – Tree Steppe **P- Pioneer Formations** Pma – Forest Vegetation Marine Influenced Pfm – Forest Vegetation Fluviomarine influenced **Transitional Zones:** OM – Transition Humid Forest / Mixed Humid Forest ON – Transition Humid Forest / Seasonal Humid Forest NM – Transition Seasonal Forest / Mixed Humid Forest NP – Transition Seasonal Forest / Pioneer Formations LO – Transition Campinarana / Humid Forest SO – Transition Savannah / Humid Forest SM – Transition Savannah / Mixed Humid Forest SN - Transition Savannah / Seasonal Forest

	ST – Transition Savannah / Steppe Savannah SP – Transition Savannah / Pioneer Formations (Restinga) TN – Transition Steppe Savannah / Seasonal Forest EM – Transition Steppe / Mixed Humid Forest EN – Transition Steppe / Seasonal Forest STN – Transition Savannah / Steppe Savannah / Seasonal Forest **Secondary Vegetation in Forestry areas** **Forest Plantations**
Other wooded land	Lb – Shrubby Campinarana Pa - Fluvial and/or Lacustre Influenced Vegetation Sp – Park Savannah Tp – Park Steppe Savannah Pmb – Shrubby Vegetation Marine Influenced Rm – Montane Vegetational Refuge Rl – High Mountane Vegetational Refuge Rs – Submontane Vegetational Refuge
Other land	**Anthropic Areas:** Disturbed forest areas (D+A+M+F+C+P) Disturbed field areas (S+T+E) **Remaining field vegetation:** Pmh – Herbaceous Vegetation Marine Influenced Pfh - Herbaceous Vegetation Fluviomarine Influenced Lg – Woody-grass Campinarana Sg – Woody-grass Savannah Tg - Woody Grass Steppe Savannah Ep – Park Steppe Eg – Woody Grass Steppe
Inland water bodies	**Rivers, lagoons, lakes, and reservoirs**

1.2.3 Original data

Native Forests

The information on the extent of natural forests and other wooded lands was obtained from the Maps of the Vegetable Cover of Brazilian Biomes – PROBIO (MMA, 2007), since Brazil does not currently have any systematized studies showing historical series with information on forest areas. The PROBIO is a study prepared by the Ministry of Environment through the Project for Conservation and Use of the Brazilian Biological Diversity – PROBIO. The national vegetation map presented by the PROBIO was prepared in the scale of 1:250,000 based on *Landsat* satellite images, and using as reference the year 2002 and the Brazilian Vegetation Classification adopted by the Brazilian Institute of Geography and Statistics-IBGE, in accordance with the Technical Manual on Brazilian Vegetation (IBGE, 1992). The minimum mapping area was 40 hectares.

The areas of each of the vegetable typologies were calculated for the six Brazilian continental biomes: Amazon Biome, Caatinga Biome, Cerrado Biome, Pantanal Biome, Atlantic Forest Biome, and Pampa Biome. In the 1:250,000-scale vegetation maps produced by PROBIO, the mapping unit is composed of up to three map keys that represent the types of vegetation or land cover. The area of each vegetation type was calculated using a proportion of the area of the polygon that represents each unit mapped, so that a polygon with one element accounts for 100% of the area of the polygon; one with two elements will have the first element accounting for 60% and the second for 40% of the total area of the polygon; one with three elements will have the first accounting for 50%, the second for 40%, and the third for 10% of the area of the polygon. Thus, the areas of vegetation types

for each biome were obtained from the original calculation spreadsheets in the SIG and tabulated according to the categories of the FRA-2010 to obtain the coverage result for the year 2002.

Area of vegetation types in Brazilian Biomes in 2002 (km²)

Vegetation Type	AMAZON	CAATINGA	CERRADO	ATLANTIC FOREST	PAMPA	PANTANAL
Dense Forest (Da, Db, Dl, Dm, Ds)	1,545,790.97	0.80	575.42	97,374.91	30.30	-
Open Forest (Aa, Ab, Am, As)	1,043,126.65	2,599.00	7,794.60	1,629.09	-	-
Mixed Forest (Ma, Ml, Mm, Ms)	-	-	-	40,144.61	-	-
Semidecidual Forest (Fa, Fb, Fl, Fm, Fs)	24,920.56	8,027.01	121,391.65	55,971.13	2,032.19	6,226.16
Decidual Forest (Ca, Cb, Cm, Cs)	2,976.62	17,231.77	24,409.75	21,332.05	15,014.59	1,439.64
Campinarana (La, Ld)	84,890.77	-	-	-	-	-
Forested and Wooded Savannah (Cerradão and Cerrado)(Sa, Sd)	45,631.51	6,365.85	530,768.41	2,949.71	-	58,638.49
Forested and Tree Steppe Savannah (Dense Caatinga) (Ta, Td)	2,796.12	340,583.20	13,950.88	7,591.90	2,774.19	636.80
Tree Steepe (Ea)	-	-	-	232.77	10,725.47	-
Restinga and Mangrove (Pf, Pm)	14,126.80	2,284.90	4,228.02	7,011.59	1,586.29	-
Secondary vegetation in ecotones (TN, TP, EM, EM, LO, NM, NP, OM, ON, OP, SE, SM, SN, SO, SP, ST, STN)	652,899.37	104,234.99	-	12,162.76	-	25,820.53
Secondary vegetation in forestry areas	232,797.26	11,014.13	72,730.05	54,539.65	891.84	108.87
Florest plantation	1,629.32	-	30,467.53	27,398.85	3,710.70	-
Sub-total	**3,651,585.94**	**492,341.65**	**806,316.31**	**328,339.03**	**36,765.56**	**92,870.48**

Source: Brazilian Forest Service, based on data from the PROBIO mapping (MMA, 2007).

The estimates on the extent of native forests for 1990 and 2000 and the projections for 2005 and 2010 were then made using the information on deforested areas or the deforestation

rates available for each biome, as explained in the item on Estimation and Forecasting below:

Forest Plantations

The data on forest plantations for 1990 and 2000 was taken from the FRA 2005. For 2005 and 2010, it was calculated based on the data found in the ABRAF Statistical Yearbooks of 2006, 2007, 2008, and 2009 (Brazilian Association of Forest Plantation Producers), with the exception of *Hevea brasiliensis* that the data (1990 – 2008) was taken from IBGE, 2008.

Species	2005	2006	2007	2008
Eucalyptus spp	3,463,000	3,746,000	3,970,000	4,259,000
Pinus spp	1,831,000	1,886,000	1,875,000	1,868,000
Acacia sp	178,377	184,363	189,690	181,780
Tectona sp	50,000	42,496	48,576	58,813
Araucaria angustifolia	24,235	18,275	17,500	12,525
Populus sp	5,600	2,972	2,800	4,022
Schizolobioum amazonicum	n.i.	41,100	79,159	80,177
*Hevea brasiliensis**	115,595	108,850	118,149	149,104

*Data from IBGE, 2008.

Official area of Brazil

Brazil's official area is 8,514,876.6 km², according to Resolution nº 05, of 10/10/2002, from the Brazilian Institute of Geography and Statistics – IBGE, based on the territorial map of 01/01/2001
(www.ibge.gov.br/pub/Organização_do_Territorio/Areas_e_Limites/Areas.zip)

1.3 Analysis and processing of national data

1.3.1 Calibration

No calibration was required.

1.3.2 Estimation and forecasting

Natural Forests

Since there was no systematized information at the national level on forests areas in each biome for the years requested by the FRA (1990, 2000, 2005 e 2010), the 2002-based mapping of the cover area of Brazilian biomes (PROBIO) was used as the reference value and estimates of the forest cover of biomes were made for the other years, based on the information available on the deforested areas and the deforestation rates for each biome, as presented below. The values for 1990 and 2000 were retroacted based on the reference value of 2002 and discounting the deforestation occurred in 12 and 2 years respectively, to generate the final values for these two points in time. Similarly, the deforestation rates were used to estimate the areas in 2005 and 2010.

We use the same methodology to obtain the values of *Forest* and *Other Wooded Land*, considering the different vegetation typologies that occurs, which are presented in the table above.

- Amazon Biome: the forest cover area in the Amazon biome in 1990, 2000, 2005, and 2010 was calculated using the area of deforestation estimates from the PRODES Project of the National Institute of Space Research – INPE for the period 1998-2007 (www.inpe.gov.br).

Data on gross deforestation estimates for the Legal Amazon in the states (km^2).

Year / Biome	State									
	Acre	Amazonas	Amapá	Maranhão	Mato Grosso	Pará	Rondônia	Roraima	Tocantins	Total Legal Amazon
88 (a)	620	1.510	60	2.450	5.140	6.990	2.340	290	1.650	21.050
89	540	1.180	130	1.420	5.960	5.750	1.430	630	730	17.770
90	550	520	250	1.100	4.020	4.890	1.670	150	580	13.730
91	380	980	410	670	2.840	3.780	1.110	420	440	11.030
92	400	799	36	1.135	4.674	3.787	2.265	281	409	13.786
93 (b)	482	370		372	6.220	4.284	2.595	240	333	14.896
94 (b)	482	370		372	6.220	4.284	2.595	240	333	14.896
95	1.208	2.114	9	1.745	10.391	7.845	4.730	220	797	29.059
96	433	1.023		1.061	6.543	6.135	2.432	214	320	18.161
97	358	589	18	409	5.271	4.139	1.986	184	273	13.227
98	536	670	30	1.012	6.466	5.829	2.041	223	576	17.383
99	441	720		1.230	6.963	5.111	2.358	220	216	17.259
00	547	612		1.065	6.369	6.671	2.465	253	244	18.226
01	419	634	7	958	7.703	5.237	2.673	345	189	18.165
02	883	885	0	1.014	7.892	7.452	3.099	84	212	21.521
03	1.078	1.558	25	993	10.405	7.145	3.597	439	156	25.396
04	728	1.232	46	755	11.814	8.870	3.858	311	158	27.772
05	592	775	33	922	7.145	5.899	3.244	133	271	19.014
06	398	788	30	651	4.333	5.592	2.049	231	124	14.196
07	184	610	39	613	2.678	5.526	1.611	309	63	11.633
08	254	604	100	1.272	3.258	5.606	1.136	574	107	12.911
Amazon	100%	100%	100%	34%	54%	100%	100%	100%	9%	
Cerrado	0%	0%	0%	65%	39%	0%	0%	0%	91%	
Other				1%	7%					

Source: PRODES 2008

Note: (a) Average between 1977-1988.

(b) Average between 1993-1994.

The percentages refer to the proportion of a States within the Legal Amazon that belongs to different biomes.

Forest area in Amazonia Biome was calculated from information provided by PRODES, which uses images from the Landsat satellite, mapping minimum areas of 6.25 hectares and estimating the extent of annual gross deforastation using the reference date of August 1st as the basis for calculation (Câmara et al., 2006). Since PRODES provides deforestation estimates for the Legal Amazon, including percentages of some States which have part of Cerrado biome, it was necessary to make corrections to avoid including areas of Cerrado that belongs to the Legal Amazon. Corrections were made considering the percentages of the areas occupied by the Amazon biome, according to IBGE (1992): Mato Grosso State (54% of Amazon), Maranhão (34% of Amazon), and Tocantins (9% of Amazon). However,

not all of this percentages are forest area, despite of being in the Amazon biome. Therefore, it was necessary to correct these areas for the percentual of forest.
The deforested area used to calculate values of forest in 1990, 2000, 2005 and 2010 was 96.89% of the value estimated by PRODES, which correspond to the forest area in the Amazon biome. To calculate the area of other wooded forests was used the percentage of 2.29% of PRODES, which corresponds to this type of vegetation in the Amazon biome, and for other lands it was 0.82% of PRODES.

It is important to note that the PRODES does not account for regeneration in areas deforested in previous years.

- Cerrado Biome: Forest area in Cerrado was calculated from the forest area estimated in 2002 and the rate of 1.27%, which represents the lost of forest area per year. The forest area in Cerrado was calculated from the deforestation area detected by Remote Sensing Center of IBAMA for the period between 2002 and 2008. The total area deforested was 85,074 square kilometers, which represents 14,179 square kilometers per year of deforestation. Thus, the difference between the vegetation area in 2002 and the vegetation area in 2008 represents a lost of 1.27% per year.

- Pantanal Biome - Forest area in Pantanal was calculated from the forest area estimated in 2002 and the rate of 1.02%, which represents the lost of forest area per year. This rate was obtained from the shapefile of the project "Updated map of the land use and vegetation area of the Pantanal" (AVINA / WWF-Brasil / SOS Mata Atlântica / Conservación Internacional / Ecoa) conducted in 2008. First, the Pantanal biome was clipped in the file. After that, the same methodology for determining areas of PROBIO in 2002 was applied, and the difference between forest areas in 2002 and 2008 was determined. Estimated area of deforestation in the period was 5,552.29 square kilometers, which means 925.3 square kilometers deforested annually, representing the lost rate of 1.02% per year.

- Caatinga Biome: Forest area in Caatinga was calculated from the forest area estimated in 2002 and the rate of 0.63%, which represents the lost of forest area per year. The forest area in Caatinga was calculated from the deforestation area detected by Remote Sensing Center of IBAMA for the period between 2002 and 2008. The total area deforested was 17,215 square kilometers, which represents 2,869 square kilometers per year of deforestation. Thus, the diference between the vegetation area in 2002 and the vegetation area in 2008 represents a lost of 0.63% per year.

- Atlantic Forest and Pampa Biomes: The estimates of forest cover areas of these biomes for 1990, 2000, 2005, and 2010 were calculated from the forest area estimated in 2002 and the rate of 0.54% (Atlantic Forest) and 0.40% (Pampa), which represents the lost of forest area per year.

Forest Plantations

The forest plantation areas for 1990 and 2000 were estimated using data from the FRA2005, which were extracted from information obtained in the Brazilian Silviculture Society (www.sbs.org.br), in addition to other sources consulted through electronic sites of forest sector associations, such as the Brazilian Paper and Cellulose Association – BRACELPA, the Brazilian Charcoal Association – ABRACAVE, the Brazilian Wooden Panels Industry

Association – ABIPA, and the Brazilian Association of Mechanically Processed Wood Industries – ABIMCI.

For the estimates of 2005, data from the Statistical Yearbooks of the Brazilian Forest Plantation Producers – ABRAF of 2006 (year base 2005) were used, and for 2010, the data from the 2007 (year base 2006), 2008 (year base 2007), and 2009 (year base 2008) ABRAF Statistical Yearbooks were used.

The average annual growth rate was calculated for the period 2005-2008 and the plantation area was estimated for 2009 and 2010, with the exception of *Hevea brasiliensis* that the data (1990 – 2008) was taken from IBGE, 2008. For the Populus and the Paricá, the growth rate for 2007-2008 was used and the plantation area for 2009-2010 was estimated.

Estimation of forest plantation areas for 2009 and 2010

Species	**2009 (ha)**	**2010(ha)**
Eucalyptus spp	4,574,700	4,913,800
Pinus spp	1,895,300	1,923,000
Acacia sp	183,037	184,304
Tectona sp	62,807	67,072
Araucaria angustifolia	10,134	8,200
Populus sp	5,777	8,299
Schizolobioum amazonicum	81,208	82,252

Result of forest area estimation data for 1990, 2000, 2005, and 2010.

Forest type	**Area (hectares)**			
NATURAL FORESTS/BIOMES	**1990**	**2000**	**2005**	**2010**
Amazon	379,938,052	367,725,556	359,535,618	354,389,794
Cerrado	90,335,526	79,578,029	74,651,865	70,007,832
Caatinga	53,128,701	49,860,012	48,294,387	46,774,120
Atlantic Forest	32,103,082	30,419,910	29,609,122	28,818,263
Pantanal	10,492,296	9,477,874	9,005,166	8,554,246
Pampa	3,856,966	3,706,028	3,632,615	3,560,541
Total of natural forests	**569,854,624**	**540,767,409**	**524,728,772**	**512,104,797**
FOREST PLANTATIONS				
Pinus spp	1,769,000	1,840,050	1,831,000	1,923,000
Eucalyptus spp	2,964,000	2,965,880	3,463,000	4,913,800
Araucaria angustifolia	18,000	13,341	24,235	8,200
Tectona sp	14,000	50,000	50,000	67,072
Mimosa scabrella	50,000	50,000	50,000	50,000
Populus sp	2,500	5,000	5,600	8,299
Acacia sp	100,000	150,000	178,377	184,304
Hevea brasiliensis	63,641	96,587	115,595	173,557
Schizolobioum amazonicum	na	na	41,100	82,252
Others	3,000	5,048	6,072	7,096
Total Forest Plantations	**4,984,141**	**5,175,906**	**5,764,979**	**7,417,580**
Total	**574,838,765**	**545,943,315**	**530,493,751**	**519,522,377**

Other Wooded Land	**Area (hectares)**

Biomes	1990	2000	2005	2010
Amazon	8,990,736.0	8,701,743.3	8,502,997.5	8,370,908.0
Cerrado	42,033,186.3	37,027,714.9	34,735,567.1	32,574,695.5
Caatinga	650,518.5	610,496.0	591,326.2	572,711.7
Atlantic Forest	903,297.9	855,937.8	833,124.3	810,871.6
Pantanal	1,338,050.6	1,208,684.4	1,148,401.4	1,090,897.0
Pampa	381,534.2	366,603.3	359,341.2	352,211.6
Total	**54,297,323.6**	**48,771,179.8**	**46,170,757.7**	**43,772,295.4**

1.3.3 Reclassification into FRA 2010 categories

1.4 Data for Table T1

FRA 2010 categories	Area (1000 hectares)			
	1990	2000	2005	2010
Forest	574,839	545,943	530,494	519,522
Other wooded land	54,297	48,771	46,171	43,772
Other land	203,377	237,799	255,849	269,218
...of which with tree cover	n.a.	n.a.	n.a.	n.a.
Inland water bodies	18,975	18,975	18,975	18,975
TOTAL	851,488	851,488	851,488	851,488

1.5 Comments to Table T1

Variable / category	Comments related to data, definitions, etc.	Comments on the reported trend
Forest		
Other wooded land		
Other land		
Other land with tree cover		
Inland water bodies	The information on the Inland water bodies was obtained from the Maps of the Vegetation Cover of Brazilian Biomes – PROBIO (MMA, 2007), in the scale of 1:250,000 based on *Landsat* satellite images. The extent of the Inland	

	water bodies may vary according to the period in wich the images were taken (rainy season, dry season, during flood event).	

Other general comments to the table

Expected year for completion of ongoing/planned national forest inventory and/or RS survey / mapping	
Field inventory	2015
Remote sensing survey / mapping	2011

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Table T2 – Forest ownership and management rights

2.1 FRA 2010 Categories and definitions

Category	Definition
Public ownership	Forest owned by the State; or administrative units of the public administration; or by institutions or corporations owned by the public administration.
Private ownership	Forest owned by individuals, families, communities, private co-operatives, corporations and other business entities, private religious and educational institutions, pension or investment funds, NGOs, nature conservation associations and other private institutions.
Individuals *(sub-category of Private ownership)*	Forest owned by individuals and families.
Private business entities and institutions *(sub-category of Private ownership)*	Forest owned by private corporations, co-operatives, companies and other business entities, as well as private non-profit organizations such as NGOs, nature conservation associations, and private religious and educational institutions, etc.
Local communities *(sub-category of Private ownership)*	Forest owned by a group of individuals belonging to the same community residing within or in the vicinity of a forest area. The community members are co-owners that share exclusive rights and duties, and benefits contribute to the community development.
Indigenous / tribal communities *(sub-category of Private ownership)*	Forest owned by communities of indigenous or tribal people.
Other types of ownership	Other kind of ownership arrangements not covered by the categories above. Also includes areas where ownership is unclear or disputed.
Categories related to the holder of management rights of public forest resources	
Public Administration	The Public Administration (or institutions or corporations owned by the Public Administration) retains management rights and responsibilities within the limits specified by the legislation.
Individuals/households	Forest management rights and responsibilities are transferred from the Public Administration to individuals or households through long-term leases or management agreements.
Private institutions	Forest management rights and responsibilities are transferred from the Public Administration to corporations, other business entities, private co-operatives, private non-profit institutions and associations, etc., through long-term leases or management agreements.
Communities	Forest management rights and responsibilities are transferred from the Public Administration to local communities (including indigenous and tribal communities) through long-term leases or management agreements.
Other form of management rights	Forests for which the transfer of management rights does not belong to any of the categories mentioned above.

