

GLOBAL FOREST RESOURCES ASSESSMENT 2015

COUNTRY REPORT

Brazil

Rome, 2014

FAO, at the request of its member countries, regularly monitors the world's forests and their management and uses through the Global Forest Resources Assessment (FRA). This country report is prepared as a contribution to the FAO publication, the Global Forest Resources Assessment 2015 (FRA 2015).

The content and the structure are in accordance with the recommendations and guidelines given by FAO in the document Guide for country reporting for FRA 2015 (<http://www.fao.org/3/a-au190e.pdf>). These reports were submitted to FAO as official government documents.

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Introductory Text

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 deposited 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 for 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 FRA2015 involved the participation of a team from the Brazilian Forest Service, each person being responsible for a Topic and the entire group discussing together about the theme which raised doubts. Despite the difficulties found, especially because of the country size and vegetation typology diversity in Brazil, the Forest Service team's execution of FRA2015 represents significant progress in the production of forest resources information for the country.

Desk Study?

Check "yes" if this survey is a Desk Study, "no" otherwise

| | |
|-------------|----|
| Desk Study? | no |
|-------------|----|

1. What is the area of forest and other wooded land and how has it changed over time?

Documents for this question:

- [Guide for country reporting FRA 2015](#)
- [FRA 2015 Terms and Definitions](#)

1.1 Categories and definitions

| Category | Definition |
|---|---|
| Forest | Land spanning more than 0.5 hectares 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 hectares with trees higher than 5 meters and a canopy cover of 5-10 percent or trees able to reach these thresholds ; 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". |
| ...of which with tree cover (<i>sub-category</i>) | Land considered as "Other land", that is predominantly agricultural or urban lands use and has patches of tree cover that span more than 0.5 hectares with a canopy cover of more than 10 percent of trees able to reach a height of 5 meters at maturity. It includes both forest and non-forest tree species. |
| Inland water bodies | Inland water bodies generally include major rivers, lakes and water reservoirs. |
| Forest expansion | Expansion of forest on land that, until then, was not defined as forest. |
| ...of which afforestation (<i>sub-category</i>) | Establishment of forest through planting and/or deliberate seeding on land that, until then, was not defined as forest. |
| ...of which natural expansion of forest (<i>sub-category</i>) | 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). |
| Deforestation | The conversion of forest to other land use or the longterm reduction of the tree canopy cover below the minimum 10 percent threshold. |
| ...of which human induced (<i>sub-category</i>) | Human induced conversion of forest to other land use or the permanent reduction of the tree canopy cover below the minimum 10 percent threshold. |
| Reforestation | Natural regeneration or re-establishment of forest through planting and/or deliberate seeding on land already in forest land use. |
| ...of which artificial reforestation (<i>sub-category</i>) | Re-establishment of forest through planting and/or deliberate seeding on land already in forest land use. |

1.2 National data

1.2.1 Data sources

| | References to sources of information | Variables | Years | Additional comments |
|--|--------------------------------------|-----------|-------|---------------------|
| | | | | |

| | | | | |
|---|--|--|-----------|---|
| 1 | Ministry of Environment (MMA)/ Project for Conservation and Sustainable Use of Brazilian Biological Diversity (PROBIO), 2007. Levantamento e mapeamento dos remanescentes da cobertura vegetal dos biomas em 2002. | Natural Forests and other vegetation | 2002 | Mapping of vegetation in the scale 1:250,000 based on Landsat images, using the year 2002 as reference, recalculated using data from CSR/IBAMA. |
| 2 | Ministry of Environment (MMA)/ Brazilian Environmental and Renewable Natural Resources Institute (IBAMA) - Center of Remote Sensing (CSR), 2009. Relatório Técnico Monitoramento Do Desmatamento Nos Biomas Brasileiros Por Satélite – Monitoramento do Bioma Cerrado 2002-2008. | Remnant vegetation Deforestation rate | 2002-2008 | Remnant vegetation and Deforestation rate of Cerrado (Savanna) biome. |
| 3 | Ministry of Environment (MMA)/ Brazilian Environmental and Renewable Natural Resources Institute (IBAMA) - Center of Remote Sensing (CSR), 2010. Relatório Técnico Monitoramento Do Desmatamento Nos Biomas Brasileiros Por Satélite – Monitoramento do Bioma Caatinga/Mata Atlântica/ Pampa/Pantanal 2002-2008. | Remnant vegetation Deforestation rate | 2002-2008 | Deforestation rate of the biomes Caatinga, Atlantic Forest, Pampa, Pantanal. |
| 4 | Ministry of Environment (MMA)/ Brazilian Environmental and Renewable Natural Resources Institute (IBAMA) - Center of Remote Sensing (CSR), 2011. Relatório Técnico Monitoramento Do Desmatamento Nos Biomas Brasileiros Por Satélite – Monitoramento do Bioma Caatinga/Cerrado/Pampa/ Pantanal 2008-2009. | Deforestation rate | 2008-2009 | Remnant vegetation and Deforestation rate of the biomes Caatinga, Cerrado (Savanna), Pampa, Pantanal. |

| | | | | |
|----|---|--|-----------|---|
| 5 | Ministry of Environment (MMA)/ Brazilian Environmental and Renewable Natural Resources Institute (IBAMA) - Center of Remote Sensing (CSR), 2012. Relatório Técnico Monitoramento Do Desmatamento Nos Biomas Brasileiros Por Satélite – Monitoramento do Bioma Mata Atlântica 2008-2009. | Deforestation rate | 2008-2009 | Deforestation rate of Atlantic Forest biome. |
| 6 | Ministry of Environment (MMA)/ Brazilian Environmental and Renewable Natural Resources Institute (IBAMA) - Center of Remote Sensing (CSR), 2011. Relatório Técnico Monitoramento Do Desmatamento Nos Biomas Brasileiros Por Satélite – Monitoramento do Bioma Cerrado 2009-2010. | Deforestation rate | 2009-2010 | Deforestation rate of Cerrado (Savanna) biome. |
| 7 | National Institute for Space Research (INPE)/TerraClass, 2011, Levantamento de informações de uso e cobertura da terra na Amazônia – TerraClass 2008 – Sumário Executivo. | Natural expansion of forest | 2008 | Secondary vegetation area |
| 8 | National Institute for Space Research (INPE)/PRODES, 2014. PRODES Project - Monitoramento da Floresta Amazônica Brasileira por Satélite. Available at: http://www.obt.inpe.br/prodes/index.php . | Deforestation rate | 1988-2013 | Deforestation rate of Amazon biome. |
| 9 | Brazilian Institute of Geography and Statistics (IBGE), 2013. Resolução nº 1, de 15 de janeiro de 2013 - Área Territorial Oficial. | Brazil's official area | 2010 | Brazil's official area. |
| 10 | Brazilian Institute of Geography and Statistics (IBGE), 2012. Manual Técnico da Vegetação Brasileira. | Technical Manual on Brazilian Vegetation | N/A | N/A |
| 11 | " /> Brazilian Institute of Geography and Statistics (IBGE), 2004. Mapa de Biomas do Brasil. Available at: http://www.ibge.gov.br/home/presidencia/noticias/21052004biomashtml.shtml > | Brazilian biome map | 2004 | Percentages of the states occupied by the Amazon biome. |

| | | | | |
|----|--|--|--------------|---|
| 12 | Brazilian Association of Planted Forest Producers (ABRAF), 2006 to ABRAF, 2013. Anuário estatístico da ABRAF 2006: ano base 2005 to ABRAF 2013: ano base 2012. Available at: http://www.abraflor.org.br/estatisticas.asp | Planted Forest Annual forest establishment | 2005 to 2012 | N/A |
| 13 | Food and Agriculture Organization of the United Nations (FAO), 2010. Global Forest Resources Assessment 2010 (FRA 2010) - Country Report Brazil. | Planted Forest | 1990, 2000 | Data from FRA 2010 Brazil. |
| 14 | National Institute for Space Research (INPE)/TerraClass, 2013, Levantamento de informações de uso e cobertura da terra na Amazônia – TerraClass 2010 . | Natural expansion of forest | 2010 | Secondary vegetation area of Amazon biome |
| 15 | Estudo comparativo entre a classificação da vegetação brasileira adotada pelo IBGE e a classificação de uso e cobertura da terra publicada pela FAO no manual de monitoramento e avaliação (2008). | Land use/cover classification in NFMA – relation to Brazilian vegetation typologies. | N/A | N/A |
| 16 | National Water Agency (ANA), 2014 | Inland water bodies area | N/A | N/A |

1.2.2 Classification and definitions

| National class | Definition |
|----------------|------------|
|----------------|------------|

| | |
|---------------------|--|
| 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 Pap - Forest Vegetation Fluvial or Lacustrine 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 | 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

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 [10]. The table below presents a list of the vegetation typologies included in each class and the equivalent of cover classification according to NFMA

(National Forest Monitoring and Assessment) - Manual for integrated field data collection. The vegetation types in the different biomes are also listed in the table. Columns 1, 2, 4 and 5 are related to national classes, based on IBGE (Brazilian Institute for Geography and Statistics). The forest area per sub typology (column 4) is the basic input for calculating forest area, volume, biomass and carbon. We added column 3, which is a correspondence between the Brazilian and FAO's vegetation classification.

It is important to note that there is a difference between the classification from FRA 2010 and FRA 2015: the pioneer formations Pa and Pap are now considered as Forest, after a discussion with other Brazilian institutions.

National classes and vegetation typologies defined by IBGE Vegetation Manual included into categories of Forest, Other Wood Land, and Other Land.

| 1 National class | 2 Vegetation typology | 3 Land use/ cover classification in NFMA | 4 Sub typology | 5 Biomes | | | | | |
|---------------------|------------------------------|---|-------------------|----------|----------|-------------------|-----------------|-------|----------|
| | | | | Amazon | Caatinga | Cerrado (Savanna) | Atlantic Forest | Pampa | Pantanal |
| Forest | A - Open Humid Forest | FEP – Primary evergreen forest | Aa | x | | | x | | |
| | | | Ab | x | | | x | | |
| | | | Am | x | | | x | | |
| | | | As | x | x | x | x | | |
| | C - Decidual Seasonal Forest | FDP – Primary decif uos forest | Ca | | | | x | x | x |
| | | | Cb | x | x | | x | | x |
| | | | Cm | | x | x | x | x | |
| | | | Cs | x | x | x | x | x | x |
| | D - Dense Humid Forest | FEP – Primary evergreen forest | Da | x | | x | x | | |
| | | | Db | x | | | x | x | |
| | | | Dl | | | | x | | |
| | | | Dm | x | | | x | x | |
| | | | Ds | x | x | x | x | x | |
| | E - Steppe | WS - Shrubs | Ea | | | | x | x | |

| | | | | | | | | |
|--|--|-----|---|---|---|---|---|---|
| F - Semi deciduous Seasonal Forest | FSP – Primary semi- deciduous forest | Fa | x | | x | x | | x |
| | | Fb | x | x | x | x | x | |
| | | Fl | | | | x | | |
| | | Fm | | x | x | x | x | |
| | | Fs | x | x | x | x | x | x |
| L - Campina/ rana | FEP – Primary" evergreen Forest | La | x | | | | | |
| | WW – Wooded" wetland | Ld | x | | | | | |
| M - Mixed Humid Forest | FEP – Primary evergreen forest | Ma | | | | x | | |
| | | Ml | | | | x | | |
| | | Mm | | | | x | | |
| | | Ms | | | | x | | |
| P - Pioneer Formations | FEP – Primary evergreen forest | Pf | x | x | | x | | |
| | | Pfm | | x | | | | |
| | | Pm | x | x | x | x | x | |
| | | Pma | | x | | | | |
| | | Pa | x | x | x | x | x | x |
| | | Pap | | | | | | |
| Planted Forest | | R | x | | x | x | x | |
| | | Re | x | | | | | |
| | | Rp | x | | | | | |
| S - Savannah | WS - Shrubs | Sa | x | x | | x | | x |
| | | Saf | | | x | | | |
| | | Sas | | | x | | | |

| | | | | | | | | | |
|----------------------|--------------------------------|-------------------------------------|----|---|---|---|---|---|---|
| | | FSP – Primary semi-deciduous forest | Sd | x | x | x | x | | x |
| T - Steppe Savannah | WS - Shrubs | Ta | x | x | | x | x | x | |
| | | Taf | | | x | | | | x |
| | | Tas | | | x | | | | x |
| | FDP – Primary deciduous forest | Td | x | x | x | x | | | x |
| Transitional Zones | | TN | x | x | | x | | | |
| | | TP | x | x | | | | | x |
| | | EM | | | | x | | | |
| | | EN | | | | x | | | |
| | | LO | x | | | | | | |
| | | NM | | | | x | | | |
| | | NP | | | | x | | | x |
| | | OM | | | | x | | | |
| | | ON | x | | | | | | |
| | | OP | | | | x | | | |
| | | SE | | x | | | | | |
| | | SM | | | | x | | | |
| | | SN | x | x | | x | | | x |
| | | SO | x | | | x | | | |
| Secondary Vegetation | | SP | x | x | | | | | x |
| | | ST | x | x | | x | | | x |
| Other wooded land | | WW – Wooded wetland | Lb | x | | | | | |

| | | | | | | | | |
|---------------|--|------------------------------|-----|---|---|---|---|---|
| | | WG – Wooded grassland | Pmb | | x | | | |
| | | WS – Shrubs | Rl | | | x | | |
| | | WS – Shrubs | Rm | x | x | | x | |
| | | WS – Shrubs | Rs | | | | x | x |
| | | WG – Wooded grassland | Sp | | | x | | |
| | | WG – Wooded grassland | Tp | | | x | | x |
| Other land | | OG – Natural grassland | Eg | | | x | x | |
| | | OM – Natural Marsh | Lg | x | | | | |
| | | | Lp | x | | | | |
| | | OM – Natural Marsh | Pfh | | x | | | |
| | | OG – Natural grassland | Pmh | | x | | | |
| | | OG – Natural grassland | Sg | x | x | x | x | x |
| | | OG – Natural grassland | Tg | x | x | x | x | x |

Forest area

Natural Forests

The information on the extent of natural forests was obtained from the Maps of the Vegetation Cover of Brazilian Biomes in 2002 – PROBIO (MMA, 2007) [1]. 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 biomes 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) [10]. The minimum mapping area was 40 hectares. The areas of each vegetation typologies were calculated for the six Brazilian continental biomes: Amazon Biome, Caatinga Biome, Cerrado (Savanna) Biome, Pantanal Biome, Atlantic Forest Biome and Pampa Biome.

In 2009, the Center of Remote Sensing (MMA/IBAMA-CSR, 2009-2010) held a more detailed study about deforestation in Caatinga, Cerrado, Atlantic Forest, Pantanal and Pampa biomes [2,3]. Due to improvement in mapping scale (from 1:250 000 to 1:50 000) and better analyses of images, it was identified deforested areas that have previously occurred in 2002, which means that the remnant vegetation in 2002 in each biome was changed.

The Geoprocessing Department of the Brazilian Forest Service (SFB) assembled the maps from the PROBIO [1], maps from the IBAMA-CSR that completes the PROBIO missing information and the maps of deforestation until 2002 from the IBAMA-CSR [2-6]. For Amazon biome, the maps of deforestation was obtained from the PRODES Project (INPE) [8]. Because of that, the remnant vegetation area in 2002 established by PROBIO was adapted, resulting in the increase of anthropic area. After this correction, the area of each vegetation tipology was re-estimated for the year 2002.

Therefore, the difference between the areas of Natural Forests obtained in FRA 2010 and FRA 2015 is not just resulting from deforestation but mainly due to the improvement of mapping and new remnant area established for biomes.

Area (ha) of Natural Forest in Brazilian biomes in 2002, using reviewed data of remnant vegetation from IBAMA-CSR [2,3] and INPE [14], estimated by SFB.

| Natural Forest Area (2002) | | | | | | |
|-----------------------------------|----------------|-----------------|------------------------------|----------------------------|--------------|-----------------|
| Biome | Amazon | Caatinga | Cerrado (Savanna) | Atlantic Forest | Pampa | Pantanal |
| Area (ha) | 354 221 815 | 43 390 181 | 77 929 220 | 22 134 124 | 3 440 379 | 9 376 913 |

Source: PROBIO mapping (MMA , 2007), MMA/IBAMA 2009-2010 and INPE/TerraClass 2014.

Planted Forests

The planted forests areas for 1990 and 2000 are data from FRA 2010 [13], 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 years 2005 and 2010, data from the Statistical Yearbooks of the Brazilian Forest Plantation Producers – ABRAF of 2006 (year base 2005) and ABRAF of 2011 (year base 2010) were used [12].

Total area (ha) of Planted Forest in Brazil.

| Planted Forest Area | | | |
|----------------------------|------------------|-------------|------------------|
| Year | Area (ha) | Year | Area (ha) |
| 2004 | 4 963 511 | 2009 | 6 782 500 |
| 2005 | 5 620 380 | 2010 | 6 973 083 |
| 2006 | 6 002 598 | 2011 | 7 005 126 |
| 2007 | 6 269 561 | 2012 | 7 185 943 |
| 2008 | 6 614 440 | | |

Source: ABRAF 2006 to ABRAF 2013.

Other wooded land and Other land

As used to Natural Forest, data were obtained using the PROBIO referred maps from 2002 [1] with adaptation to new remnant vegetation area in each biome in 2002 published by reports from the CSR (Caatinga, Cerrado, Atlantic Forest, Pampa and Pantanal biomes) [2,3]] and from PRODES Project (Amazon biome) [8].

Therefore, the difference between the areas of Other Wooded Land and Other Land obtained in FRA 2010 and FRA 2015 is not just resulting from deforestation but mainly due to the improvement of mapping methodology.

Area (ha) of Other Wooded Land in Brazilian biomes in 2002, using reviewed data of remnant vegetation [1] from IBAMA-CSR [2,3] and INPE [8].

| Other Wooded Land Area | | | | | | |
|-------------------------------|---------------|-----------------|------------------------------|----------------------------|--------------|-----------------|
| Biome | Amazon | Caatinga | Cerrado (Savanna) | Atlantic Forest | Pampa | Pantanal |
| Area (ha) | 6 888 099 | 2 651 665 | 32 283 527 | 1 106 304 | - | 662 347 |

Source: PROBIO mapping (MMA , 2007), MMA/IBAMA 2009-2010 and INPE/TerraClass 2014.

Official area of Brazil

Brazil's official area is 8 515 767.049 km² (851 576 705 ha), according to Resolution nº 01, of 15/01/2013, from the Brazilian Institute of Geography and Statistics – IBGE, based on the territorial map of 01/08/2010 (http://www.ibge.gov.br/home/geociencias/areaterritorial/resolucao_01_2013.shtm) [9].

In FRA 2010, the official area of the country was 8 514 876.6 km² and it has changed due to legal or judicial modifications or better cartographic representation used in the Census of 2010.

1.3 Analysis and processing of national data

1.3.1 Adjustment

1.3.2 Estimation and forecasting

Table 1a:

Forest area

Natural Forests

Having the measured forest area for 2002 (PROBIO mapping), estimates on the extent of native forests for 1990, 2000, 2005 and 2010 and the projections for 2015 were made using the information about deforestation available for each biome.

The deforestation areas provided in tables (see below), together with the remnant vegetation area of each biome in each year, were used to calculate the proportion of deforestation, by biome and by year. The values of deforestation area were not directly used, but the proportion of deforestation calculated from them.

Since there was no systematized information at national level about forest areas for the years requested by FRA, the 2002-based mapping of vegetation cover area of Brazilian biomes (PROBIO), with adapted area, was used as reference value. Percentage of deforestation observed for each biome were applied in order to obtain the area in previous and subsequent periods, according to studies for each year (presented below). In case the deforestation data is absent, the value from previous year was repeated.

The area for 1990 and 2000 were retroacted based on the reference value of 2002, adding the deforestation occurred in 12 and 2 years respectively, to generate the final values for these two points in time. Similarly, the proportion of deforestation were used to estimate the areas in 2005, 2010 and 2015, discounting the deforestation values from 2002 area.

Amazon Biome: the vegetation cover area in the Amazon biome in 1990, 2000, 2005, 2010 and 2015 was calculated by using the total cover area of the biome from PROBIO (with adaptations from IBAMA/CSR and INPE/PRODES) and the area of annual deforestation estimated from INPE/PRODES for the period 1998-2013 (http://www.obt.inpe.br/prodes/prodes_1988_2013.htm, accessed in march 2014) [8].

The PRODES Project uses images from the Landsat satellite, mapping minimum areas of 6.25 hectares and estimating the extent of annual gross deforestation (kilometers) on using the reference date of August 1st

as the basis for calculation (Câmara *et al.*, 2006). Since PRODES provides estimated deforestation area for 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 Legal Amazon. Corrections were made considering percentages of the areas occupied by Amazon biome, according to IBGE (2004) [11]: Mato Grosso State (54% of Amazon), Maranhão (34% of Amazon) and Tocantins (9% of Amazon).

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

Deforestation estimates for the Amazon biome (ha).

| Deforestation area | | | |
|---------------------------|------------------|-------------|------------------|
| Year | Area (ha) | Year | Area (ha) |
| 1988 | 1 553 400 | 2001 | 1 379 900 |
| 1989 | 1 340 600 | 2002 | 1 709 100 |
| 1990 | 1 061 000 | 2003 | 1 979 000 |
| 1991 | 887 000 | 2004 | 2 167 500 |
| 1992 | 1 049 600 | 2005 | 1 485 300 |
| 1993 | 1 147 400 | 2006 | 1 172 200 |
| 1994 | 1 147 400 | 2007 | 993 400 |
| 1995 | 2 237 000 | 2008 | 1 045 900 |
| 1996 | 1 414 100 | 2009 | 637 000 |
| 1997 | 1 027 300 | 2010 | 607 600 |
| 1998 | 1 319 900 | 2011 | 559 900 |
| 1999 | 1 302 700 | 2012 | 399 300 |
| 2000 | 1 435 300 | 2013 | 501 696 |

Source: adapted from INPE/PRODES - http://www.obt.inpe.br/prodes/prodes_1988_2013.htm , accessed in march 2014.

Deforestation areas detected were used to calculate the proportion of deforestation of the biome, comparing to the total remnant vegetation area of previous year. Using the percentage estimated, it was calculated the areas in the previous and next years starting from 2002.

Other Biomes: Vegetation areas were calculated from vegetation areas in 2002 (PROBIO base map with areas adaptation) and percentage of deforestation. The deforestation areas detected for each biome by Remote Sensing Center (CSR) of IBAMA for the period 2002 to 2008 [2,3], between 2008 and 2009 [4,5] and between 2009 and 2010 [6] (the latest only for Cerrado biome) were used to calculate the proportion of deforestation of the biomes, comparing to the total vegetation area of the previous year. The proportion of deforestation observed in each year for each biome, according to studies, were applied to estimate the area for previous and subsequent years. In case the information is absent, the value of the nearest year was used.

Deforestation area (ha) for biome and for period.

| Biome | Deforestation area 2002-2008 | Deforestation area 2008-2009 | Deforestation area 2009-2010 |
|--------------------------|---------------------------------|---------------------------------|---------------------------------|
| Caatinga | 1 657 600 | 192 100 | - |
| Cerrado (Savanna) | 8 507 400 | 763 700 | 646 900 |
| Atlantic Forest | 274 200 | 24 800 | - |
| Pampa | 217 900 | 33 100 | - |
| Pantanal | 427 900 | 18 800 | - |

Source: MMA/IBAMA-CSR 2009 to 2012.

Planted Forests

Data for 2015 was based on data of annual growth (increasing) of planted forest between 2007 and 2012 [12], as shown below.

Measurement of planted forest annual growth area (ha/year) in the period 2007-2012.

| | Annual growth (ha) | | | | | Annual growth average (ha) |
|------------------|---------------------------|------------------|------------------|------------------|------------------|-----------------------------------|
| Year | 2007-2008 | 2008-2009 | 2009-2010 | 2010-2011 | 2011-2012 | 2008-2012 |
| Area (ha) | 344 879 | 168 060 | 190 583 | 32 043 | 180 817 | 183 276 |

Source: Adapted from ABRAF 2008 to 2013.

Then, using this average change, it was estimated the areas for 2013, 2014 and 2015, based in the area of the previous years (2012, 2013 and 2014, respectively).

Estimated area (ha) for the years 2013, 2014 and 2015.

| | Estimated area | | |
|------------------|-----------------------|-------------|-------------|
| Year | 2013 | 2014 | 2015 |
| Area (ha) | 7 369 219 | 7 552 496 | 7 735 772 |

Total Forest Area

Result of Forest area estimation for 1990, 2000, 2005, 2010 and projections for 2015 (ha).

| Forest type | Area (ha) | | | | |
|--------------------------------|--------------------|--------------------|--------------------|--------------------|--------------------|
| | 1990 | 2000 | 2005 | 2010 | 2015 |
| NATURAL FORESTS/ BIOMES | | | | | |
| Amazon | 369 820 791 | 357 222 758 | 348 750 559 | 344 421 391 | 342 027 340 |
| Caatinga | 46 490 458 | 43 906 894 | 42 615 112 | 41 480 794 | 40 582 671 |
| Cerrado (Savanna) | 89 175 265 | 79 803 561 | 75 117 709 | 71 373 852 | 69 235 988 |
| Atlantic Forest | 22 579 479 | 22 208 350 | 22 022 785 | 21 871 166 | 21 770 466 |
| Pampa | 3 663 163 | 3 477 510 | 3 384 683 | 3 295 129 | 3 210 486 |
| Pantanal | 9 991 603 | 9 479 361 | 9 223 240 | 9 042 555 | 8 975 022 |
| Total Natural Forests | 541 720 759 | 516 098 434 | 501 114 088 | 491 484 887 | 485 801 973 |
| PLANTED FOREST | | | | | |
| Total Planted Forest | 4 984 141 | 5 175 906 | 5 620 380 | 6 973 083 | 7 735 772 |
| TOTAL FOREST | 546 704 900 | 521 274 340 | 506 734 468 | 498 457 970 | 493 537 745 |

Other wooded land and Other land

We used the same methodology as Natural Forest to obtain the areas of Other伍ooded Land, considering the different vegetation typologies that occur. That is, the percentage of deforestation observed for each biome were applied to the 2002 adapted base area in order to obtain the area of previous and subsequent years for the defined typologies.

Result of Other伍ooded Land area estimation for 1990, 2000, 2005, 2010 and projections for 2015 (ha).

| Other Wooded Land | Area (ha) | | | | |
|----------------------------------|-------------------|-------------------|-------------------|-------------------|-------------------|
| Biomes | 1990 | 2000 | 2005 | 2010 | 2015 |
| Amazon | 7 191 432 | 6 946 454 | 6 781 706 | 6 697 523 | 6 650 969 |
| Caatinga | 2 841 129 | 2 683 242 | 2 604 299 | 2 534 978 | 2 480 092 |
| Cerrado (Savanna) | 36 942 396 | 33 060 005 | 31 118 810 | 29 567 853 | 28 682 205 |
| Atlantic Forest | 1 128 564 | 1 110 014 | 1 100 739 | 1 093 161 | 1 088 128 |
| Pampa | - | - | - | - | - |
| Pantanal | 705 766 | 669 584 | 651 492 | 638 729 | 633 959 |
| Total | 48 809 287 | 44 469 299 | 42 257 047 | 40 532 244 | 39 535 353 |

Table 1b:

Forest expansion

... of which afforestation

The Statistical Yearbooks of the Brazilian Forest Plantation Producers – ABRAF provides information about the annual plantation of planted forest for Eucalyptus [12]. The plantation consists of:

- New Plantation: expansion of planted forest on land that until that was occupied by other crops;

- Reform: management of planted forests through planting after cutting area previously occupied by planted forest. Generates no expansion of planted area;
- Regrowth: management of planted forests by conducting sprouting after cutting area previously occupied by planted forest. Generates no expansion of planted area.

ABRAF only provides information about Eucalyptus planted forest of ABRAF members [12]:

| | | Annual plantation (ha) of Eucalyptus planted forest of ABRAF members | | | Percentage of each type of plantation | | |
|------|---|--|---------|----------|---------------------------------------|--------|----------|
| | Area (ha) of Eucalyptus planted forest of ABRAF members | New Plantation | Reform | Regrowth | New Plantation | Reform | Regrowth |
| 2008 | 2,393,161 | 187,800 | 194,300 | 18,600 | 7.85 | 8.12 | 0.78 |
| 2009 | 2,445,070 | 66,900 | 103,400 | 56,100 | 2.74 | 4.23 | 2.29 |
| 2010 | 2,633,792 | 106,000 | 181,500 | 63,900 | 4.02 | 6.89 | 2.43 |
| 2011 | 2,740,893 | 129,900 | 160,200 | 58,600 | 4.74 | 5.84 | 2.14 |
| 2012 | 2,778,710 | 97,700 | 167,200 | 49,800 | 3.52 | 6.02 | 1.79 |

Using the percentages of each type of plantation for each year, it was calculated an average percentage: New Plantation (4.57), Reform (6.22) and Regrowth (1.89).

These percentages were applied for total planted area, in order to obtain the area, in each year, that is originated from New Plantation, Reform or Regrowth.

Area (ha) of Planted Forest, by species and by year

| Hectares | Total area of Eucalyptus Planted Forest | Total area of Pinus Planted Forest | Total area of Other Natural Species Planted Forest ¹ | Total area of Other Introduced Species Planted Forest ² |
|----------|---|------------------------------------|---|--|
| 1990 | 2,964,000 | 1,769,000 | 81,641 | 119,500 |
| 2000 | 2,965,880 | 1,840,050 | 109,928 | 210,048 |

| | | | | |
|------|-----------|-----------|---------|---------|
| 2004 | 3,199,816 | 1,763,695 | | |
| 2005 | 3,462,719 | 1,831,485 | 92,199 | 233,977 |
| 2006 | 3,745,794 | 1,886,286 | 140,687 | 229,831 |
| 2007 | 3,969,711 | 1,874,656 | 182,427 | 242,767 |
| 2008 | 4,325,430 | 1,832,320 | 210,208 | 246,482 |
| 2009 | 4,515,730 | 1,794,720 | 225,890 | 246,160 |
| 2010 | 4,754,334 | 1,756,359 | 256,160 | 206,230 |
| 2011 | 4,873,952 | 1,641,892 | 262,300 | 226,982 |
| 2012 | 5,102,030 | 1,562,782 | 268,092 | 253,039 |

¹ Includes *Hevea brasiliensis*, *Schizolobium Amazonicum* and *Araucaria angustifolia*

² Includes *Acacia mearnsii*, *Acacia mangium*, *Tectona grandis*, *Populus* spp. and others .

* Data from 1990 and 2000 were obtained from FRA2010 [13]. For the other years, it was used data from the Statistical Yearbooks of the Brazilian Forest Plantation Producers – ABRAF [12].

The percentage of Regrowth was applied only for Eucalyptus. The percentages of New Plantation and Reform were applied for all species.

In order to calculate Afforestation, the area of New Plantation in each year was used.

Area (ha) of Afforestation, by species and by year.

| Hectares | New Plantation area of Eucalyptus Planted Forest | New Plantation area of Pinus Planted Forest | New Plantation area of Other Natural Species Planted Forest | New Plantation area of Other Introduced Species Planted Forest |
|----------|--|---|---|--|
| 1990 | 135,535 | 80,891 | 3,733 | 5,464 |
| 2000 | 135,620 | 84,140 | 5,027 | 9,605 |
| 2004 | 146,318 | 80,648 | | |
| 2005 | 158,339 | 83,748 | 4,216 | 10,699 |
| 2006 | 171,284 | 86,254 | 6,433 | 10,509 |

| | | | | |
|------|---------|--------|--------|--------|
| 2007 | 181,523 | 85,722 | 8,342 | 11,101 |
| 2008 | 197,788 | 83,786 | 9,612 | 11,271 |
| 2009 | 206,490 | 82,067 | 10,329 | 11,256 |
| 2010 | 217,401 | 80,313 | 11,713 | 9,430 |
| 2011 | 222,871 | 75,079 | 11,994 | 10,379 |
| 2012 | 233,300 | 71,461 | 12,259 | 11,571 |

As requested, the Afforestation area for 2010 is the average of 2008-2012; for 2005 is the average of 2004-2007. For 2000 and 1990, we only have the area of the year.

The Afforestation of introduced species was estimated considering only the species *Eucalyptus* spp, *Pinus* spp, *Acacia* sp, *Tectona* sp, *Populus* sp and others.

It is important to note that for estimates of Afforestation, we considered only the expansion of planted forest. This means that the figure for Afforestation is underestimated. For instance, we know there are projects of restoration of degraded areas, but the information of these areas is not available.

... of which natural expansion of forest

In terms of natural expansion of forest, data regarding secondary vegetation in Amazon biome, disclosed by TerraClass 2008 and 2010 [7, 14], were used. The value for annual forest establishment for 2010 is the difference between 2010 and 2008 secondary vegetation, divided by three years (2008, 2009, 2010).

Annual expansion of forest (ha) in Amazon Biome.

| | TerraClass 2008 | TerraClass 2010 | Annual expansion |
|----------------------|-----------------|-----------------|------------------|
| Secondary vegetation | 11 673 562 | 13 097 717 | 474 718 |

We don't have assumptions to establish the area under forest regeneration in other biomes, except Amazon.

Deforestation

Data regarding biome deforestations elaborated by MMA/IBAMA-CSR were used in order to calculate the annual forest loss in Caatinga, Cerrado, Atlantic Forest, Pantanal and Pampa biomes. There is information for

the periods 2002 to 2008, 2008 to 2009 and 2009 to 2010 (the latest only for Cerrado) [2-6]. For the years that there is no data available, it was used the same deforestation area of the nearest year.

Deforestation of the Legal Amazon is monitored by INPE/PRODES. There is information of deforested area of the Legal Amazon since 1988 to 2012 [8]. Using the percentages of the Amazon biome present in each state of the Legal Amazon, it was possible to define the deforested area of the biome, by year.

The final value of deforestation established for 1990, 2000, 2005 and 2010 are the average for the 5 years periods (1988-1992, 1998-2002, 2003-2007 and 2008-2012, respectively).

Annual vegetation loss (ha/year).

| Annual deforestation area (ha) | | | | |
|---------------------------------------|------------------|------------------|------------------|------------------|
| | 1988-1992 | 1998-2002 | 2003-2007 | 2008-2012 |
| Biomes | 1990 | 2000 | 2005 | 2010 |
| Amazon | 1 178 353 | 1 429 358 | 1 559 493 | 649 945 |
| Caatinga | 276 300 | 276 300 | 276 300 | 208 940 |
| Cerrado (Savanna) | 1 417 900 | 1 417 900 | 1 417 900 | 824 460 |
| Atlantic Forest | 45 700 | 45 700 | 45 700 | 28 980 |
| Pampa | 36 300 | 36 300 | 36 300 | 33 740 |
| Pantanal | 71 300 | 71 300 | 71 300 | 29 300 |
| Total | 3 025 853 | 3 276 858 | 3 406 993 | 1 775 365 |

Reforestation

The Reforestation was calculated the same way as explained for Afforestation (see above), using data from ABRAF.

In order to calculate Reforestation, the area of Reform and Regrowth in each year were used.

Area (ha) of Reforestation (Reform), by species and by year.

| Hectares | Reform area of Eucalyptus Planted Forest | Reform area of Pinus Planted Forest | Reform area of Other Natural Species Planted Forest ¹ | Reform area of Other Introduced Species Planted Forest ² |
|----------|--|-------------------------------------|--|---|
| 1990 | 184,367 | 110,036 | 5,078 | 7,433 |
| 2000 | 184,484 | 114,455 | 6,838 | 13,065 |
| 2004 | 199,035 | 109,706 | | |
| 2005 | 215,389 | 113,922 | 5,735 | 14,554 |
| 2006 | 232,996 | 117,331 | 8,751 | 14,296 |
| 2007 | 246,925 | 116,608 | 11,347 | 15,101 |
| 2008 | 269,051 | 113,974 | 13,075 | 15,332 |
| 2009 | 280,888 | 111,635 | 14,051 | 15,312 |
| 2010 | 295,730 | 109,249 | 15,934 | 12,828 |
| 2011 | 303,170 | 102,129 | 16,316 | 14,119 |
| 2012 | 317,357 | 97,208 | 16,676 | 15,740 |

¹ Includes *Hevea brasiliensis*, *Schizolobium Amazonicum* and *Araucaria angustifolia*

² Includes *Acacia mearnsii*, *Acacia mangium*, *Tectona grandis*, *Populus spp.* and others.

Area (ha) of Reforestation (Regrowth) of Eucalyptus, by year.

| Hectares | Regrowth area of Eucalyptus Planted Forest |
|----------|--|
| 1990 | 55,889 |
| 2000 | 55,924 |
| 2004 | 60,336 |
| 2005 | 65,293 |
| 2006 | 70,631 |
| 2007 | 74,853 |
| 2008 | 81,560 |

| | |
|------|--------|
| 2009 | 85,148 |
| 2010 | 89,647 |
| 2011 | 91,903 |
| 2012 | 96,204 |

As requested, the Reforestation area for 2010 is the average of 2008-2012; for 2005 is the average of 2004-2007. For 2000 and 1990, we only have the area of the year.

The planted forest with introduced species was estimated considering only the species *Eucalyptus* spp, *Pinus* spp, *Acacia* sp, *Tectona* sp, *Populus* sp.

1.3.3 Reclassification

The classification of vegetation typologies in each category (Forest, Other伍ooded Land and Other Land) is described in item 1.2.2.

1.4 Data

Table 1a

| Categories | | Area (000 hectares) | | | | |
|------------|------------------------------|---------------------|-----------|-----------|-----------|-----------|
| | | 1990 | 2000 | 2005 | 2010 | 2015 |
| CFQ | Forest | 546705 | 521274 | 506734 | 498458 | 493538 |
| CFQ | Other wooded land | 48809 | 44469 | 42257 | 40532 | 39535 |
| CFQ | Other land | 240300 | 270071 | 286823 | 296824 | 302741 |
| CFQ | ... of which with tree cover | N/A | N/A | N/A | N/A | N/A |
| CFQ | Inland water bodies | 15763 | 15763 | 15763 | 15763 | 15763 |
| | TOTAL | 851577.00 | 851577.00 | 851577.00 | 851577.00 | 851577.00 |

Table 1b

| Categories | | Annual forest establishment / loss (000 hectares per year) | | | | ...of which of introduced species (000 hectares per year) | | | |
|------------|------------------|--|------|------|------|---|------|------|------|
| | | 1990 | 2000 | 2005 | 2010 | 1990 | 2000 | 2005 | 2010 |
| CFQ | Forest expansion | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |

| | | | | | | | | | |
|--|--|------|------|------|------|-----|-----|-----|-----|
| | ... of which afforestation | 226 | 234 | 266 | 316 | 222 | 229 | 257 | 305 |
| | ... of which natural expansion of forest | N/A | N/A | N/A | 475 | N/A | N/A | N/A | N/A |
| | Deforestation | 3026 | 3277 | 3407 | 1775 | N/A | N/A | N/A | N/A |
| | ... of which human induced | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| | Reforestation | 363 | 375 | 429 | 519 | 358 | 368 | 417 | 504 |
| | ... of which artificial | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |

Tiers

| Category | Tier for status | Tier for reported trend |
|-------------------|-----------------|-------------------------|
| Forest | Tier 2 | Tier 1 |
| Other wooded land | Tier 2 | Tier 1 |
| Forest expansion | Tier 2 | Tier 2 |
| Deforestation | Tier 2 | Tier 1 |
| Reforestation | Tier 1 | Tier 1 |

Tier criteria

| Category | Tier for status | Tier for reported trend |
|---|---|--|
| <ul style="list-style-type: none"> • Forest • Other wooded land • Afforestation • Reforestation • Natural expansion of forest • Deforestation | Tier 3 : Data sources: Either recent (less than 10 years ago) National Forest Inventory or remote sensing, with ground truthing, or programme for repeated compatible NFIs Tier 2 : Data sources: Full cover mapping / remote sensing or old NFI (more than 10 years ago) Tier 1 : Other | Tier 3 : Estimate based on repeated compatible tiers 3 (tier for status) Tier 2 : Estimate based on repeated compatible tier 2 or combination tier 3 and 2 or 1 (tier for status) Tier 1 : Other |

1.5 Comments

| Category | Comments related to data definitions etc | Comments on the reported trends |
|----------|--|---------------------------------|
| | | |

| | | |
|----------------------------|---|--|
| Forest | The first section is not related to a historical survey of inventories since 2002. It provides information on existing vegetation mapping, from where forested areas by forest type were computed to produce information for FRA2010 and FRA2015. The PROBIO Project, which was the main vegetation mapping at national level after several decades, was done just once, in 2002. After that, in 2009, another study executed by the Center of Remote Sensing (MMA/IBAMA-CSR), having PROBIO as the main base, carried out a more detailed image interpretation, detecting areas that were deforested since 2002, but that was not detected by PROBIO project. That is, in 2009, due to improvement in mapping scale and better analyses of images, it was discovered that some data of PROBIO were not as much accurate as it could be, which implicates in some adaptation by the BR FRA team to obtain a better estimate for the remnant vegetation area in 2002. Using this reviewed data of remnant vegetation in 2002 as reference, the area of forest and other wooded land were calculated for all FRA2015 requested years. | The difference between the areas of Natural Forests obtained in FRA 2010 and FRA 2015 is not just resulting from deforestation but mainly due to the improvement of mapping methodology and new remnant area established for 2002. The study executed by the Center of Remote Sensing did correct the remnant vegetation areas for year 2002; FRA 2010 used the PROBIO 2002 remnant vegetation area while FRA 2015 used the adapted remnant vegetation area of 2002. For FRA2015, it was necessary to use the area established for 2002, with the correction, once the PROBIO project is the only one that provided the areas of each vegetation typology. |
| Other wooded land | For the estimations, it was used the proportion of deforestation of each biome. These percentages were calculated as they were calculated for forest: using the deforestation area and the remnant vegetation in each biome. | The difference between the areas of Other Wooded Land in FRA 2010 and FRA 2015 is not just resulting from deforestation but mainly due to the improvement of mapping methodology and new remnant area established for 2002. |
| Other land | N/A | The difference between the areas of Other Land obtained in FRA-2010 and FRA-2015 is not just resulting from deforestation but mainly due to the improvement of mapping methodology and new remnant area established for 2002. |
| Other land with tree cover | N/A | N/A |
| Inland water bodies | Information on the Inland water bodies was obtained from the National Water Agency (ANA) [16]. The extent of the Inland water bodies may vary according to the period in which the images were taken (rainy season, dry season, during flood event). | N/A |

| | | |
|------------------|---|-----|
| Forest expansion | Data of natural forest expansion correspond only to secondary vegetation in Amazon biome, that is, it is a partial data. We don't have assumptions to establish the area under forest regeneration in other biomes. For Afforestation, it was considered only the information of planted forest. Therefore, the area is underestimated. | N/A |
| Deforestation | Data available about deforestation is not only about the conversion of forest to other land use, but about the conversion of any typology of vegetation to an anthropic use. | N/A |
| Reforestation | N/A | N/A |

Other general comments to the table

The official area of the country has changed in relation to the area used in FRA2010 due to legal or judicial modifications or better cartographic representation used in the Census of 2010. Brazil has confirmed updated figures for country, land and inland water areas and those figures were informed to FAOSTAT.