2.2 National data

2.2.1 Data sources

References to sources of information	Quality (H/M/L)	Variable(s)	Year(s)	Additional comments
IBGE agriculture and livestock census (2006)	H	Forests and Woods in private properties	1980, 1985, 1995, and 2006	
2003-2006 SEPPIR Management Report SEPPIR	H	Areas belonging to remnant quilombo communities with legal title	1995 - 2006	
ICMBIO	H	Federal sustainable use conservation unit areas	1946-2005	
FUNAI	M	Areas of Indigenous Lands	1990; 2000 e 2005	Information sent by e-mail pursuant to request by Agrarian Assistance Director.
Rylands A.B; Brandon Katrina (2005).	H	Area of State forests	2005	
Department of Protected Areas of the Ministry of Environment	M	Area of state forests; flonas, Sustainable Development Reserve – SDR (state and federal), Extractivist Reserve (federal and state)	1990,2000 e 2005	Information sent by e-mail extracted from the National Registry of Conservation Units
DATALUTA GIRARDI (2008)	M	Areas of Federal Agrarian Reform Settlements	1990, 2000 e 2005	

2.2.2 Classification and definitions

National class	Definition
National Forest	Conservation Unit with forest cover of mainly native species and with the basic objective of multiple sustainable use of forest resources and scientific research with emphasis on methods for the sustainable exploration of native forests belonging to the federal government.
State Forest	Conservation Unit with forest cover of mainly native species and with the basic objective of multiple sustainable use of forest resources and scientific research, with emphasis on methods for the sustainable exploration of native forests belonging to the state government.
Extractivist Reserve	Federal or state Conservation Unit, used by local populations , whose subsistence is based on extractivist activities, and complemented by subsistence agriculture and breeding o small livestock, with the basic objective of protecting the way of life and culture of these populations, and to secure the sustainable use of its natural resources.
Sustainable Development Reserve	According to the SNUC definition, this is a natural area that shelters traditional populations whose existence is based on sustainable exploitation of natural resources, developed over many generations and adapted to the local ecological conditions, which carry out a fundamental role in protecting nature and in maintaining the biological diversity.
Indigenous Lands	Lands traditionally occupied and permanently inhabited by Indigenous peoples, which are used for their productive activities, and essential for the conservation of environmental resources necessary for their well-being and necessary for their physical and cultural reproduction, according to their uses, customs, and traditions. These are inalienable and indisposible properties of the federal government and the

	rights over them are imprescriptible." Although Indians hold the permanent tenure and the "exclusive right to use the land, rivers, and lake resources existing in their lands, they are federal government property, and as public goods of special use, cannot be used in any way by anyone other than indigenous peoples.
Agrarian Reform Settlement	Implementation of sustainable livelihood and production systems with the objective of fulfilling the social function of land and promoting the economic, social, and cultural development of rural workers and their families.
Woods and/or Natural Forests in private properties	Woods and/or natural forests used for permanent conservation or legal reserve areas, and areas used for vegetal extraction covered by woods, and natural forests without plantations, including areas with thin brush, caatinga, or cerrado, which may or not have been used for animal pasture. It also includes plantation areas with native or exotic forest essences.
Agriculture and livestock establishment	The agriculture and livestock establishment is the entire continuous area of land, regardless of size or situation (urban or rural), formed by one or more parts, under a single producer, in which agriculture and livestock production, including vegetables and flowers, is managed; the production, reproduction, or fattening of large and medium size animals; the production of small animals; planted forests or reforestation; and the extraction of vegetable products.
Remnant Quilombola communities	Social groups whose ethnic identity distinguishes them from the rest of society, and which have developed resistance practices to maintain and reproduce their characteristic lifestyles in a certain place.

2.2.3 Original data

Area of private forests

There is no information on forest ownership at the national level available from land-management agencies. The area of private forests is considered as the sum of the areas of forests and woods of (private) agriculture and livestock establishments in Brazil.

This information is derived from the results of the Brazil-Agriculture and Livestock Census 1970/2006 carried out by the IBGE (Brazilian Institute of Geography and Statistics). The original data is presented in the table below. The Agriculture and Livestock Census is a large-scale statistical operation which is carried out periodically to gather, process, and release data on the structure of the agriculture and livestock, forests, and aquiculture sectors in Brazil. The information is directly collected in all the (private) agriculture and livestock establishments through declaratory questionnaires. The typical structural data requested are: size of agriculture area, land use and management, cultivated areas, irrigation, livestock population, labor, and other agriculture and livestock input. One category of land use considered is "woods and forests," which was included in this work. In the "woods and forests" category, the IBGE accounts for all the natural woods and/or forests used for permanent conservation or legal reserve areas, natural woods and/or forests, forests with forest essences and forest areas also used for crops and livestock pasture.

The IBGE has designed a process to review the methodology for the 2006 Agriculture and Livestock Census particularly to redesign the research content and include concepts that correspond to elements of greater notoriety or new issues that have become part of the national agricultural universe. By applying technological innovation to collection tools, it has invested in replacing a palmtop-based electronic questionnaire, the *Personal Digital Assistant* - for the paper questionnaire.

The 2006 Agriculture and Livestock Census - as in previous years - followed the recommendations and the basic concepts established by the United Nation's Food and Agriculture Organization – FAO included in the 2010 Agriculture and Livestock Census

Program, aiming at unifying the concepts and ensuring the comparability of results for all countries conducting similar surveys.

Area of Woods and Forests in agriculture and livestock establishments in Brazil, taken from the IBGE Agriculture and Livestock Census of 1970/2006 (ha)

	1970	1975	1980	1985	1995	2006
Woods and Forests	57,881,182	70,721,929	88,167,703	88,983,599	94,293,598	99,887,620

2.3 Analysis and processing of national data

2.3.1 Calibration

2.3.2 Estimation and forecasting

Table 2a – Forest ownership

Area of public forests (Public ownership)

The area of public forests was estimated by subtracting the area of private forests from the total forest area presented in Table 1.

Area of private forests (Private ownership)

The area of private woods and forests for 1990, 2000, and 2005 required in the FRA was estimated using a linear regression and considering the areas of woods and forests derived from the Agriculture and Livestock Census (IBGE) in 1980, 1985, 1995, and 2006.

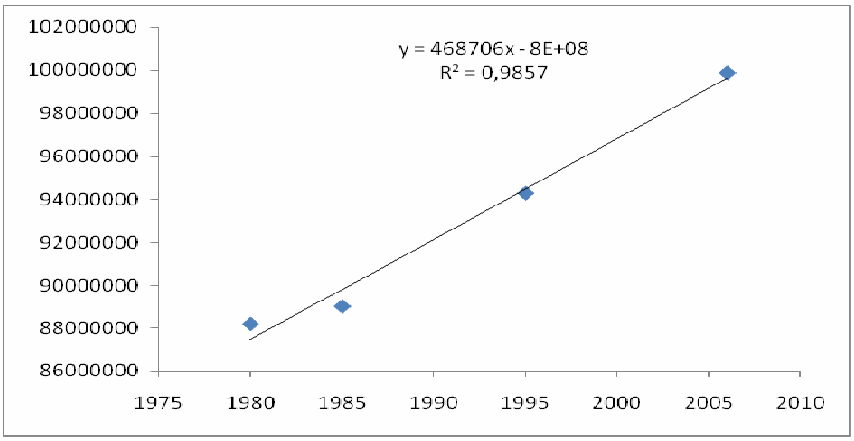

Table 2b – Holder of management rights of public forests

Public management

The area of forests under public management (publicly managed forests) was estimated by subtracting the areas destined for community use from the total area of public forests presented in Table 2a.

Management rights of public forests for communities

The public areas destined for community use were considered as follows: Federal and State Extractivist Reserves, federal and state sustainable development reserves, Indigenous Lands and forest areas in federal agrarian reform settlements.

Public forests with management rights for communities

	1990	2000	2005
Extractivist Reserves - RESEX (Federal)	2,162,989	3,490,047	8,473,222
Extractivist Reserves - RESEX (State)	0	49,001	887,937
Sustainable development reserve - SDR (Federal)	0	0	64,735
Sustainable development reserve - SDR (State)	1,310,802	4,398,809	9,572,548
Indigenous Lands	28,458,000	91,861,000	105,485,000
Forest areas in agrarian reform settlements	5,991,739	18,199,085	35,664,753
TOTAL	**37,923,530**	**117,997,942**	**160,148,195**

Forest Areas in Agrarian Reform Settlements

The area of forests in agrarian reform settlements was estimated as 80% of the area of settlements located in the Legal Amazon region (this percentage corresponds to the area of legal reserve which must be maintained as forest by force of law). For the rest of the country, the area was estimated as 20% of the area of settlements (which corresponds to the area of legal reserve in other biomes).

2.3.3 Reclassification into FRA 2010 categories

FRA Categories	National Classes	Comments
Private ownership	Woods and forests in agricultural properties included in the IBGE's agriculture and livestock census of 1985, 1995, and 2006.	The years 1990, 2000, and 2005 were calculated using a linear regression.
Owned by local communities	Areas of quilombola communities with legal title were used.	
Owned by indigenous		Indigenous lands in Brazil are considered of public ownership
Holder of management rights of public forests – Public administration	Areas of National Forests and State Forests were considered.	
Holder of management rights of public forests – Individuals	All public forests were considered subtracting those that are under community use.	
Holder of management rights of public forests – Private corporations and institutions	There was no case of forest management rights in public areas by corporations in the period assessed.	In 2008, the first forest concession was made in a public area for private companies.
Holder of management rights of public forests – Communities	The following areas were considered: Federal and State Extractivist Reserves, federal and state Sustainable Development Reserves, Indigenous Lands, and forest areas in federal agrarian reform settlements.	
Holder of management rights of public forests – Other		

2.4 Data for Table T2

Table 2a - Forest ownership

FRA 2010 Categories	Forest area (1000 hectares)		
	1990	2000	2005
Public ownership	482,709	449,126	431,334
Private ownership	92,130	96,817	99,160
...of which owned by individuals	...	...	...
...of which owned by private business entities and institutions	...	...	...
...of which owned by local communities*	0	774	907
...of which owned by indigenous / tribal communities**	...	...	...
Other types of ownership	...	...	...
TOTAL	**574,839**	**545,943**	**530,494**

* Remnant quilombola communities

Does ownership of trees coincide with ownership of the land on which they are situated?		Yes
	x	No
If **No** above, please describe below how the two differ:		
Both cases are seen in Brazil. In many public areas, exploration rights of forest resources belong to communities, as is the case of Indigenous Lands, Extractivist Reserves, Sustainable Development Reserves, and Agrarian Reform Settlements. In the case of private forests, the landowner holds the right to explore the forest resources, with some exceptions to the right of communities to explore non-wood resources in private areas. However, it is important to observe that forest management must always be authorized by the government, even in privately owned forests.		

Table 2b - Holder of management rights of public forests

FRA 2010 Categories	Forest area (1000 hectares)		
	1990	2000	2005
Public Administration	444,786	331,128	271,186
Individuals	0	0	0
Private corporations and institutions	0	0	0
Communities	37,923	117,998	160,148
Other	0	0	0
TOTAL	**482,709**	**449,126**	**431,334**

2.5 Comments to Table T2

Variable / category	Comments related to data, definitions, etc.	Comments on the reported trend
Public ownership		
Private ownership	The IBGE presents data for 1970, 1975, 1980, 1995, and 2006, and the values for the years 1990, 2000, 2005 were obtained trough a linear regression.	
Other types of ownership		

Management rights		

Other general comments to the table
There is a great lack of information on the ownership of forests in Brazil. The IBGE's agriculture and livestock census provides very important information, but it is only held every ten years and data is only released at least two years after the end of the data collection period. The Brazilian Forest Service is forming a registry of the Brazilian public forests. This data will also be very important to ensure better information on the land profile of Brazilian forests over the next years.

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Table T3 – Forest designation and management

3.1 FRA 2010 Categories and definitions

Term	Definition
Primary designated function	The primary function or management objective assigned to a management unit either by legal prescription, documented decision of the landowner/manager, or evidence provided by documented studies of forest management practices and customary use.
Protected areas	Areas especially dedicated to the protection and maintenance of biological diversity, and of natural and associated cultural resources, and managed through legal or other effective means.
Categories of primary designated functions	
Production	Forest area designated primarily for production of wood, fibre, bio-energy and/or non-wood forest products.
Protection of soil and water	Forest area designated primarily for protection of soil and water.
Conservation of biodiversity	Forest area designated primarily for conservation of biological diversity. Includes but is not limited to areas designated for biodiversity conservation within the protected areas.
Social services	Forest area designated primarily for social services.
Multiple use	Forest area designated primarily for more than one purpose and where none of these alone is considered as the predominant designated function.
Other	Forest areas designated primarily for a function other than production, protection, conservation, social services or multiple use.
No / unknown	No or unknown designation.
Special designation and management categories	
Area of permanent forest estate (PFE)	Forest area that is designated to be retained as forest and may not be converted to other land use.
Forest area within protected areas	Forest area within formally established protected areas independently of the purpose for which the protected areas were established.
Forest area under sustainable forest management	To be defined and documented by the country.
Forest area with management plan	Forest area that has a long-term (ten years or more) documented management plan, aiming at defined management goals, which is periodically revised.

3.2 National data

3.2.1 Data sources

References to sources of information	Quality (H/M/L)	Variable(s)	Year(s)	Additional comments
ICMBio(1) –	M	UC´s; year created; area	1990, 2000, 2005 2009	
MMA(2) – DAP	M	UC´s; year created; area	1990, 2000, 2005 2009	Indigenous lands
ISA(3)	A	UC´s; area	2005	
CNRPPN(4)	A	RPPN area	2004	

3.2.2 Classification and definitions

National class	Definition
Ecological Station	Objectives are nature conservation and undertaking scientific research
Biological Reserve	Objective is the integral conservation of the biota and other natural features within the area, excluding direct human interference or modifications in the environment, except for recovery of degraded ecosystems and management actions needed for recovering and preserving the natural equilibrium, the biological diversity and the natural ecological processes.
National Park	Basic objective is the preservation of the natural ecosystems of great ecological relevance and scenic beauty, allowing the undertaking of scientific research and educational and environmental interpretation activities, in nature recreation and ecological tourism.
Natural Monument	Basic objective to preserve rare and unique natural sites, or those of great scenic beauty.
Wildlife Refuge	Objective of protecting natural environments that secure conditions necessary for the existence or reproduction of species or communities of the local flora and resident or migratory fauna.
Environmental Protection Area	Generally extensive areas with a certain degree of human occupation, endowed with abiotic, biotic, aesthetic or cultural features that are especially important for the quality of life and well-being of human populations, and with the basic objectives of protecting biological diversity, disciplining the process of occupation, and securing the sustainable use of natural resources.
Area of Relevant Ecological importance	Generally small area with little or no human occupation, with extraordinary natural features or endowed with rare examples of the regional biota, and which has the objective of maintaining the natural ecosystems of regional or local importance and regulating the adequate use of these areas in a compatible way to ensure the objectives of nature conservation.
National Forest	Area with forest cover of mainly native species and has as a basic objective the sustainable multiple use of forest resources and scientific research, with emphasis on methods for sustainable exploration of native forests.
Extractivist Reserve	Area used by traditional extractivist populations, whose subsistence is based on extractivist activities, and complemented by subsistence agriculture and breeding of small sized animals, and has as an basic objective to protect the way of life and culture of these populations, and to secure the sustainable use of its natural resources.
Fauna Reserve	Natural area with populations of native animal species, land or aquatic, resident or migratory, and suitable for technical-scientific studies on the sustainable economic management of the fauna resources.
Sustainable Development Reserve	Natural area that shelters traditional populations whose existence is based on sustainable exploitation of natural resources, developed over generations and have a fundamental role in nature protection and maintenance of biological diversity.
Natural Heritage Private Reserve	Private area, with the objective of conserving its biological diversity for perpetuity.
Permanent Conservation Area	Protected area, covered or not by native vegetation, with the environmental function to preserve water resources, the landscape, the geological stability, the biodiversity, the gene flow of plants and animals, soil protection and assure the well-being of the human populations.
Legal Reserve	An area within a rural property or holding, of permanent preservation, necessary for the sustainable use of natural resources, by conservation and rehabilitation of ecological processes, by biological conservation and shelter and protection of the native fauna and flora.
SISPROF	Integrated Monitoring and Control System of Forest Resources and Products.

3.2.3 Original data

Categories	Area (1000 hectares)		
	1990	2000	2005
National Forests	8,428,508	10,826,056	14,273,283
State Forests	12,887	13,661	1,353,139
Forest Plantations	5,070,500	5,279,319	5,717,348
Biodiversity Conservation	20,914,598	23,942,652	37,330,445
SDR	1,310,802	4,398,809	7,039,608
RESEX	2,158,535	3,579,909	8,801,746
Indigenous Lands	28,458,000	91,861,000	105,485,000
Federal EPA	2,224,336	14,573,955	18,100,449
Multiuse	2,224,336	14,573,955	18,100,449

Estimated Areas of Legal Reserve per Biome (1000 ha):

Biomes	Legal Reserve
Atlantic Forest	22,203,640
Pampa	3,529,915
Caatinga	16,889,068
Cerrado	25,079,768
Cerrado in the Amazon	27,386,085
Amazônia	335,755,397
Pantanal	3,007,102

3.3 Analysis and processing of national data

Table 3 is complementary to Table 1 because it subdivides the forestry areas according to the designated functions. The term designated function is used to specify the function or the purpose for which part of the forest was designated, either by regulation or pursuant to the landowner's decision.

Table 3 requires information about the forestry areas that have a "primary function" and about "total area destined to a function". An area is determined as "primary function" when it has a more relevant function than its other functions, and this category includes areas reserved to fulfill a specific purpose. The "total area destined to a function" is the total area that fulfils a specific function, this being of primary nature or not.

To classify the forestry areas inside the categories presented in Table 3 the written definitions in the National System of Conservation Units was used, the SNUC, as well as the Brazilian Forestry Code. The classification of Brazilian forestry areas in the Designated function Category, pre established by FAO, was done according to the functions of the Conservation Units (UC) described in SNUC

To determine the total area of each category inside the Primary Function item, the areas of the CU that had the same principal function were added. The description of the categories

established by FAO as well as their equivalents in the Brazilian classification, used in the calculation of the area, are described below:

Production: Forests designated for a production function and extraction of forest goods.:
- National forests (FLONAS);
- Forest plantations;

Soil and water protection: Forests designated for soil and water protection.
- Permanent Preservation Area (APP);

Conservation of Biodiversity: Forests designated for conservation of biological diversity.
- Ecological station;
- Biological reserve;
- National Park Natural Monument;
- Wildlife refuge;
- Area of relevant ecological importance;
- Natural Heritage private reserve.

Social Services: Forests designated for provision of social services.
- Federal Extractivist Reserve;
- State Extractivist Reserve;
- Indigenous Lands;
- Federal Sustainable Development Reserve (SDR)
- State Sustainable Development Reserve

Multiple use: Forests designated to any combination of the following functions: production of goods, protection of soil and water, conservation of biodiversity and provision of social services. In these combinations none of the functions can be considered more important than the others.
- Federal Environmental Protection Area
- State Environmental Protection Area

Without function or function unknown: Forests which have no designated function or whose function is unknown.

To calculate the Soil and Water Protection category, the value of 5% of the total country area was assumed, since there is no national survey available on these areas. Since a federal law establishes that these are conservation areas, no variations were considered for the years included in the table. Once the values presented in Table 3a for the majority of categories (Production, Conservation of biodiversity, Social services e Multiple use) came from the aggregation of available information (total areas) on Conservation Units, National Forests, planted forests, etc, and that these figures already include the assumed value 5% of protected forests alongside rivers, we discounted 5% of each of these categories in order to avoid double counting.

The areas assumed as “Area of permanent forest estate (PFE) were calculated considering land for the production of timber and other forest products, for the protection of soil and water, and the conservation of biological diversity, as well as land intended to fulfil a combination of these function.

The areas considered "Forest area within protected areas" were calculated from the total protected areas considered for the preparation of the 3rd table, excluding the protected areas that correspond to the categories V and VI of IUCN

The “Forest areas with Management Plan” were calculated by adding the areas of the Conservation Units that have management plans approved by the government.

The areas considered “Forest areas under sustainable forest management” were those with effective management within the property and with a forest management plan approved by the government. In this item, the Amazon and Caatinga areas were considered only for 2005. Until 2007, these areas were monitored by the federal government through the SISPROF, and henceforth the inspection of forest management plans was conducted by the state governments, which still do not have an adequate information system for the management plans.

3.3.1 Calibration

No calibration was required;

3.3.2 Estimation and forecasting

The Permanent Conservation Area (APP) was estimated at 5% of the country area, and the 2010 values were estimated through the new areas that are being established.

3.3.3 Reclassification into FRA 2010 categories

3.4 Data for Table T3

Table 3a – Primary designated function

FRA 2010 Categories	Forest area (1000 hectares)			
	1990	2000	2005	2010
Production	12,754	15,215	20,322	34,251
Protection of soil and water	42,574	42,574	42,574	42,574
Conservation of biodiversity	19,869	22,746	35,464	46,966
Social services	30,331	94,848	115,260	119,193
Multiple use	2,113	13,845	17,195	20,776
Other (please specify in comments below the table)	0	0	0	0
No / unknown	467,197	356,715	299,678	255,760
TOTAL	574,839.00	545,943.00	530,494.00	519,522.00

Table 3b – Special designation and management categories

FRA 2010 Categories	Forest area (1000 hectares)			
	1990	2000	2005	2010
Area of permanent forest estate	105,528	175,382	213,620	242,986
Forest area within protected areas	62,443	65,312	78,038	89,541
Forest area under sustainable forest management			328.33	
Forest area with management plan	13,689	15,138	16,332	30,543

3.5 Comments to Table T3

Variable / category	Comments related to data, definitions, etc.	Comments on the reported trend
Production		
Protection of soil and water		
Conservation of biodiversity		
Social services		
Multiple use		
Other		
No / unknown designation		
Area of permanent forest estate		
Forest area within protected areas		
Forest area under sustainable forest management		
Forest area with management plan		

Other general comments to the table
The total area of conservation units is underestimated because municipal conservation units are not included and not all units at the state level are included. There is an overlapping area of indigenous lands and conservation units, which was also not included in the calculations**.**

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Table T4 – Forest characteristics

4.1 FRA 2010 Categories and definitions

Term / category	Definition
Naturally regenerated forest	Forest predominantly composed of trees established through natural regeneration.
Introduced species	A species, subspecies or lower taxon, occurring outside its natural range (past or present) and dispersal potential (i.e. outside the range it occupies naturally or could occupy without direct or indirect introduction or care by humans).
Characteristics categories	
Primary forest	Naturally regenerated forest of native species, where there are no clearly visible indications of human activities and the ecological processes are not significantly disturbed.
Other naturally regenerated forest	Naturally regenerated forest where there are clearly visible indications of human activities.
Other naturally regenerated forest of introduced species *(sub-category)*	Other naturally regenerated forest where the trees are predominantly of introduced species.
Planted forest	Forest predominantly composed of trees established through planting and/or deliberate seeding.
Planted forest of introduced species *(sub-category)*	Planted forest, where the planted/seeded trees are predominantly of introduced species.
Special categories	
Rubber plantations	Forest area with rubber tree plantations.
Mangroves	Area of forest and other wooded land with mangrove vegetation.
Bamboo	Area of forest and other wooded land with predominant bamboo vegetation.