2. What is the area of natural and planted forest and how has it changed over time?

Documents for this question:

- [Guide for country reporting FRA 2015](#)
- [FRA 2015 Terms and Definitions](#)

2.1 Categories and definitions

| Term | Definition |
|---|---|
| Naturally regenerated forest | Forest predominantly composed of trees established through natural regeneration. |
| Naturalized introduced species | Other naturally regenerated forest where the tree species are predominantly non-native and do not need human help to reproduce/maintain populations over time. |
| Introduced species | A species, subspecies or lower taxon occurring <u>outside</u> 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). |
| Category | Definition |
| 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. |
| ...of which of introduced species (<i>sub-category</i>) | Other naturally regenerated forest where the trees are predominantly of introduced species. |
| ...of which naturalized (<i>sub-sub category</i>) | Other naturally regenerated forest where the trees are predominantly of naturalized introduced species. |
| Planted forest | Forest predominantly composed of trees established through planting and/or deliberate seeding. |
| ...of which of introduced species (<i>sub-category</i>) | Planted forest where the planted/seeded trees are predominantly of introduced species. |
| Mangroves | Area of forest and other wooded land with mangrove vegetation. |
| ...of which planted (<i>sub-category</i>) | Mangroves predominantly composed of trees established through planting. |

2.2 National data

2.2.1 Data sources

| | References to sources of information | Variables | Years | Additional comments |
|---|--|---------------------|---------------|---------------------------|
| 1 | Food and Agriculture Organization of the United Nations (FAO), 2010. Global Forest Resources Assessment 2010 (FRA 2010) - Country Report Brazil. | Planted Forest Area | 1990 and 2000 | Data from FRA 2010 Brazil |

| | | | | |
|----|--|------------------------------------|------------------------------|--|
| 2 | Brazilian Association of Planted Forest Producers (ABRAF), 2006 to ABRAF, 2013. Anuário estatístico da ABRAF 2006: ano base 2005 to ABRAF 2013: ano base 2012. Available at: http://www.abraflor.org.br/estatisticas.asp | Planted Forest area | 2005 to 2012 | N/A |
| 3 | Ministry of Environment (MMA) / Department of Protected Areas (DAP), 2013. Cadastro Nacional de Unidades de Conservação – CNUC. | UC's; year created; area | 1990, 2000, 2005 2010 | National Cadastre of Conservation Units – area of UCs. Personal contact |
| 4 | Indigenous National Foundation (FUNAI). | Indigenous Land area | 1990, 2000, 2005 2010 | Personal contact |
| 5 | Indigenous National Foundation (FUNAI). Situação Fundiária Indígena. Available at: http://mapas.funai.gov.br . | Indigenous Land area | 2012, 2013 | N/A |
| 6 | Brazilian Forest Service (SFB), 2012 | Natural Forest | 2009 | Shape of natural forest, for each biome |
| 7 | Brazilian Forest Service (SFB), 2013. | Non Designated Public Forests | 1990, 2000, 2005, 2010, 2015 | National Register of Public Forests |
| 8 | Ministry of Environment (MMA)/ Brazilian Environmental and Renewable Natural Resources Institute (IBAMA). | Mangrove Area | 2000 | Information obtained through personal contact with the Coordinator of the Coast and Marine ad Zone Nucleus (raquel.barreto@ibama.gov.br) |
| 9 | Ministry of Environment (MMA)/ Brazilian Environmental and Renewable Natural Resources Institute (IBAMA) - Center of Remote Sensing (CSR), 2013. | Mangrove Area | 2010 | Information obtained through personal contact with the Remote Sensing Center (Data not published) |
| 10 | Non governmental organization - SOS Mata Atlântica Foudation / National Institute for Space Research (INPE), 2013. Atlas of Forest Remnants of the Atlantic Forest, 2011-2012. Available at: http://mapas.sosma.org.br/dados . | Atlantic Forest deforestation rate | 2011 to 2012 | Mangrove deforestation |

2.2.2 Classification and definitions

| National class | Definition |
|----------------|------------|
|----------------|------------|

| | |
|------------------------------------|--|
| 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 | Forest area that was not considered primary neither planted forest. |
| Planted Forest | Planted forest areas calculated for Table 1 were used. |
| N/A | N/A |

2.2.3 Original data

Primary Forest

Considering the difficult of identifying these areas from remote sensing surveys and the absence of field data, we based our estimation on two indirect criteria: the degree of protection of the forest and the difficult of access due to land use and occupation. We considered part of the forest area within some protected areas. In Brazil, the Conservation Units are classified as Full Protection (Ecological Station, Biological Reserve, National Park, Natural Monument and Wildlife Refuge) and Sustainable Use categories (Environmental Protection Area, Area of Relevant Ecological Importance, National Forest, Extractive Reserve, Sustainable Development Reserve and Natural Heritage Private Reserve). There are also the Indigenous land and the Non Designated Public Forests. In each biome, part of the forest areas of the conservation units were considered as primary forest, as showed below.

The percentage of forest area within protected areas considered in each biome as primary forest was chosen based on the use and occupation of the soil.

Primary Forest

| Biome | Amazon | Caatinga | Cerrado (Savanna) | Atlantic Forest | Pampa | Pantanal |
|-------|--------|----------|----------------------|--------------------|-------|----------|
| | | | | | | |

| | | | | | | |
|--|--|--|--|--|---|--|
| Protected Area considered Primary Forest (only the forest within the considered categories) | <ul style="list-style-type: none"> - 90% of forest area within Full Protection Conservation Units - 90% of forest area within Sustainable Use Conservation Units (except Environmental Protection Area) - 90% of forest area within Indigenous Land area - 30%* of Non Designated Public Forests | <ul style="list-style-type: none"> - 10% of forest area within Full Protection Conservation Units | <ul style="list-style-type: none"> - 30% of forest area within Full Protection Conservation Units | <ul style="list-style-type: none"> - 30% of forest area within Full Protection Conservation Units | None forest was considered primary forest | <ul style="list-style-type: none"> - 30% of forest area within Full Protection Conservation Units |
|--|--|--|--|--|---|--|

*Non Designated Public Forests area: we considered 50% of the area for 1990; 40% for 2000; 35% for 2005 and 30% for 2010 and 2015.

Areas of Conservation Units were obtained from the National Conservation Units Cadastre (Cadastro Nacional de Unidades de Conservação – CNUC) for year 2012 [3].

Area of Indigenous Land was based on data from FUNAI (Indigenous National Foundation) for year 2013 [4,5].

These area data (cited above) represent the total protected area. In order to obtain the forest area inside these protected areas, it was calculated the percentage of forest inside the protected area in each biome, using shape files. The forest shape was obtained from the superposition of vegetation remaining areas collected in 2009 on the PROBIO referred maps from 2002 [6].

For Amazon biome, once it was not possible to define only the forest areas inside the protected areas, we considered all protected areas as forest, once this kind of vegetation typology prevails in Amazon biome.

Area of Non Designated Public Forests of 2013 was obtained in the National Register of Public Forests [7].

Other Naturally Regenerated Forest

In order to determine the naturally regenerated forest area in Brazil, it was decided to consider all forest area that was not considered primary neither planted forest.

Planted Forests

As explained in item 1.2.3, the planted forest areas for 1990 and 2000 are the data from FRA 2010 [1] and for years 2005 and 2010 the areas were obtained from the Statistical Yearbooks of the Brazilian Forest Plantation Producers (ABRAF 2006, year base: 2005 and ABRAF 2011, year base: 2010) [2].

Areas of planted forests for 2005 and 2010 were obtained from ABRAF 2006 (years base 2005) and ABRAF 2011 (year base 2010) as described in Table below.

Planted Forest areas estimated for 2005 and 2010 (ha).

| | 2005 | 2010 |
|------------------|-------------|-------------|
| Area (ha) | 5 620 380 | 6 973 083 |

The introduced planted species are *Eucalyptus* spp, *Pinus* spp, *Acacia* sp, *Tectona* sp and *Populus* sp.

Mangrove Areas

The mapping of mangroves in Brazil (year-base 2000 and 2010) was prepared by the IBAMA Remote Sensing Center (Centro de Sensoriamento Remoto – CSR) – Coastal and Marine Zone Nucleus and by interpreting Landsat satellite images in the work scale of 1:50,000 [8,9].

It is important to note that the CSR provides de total mangrove area, it is not possible to know how much Forest is there within mangrove.

2.3 Analysis and processing of national data

2.3.1 Adjustment

2.3.2 Estimation and forecasting

Primary Forest

The same areas calculated for the most recent year were used for all years requested by FRA, once if these areas are considered forest now, they were probably forest area before too.

The difference between the years refers to primary forest within Non Designated Public Forests.

We decided to maintain the same primary forest of 2010 in 2015. Considering that the primary forest defined is within protected areas, it is expected that they will remain without human interference.

Primary Forest area in Amazon biome (hectare).

| | 90% of forest area within Full Protection Conservation Units | 90% of forest area within Sustainable Use Conservation Units (except Environmental Protection Area) | 90% of forest area within Indigenous Land area | 50% (1990) to 30% (2010, 2015) of forest area within Non Designated Public Forests area | Total |
|------|--|---|--|---|-------------|
| 1990 | 37 196 724 | 49 661 817 | 90 978 278 | 38 871 969 | 216 708 787 |
| 2000 | 37 196 724 | 49 661 817 | 90 978 278 | 31 097 575 | 208 934 393 |
| 2005 | 37 196 724 | 49 661 817 | 90 978 278 | 27 210 378 | 205 047 197 |
| 2010 | 37 196 724 | 49 661 817 | 90 978 278 | 23 323 181 | 201 160 000 |
| 2015 | 37 196 724 | 49 661 817 | 90 978 278 | 23 323 181 | 201 160 000 |

Primary Forest area in Cerrado, Atlantic Forest, Pantanal and Caatinga biomes (hectare).

| 30% of forest area within Full Protection Conservation Units | | | | 10% of forest area within Full Protection Conservation Units |
|---|------------------------------|------------------------|-----------------|---|
| Biome | Cerrado (Savanna) | Atlantic Forest | Pantanal | Caatinga |
| 1990 | 770 753 | 600 668 | 100 295 | 59 479 |

| | | | | |
|------|---------|---------|---------|--------|
| 2000 | 770 753 | 600 668 | 100 295 | 59 479 |
| 2005 | 770 753 | 600 668 | 100 295 | 59 479 |
| 2010 | 770 753 | 600 668 | 100 295 | 59 479 |
| 2015 | 770 753 | 600 668 | 100 295 | 59 479 |

Other naturally regenerated forest

From total area of forest determined in Table 1a, it was subtracted the area of planted forest and the primary forest, obtaining the area of other naturally regenerated forest.

Planted Forests

As explained before, in item 1.3.2, in order to estimate data for 2015, data from ABRAF [2] between 2008 (year base 2007) and 2013 (year base 2012) were used, and the average annual growth rate was calculated for the last five years (2007-2012), as shown below.

Measurement of planted forest annual growth area (ha/year) in the period 2007-2012

| | Annual growth (ha) | | | | | | Annual growth average (ha) |
|------------------|---------------------------|------------------|------------------|------------------|------------------|------------------|-----------------------------------|
| Year | 2007-2008 | 2008-2009 | 2009-2010 | 2010-2011 | 2011-2012 | 2008-2012 | |
| Area (ha) | 344 879 | 168 060 | 190 583 | 32 043 | 180 817 | 183 276 | |

Source: Adapted from ABRAF 2008 to 2013.

Then, using these average change, it was estimated the areas for 2013, 2014 and 2015, based in the area of the previous years (2012, 2013 and 2014, respectively).

Estimates areas for the years 2013, 2014 and 2015

| | Estimated area | | |
|-------------|-----------------------|-------------|-------------|
| Year | 2013 | 2014 | 2015 |

| | | | |
|------------------|-----------|-----------|-----------|
| Area (ha) | 7 369 219 | 7 552 496 | 7 735 772 |
|------------------|-----------|-----------|-----------|

Mangrove:

In order to estimate the mangrove area in 2015, the available information about mangrove deforestation was used. According to the Remnant Forest Atlas of the Tropical Forest (Atlas dos Remanescentes Florestais da Mata Atlântica), produced by SOS Mata Atlântica/INPE [10], in this biome, there is a remnant mangrove area of 224 954 hectares and, from 2011 to 2012, there was a deforestation of 17 hectares, which represents a deforestation rate of 0,0076%.

Considering the total area of mangrove in Brazil in 2010 (1 383 101 hectares), obtained from the Remote Sensing Center (IBAMA) [9], and using the same deforestation rate for all years (0,0076%), it was possible to forecast the mangrove area in 2015.

2.3.3 Reclassification

| |
|--|
| |
|--|

2.4 Data

Table 2a

| Categories | | Forest area (000 hectares) | | | | |
|---|------------------------------------|-----------------------------------|-------------|-------------|-------------|-------------|
| | | 1990 | 2000 | 2005 | 2010 | 2015 |
|  | Primary forest | 218240 | 210466 | 206578 | 202691 | 202691 |
|  | Other naturally regenerated forest | 323481 | 305632 | 294536 | 288794 | 283111 |
|  | ... of which of introduced species | N/A | N/A | N/A | N/A | N/A |
|  | ... of which naturalized | N/A | N/A | N/A | N/A | N/A |
|  | Planted forest | 4984 | 5176 | 5620 | 6973 | 7736 |
|  | ... of which of introduced species | 4850 | 5108 | 5528 | 6717 | 7416 |
| TOTAL | | 546705.00 | 521274.00 | 506734.00 | 498458.00 | 493538.00 |

Table 2b

| Primary forest converted to (000 ha) | | | | | | | | |
|---|----------------|-------------------|-----------------------------------|----------------|-------------------|-----------------------------------|----------------|-------------------|
| 1990-2000 | | | 2000-2010 | | | 2010-2015 | | |
| Other natural regeneration | Planted | Other land | Other natural regeneration | Planted | Other land | Other natural regeneration | Planted | Other land |
| | | | | | | | | |

| | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| N/A |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|

Table 2c

| Categories | Area (000 hectares) | | | | |
|----------------------------|---------------------|------|------|--------|--------|
| | 1990 | 2000 | 2005 | 2010 | 2015 |
| Mangroves (forest and OWL) | N/A | 1252 | 1317 | 1383.1 | 1382.6 |
| ... of which planted | 0 | 0 | 0 | 0 | 0 |

Tiers

| Category | Tier for status | Tier for reported trend |
|------------------------------------|-----------------|-------------------------|
| Primary forest | Tier 3 | Tier 2 |
| Other naturally regenerated forest | Tier 1 | Tier 1 |
| Planted forest | Tier 1 | Tier 1 |
| Mangroves | Tier 1 | Tier 1 |

Tier Criteria

| Category | Tier for status | Tier for reported trend |
|--|--|---|
| Primary forest/Other naturally regenerated forest/Planted forest | Tier 3 : Data sources: Recent (less than 10 years) National Forest Inventory or remote sensing with ground truthing or data provided by official agencies or programme for repeated compatible NFIs Tier 2 : Data sources: Full cover mapping/remote sensing or old NFI (more than 10 years) Tier 1 : Other | Tier 3 : Estimate based on repeated compatible tiers 3 (tier for status) Tier 2 : Estimate based on repeated compatible tier 2 or combination tier 3 and 2 or 1 (tier for status) Tier 1 : Other |

2.5 Comments

| Category | Comments related to data definitions etc | Comments on reported trend |
|-------------------------------------|--|---|
| Primary forest | The percentage of forest area within protected areas considered in each biome as primary forest was chosen based on the use and occupation of the soil. | We decided to maintain the same primary forest of 2010 in 2015. Considering that the primary forest defined is within protected areas, it is expected that they will remain without human interference. |
| Other naturally regenerating forest | So far, it is difficult to define the area of primary forest in Brazil. All forest areas that do not fit as primary forest, according to the adopted criteria, or as planted forests were considered as other naturally regenerated forests. | N/A |
| Planted forest | N/A | N/A |

| | | |
|-----------|---|---|
| Mangroves | The mangrove area of 2010 is bigger than area of 2000 because of improvements in the mapping, including more details, adding unmapped areas due to cloud cover in satellite images. | We could not estimate the value for 2005 because the values of 2000 and 2010 were provided by the Coastal and Marine Zone Nucleus, which carried out the mapping of mangroves in Brazil for only these years. |
|-----------|---|---|

Other general comments to the table

N/A

3. What are the stocks and growth rates of the forests and how have they changed?

Documents for this question:

- [Guide for country reporting FRA 2015](#)
- [FRA 2015 Terms and Definitions](#)

3.1 Categories and definitions

| Category | Definition |
|--------------------------------|--|
| Growing stock | Volume over bark of all living trees with a minimum diameter of 10 cm at breast height (or above buttress if these are higher). Includes the stem from ground level up to a top diameter of 0 cm, excluding branches. |
| Net Annual Increment (NAI) | Average annual volume of gross increment over the given reference period less than that of natural losses on all trees, measured to minimum diameters as defined for "Growing stock". |
| 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 2 mm 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. |
| 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 soil depth of 30 cm. |

3.2 National data

3.2.1 Data sources

| | References to sources of information | Variables | Years | Additional comments |
|---|--|-----------------------------------|-----------|---|
| 1 | Scolforo, J et al 2008. Volumetria, peso de matéria seca e carbono | Growing stock (Cerrado (Savanna)) | 2003-2007 | 5 cm." /> Forest Inventory. Data collected using minimum DBH of > 5 cm. |
| 2 | Rezende, A et al 2006. Comparação de modelos matemáticos para estimativa do volume, biomassa e estoque de carbono da vegetação lenhosa de um cerrado sensu stricto em Brasília, DF | Growing stock (Cerrado (Savanna)) | 2005 | 5 cm." /> Data collected using minimum DBH of > 5 cm. |

| | | | | |
|----|---|--|-----------|---|
| 3 | Imaña-Encinas, J 2008 Volume de madeira de um hectare de cerrado sensu stricto em planaltina de Goiás | Growing stock (Cerrado (Savanna)) | 2000 | 5 cm." /> Data colected using minimum DBH of > 5 cm. |
| 4 | Vibrans, A Inventário Florístico Florestal de Santa Catarina | Growing stock (Atlantic Forest) | 2007-2011 | 10 cm." /> Forest Inventory. Data colected using minimum DHB of > 10 cm. |
| 5 | Vogel, H et al 2006 Quantificação da biomassa em uma Floresta Estacional Decidual em Itaara, RS, Brasil. | Growing stock (Atlantic Forest) | 2003 | 10 cm." /> Data colected using minimum DHB of > 10 cm. |
| 6 | Carvalho & Oliveira 1993. Avaliação do estoque lenhoso: Inventário Florestal do estado do Ceará. | Growing stock ("Caatinga") | 1991-1992 | N/A |
| 7 | Francelino et al. 2003. Contribuição da Caatinga na sustentabilidade de projetos de assentamentos no sertão norte-rio-grandense | Growing stock ("Caatinga") | 2002 | N/A |
| 8 | Sá 1998. Avaliação do estoque lenhoso do sertão e agreste pernambucano: inventário florestal do estado de Pernambuco. | Growing stock ("Caatinga") | 1995-1997 | N/A |
| 9 | Silva 1994. Avaliação do estoque lenhoso: inventário florestal do estado da Paraíba | Growing stock("Caatinga") | 1992-1993 | N/A |
| 10 | Silva et al 2008. Manejo florestal da Caatinga: uma alternativa de desenvolvimento sustentável em projetos de assentamentos rurais do semi-árido em Pernambuco | Growing stock ("Caatinga") | 2006-2007 | N/A |
| 11 | Carreira 2009. Estimativas de biomassa, do índice de área foliar e aplicação do sensoriamento remoto no estudo da cobertura vegetal em áreas de florestas ombrófila aberta e densa da Amazônia. | Growing stock (Amazon) | 2008 | N/A |
| 12 | Eldik 2008. Inventário Florestal Da Flona De Saracá-Taquera. | Growing stock (Amazon) | 2007 | N/A |
| 13 | Scolforo, J et al. 2008. Volumetria, peso de matéria seca e carbono | Above-ground biomass (Cerrado (Savanna)) | 2003 | 5 cm." /> Forest Inventory. Data colected using minimum DHB of > 5 cm. |

| | | | | |
|----|---|---|-----------|-----|
| 14 | Miranda, S 2012. Variação espacial e temporal da biomassa vegetal em áreas de Cerrado. | Above and below-ground biomass (Cerrado (Savanna)) | Review | N/A |
| 15 | Castro, 1996. Biomass, nutrient pools and response to fire in the Brazilian Cerrado. | Above and below-ground biomass, dead wood (Cerrado (Savanna)) | 1993-1994 | N/A |
| 16 | Rezende, A et al. 2006. Comparação de modelos matemáticos para estimativa do volume, biomassa e estoque de carbono da vegetação lenhosa de um Cerrado sensu stricto em Brasília, DF. | Above-ground biomass (Cerrado (Savanna)) | 2005 | N/A |
| 17 | Imaña-Encinas, J and Kleinn, C. Determinação do Volume de Madeira em Florestas de Galeria. | Above-ground biomass (Cerrado (Savanna)) | 2001 | N/A |
| 18 | Cogliatti-Carvalho, L 2004. Quantificação da biomassa e do Carbono em Rhizophora mangle, Avicennia shaueriana e Laguncularia racemosa no manguezal da laguna de Itaipu, Niterói – RJ. | Above-ground biomass (Atlantic Forest) | 2003 | N/A |
| 19 | Britez, R 2006. Estoque e incremento de carbono em florestas e povoamentos de espécies arbóreas com ênfase na Floresta Atlântica do sul do Brasil. | Above-ground biomass (Atlantic Forest) | 2005 | N/A |
| 20 | Vibrans, A. Inventário Florístico Florestal de Santa Catarina. | Above-ground biomass, dead wood (Atlantic Forest) | 2007-2011 | N/A |
| 21 | Valerio, A 2006. Quantificação de biomassa e do estoque de carbono em área de Mata Atlântica. | Above-ground biomass (Atlantic Forest) | 2005 | N/A |
| 22 | Amaro, M 2010. Quantificação do estoque volumétrico, de estacional semidecidual no município de Viçosa-MG. | Above-ground biomass (Atlantic Forest) | 2005 | N/A |
| 23 | Brun, F 2004. Biomassa e nutrientes na Floresta Estacional Decidual, em Santa Tereza, RS. | Above-ground biomass (Atlantic Forest) | 2002-2003 | N/A |
| 24 | Sanquetta et al. 2002. As florestas e o carbono. | Above-ground biomass (Atlantic Forest) | 2001 | N/A |

| | | | | |
|----|--|--|-----------|-----|
| 25 | Vogel et al. 2006. Quantificação de estoque de biomassa e carbono em Floresta Estacional Decidual em Itaara. | Above-ground biomass (Amazon) | 2002-2004 | N/A |
| 26 | Salomao et al. 1996. Como a biomassa de florestas tropicais influí no efeito estufa. | Above-ground biomass (Amazon) | N/A | N/A |
| 27 | Nogueira, E 2008. Densidade de madeira e alometria de árvores em florestas do arco de desmatamento: implicações para biomassa e emissão de carbono a partir a partir de mudanças de uso da terra na Amazônia brasileira. | Above and below-ground biomass, dead wood (Amazon) | 2004-2007 | N/A |
| 28 | Santos, F 2012. Estoque e dinâmica de biomassa arbórea em floresta ombrófila densa na FLONA Tapajós: Amazônia oriental. | Above-ground biomass (Amazon) | 2010-2011 | N/A |
| 29 | Oliveira, M 2009. Avaliação da biomassa aérea e subterrânea dos campos sulinos. | Above and below-ground biomass (“Pampa”) | 2008 | N/A |
| 30 | Paiva, A 2011. Estoque de carbono em Cerrado sensu stricto do Distrito Federal. | Below-ground biomass (“Caatinga”) | 2010 | N/A |
| 31 | Rodin, P 2004. Distribuição da biomassa subterrânea e dinâmica de raízes finas em ecossistemas nativos e em uma pastagem plantada no Cerrado do Brasil Central. | Below-ground biomass (“Caatinga”) | 2003 | N/A |
| 32 | Cardoso et al., 2012. Inventory of coarse woody debris in forest remnants in Santa Catarina. | Dead wood (Atlantic Forest) | 2011 | N/A |
| 33 | Vibrans, A. Inventário Florístico Florestal de Santa Catarina. | Above-ground biomass, dead wood (Atlantic Forest) | 2007-2011 | N/A |
| 34 | Carvalho & Oliveira 1993. Avaliação do estoque lenhoso: Inventário Florestal do estado do Ceará. | Above-ground biomass (“Caatinga”) | 1991-1992 | N/A |
| 35 | Sá 1998. Avaliação do estoque lenhoso do sertão e agreste pernambucano: inventário florestal do estado de Pernambuco. | Above-ground biomass (“Caatinga”) | 1995-1997 | N/A |

| | | | | |
|----|--|---|-----------|-----|
| 36 | Silva et al. 2008. Manejo florestal da Caatinga: uma alternativa de desenvolvimento sustentável em projetos de assentamentos rurais do semi-árido em Pernambuco. | Above-ground biomass (“Caatinga”) | 2006-2007 | N/A |
| 37 | Vibrans et al. 2012. Inventário Florístico Florestal de Santa Catarina. | Volume (Brazilian Pine) | N/A | N/A |
| 38 | Giongo, M, 2012. Inventário de biomassa em um plantio de <i>Pinus elliottii</i> engelm. aos 23 anos de idade. | Volume (Pinus) | N/A | N/A |
| 39 | Ribas, C & Calonego, FW, 2008. Aproveitamento de Biomassa Pós-Colheita Florestal de <i>Pinus elliottii</i> var. <i>elliottii</i> . | Volume (Pinus) | N/A | N/A |
| 40 | Schumacher, M et al., 2013. Biomassa e nutrientes no corte raso de um povoamento de <i>Pinus taeda</i> L. de 27 anos de idade em Cambará do Sul – RS. | Volume (Pinus) | N/A | N/A |
| 41 | Silveira, P., 2008. O estado da arte na estimativa de biomassa e carbono em formações florestais. | Volume (Pinus) | N/A | N/A |
| 42 | Carreire 2009. Estimativas de biomassa, do índice de área foliar e aplicação do sensoriamento remoto no estudo da cobertura vegetal em áreas de florestas ombrófila aberta e densa da Amazônia. | Above-ground biomass (Amazon) | 2006-2008 | N/A |
| 43 | Santos 2012. Estoque e dinâmica de biomassa arbórea em floresta ombrófila densa na FLONA Tapajós: Amazonia oriental. | Above-ground biomass (Amazon) | 2011 | N/A |
| 44 | Fearnside 2000. Global Warming And Tropical Land-Use Change: Greenhouse Gas Emissions From Biomass Burning, Decomposition And Soils In Forest Conversion, Shifting Cultivation And Secondary Vegetation. | Above and below-ground biomass (Amazon) | Review | N/A |

| | | | | |
|----|--|--|-----------|-----|
| 45 | Fearnside et al. 2009. Biomass and greenhouse-gas emission from land-use change in Brazil's Amazonian “arc of deforestation”: The states of Mato Grosso and Rondônia. | Above and below-ground biomass (Amazon) | 2008 | N/A |
| 46 | Schöngart et al. 2011. Age-related and stand-wise estimates of carbon stocks and sequestration in the aboveground coarse wood biomass of wetland forests in the northern Pantanal, Brazil. | Above and below-ground biomass (“Pantanal”) | 2009 | N/A |
| 47 | Oliveira 2009. Avaliação da biomassa aérea e subterrânea dos campos sulinos. | Above-ground biomass (“Pampa”) | 2008 | N/A |
| 48 | Scolforo, J et al. 2008. Volumetria, peso de matéria seca e carbono. | Above-ground carbon (Cerrado (Savanna)) | 2003 | N/A |
| 49 | Rezende and Felfili, 2003. Avaliação do estoque de carbono do Cerrado sensu stricto do Brasil Central. | Above-ground carbon (Cerrado (Savanna)) | 2002 | N/A |
| 50 | Rodin, P 2004. Distribuição da biomassa subterrânea e dinâmica de raízes finas em ecossistemas nativos e em uma pastagem plantada no Cerrado do Brasil Central. | Above and Below-ground carbon (Cerrado (Savanna)) | 2003 | N/A |
| 51 | Rezende, A et al. 2006. Comparação de modelos matemáticos para estimativa do volume, biomassa e estoque de carbono da vegetação lenhosa de um Cerrado sensu stricto em Brasília, DF. | Below , under-ground and litter carbon (Cerrado (Savanna)) | 2005 | N/A |
| 52 | Amaro, M 2010. Quantificação do estoque volumétrico, de estacional semidecidual no município de Viçosa-MG. | Below-ground carbon (Cerrado (Savanna)) | 2005 | N/A |
| 53 | Castro, 1996. Biomass, nutrient pools and response to fire in the Brazilian Cerrado. | Below-ground biomass (Cerrado (Savanna)) | 1993-1994 | N/A |
| 54 | Paiva, A 2011. Estoque de carbono em Cerrado sensu stricto do Distrito Federal. | Below-ground carbon (Cerrado (Savanna)) | 2010 | N/A |
| 55 | Vibrans, A. Inventário Florístico Florestal de Santa Catarina. | Above and below-ground and litter carbon (Atlantic Forest) | 2007-2011 | N/A |

| | | | | |
|----|--|--|-----------|-----|
| 56 | Brun, F 2004. Biomassa e nutrientes na Floresta Estacional Decidual, em Santa Tereza, RS. | Below-ground and litter carbon (Atlantic Forest) | 2002-2003 | N/A |
| 57 | Souza 2012. Estoque de carbono em diferentes fisionomias de Caatinga do Seridó da Paraíba. | Litter (“Caatinga”) | 2011 | N/A |
| 58 | Amorim 2009. Caracterização da serrapilheira em Caatinga preservada e mudanças no carbono do solo após o desmatamento sem queima. | Soil (“Caatinga”) | 2008 | N/A |
| 59 | Giongo 2011. Estoque de carbono no sistema solo em uma área referência do semiárido. | Soil (“Caatinga”) | 2010 | N/A |
| 60 | MCTI 2014 Available at: http://www.mcti.gov.br/index.php/content/view/328959/ Arquivos_SHAPEFILES_da_Funcate_para_Inventario_de_Mudanca_do_Uso_da_Terra_e_Florestas.html | Soil carbon | 2014 | N/A |

3.2.2 Classification and definitions

| National class | Definition |
|----------------|------------|
| N/A | N/A |

3.2.3 Original data

Due to the different typologies of natural vegetation in Brazil the **growing stock** data was calculated considering the different vegetation types inside each biome (Savanna, “Caatinga”, Atlantic Forest, Amazon, “Pampa” and “Pantanal”) according references above in **3.2.1**. After adjustment and estimations, results for each Biome are present in tables **3.5a, 3.5b and 3.5c** below.

Original data base for table 3a.

Estimates of growing stock volume in Brazilian biomes and forest plantations

| FRA Category Biome | Growing stock volume (million cubic meters) | | | | | Growing stock volume (million cubic meters) | | | | |
|-------------------------------|--|-------------|-------------|-------------|-------------|--|-------------|-------------|-------------|-------------|
| | Forest | | | | | Other Wooded Land | | | | |
| Growing stock | 1990 | 2000 | 2005 | 2010 | 2015 | 1990 | 2000 | 2005 | 2010 | 2015 |
| Amazon | 91.491,73 | 88.375,04 | 86.279,06 | 85.208,05 | 84.615,77 | 131,79 | 127,30 | 124,28 | 122,74 | 121,89 |
| Caatinga | 2.937,33 | 2.774,10 | 2.692,48 | 2.620,82 | 2.564,07 | 60,88 | 57,50 | 55,81 | 54,32 | 53,15 |
| Cerrado | 5.884,58 | 5.266,15 | 4.956,94 | 4.709,88 | 4.568,81 | 291,06 | 260,47 | 245,18 | 232,96 | 225,98 |
| Atlantic Forest | 2.188,95 | 2.152,98 | 2.134,99 | 2.120,29 | 2.110,52 | 17,36 | 17,08 | 16,93 | 16,82 | 16,74 |
| Pampa | 126,93 | 120,49 | 117,28 | 114,17 | 111,24 | - | - | - | - | - |
| Pantanal | 743,96 | 705,82 | 686,75 | 673,29 | 668,26 | 5,76 | 5,46 | 5,32 | 5,21 | 5,17 |
| Forest Plantation | 1.357,35 | 1.409,57 | 1.530,62 | 1.899,01 | 2.106,71 | - | - | - | - | - |
| Total | 104.730,83 | 100.804,15 | 98.398,11 | 97.345,51 | 96.745,40 | 506,85 | 467,81 | 447,52 | 432,05 | 422,92 |
| — Growing stock | | | | | | | | | | |

Original data base for table 3d.

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

| FRA Category Biome | Biomass (million metric tonnes oven-dry weight) | | | | | Biomass (million metric tonnes oven-dry weight) | | | | |
|-------------------------------|--|-------------|-------------|-------------|-------------|--|-------------|-------------|-------------|-------------|
| | Forest | | | | | Other Wooded Land | | | | |
| Above-ground biomass | 1990 | 2000 | 2005 | 2010 | 2015 | 1990 | 2000 | 2005 | 2010 | 2015 |
| Amazon | 93.733,65 | 90.540,60 | 88.393,26 | 87.296,00 | 86.689,21 | 140,98 | 136,18 | 132,95 | 131,30 | 130,39 |
| Caatinga | 2.307,49 | 2.179,26 | 2.115,15 | 2.058,85 | 2.014,27 | 54,18 | 51,17 | 49,67 | 48,35 | 47,30 |
| Cerrado | 4.653,50 | 4.164,45 | 3.919,92 | 3.724,55 | 3.612,99 | 192,10 | 171,91 | 161,82 | 153,75 | 149,15 |
| Atlantic Forest | 2.378,65 | 2.339,55 | 2.320,00 | 2.304,03 | 2.293,42 | 12,83 | 12,62 | 12,51 | 12,42 | 12,37 |
| Pampa | 174,06 | 165,23 | 160,82 | 156,57 | 152,55 | - | - | - | - | - |

| | | | | | | | | | | |
|-----------------------------|--|------------------|------------------|------------------|------------------|-----------------|--|---------------|---------------|---------------|
| Pantanal | 536,87 | 509,35 | 495,59 | 485,88 | 482,25 | 3,75 | 3,55 | 3,46 | 3,39 | 3,36 |
| Forest Plantation | 1.018,01 | 1.057,18 | 1.147,96 | 1.424,25 | 1.580,03 | - | - | - | - | - |
| Total | 104.802,23 | 100.955,62 | 98.552,70 | 97.450,13 | 96.824,72 | 403,84 | 375,43 | 360,40 | 349,21 | 342,56 |
| Above-ground biomass | | | | | | | | | | |
| Category/ Biome | Biomass (million metric tonnes oven-dry weight) | | | | | | Biomass (million metric tonnes oven-dry weight) | | | |
| | Forest | | | | | | Other Wooded Land | | | |
| Below-ground biomass | 1990 | 2000 | 2005 | 2010 | 2015 | 1990 | 2000 | 2005 | 2010 | 2015 |
| Amazon | 18.203,88 | 17.583,76 | 17.166,73 | 16.953,63 | 16.835,79 | 179,63 | 173,51 | 169,39 | 167,29 | 166,13 |
| Caatinga | 623,03 | 588,41 | 571,10 | 555,90 | 543,86 | 37,28 | 35,21 | 34,17 | 33,26 | 32,54 |
| Cerrado | 2.726,91 | 2.440,33 | 2.297,04 | 2.182,55 | 2.117,18 | 772,47 | 691,28 | 650,69 | 618,26 | 599,74 |
| Atlantic Forest | 528,92 | 520,23 | 515,88 | 512,33 | 509,97 | 21,70 | 21,34 | 21,16 | 21,02 | 20,92 |
| Pampa | 40,85 | 38,78 | 37,75 | 36,75 | 35,80 | - | - | - | - | - |
| Pantanal | 257,78 | 244,56 | 237,95 | 233,29 | 231,55 | 14,71 | 13,96 | 13,58 | 13,31 | 13,22 |
| Forest Plantation | 203,60 | 211,44 | 229,59 | 284,85 | 316,01 | - | - | - | - | - |
| Total | 22.584,97 | 21.627,50 | 21.056,04 | 20.759,30 | 20.590,16 | 1.025,78 | 935,30 | 889,00 | 853,15 | 832,55 |
| Below-ground biomass | | | | | | | | | | |
| Category/ Biome | Biomass (million metric tonnes oven-dry weight) | | | | | | Biomass (million metric tonnes oven-dry weight) | | | |
| | Forest | | | | | | Other Wooded Land | | | |
| Dead wood | 1990 | 2000 | 2005 | 2010 | 2015 | 1990 | 2000 | 2005 | 2010 | 2015 |
| Amazon | 1.308,05 | 1.263,49 | 1.233,53 | 1.218,21 | 1.209,75 | 3,68 | 3,56 | 3,47 | 3,43 | 3,41 |
| Caatinga | 95,85 | 90,52 | 87,86 | 85,52 | 83,67 | 4,02 | 3,79 | 3,68 | 3,58 | 3,50 |

| | | | | | | | | | | |
|--------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| Cerrado | 54,59 | 48,85 | 45,98 | 43,69 | 42,38 | | | | | |
| Atlantic Forest | 108,65 | 106,87 | 105,97 | 105,24 | 104,76 | | | | | |
| Pampa | 4,33 | 4,11 | 4,00 | 3,89 | 3,79 | | | | | |
| Pantanal | 6,60 | 6,26 | 6,09 | 5,97 | 5,93 | | | | | |
| Forest Plantation | - | - | - | - | - | - | - | - | - | - |
| Total | 1.578,07 | 1.520,10 | 1.483,43 | 1.462,54 | 1.450,28 | 7,70 | 7,35 | 7,15 | 7,01 | 6,91 |
| — Dead wood | | | | | | | | | | |
| TOTAL | 128.965,27 | 124.103,22 | 121.092,17 | 119.671,96 | 118.865,16 | 1.437,32 | 1.318,08 | 1.256,56 | 1.209,37 | 1.182,02 |
| Biomass | | | | | | | | | | |

Original data base for table 3e.

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/ Biome | Carbon in biomass (million metric tonnes) | | | | | Carbon in biomass (million metric tonnes) | | | | |
|---------------------------|---|-----------|-----------|-----------|-----------|---|--------|--------|--------|--------|
| | Forest | | | | | Other Wooded Land | | | | |
| C in above-ground biomass | 1990 | 2000 | 2005 | 2010 | 2015 | 1990 | 2000 | 2005 | 2010 | 2015 |
| Amazon | 47.556,49 | 45.936,47 | 44.847,00 | 44.290,30 | 43.982,44 | 61,76 | 59,65 | 58,24 | 57,52 | 57,12 |
| Caatinga | 1.084,80 | 1.024,51 | 994,37 | 967,90 | 946,95 | 25,46 | 24,05 | 23,34 | 22,72 | 22,23 |
| Cerrado | 2.188,08 | 1.958,13 | 1.843,15 | 1.751,29 | 1.698,83 | 90,29 | 80,80 | 76,05 | 72,26 | 70,10 |
| Atlantic Forest | 1.111,10 | 1.092,84 | 1.083,71 | 1.076,25 | 1.071,29 | 6,03 | 5,93 | 5,88 | 5,84 | 5,81 |
| Pampa | 81,81 | 77,66 | 75,59 | 73,59 | 71,70 | - | - | - | - | - |
| Pantanal | 252,48 | 239,54 | 233,07 | 228,50 | 226,80 | 1,76 | 1,67 | 1,62 | 1,59 | 1,58 |
| Forest Plantation | 478,47 | 496,87 | 539,54 | 669,40 | 742,62 | - | - | - | - | - |
| Total | 52.753,22 | 50.826,02 | 49.616,42 | 49.057,22 | 48.740,61 | 185,30 | 172,10 | 165,14 | 159,93 | 156,84 |

| FRA Category/ Biome | Carbon in biomass (million metric tonnes) | | | | | Carbon in biomass (million metric tonnes) | | | | |
|---|--|-------------|-------------|-------------|-------------|--|-------------|-------------|-------------|-------------|
| | Forest | | | | | Other Wooded Land | | | | |
| C in below- ground biomass | 1990 | 2000 | 2005 | 2010 | 2015 | 1990 | 2000 | 2005 | 2010 | 2015 |
| Amazon | 8.555,82 | 8.264,37 | 8.068,36 | 7.968,21 | 7.912,82 | 73,10 | 70,61 | 68,93 | 68,08 | 67,61 |
| Caatinga | 305,66 | 288,67 | 280,18 | 272,72 | 266,82 | 17,52 | 16,55 | 16,06 | 15,64 | 15,30 |
| Cerrado | 1.326,48 | 1.187,08 | 1.117,38 | 1.061,69 | 1.029,89 | 363,06 | 324,90 | 305,83 | 290,58 | 281,88 |
| Atlantic Forest | 1.027,67 | 1.010,78 | 1.002,33 | 995,43 | 990,85 | 10,20 | 10,03 | 9,95 | 9,88 | 9,83 |
| Pampa | 19,26 | 18,29 | 17,80 | 17,33 | 16,88 | - | - | - | - | - |
| Pantanal | 128,43 | 121,84 | 118,55 | 116,23 | 115,36 | 6,91 | 6,56 | 6,38 | 6,26 | 6,21 |
| Forest Plantation | 95,69 | 99,37 | 107,91 | 133,88 | 148,52 | - | - | - | - | - |
| Total | 11.459,02 | 10.990,40 | 10.712,51 | 10.565,48 | 10.481,14 | 470,79 | 428,65 | 407,15 | 390,43 | 380,83 |
| C Subtotal in living biomass | 64.212,24 | 61.816,42 | 60.328,93 | 59.622,71 | 59.221,75 | 656,09 | 600,75 | 572,29 | 550,36 | 537,66 |
| FRA Category/ Biome | Carbon in biomass (million metric tonnes) | | | | | Carbon in biomass (million metric tonnes) | | | | |
| | Forest | | | | | Other Wooded Land | | | | |
| C in dead wood | 1990 | 2000 | 2005 | 2010 | 2015 | 1990 | 2000 | 2005 | 2010 | 2015 |
| Amazon | 615,14 | 594,19 | 580,09 | 572,89 | 568,91 | 1,73 | 1,67 | 1,63 | 1,61 | 1,60 |
| Caatinga | 59,54 | 56,23 | 54,58 | 53,13 | 51,98 | 1,89 | 1,78 | 1,73 | 1,68 | 1,65 |
| Cerrado | 51,02 | 45,66 | 42,98 | 40,84 | 39,61 | | | | | |
| Atlantic Forest | 66,45 | 65,36 | 64,81 | 64,37 | 64,07 | | | | | |
| Pampa | 10,74 | 10,19 | 9,92 | 9,66 | 9,41 | | | | | |
| Pantanal | 3,09 | 2,93 | 2,85 | 2,80 | 2,78 | | | | | |

| | | | | | | | | | | |
|----------------------------------|--|-------------|-------------|-------------|-------------|--|-------------|-------------|-------------|-------------|
| Forest Plantation | | | | | | | | | | |
| Total | 805,98 | 774,56 | 755,24 | 743,68 | 736,76 | 3,61 | 3,45 | 3,36 | 3,29 | 3,24 |
| FRA Category/ Biome | Carbon in biomass (million metric tonnes) | | | | | Carbon in biomass (million metric tonnes) | | | | |
| | Forest | | | | | Other Wooded Land | | | | |
| C in litter | 1990 | 2000 | 2005 | 2010 | 2015 | 1990 | 2000 | 2005 | 2010 | 2015 |
| Amazon | 776,62 | 750,17 | 732,38 | 723,28 | 718,26 | 15,10 | 14,59 | 14,24 | 14,06 | 13,97 |
| Caatinga | 99,05 | 93,55 | 90,79 | 88,38 | 86,46 | 5,97 | 5,63 | 5,47 | 5,32 | 5,21 |
| Cerrado | 188,66 | 168,83 | 158,92 | 151,00 | 146,47 | 77,58 | 69,43 | 65,35 | 62,09 | 60,23 |
| Atlantic Forest | 60,40 | 59,41 | 58,91 | 58,51 | 58,24 | 2,37 | 2,33 | 2,31 | 2,30 | 2,29 |
| Pampa | 7,69 | 7,30 | 7,11 | 6,92 | 6,74 | - | - | - | - | - |
| Pantanal | 21,21 | 20,12 | 19,58 | 19,20 | 19,05 | 1,48 | 1,41 | 1,37 | 1,34 | 1,33 |
| Forest Plantation | 109,65 | 113,87 | 123,65 | 153,41 | 170,19 | - | - | - | - | - |
| Total | 1.263,29 | 1.213,25 | 1.191,34 | 1.200,69 | 1.205,42 | 102,50 | 93,39 | 88,74 | 85,12 | 83,02 |
| C Subtotal in dead wood + litter | 2.069,27 | 1.987,81 | 1.946,57 | 1.944,37 | 1.942,17 | 106,11 | 96,84 | 92,10 | 88,41 | 86,27 |
| FRA Category/ Biome | Carbon in biomass (million metric tonnes) | | | | | Carbon in biomass (million metric tonnes) | | | | |
| | Forest | | | | | Other Wooded Land | | | | |
| C in soil | 1990 | 2000 | 2005 | 2010 | 2015 | 1990 | 2000 | 2005 | 2010 | 2015 |
| Amazon | 16.639,96 | 16.073,12 | 15.691,92 | 15.497,13 | 15.389,41 | 288,08 | 278,27 | 271,67 | 268,30 | 266,43 |
| Caatinga | 1.286,58 | 1.215,08 | 1.179,33 | 1.147,94 | 1.123,09 | 77,61 | 73,30 | 71,14 | 69,25 | 67,75 |
| Cerrado | 3.333,21 | 2.982,91 | 2.807,76 | 2.667,82 | 2.587,91 | 1.363,94 | 1.220,60 | 1.148,93 | 1.091,66 | 1.058,97 |
| Atlantic Forest | 1.152,27 | 1.133,33 | 1.123,86 | 1.116,12 | 1.110,98 | 42,45 | 41,75 | 41,40 | 41,11 | 40,93 |

| | | | | | | | | | | | |
|---------------------|------------------|------------------|------------------|------------------|------------------|-----------------|-----------------|-----------------|-----------------|-----------------|---|
| Pampa | 183,86 | 174,54 | 169,88 | 165,39 | 161,14 | - | - | - | - | - | - |
| Pantanal | 377,28 | 357,94 | 348,27 | 341,44 | 338,89 | 26,26 | 24,91 | 24,24 | 23,76 | 23,59 | |
| Forest Plantation | 227,63 | 236,38 | 256,68 | 318,46 | 353,29 | - | - | - | - | - | |
| Total | 23.200,78 | 22.173,30 | 21.577,70 | 21.254,30 | 21.064,71 | 1.798,34 | 1.638,82 | 1.557,38 | 1.494,09 | 1.457,66 | |
| Total Carbon | 89.482,30 | 85.977,54 | 83.853,21 | 82.821,38 | 82.228,64 | 2.560,54 | 2.336,41 | 2.221,77 | 2.132,86 | 2.081,59 | |

3.3 Analysis and processing of national data

3.3.1 Adjustment

The Biomes in Brazil are formed by a mosaic of different forest types. Currently, there is a consensus about the localization and area of each typology inside the Biomes. Then, in order to get more accurate results, we calculate the variables based on the typologies in each Biome. In case of one of this typologies in one Biome have no studies about their forests we used the same results of these typologies in another Biome. That is, for those vegetation types which studies were absent in one biome but existing in other, we assumed the available data to fill the gap.