4.2 National data

4.2.1 Data sources

References to sources of information	Quality (H/M/L)	Variable(s)	Year (s)	Additional comments
PortalBio/MMA:	M	Primary Forest Area Other naturally regenerated forest areas	2002	Vegetation map in the scale of 1:250.000 based on Landsat images, based on the year 2002
FRA 2005	M	Planted Forest Area	1990 e 2000	
ABRAF 2006	H	Planted forest area	2005	
ABRAF 2007	H	Planted Forest Area	2006	
ABRAF 2008	H	Planted Forest Area	2007	
ABRAF 2009	H	Planted Forest Area	2008	Data from 2006, 2007, and 2008 were used to estimate the data for 2010.

IBGE 2008	H	Rubber plantation	1990, 2000, 2005	Data from Produção agrícola Municipal 2008 (www.sidra.ibge.gov.br)
IBAMA	H	Mangrove Area	2000	Information obtained through personal contact with the Coordinator of the Coast and Marine ad Zone Nucleus (raquel.barreto@ibama.gov.br)

4.2.2 Classification and definitions

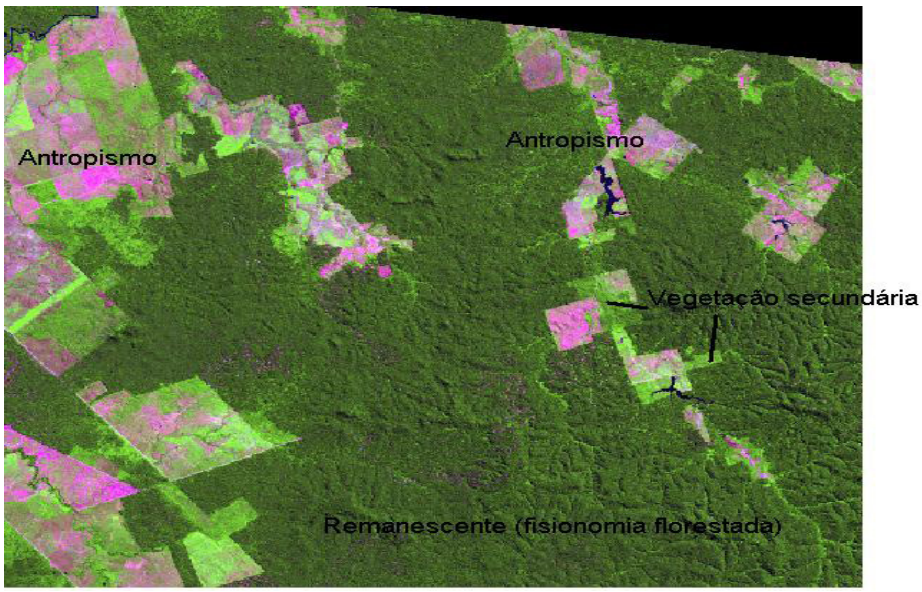
National class	Definition
Primary forest	Total area of forests (Table 1) subtracting the secondary vegetation areas in forest areas and planted forest areas.
Other naturally regenerated forest	Areas of secondary vegetation in forest areas identified in the PROBIO mapping (2007) based on the year 2002.
Planted Forest	Planted forest areas calculated for Table 1 were used.
Mangrove	
Rubber plantations (Forest)	Planted forest areas with *Hevea brasiliensis*

4.2 3 Original data

Natural Regeneration of Forests

Data on naturally regenerated forest were derived from the secondary vegetation category in forest areas identified in the mapping of vegetal cover for each biome for the year of 2002, made by Ministry of Environment. In mapping PROBIO 2002, based on interpretation of satellite images, these elements are related to mental association that the interpreter makes of the features present in the image with the targets on the ground, which exhibit behavior previously known to him. These targets are identified by field work, pre-existing maps or other secondary data that can be used to eliminate doubt about the correct identification of these.

The figure bellow shows some examples of types of use/cover of ground interpreted in this project.



Secondary Vegetation in forest areas in each biome in 2002 (Km²)

Amazon	Atlantic Forest	Cerrado	Caatinga	Pantanal	Pampa
232,797.26	54,539.65	72,730.05	11,014,13	108.88	891.84

Planted Forests

The areas of planted forests were obtained as described in the methodology of Table 1.

Mangrove Areas

The mapping of mangroves in Brazil (year-base 2000) was prepared by the IBAMA Remote Sensoring Center – Coastal and Marine Zone Nucleus and by interpreting Landsat satellite images in the work scale of 1:50,000. The Mangrove areas have been mapped with the biomes Amazon, Cerrado, Atlantic Forest, Caatinga and Pampa, as shown in Table 1 (Original data).

4.3 Analysis and processing of national data

The calculation of Primary Forest areas was made using the data on forests obtained from Table 1 and subtracting the areas of secondary forests for each biome and the areas of planted forests.

4.3.1 Calibration

4.3.2 Estimation and forecasting

Other naturally regenerated forests

The estimates of secondary vegetation areas for other years were made based on data for 2002, as explained above, resulting in the following values:

Secondary vegetation in forest areas (hectares)

	1990	2000	2005	2010
Caatinga	1,188,634	1,115,504	1,080,477	1,046,465
Cerrado	8,468,284	7,459,848	6,998,057	6,562,714
Pantanal	12,300	1,208,684	10,557	10,028

Atlantic Forest	5,818,070	5,513,027	5,366,087	5,222,759
Pampa	93,560	89,899	88,118	86,370
Amazon	24,232,764	23,453,841	22,931,480	22,603,275
Total	39,813,611	38,840,804	36,474,776	35,531,610

4.3.3 Reclassification into FRA 2010 categories

4.4 Data for Table T4

Table 4a

FRA 2010 Categories	Forest area (1000 hectares)			
	1990	2000	2005	2010
Primary forest	530,041	501,926	488,254	476,573
Other naturally regenerated forest	39,814	38,841	36,475	35,532
...of which of introduced species	n.a	n.a	n.a	n.a
Planted forest	4,984	5,176	5,765	7,418
...of which of introduced species	4,850	5,108	5,578	7,096
TOTAL	**574,839**	**545,943**	**530,494**	**519,522**

Table 4b

FRA 2010 Categories	Area (1000 hectares)			
	1990	2000	2005	2010
Rubber plantations (Forest)	63.64	96.58	115.59	173.56
Mangroves (Forest and OWL)	n.a	1,252	n.a	n.a
Bamboo (Forest and OWL)	n.a	n.a	n.a	n.a

4.5 Comments to Table T4

Variable / category	Comments related to data, definitions, etc.	Comments on the reported trend
Primary forest		
Other naturally regenerating forest		
Planted forest		
Rubber plantations		
Mangroves		
Bamboo		

Other general comments to the table

Sources and Reference list

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Table T5 – Forest establishment and reforestation

5.1 FRA 2010 Categories and definitions

Term	Definition
Afforestation	Establishment of forest through planting and/or deliberate seeding on land that, until then, was not classified as forest.
Reforestation	Re-establishment of forest through planting and/or deliberate seeding on land classified as forest.
Natural expansion of forest	Expansion of forests through natural succession on land that, until then, was under another land use (e.g. forest succession on land previously used for agriculture).

5.2 National data

5.2.1 Data sources

References to sources of information	Quality (H/M/L)	Variable(s)	Year(s)	Additional comments
Bracelpa 2002	M	Total planted forest area	2000	
ABRAF 2006	M	Annual forest establishment	2005	

5.2.2 Classification and definitions

National class	Definition

5.2.3 Original data

5.3 Analysis and processing of national data

5.3.1 Calibration

5.3.2 Estimation and forecasting

ANUAL REFORESTATION AREA 1992 - 2001 (hectares)

Species	Year									
	1992	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**
Eucalyptus spp	69,556	70,045	64,060	71,294	88,004	86,118	92,223	88,897	101,133	133,959
Pinus spp	12,923	18,820	19,562	22,695	24,118	15,228	18,374	18,278	18,071	14,616
Araucaria angustifolia	0	267	81	147	111	116	104	154	25	12
Acacia sp	0	0	0	234	2	1	0	0	0	0
Other	174	71	0	170	307	206	0	27	175	0
Total	**82,653**	**89,203**	**83,703**	**94,540**	**112,542**	**101,669**	**110,701**	**107,356**	**119,404**	**148,587**

Fonte: Bracelpa, 2002.

Annual forest establishment for 2000(BRACELPA 2002) (hectares/year)	**119,404**

Annual forest establishment for 2005(ABRAF 2006) (hectares/year)	**553,000**

% of planted forest with introduced species in 2005	98.34
planted forest with introduced species in 2000 (98.34% of planted forest area in 2000)	**117,422**
planted forest with introduced species in 2005 (98.34% of planted forest area in 2005)	**543,820**

5.3.3 Reclassification into FRA 2010 categories

5.4 Data for Table T5

FRA 2010 Categories	Annual forest establishment (hectares/year)			...of which of introduced species [1)] (hectares/year)		
	1990	**2000**	**2005**	**1990**	**2000**	**2005**
Afforestation	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Reforestation	n.a.	119,404	553,000	n.a.	117,422	543,820
...of which on areas previously planted	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Natural expansion of forest	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.

Note: The figures for the reporting years refer to the averages for the 5-year periods 1988-1992, 1998-2002 and 2003-2007 respectively.

5.5 Comments to Table T5

Variable / category	Comments related to data, definitions, etc.	Comments on the reported trend
Afforestation		

Reforestation	There data available in the country regarding the total area of forest plantations each year. It is possible to assess the increase in total area of forest plantations each year, but it is not possible to identify if the new reforested areas is on land that, until then, was not classified as forest or not. We know that this area is in most of the cases is reforestation, so we put the total in this category.	
Natural expansion of forest		

Other general comments to the table

Sources and Reference list

ABRAF. **Anuário estatístico da ABRAF 2006** : ano base 2005. Brasília, 2006. Disponível em: <http://www.abraflor.org.br/estatisticas/anuario-ABRAF-2006.pdf> Acesso em: nov. 2009.

Table T6 – Growing stock

6.1 FRA 2010 Categories and definitions

Category	Definition
Growing stock	Volume over bark of all living trees more than X cm in diameter at breast height (or above buttress if these are higher). Includes the stem from ground level or stump height up to a top diameter of Y cm, and may also include branches to a minimum diameter of W cm.
Growing stock of commercial species	Growing stock (see def. above) of commercial species.

6.2 National data

6.2.1 Data sources

Different sources of information, thesis papers, dissertations, state surveys, scientific articles, and direct contact with experts and researchers were used to determine the growing stocks in biomes. The existence of different physiognomies in the Cerrado and Atlantic Forest biomes were considered in estimating the growing stocks, in addition to the specificities of cultivated forest species. Thus the equation that best estimates volume was used for each type of formation.

References to sources of information	Quality (H/M/L)	Variable(s)	Year(s)	Additional comments
FELFILI (1994)	A	Volume of existing trees in forested and wooded savannah areas.	1988-1992	This work contains information on woody vegetation in forested and tree savanna areas, with data obtained in randomly selected parts of 0.1 ha from forested savanna (cerradão) areas and from wooded savanna (cerrado *sensu stricto*) areas of a physiographic unit from Central Brazil: Chapada Pratinha. Parcels were sampled both in Conservation Unit areas and in non-protected areas.
FELFILI (2001)	A	Volume of existing trees in wooded savannah areas.	1997-2000	This work contains information on randomly selected parts of 0.1 ha from wooded savanna (cerrado *sensu stricto*) areas of a physiographic unit from Central Brazil: Chapada do Espigão Mestre do São Francisco. Parcels were sampled both in Conservation Unit areas and in non-protected areas.
FELFILI (1997)	A	Volume of existing trees in forested and wooded savannah areas.	1988-1996	This work contains information on randomly selected parts of 0.1 ha from forested savanna (cerradão) areas and from wooded savanna (cerrado *sensu stricto*) areas of two physiographic units from Central Brazil: Chapada Pratinha and Chapada dos Veadeiros. Parcels were sampled both in Conservation Unit areas and in non-protected areas.
PEREIRA,	M	Volume of existing	1987	The volume, in cubic meters, of trees registered in

BRASILEIRO FELFILI (1988)		trees in forested savannah areas.		forested savannah areas (cerradão) belonging to species that are not common to wooded savannah (cerrado *sensu stricto*) environments was obtained from the equation developed in this work.
REZENDE (2002)	A	Volume of existing trees in forested and wooded savannah areas.	1998	The volume, in cubic meters, of tree species registered in wooded savannah areas (cerrado *sensu stricto*) and the volume, in cubic meters, of species registered in wooded savannah areas (cerradão) that are common to wooded savannah environments was obtained from the equation developed in this work.
Higuchi et al (1997)	A	Volume of existing trees in upland (terra-firme) areas.		The volume in cubic meters of tree species registered in upland areas was obtained from the equation generated in this work.
Andrade and Higuchi (2009)	A	Volume of existing four tree species in upland areas.	2000, 2002, 2004 e 2006	The volume in cubic meters of four tree species (*E. wachenheimii*, *M. siphonioides*, *P. reticulata* and *P. Hebetatum*) registered in upland areas was obtained from the equation generation in this work.
Silva (1994)	M			
Carvalho, Oliveira, (1993)	M			
Sá (1998)	M			
Carvalho, Zákia (1994)	M			
Isaia, Verslype, Gariglio (1992)	M			

[1] Assuming an average rotation for genus **Average annual increment ***Rotation

[2] The quality of information is considered average because the alometric equation producing this work was obtained from data deriving from only a determined physiognomic area.

6.2.2 Classification and definitions

National class	Definition
Total growing stock	Sum of the forest vegetation volume in each of the biomes and forest plantations

6.2.3 Original data

The original data on stock volume of forest vegetation for the different biomes was obtained from the different phyto-physionomy areas of each biome used for the calculations in Table 1. The volume estimates for the different phyto-physionomies of each biome are described in item 6.3.2.

6.3 Analysis and processing of national data

6.3.1 Calibration

6.3.2 Estimation and forecasting

The growing stock was calculated based on information available on the volume of forest vegetation in each of the biomes and of cultivated forest species.

Amazon

To estimate the growing stock in the Amazon bioma the volume means per hectare were used based on various surveys in the literature. The means was 300 m^3/ha.

Cerrado and Pantanal

To estimate the growing stock in the Cerrado and Pantanal biomes we used different values of volume, considering the vegetation typologies proportion, as shown in the table below.

Volume in m^3/ha used for the calculation of growth stocks in each vegetation typologies in the Cerrado and Pantanal biomes.

Vegetation typologies	Volume (m^3/ha)
Wooded Savannah	35.79
Forested Savannah	126.13
Dense Forest	420.79
Open Forest	420.79
Mixed Forest	420.79
Semi Decidual Forest	420.79
Decidual Forest	193.87
Tree Steppe	51.49
Transitional Zones	100.73

For the wooded savannah category, the volume over bark of living trees was obtained considering a minimum diameter of 5 cm taken 0.30m above soil level. For the forested savannah, which has species that also occur in wooded savannah environments (cerrado *sensu stricto*), the volume over bark of living trees was calculated considering the following procedure:

a) For species that are common in wooded savannah environments, a minimum diameter of 5 cm from the trunk base was adopted, that is, a diameter at 0.30m above the ground level.
b) For forest species a minimum diameter of 5 cm taken at DBH, that is diameter taken at 1.30m above soil level.

There are no surveys so far that enable estimation of the volume of individual trees in savannah-steppe savannah transition areas. Thus, the average volume of trees in savannah-steppe savannah transition areas was considered equal to that recorded in wooded savannah areas, taking into account that many species found in these transition areas are typical of

wooded savannah environments and that the structure of vegetation is similar in the two environments.

The branch volume was also included considering a minimum diameter of 3cm.

Atlantic Forest and Pampa

The volume for the Atlantic Forest biome was estimated considering the occurrence of different succession stages: mature, medium, and initial, and its proportions in the biome. The definition of the regeneration stages: initial (capoeirinhas and capoeiras), medium (capoeirões), and mature (forests), followed the parameters of CONAMA Resolutions. The occupation rates used for each stage and other forest lands in the Atlantic Forest and Pampa biomes were: mature stage (44.10%), medium stage (26.02%), initial stage (26.02%), and other forest lands (3.87%).

To obtain the stock volume for both the Atlantic Forest and the forest remains inserted, the volume means per hectare were used based on various surveys in the literature. The means were 367.22 m^3/ha (mature stage); 257.76 m^3/ha (medium stage); 83.35 m^3/ha (initial stage), and 30.00 m^3/ha (other forest lands, such as restingas, mangroves, etc.).

Caatinga

For states in which the biome occurs (with the exception of Bahia), the results from forest inventories conducted by the UNDP/FAO/IBAMA Project in the early 1990s were used, since the unit stock has remained the same to date without significant changes. These inventories classified the vegetation into forest types according to size and density. The volume was calculated from the weighted averages in the (DAB) diameter class, 1.5 – 7.5 cm; 7.5 – 10.5 cm; 10.5 – 12.5 cm; 12.5 – 14.5 cm; >14.5 cm. The forest stock for DAB > 1.5 cm was calculated considering all the parts of trees (trunk and branches) and all the species were considered commercial. To obtain the stock volume for Caatinga, the volume means per hectare were used based on various surveys in the literature. The means was 51.49 m^3/ha.

Commercial stock

The commercial stock of each biome was calculated as a proportion of the total stock. The proportion for each biome was established based on the vegetation characteristics, from what is generally used in forest management, and also considering legal restrictions. It is important to note that forest management in some biomes is not allowed by law. The proportions of commercial volume considered for each biome were: Atlantic Forest (20%); Cerrado (70%); Caatinga (100%); Amazon (30%), and Pampa (20%). In case of Amazon bioma approximately 1/3 of growing stock is commercial, considering tree species largest than 10cm DBH. In Caatinga, as the predominant forest management system is based on clear cut and resprout, we consider 100%, with cutting cycle of approximately 15 years. For Atlantic Forest, Cerrado and Pantanal we estimate the percentages. Plantations are included in the estimates.

Forest Plantations

The calculations made to estimate the growing stock of forest plantations were based on the area occupied by each of the seven species of greater economic relevance for the country, namely *Eucalyptus spp, Pinus spp*, *Araucaria angustifolia*, *Tectona grandis*, *Mimosa scabrella*, *Populus sp, Acacia sp*, *Hevea brasiliensis* and *Schizolobium amazonicum*, according to information produced by ABRAF (Brazilian Association of Forest Plantation Producers). The Mean Annual Increment (MAI) and the rotation age were used to determine the stem volume of species.

Regarding the growing stock of native conifer genus species, in Brazil there is only the *Araucaria angustifolia* which occurs in the Atlantic Forest.

Estimation of stock volumes (in millions of m^3) in Brazilian biomes and forest plantations in the years 1990, 2000, 2005, and 2010.

	Millions of cubic meters over bark			
FRA Category	**1990**	**2000**	**2005**	**2010**
Plantations	806.17	938.18	1,099.05	1,468.70
Amazon – total	113,981.42	110,317.67	109,498.70	106,928.81
Amazon – commercial	34,194.42	33,095.30	32,849.61	32,078.64
Atlantic forest - total	8,051.86	7,629.70	7,426.35	7,227.99
Atlantic forest – commercial	1,610.37	1,525.94	1,485.27	1,445.60
Pampa – total	967.38	929.52	911.10	893.03
Pampa – commercial	193.48	185.90	182.22	178.61
Cerrado – total	10,208.12	8992.50	8435.83	7911.05
Cerrado – commercial	7,145.69	6,294.75	5,905.08	5,537.73
Pantanal - total	1,044.63	943.63	896.56	851.67
Pantanal - commercial	731.24	660.54	627.60	596.17
Caatinga – total	2,735.71	2,567.40	2,486.78	2,408.50
Caatinga – commercial	2,735.71	2,567.40	2,486.78	2,408.50
Total growing stock	**136,989.11**	**131,380.42**	**129,655.33**	**126,221.04**
Commercial growing stock	**47,417.07**	**45,268.01**	**44,635.60**	**43,713.94**

6.3.3 Reclassification into FRA 2010 categories

6.4 Data for Table T6

Table 6a – Growing stock

FRA 2010 category	Volume (million cubic meters over bark)							
	Forest				Other wooded land			
	1990	**2000**	**2005**	**2010**	**1990**	**2000**	**2005**	**2010**
Total growing stock	136.989,11	131.380,42	129.655,33	126.221,04				
... of which coniferous	383,32	363,77	354,34	345,14				

... of which broadleaved	136.605,79	131.016,65	129.300,99	125.875,90				
Growing stock of commercial species	47.417,07	45.268,01	44.635,60	43.713,94				

Table 6b – Growing stock of the 10 most common species

FRA 2010 category / Species name			Growing stock in forest (million cubic meters)		
Rank	**Scientific name**	**Common name**	**1990**	**2000**	**2005**
1st	*Eucalyptus spp*	Eucalyptus			
2nd	*Pinus spp*	Pinus			
3rd	*Araucaria angustifolia*	Araucaria			
4th	*Tectona grandis*	Teca			
5th	*Mimosa scabrella*	Bracatinga			
6th	*Populus sp*	Populus			
7th	*Acacia sp*	Acacia			
8th	*Hevea brasiliensis*	Seringueira			
9th	*Schizolobium amazonicum*	Paricá			
10th					
Remaining					
TOTAL					

Note: Rank refers to the order of importance in terms of growing stock, i.e. 1st is the species with the highest growing stock. Year 2000 is the reference year for defining the species list and the order of the species.