3.3.2 Estimation and forecasting

In case information is completely absent about a specific forest type, we assumed IPCC estimations. We used IPCC estimation to calculate the carbon mass below-ground, dead wood, litter and soil in all typologies, except for the Savanna Biome.

3.3.3 Reclassification

The calculation of growing stock assumed different DBH, according the forest type considered. Most of forest types considered DBH ≥ 10 cm. However, because dry forests present particular features, DBH ≤ 10 cm was adopted as explained below.

Cerrado (Savanna)

Cerrado biome occupies more than 200 million acres in central Brazil. It is the second richest biome in biodiversity composed by different wooded lands like forest with or without continuous canopy (EMBRAPA 2007). Soil compounds and fire action are responsible for making the structures smaller and open. Although the decrease in the biomass above-ground the lower stratum and below-ground developed (Mardegan 2012), turning the below-ground biomass higher than the above-ground one like savanna types reviewed by Fearnside

et al. 2010. In this type of vegetation, according Felfili (2008) 80% of the woody individuals present DHB between 5 and 8 cm. Therefore, for typical vegetation types in this biome, we decided to use of DHB ≥ 5 cm for biomass calculation in the forest types.

“Caatinga”

Caatinga is an exclusive Brazilian Biome and the largest one in the northeast of the country. Besides, the name refers to the dominant vegetation that presents different vegetable types (APN 2006). According Sá (1998) around 75% of above-ground biomass presents DBH between 1,5 and 10 cm. Then, we decided to use the minimum DBH of 1,5 cm for the Foresty.

Atlantic Forest, Amazon, “Pampa” and “Pantanal”

In case of Atlantic Forest, Amazon, “Pampa” and “Pantanal” biomes, it was adopted a DBH of 10 cm in case of Foresty types excepted when tipical forestry types of Savana and Caatinga were included inside in these biomes.

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3.4 Data

Table 3a

| Category | Growing stock volume (million m ³ over bark) |
|----------|---|
|----------|---|

| | | Forest | | | | | Other wooded land | | | | |
|-----|--------------------------|-----------|-----------|----------|----------|----------|-------------------|--------|--------|--------|--------|
| | | 1990 | 2000 | 2005 | 2010 | 2015 | 1990 | 2000 | 2005 | 2010 | 2015 |
| CFQ | Total growing stock | 104730.83 | 100804.15 | 98398.11 | 97345.51 | 96745.4 | 506.85 | 467.81 | 447.52 | 432.05 | 422.92 |
| CFQ | ... of which coniferous | 482.7 | 500.99 | 498.57 | 478.7 | 378.68 | N/A | N/A | N/A | N/A | N/A |
| CFQ | ... of which broadleaved | 104248.13 | 100303.16 | 97899.54 | 96866.81 | 96366.72 | N/A | N/A | N/A | N/A | N/A |

Table 3b

| Category/Species name | | | Growing stock in forest (million cubic meters) | | | |
|-----------------------|-----------------|-------------|--|------|------|------|
| Rank | Scientific name | Common name | 1990 | 2000 | 2005 | 2010 |
| 1 st | N/A | N/A | N/A | N/A | N/A | N/A |
| 2 nd | N/A | N/A | N/A | N/A | N/A | N/A |
| 3 rd | N/A | N/A | N/A | N/A | N/A | N/A |
| 4 th | N/A | N/A | N/A | N/A | N/A | N/A |
| 5 th | N/A | N/A | N/A | N/A | N/A | N/A |
| 6 th | N/A | N/A | N/A | N/A | N/A | N/A |
| 7 th | N/A | N/A | N/A | N/A | N/A | N/A |
| 8 th | N/A | N/A | N/A | N/A | N/A | N/A |
| 9 th | N/A | N/A | N/A | N/A | N/A | N/A |
| 10 th | N/A | N/A | N/A | N/A | N/A | N/A |
| Remaining | | | N/A | N/A | N/A | N/A |
| TOTAL | | | .00 | .00 | .00 | .00 |

THE PRE-FILLED VALUES FOR GROWING STOCK REFER TO THE FOLLOWING THRESHOLD VALUES (SEE TABLE BELOW)

| Item | Value | Complementary information |
|---|--|---------------------------|
| Minimum diameter (cm) at breast height of trees included in growing stock (X) | > 10 cm (Atlantic Forest, “Pampa”, Amazon tipical forest types); > 5 cm (Cerrado (Savanna)); > 1,5 cm (“Caatinga”) | N/A |

| | | |
|---|-----|-----|
| Minimum diameter (cm) at the top end of stem for calculation of growing stock (Y) | N/A | N/A |
| Minimum diameter (cm) of branches included in growing stock (W) | N/A | N/A |
| Volume refers to above ground (AG) or above stump (AS) | N/A | N/A |

PLEASE NOTE THAT THE DEFINITION OF GROWING STOCK HAS CHANGED AND SHOULD BE REPORTED AS GROWING STOCK DBH 10 CM INCLUDING THE STEM FROM GROUND LEVEL UP TO A DIAMETER OF 0 CM, EXCLUDING BRANCHES.

Table 3c

| Category | | Net annual increment (m^3 per hectare and year) | | | | |
|----------|--------------------------|--|------|------|------|------|
| | | Forest | | | | |
| | | 1990 | 2000 | 2005 | 2010 | 2015 |
| CFQ | Net annual increment | N/A | N/A | N/A | N/A | N/A |
| CFQ | ... of which coniferous | N/A | N/A | N/A | N/A | N/A |
| CFQ | ... of which broadleaved | N/A | N/A | N/A | N/A | N/A |

Table 3d

| Category | | Biomass (million metric tonnes oven-dry weight) | | | | | | | | | |
|----------|----------------------|---|-----------|-----------|-----------|-----------|-------------------|---------|---------|---------|---------|
| | | Forest | | | | | Other wooded land | | | | |
| | | 1990 | 2000 | 2005 | 2010 | 2015 | 1990 | 2000 | 2005 | 2010 | 2015 |
| CFQ | Above ground biomass | 104802.23 | 100955.62 | 98552.7 | 97450.13 | 96824.72 | 403.84 | 375.43 | 360.4 | 349.21 | 342.56 |
| CFQ | Below ground biomass | 22584.97 | 21627.5 | 21056.04 | 20759.3 | 20590.16 | 1025.78 | 935.3 | 889 | 853.15 | 832.55 |
| CFQ | Dead wood | 1578.07 | 1520.1 | 1483.43 | 1462.54 | 1450.28 | 7.7 | 7.35 | 7.15 | 7.01 | 6.91 |
| TOTAL | | 128965.27 | 124103.22 | 121092.17 | 119671.97 | 118865.16 | 1437.32 | 1318.08 | 1256.55 | 1209.37 | 1182.02 |

Table 3e

| Category | | Carbon (Million metric tonnes) | | | | | | | | | |
|----------|--|--------------------------------|------|------|------|------|-------------------|------|------|------|------|
| | | Forest | | | | | Other wooded land | | | | |
| | | 1990 | 2000 | 2005 | 2010 | 2015 | 1990 | 2000 | 2005 | 2010 | 2015 |
| CFQ | | | | | | | | | | | |

| | | | | | | | | | | | |
|---|--------------------------------------|----------|----------|----------|----------|----------|---------|---------|---------|---------|---------|
|  | Carbon in above ground biomass | 52753.22 | 50826.02 | 49616.42 | 49057.22 | 48740.61 | 185.3 | 172.1 | 165.14 | 159.93 | 156.84 |
|  | Carbon in below ground biomass | 11459.02 | 10990.4 | 10712.51 | 10565.48 | 10481.14 | 470.79 | 428.65 | 407.15 | 390.43 | 380.83 |
|  | <i>Subtotal Living biomass</i> | 64212.24 | 61816.42 | 60328.93 | 59622.71 | 59221.75 | 656.09 | 600.75 | 572.29 | 550.36 | 537.66 |
|  | Carbon in dead wood | 805.98 | 774.56 | 755.24 | 743.68 | 736.76 | 3.61 | 3.45 | 3.36 | 3.29 | 3.24 |
|  | Carbon in litter | 1263.29 | 1213.25 | 1191.34 | 1200.69 | 1205.42 | 102.5 | 93.39 | 88.74 | 85.12 | 83.02 |
|  | <i>Subtotal Dead wood and litter</i> | 2069.27 | 1987.81 | 1946.57 | 1944.37 | 1942.17 | 106.11 | 96.84 | 92.1 | 88.41 | 86.27 |
|  | Soil carbon | 23200.78 | 22173.3 | 21577.7 | 21254.3 | 21064.71 | 1798.34 | 1638.82 | 1557.38 | 1494.09 | 1457.66 |
| TOTAL | | 89482.29 | 85977.53 | 83853.21 | 82821.37 | 82228.64 | 2560.54 | 2336.41 | 2221.77 | 2132.86 | 2081.59 |

Tiers

| Variable/category | Tier for status | Tier for trend |
|--------------------------------|-----------------|----------------|
| Total growing stock | Tier 2 | Tier 1 |
| Net annual increment | N/A | N/A |
| Above ground biomass | Tier 2 | Tier 1 |
| Below ground biomass | Tier 2 | Tier 1 |
| Dead wood | Tier 1 | Tier 1 |
| Carbon in above-ground biomass | Tier 1 | Tier 1 |
| Carbon in below ground biomass | Tier 1 | Tier 1 |
| Carbon in dead wood and litter | Tier 1 | Tier 1 |
| Soil carbon | Tier 1 | Tier 1 |

Tier criteria

| Category | Tier for status | Tier for reported trend |
|----------|-----------------|-------------------------|
|----------|-----------------|-------------------------|

| | | |
|---|---|---|
| Total growing stock | Tier 3: Data sources Recent 10 years National Forest Inventory or remote sensing with ground truthing or programme for repeated compatible NFI 10 years Domestic volume functions Tier 2: Data sources/registers and statistics modelling or old NFI 10 years or partial field inventory Tier 1: Other data sources | Tier 3: Estimate based on repeated compatible tiers 3 (tier for status) Domestic growth functions Tier 2: Estimate based on repeated compatible tier 2 or combination tier 3 and 2 or 1 tier for status Tier 1: Other |
| Net annual increment | Tier 3: Scientifically tested national volume and growth functions Tier 2: Selection of volume and growth functions as relevant as possible Tier 1: Other | Tier 3: Confirmation/adjustment of functions used through scientific work Tier 2: Review work done to seek alternative functions Tier 1: Other |
| Biomass | Tier 3: Country-specific national or sub-national biomass conversion expansion factors applied or other domestic or otherwise nationally relevant biomass studies Tier 2: Application of country specific national or sub-national biomass conversion factors from other country with similar climatic conditions and forest types Tier 1: International/regional default biomass expansion factors applied | Tier 3 : Estimate based on repeated compatible tiers 3 (tier for status) Tier 2 : Estimate based on repeated compatible tier 2 or combination tier 3 and 2 or 1 (tier for status) Tier 1 : Other |
| <ul style="list-style-type: none"> • Carbon in above ground biomass • Carbon in below ground biomass • Carbon in dead wood and litter • Soil carbon | Tier 3: Country-specific national or sub-national biomass conversion expansion factors applied Tier 2: Application of country specific national or sub-national biomass conversion factors from other country with similar climatic conditions and forest types Tier 1: International/regional default biomass expansion factors applied | Tier 3 : Estimate based on repeated compatible tiers 3 (tier for status) Tier 2 : Estimate based on repeated compatible tier 2 or combination tier 3 and 2 or 1 (tier for status) Tier 1 : Other |

3.5 Comments on growing stock biomass and carbon

| Category | Comments related to data definitions etc | Comments on the reported trend |
|---|--|--------------------------------|
| Total growing stock | N/A | N/A |
| Growing stock of broadleaved coniferous | The mainly conifers in Brazil are Araucaria (natural) and Pinus (planted). In order to calculate growing stock of coniferous, it was considered the volume of Pinus and Brazilian Pine. According to available scientific studies, the average for Araucaria volume is 6,79 m ³ /ha (1) and for Pinus is 262,5 m ³ /ha (2, 3, 4, 5). Then, multiplying the media per area of each forest, according the deforestation throughout the years, we have got the results presented. | N/A |

| | | |
|--------------------------------|--|-----|
| Growing stock composition | Currently, the Brazilian Forest Service is responsible by coordinate the National Forest Inventory in all Biomes in the country. Until this, due to the high biodiversity is not possible to define the top ten species that present the most growing stock in each Biome, without risking to have a big error. Then, we opted to not provide the estimate. It is important to note that we can find up to 300 tree species per hectare in some regions, becoming difficult to estimate the main species at large scale, without having field data to support the information. | N/A |
| Net annual increment | N/A | N/A |
| Above-ground biomass | The figure for total biomass, in Table 3d, considers the different types of forests inside the different Biomes in Brazil. The Savanna biome (Cerrado) occupies more than 200 million acres in central Brazil. It is the second richest biome in biodiversity composed by different wooded lands like forest with or without continuous canopy. Soil compounds and fire action are responsible by making the vegetation structures smaller and opened. Although the decrease in the biomass above-ground the lower stratum and below-ground developed (Mardegan 2012), turning the below-ground biomass higher than the above-ground one. The behavior is supported for different scientific studies, like the one by reviewed by Fearnside et al. (2010). References: Fearnside, P. M. 2010. Estoque e estabilidade do carbono nos solos na Amazônia brasileira. pp. Terras Pretas de Índio da Amazônia: Sua Caracterização e Uso deste Conhecimento na Criação de Novas Áreas. Universidade Federal do Amazonas. Mardegan, (2012) A ocorrência de espécies de cerrado em 18 fragmentos com fisionomia florestal no noroeste do estado de São Paulo. Tese. Universidade Estadual Paulista. 90p. | N/A |
| Below-ground biomass | N/A | N/A |
| Dead wood | There is no data about dead wood available for most of the forest types. The reported values are probably underestimated. These data will be improved when the NFI is completed. | N/A |
| Carbon in above-ground biomass | N/A | N/A |
| Carbon in below-ground biomass | N/A | N/A |

| | | |
|---------------------|---|-----|
| Carbon in dead wood | Since some data about dead wood is absent, the total amount of carbon in dead wood is probably underestimated. | N/A |
| Carbon in litter | Because there is no data for most forest types, the total amount of carbon in litter is probably underestimated. | N/A |
| Soil carbon | The values were reviewed for this report. For FRA 2015, the values were based on the same sources used to produce the country report to the UNFCCC. | N/A |

Other general comments to the table

It is expected that the values of above-ground biomass should be superior than the value of growing-stock. That is not the case for some biomes in the tables 3a and 3d. Many types of forest but not all of them present value of growing-stock superior. It can be corroborated by the Default Biomass Conversion and Expansion Factors (FRA 2015 Guidelines, Appendix 5, Table 5.4).

4. What is the status of forest production and how has it changed over time?

Documents for this question:

- Guide for country reporting FRA 2015
- FRA 2015 Terms and Definitions

4.1 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. |
| Non wood forest product (NWFP) | Goods derived from forests that are tangible and physical objects of biological origin other than wood. |
| Commercial value of NWFP | For the purpose of this table, value is defined as the commercial market value at the forest gate. |
| Category | Definition |
| Production forest | Forest area designated primarily for production of wood, fibre, bio-energy and/or non-wood forest products. |
| Multiple use forest | Forest area designated for more than one purpose and where none of these alone is considered as the predominant designated function. |
| Total wood removals | The total of industrial round wood removals and woodfuel removals. |
| ...of which woodfuel | The wood removed for energy production purposes, regardless whether for industrial, commercial or domestic use. |

4.2 National data

4.2.1 Data sources

| | References to sources of information | Variables | Years | Additional comments |
|---|--|---|-----------------------------|---------------------|
| 1 | Ministério do Meio Ambiente (2013). Cadastro Nacional de Unidades de Conservação (CNUC). | Conservation Units; year created; area | 1990, 2000, 2005 2010, 2015 | N/A |
| 2 | ABRAF. Anuário estatístico de 2006, 2011, 2012 e 2013. Brasília. Available at: http://www.abraflor.org.br/estatisticas.asp | Planted forest, area | 2005, 2010, 2011, 2012 | N/A |
| 3 | IBGE 2013. Pesquisa de Extração Vegetal e Silvicultura (PEVS). Available at: http://www.sidra.ibge.gov.br/bda/pesquisas/pevs/default.asp | Roundwood (m ³), Fuel wood (m ³) Charcoal (ton) from native forests and planted forests and total value of product removals | 1990 to 2011 | N/A |
| 4 | N/A | N/A | N/A | N/A |

4.2.2 Classification and definitions

| National class | Definition |
|---|---|
| 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. |
| National Forest / State 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. |
| Extractive reserve (Federal, state and county) | Federal or state Conservation Unit, used by local populations, whose subsistence is based on extractives activities, and complemented by subsistence agriculture and breeding or 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 (Federal, state and county) | Natural area that shelters traditional populations whose existence is based on sustainable exploration 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. |
| Planted Forest | Forest composed of trees established through planting |
| Round wood | The total of industrial round wood removals and wood fuel removals of native forest species and from planted forest |
| Fuel wood | Fuel + Charcoal (estimated as fuel) |

4.2.3 Original data

| Categories | Area (000 hectares) | | | | | |
|---|----------------------|-------|--------|--------|--------|--------|
| | 1990 | 2000 | 2005 | 2010 | 2012 | 2015 |
| National Forests ¹ | 6 125 | 8 494 | 12 108 | 16 423 | 16 423 | 16 423 |
| State Forests ¹ | 180 | 308 | 2.378 | 13.602 | 13.602 | 13.602 |
| Federal Extractive Reserve ¹ | 2 206 | 3 550 | 8 436 | 12 333 | 12 333 | 12 333 |

| | | | | | | |
|--|---------------|---------------|---------------|---------------|---------------|---------------|
| State/ County Extractive Reserve ¹ | 0 | 1 152 | 1 513 | 2 020 | 2 020 | 2 020 |
| Federal Sustainable Development Reserve ¹ | 0 | 0 | 64 | 64 | 64 | 64 |
| State/ County Sustainable Development Reserve ¹ | 1 320 | 4 497 | 9 454 | 11 595 | 11 597 | 11 600 |
| Planted Forest ² | 4 984 | 5 176 | 5 620 | 6 973 | 7 186 | 7 736 |
| Total Production | 14 815 | 23 177 | 39573 | 63 011 | 63 226 | 63 778 |
| State Environmental Protection Area ¹ | 6 757 | 22 528 | 26 434 | 33 769 | 34 096 | 34 586 |
| Federal Environmental Protection Area ¹ | 1 821 | 6 985 | 7 815 | 10 000 | 10 000 | 10 000 |
| Total Multiple Use | 8 578 | 29 513 | 34 249 | 43 769 | 44 096 | 44 586 |

Analysis and processing of national data

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.

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 :

National Forests [1]

State Forests [1]

Federal Extractive Reserve [1]

State/ County Extractive Reserve [1]

Federal Sustainable Development Reserve [1]

State/ County Sustainable Development Reserve [1]

Planted Forest [2]

Multiple use :

Federal Environmental Protection Area [1]

State Environmental Protection Area [1]

4.3 Analysis and processing of national data

4.3.1 Adjustment

No adjustment was required

4.3.2 Estimation and forecasting

Table 4a

In order to obtain forest areas for 2015, the areas of 2012 were also used. The difference between 2012 and 2010 was used to estimate the protective area in 2015.

Table 4c

Total wood removal, of which wood fuel³:

Information obtained from IBGE for removal wood fuels are charcoal and firewood. Therefore it is necessary to transform charcoal into firewood to add up the total fuel.

Charcoal was estimate as firewood by using:

$$F (\text{m}^3) = [(c(t) \times 1000) / 250] \times 2$$

F= Firewood

c = Charcoal

To estimate the values of wood removal under the bark was removed 15% of the value obtained from wood removal with bark from IBGE.

| Year | Category (1000 m³ with bark) | | Category (1000 m³ u.b.) | |
|-------------|--|------------------------------|---|------------------------------|
| | Total wood removals | ...of which wood fuel | Total wood removals | ...of which wood fuel |
| 1990 | 312 877 | 168 339 | 265 945 | 143 088 |
| 1991 | 256 809 | 160 871 | 218 288 | 136 740 |
| 1992 | 263 120 | 157 834 | 223 652 | 134 159 |
| 1993 | 273 212 | 153 103 | 232 230 | 130 138 |
| 1994 | 284 588 | 152 688 | 241 900 | 129 785 |
| 1995 | 277 032 | 147 258 | 235 477 | 125 169 |
| 1996 | 269 328 | 136 455 | 228 929 | 115 987 |
| 1997 | 216 380 | 133 053 | 183 923 | 113 095 |
| 1998 | 217 947 | 123 215 | 185 255 | 104 733 |
| 1999 | 206 860 | 120 987 | 175 831 | 102 839 |
| 2000 | 215 018 | 121 382 | 182 765 | 103 175 |
| 2001 | 199 445 | 109 617 | 169 528 | 93 174 |
| 2002 | 223 998 | 127 558 | 190 398 | 108 424 |
| 2003 | 236 472 | 116 111 | 201 001 | 98 694 |
| 2004 | 222 540 | 115 922 | 189 159 | 98 534 |
| 2005 | 242 942 | 124 955 | 206 501 | 106 212 |
| 2006 | 240 940 | 122 187 | 204 799 | 103 859 |
| 2007 | 255 211 | 133 691 | 216 929 | 113 637 |

| | | | | |
|-------------|---------|---------|---------|---------|
| 2008 | 249 124 | 133 735 | 211 755 | 113 675 |
| 2009 | 245 156 | 122 997 | 208 383 | 104 547 |
| 2010 | 254 317 | 125 920 | 216 169 | 107 032 |
| 2011 | 273 117 | 133 147 | 232 149 | 113 175 |

4.3.3 Reclassification

| |
|--|
| |
|--|

4.4 Data

Table 4a

| Categories | | Forest area (000 hectares) | | | | |
|---|---------------------|----------------------------|-------|-------|-------|-------|
| | | 1990 | 2000 | 2005 | 2010 | 2015 |
|  | Production forest | 14815 | 23177 | 39573 | 63011 | 63778 |
|  | Multiple use forest | 8578 | 29513 | 34249 | 43769 | 44586 |

Table 4b

| Rank | Name of product | Key species | Commercial value of NWFP removals 2010 (value 1000 local currency) | NWFP category |
|-------|--------------------------|------------------------|--|---------------|
| 1 st | Açaí (fruit) [3] | Euterpe oleracea | 179378 | 1 |
| 2 nd | Babaçu (nut for oil) [3] | Orbignya phalerata | 130940 | 8 |
| 3 rd | Resin of pinus [3] | Pinus spp | 126026 | 7 |
| 4 th | Piaçava (fibre) [3] | Attalea funifera | 117706 | 5 |
| 5 th | Carnaúba (powder) [3] | Copernicia prunifera | 103603 | 8 |
| 6 th | Mate [3] | Ilex paraguariensis | 100526 | 1 |
| 7 th | Brazilian nut [3] | Bertholletia excelsa | 55194 | 1 |
| 8 th | Pequi (nut) [3] | Caryocar brasiliense | 10688 | 1 |
| 9 th | Black acácia bark [3] | Acacia decurrens | 9586 | 8 |
| 10 th | Pinhão (seed) [3] | Araucaria angustifolia | 9120 | 1 |

| | | | |
|-------|--|-----------|--|
| TOTAL | | 842767.00 | |
|-------|--|-----------|--|

| | | |
|------------------------|------|--|
| 2010 | | |
| Name of local currency | Real | |

| 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 beewax |
| 12 Wild meat |
| 13 Raw material for medicine |
| 14 Raw material for colorants |
| 15 Other edible animal products |
| 16 Other non-edible animal products |

Table 4c Pre-filled data from FAOSTAT

| Year | FRA 2015 category (1000 m ³ u.b.) | |
|------|--|----------------------|
| | Total wood removals | ...of which woodfuel |
| 1990 | 265945 | 143088 |

| | | |
|------|--------|--------|
| 1991 | 218288 | 136740 |
| 1992 | 223652 | 134159 |
| 1993 | 232230 | 130138 |
| 1994 | 241900 | 129785 |
| 1995 | 235477 | 125169 |
| 1996 | 228929 | 115987 |
| 1997 | 183923 | 113095 |
| 1998 | 185255 | 104733 |
| 1999 | 175831 | 102839 |
| 2000 | 182765 | 103175 |
| 2001 | 169528 | 93174 |
| 2002 | 190398 | 108424 |
| 2003 | 201001 | 98694 |
| 2004 | 189159 | 98534 |
| 2005 | 265945 | 143088 |
| 2006 | 218288 | 136740 |
| 2007 | 223652 | 134159 |
| 2008 | 232230 | 130138 |
| 2009 | 241900 | 129785 |
| 2010 | 235477 | 125169 |
| 2011 | 228929 | 115987 |

Tiers

| Category | Tier for status | Tier for reported trend |
|---------------------|-----------------|-------------------------|
| Production forest | Tier 2 | Tier 2 |
| Multiple use forest | Tier 2 | Tier 2 |

Tier Criteria

| Category | Tier for status | Tier for reported trend |
|----------|-----------------|-------------------------|
| | | |

| | | |
|---------------------------------------|--|---|
| Production forest Multiple use forest | Tier 3: Updated including field verifications national forest maps including functions Tier 2: Forest maps older than 6 years including forest functions Tier 1: Other | Tier 3 : Estimate based on repeated compatible tiers 3 (tier for status) Tier 2 : Estimate based on repeated compatible tier 2 or combination tier 3 and 2 or 1 (tier for status) Tier 1 : Other |
|---------------------------------------|--|---|

4.5 Comments

| Category | Comments related to data definitions etc | Comments on the reported trend |
|--------------------------|--|--------------------------------|
| Production forest | N/A | N/A |
| Multiple use forest | N/A | N/A |
| Total wood removals | N/A | N/A |
| Commercial value of NWFP | N/A | N/A |

Other general comments to the table

N/A

5. How much forest area is managed for protection of soil and water and ecosystem services?

Documents for this question:

- [Guide for country reporting FRA 2015](#)
- [FRA 2015 Terms and Definitions](#)

5.1 Categories and definitions

| Category | Definition |
|--|--|
| Protection of soil and water | Forest area designated or managed for protection of soil and water |
| ...of which production of clean water (<i>sub-category</i>) | Forest area primarily designated or managed for water production, where most human uses are excluded or heavily modified to protect water quality. |
| ...of which coastal stabilization (<i>sub-category</i>) | Forest area primarily designated or managed for coastal stabilization. |
| ...of which desertification control (<i>sub-category</i>) | Forest area primarily designated or managed for desertification control. |
| ...of which avalanche control (<i>sub-category</i>) | Forest area primarily designated or managed to prevent the development or impact of avalanches on human life assets or infrastructure. |
| ...of which erosion, flood protection or reducing flood risk (<i>sub-category</i>) | Forest area primarily designated or managed for protecting communities or assets from the impacts of erosion riparian floods and landslides or for providing flood plain services. |
| ...of which other (<i>sub-category</i>) | Forest area primarily designated or managed for other protective functions. |
| Ecosystem services, cultural or spiritual values | Forest area primarily designated or managed for selected ecosystem services or cultural or spiritual values. |
| ...of which public recreation (<i>sub-category</i>) | Forest area designated or managed for public recreation. |
| ...of which carbon storage or sequestration (<i>sub-category</i>) | Forest area designated or managed for carbon storage or sequestration. |
| ...of which spiritual or cultural services (<i>sub-category</i>) | Forest area designated or managed for spiritual or cultural services. |
| ...of which other (<i>sub-category</i>) | Forest area designated or managed for other ecosystem services. |

5.2 National data

5.2.1 Data sources

| | References to sources of information | Variables | Years | Additional comments |
|---|--|-----------------------------|-------|---------------------|
| 1 | Sparovek et al., 2011. A revisão do Código Florestal Brasileiro. | Permanent Preservation Area | 2010 | N/A |

| | | | | |
|---|---|---|-----------------------|---|
| 2 | United Nations Framework Convention on climate Change (UNFCCC), 2013. Available at: http://cdm.unfccc.int/Projects/projsearch.html . | Forest area in projects of “Clean Development Mechanisms” (CDM) | 2000 to 2015 | Forest area used to carbon storage or sequestration |
| 3 | Indigenous National Foundation (FUNAI). | Indigenous Land area | 1990, 2000, 2005 2010 | Personal contact |
| 4 | Indigenous National Foundation (FUNAI). Situação Fundiária Indígena. Available at: http://mapas.funai.gov.br . | Indigenous Land area | 2012, 2013 | N/A |
| 5 | Ministry of Environment (MMA) / Department of Protected Areas (DAP), 2013. Cadastro Nacional de Unidades de Conservação – CNUC. | UC's; year created; area | 1990, 2000, 2005 2010 | National Cadastre of Conservation Units – area of UCs. Personal contact |

5.2.2 Classification and definitions

| National class | Definition |
|-----------------------------|---|
| Permanent Preservation 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. According Law n° 12,651, of 25th May, 2012, the vegetation located in Permanent Preservation Area must be maintained by the owner of the area, possessor or occupier, person or entity, public or private. |
| 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. |
| Indigenous Land | 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 unavailable 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 |
| N/A | N/A |

5.2.3 Original data

Protection of soil and water:

In order to obtain the forest area designed to protection of soil and water, it was used the areas of Permanent Preservation Area (PPA). The area for 2010 was estimated based on a study (Sparovek *et al.*, 2011) [1].

Permanent Preservation Area in 2010 according to Sparovek *et al.*, 2011.

| Biome | PPA área (ha) |
|-------------------|-------------------|
| Amazon | 22.000.000 |
| Caatinga | 9.000.000 |
| Cerrado (Savanna) | 16.000.000 |
| Atlantic Forest | 6.000.000 |
| Pampa | 2.000.000 |
| Pantanal | 1.800.000 |
| Total | 56.800.000 |

Ecosystem services, cultural or spiritual values:

In order to obtain the forest area to public recreation, it was considered the area of National Park. It was obtained from the National Conservation Units Cadastre (Cadastro Nacional de Unidades de Conservação – CNUC) for years 1990, 2000, 2005 and 2010 [5].

In order to obtain the forest area to carbon storage or sequestration, it was used the planted area expected in projects of Clean Development Mechanisms (CDM). Brazil only has three Aforestation/Reforestation CDM projects registered under the United Nations Framework Convention on Climate Change (UNFCCC) [2]: (i) Reforestation as Renewable Source of Wood Supplies for Industrial Use in Brazil (Plantar Project, registered in July 2010), (ii) AES Tietê Afforestation/Reforestation Project in the State of São Paulo (registered in January 2011) and (iii) Reforestation of degraded tropical land in Brazilian Amazon (Vale Florestar, registered in September 2012). The planted area expected in these projects was considered as forest to carbon storage or sequestration.

For cultural and spiritual services, it was considered the area of Indigenous Land. Area of Indigenous Land was based on data from FUNAI (Indigenous National Foundation) for years 1990, 2000, 2005 and 2010 [3,4].

5.3 Analysis and processing of national data

5.3.1 Adjustment

5.3.2 Estimation and forecasting

Protection of soil and water:

In order to obtain the forest area designed to protection of soil and water in the previous years, deforestation rates (calculated for chapter 1) were used. For 2015 we used the same area as established for 2010.

According to Brazilian Law 12,651 of 2012, the Permanent Preservation Area is a protected area, covered or not by native vegetation, with environmental function of preserving water resources, landscape, geological stability and biodiversity, facilitate gene flow of fauna and flora, soil protection and ensure the well-being of human populations. This law also created the Rural Environmental Registry – CAR, under the National System of Environmental Information, an electronic public record nationwide, mandatory for all rural properties in order to integrate environmental information of rural properties and possessions, composing database for control, monitoring, environmental and economic planning and combating deforestation. Also according to the law, intervention or suppression of native vegetation in Permanent Preservation Area only can occur in cases of public utility, social interest or intervention of low environmental impact. Thus, it was considered that the area of “Forest area for protection of soil and water” in the year 2015 will be at least the same area established in 2010 , since these areas must not pass through deforestation, but rather should be preserved, restored and even enhanced. **Ecosystem services, cultural or spiritual values:** In order to obtain forest areas of National Park and Indigenous Land for 2015, the areas of 2012 were also used. The difference between 2012 and 2010 was used to estimate the protective area in 2015.

| | Area (hectares) | | | | | |
|-------------------------------|----------------------------|-------------|-------------|-------------|-------------|-------------|
| Conservation Units | 1990 | 2000 | 2005 | 2010 | 2012 | 2015 |
| National Park | 12934596 | 15187365 | 22831879 | 30637182 | 30645887 | 30658943 |
| Indigenous Land | 11307134 | 70311994 | 93383329 | 101027905 | 102126257 | 102389376 |

For carbon storage, the planted area expected in the CDM projects was considered as forest to carbon storage or sequestration. The estimation was based on the description of the projects.

5.3.3 Reclassification

5.4 Data

Table 5a

| Categories | | Forest area (1000 hectares) | | | | |
|---|--|------------------------------------|-------------|-------------|-------------|-------------|
| | | 1990 | 2000 | 2005 | 2010 | 2015 |
|  | Protection of soil and water | 64979 | 60818 | 58602 | 56800 | 56800 |
|  | ... of which production of clean water | N/A | N/A | N/A | N/A | N/A |
|  | ... of which coastal stabilization | N/A | N/A | N/A | N/A | N/A |

| | | | | | | |
|-----|---|-----|-----|-----|-----|-----|
| CFQ | ... of which desertification control | N/A | N/A | N/A | N/A | N/A |
| CFQ | ... of which avalanche control | N/A | N/A | N/A | N/A | N/A |
| CFQ | ... of which erosion, flood protection or reducing flood risk | N/A | N/A | N/A | N/A | N/A |
| CFQ | ... of which other (please specify in comments below the table) | N/A | N/A | N/A | N/A | N/A |

Other

N/A

Table 5b

| Categories | Forest area (1000 hectares) | | | | |
|--|-----------------------------|-------|-------|--------|--------|
| | 1990 | 2000 | 2005 | 2010 | 2015 |
| Ecosystem services, cultural or spiritual values | | | | | |
| ...of which public recreation | 12935 | 15187 | 22832 | 30637 | 30659 |
| ...of which carbon storage or sequestration | N/A | 0.303 | 13.21 | 20.768 | 31.593 |
| ...of which spiritual or cultural services | 11307 | 70312 | 93383 | 101028 | 102389 |
| ...of which other (please specify in comments below the table) | N/A | N/A | N/A | N/A | N/A |

Tiers

| Category | Tier for reported trend | Tier for status |
|--|-------------------------|-----------------|
| Protection of soil and water | Tier 1 | Tier 1 |
| Ecosystem services, cultural or spiritual values | Tier 3 | Tier 3 |

Tier criteria

| Category | Tier for status | Tier for reported trend |
|----------|-----------------|-------------------------|
|----------|-----------------|-------------------------|

| | | |
|--|---|---|
| Protection of soil and water | Tier 3: High reliability data derived either from high intensity sample survey or data obtained from national or state agencies responsible for regulations or legislation relating to soil and water protection. Tier 2: Approaches based on low intensity or incomplete sample-based surveys or studies that provide data for specific areas that is extrapolated through statistical analysis to national level estimates. Tier 1: Other | Tier 3 : Estimate based on repeated compatible tiers 3 (tier for status) Tier 2 : Estimate based on repeated compatible tier 2 or combination tier 3 and 2 or 1 (tier for status) Tier 1 : Other |
| <ul style="list-style-type: none"> • Cultural or spiritual values • Public recreation • Spiritual or cultural services • Other | Tier 3: High reliability data derived either from high intensity sample survey or data obtained from national or state agencies responsible for regulations. Tier 2: Approaches based on low intensity or incomplete sample-based surveys or studies that provide data for specific areas that is extrapolated through statistical analysis to national level estimates. Tier 1: Other | Tier 3 : Estimate based on repeated compatible tiers 3 (tier for status) Tier 2 : Estimate based on repeated compatible tier 2 or combination tier 3 and 2 or 1 (tier for status) Tier 1 : Other |

5.5 Comments

| Category | Comments related to data definitions etc | Comments on the reported trend |
|--|--|---|
| Protection of soil and water | N/A | It was considered that the area of “Forest area for protection of soil and water” in the year 2015 will be at least the same area established in 2010, since these areas must not pass through deforestation, but rather should be preserved, restored and even enhanced. |
| Production of clean water | N/A | N/A |
| Coastal stabilization | N/A | N/A |
| Desertification control | N/A | N/A |
| Avalanche control | N/A | N/A |
| Erosion, flood protection or reducing flood risk | N/A | N/A |
| Other protective functions | N/A | N/A |
| Ecosystem services, cultural or spiritual values | N/A | N/A |
| Public recreation | National Parks were considered as forest for public recreation. | N/A |
| Carbon storage or sequestration | N/A | N/A |
| Spiritual or cultural services | All Indigenous Land were considered as spiritual or cultural services. | N/A |

| | | |
|--|-----|-----|
| Other ecosystem services | N/A | N/A |
| Other general comments to the table | | |
| N/A | | |

6. How much forest area is protected and designated for the conservation of biodiversity and how has it changed over time?

Documents for this question:

- [Guide for country reporting FRA 2015](#)
- [FRA 2015 Terms and Definitions](#)

6.1 Categories and definitions

| Category | Definition |
|------------------------------------|--|
| 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. |
| Forest area within protected areas | Forest area within formally established protected areas independently of the purpose for which the protected areas were established. |

6.2 National data

6.2.1 Data sources

| | References to sources of information | Variables | Years | Additional comments |
|---|--|-----------------------------|-----------------------|--|
| 1 | Ministry of Environment (MMA) / Department of Protected Areas (DAP), 2013. Cadastro Nacional de Unidades de Conservação – CNUC. | UC's; year created; area | 1990, 2000, 2005 2010 | National Cadastre of Conservation Units – area of UCs. Personal contact. |
| 2 | Indigenous National Foundation (FUNAI) | Indigenous Land area | 1990, 2000, 2005 2010 | Personal contact. |
| 3 | Indigenous National Foundation (FUNAI). Situação Fundiária Indígena. Available at: http://mapas.funai.gov.br | Indigenous Land area | 2012, 2013 | N/A |
| 4 | Sparovek et al., 2011. A revisão do Código Florestal Brasileiro. | Permanent Preservation Area | 2010 | N/A |
| 5 | Brazilian Forest Service (SFB), 2012. | Natural Forest | 2009 | Shape of natural forest, for each biome. |

6.2.2 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. |
| Sustainable Development Reserve | Natural area that shelters traditional populations whose existence is based on sustainable exploration 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 Preservation 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. According Law n° 12,651, of 25th May, 2012, the vegetation located in Permanent Preservation Area must be maintained by the owner of the area, possessor or occupier, person or entity, public or private. |
| Extractive Reserve | Basic objective to ensure the sustainable use of the natural resources, in order to guarantee the livelihood and culture of traditional extractive populations. |

| | |
|-----------------|--|
| Indigenous Land | 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 unavailable 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. |
|-----------------|--|

6.2.3 Original data

Areas of Conservation Units (Ecological Station, Biological Reserve, National Park, Natural Monument, Wildlife Refuge, Natural Heritage Private Reserve and Area of Relevant Ecological Importance) were obtained from the National Conservation Units Cadastre (Cadastro Nacional de Unidades de Conservação – CNUC) for years 1990, 2000, 2005 and 2010 [1].

Area of Indigenous Land was based on data from FUNAI (Indigenous National Foundation) for years 1990, 2000, 2005 and 2010 [2,3].

Area of Permanent Preservation Area for 2010 was estimated based on a study (Sparovek *et al.*, 2011) [4]. Deforestation rates (calculated for chapter 1) were used to calculate this area for the previous years.

These area data (cited above) represent the total protected area. In order to obtain the forest area inside these protected areas, it was calculated the percentage of forest inside the protected area in each biome, using shape files. The forest shape was obtained from the superposition of vegetation remaining areas collected in 2009 on the PROBIO referred maps from 2002 [5]. The same percentage of forest inside the protected area was used to calculate the forest area in all years.

For Amazon biome, once it was not possible to define only the forest areas inside the protected areas, we considered all protective areas as forest, once this kind of vegetation typology prevails in Amazon biome.

Ecological Station, Biological Reserve, National Park, Natural Monument and Wildlife Refuge protective areas are considered of full protection. The other categories are considered of sustainable use although there may be protection objectives.

6.3 Analysis and processing of national data

6.3.1 Adjustment

In order to define which protected areas fit in each category requested by FRA, the main objective (primary designation) of the protected area established in its definition was taken into account. Category “Conservation of biodiversity” includes Biological Reserve, Ecological Station, National Park, Natural Monument, Wildlife Refuge and Natural Heritage Private Reserve.

For “Forest area within protected areas” it is considered the same protective areas as above and also Area of Relevant Ecological Importance, Permanent Preservation Area and Indigenous Land.

As requested, the protective areas corresponded to IUCN classification V (Area of Environmental Protection) and VI (National Forest, Extractive Reserve and Sustainable Development Reserve) were excluded.

Classification of Brazilian protected areas categories into the classes required by FRA*.

| Conservation of biodiversity | Forest area within protected areas |
|----------------------------------|--|
| Ecological Station | Ecological Station |
| Biological Reserve | Biological Reserve |
| National Park | National Park |
| Natural Monument | Natural Monument |
| Wildlife Refuge | Wildlife Refuge |
| Natural Heritage Private Reserve | Natural Heritage Private Reserve Area of Relevant Ecological Importance Permanent Preservation Area Indigenous Land |

* IUCN V and VI categories excluded:

Environmental Protection Area

National Forest

Extractive Reserve

Sustainable Development Reserve

6.3.2 Estimation and forecasting

The protective areas were estimated between 1990 and 2010, as shown below.

In order to obtain forest areas for 2015, the areas of 2012 were also used. The difference between 2012 and 2010 was used to estimate the protective area in 2015.