Table 6c – Specification of threshold values

Item	Value	Complementary information
Minimum diameter (cm) at breast height[1] of trees included in growing stock (X)	Amazon: 10cm Cerrado and Pantanal: 5cm Caatinga: 1,5cm Atlantic Forest: 10cm	
Minimum diameter (cm) at the top end of stem for calculation of growing stock (Y)	NA	
Minimum diameter (cm) of branches included in growing stock (W)	3cm	
Volume refers to "above ground" (AG) or "above stump" (AS)	NA	

6.5 Comments to Table T6

Variable / category	Comments related to data, definitions, etc.	Comments on the reported trend
Total growing stock		

1

Growing stock of broadleaved / coniferous		
Growing stock of commercial species		
Growing stock composition		

Other general comments to the table

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Table T7 – Biomass stock

7.1 FRA 2010 Categories and definitions

Category	Definition
Above-ground biomass	All living biomass above the soil including stem, stump, branches, bark, seeds, and foliage.
Below-ground biomass	All biomass of live roots. Fine roots of less than 2mm diameter are excluded because these often cannot be distinguished empirically from soil organic matter or litter.
Dead wood	All non-living woody biomass not contained in the litter, either standing, lying on the ground, or in the soil. Dead wood includes wood lying on the surface, dead roots, and stumps larger than or equal to 10 cm in diameter or any other diameter used by the country.

7.2 National data

7.2.1 Data sources

Different sources of information, thesis papers, dissertations, state surveys, scientific articles, and direct contact with experts and researchers were used to determine the biomass above the soil, below the soil, and in dead wood in biomes, considering the diversity of physiognomies in biomes and the specificities of cultivated forest species. Thus, the equation that best estimates the biomass was used for each type of formation.

References to sources of information	Quality (H/M/L)	Variable(s)	Year(s)	Additional comments
REZENDE (2002)	M	Dry biomass from trees	1998	The dry biomass (bark and branches) in kilograms of tree species recorded in wooded savannah areas

		exisitng in wooded and forested savannah areas.		(cerrado *sensu stricto*) and in savannah-steppe savannah transition areas, as well as the dry biomass of tree species recorded in forested savannah areas (cerradão), common in wooded savannah environments, was obtained from the equation generated in this work. All trees with a minimum diameter of 5 cm, taken from the base of the trunk, that is diameter at 0.30m above soil level, were considered.
SANTOS et al (2001)	M	Dry biomass from trees existing in forested savannah areas.	1998	The dry biomass of tree species recorded in forested savannah areas, not common in forested savannah areas, was obtained by using the equation developed in this work for the tropical forest and validated for the forested savannah, since an alometric equation has not been developed for this physiognomy to estimate biomass. The equation presented by Santos et al. (2001) estimates the green phytomass above soil level for the trunk and the crown (branches, leaves, fruits, etc) of trees with DBH equal to or greater than 5cm. The weight of dry mass (dry weight) was considered as equal to 50% of the weight of green mass because according to Santos et al. (2001), the trunk of a tree contributes to 60% of the total green weight and the crown to 40%.
CASTRO (1996)	M	Root / aerial (shoot) biomass ratio	1998	In this work, the root/shoot biomass ration was obtained for the following physiognomies: forested savannah, wooded savannah, and savannah-steppe savannah transition. The value recorded by Castro (1994) is equal to 2.98 and according to the author, this ratio is among the highest for tropical ecosystems.
FELFILI (1994)	A	Volume of stem of forested savannah and wooded savannah species	1988-1992	This work contains information on randomly selected parts of 0.1 ha from forested savannah areas (cerradão) and from wooded savannah areas (cerrado *sensu stricto*) of a physiographic unit from Central Brazil: Chapada Pratinha. Parcels were sampled both in Conservation Unit areas and in non-protected areas.
FELFILI, SILVA (2001)	A	Volume of stem of wooded savannah species	1997-2000	This work contains information on randomly selected parts of 0.1 ha from wooded savannah areas (cerrado *sensu stricto*) of a physiographic unit from Central Brazil: Chapada do Espigão Mestre do São Francisco. Parcels were sampled both in Conservation Unit areas and in non-protected areas.
FELFILI et al (1997, p.6-11)	A	Volume of stem of forested savannah and wooded savannah species	1988-1996	This work contains information on randomly selected parts of 0.1 ha from forested savannah areas (cerradão) and from wooded savannah areas (cerrado *sensu stricto*) of two physiographic units from Central Brazil: Chapada Pratinha and Chapada dos Veadeiros. Parcels were sampled both in Conservation Unit areas and in non-protected areas.
HIGUCHI et al (1994)	A			
HIGUCHI et al (1998, p. 153-166)		Green and dry biomass, wood density of trees existing in upland areas.		The dry biomass of tree species recorded in upland areas of the Amazon was obtained from the equation developed in this work.
HIGUCHI et al (1998, p. 153-166)	A			
HIGUCHI	M			

(2004)				
FEARNSIDE (1994)	M			
HIGUCHI et al (1994)	A	Aerial biomass in humid tropical forest areas		

7.2.2 Classification and definitions

National class	Definition

7.2.3 Original data

7.3 Analysis and processing of national data

7.3.1 Calibration

7.3.2 Estimation and forecasting

Above-ground biomass

The estimates of above-ground biomass were calculated from information available on stem volume, wood density, and biomass expansion factor in each of the Brazilian biomes. The biomass expansion factors used were: Amazon (1.53); Cerrado and Pantanal (1.67); Atlantic Forest and Pampa - mature stage (1.7); Atlantic Forest and Pampa - medium stage (1.8); Atlantic Forest and Pampa initial stage (1.9); Caatinga (2.0).

Cerrado and Pantanal: The calculations to estimate biomass in the Cerrado biome took into account the specificities of physiognomies of forested savannah and wooded savannah, considering the proportion of these physiognomies in the biome.

The medium dry woody biomass for wooded savannah was obtained from the sampling of 244 parts of 0.1 ha (20x50 m) allocated into 24 selected locations in six physiographic units of Central Brazil (Cochrane et al. 1985), namely: 1. "Pratinha" ("Chapada Pratinha"), 2. "Veadeiros" ("Chapada do Tocantins"), 3. "São Francisco" ("Espigão Mestre do São Francisco"), 4. Planície do Araguaia, 5. Complexo Xavantina, and 6. Bacia do Paranã, encompassing 10 degrees of latitude and 10 degrees of longitude along the cerrado biome. At least 10 parts per location were sampled, randomly distributed in each area. The existing Conservation Units in the region were included in the sampling. A total of six protected and 18 non-protected areas were selected. See Felfili et al. (1994, 1997 e 2001) for a description of the areas.

The medium dry woody biomass for forested savannah was obtained form the sampling of 28 parts of 0.1 ha (20x50 m) allocated in 8 selected locations in a physiographic unit of Central Brazil (Cochrane et al. 1985), namely: "Pratinha" ("Chapada Pratinha"). At least 2

parts were sampled per location, randomly distributed in each area. The existing Conservation Units in the region were included in the sampling. A total of one protected and seven non-protected areas were selected.

Atlantic Forest and Pampa: To obtain the estimates of dry biomass, the volume stocks previously calculated and the information on basic density of wood for each formation in g/m3 were used as follows: mature stage (0.60); medium stage (0.55); initial stage (0.50); other forest lands (0.50).

Multiplying the volume stock and the respective density, we obtain the weight of stem biomass. Subsequently, to expand the stem biomass to the above-ground biomass, expansion factors were used, which represent the relationship between the biomass of leaves, fine and thick branches, etc, and the stem biomass. To obtain the biomass in the different regeneration stages, the different biomass expansion factors presented in the literature were used, as follows: mature stage (1.70); medium stage (1.80); initial stage (1.90); other forest lands (1.90).

Forest plantations: The estimate of above-ground biomass in forest plantations each of the seven species of greater economic relevance for the country -*Eucalyptus Pinus*, *Araucaria angustifolia*, *Tectona grandis*, *Mimosa scabrella*, *Populus Acacia*, *Hevea brasiliensis* and *Schizolobium amazonicum* was calculated using the Mean Annual Increment (MAI), the rotation age, the mean age, wood density, stem biomass, and expansion factor.

The volume stocks previously calculated and information on basic wood density of each species or genus in g/m3 were used to obtain estimates of dry biomass. The stem biomass weight for each species or genus is obtained by multiplying the volume stock and the respective density. Subsequently, the expansion factors were used to expand the stem biomass for the entire above-ground biomass, which represent the ratio between the total aerial biomass (leaves, fine and thick branches, etc) and the stem biomass. In the case of the Pinus genus, this factor was calculated at 1.41 from 200 trees surveyed at the Federal University of Paraná (UFPR) for different species of this genus.

Below-ground Biomass

The estimate of below-ground biomass was estimated based on the root/shoot ratio.

Cerrado e Pantanal: To obtain the below-ground biomass we used classic studies carried out in different vegetation types which show that these biomes the root / shoot ratio varies between 0.1 and 3.0.

Estimates of Below-ground biomass (t/ha), Above-ground biomass (t/ha) and Root/Shoot ratio in Vegetation typologies of the Cerrado biome.

Vegetation typologies	Below-ground biomass (t/ha)	Above-ground biomass (t/ha)	Root/Shoot ratio
Wooded Savannah	44.64	14.98	2.98
Forested Savannah	190.32	63.87	2.98
Dense Forest	37.70	260.00	0.15
Open Forest	37.70	260.00	0.15

Mixed Forest	37.70	260.00	0.15
Semi Decidual Forest	35.58	273.69	0.13
Decidual Forest	22.,31	171.60	0.13
Tree Steppe	17.71	65.60	0.27
Transitional Zones	71.59	59.00	1.21

Atlantic Forest and Pampa: The below-ground biomass was obtained by multiplying the aerial biomass and the root/shoot ratio = 0.18, using an extensive series of date collected by UFPR.

Caatinga: The below-ground biomass was obtained by multiplying the aerial biomass and the root/shoot ratio = 0.27.

Forest plantations: The fraction of underground biomass was obtained by using the ratio between this below-ground biomass and the total aerial biomass for each genus in the mean age of populations, namely the rotation age divided by two. Thus, the below-ground biomass was obtained by multiplying the aerial biomass and the root/shoot ratio.

Dead wood biomass

Cerrado and Pantanal: The dead biomass was obtained considering the trunk and roots of all standing dead elements with diameter equal to or greater than the minimum established for living trees in each physiognomy (forested savannah, wooded savannah, and savannah-steppe savanna transition).

Atlantic Forest and Pampa: In all forest formations, to obtain the estimate of dead wood in millions of tonnes, the below-ground biomass was multiplied by the factor of 0.15 obtained from studies available.

Forest plantations: Information was obtained regarding the percentage of dead wood biomass on the ground (necromass) in relation to the underground biomass in different populations to obtain the estimate of this component.

Estimates of above-ground biomass, below-ground biomass, and dead wood in Brazilian biomes and forest plantations.

	Biomass (Millions of Metric Tons)			
Above-ground biomass	**1990**	**2000**	**2005**	**2010**
Amazon	98,783.9	95,608.6	93,479.3	92,141.3
Caatinga	3,485.24	3,270.82	3,168.11	3,068.38
Cerrado	6,185.27	5,448.70	5,111.41	4,793.43
Pantanal	716.98	647.66	615.35	584.54
Atlantic Forest	8,134.7	7,708.2	7,502.7	7,302.3
Pampas	977.3	939.1	920.5	902.2
Forest Plantation	605.1	705.6	836.9	1,141.4
Total – Above-ground biomass	**118,888.5**	**114,328.7**	**111,634.2**	**109,933.6**
	Biomass (Millions of Metric Tons)			

Below-ground biomass	1990	2000	2005	2010
Amazon	14,320.5	13,860.2	13,551.5	13,357.5
Caatinga	941.0	883.1	855.4	828.5
Cerrado	5,010.2	4,413.6	4,140.3	3,882.8
Pantanal	828.76	748.63	711.30	675.68
Atlantic Forest	1,464.2	1,387.5	1,350.5	1,314.4
Pampa	175.9	169.0	165.7	162.4
Forest Plantation	105.7	123.1	147.9	206.5
Total – Below-ground biomass	**22,846.3**	**21,585.1**	**20,922.6**	**20,427.8**
	Biomass (Millions of Metric Tons)			
Dead wood	**1990**	**2000**	**2005**	**2010**
Amazon	7,677.2	7,430.4	7,375.2	7,160.9
Caatinga	154.1	144.6	140.1	135.6
Cerrado	574.5	506.1	474.8	445.2
Pantanal	78.00	70.46	66.94	63.59
Atlantic Forest	219.6	208.1	202.6	197.2
Pampa	26.4	25.4	24.9	24.4
Forest Plantation	15.9	18.5	22.2	31.0
Total – Dead wood	**8,745.6**	**8,403.5**	**8,306.6**	**8,057.9**
TOTAL - Biomass	**150,480.46**	**144,317.25**	**140,863.42**	**138,419.35**

7.3.3 Reclassification into FRA 2010 categories

7.4 Data for Table T7

FRA 2010 category	Biomass (million metric tonnes oven-dry weight)							
	Forest				Other wooded land			
	1990	2000	2005	2010	1990	2000	2005	2010
Above-ground biomass	118,888.51	114,328.69	111,634.24	109,933.65				
Below-ground biomass	22,846.31	21,585.08	20,922.57	20,427.80				
Dead wood	8,745.63	8,403.48	8,306.61	8,057.90				
TOTAL	**150,480.46**	**144,317.25**	**140,863.42**	**138,419.35**				

7.5 Comments to Table T7

Variable / category	Comments related to data, definitions, etc.	Comments on the reported trend
Above-ground biomass		
Below-ground biomass		
Dead wood		

Other general comments to the table

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Table T8 – Carbon stock

8.1 FRA 2010 Categories and definitions

Category	Definition
Carbon in above-ground biomass	Carbon in all living biomass above the soil, including stem, stump, branches, bark, seeds, and foliage.
Carbon in below-ground biomass	Carbon in all biomass of live roots. Fine roots of less than 2 mm diameter are excluded, because these often cannot be distinguished empirically from soil organic matter or litter.
Carbon in dead wood	Carbon in all non-living woody biomass not contained in the litter, either standing, lying on the ground, or in the soil. Dead wood includes wood lying on the surface, dead roots, and stumps larger than or equal to 10 cm in diameter or any other diameter used by the country.
Carbon in litter	Carbon in all non-living biomass with a diameter less than the minimum diameter for dead wood (e.g. 10 cm), lying dead in various states of decomposition above the mineral or organic soil.
Soil carbon	Organic carbon in mineral and organic soils (including peat) to a specified depth chosen by the country and applied consistently through the time series.

8.2 National data

8.2.1 Data sources

Different data on biomass and average C levels available in theses, scientific articles and books were used to estimate carbon in above-ground biomass, below-ground biomass, dead wood, litter, and soil in biomes and planted forests.

References to sources of information	Quality (H/M/L)	Variable(s)	Year(s)	Additional comments
CASTRO (1996)	M[1]	a) Carbon level in soil; b) Carbon level in litter.	1994	According to Castro (1994), the level of soil carbon at a 100-cm depth is approximately 58.09 ton/ha for tree savannah and 160.63 ton/ha for wooded savannah. The C level in litter is approximately 2.57 ton/ha for tree savannah and 1.79 ton/ha for forest savannah.
BODIG, JAYNE (1963)	M[2]	Carbon level in wood.		The carbon level recommended for wood is 50%, dry biomass.
REZENDE (2002)	M[3]	Dry biomass of trees found in tree savannah and wooded savannah.	1998	The dry biomass (trunks and branches), in kilograms of tree species found in tree savannah areas (*cerrado sensu stricto*) in savannah-steppe savannah transition areas as well as the dry biomass of tree species found in wooded savannah areas (*cerradão*), common to tree savannah environments was obtained by using the equation generated from this study. All trees with a minimum 5-cm diameter measured at the trunk base, i.e., diameter measured at 0.30 cm from the ground were considered.
SANTOS (2001)	M[3]	Dry biomass of trees found in wooded savannah.	1998	The dry biomass, in kilograms, of tree species found in wooded savannah areas that are not common to tree savannah areas was obtained by using an equation developed in this study for tropical forests and validated for wooded savannah, since an alometric

				equation to estimate the biomass has not yet been developed for this physiognomy. The equation developed by Santos et al. (2001) estimates the above-ground green phytomass for trunk and canopy (branches, leaves, fruit, etc.) of trees with DAP equal to or larger than 5 cm. The dry mass weight (dry weight) was considered as being equal to 50% of the weight of the total green mass, since according to Santos et al. (2001) the trunk of a tree corresponds to 60% of the total green weight and the canopy to 40%. The average biomass for *cerradão* was obtained from the sampling of 28 plots of 0.1 ha (20x50 m) distributed in 8 locations selected from one physiographic unit in Central Brazil (Cochrane et al., 1985), i.e.: "*Pratinha*" ("*Chapada Pratinha*"). At least two plots per location were sampled, which were randomly distributed in the area. Conservation Units existing in the region were included in the sampling. The selection included one protected area and seven non-protected areas. For a description of the areas see Felfili et al. (1994).
FELFILI et al. (1994)	A	Survey of woody vegetation in wooded savannah and tree savannah areas.	1988-1992	This study also provides information on 0.1 ha plots randomly selected in wooded savannah areas (*cerradão*) and tree savannah areas (*cerrado sensu stricto*) of a physiographic unit in Central Brazil: *Chapada Pratinha*. Plots in both Conservation Units and non-protected areas were sampled.
FELFILI, SILVA JR. (2001)	A	Survey of woody vegetation in tree savannah areas.	1997-2000	This study provides information on 0.1 ha plots randomly selected in tree savannah areas (*cerrado sensu stricto*) of a physiographic unit in Central Brazil: *Chapada do Espigão Mestre do São Francisco*. Plots in both Conservation Units and non-protected areas were sampled.
FELFILI et al. (1997)	A	Survey of woody vegetation in wooded and tree savannah areas.	1988-1996	This study also provides information on 0.1 ha plots randomly selected in wooded savannah areas (*cerradão*) and tree savannah areas (*cerrado sensu stricto*) of two physiographic units in Central Brazil: *Chapada Pratinha* and *Chapada dos Veadeiros*. Plots in both Conservation Units and non-protected areas were sampled.

8.2.2 Classification and definitions

National class	Definition

8.2.3 Original data

Information on the biomass (T7) and on the average C level of the physiognomies considered in the biomes as well as of planted forest species were used to estimate the C level in above-ground biomass, below-ground biomass, dead wood, litter, and soil.

8.3 Analysis and processing of national data

8.3.1 Calibration

8.3.2 Estimation and forecasting

- Carbon in above-ground biomass:

Cerrado* and *Pantanal

Estimates of carbon reserves for savannah formations (tree savannah, wooded savannah and transition savannah-steppe savannah areas) taking into account the different FRA categories were made based on the alometric equations developed by Santos et al. (2001) and Rezende (2002) for biomass, as well as on the carbon level ratios recommended by Castro (1994) and the 50% carbon level adopted for living biomass.

Atlantic Forest and *Pampas*
To estimate the C level in the dry biomass of succession stages, the average C level (0.47) was used, as calculated from direct laboratory determinations for a wide range of Atlantic Forest native species surveyed by the UFPR as well as from data found in the literature. The estimate of carbon in above-ground biomass was found by multiplying the above-ground biomass by the average C level in dry biomass.

Forest plantations
To estimate the C level in planted forests, the average C level (0.47) in dry biomass was used, as defined from direct laboratory determinations for the main species and genera planted in Brazil as well as from data found in the literature. The estimate of carbon in above-ground biomass was determined by multiplying the above-ground biomass by the average C level in dry biomass.

- Carbon in below-ground biomass:

Atlantic Forest and *Pampas*
The C level of below-ground biomass was obtained by multiplying the below-ground biomass by the C level in the biomass (0.47).

Forest plantations
The C level of below-ground biomass up to a depth of 0.9 m was estimated by multiplying the below-ground biomass by the average C level in dry biomass.

- Carbon in dead wood:

Atlantic Forest and Pampas
The C level was obtained by multiplying the biomass of dead wood by the average C level in Atlantic Forest species (0.47). For all forest formations, the biomass of dead wood lying on the ground (necromass) was estimated by multiplying the below-ground biomass by 0.15.

Forest plantations
The C level in dead wood was estimated by multiplying its biomass by the average C level in dry biomass.

- Carbon in litter:

Atlantic Forest and *Pampas*
Data used to estimate the average weight of litter in t/ha values for each formation were: advanced stage (11.07); intermediate stage (7.61); initial stage (5.29); other wooded lands (3.00).

Forest plantations
The biomass of the litter lying on the ground in each species and genus considered was estimated by multiplying the biomass fraction by the average C level in the litter (0.47).

- Soil carbon:

Atlantic Forest and *Pampas*
The level of soil carbon was estimated by using the C levels for each regeneration stage: advanced stage (0.012); intermediate stage (0.010); initial stage (0.008); other wooded lands (0.008). The level of carbon soil in the Atlantic Forest was estimated up to 0.9 m.

Forest plantations
The C level in organic soil was estimated from determinations of the average soil weight in 1 hectare in plantations of each species and genus under analysis. This value was then multiplied by the average level of soil carbon (0.025) for the respective species and genus so that the total soil carbon could be obtained.

Estimates of carbon levels in living biomass (C in above-ground and below-ground biomass) dead biomass (C in dead wood and litter), and in soil in Brazilian biomes and forest plantation.

FRA Category	Carbon in Biomass (Million metric ton)			
C in above-ground biomass	**1990**	**2000**	**2005**	**2010**
Amazon	47,492.3	45,965.7	44,942.0	44,298.7
Caatinga	1,568.4	1,471.9	1,425.7	1,380.8
Cerrado	3,092.6	2,724.4	2,555.7	2,396.7
Pantanal	358.49	323.83	307.68	292.27
Atlantic Forest	3,823.3	3,622.8	3,526.3	3,432.1
Pampas	459.3	441.4	432.6	424.0
Forest plantation	277.7	323.7	383.1	520.8
Total	**57,072.1**	**54,873.7**	**53,573.0**	**52,745.4**
C in below-ground biomass	**1990**	**2000**	**2005**	**2010**
Amazon	6,884.9	6,663.6	6,515.1	6,421.9
Caatinga	423.5	397.4	384.9	372.8
Cerrado	2,505.1	2,206.8	2,070.2	1,941.4
Pantanal	414.38	374.32	355.65	337.84
Atlantic Forest	688.2	652.1	634.7	617.8
Pampas	82.7	79.4	77.9	76.3
Forest plantation	48.35	56.28	67.48	93.96
Total	**11,047.0**	**10,429.9**	**10,106.0**	**9,862.0**
C Subtotal in living biomass	**68,119.1**	**65,303.6**	**63,679.0**	**62,607.4**
C in dead wood	**1990**	**2000**	**2005**	**2010**
Amazon	3,685.1	3,566.6	3,487.2	3,437.3
Caatinga	69.3	65.1	63.0	61.0

Cerrado	287.3	253.1	237.4	222.6
Pantanal	39.00	35.23	33.47	31.79
Atlantic Forest	103.2	97.8	95.2	92.7
Pampas	12.4	11.9	11.7	11.4
Forest plantation	7.3	8.4	10.1	14.1
Total	**4,203.6**	**4,038.2**	**3,938.1**	**3,871.0**
C in litter				
Amazon	1,878.4	1,818.0	1,777.5	1,762.2
Caatinga	95.6	89.7	86.9	84.2
Cerrado	336.7	296.6	278.2	260.9
Pantanal	34.57	31.22	29.67	28.18
Atlantic Forest	126.0	119.4	116.3	113.1
Pampas	15.1	14.6	14.3	14.0
Forest plantation	14.1	14.8	16.2	20.1
Total	**2,500.6**	**2,384.3**	**2,319.0**	**2,282.7**
C Subtotal in dead wood + litter	**6,704.1**	**6,422.5**	**6,257.1**	**6,153.7**
C in soil	**1990**	**2000**	**2005**	**2010**
Amazon	37,993.8	36,772.6	35,953.6	35,439.0
Caatinga	1,859.5	1,745.1	1,690.3	1,637.1
Cerrado	12,098.7	10,658.0	9,998.2	9,376.2
Pantanal	1,484.60	1,341.06	1,274.18	1,210.38
Atlantic Forest	2,971.4	2,815.6	2,740.6	2,667.4
Pampas	357.0	343.0	336.2	329.6
Forest plantation	1,086.9	1,124.0	1,251.3	1,617.0
Total	**57,851.9**	**54,799.4**	**53,244.4**	**52,276.6**

8.3.3 Reclassification into FRA 2010 categories

8.4 Data for Table T8

FRA 2010 Category	**Carbon (Million metric tonnes)**							
	Forest				**Other wooded land**			
	1990	**2000**	**2005**	**2010**	**1990**	**2000**	**2005**	**2010**
Carbon in above-ground biomass	57,072	54,874	53,573	52,745				
Carbon in below-ground biomass	11,047	10,430	10,106	9,862				
Sub-total: Living biomass	68,119	65,304	63,679	62,607				
Carbon in dead wood	4,204	4,038	3,938	3,871				
Carbon in litter	2,501	2,384	2,319	2,283				
Sub-total: Dead wood and litter	6,704	6,422	6,257	6,154				
Soil carbon	57,852	54,799	53,244	52,277				

TOTAL	132,675	126,525	123,180	121,038				

Soil depth (cm) used for soil carbon estimates was:	Amazon, Cerrado and Pantanal (1m), Atlantic Forest and Pampa (0,9 m).

8.5 Comments to Table T8

Variable / category	Comments related to data, definitions, etc.	Comments on the reported trend
Carbon in above-ground biomass		
Carbon in below-ground biomass		
Carbon in dead wood		
Carbon in litter		
Soil carbon		

Other general comments to the table
1. Estimates refer to carbon (C) and not to equivalent CO_2.

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Table T9 – Forest fires

9.1 FRA 2010 Categories and definitions

Category	Definition
Number of fires	Average number of vegetation fires per year in the country.
Area affected by fire	Average area affected by vegetation fires per year in the country.
Vegetation fire *(supplementary term)*	Any vegetation fire regardless of ignition source, damage or benefit.
Wildfire	Any unplanned and/or uncontrolled vegetation fire.
Planned fire	A vegetation fire regardless of ignition source that burns according to management objectives and requires limited or no suppression action.

9.2 National data

9.2.1 Data sources

References to sources of information	Quality (H/M/L)	Variable(s)	Year(s)	Additional comments
IBAMA (1), Prevfogo (2)	M	Area burnt (1) Number of fires (2)	1988-1992 1998-2002 2003-2007	Data refer to fires in Federal Conservation Units alone.
INPE (3)	M	Number of heat spots (3)	1998-2002 2003-2007	Heat spots within and outside of the forests / other wooded lands

(1) IBAMA – Brazilian Institute for Renewable Natural Resources and the Environment. Prevfogo – National System for Fire Fighting and Prevention of Forest Fires
Proarco – Program for the Prevention and Control of Forest Fires in the Greater Amazon
(2) INPE – National Institute of Space Research. CPTEC – Centre for Weather Forecasting and Climate Studies

9.2.2 Classification and definitions

National class	Definition
Number of Fires	Average number of wildfires per year in Federal Conservation Units.
Area affected by wildfire	Average area affected by wildfires per year in Federal Conservation Units.
Heat Spots	Heat spots inside and outside forests / other wooded lands.

9.2.3 Original data

History of Fire Outbreaks in Federal Conservation Units

A Register of Fire Outbreaks (ROI) in Federal Conservation Units has been maintained since 1979, generating a historical report of fire outbreaks, which is a fundamental tool for proposing fire prevention and fight in Conservation Units. IBAMA, through PREVFOGO, has systematized this information and generated annual reports on wildfires in Federal Conservation Units.

PREVFOGO is a Specialized Centre within IBAMA responsible for the wildfire prevention and fight policy all over the national territory, including activities related to educational campaigns, training of rural producers and fire brigades, monitoring, research, and fire management in conservation units managed by the ICMBio – Chico Mendes Biodiversity Conservation Institute.

Wildfire registers are constantly updated in a database called SisFogo, based on the records and forms of fire outbreaks sent by Conservation Units and Municipalities.

The data and information generated by PREVFOGO on wildfires in Federal Conservation Units are public and can be found at www.ibama.gov.br/prevfogo.

Monitoring heat spots

The INPE provides daily data on heat spots received from several satellites. Data on the night passages of the satellite NOAA-15 and the satellite Terra and Aqua (MODIS sensor) are loaded into the IBAMA information system. Through a geographic information system, satellite images and several bases containing detailed information on the entire national territory, the monitoring team identifies areas at risk of fire outbreaks.

The heat spots detected in risk areas are loaded into an alert system that classifies them according to persistence, location and the risk they pose.

Year	**# of heat spots**
1998	107,007
1999	111,177
2000	104,122
2001	145,708
2002	232,543
Average in the 1998-2002 period	**140,111**
2003	212,989
2004	236,014
2005	226,347
2006	117,458
2007	188,993
Average in the 2003-2007 period	**196,360**

Processed data generate several products and trigger forest protection actions by IBAMA. Daily and specific reports are prepared, which contain, *inter alia*, data on heat spots classified by the alert system as well as tables, maps, and field information. Statistics, informative texts, maps and documents capable of generating more information on possible wildfires are also prepared.

The data and information generated by IBAMA's heat spot monitoring system are public and can be found at www.ibama.gov.br/emergencias.

9.3 Analysis and processing of national data

9.3.1 Calibration

9.3.2 Estimation and forecasting

Wildfire in Federal Conservation Units recorded by IBAMA

Year	Number of Fires	Area (1000 ha)
1988	16	59.05
1989	19	33.66
1990	43	64.68
1991	113	272.36
1992	50	74.39
Average in the 1988-1992 period	**48,2**	**100.83**
1998	56	40.68
1999	75	41.13
2000	151	46.32
2001	275	51.93
2002	347	157.68
Average in the 1998-2002 period	**180.80**	**67.55**
2003	389	201.36
2004	261	42.11
2005	377	62.44
2006	363	117.9
2007	494	197.5
Average in the 2003-2007 period	**376.80**	**124.26**

9.3.3 Reclassification into FRA 2010 categories

FRA 2010 Categories	National Categories	
Total land area affected by fire	Only fires inside Federal Conservation Units, since there is no information available on areas outside the Units. Areas in Federal Conservation Units totalled approximately 27.5 million hectare in 1990; 29 million hectare in 2000; and 58.9 million hectare in 2005.	

9.4 Data for Table T9

Table 9a

FRA 2010 category	Annual average for 5-year period					
	1990		2000		2005	
	1000 hectares	number of fires	1000 hectares	number of fires	1000 hectares	number of fires
Total land area affected by fire*	100.83	48.2	67.54	180.8	124.26	376.8
... of which on forest	n.a	n.a	n.a	n.a	n.a	n.a
... of which on other wooded land	n.a	n.a	n.a	n.a	n.a	n.a
... of which on other land	n.a	n.a	n.a	n.a	n.a	n.a

* Only fires in Federal Conservation Units.

Table 9b

FRA 2010 category	Proportion of forest area affected by fire (%)		
	1990	2000	2005
Wildfire	100	100	100
Planned fire	0	0	0

Note: The figures for the reporting years refer to the averages of annually affected areas for the 5-year periods 1988-1992, 1998-2002 and 2003-2007 respectively

9.5 Comments to Table T9

Variable / category	Comments related to data, definitions, etc.	Comments on the reported trend
Area affected by wildfire and number of fire outbreaks	Only data on the area affected by fires in Federal Conservation Units (CUs) are available.	
Wildfire / planned fire	All fire outbreaks recorded in areas in Federal Conservation Units are wildfire, since planned fires as a means to manage a CU are not usual in the country. Fire is used in some CUs for producing firebreaks. Fire is also used to clear rural areas for agriculture and pasture. In this case, authorization must be obtained from the respective public authority. However, these data are not available.	

Other general comments to the table

Sources and Reference list

IBAMA. Prevfogo. Fire outbreaks in Conservation Units. Available at: <www.ibama.gov.br/prevfogo>

INPE. **Fire Thematic Area/**data on heat spots. Available at: < www.ibama.gov.br/emergencias>

Table T10 – Other disturbances affecting forest health and vitality

10.1 FRA 2010 Categories and definitions

Term	Definition
Disturbance	Damage caused by any factor (biotic or abiotic) that adversely affects the vigour and productivity of the forest and which is not a direct result of human activities.
Invasive species	Species that are non-native to a particular ecosystem and whose introduction and spread cause, or are likely to cause, socio-cultural, economic or environmental harm or harm to human health.
Category	**Definition**
Disturbance by insects	Disturbance caused by insect pests.
Disturbance by diseases	Disturbance caused by diseases attributable to pathogens, such as bacteria, fungi, phytoplasma or virus.
Disturbance by other biotic agents	Disturbance caused by biotic agents other than insects or diseases, such as wildlife browsing, grazing, physical damage by animals, etc.
Disturbance caused by abiotic factors	Disturbances caused by abiotic factors, such as air pollution, snow, storm, drought, etc.

10.2 National data

10.2.1 Data sources

References to sources of information	Quality (H/M/L)	Variable(s)	Year(s)	Additional comments
EMBRAPA FLORESTAS (1)				
- Sirex noctilio	M	Affected area	1988-1992 1998-2002	
- Cinara spp.	H	Affected area	2002-2002	
- Armilaria spp.	M	Affected area	2001-2003	

(1) EMBRAPA- Brazilian Company for Agricultural research – National Centre for Forestry Research

10.2.2 Classification and definitions

National class	Definition
Disturbance by insects	Disturbance caused by insect pests that are detrimental to tree health.
Disturbance by diseases	Disturbance caused by diseases attributable to pathogens, such as a bacteria and fungi.

10.2.3 Original data

10.3 Analysis and processing of national data

10.3.1 Calibration

10.3.2 Estimation and forecasting

10.3.3 Reclassification into FRA 2010 categories

10.4 Data for Table T10

Table 10a – Disturbances

FRA 2010 category	Affected forest area (1000 hectares)		
	1990	2000	2005
Disturbance by insects	50.00	30.00	n.a
Disturbance by diseases		20.00	n.a
Disturbance by other biotic agents			
Disturbance caused by abiotic factors			
Total area affected by disturbances			

Notes: The figures for the reporting years refer to the averages of annually affected areas for the 5-year periods 1988-1992, 1998-2002 and 2003-2007 respectively.

The total area affected by disturbances is not necessarily the sum of the individual disturbances as these may be overlapping.

Table 10b – Major outbreaks of insects and diseases affecting forest health and vitality

Description / name	Tree species or genera affected (scientific name)	Year(s) of latest outbreak	Area affected (1000 hectares)	If cyclic, approx. cycle (years)

Note: Area affected refers to the total area affected during the outbreak.

Table 10c – Area of forest affected by woody invasive species

Scientific name of woody invasive species	Forest area affected 2005 (1000 hectares)
Total forest area affected by woody invasive species	

Note: The total forest area affected by woody invasive species is not necessary the sum of the values above, as these may be overlapping.

10.5 Comments to Table T10

Variable / category	Comments related to data, definitions, etc.	Comments on the reported trend

Disturbance by insects	***Sirex noctilio*** (Hymenptera: Siricidae)-: Insect that attacks *Pinus* spp. and was the cause of high losses in the 1990's, when the Control Fund (FUNCEMA) was organized and lead by EMBRAPA. Estimates around 350 to 400 thousand ha have been affected, in different degree of attack. The losses are estimated in **236,250 m³** of wood (US$ 4.2 millions / year). The most aggressive levels occurred in the years 90 (1988-1992). The system of control was efficient and its result is reflected in the second period (1998-2002). ***Cinara*** spp. (Hemiptera: Aphididae): Recently detected, only in the period 1998-2002. Insect that attacks young plantations of *Pinus* spp affecting the form of the trees and reducing increments. The losses in height growth were estimated as 14%, in plantations to 2 years of age. The economic losses can be estimated in US$ 3.8 millions/year.	
Disturbance by diseases	***Armilaria*** spp. : Disease found in *Pinus* spp. plantations from the 1990's. The mortality level is estimated at 5.1% per year. In the South and Southeast of Brazil, estimates of 10% of the total area planted with Pinus are affected by Armilaria, in different levels of attack. Losses could reach **190,000 m³** of wood, estimated in US$ 3.4 millions / year.	
Disturbance by other biotic agents		
Disturbance caused by abiotic factors		
Major outbreaks		
Invasive species		

Other general comments to the table

Sources and Reference list

EMBRAPA**. National Centre for Forestry Research.** Available at: <http://www.embrapa.br/>

Table T11 – Wood removals and value of removals

11.1 FRA 2010 Categories and definitions

Category	Definition
Industrial round wood removals	The wood removed (volume of round wood over bark) for production of goods and services other than energy production (fuel wood).
Fuel wood removals	The wood removed for energy production purposes, regardless whether for industrial, commercial or domestic use.

11.2 National data

11.2.1 Data sources

References to sources of information	Quality (H/M/L)	Variable(s)	Year(s)	Additional comments
IBGE	M	Round wood (m³) Fuel wood (m³) Charcoal (ton) from native forests and planted forests and total value of product removals	1990 to 2007	IBGE produces annual data on wood removed from native forests and planted forests in terms of volume and value

11.2.2 Classification and definitions

National class	Definition
Round wood	Cut tree trunk of native forest species including Brazilian pinus (*Araucaria angustifolia*), still with the bark and sawn at the ends, not intended for use as fuel in the case of vegetal extraction products. A planted forest product is the trunk of a felled tree derived from planted forest species, sawn at the ends, for production of paper and cellulose.
Fuel wood	Material obtained from the sawing of tree branches and trunks in adequate sizes, used as fuel in furnaces, boilers, stoves, fireplaces, etc. Native forest fuel wood is the one removed from native vegetation such as *cerrados, cerradões, capões, capoeiras, caatingas*, natural woods, and forests whereas planted forest fuel wood is the one obtained from planted forest species.
Charcoal	Fuel resulting from the partial burning of woody material in closed areas under controlled air admission. Native forest charcoal is the one removed from native vegetation such as savannahs (*cerrados), cerradões, capões, capoeiras,* savannah steppes *(caatingas)*, natural woods and forests whereas planted forest charcoal is the one obtained from wood or timber (eucalyptus, pinus, etc.) removed from planted forests.
Average unit price	Average price received by producers weighted by the amounts traded, in the reference year of the survey.
Products from Native Forests	Products derived from natural forest management process.
Products from Planted Forests	Products derived from the management of planted forests (fuel wood, charcoal and round wood).

11.2.3 Original data

In Brazil, the survey of products derived from native forests and planted forests is carried out by the Brazilian Institute of Geography and Statistics – IBGE, the main Brazilian agency responsible for producing, analyzing, documenting, and disseminating statistical and geographic information, which operates as a data and information provider in the country so as to meet the needs of both the most diverse segments of civil society and government agencies.

The data collection methodology consists in the administration, in each municipality, of a questionnaire to be completed by the IBGE Collection Agent, based on information gathered in meetings with representatives of agencies or institutions that are either directly or indirectly involved in actions aimed at fostering production, industrialization, trade and inspection of forest products. The Collection Agent also uses information provided by local producers engaged in the management of forest resources.
The variables investigated are the amount obtained from each native or cultivated plant product and the average unit price received by producers in the municipality.

The survey is annual and the base year of the survey is used as reference for the amounts and average unit prices of all investigated products.

In general, the main sources of information on products removed from native forests are the State Forest Institutes (or an equivalent thereof), State Secretariats, producers, traders, associations, cooperatives, and regional IBAMA offices. In the case of silviculture (forest plantation), which is a better organized activity, part of the information is provided by large companies with reforestation projects.

The difficulty to collect information mainly on removals from native forests in some regions in the country - due either to the lack of people capable of providing information or to the scattered nature of the activity - leads the Collection Agent to use different types of estimates:
1- Survey in the main point of sale of the product, seeking to distribute production across the municipalities of origin.
2- Use of knowledge typical of industry, trade as well as of other sectors in the municipality using forest raw materials. In this case estimates are based on the average product consumption in those activities.
3- Use of other surveys indicating consumption of the products investigated. For original data please visit:
http://www.sidra.ibge.gov.br/bda/pesquisas/pevs/default.asp

11.3 Analysis and processing of national data

11.3.1 Calibration

For total values in local currency – 1990, 1991 and 1992 values were used to obtain the average value for 1990. However, as the country's currency at the time was the Cruzeiro and inflation was considerably high, it was not possible to obtain an average with very different value sizes. On order to calculate the average, values were converted into dollars at that time's rates and then converted back to Cruzeiros at 1990 rates.

So, by considering:

AVERAGE DOLLAR EXCHANGE RATE	
1990	67.2
1991	403.17
1992	4,461.07

VALUE OF PLANTED FOREST PRODUCTS - IBGE (Cruzeiros 1,000 – Cr$)			
	1990	**1991**	**1992**
Fuel wood	11,355,851	55,371,712	677,703,491
Charcoal	16,167,263	60,785,714	595,223,726
Fuel	**27,523,114**	**116,157,426**	**1,272,927,217**
Round wood	**59,814,035**	**263,741,320**	**2,948,180,829**

VALUE OF PLANTED FOREST PRODUCTS ($1,000)				
	1990	**1991**	**1992**	**AVERAGE**
Fuel wood	168,953	137,340	151,915	152,736
Charcoal	240,538	150,769	113,426	168,244
Fuel	**409,491**	**288,109**	**285,341**	**327,647**
Round wood	**889,919**	**654,166**	**660,869**	**734,984**

With $1 = Cr$67.2 in 1990, we have:
From Planted Forests:
Fuel (fuel wood + charcoal) = 327,647 ($) x 67.2 = **22,017,878.4 (Cr$)**
Round wood = 734,984 ($) x 67.2= **49,390,924.8 (Cr$)**

VALUE OF NATIVE FOREST PRODUCTS - IBGE (Cr$1,000)			
	1990	**1991**	**1992**
Fuel wood	26,106,219	124,682,489	1,333,565,091
Charcoal	21,625,984	75,458,903	767,634,972
Fuel	**47,732,203**	**200,141,392**	**2,101,200,063**
Round wood	**245,928,143**	**479,616,913**	**5,240,164,554**

VALUE OF NATIVE FOREST PRODUCTS ($1,000)				
	1990	**1991**	**1992**	**AVERAGE**
Fuel wood	388,411	309,254	298,934	332,200
Charcoal	321,753	187,163	172,074	226,997
Fuel	**710,164**	**496,417**	**471,008**	**559,196**
Round wood	**3,658,942**	**1,118,609**	**1,174.643**	**1,984,065**

With $1 = Cr$67.2 in 1990, we have:
From native forests:
Fuel (fuel wood + charcoal) = 559,196 ($) x 67.2 = **37,577,971.2 (Cr$)**
Round wood = 1,984,065 ($) x 67.2 = **133,329,168 (Cr$)**

1990 /1991/1992 average value (Cr$1,000)			
	From planted forests	**From native forests**	**TOTAL (1990)**
Fuel	22,017,878.40	37,577,971.20	**59,595,849.60**
Round wood	49,390,924.80	133,329,168.00	**182,720,092.80**

Equation used for transforming charcoal (t) into fuel wood (m^3):

250 kg charcoal = 1 mdc (meter of charcoal)
1 mdc = 2m^3 fuel wood
where: 1 ton charcoal x 1000/250 = 1 mdc x 2 = 1m^3 fuel wood

11.3.2 Estimation and forecasting

None.