Forest area within protected areas (ha).

| | | Area (hectares) |
|--|--|-----------------|
| | | |

| Categorie | Conservation Units | 1990 | 2000 | 2005 | 2010 | 2012 | 2015 |
|---|---|---------------|---------------|---------------|----------------|----------------|----------------|
| Conservation of biodiversity | Ecological Station | 2 478 258 | 2 704 246 | 6 596 347 | 10 816 725 | 10 816 725 | 10 816 725 |
| | Biological Reserve | 3 537 623 | 3 543 266 | 3 932 113 | 5 126 774 | 5 160 015 | 5 209 875 |
| | National Park | 12 934 596 | 15 187 365 | 22 831 879 | 30 637 182 | 30 645 887 | 30 658 943 |
| | Natural Monument | 131 | 27 926 | 60 586 | 91 874 | 93 048 | 94 810 |
| | Wildlife Refuge | 1 705 | 1 705 | 87 172 | 134 277 | 134 814 | 135 618 |
| | Natural Heritage Private Reserve | | 26 364 | 27 591 | 33 753 | 41 374 | 52 806 |
| | Total conservation of biodiversity | 18 952 313 | 21 490 872 | 33 535 688 | 46 840 585 | 46 891 863 | 46 968 777 |
| Forest area within protected areas | Ecological Station | 2 478 258 | 2 704 246 | 6 596 347 | 10 816 725 | 10 816 725 | 10 816 725 |
| | Biological Reserve | 3 537 623 | 3 543 266 | 3 932 113 | 5 126 774 | 5 160 015 | 5 209 875 |
| | National Park | 12 934 596 | 15 187 365 | 22 831 879 | 30 637 182 | 30 645 887 | 30 658 943 |
| | Natural Monument | 131 | 27 926 | 60 586 | 91 874 | 93 048 | 94 810 |
| | Wildlife Refuge | 1 705 | 1 705 | 87 172 | 134 277 | 134 814 | 135 618 |
| | Natural Heritage Private Reserve | | 26 364 | 27 591 | 33 753 | 41 374 | 52 806 |
| | Area of Relevant Ecological Importance | 24 672 | 31 173 | 42 845 | 68 545 | 68 550 | 68 558 |
| | Indigenous Land | 11 307 134 | 70 311 994 | 93 383 329 | 101 027 905 | 102 126 257 | 102 389 376 |

| | | | | | | | |
|--|---|---------------|----------------|----------------|----------------|----------------|----------------|
| | Permanent Preservation Area | 64 978 679 | 60 817 738 | 58 601 943 | 56 800 000 | 56 800 000 | 56 800 000 |
| | Total forest area within protected areas | 95 262 798 | 152 651 777 | 185 563 805 | 204 737 035 | 205 886 670 | 206 226 711 |

6.3.3 Reclassification

| |
|--|
| |
|--|

6.4 Data

Table 6

| Categories | | Forest area (000 hectares) | | | | |
|---|------------------------------------|----------------------------|--------|--------|--------|--------|
| | | 1990 | 2000 | 2005 | 2010 | 2015 |
|  | Conservation of biodiversity | 18952 | 21491 | 33536 | 46841 | 46969 |
|  | Forest area within protected areas | 95263 | 152652 | 185564 | 204737 | 206227 |

Tiers

| Category | Tier for status | Tier for reported trend |
|------------------------------------|-----------------|-------------------------|
| Conservation of biodiversity | Tier 2 | Tier 2 |
| Forest area within protected areas | Tier 2 | Tier 2 |

Tier criteria

| Category | Tier for status | Tier for reported trend |
|--|---|---|
| <ul style="list-style-type: none"> • Conservation of biodiversity • Forests within protected areas | Tier 3: Data obtained from national or state agencies responsible for conservation and protected area or legislation relating to area protection. Tier 2: Studies that provide data for specific areas that is extrapolated through statistical analysis to national level estimates Tier 1 Other | Tier 3 : Estimate based on repeated compatible tiers 3 (tier for status) Tier 2 : Estimate based on repeated compatible tier 2 or combination tier 3 and 2 or 1 (tier for status) Tier 1 : Other |

6.5 Comments

| Category | Comments related to data definitions etc | Comments on the reported trend |
|------------------------------------|---|---------------------------------------|
| Conservation of biodiversity | Refers to Ecological Station, Biological Reserve, National Park, Natural Monument, Wildlife Refuge and Natural Heritage Private Reserve. | not applicable |
| Forest area within protected areas | Refers to Ecological Station, Biological Reserve, National Park, Natural Monument, Wildlife Refuge, Natural Heritage Private Reserve, Area of Relevant Ecological Importance, Permanent Preservation Area and Indigenous Lands. | not applicable |

Other general comments to the table

N/A

7. What is the area of forest affected by woody invasive species?

Documents for this question:

- [Guide for country reporting FRA 2015](#)
- [FRA 2015 Terms and Definitions](#)

7.1 Categories and definitions

| Category | Definition |
|------------------|--|
| 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. |

7.2 National data

7.2.1 Data sources

| | References to sources of information | Variables | Years | Additional comments |
|---|---|------------------|-------|---|
| 1 | Instituto Hórus. I3N Invasive Information Network – I3N Brasil. | Invasive species | 2013 | Personal contact with Sílvia Ziller (sziller@institutohorus.org.br) |
| 2 | N/A | N/A | N/A | N/A |
| 3 | N/A | N/A | N/A | N/A |
| 4 | N/A | N/A | N/A | N/A |

7.2.2 Classification and definitions

| National class | Definition |
|----------------|------------|
| N/A | N/A |

7.2.3 Original data

| |
|--|
| |
|--|

7.3 Analysis and processing of national data

7.3.1 Adjustment

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| |
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7.3.2 Estimation and forecasting

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| |
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7.3.3 Reclassification

| |
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| |
|--|

7.4 Data

Table 7

| Scientific name of woody invasive species | Forest area affected (000 ha) | |
|---|-------------------------------|------|
| | 2005 | 2010 |
| 1. Acacia mangium | N/A | N/A |
| 2. Acacia mearnsii | N/A | N/A |
| 3. Casuarina equisetifolia | N/A | N/A |
| 4. Eucalyptus spp. | N/A | N/A |
| 5. Hovenia dulcis | N/A | N/A |
| 6. Leucaena leucocephala | N/A | N/A |
| 7. Ligustrum spp. | N/A | N/A |
| 8. Pinus spp. | N/A | N/A |
| 9. Prosopis juliflora | N/A | N/A |
| 10. Prosopis pallid | N/A | N/A |
| Total | N/A | N/A |

Tiers

| Category | Tier for status | Tier for reported trend |
|------------------|-----------------|-------------------------|
| Invasive species | Tier 1 | Tier 1 |

Tier Criteria

| Category | Tier for status | Tier for reported trend |
|----------|-----------------|-------------------------|
| | | |

| | | |
|------------------|--|---|
| Invasive species | Tier 3: Systematic assessment in forest inventory or other survey (e.g. by conservation department) within the last 5 years) Tier 2: Systematic assessment in forest inventory or other survey (e.g. by conservation department conducted more than 5 years ago) Tier 1: Other | Tier 3 : Estimate based on repeated compatible tiers 3 (tier for status) Tier 2 : Estimate based on repeated compatible tier 2 or combination tier 3 and 2 or 1 (tier for status) Tier 1 : Other |
|------------------|--|---|

7.5 Comments

| Category | Comments related to data definitions etc | Comments on the reported trend |
|------------------|--|--------------------------------|
| Invasive species | List presented was obtained with expert in invasive species [1]. The cited species were listed for having large production or present a high risk as invasive. There is no information about forest area affected. | N/A |

Other general comments to the table

Species like Eucalyptus and Pinus are in the list provided by experts we consulted (Hórus Institute), probably because they may have ecological characteristics of invasive species, when in non-controlled situations. For example, Pinus' seeds are dispersed by wind; sometimes establishing seedlings groups in surrounded areas not assigned for that, and because of that included in the invasive species. It is important to point out that both genus (Pinus and Eucalyptus) are the main tree species of the planted forests in Brazil.

8. How much forest area is damaged each year?

Documents for this question:

- [Guide for country reporting FRA 2015](#)
- [FRA 2015 Terms and Definitions](#)

8.1 Categories and definitions

| Category | Definition |
|-----------------------|---|
| Number of fires | Number of fires per year |
| Burned area | Area burned per year |
| Outbreaks of insects | A detectable reduction in forest health caused by a sudden increase in numbers of harmful insects. |
| Outbreaks of diseases | A detectable reduction in forest health caused by a sudden increase in numbers of harmful pathogens, such as bacteria, fungi, phytoplasma or virus. |
| Severe weather events | Damage caused severe weather events, such as snow, storm, drought, etc. |

8.2 National data

8.2.1 Data sources

| | References to sources of information | Variables | Years | Additional comments |
|---|---|-----------------------------------|-----------------------|----------------------------------|
| 1 | National Institute for Space Research (INPE), 2013. Monitoring fires by satellites (Monitoramento de Queimadas e Incêndios por satélite). Available at: http://www.inpe.br/queimadas/estatisticas.php . | Number of fires detected per year | 2003-2012 | N/A |
| 2 | EMBRAPA Florestas - Brazilian Company for Agricultural research – National Centre for Forestry Research | Affected area | 1988- 1992 1998- 2002 | Affected area by Sirex noctilio |
| 3 | EMBRAPA Florestas - Brazilian Company for Agricultural research – National Centre for Forestry Research | Affected area | 2002- 2002 | Affected area by Cinara spp. |
| 4 | EMBRAPA Florestas - Brazilian Company for Agricultural research – National Centre for Forestry Research | Affected area | 2001- 2003 | Affected area by Armillaria spp. |
| 5 | National Institute for Space Research (INPE), 2014 – Burned Monitoring Group | Land area burned | 2005-2010 | N/A |

8.2.2 Classification and definitions

| National class | Definition |
|----------------|------------|
| N/A | N/A |

8.2.3 Original data

Information about the number of fires was obtained from the monitoring of points of fires by satellite released by INPE (active focus of heat) [1].

Outbreaks of insects and diseases: the information was compiled by the Entomology team of EMBRAPA Florestas [2,3,4]. The methodology for estimating burned area in Brazil is being developed by INPE (Burned Monitoring Group) and the data presented in FRA were adapted by SFB team.

8.3 Analysis and processing of national data

8.3.1 Adjustment

8.3.2 Estimation and forecasting

8.3.3 Reclassification

8.4 Data

Table 8a

| Category | | 000 ha, number of fires | | | | | | | | | |
|---|------------------------|-------------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| | | 2003 | | 2004 | | 2005 | | 2006 | | 2007 | |
| | | 000 ha | # | 000 ha | # | 000 ha | # | 000 ha | # | 000 ha | # |
|  | Total land area burned | N/A | 210894 | N/A | 232621 | 76575 | 225610 | 44871 | 117315 | 97433 | 229327 |

| | | | | | | | | | | | |
|---|---------------------------------|--------|---------------|--------|---------------|--------|---------------|--------|---------------|--------|-----|
|  | ... of which forest area burned | N/A | N/A | N/A | N/A | 48886 | N/A | 24781 | N/A | 46771 | N/A |
| Category | 2008 | | 2009 | | 2010 | | 2011 | | 2012 | | |
| | 000 ha | # | 000 ha | # | 000 ha | # | 000 ha | # | 000 ha | # | |
| | 55345 | 123249 | 46176 | 123211 | 70458 | 249291 | N/A | 133087 | N/A | 193838 | |
|  | ... of which forest area burned | 24862 | N/A | 20665 | N/A | 34295 | N/A | N/A | N/A | N/A | |

Table 8b

| Outbreak category | Description/name | Year(s) of latest outbreak | Area damaged (000 hectares) |
|-------------------|------------------|----------------------------|-----------------------------|
| Insects | Sirex noctilio | 1990 | 50 |
| Insects | Sirex noctilio | 2000 | 20 |
| Insects | Cinara spp. | 2000 | 10 |
| Disease | Armillaria spp. | 2000 | 20 |
| N/A | N/A | N/A | N/A |
| N/A | N/A | N/A | N/A |
| N/A | N/A | N/A | N/A |
| N/A | N/A | N/A | N/A |
| N/A | N/A | N/A | N/A |

Outbreak category

1 Insects

2 Diseases

3 Severe weather events

Tiers

| Category | Tier for status | Tier for trend |
|----------|-----------------|----------------|
|----------|-----------------|----------------|

| | | |
|--|--------|--------|
| Area affected by fire | Tier 2 | Tier 2 |
| • Insects • Diseases • Severe weather events | Tier 1 | Tier 1 |

Tier criteria

| Category | Tier for status | Tier for reported trend |
|--|--|---|
| Burned area | Tier 3 : National fire monitoring routines Tier 2 : Remote sensing surveys Tier 1 : Other | Tier 3 : Estimate based on repeated compatible tiers 3 (tier for status) Tier 2 : Estimate based on repeated compatible tier 2 or combination tier 3 and 2 or 1 (tier for status) Tier 1 : Other |
| • Insects • Diseases • Severe weather events | Tier 3 : Systematic survey (e.g. via inventory or aerial damage assessment) Tier 2 : Management records Tier 1 : Other | Tier 3 : Estimate based on repeated compatible tiers 3 (tier for status) Tier 2 : Estimate based on repeated compatible tier 2 or combination tier 3 and 2 or 1 (tier for status) Tier 1 : Other |

8.5 Comments

| Category | Comments related to data definitions etc | Comments on the reported trend |
|-------------|--|--------------------------------|
| Burned area | N/A | N/A |
| Insects | Sirex noctilio (Hymenoptera: 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 m ³ 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. | N/A |

| | | |
|-----------------------|---|-----|
| 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 m ³ of wood, estimated in US\$ 3.4 millions/year. | N/A |
| Severe weather events | N/A | N/A |

Other general comments to the table

Information about the points of fires: The satellites used by INPE to identify the points of fire can detect fires of 30 m of extension by 1 m width, or bigger. However, as the satellite spatial resolution (pixel) has 1 km x 1 km or more, a burnt of a few m² will be identified as having at least 1 km². In the images of geostationary satellites, where the pixel is 4km x 4km, this little burned area will be indicated by an area of 16 km² or more. Thus, a focus firing, the same as a pixel burning, may indicate either a small fire as well as several small fires or a very large fire inside. Summarizing, the system of INPE detects the existence of fire on vegetation without being able to assess the size of the area that is burning or the type of vegetation affected. In cases of many burning pixels together, and in the presence of a large cloud of smoke, it can be inferred that the burned area will have the size of the burnt pixels detected. The relation between focus x burnt area is not seen directly in satellite images. The pixel can have one or more separate fires, but the indication will be of a single focus. If a fire is too long, it will be detected in some neighboring pixels, that is, many focus will be associated with a single large fire. This fire system of INPE detects the occurrence of a fire, which is itself extremely important and valuable, and necessary for thousands of users of this system. Precise details of what is burning and the burnt information are impossible to achieve with current available sensors.

9. What is the forest area with reduced canopy cover?

Documents for this question:

- Guide for country reporting FRA 2015
- FRA 2015 Terms and Definitions

| Category | Definition |
|---------------------------|--|
| Reduction in canopy cover | Forest that has undergone a reduction of canopy cover of more than 20% between the years 2000 and 2010 within the forest canopy cover range of 30-80% as detected by the MODIS VCF sensor. |

Table 9

| Category | Area of forest with reduced canopy cover (000 ha) |
|---------------------------|---|
| Reduction in canopy cover | 4198 |

Tiers

| Category | Tier for reported trend |
|---------------------------|-------------------------|
| Reduction in canopy cover | Tier 3 |

Tier criteria

| Category | Tier for reported trend |
|---------------------------|--|
| Reduction in canopy cover | Tier 3 : Remote sensing with ground truthing and/or Landsat imagery Tier 2 : Remote sensing using Modis (using pre-filled data provided by FAO) Tier 1 : Expert opinion |

Comments

| Category | Comments related to data definitions etc |
|---------------------------|--|
| Reduction in canopy cover | The reported area of forest with reduced canopy cover corresponds to areas in Amazon biome that are under deforestation but that the forest cover has not yet been totally removed. Data used refers to DEGRAD project of 2007 to 2010. Considering that the area of 4 198 000 ha corresponds to 4 years (2007 to 2010), the estimation for 2000 to 2010 could be approximately 10 500 000 ha. Despite considering only the Amazon biome, this one has the largest forest area and has the biggest deforestation. Thus, we believe that the value provided by FAO for the area of forest with reduced canopy cover (45 004 760 ha) is overestimated. |

Other general comments

10. What forest policy and regulatory framework exists to support implementation of sustainable forest management SFM?

Documents for this question:

- [Guide for country reporting FRA 2015](#)
- [FRA 2015 Terms and Definitions](#)

10.1 Categories and definitions

| Category | Definition |
|--|--|
| Policies supporting sustainable forest management | Policies or strategies that explicitly encourage sustainable forest management. |
| Legislation and regulations supporting sustainable forest management | Legislation and regulations that govern and guide sustainable forest management, operations and use. |

10.2 National data

10.2.1 Data sources

| | References to sources of information | Variables | Years | Additional comments |
|---|---|---|--|---------------------|
| 1 | Brazilian government portal. 2013. Available at: http://www.planalto.gov.br/ | Federal Environmental Legislation | 1989; 2000; 2002; 2006; 2007; 2008; 2009; 2012 | N/A |
| 2 | Institute of Environmental Protection of the Amazonas state portal. 2013. Available at: http://www.ipaam.am.gov.br/ | Environmental Legislation of Amazonas state | 2008 | N/A |
| 3 | Department of Environment of Bahia state portal. 2013. Available at: http://www.meioambiente.ba.gov.br/ | Environmental Legislation of Bahia state | 2006 | N/A |
| 4 | Department of Environment and Sustainable Development of Minas Gerais state portal. 2013. Available at: http://www.siam.mg.gov.br/ | Environmental Legislation of Minas Gerais state | 2002; 2004 | N/A |
| 5 | Department of Environmental Development of Rondônia state portal. 2013. Available at: http://www.sedam.ro.gov.br/ | Environmental Legislation of Rondônia state | 2006 | N/A |
| 6 | Secretary of Urban Habitation, Regularization and Development portal. 2013. Available at: http://www.sedhab.df.gov.br/ | Environmental Legislation of Federal District | 2002 | N/A |

| | | | | |
|----|---|--|------------------|-----|
| 7 | Brazilian Environmental and Renewable Natural Resources Institute. Directorate of Sustainable Use of Biodiversity and Forests (IBAMA /DBFLO). 2007. Normas Florestais Federais para a Amazônia. | Federal Forest Norms for Amazon | 2003; 2006; 2007 | N/A |
| 8 | Mendes e Forster Júnior, 2002. Manual de redação da Presidência da República | Concept of Law, decree and ordinance | N/A | N/A |
| 9 | Acquaviva, M. C. 1999. Dicionário Acadêmico de Direito | Concept of normative instruction | N/A | N/A |
| 10 | Ministry of Environment, 2013. Available at: http://www.mma.gov.br | Federal Environmental Legislation | 2006; 2009 | N/A |
| 11 | Brazilian Legislation portal, 2013. Available at: http://www.diariodasleis.com.br | Brazilian Legislation | 2009 | N/A |
| 12 | Chico Mendes Institute for Biodiversity Conservation portal, 2013. Available at: http://www.icmbio.gov.br/ | Federal Legislation about Community Sustainable Forest Management Plan in Conservation Units | 2011 | N/A |

10.2.2 Classification and definitions

| National class | Definition |
|-----------------------|--|
| Law | Primary normative act of practical effects. Contains, as a rule, general and abstract rules [8]. |
| Decree | Administrative acts within the exclusive jurisdiction of the Chief Executive, intended to provide general or individual cases, provided abstractly, express or implied in law [8]. |
| Ordinance | Instrument by which Ministers or other authorities expedite instructions the organization and functioning of service and practice other acts of their jurisdiction [8]. |
| Normative Instruction | Administrative act expressed by written order expedited by the Head of Department or Minister of State to their subordinates, providing disciplinary rules that should be adopted in the operation of public service reworked or newly formed. Also considered as a rule expedited to interpret a law [9]. |
| Resolution | N/A |
| Execution Rule | N/A |

10.2.3 Original data

| | | |
|---|--|---|
| 1 | Law n. 7,797, of 10 th July 1989 | Institutes the National Fund for the Environment, in order to develop projects aimed at the rational and sustainable use of natural resources, including the maintenance, improvement or restoration of environmental quality in order to enhance the quality of life of the population [1]. |
| 2 | Law n. 9,985, of 18 th July 2000 | Institutes the National System of Conservation Units (SNUC), establishes criteria and norms for the creation, implementation, and management of protected areas and makes other provisions [1]. |
| 3 | Law n. 12,651, of 25 th May 2012 | Institutes the Forest Code. Provides on protection on the vegetation, Permanent Preservation Areas, Legal Reserve; exploration of forests and succeeding formations, the supply of forest raw materials, control the origin of forest products and the prevention and control of forest fires, and provides economic and financial instruments for the achievement of its objectives, and makes other provisions [1]. |
| 4 | Law n. 11,284, of 2 nd March 2006 | Provides for public forest management for sustainable production; creates the Brazilian Forest Service (SFB) in the structure of the Brazilian Ministry of the Environment; establishes the National Forest Development Fund (FNDF), and makes other provisions [1]. |

| | | |
|---|--|--|
| 5 | Decree n. 3,420, of 20 th April 2000 | Provides for the creation of the National Forests Program – PNF, and makes other provisions [1]. |
| 6 | Decree n. 4,340, of 22 th August 2002 | Regulates Articles of Law n. 9,985, of 18 th July 2000, which provides on the National System of Conservation Units (SNUC), and makes other provisions. Provides on the creation of Protected Areas, Management Plan, advisory, management and authorization to explore goods and services [1]. |
| 7 | Decree n. 5,975, of 30 th November 2006 | Regulates Articles of Law n. 4,771, of 15 th September 1965, of Law n. 6,938, of 31 st August 1981, of Law n. 10,650, of 16 th April 2003, alters and adds provisions to Decrees ns. 3,179, of 21 st September 1999, and 3,420, of 20 th April 2000, and makes other provisions. Provides on observations for the exploration, suppression and clear-cutting of forests and succeeding formations; Sustainable Forest Management Plan, Forest Replanting and License to transport forest by products [1]. |
| 8 | Decree n. 6,063, of 20 th March 2007 | Regulates, at the federal level, provisions of Law n. 11,284, of 2 nd March 2006, which provides on public forest management for sustainable production, and makes other provisions [1]. |
| 9 | Decree n. 6,527, of 1 st August 2008 | Provides for the establishment of the Amazon Fund by National Bank for Economic and Social Economic Development – BNDES [1]. |

| | | |
|----|---|--|
| 10 | Decree n. 6,874, of 5 th June 2009 | Institutes Federal Program for Community and Family Forest Management – PMCF, established under the Ministry of Environment and Ministry of Agrarian Development, whose goal is to organize management actions and fostering sustainable management in forests that are subject to use by farmers, settlers reform land and the traditional peoples and communities [1]. |
| 11 | Resolution n. 378, of 19 th October 2006 | Defines undertakings which may potentially cause national or regional environmental impacts and makes other provisions. Subjects forest exploration to an IBAMA's authorization [1]. |
| 12 | Resolution n. 379, of 19 th October 2006 | Creates and regulates the database on forest management at the National Environmental System – SISNAMA level [10]. |
| 13 | Resolution n. 406, of 2 nd February 2009 | Establishes technical parameters to be adopted in preparation, presentation, technical evaluation and implementation of Sustainable Forest Management Plan – PMFS with timber purpose, for native forests and their forms of succession in the Amazon [10]. |
| 14 | Normative Instruction n. 7, of 22 th August 2003 | Procedures related to the activities of the Sustainable Forest Management Plan which consider the exploration of mahogany (<i>Swietenia macrophylla</i> King) [7]. |