11.3.3 Reclassification into FRA 2010 categories

- **Industrial round wood removals** = Round wood from native forests + Round wood from planted forests.
- **Fuel wood removals =** fuel wood (from planted forests) + charcoal (from planted forests) + fuel wood (from native forests) + charcoal (from native forests).

11.4 Data for Table T11

FRA 2010 Category	Industrial round wood removals			Fuel wood removals		
	1990	2000	2005	1990	2000	2005
Total volume (1000 m^3 o.b.)	115,254	92,102	117,048	162,348	120,552	122,573
... of which from forest	115,254	92,102	117,048	162,348	120,552	122,573
Unit value (local currency / m^3 o.b.)	1585.37	26.25	53.21	367.1	11.1	25.0
Total value (1000 local currency)	182,720,092	2,417,238	6,228,571	59,595,849	1,332,968	3,065,136

Note: The figures for the reporting years refer to the averages of annually affected areas for the 5-year periods 1990-1992, 1998-2002 and 2003-2007 respectively.

	1990	2000	2005
Name of local currency	Cruzeiro	Real	Real

11.5 Comments to Table T11

Variable / category	Comments related to data, definitions, etc.	Comments on the reported trend
Total volume of industrial round wood removals	Data used refer to Round wood removed from native forests and planted forests, collected by the IBGE (Native Forests and Planted Forests Survey).	From the late 1990s and early 2000s there was a sharp fall in the removal of round wood from natural forests – from 97 million m^3 in 1990 to 22 million m^3 in 2000. However, the 2003-2007 period witnessed an increase in the amount removed from planted forests - from 71 million in 2000 to 105 million in 2007, thus

		compensating for the decrease in the removal from natural forests and increasing the total value in the 2005 period in question.
Total volume of fuel wood removals	Data used refer to fuel wood and charcoal removals from natural forests and from planted forests, collected by the IBGE (Native Forests and Planted Forests Survey).	Fuel wood removals from natural forests experienced a sharp decline from around 100 million cubic meters in the 1990s to an average of 50 million cubic meters in the early 2000s. This was probably due to increased concern about the Brazilian Amazon region, including international pressure, which resulted in harsher inspection and improved legislation to protect the region. The fall observed was not as high on the average due to a 30% increase in fuel wood removals from planted forests between 1990 and 2007 resulting from increased demand.
Unit value	The total value was divided by the removed volume.	A very large increase in the value of the fuel material removed (fuel wood + charcoal) was observed - from 11 reals/cubic meter in 2000 to 25 reals /m³ in 2005. This was due mainly to the increase in charcoal prices. According to the Silviculture Association of Minas Gerais, the average price of the cubic meter of charcoal consumed in Minas Gerais in the 1998 – 2002 period was $17, having jumped to $37 in the 2003 - 2007 period. This probably happened because of the fall in the production of charcoal removed from natural forests which, in turn, resulted from the stricter inspection aimed to protect the Brazilian Amazon region.
Total value	The use of local currency hinders comparison between countries, and in inflation years it is hard to calculate averages and establish comparison to other years.	

Other general comments to the table
The values presented are different from those contained in the FRA 2005 because they are average values, as requested in the FRA 2010 methodology. In the previous report, information was collected from different sources such as associations and entities representing the forest sector for the specific years of 1990 and 2000 and estimates were produced for 2005. For the FRA 2010 the data used were provided by the official government agency responsible for collecting data on native forests and planted forests (IBGE), which has historical series that enable conducting a more consistent analysis over a long period, through averages.

SOURCES AND REFERENCES

IBGE. ***Pesquisa de Extração Vegetal e Silvicultura (PEVS)*** **(Survey of Native Forests and Planted Forests)** . Available at: <http://www.sidra.ibge.gov.br/bda/pesquisas/pevs/default.asp>

Table T12 – Non-wood forest products removals and value of removals

12.1 FRA 2010 Categories and definitions

Term	Definition
Non-wood forest product (NWFP)	Goods derived from forests that are tangible and physical objects of biological origin other than wood.
Value of NWFP removals	For the purpose of this table, value is defined as the market value at the site of collection or forest border.

NWFP categories

Category
Plant products / raw material
1. Food
2. Fodder
3. Raw material for medicine and aromatic products
4. Raw material for colorants and dyes
5. Raw material for utensils, handicrafts & construction
6. Ornamental plants
7. Exudates
8. Other plant products
Animal products / raw material
9. Living animals
10. Hides, skins and trophies
11. Wild honey and bee-wax
12. Wild meat
13. Raw material for medicine
14. Raw material for colorants
15. Other edible animal products
16. Other non-edible animal products

12.2 National data

12.2.1 Data sources

References to sources of information	Quality (H/M/L)	Variable(s)	Year(s)	Additional comments
IBGE	H	Amount produced and production value of non-wood forest products.	2005	A historical series spanning the 1990-2007 period is available on the website.

12.2.2 Classification and definitions

National class	Definition
Rubber	Elastic gum resulting from the extraction of the latex or milk of forest essences.
Dry bark of black acacia	Product removed from the trunk of the black acacia tree right after felling and which, after sun-dried is used in tanning production.
Wax	Substance covering the leaves of native trees, forming a thin film, whose physical-chemical properties enable different industrial uses.
Fibre	Textile filament obtained by defibering the leaves, roots or stalks of plant species.
Eucalyptus leaf	Production of eucalyptus leaves for the eucalyptus oil industry (essential oil of eucalyptus).
Non-elastic gum	Vegetal gum with no elasticity resulting from the coagulation of latex extracted from forest essences.
Latex (rubber)	Liquid, thick, coagulable, glossy or colourless, sometimes orange or red substance found in several plant species, which is released by these plants when their stalk or leaves are broken, or after scarification of the trunk. Only the productions of coagulated or liquid latex from native rubber tree plantations are considered, since planted area productions are the object of the research into Agricultural Production. Coagulated latex are all the commercial types of coagulated latex from rubber trees such as, *inter alia*, *cernambi rama, cernambi cocho, cernambi virgem prensado, péla* (ball).
Food products	Plant products derived from the extraction of forest essences that can be used *in natura* or as raw material in the food industry.
Aromatic products	Plant products with aroma (leaves, roots, bark, etc.) intended for both domestic and industrial use without any processing or, when industrialized, in the form of essential oils.
Dyeing products	Plant products with dyeing or colouring properties.
Medicinal products	Products obtained from spontaneous vegetation intended for medical purposes due to their therapeutic properties (bark, roots, resin, etc.).
Oily products	Plant products from the extraction of forest essences, which are rich in oil, or the oil itself, used for industrial purposes.
Tanning products	Plant products from the extraction of forest essences, which are rich in tannin and intended for industrial purposes.
Toxic products	Plant products with venomous properties intended for industrial purposes.
Resin	Viscous substance, also called essence or oil resin, from cuts made on the trunk of certain planted forest species which, through industrial processes, yields natural resin products such as turpentine essence, tar, etc.

12.2.3 Original data

The data collection methodology consists in the administration, in each municipality, of a questionnaire to be completed by the IBGE Collection Agent, based on information gathered in meetings with representatives of agencies or institutions either directly or indirectly involved in actions aimed at fostering production, industrialization, trade and inspection of forest products. The Collection Agent also uses information provided by local producers engaged in the management of forest resources.
The variables investigated are the amount obtained from each native or cultivated plant product and the average unit price received by producers in the municipality.

The survey is annual and the base year of the survey is used as reference for the amounts and average unit prices of all investigated products.

In general, the main sources of information for products derived from native forests are the State Forest Institutes (or an equivalent thereof), State Secretariats, producers, traders, associations, cooperatives, and regional IBAMA offices. In the case of silviculture (forest plantation), which is a better organized activity, part of the information is provided by large companies with reforestation projects.

The difficulty to collect information mainly on removals from native forests in some regions in the country - due either to the lack of people capable of providing information or the scattered nature of the activity - leads the Collection Agent to use different types of estimates:
1- Survey in the main point of sale of the product, seeking to distribute production across the municipalities of origin.
2- Use of knowledge typical of industry, trade as well as other sectors in the municipality that use forest raw materials. In this case, estimates are based on the average product consumption in those activities.
3- Use of other surveys indicating consumption of the products investigated. For original data please visit:
http://www.sidra.ibge.gov.br/bda/pesquisas/pevs/default.asp

12.3 Analysis and processing of national data

12.3.1 Calibration

Not applicable to the available data.

12.3.2 Estimation and forecasting

Not applicable to the available data.

12.3.3 Reclassification into FRA 2010 categories

According to the criteria established by the IBGE (national classes), non-wood products from native forests and planted forests are defined as follows:

Main non-wood products
Native Forests
Rubbers-Group 1
Hevea (coagulated latex)
Hevea (liquid latex)
Non-elastic gums-Group 2
Maçaranduba
Sorva
Waxes-Group 3
Carnaúba palm tree (wax)
Carnaúba palm tree (powder)
Others
Fibres- Group 4
Buriti palm tree
Carnaúba palm tree

Piassava palm
Others
Tanning- Group 5
Angico tree (bark)
Barbatimão alumbark tree (bark)
Others
Oilseeds-Group 6
Babaçu (nut)
Copaíba Copal (oil)
Cumaru (Brazilian Teak) (nut)
Licuri (uricury ayagrus palm) (copra)
Oiticica (seed)
Pequi (ouari nut tree) (nut)
Tucum (nut)
Others
Food- Group 7
Açaí (fruit)
Castanha de caju (Cashew nuts)
Castanha-do-pará (Brazilian nuts)
Herba matte
Mangaba (fruit)
Palm cabbage
Pinhão (pinus seed)
Umbu (hog plum) (fruit)
Aromatic, medicinal, toxic and tanning- Group 8
Ipecacuanha or *poaia* (roots)
Jaborandi (leaves)
Urucu (annatto tree) (seed)
Brazilian pinus-Group 9
Nó-de-pinho (1)
Other products-Group 10
Black acacia bark
Eucalyptus leaves
Resin

IBGE (2005)

(1) Quantity stated in m^3. (2) Quantity in 1,000 trees.

With the aim of reclassifying according to the categories of non-wood products established in the FRA 2010 Report, the following rearrangement has been made:

Table 2 FRA 2010- Categories corresponding to IBGE groups (national classes)

1. Food	1. Food-Group 7
2. Fodder	2. Not available
3. Raw material for the fabrication of medicinal and aromatic products	3. *Ipeacuanha* or *poia* (Roots)+Jaborandi (leaves) belonging to Group 8+ Eucalyptus Leaves (Group 10)
4. Raw material for the fabrication of colorants and dyes	4. Urucu (seed) belonging to Group 8
5. Raw material for the fabrication of utensils, handicrafts & construction	5. Fibres (Group 4)
6. Ornamental plants	6. Not available
7. Exudates*	7. Rubbers (Group 1) + Non-elastic Gums (Group 2) + Resins (Group 10)
8. Other plant products	8. Waxes (Group 3) + Tanning products (Group 5) + Oily products (Group 6) + Group 9 - Brazilian pinus + Group 10 - Other Products (black acacia bark)

12.4 Data for Table T12

Rank	Name of product	Key species	Unit	NWFP removals 2005		NWFP category
				Quantity	Value (1000 local currency)	
1st	Resin	*Pinus* spp	t	64,197	135,218	7
2nd	*Babaçu* (nut)	*Orbignya phalerata*	t	119,031	98,892	8
3rd	*Piassava (fibre)*	*Attalea funifera*	t	86,550	89,345	5
4th	*Açaí* (fruit)	*Euterpe oleracea*	t	104,874	83,220	1
5th	Herba matte	*lex paraguariensis*	t	238,869	76,712	1
6th	*Carnaúba* (powder)	*Copernicia prunifera*	t	19,143	46,821	8
7th	Brazilian nuts	*Bertholletia excelsa*	t	30,555	46,656	1
8th	Black acacia bark	*Acacia decurrens*	t	280,329	31,933	8
9th	*Carnaúba* (wax)	*Copernicia prunifera*	t	3,209	13,689	8
10th	Palm cabbage	*Euterpe* spp	t	7,863	10,747	1
All other plant products				103,221	46,036	
All other animal products				NA	NA	
TOTAL				1,057,841	679,269	

	2005
Name of local currency	Real

12.5 Comments to Table T12

Variable / category	Comments related to data, definitions, etc.
10 most important products	It should be mentioned that among Brazil's ten most important products there used to be classes defined by the IBGE that were not in compliance with the groups of non-wood products contained in the FRA-2010, e.g. *Babaçu* (nut), *Carnaúba* (powder), Black Acacia Bark (wax).
Other plant products	IBGE groups included in other Products of the FRA Report were basically: Waxes (Group 3) + Tanning products (Group 5) + Oily products (Group 6) + Brazilian pinus (Group 9) + Group 10-Other Products (Black Acacia bark).
Other animal products	Commercial hunting is prohibited in Brazil. Only subsistence hunting is permitted. In the case of this section, there are no consolidated data in the country to enable completing the FRA – 2010 tables.
Value by product	The production of non-wood Forest products is very concentrated. The first three products by order of importance concentrate over 43% of non-wood forest production. Some 25.9% of the production involves other products, i.e., without specific classification in the FRA Report.
Total value	It should be mentioned that the ten most important products concentrate 92.7% of the total production of non-wood products in the country.

Other general comments to the table

Sources and Reference list

IBGE, Research Board, Coordination Unit for Agriculture and Livestock, Native Forest and Planted Forest Production, 2005.

Table T13 – Employment

13.1 FRA 2010 Categories and definitions

Category	Definition
Full-time equivalents (FTE)	A measurement equal to one person working full-time during a specified reference period.
Employment	Includes all persons in paid employment or self-employment.
Paid employment	Persons who during a specified reference period performed some work for wage or salary in cash or in kind.
Self-employment	Persons who during a specified reference period performed some work for profit or family gain in cash or in kind (e.g. employers, own-account workers, members of producers' cooperatives, contributing family workers).

13.2 National data

13.2.1 Data sources

References to sources of information	Quality (H/M/L)	Variable(s)	Year(s)	Additional comments
MTE/RAIS	H	Employment in primary production of	2000 2005	Data based on the National Classification of Economic Activities (CNAE) used in Brazil's Public Administration Statistical system. The CNAE classification derives from the International Standard Industrial Classification - ISIC/CIUU, Version 3, developed by the UN Statistics Division. It should be highlighted that the statistics contained in this database are restricted to formal employment.
IBAMA (2009)	H	Employment in management of protected areas	2000 2005	Information provided by the Human Resources Secretariat of the Brazilian Environmental and Renewable Natural Resources Institute (IBAMA).

13.2.2 Classification and definitions

National class	Definition
Employment in forest plantation (CNAE Class - 0211-9)	This class comprises formal employment in the cultivation of wood species: planting, replanting, pruning and conservation of woods and forest zones. The cultivation of wood species for cellulose production and other purposes and the cultivation of forest nurseries. Wood species grown include Eucalyptus, Black Acacia, and *Teca* (Angelim tree). This class also includes employment in forest nurseries.
Employment in Forest Management (CNAE Class - 0212-7)	This class comprises formal employment in tree felling and in the production of raw wood, trunks, posts, stakes, fuel wood, and other products from native and planted forest management, in addition to employment in the charcoal production sector where carried out together with forest management. Includes also wood removal, Black Acacia bark production, latex extraction (extractive rubber), Brazil nut

	harvesting, palm harvesting, extraction of other wild forest products such as latex, *babaçu*, *carnauba* wax, Brazil nuts and resins.
Activities of services related to forest plantation and forest management (CNAE Class - 0213-5)	This subclass includes Forest services carried out by third parties such as inspecting standing timber masses, estimating wood prices, felling trees, transporting round wood, unloading wood, and restoring forest – replanting forest species, including on the margins of rivers and lakes, inspecting forest restoration activities, air sowing of forest species, and forest care as well as other services linked to forest plantation or forest management, and forest fire protection services.
Employment in management of protected areas	Comprises civil servants working in Federal Conservation Units.

13.2.3 Original data

Data on employment in the primary production of goods related to the forest sector are contained in the Statistical Base of the Annual List of Social Information – RAIS. Employment is based on the National Classification of Economic Activities (CNAE) used in Brazil's Public Administration Statistical system. The CNAE classification derives from the International Standard Industrial Classification - ISIC/CIUU, Version 3, developed by the UN Statistics Division. It should be highlighted that the Statistics contained in this database are restricted to formal employment.

To represent employment in the primary production of goods in the forest sector, the following classes have been used: employment in forest plantation, employment in forest management, and activities of services related to forest plantation and forest management (as defined in the previous table).

In 1990 the "Silviculture" and "Agriculture" classes of economic activities were added to the RAIS database, making it impossible to complete the information for that year. As regards the number of jobs in protected areas, a request was submitted to IBAMA, which could only find information for the years 2000 and 2005, totalling 588 and 884 respectively.

Based on the aforementioned criteria and pursuant to a survey of the RAIS statistical database in 2000 and 2005, the following results have been found:

CNAE 95 CLASS	**2000**	2005
Employment in forest plantation (Class 02119)	10,774	15,475
Employment in forest management (Class 02127)	19,957	24,915
Employment in activities related to forest plantation and forest management (Class 02135)	34,521	67,803
Total	**65,252**	**108,193**
Source: 2000 and 2005 RAIS.		

Information on employment in protected areas was obtained from the Human Resources Coordination Unit of IBAMA. The data obtained are mentioned below:

Category of Conservation Unit	**ACRONYM**	**No. of employees in**	**No. of employees in**

		2000	2005
Area of Environmental Protection	APA	43	71
Area of Relevant Ecological Interest	ARIE	0	2
Ecological Station	ESEC	61	120
National Forest	FLONA	72	100
National Park	PARNA	292	418
Biological Reserve	REBIO	115	150
Ecological Reserve	RESEC	5	23
TOTAL		**588**	**884**

Source: SRH/IBAMA

13.3 Analysis and processing of national data

13.3.1 Calibration

This stage was not required.

13.3.2 Estimation and forecasting

No estimates were made, but only the summation of original data.

13.3.3 Reclassification into FRA 2010 categories

FRA Category	National Category – CNAE Classes
Employment in primary production of goods	Employment in (CNAE Class 02119) + Employment in forest management (CNAE Class 02127) + Employment in activities related to forest plantation and forest management (CNAE Class 02135).
Employment in management of protected areas	Civil servants hired to work in Federal Conservation Units.

13.4 Data for Table T13

FRA 2010 Category	Employment (1000 years FTE)		
	1990	2000	2005
Employment in primary production of goods	n.a	65,252	108,193
...of which paid employment	n.a	n.a	n.a
...of which self-employment	n.a	n.a	n.a
Employment in management of protected areas	n.a	0,588	0,884

13.5 Comments to Table T13

Variable / category	Comments related to data, definitions, etc.	Comments on the reported trend
Employment in primary production of goods	Data provided by the Brazilian Silviculture Society in 2007 show a total of 240,000 direct and 840,000 indirect jobs in forest plantation in 2006. These figures are considerably higher than those found in the RAIS, probably because they take into account both temporary and informal jobs. In the case of RAIS databases, only formal, supposedly full time jobs are considered. (*Fatos e Números do Brasil Florestal* 2007 - http://www.sbs.org.br/FatoseNumerosdoBrasilFlorestal.pdfum)	There has been a clear increase in forest sector employment. Between 2000 and 2005 the stock of employment links increased by more than 70%. This shows that the forest labour market in Brazil is

		undergoing an expansion process.
Paid employment / self-employment	No employment information system containing this type of information was found.	There is no trend to be reported.
Employment in management of protected areas	As for the number of jobs in protected areas, the General Human Resources Coordination Unit of IBAMA could only provide data for 2000 and 2005. The data are underestimated because only jobs in Federal Conservation Units were identified. These data can be improved when information on employment in state and municipal Conservation Units are available.	It is clear tat the Brazilian Government was concerned about increasing the number of civil servants in federal protected areas. There was a 30% increase in the number of employees in the five-year period under analysis.

Other general comments to the table

Sources and Reference list

MTE/ BASE Estatística da Relação Anual de Informações Sociais – RAIS. Available at: <http://sgt.caged.gov.br/>

Brazilian Environmental and Renewable Natural Resources Institute – IBAMA – Personal Information

Table T14 – Policy and legal framework

14.1 FRA 2010 Categories and definitions

Term	Definition
Forest policy	A set of orientations and principles of actions adopted by public authorities in harmony with national socio-economic and environmental policies in a given country to guide future decisions in relation to the management, use and conservation of forest and tree resources for the benefit of society.
Forest policy statement	A document that describes the objectives, priorities and means for implementation of the forest policy.
National forest programme (nfp)	A generic expression that refers to a wide range of approaches towards forest policy formulation, planning and implementation at national and sub-national levels. The national forest programme provides a framework and guidance for country-driven forest sector development with participation of all stakeholders and in consistence with policies of other sectors and international policies.
Law (Act or Code) on forest	A set of rules enacted by the legislative authority of a country regulating the access, management, conservation and use of forest resources.

14.2 Data for Table T14

Indicate the existence of the following (2008)			
Forest policy statement with national scope			Yes
		X	No
If Yes above, provide:	Year of endorsement		
	Reference to document		
National forest programme (nfp)		X	Yes
			No
If Yes above, provide:	Name of nfp in country	National Forest Programme	
	Starting year	2000	
	Current status		In formulation
		X	In implementation
			Under revision
			Process temporarily suspended
	Reference to document or web site	Decree No. 3420 of 20 April 2000 – Creates the National Forests Programme (http://www.planalto.gov.br/ccivil_03/decreto/D3420.htm)	
Law (Act or Code) on forest with national scope		X	Yes, specific forest law exists
			Yes, but rules on forests are incorporated in other (broader) legislation
			No, forest issues are not regulated by national legislation
If Yes above, provide:	Year of enactment	1965	
	Year of latest amendment	2009	

	Reference to document	Law No. 4.771 of 15 September 1965 - establishes the Brazilian Forest Code (http://www.planalto.gov.br/ccivil_03/Leis/L4771.htm)

In case the responsibility for forest policy- and/or forest law-making is decentralized, please indicate the existence of the following and explain in the comments below the table how the responsibility for forest policy- and law-making is organized in your country.		
Sub-national forest policy statements	x	Yes
		No
If Yes above, indicate the number of regions/states/provinces with forest policy statements	27 States	
Sub-national Laws (Acts or Codes) on forest	x	Yes
		No
If Yes above, indicate the number of regions/states/provinces with Laws on forests	27 States	

14.3 Comments to Table T14

Variable / category	Comments related to data, definitions, etc.
Forest policy statement with national scope	There is no specific law providing for a forest policy for the country. The closest thing to such an act is the Brazilian Forest Code.
National forest programme (nfp)	The National Forest Programme (PNF) was established by Decree No. 3,420 of 20 April 2000, with the aim of articulating sectoral public policies to promote sustainable development through combining the use and conservation of Brazilian forests. The Programme, which is included in the Government's Multiannual Plan, is coordinated by the Ministry of the Environment's Forest Department (DFLOR) and has actions executed by IBAMA and the Brazilian Forest Service.
Law (Act or Code) on forest with national scope	Besides the Forest Code, there are other pieces of legislation that complement the country's Forest Policy. Among the main Ordinary Laws and Decrees are: A) Ordinary laws LAW No. 6,938 OF 31 AUGUST 1981 – Provides for the National Environmental Policy and purposes, formulation and enforcement mechanisms thereof among other provisions. LAW No. 7.509 OF 4 JULY 1986 – Regulates the river transportation of round wood. LAW No. 7,754 OF 14 APRIL 1989 – Sets measures to protect forests existing in river springs among other provisions. LAW No. 9,605 OF 12 FEBRUARY 1998 – provides for penal and administrative sanctions on conducts and activities harmful to the environment among other provisions (Law on Environmental Crimes). LAW No. 9,985 OF 18 JULY 2000 – Regulates Art. 225, § 1, items I, II, III and VII of the Federal Constitution, establishes the National System of Nature Conservation Units among other provisions (SNUC). LAW No. 10,650 of 16 APRIL 2003 – Provides for public access to data and information available in agencies and entities included in Sisnama.

	LAW No. 10,711 OF 5 AUGUST 2003 – Provides for the National Seeds and Seedlings System among other provisions. LAW No. 11,284 OF 2 MARCH 2006 – Provides for public forest management for sustainable production; establishes the Brazilian Forest Service – SFB within the Ministry of the Environment; and creates the National Forest Development Fund - FNDF among other provisions. LAW No.11,428 OF 22 DECEMBER 2006 – Provides for the use and protection of the Atlantic Forest Biome's native vegetation among other provisions. LAW No. 11,516 OF 28 AUGUST 2007 – Provides for the creation of the Chico Mendes Biodiversity Conservation Institute - Chico Mendes Institute; amends Laws No. 7,735/1989, No. 11,284/2006, No. 9,985/2000, No. 10,410/2002, No.º 11,156/2005, No. 11,357/2006, and No. 7,957/1989; and revokes the provisions of Law No. 8,028/1990 and Provisional Measure No. 2,216-37/2001 among other provisions. B) Decrees: DECREE No. 76,623 OF 17 NOVEMBER 1975 – Promulgates the Convention on the International Trade of Endangered Wild Flora and Fauna Species. DECREE No. 97,628 OF 10 APRIL 1989 – Regulates Article 21 of Law No. 4,771 of 15 September 1965, Forest Code among other provisions. DECREE No. 99,274 OF 6 JUNE 1990 – Regulates Law No. 6,902 of 27 April 1981, and Law No. 6,938 of August 31, 1981 providing for the creation of Ecological Stations and Areas of Environmental Protection and for the National Environmental Policy, respectively, among other provisions. DECREE No. 1,298 OF 27 OCTOBER 1994 – Approves the Regulation on National Forests among other provisions. DECREE No. 2,661 OF 8 JULY 1998 – Regulates the single paragraph, Article 27 of Law No. 4,771 of 15 September 1965 (Forest Code), by establishing precaution rules related to the use of fire in agropastoral and forest practices among other provisions. DECREE No. 2,707 OF 4 AUGUST 1998 – Promulgates the International Agreement on Tropical Woods signed in Geneva on 26 January 1994. DECREE No. 3,420 OF 20 APRIL 2000 – Provides for the establishment of the National Forest Programme – PNF among other provisions. DECREE No. 3,607 OF 21 SEPTEMBER 2000 – Provides for the implementation of the Convention on the International Trade of Endangered Wild Flora and Fauna Species – CITES among other provisions. DECREE No. 4,593 OF 13 FEBRUARY 2003 – Suspends removal of the mahogany species (*Swietenia macrophylla King*) in the National Territory for 150 days among other provisions. DECREE No. 4,722 OF 5 JUNE 2003 – Establishes criteria for the removal of the *Swietenia macrophylla King* (mahogany) species among other provisions. DECREE No. 4,802 OF 7 AUGUST 2003 – Extends the International Agreement on Tropical Woods signed in Geneva on 26 January 1994 and promulgated by Decree No. 2,707 of 4 August 1998. DECREE No. 5,153 OF 23 JULY 2004 – Approves the regulation of Law No. 10,.711 of 5 August 2003, which provides for the National Seeds and Seedlings

	System – SNSM among other provisions. DECREE No. 5,776 OF 12 MAY 2006 – Approves the Regimental Framework and the Demonstration Table of At-will Appointments and Temporary Appointments of the Ministry of the Environment among other provisions. DECREE No. 5,795 OF 5 JUNE 2006 – Provides for the composition and operation of the Public Forest Management Committee among other provisions. DECREE No. 5,975 OF 30 NOVEMBER 2006 - Regulates Arts. 12, final section, 15, 16, 19, 20 and 21 of Law No. 4,771 of 15 September 1965; Art. 4, item III of Law No. 6,938 of 31 August 1981; Art. 2 of Law No. 10,650 of 16 April 2003; amends and adds provisions to Decrees No. 3,179 of 21 September 1999 and 3,420 of 20 April 2000 among other provisions. (**Replaces Decree No. 1,282/94).** DECREE No. 6,063 OF 20 MARCH 2007 – Regulates, at federal level, the provisions of Law No. 11,284 of 2 March 2006 providing for public forest management for sustainable production among other provisions. DECREE No. 6,514 OF 22 JULY 2008 – Provides for environment-related crimes and administrative sanctions and establishes the federal administrative process for assessing these crimes among other provisions. This Decree also revokes Decrees No. 3,179 of 1999; 3,919 of 2001; 4,592 of 2003; 5,523 of 2005; articles 26 and 27 of Decree No. 5,975 of 2006; and articles 12 and 13 of Decree No. 6,321 of 2007.
Sub-national forest policy statements	Each State is autonomous to establish its own forest policy, provided that it respects the principles of federal legislation.
Sub-national Laws (Acts or Codes) on forest	Article 23, paragraph X of the Federal Constitution states that the Union, the States and the Municipalities, in common, have the power to preserve the Fauna, Flora and Forests. Article 24, item VI of the Charter establishes that the Union, the States and the Federal District have the power to legislate concurrently on forests, hunting, fishing, fauna, preservation of nature, defence of the soil and natural resources, protection of the environment and control of pollution. As a result, the States of the Federative Republic of Brazil are expected to produce state legislation to supplement federal legislation with respect to the forest policy. However, it should be highlighted that the competence of the states cannot conflict with that of the Union in terms of managing their forests. The same applies to the Municipalities, which can also manage their forests provided that it conflicts neither with the legislation of the State of the Federation they belong to nor with the Federal Legislation. All states in the country have some type of forest legislation in place. However, no information could be obtained with respect to the Municipalities. According to the IBGE, there are 5,564 municipalities in the country and no information system was found that could allow us to precisely assess which ones have local forest policies in place.

Other general comments to the table

SOURCES AND REFERENCES

BRAZIL. **Law No. 4,771** of 15 September 1965 - Establishes the Brazilian Forest Code. Available at <http://www.planalto.gov.br/ccivil_03/Leis/L4771.htm>

BRAZIL. **Decree No. 3420** of 20 April 2000 – Creates the National Forest Programme. Available at <http://www.planalto.gov.br/ccivil_03/decreto/D3420.htm>

Table T15 – Institutional framework

15.1 FRA 2010 Categories and definitions

Term	Definition
Minister responsible for forest policy-making	Minister holding the main responsibility for forest issues and the formulation of the forest policy.
Head of Forestry	The Head of Forestry is the Government Officer responsible for implementing the mandate of the public administration related to forests.
Level of subordination	Number of administrative levels between the Head of Forestry and the Minister.
University degree	Qualification provided by University after a minimum of 3 years of post secondary education.

15.2 Data for Table T15

Table 15a – Institutions

FRA 2010 Category	2008	
Minister responsible for forest policy formulation : please provide full title	Carlos Minc Baumfeld – Minister of the Enviroment	
Level of subordination of Head of Forestry within the Ministry	X	1st level subordination to Minister
		2nd level subordination to Minister
		3rd level subordination to Minister
		4th or lower level subordination to Minister
Other public forest agencies at national level	• Brazilian Forest Service • Brazilian Environmental and Renewable Natural Resources Institute (IBAMA). • Chico Mendes Biodiversity Conservation Institute (ICMBio).	
Institution(s) responsible for forest law enforcement	Brazilian Environmental and Renewable Natural Resources Institute - IBAMA	

Table 15b – Human resources

FRA 2010 Category	Human resources within public forest institutions					
	2000		2005		2008	
	Number	%Female	Number	%Female	Number	%Female
Total staff	**n.a**	**n.a**	**619**	**n.a**	**1,080***	**n.a**
...of which with university degree or equivalent	**n.a**	**n.a**	**n.a**	**n.a**	**n.a**	**n.a**

* Includes only information on people employed in federal level institutions: Brazilian Forest Service; Biodiversity and Forest Secretariat, Ministry of the Environment; and Conservation Units linked to the Chico Mendes Biodiversity Conservation Institute.

Notes:
1. Includes human resources within public forest institutions at sub-national level
2. Excludes people employed in State-owned enterprises, education and research, as well as temporary / seasonal workers.

15.3 Comments to Table T15

Variable / category	Comments related to data, definitions, etc.	Comments on the reported trend
Minister responsible for forest policy formulation	According to Law No. 10,683 of 28 May 2003, which provides for the organizational structure of the Presidency of the Republic and ministries, matters within the competence of the Ministry of the Environment include: I – national policy on the environment and water resources; II - policy on the preservation, conservation and sustainable use of ecosystems as well as on biodiversity and forests; III – proposing economic and social strategies, mechanisms and instruments to improve the environmental quality and the sustainable use of natural resources; IV - policies to integrate the environment and production; V – environmental policies and programmes for the Legal Amazon; and VI – ecological-economic zoning.	
Level of subordination of Head of Forestry within the Ministry	The Secretariat of Biodiversity and Forests is a unique, specific agency within the Ministry of the Environment, with the following responsibilities among others: I – proposing policies and rules and defining strategies that take into account the different Brazilian biomes, in the following forest-related topics: a) fostering forest and agroforest plantations on sustainable bases; b) promoting the recovery of degraded areas and the restoration of ecosystems; c) promoting the sustainable management of native forests with a view to ensuring the generation of wood and non-wood products and the valuing of environmental services provided by the forests; d) ensuring forest protection, including the preservation and control of forest fires, deforestation and other forms of habitat destruction;	
Other public forest agencies at national level	Forest management in Brazil involves different institutions and the three levels of government. At Federal Government level, forest management is the direct responsibility of four institutions namely: the Ministry of the Environment, the Brazilian Forest Service; the Brazilian Environmental and Renewable Natural Resources Institute – IBAMA, and the Chico Mendes Biodiversity Conservation Institute - ICMBio. The Ministry of the Environment, in addition to designing policies also interferes directly in public forest management as the granting authority for sustainable production purposes (it is responsible for signing concession contracts). The Brazilian Forest Service is the Managing Agency of federal public forests and also responsible for generating information on, providing training in and fostering the forest area. IBAMA is the Environmental Control and Inspection Agency responsible for granting licenses and carrying out the environmental control of forests. The Chico Mendes Biodiversity Conservation Institute is the newest federal government environmental agency. It was established by Law No. 11,516 of 28 August 2007. It is a semi-autonomous agency linked to the Ministry of the Environment and also part of the National Environmental System (SISNAMA). Its chief institutional mission is to propose, implement, manage, protect, inspect, and monitor the Conservation Units established by the Union.	

Institution(s) responsible for forest law enforcement	The Brazilian Environmental and Renewable Natural Resources Institute (Ibama) is a federal agency with financial and administrative authority linked to the Ministry of the Environment. It was established by Law No. 7,735 of 22 February 1989 and its main duties include enforcing environmental laws; implementing actions related to national environmental policies as regards federal duties involving environmental licensing, environmental quality control, authorization to use natural resources, and environmental inspection, monitoring and control; and implementing supplementary actions falling within the competence of the Union.	
Human resources within public forest institutions	The data presented in this report are underestimated because information could only be obtained from the main federal institutions responsible for forest management. The information available include: employees of the Brazilian Forest Service, of the Ministry of the Environment's Biodiversity and Forest Secretariat, and of the Conservation Units linked to the Chico Mendes Institutes. Information on the Conservation Units does not provide data on the number of people with a university degree and whether these are temporary employees or not.	

Other general comments to the table

Table T16 – Education and research

16.1 FRA 2010 Categories and definitions

Term	Definition
Forest-related education	Post-secondary education programme with focus on forests and related subjects.
Doctor's degree (PhD)	University (or equivalent) education with a total duration of about 8 years.
Master's degree (MSc) or equivalent	University (or equivalent) education with a total duration of about five years.
Bachelor's degree (BSc) or equivalent	University (or equivalent) education with a duration of about three years.
Technician certificate or diploma	Qualification issued from a technical education institution consisting of 1 to 3 years post secondary education.
Publicly funded forest research centres	Research centres primarily implementing research programmes on forest matters. Funding is mainly public or channelled through public institutions.

16.2 National data

16.2.1 Data sources

References to sources of information	Quality (H/M/ L)	Variable(s)	Year(s)	Additional comments
CAPES	H	Masters degree in the area of Forest Resources and Forest Engineering from higher learning institutions and INPA	1996 - 2008	It is not possible to carry out a gender-based survey.
National Institute of Educational Statistics and Research -INEP/ Ministry of Education – MEC.	M	Degree in Forest Engineering from higher learning institutions	1990 - 2006	Data received by email.
2005 School Census – INEP – MEC	M	Technical certificate or diploma in the forest area	2003 - 2005	Data received by email.
Emílio Goeldi Museum in Paraná - MPEG Laboratory of Forest Products - LPF Embrapa Forests Embrapa Western Amazon Region Embrapa Rondônia Technological Research Institute of the State of São Paulo - IPT National Research Institute of the Amazon Region - INPA	M	People working in research centres performing forest-related research	2000, 2005 and 2008	Missing data on other Embrapa units in the northern region.

16.2.2 Original data

For information on people holding a master's degree in Forest Sciences, the data used were those contained in the statistics system of the National Council for the Improvement of Higher Education (CAPES). Data for 2000 to 2008 are shown on the table below. The system does not allow for a gender-based survey.

Master's Degree	
Years	Total
1996	85
1997	84
1998	87
1999	101
2000	150
2001	113
2002	179
2003	137
2004	157
2005	181
2006	200
2007	177
2008	199

Data on people with a Bachelor's degree were emailed to the National Institute of Educational Statistics and Research (INEP) for the 1990 – 2006 period. The data used are shown on the table below.

People with a Bachelor's degree				
Year	**Female**	**Male**	**Total**	**% Female**
1990	49	118	167	29.34
1991	73	158	231	31.60
1992	90	140	230	39.13
1993	90	143	233	38.63
1994	79	182	261	30.27
1995	104	155	259	40.15
1996	81	163	244	33.20
1997	110	173	283	38.87
1998	129	187	316	40.82
1999	150	239	389	38.56
2000	128	205	333	38.44
2001	170	249	419	40.57
2002	180	267	447	40.27
2003	225	353	578	38.93
2004	236	340	576	40.97
2005	272	407	679	40.06
2006	341	541	882	38.66

As for people with a technician certificate or diploma in the forest area, the data used were those received by INEP which, however, cover only 2003, 2004 and 2005. Direct contacts with agricultural schools were attempted but very few of them replied to our requests on the

number of people that completed such courses in the other years. The date used are shown on the table below.

People with a certificate or diploma as forest technician								
Course	**2003**		**2004**		**2005**		**2006**	
	Male	Female	Male	Female	Male	Female	Male	Female
Forest Technician	139	46	173	50	174	53	174	53
Forest Management Technician	76	17	12	3	8	10	8	10
TOTAL	**215**	**63**	**185**	**53**	**182**	**63**	**182**	**63**

Research centres carrying out forest-related research were identified with respect to researchers working in publicly funded forest research centres. Information on researchers in the forest area was requested directly from the following institutions:

- Emílio Goeldi Museum in the State of Paraná - MPEG
- Laboratory of Forest Products - LPF
- Embrapa Forests
- Embrapa Western of the Amazon Region
- Embrapa Rondônia
- Technological Research Institute of the State of São Paulo - IPT
- National Research Institute of the Amazon Region – INPA

Contacts were made with other Embrapa units in the northern region which, however, were unable to provide data on the number of researchers.

The data for 2000, 2005 and 2008 received from the institutions are shown on the table below.

Researchers in the research centres contacted												
Degree	**2000**				**2005**				**2008**			
	Male	Fem.	Total	%Fem.	Male	Fem.	Total	%Fem.	Male	Fem.	Total	%Fem.
Doctor's Degree	59	28	87	32.18	68	32	100	32.00	75	41	116	35.34
Master's Degree	32	13	45	28.89	31	16	47	34.04	23	15	38	39.47
Bachelor's Degree	25	17	42	40.48	25	20	45	44.44	29	25	54	46.30

An attempt was made to find the number of professors in university forest engineering courses in the country. However, as only data for 2005 were available, just the number of researchers in the research centres contacted was used.

16.3 Analysis and processing of national data

16.3.1 Estimation and forecasting

The numbers of people that have completed a Bachelor's or higher degree or achieved a certificate or diploma as forest technician for 2008 need to be estimated.

The increase rate in the number of people that have completed a Bachelor's or higher degree was calculated based on the data series available. The rate found was applied to the number of degree holders in 2006 and subsequently to the number found for 2007. The same method was used to calculate the number of women with university degree.

For people who have achieved a certificate or diploma as forest technician, the average number was calculated based on the historical series available at INEP. The number was then applied to 2008. The same method was used to calculate the number of women with a forest technician certificate or diploma.

16.4 Data for Table T16

FRA 2010 Category	Graduation [1] of students in forest-related education					
	2000		2005		2008	
	Number	%Female	Number	%Female	Number	%Female
Master's degree (MSc) or equivalent	150	n.a	181	n.a	200	n.a
Bachelor's degree (BSc) or equivalent	333	38.44	679	40.06	1,048	40.68
Forest technician certificate / diploma	n.a	n.a	245	25.71	253	23.55
FRA 2010 Category	**Professionals working in publicly funded forest research centres [2]**					
	2000		2005		2008	
	Number	%Female	Number	%Female	Number	%Female
Doctor's degree (PhD)	87	32.18	100	32.00	116	35.34
Master's degree (MSc) or equivalent	45	28.89	47	34.04	38	39.47
Bachelor's degree (BSc) or equivalent	42	40.48	45	44.44	54	46.30

Notes:

1. Graduation refers to the number of students that have successfully completed a Bachelor's or higher degree or achieved a certificate or diploma as forest technician.
2. Covers degrees in all sciences, not only forestry.

16.5 Comments to Table T16

Variable / category	Comments related to data, definitions, etc.	Comments on the reported trend
Graduation of students in forest-related education	As regards the number of graduates in the forest-related education component, only the number of people with a Master's Degree (MSc) from institutions recognized by the Ministry of Education and Culture (MEC) was used in the "Master's degree (MSc) or equivalent" category. However, there are in the country people with a Doctor's degree in the area, which were not included in the table, since this component does not provide for this category.	

Professionals working in public forest research centres	Does not consider professors in all forest engineering courses at university level, since only data for 2005 are available in the portal of the National Higher Education Evaluation System (Sinaes).	

Other general comments to the table

SOURCES AND REFERENCES

CAPES. Statistics System for Graduate Courses. Available at <http://ged.capes.gov.br/AgDw/silverstream/pages/frPesquisaColeta.html>

BRAZIL. Ministry of Education. **Educational Statistics Board**, **INEP – MEC**.

BRAZIL. Ministry of Education. **2005 School Census** – INEP – MEC

INEP. General **Coordination of the Integrated Educational Information System.** INEP/DTDIE

Emílio Goeldi MUSEUM in Paraná – MPEG – personal contacts

LABORATORY of Forest Products – LPF – personal contacts

EMBRAPA Forests - personal contacts

EMBRAPA Western Amazon - personal contacts

EMBRAPA Rondônia - personal contacts

TECHNOLOGICAL Research Institute of the State of São Paulo – IPT- personal contacts

NATIONAL Research Institute of the Amazon Region – INPA- personal contacts

Table T17 – Public revenue collection and expenditure

17.1 FRA 2010 Categories and definitions

Category	Definition
Forest revenue	All government revenue collected from the domestic production and trade of forest products and services. For this purpose, forest products include: round wood; sawnwood; wood-based panels; pulp and paper; and non-wood forest products. As far as possible, this should include revenue collected by all levels of government (i.e. central, regional/provincial and municipal level), but it should exclude the income of publicly owned business entities.
Public expenditure	All government expenditure on forest related activities (further defined below).
Operational expenditure *(sub-category to Public expenditure)*	All government expenditure on public institutions solely engaged in the forest sector. Where the forest administration is part of a larger public agency (e.g. department or ministry), this should only include the forest sector component of the agency's total expenditure. As far as possible, this should also include other institutions (e.g. in research, training and marketing) solely engaged in the forest sector, but it should exclude the expenditure of publicly owned business entities.
Transfer payments *(sub-category to Public expenditure)*	All government expenditure on direct financial incentives paid to non-government and private-sector institutions, enterprises communities or individuals operating in the forest sector to implement forest related activities.
Domestic funding	Public expenditure funded from domestic public financial resources, including: retained forest revenue; forest-related funds; and allocations from the national budget (i.e. from non-forest sector public revenue sources).
External funding	Public expenditure funded from grants and loans from donors, non-governmental organisations, international lending agencies and international organisations, where such funds are channelled through national public institutions.

17.2 National data

17.2.1 Data sources

References to sources of information	Quality (H/M/L)	Variable(s)	Year(s)	Additional comments
IBGE (2004, 2005)	H	Forest revenue	2005 2000	Refers to data on industrial production in Brazil for 2005 and 2000.
AFONSO (2000/2005)	H	Forest revenue	2005 2000	Refers to sources of information on tax rates for calculating forest revenue: - Goods and Services Tax (ICMS); - Industrial Products Tax (IPI).
LOA (2000, 2005)	H	Operational expenditure	2005 2000	Refers to data on operational expenditure.
IBGE	H	Forest revenue	2005 2000	Refers to data on the production of products from "Native Forests and Planted Forests" and of "Non-Wood Forest Products".
LOA (2000, 2005)	H	Transfer payments	2005 2000	

17.2.2 Classification and definitions

National class	Definition

17.2.3 Original data

17.3 Analysis and processing of national data

17.3.1 Calibration

17.3.2 Estimation and forecasting

Forest revenues refer to an estimation based on the representativeness of taxes vis-à-vis Brazil's GDP. The estimation took into account the IPI (Industrial Products Tax) and the Goods and Services Tax (ICMS), which basically incur on any forest products, as well as the distribution of those products across different segments of the forest production chain. Forest production has been basically subdivided into three economic segments: Native Forests and Planted Forests, Industrial Forest Production, and Non-Wood Forest Products. It should be highlighted that for the purpose of forest revenue, the IPI rate was applied only to Industrial Forest Production.

The rates used to estimate the federal revenue collection based on forest production were taken from the paper published in the Unicamp Journal in March 2006 entitled *Carga Tributária Global no Brasil, 2000/2005: cálculos revisitados* (Global Tax Burden in Brazil, 2005/2005: calculations revisited), which reviews the calculations of the overall tax burden in Brazil between 2000 and 2005. The table below, which was taken from the said paper evinces the use of IPI and ICMS rates for 2000 (1.59% and 7.47%) and 2005 (1.24% and 7.2%) respectively.

The sum of the ICMS and IPI rates based on data on forest industry production has yielded the following results:

Code	Forest Product	Gross Production Value (R$1,000)	IPI [TN1] (1.24%)	ICMS[TN2] (7.92%)	Collected revenue (R$1,000)
	Native Forests and Planted Forests	9,570,631.00		757,993.98	757,993.98
	Charcoal	1,679,410.00	-	**133,009.27**	133,009.27
	Fuel wood	1,287,353.00	-	**101,958.36**	101,958.36
	Round wood	6,603,868.00	-	**523,026.35**	523,026.35
	Industrial Forest Production	78,239,589.37	970,170.91	6,196,575.48	7,166,746.39
2010	Sawing of wood	**4,942,594.53**	**61,288.17**	**391,453.49**	452,741.66
2021	Manufacturing of laminated wood and boards from plywood, pressed wood.	**6,078,932.38**	**75,378.76**	**481,451.44**	556,830.21
2022	Manufacturing of wood door/window frames; prefabricated wood houses; wood structures; and carpentry items.	**1,133,033.95**	**14,049.62**	**89,736.29**	103,785.91
2023	Manufacturing of tanning articles and wood packaging.	**686,631.11**	**8,514.23**	**54,381.18**	62,895.41
2029	Manufacturing of several wood, straw, cork and braided material – except furniture.	**888,882.77**	**11,022.15**	**70,399.52**	81,421.66
2110	Manufacturing of cellulose and other pastes for paper production.	**7,135,072.45**	**88,474.90**	**565,097.74**	653,572.64
2121	Paper manufacturing.	**11,435,897.17**	**141,805.12**	**905,723.06**	1,047,528.18
2122	Manufacturing of plain cardboard, construction paper, and cardboard.	**1,142,279.50**	**14,164.27**	**90,468.54**	104,632.80
2131	Manufacturing of paper packaging.	**2,149,996.11**	**26,659.95**	**170,279.69**	196,939.64
2132	Manufacturing of cardboard packaging and corrugated cardboard.	**8,632,126.65**	**107,038.37**	**683,664.43**	790,702.80
2141	Manufacturing of paper, cardboard, and construction paper stationery.	**1,483,292.43**	**18,392.83**	**117,476.76**	135,869.59
2142	Manufacturing of tapes and fanfold paper – whether printed or not.	**703,801.68**	**8,727.14**	**55,741.09**	64,468.23
2149	Manufacturing of other paste, paper, cardboard, construction paper, and card items.	**5,615,027.73**	**69,626.34**	**444,710.20**	514,336.54
2215	Editing of books, magazines and newspapers.	**965,705.21**	**11,974.74**	**76,483.85**	88,458.60
2216	Editing and printing of books.	**3,026,704.13**	**37,531.13**	**239,714.97**	277,246.10
2217	Editing and printing of newspapers.	**4,632,845.83**	**57,447.29**	**366,921.39**	424,368.68
2218	Editing and printing of magazines.	**2,541,885.19**	**31,519.38**	**201,317.31**	232,836.68
2219	Editing; editing and printing of graphic items.	**997,691.94**	**12,371.38**	**79,017.20**	91,388.58
2221	Printing of newspapers, magazines and books.	**1,206,351.13**	**14,958.75**	**95,543.01**	110,501.76
2511	Manufacturing of pneumatic items and air chambers.	**7,721,758.85**	**95,749.81**	**611,563.30**	707,313.11
2512	Rebuilding of pneumatic items.	**751,860.05**	**9,323.06**	**59,547.32**	68,870.38
2519	Manufacturing of different rubber items.	**4,367,218.61**	**54,153.51**	**345,883.71**	400,037.22
	Non-wood Forest Products (Native and Planted Forests)	505,492.00		40,034.97	40,034.97
	FOOD	233,769		**18,514.50**	18,514.50
	RESIN	135,218		**10,709.27**	10,709.27
	OILY PRODUCTS	110,526		**8,753.66**	8,753.66
	FIBRES	91,473		**7,244.66**	7,244.66
	EUCALYPTUS LEAVES	63,620		**5,038.70**	5,038.70
	WAXES	60,510		**4,792.39**	4,792.39
	BARKS OF BLACK ACACIA	31,933		**2,529.09**	2,529.09
	RUBBER	8,439		**668.37**	668.37
	AROMATIC, MEDICINAL, TOXIC AND COLOURING PRODUCTS	3,577		**283.30**	283.30
	TANNING PRODUCTS	196		**15.52**	15.52
	Total	**88,315,649.37**	**970,170.91**	**6,994,604.43**	**7,964,775.33**

T [N1] Industrial Products Tax.

T [N2] Goods and Services Tax.

	2000				
Code	Forest Product	Gross Production Value (R$1,000)	IPI (1.59%)	ICMS (7.47%)	Collection (R$1,000)
	Native Forests and Planted Forests	1,390,201.00	-	103,848.01	103,848.01
	Charcoal	206,640.00		**15,436.01**	15,436.01
	Fuel wood	280,041.00		**20,919.06**	20,919.06
	Round wood	903,520.00		**67,492.94**	67,492.94
	Industrial Forest Production	**43,071,541.00**	**684,837.50**	**3,217,444.11**	**3,902,281.61**
2010	Sawing of wood	1 490 657	**23,701.45**	**111,352.08**	135,053.52
2021	Manufacturing of laminated wood and boards from plywood, pressed wood.	2 202 951	**35,026.92**	**164,560.44**	199,587.36
2022	Manufacturing of wood door/window frames; prefabricated wood houses; wood structures; and carpentry items.	445 750	**7,087.43**	**33,297.53**	40,384.95
2023	Manufacturing of tanning articles and wood packaging.	154 730	**2,460.21**	**11,558.33**	14,018.54
2029	Manufacturing of several wood, straw, cork and braided material – except furniture.	500 867	**7,963.79**	**37,414.76**	45,378.55
2110	Manufacturing of cellulose and other pastes for paper production.	4 130 258	**65,671.10**	**308,530.27**	374,201.37
2121	Paper manufacturing.	5 820 273	**92,542.34**	**434,774.39**	527,316.73
2122	Manufacturing of plain cardboard, construction paper, and cardboard.	911 783	**14,497.35**	**68,110.19**	82,607.54
2131	Manufacturing of paper packaging.	1 121 012	**17,824.09**	**83,739.60**	101,563.69
2132	Manufacturing of cardboard packaging corrugated cardboard.	3 761 729	**59,811.49**	**281,001.16**	340,812.65
2141	Manufacturing of paper, cardboard, and construction paper stationery.	701 145	**11,148.21**	**52,375.53**	63,523.74
2142	Manufacturing of tapes and fanfold paper – whether printed or not.	430 135	**6,839.15**	**32,131.08**	38,970.23
2149	Manufacturing of other paste, paper, cardboard, construction paper, and card items.	3 437 372	**54,654.21**	**256,771.69**	311,425.90
2211	Editing and printing of books.	4 057 693	**64,517.32**	**303,109.67**	367,626.99
2212	Editing and printing of newspapers.	2 767 035	**43,995.86**	**206,697.51**	250,693.37
2213	Editing and printing of magazines.	2 329 232	**37,034.79**	**173,993.63**	211,028.42
2215	**Not available**	-	-	-	-
2216	**Not available**	-	-	-	-
2217	**Not available**	-	-	-	-
2218	**Not available**	-	-	-	-
2219	Editing; editing and printing of graphic items.	2 157 615	**34,306.08**	**161,173.84**	195,479.92
2221	Printing of newspapers, magazines and books.	519 004	**8,252.16**	**38,769.60**	47,021.76
2511	Manufacturing of pneumatic items and air chambers.	3 883 781	**61,752.12**	**290,118.44**	351,870.56
2512	Rebuilding of pneumatic items.	326 125	**5,185.39**	**24,361.54**	29,546.93
2519	Manufacturing of different rubber items.	1 922 394	**30,566.06**	**143,602.83**	174,168.90
	Non-wood Forest Products (Native and Planted Forests)	379,184.00	-	28,325.04	28,325.04
	FOOD	190 546		**14,233.79**	14,233.79
	RESIN	-		-	-
	OILY PRODUCTS	52 061		**3,888.96**	3,888.96
	FIBRES	99 221		**7,411.81**	7,411.81
	EUCALYPTUS LEAVES	-		-	-
	WAXES	27 067		**2,021.90**	2,021.90
	BARKS OF BLACK ACACIA	-		-	-
	RUBBER	7 357		**549.57**	549.57
	AROMATIC, MEDICINAL, TOXIC AND COLOURING PRODUCTS	2 839		**212.07**	212.07
	TANNING PRODUCTS	93		**6.95**	6.95
	Total	**44,840,926.00**	**684,837.50**	**3,349,617.17**	**4,034,454.67**

On the expenditure side, a study was conducted based on the registry of Government programme actions, and taking into account the amounts actually paid per programme. In general, most of the programmes are under the responsibility of the Ministry of the Environment.

The following programmes were included in the calculations for 2000 and 2005:

YEAR 2005- Amounts per Forest-related Government Programme (R$1,000)

code	Programmes (amounts paid in R$1,000)	Total	Source of external credit	Source of domestic credit
151	*Proteção de Terras Indígenas, Gestão Territorial* (Protection of Indigenous Lands, Territorial Management)	971		971
498	*Desenvolvimento sustentável do Pantanal* (Sustainable Development of Pantanal)	67		67
499	*Áreas Protegidas do Brasil* (Protected Areas of Brazil)	21,170		21,170
500	*Nacional de Ecoturismo* (Ecotourism)	1,186		1,186
502	*Amazônia sustentável* (Sustainable Amazon)	11,217	9,385	1,832
503	*Prevenção e Combate ao Desmatamento, Queimadas e Incêndios Florestais – Florescer* (Prevention and Combat of Deforestation and Forest Fires)	38,316		38,316
505	Florestar	-		-
506	*Nacional de Florestas* (Forests)	20,685	41	20,644
508	*Conservação, uso sustentável e Recuperação da Biodversidade* (Conservation, Sustainable Use and Recovery of Biodiversity)	14,784	1,174	13,610
512	*Zoneamento Economico-Ecológico* (Economic-Ecological Zoning)	2,299		2,299
1,080	*Combate à desertificação* (Desertification Combat)	2,032		2,032
1,332	*Conservação e Recuperação de Biomes* (Conservation and Recovery of Biomes)	3,403	1,054	2,349
	Total	**116,130**	**11,654**	**104,476**

Source: Chamber of Deputies

The following Brazilian Federal Government Budget units were responsible for the aforementioned programmes:

a) ***Proteção de Terras Indígenas, Gestão Territorial*** **(Protection of Indigenous Lands, Territorial Management)** – Ministry of Justice and Ministry of the Environment;
b) ***Desenvolvimento Sustentável do Pantanal*** **(Sustainable Development of Pantanal)** - Ministry of the Environment and Ministry of Integration;
c) ***Áreas Protegidas do Brasil*** **(Protected Areas of Brazil)** - Ministry of the Environment;
d) ***Nacional de Ecoturismo*** **(Ecotourism)** - Ministry of the Environment;
e) ***Amazônia Sustentável*** **(Sustainable Amazon)**- Ministry of the Environment;
f) ***Prevenção e Combate ao Desmatamento, Queimadas e Incêndios Florestais - Florescer*** **(Prevention and Combat of Forest Fires)** - Ministry of the Environment and Ministry of Science and Technology;
g) **Florestar-** Ministry of Agriculture and Ministry of the Environment;
h) ***Nacional de Florestas*** **(Forests)** - Ministry of the Environment;
i) ***Conservação, Uso Sustentável e Recuperação da Biodversidade*** **(Conservation, Sustainable Use and Recovery of Biodiversity)** - Ministry of the Environment and Ministry of Integration;
j) ***Zoneamento Econômico-Ecológico*** **(Economic-Ecological Zoning)** - Ministry of the Environment, Ministry of Mines and Energy, and Ministry of National Integration;
k) ***Combate à Desertificação*** **(Desertification Combat)** - Ministry of the Environment;
l) ***Conservação e Recuperação de Biomes*** **(Conservation and Recovery of Biomes)** - Ministry of the Environment.

Transfers from Forest-related Programmes to Private Non-profit Entities in 2005 (R$1,000)

		Transfer to non-profit entities		
code	Programmes (amounts paid in R$1,000	Total	Source of external credit/Transfers	Source of domestic credit/Transfers
151	Protection of Indigenous Lands, Territorial Management	0		0
498	Sustainable Development of Pantanal	0		0
499	Protected Areas of Brazil	1,062	237	825
500	Ecotourism	247		247
502	Sustainable Amazon	0		0
503-	Prevention and Combat of Deforestation and Forest Fires Florescer	0		0
505	Florestar	0		0
506	Forests	2,081	454	1,627
508	Conservation, Sustainable Use and Recovery of Biodiversity	1,513	538	975
512	Economic-Ecological Zoning	0		0
1.080	Desertification Combat	0		0
1.332	Conservation and Recovery of Biomes	481	191	290
	Total	5,384	1,420	3,964

Year 2000

	year 2000			
code	Programmes (amounts paid in R$ 1,000)	Total	Source of external credit	Source of domestic credit
151	INDIGENOUS TERRITORIES AND CULTURES	11,304	501	10,803
498	PANTANAL	1,331	0	1,331
499	PARKS OF BRAZIL	29,569	1,191	28,378
500	GREEN TOURISM	4,049	337	3,712
502	SUSTAINABLE AMAZON	9,982	980	9,002
503	PREVENTION AND COMBAT OF DEFORESTATION	11,713	3,275	8,438
505	FLORESTAR	12,052	2,456	9,596
506	SUSTAINABLE FORESTS	9,929	1,349	8,580
508	BIODIVERSITY AND GENETIC RESOURCES	4,979	1,554	3,425
512	ECONOMIC AND ECOLOGICAL ZONING	790	0	790
1080	DESERTIFICATION COMBAT	none	none	none
1332	CONSERVATION AND RECOVERY OF BIOMES	none	none	none
	Total	95,698	11,643	84,055

Source: Chamber of Deputies

Year 2000 - Transfers to private Nonprofit Entities by Programme

Transfer to non-profit entities				
code	Programmes (amounts paid in R$1,000)	Total	Source external credit /Transfers	Source domestic credits/Transfers
IND1	INDIGENOUS TERRITORIES AND CULTURES	43	0	43
498	PANTANAL	192	0	192
499	PARKS OF BRAZIL	1,501	367	1,134
500	GREEN TOURISM	952	0	952
502	SUSTAINABLE AMAZON	1,706	132	1,574
503	PREVENTION AND COMBAT OF DEFORESTATION	10	0	10
505	FLORESTAR	1,197	481	716
506	SUSTAINABLE FORESTS	0	0	0
508	BIODIVERSITY AND GENETIC RESOURCES	1,667	932	735
512	ECONOMIC AND ECOLOGICAL ZONING	220	0	220
1082	DESERTIFICATION COMBAT	-	-	-
1331	CONSERVATION AND RECOVERY OF BIOMES	-	-	-
	Total	7,445	1,912	5,576

In both exercises, the first "total" column refers to the amount of operational expenditures on forests in different areas. It includes, *inter alia*, programmes to protect indigenous lands; programmes to foster the sustainable development of Pantanal; programmes to maintain the country's protected areas; programmes to strengthen ecotourism; programmes to combat deforestation; and programmes to conserve and recover biomes. As requested by the FRA 2010, the amounts paid in each of such programmes were subdivided by funding source: amounts financed with external funds and amounts financed with domestic funds.

17.3.3 Reclassification into FRA 2010 categories

17.4 Data for Table T17

Table 17a - Forest revenues

FRA 2010 Categories	Revenues (1000 local currency)	
	2000	2005
Forest revenue	4,034,455	7,965,775

Table 17b - Public expenditure in forest sector by funding source

FRA 2010 Categories	Domestic funding (1000 local currency)		External funding (1000 local currency)		Total (1000 local currency)	
	2000	2005	2000	2005	2000	2005
Operational expenditure	84,055	100,512	11,643	10,234	95,698	110,746
Transfer payments	5,576	3,964	1,912	1,420	7,445	5,384
Total public expenditure	89,631	104,476	10,551	11,654	88,351	116,130

If transfer payments are made for forest management and conservation, indicate for what specific objective(s) - Please tick all that apply.		
		Reforestation
		Afforestation
	x	Forest inventory and/or planning
	x	Conservation of forest biodiversity
	x	Protection of soil and water
	x	Forest stand improvement
	x	Establishment or maintenance of protected areas
		Other, specify below

17.5 Comments to Table T17

Variable / category	Comments related to data, definitions, etc.	Comments on the reported trend
Forest revenue	Forest revenues refer to an estimation based on the representativeness of taxes vis-à-vis Brazil's GDP. The estimation took into account the IPI (Industrial Products Tax) and the Goods and Services Tax (ICMS), which basically incur on any forest products, as well as the distribution of these products across the different segments of the forest production chain. Forest production has been basically subdivided into three economic segments: Native Forests and Planted Forests, Industrial Forest Production, and Non-Wood Forest Products. It should be highlighted that for the purpose of forest revenue, the IPI rate was applied only to Industrial Forest Production.	Between 2000 and 2005 there has been an increase in public expenditure on the forest sector which, in absolute terms, jumped from 88.35 to 116.13 million Reals or a 31.44% increase. Transfers to Private Nonprofit Entities represented 7.7% and 4.43% in 2000 and 2005 respectively, thus showing a significant decrease. External Funding displayed a modest increase - from 12.46 to 13.07 million Reals.
Operational expenditure	Based on consultation to the Federal Budget. The programmes selected were those directly related to Forest Management.	
Transfer payments	Based on consultation to the Federal Budget. The programmes selected were those directly related to Forest Management.	

Other general comments to the table

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