| | | |
|----|---|--|
| 15 | Normative Instruction n. 93, of 3 th March 2006 | Establishes technical norms for the presentation of maps and geo-referenced information about the localization of Legal Reserves and areas under forest management and respective subdivisions. Sustainable Forest Management Plans and authorization requests for alternative land use in the several Brazilian biomes, to be applied for at IBAMA and submitted to technical and juridical analysis, shall be accompanied by geo-referenced maps and forms prepared in accordance with technical norms and requirements set forth by this Normative Instruction [7]. |
| 16 | Normative Instruction n. 112, of 21 th August 2006 | Provides on the Document of Forest Origin – DOF and Declaration of Forest Products Supply, Forest Products Transport Authorization – ATPF [7]. |
| 17 | Normative Instruction n. 4, of 11 th December 2006 | Provides on the Previous Authorization for Technical Analysis of Sustainable Forest Management Plans – APAT, and makes other provisions [7]. |
| 18 | Normative Instruction n. 5, of 11 th December 2006 | Provides on technical procedures for the formulation, presentation, carrying-out, and technical evaluation of Sustainable Forest Management Plans – PMFS in primitive forests and succeeding forms thereof in the legally-defined Brazilian Amazon region (Legal Amazon), and makes other provisions [7]. |
| 19 | Normative Instruction n. 6, of 15 th December 2006 | Provides on forest replanting and forest raw-material consumption, and makes other provisions [7]. |

| | | |
|----|---|--|
| 20 | Normative Instruction n. 1, of 25 th June 2009 | Provides for technical procedures for preparation, presentation, execution and technical evaluation of Sustainable Forest Management Plans – PMFS for native forests and their forms of succession in the Caatinga, and makes other provisions [11]. |
| 21 | Normative Instruction n. 16, of 4th August 2011 | Regulates the guidelines and administrative procedures for the approval of the Community Sustainable Forest Management Plan – PMFS for exploration timber resources within Extractive Reserve, Sustainable Development Reserve and National Forest [12]. |
| 22 | Execution Rule n. 1, of 18 th December 2006 | Institutes the methodology and its model inspection report in order to subsidize the analysis of the Sustainable Forest Management Plans – PMFS [7]. |
| 23 | Execution Rule n. 1, of 24 th Abril 2007 | Institutes technical guidelines for development of Sustainable Forest Management Plans – PMFS [7]. |
| 24 | Execution Rule n. 2, of 26 th April 2007 | Institutes the Simplified Manual for Analysis of the Timber Forest Management Plan in Amazon in order to subsidize the analysis of the Sustainable Forest Management Plans – PMFS [7]. |
| 25 | Normative Instruction n. 2, of 11 th February 2008 | Provides for technical procedures for the preparation, presentation, implementation and technical evaluation of Small Scale Sustainable Forest Management Plans - PMFSPE in native forests and succeeding formations, less than 500 hectares in the state of Amazonas, and makes other provisions [2]. |

| | | |
|----|---|---|
| 26 | Normative Instruction n. 5, of 26 th February 2008 | Provides for technical procedures for the preparation, presentation, implementation and technical evaluation of Sustainable Forest Management Plans - PMFS in native forests and succeeding formations in the state of Amazonas, and makes other provisions [2]. |
| 27 | Law n. 10,431, of 20 th December 2006 | Provides for Environmental and Biodiversity Protection Policy of the State of Bahia, and makes other provisions [3]. |
| 28 | Ordinance n. 29, of 10 th May 2005 | Provides for guidelines for forest exploration, the forest management plan, the removal of native vegetation for changing the land use, special procedures for projects and activities within the Forests for the Future Program, the Forest Register of Rural Property - CFIR in the state of Bahia, and makes other provisions [3]. |
| 29 | Law n. 14,309, of 19 th June 2002 | Provides for Environmental and Biodiversity Protection Policy of the State of Minas Gerais [4]. |
| 30 | Decree n. 43,710, of 8 th January 2004 | Regulates Law n. 14,309, of June 19 th 2002 in the state of Minas Gerais [4]. |
| 31 | Decree n. 12,447, of 10 th October 2006 | Institutes the Forest Management in the state of Rondônia, and makes other provisions [5]. |
| 32 | Law n. 3,031, of 18 th July 2002 | Institutes the Forest Policy in the Federal District [6]. |

10.3 Data

Table 10

| Category | |
|----------|--|
| | |

| | National | Sub-national | | |
|--|-----------------|---------------------|-------------------------|--------------|
| | | Regional | Provincial/State | Local |
| Policies supporting sustainable forest management | yes | yes | yes | yes |
| ... of which, in <u>publicly</u> owned forests | yes | yes | yes | yes |
| ... of which, in <u>privately</u> owned forests | yes | yes | yes | yes |
| Legislation and regulations supporting sustainable forest management | yes | yes | yes | yes |
| ... of which, in <u>publicly</u> owned forests | yes | yes | yes | yes |
| ... of which, in <u>privately</u> owned forests | yes | yes | yes | yes |

10.4 Comments

| Variable / category | Comments related to data definitions etc |
|--|--|
| Policies supporting sustainable forest management | Many policies supporting sustainable forest management are regulated by Brazilian environmental laws. There are no specific local laws and policies, but municipalities follow the politics and legislation guidelines from state and country. |
| Legislation and regulations supporting sustainable forest management | There are no specific local laws and policies, but municipalities follow the politics and legislation guidelines from state and country. |

Other general comments

11. Is there a national platform that promotes stakeholder participation in forest policy development?

Documents for this question:

- [Guide for country reporting FRA 2015](#)
- [FRA 2015 Terms and Definitions](#)

11.1 Categories and definitions

| Category | Definition |
|-------------------------------|---|
| National stakeholder platform | A recognized procedure that a broad range of stakeholders can use to provide opinions, suggestions, analysis, recommendations and other input into the development of national forest policy. |

11.2 National data

11.2.1 Data sources

| | References to sources of information | Years | Additional comments |
|---|---|------------|--|
| 1 | Brazilian government portal. 2013. Available at: http://www.planalto.gov.br/ | 2000; 2006 | For consulting Decree n. 3,420, of 20th April 2000; Law n. 11,284, of 2nd March 2006 and Decree n. 5,975, of 30th November 2006. |
| 2 | N/A | N/A | N/A |
| 3 | N/A | N/A | N/A |
| 4 | N/A | N/A | N/A |

Table 11

| | |
|--|-----|
| Is there a national platform that promotes or allows for stakeholder participation in forest policy development? | yes |
|--|-----|

11.3 Comments

| Category | Comments related to data definitions etc |
|----------|--|
|----------|--|

| | |
|-------------------------------|--|
| National stakeholder platform | <p>National stakeholder platform that can be highlighted [1]: - National Forest Commission (CONAFLOR) CONAFLOR is the National Forest Commission, established by Decree 3,420/2000. The Commission provides guidelines on the implementation of the National Forests procedures and allows the joint participation of various interest groups in developing public policies for the forest sector. CONAFLOR has the main role in the process of putting in practice the National Program of Forests and by now it is dealing with the review of the National Forest Code, the National Report of Genetic Forest Resources, the National Study of Brazilian Forest Sector and the inclusion of the subject "Forests" in the multiannual Brazilian plans. It is composed of 39 representatives distributed equally between the government (20) and civil society (19), including some federal government agencies and entities, state environmental agencies, civil society groups, forestry sectors, NGOs and educational and research institutions.</p> <p>- Commission on Public Forest Management (CGFLOP)</p> <p>The Commission on Public Forest Management (CGFLOP) is an advisory body of the Brazilian Forest Service which aims to advise, evaluate and propose guidelines for the management of public forests in Brazil, especially regarding the Annual Plan on Forest Concession (PAOF), which deals with identification, selection and description of public federal forests or potential areas for concession. Besides that, the CGFLOP deliberates about different subjects such as Community and Family Annual Plan of Forest Management, The National Forest Inventory, The National Register of Public Forests, National Forest Development Fund, studies about the promotion of forest planting and also the research carried out by the Laboratory of Forest Products. The CGFLOP, established by the Law 11,284/2006 and regulated by the Decree 5,795/2006, is composed of 24 representatives appointed by the holders of the respective agencies, groups, organizations and sectors involved in the process and designated by the Minister of State for the Environment. The Commission meets, ordinarily, at least twice a year and extraordinarily at any time when called by its chairman or by request of at least one third of its members.</p> |
|-------------------------------|--|

Other general comments

12. What is the forest area intended to be in permanent forest land use and how has it changed over time?

Documents for this question:

- [Guide for country reporting FRA 2015](#)
- [FRA 2015 Terms and Definitions](#)

12.1 Categories and definitions

| Category | Definition |
|---|---|
| Forest area intended to be in permanent forest land use | Forest area that is designated or expected to be retained as forest and is highly unlikely to be converted to other land use. |
| ...of which permanent forest estate (<i>sub-category</i>) | Forest area that is designated by law or regulation to be retained as forest and may not be converted to other land use. |

12.2 National data

12.2.1 Data sources

| | References to sources of information | Variables | Years | Additional comments |
|---|---|------------------------------|-------|--|
| 1 | Sparovek et al., 2011. A revisão do Código Florestal Brasileiro. | Permanent Preservation Area | 2011 | 45°)" /> Only riparian systems defined as vegetation strips along water body and steep slopes (> 45°) |
| 2 | Brazilian Forest Service (SFB), 2013. National Public Forest Cadastre (CNFP). | Non Designated Public Forest | 2012 | It was assumed that the data of 2012 is the same as 2010 data since the majority of public forests in 2012 were already public forest in 2010. |
| 3 | N/A | N/A | N/A | N/A |
| 4 | N/A | N/A | N/A | N/A |

12.2.2 Classification and definitions

| National class | Definition |
|-----------------------------|--|
| Permanent Preservation 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. According Law nº 12,651, of 25th May 2012, the vegetation located in Permanent Preservation Area must be maintained by the owner of the area, possessor or occupier, person or entity, public or private. |

| | |
|------------------------------|--|
| Indigenous Land | Lands traditionally occupied and permanently inhabited by indigenous people, 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 unavailable properties of the federal government and the rights over them are nonprescription. Although indigenous people 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 people. |
| Non Designated Public Forest | Public Forests, natural or planted, located in different biomes under the control of the government without a defined destination. According Law n. 11,284, of 2nd March 2006, not destined Public Forests are unable to be converted to alternative land use. |
| Conservation Unit | Territorial space and its environmental resources, including jurisdictional waters, with relevant natural characteristics, legally instituted by the Government, with conservation objectives and limits, under special administration, which apply adequate assurances protection. The Brazilian conservation units are divided into two groups, with specific characteristics: Integral Protection Units and Sustainable Use Units. The basic goal of Integral Protection Units is to preserve nature, being admitted only the indirect use of its natural resources, except in cases provided by law. The basic objective of the Sustainable Use Units is reconciling nature conservation with sustainable use of a portion of its natural resources. |

12.2.3 Original data

| | |
|--|---------------------------|
| Permanent Preservation Area: The existing Permanent Preservation Area for 2010 was estimated based on a study [1]. | |
| Biome | PPA area in 2010 (000 ha) |
| Amazon | 22 000 |
| Caatinga | 9 000 |
| Savanna | 16 000 |
| Atlantic Forest | 6 000 |
| Pampa | 2 000 |
| Pantanal | 1 800 |
| Total | 56 800 |

Public Forests: Public Forests were obtained from the National Public Forest Cadastre (Cadastro Nacional de Florestas Públicas – CNFP) for year 2012. This cadastre includes Conservation Unit, Indigenous Land and Not Destined Public Forests.

| Permanent Forest Estate Area | |
|--------------------------------------|---------------------|
| | Total area (000 ha) |
| Permanent Preservation Area | 56 800 |
| Public Forest | 308 085.36 |
| Total Permanent Forest Estate | 364 885.36 |

12.3 Analysis and processing of national data

12.3.1 Adjustment

12.3.2 Estimation and forecasting

12.3.3 Reclassification

| FRA Classes | National class |
|-------------------------|---|
| Permanent Forest Estate | Permanent Preservation Area + Public Forest |

12.4 Data

Table 12

| Categories | | Forest area 2010 (000 ha) |
|---|---|---------------------------|
|  | Forest area intended to be in permanent forest land use | |
|  | ... of which permanent forest estate | 364885.36 |

Tiers

| Category | Tier for status |
|----------|-----------------|
| | |

| | |
|---|--------|
| Forest area intended to be in permanent forest land use | Tier 1 |
| Permanent forest estate | Tier 1 |

Tier Criteria

| Category | Tier for status |
|---|---|
| Forest area intended to be in permanent forest land use | Tier 3 : National or sub-national land use plans strategy documents or other reports within the past 10 years Tier 2 : National or sub-national land use plans strategy documents or other reports within the past 20 years Tier 1 : Other |
| Permanent forest estate | Tier 3 : National or sub-national land use plans strategy documents or other reports within the past 10 years Tier 2 : National or sub-national land use plans strategy documents or other reports within the past 20 years Tier 1 : Other |

12.5 Comments

| Category | Comments related to data definitions etc |
|---|---|
| Forest area intended to be in permanent forest land use | As Brazilian legislation already provides areas for conservation on private forest lands, as Permanent Preservation Areas and Legal Reserves, and also because there is a difference between what the law requires and what is actually protected, rather than there being a forest area intended to be in permanent forest land use larger than Permanent Forest Estate, there is a deficit between what the law requires and what actually exists in Permanent Forest Estate. An example of this difference can be noted in the following table: - Required by law (ha): 100 000 000; - Existing (ha): 56 800 000; - Deficit (ha): 43 200 000; - Deficit (%): 43.2. |
| Permanent forest estate | N/A |

Other general comments

13. How does your country measure and report progress towards SFM at the national level?

Documents for this question:

- [Guide for country reporting FRA 2015](#)
- [FRA 2015 Terms and Definitions](#)

13.1 Categories and definitions

| Category | Definition |
|--|--|
| Forest area monitored under a national forest monitoring framework | Forest area monitored by a national monitoring framework or systems that provide measurement based periodic monitoring of forest extent and quality. |
| Forest reporting at national scale | National reporting of forest extent and characteristics that includes some measure of progress toward sustainable forest management. |

13.2 National data

13.2.1 Data sources

| | References to sources of information | Variables | Years | Additional comments |
|---|---|---|------------------------|---------------------|
| 1 | Brazilian Forest Service (SFB). 2013. Available at: www.florestal.gov.br . | Forest Inventory Area; Forest reports at the national level; Evaluation study of forest areas in Legal Reserve and Permanent Preservation Area; Periodic national state of the forest report; Implementing regulation of the National Permanent Plots System – SisPP; Area of Permanent Plots registered in the National Permanent Plots System – SisPP | 2008; 2010; 2013; 2014 | N/A |
| 2 | Brazilian Institute of Geography and Statistics (IBGE). 2014. Available at: http://www.ibge.gov.br . | Brazilian States Area | 2014 | N/A |
| 3 | National Institute for Space Research (INPE). 2013. Available at: http://www.obt.inpe.br/ . | Forest area in Legal Amazon monitored by remote | 2013 | N/A |
| 4 | Sparovek et al., 2010. Brazilian agriculture and environmental legislation: status and future challenges | Evaluation study of forest areas in Legal Reserve and Permanent Preservation Area | 2010 | N/A |
| 5 | Sparovek et al., 2011. A revisão do Código Florestal Brasileiro. | Evaluation study of forest areas in Legal Reserve and Permanent Preservation Area | 2011 | N/A |

| | | | | |
|----|---|--|-----------|-----|
| 6 | Ipea, 2011. Código Florestal: Implicações do PL1876/99 nas áreas de Reserva Legal. | Evaluation study of forest areas in Legal Reserve | 2011 | N/A |
| 7 | Miranda et al., 2008. Alcance Territorial da Legislação Ambiental e Indigenista. | Evaluation study of forest | 2008 | N/A |
| 8 | International Tropical Timber Organization (ITTO), 2010. Criteria and Indicators for the Sustainable Management of Tropical Forests. Reporting Questionnaire for Indicators at the National Level. | Criteria and Indicators national report toward forest | 2010 | N/A |
| 9 | United Nations Forum on Forest (UNFF), 2010. National Report to the Tenth Session of the United Nations Forum on Forests. | Criteria and Indicators national report toward forest | 2010 | N/A |
| 10 | Ministry of Environment (MMA). 2011. National Report to the Convention on Biological Diversity. | Forest reports at the national level | 2011 | N/A |
| 11 | Brazilian Association of Planted Forest Producers (ABRAF), 2013. Annual report of silviculture and forest productivity of planted forests in Brazil. | Forest reports at the national level | 2013 | N/A |
| 12 | Brazilian Environmental and Renewable Natural Resources Institute. Remote Sensing Center (IBAMA / CSR), 2013. Available at: http://siscom.ibama.gov.br/monitorabiomas . | Forest area in Cerrado (Savanna), Atlantic Forest, Caatinga, Pampa e Pantanal biomes monitored by remote sensing | 2002-2008 | N/A |

13.2.2 Classification and definitions

| National class | Definition |
|------------------|---|
| Forest inventory | The National Forest Inventory (IFN) is a forest inventory that covers the whole country, repeated periodically, every five years, using sampling techniques to enable continuous monitoring of Brazilian forest resources, with the principal purpose of providing information to support the definition of forest policies, management of forest resources and the development of plans for the use and conservation of forest resources [1]. As the implementation of this project is recent, the first measurement was performed in only six states. Thus, the percentage of the forest area that is monitored in category |

| | |
|--|--|
| Other field assessments | The percentage of forest area monitored by other field assessments was based on the sum of the all permanent plots areas allocated in the country, in forest areas, which are registered in the National Permanent plots – SisPP. The permanent plots already installed in areas under forest concession were also added, once they will also be integrated into SisPP [1]. The calculated value (0.000217%) is underestimated because there are Permanent Plots allocated in the field which are not yet registered in SisPP yet. The main objective of National System of Permanent Plots (SisPP) is monitoring the dynamics of natural and planted forests, located in different biomes, for research purposes. |
| Updates to other sources* | The National Institute for Space Research (INPE) has a program for monitoring the Amazon by Remote Sensing, with three operating and complementary systems: PRODES, DETER and DEGRAD [3]. The images used are from the LANDSAT satellite and form a grid covering the entire Amazon, made up of a set of points and orbits. The PRODES system monitors the deforestation of forest in the Legal Amazon. It is a systematic survey done since 1988 to estimate the annual rate of deforestation, and detects exclusively deforestation type |
| Expert estimate | We considered studies and analyzes of experts on assessment of Brazilian forest resources, based on literature searches, analysis of satellite images, and access to consolidated basis of secondary data, both from research institutes as environmental agencies. In these works are carried out interpolations, extrapolations and estimations to find out about the quality and extent of forests, considering different scenarios of public policy and forest and/or environmental legislation [1,4,5,6,7]. |
| Criteria and Indicators reporting | - Criteria and Indicators for the Sustainable Management of Tropical Forests - Reporting Questionnaire for Indicators at the National Level (International Tropical Timber Organization – ITTO) [8] - National Report to the Tenth Session of the United Nations Forum on Forests (UNFF) [9] |
| Periodic national state of the forest report | - Forest of Brazil in summary (annual periodicity) [1]; - Annual report of silviculture and forest productivity of planted forests in Brazil [11] |
| Other forest reports at the national level | - Sustainable Use and Conservation of Forest Resources in Caatinga [1]; - Technical Report Brazilian Production Native Forests [1]; - Management of Public Forests (annual periodicity) [1]; - Final Report of the Annual Plan of Community and Family Forest Management [1]; - National Report to the Convention on Biological Diversity [10] |

13.3 Data

Table 13a

| Category | % of total forest area | Most recent year | Check all boxes that apply | | | | | |
|----------|------------------------|------------------|----------------------------|----------|------------------------|------------------------|------------------------------------|-------------------------------------|
| | | | Continuous | Periodic | Permanent ground plots | Temporary ground plots | Aerial/remote sensing sample based | Aerial/remote sensing full coverage |
| | | | | | | | | |

| | | | | | | | | |
|--------------------------|----------|------|-----|-----|-----|----|----|----|
| Forest inventory | 8.83 | 2014 | yes | no | yes | no | no | no |
| Other field assessments | 0.000217 | 2010 | yes | no | yes | no | no | no |
| Updates to other sources | 70 | 2012 | yes | yes | | | | |
| Expert estimate | 100 | 2013 | | | | | | |

Table 13b

| Type of forest reporting used at national scale | Check boxes that apply |
|---|------------------------|
| 1 Criteria and Indicators reporting | yes |
| 2 Periodic national state of the forest report | yes |
| 3 Other (please document) | yes |
| 4 None | no |

| Other type of forest reporting |
|--------------------------------|
| N/A |

13.4 Comments

| Category | Comments |
|--------------------------------------|---|
| 1. Criteria and Indicators reporting | <p>- Criteria and Indicators for the Sustainable Management of Tropical Forests - Reporting Questionnaire for Indicators at the National Level (International Tropical Timber Organization – ITTO) [8]: ITTO developed criteria and indicators to define, assess and monitor progress towards sustainable management of natural tropical forests. They list the main factors that influence the health and productivity of a forest ('criteria') and suggest indicators that, if measured over time, will help managers assess the extent to which management practices are consistent with the sustainability of forests and of forest-dependent communities. For this reason, ITTO devotes considerable resources to the practical application of criteria and indicators, conducting national-level workshops in tropical member countries to train government officials in applying the criteria and indicators.</p> <p>- National Report to the Tenth Session of the United Nations Forum on Forests (UNFF) [9]: The objective of this report is to complement ongoing reporting by other processes and focuses on identifying critical gaps in international and national reporting, and on issues that are not sufficiently covered by other reporting processes such as forest financing and forest contributions to the achievement of the Millennium Development Goals (MDG's). It helps to measure better the progress achieved across the full scope of the forest instrument and its Global Objectives on Forests (GOF's).</p> |

| | |
|---|---|
| 2. Periodic national state of the forest report | <p>- Forest of Brazil in summary (annual periodicity) [1]: This book allows a simple, accurate and update vision of Brazilian forests, both natural and planted, showing their value in national and international scenarios. It is based on data from national sources that are involved directly in management, use and conservation of brazilian forests. The main data are protection status of forests, state of degradation of forests, Sustainable Management Forests, forest management, social and economic aspects and forest research and education. It also shows a comparison between Brazilian data and international ones.</p> <p>- Annual report of silviculture and forest productivity of planted forests in Brazil [11]: This report shows the main indicators of the areas with planted forests in Brazil. It shows the extension and the species of trees planted, production and consumption of wood products, the economic value of monoculture of exotic trees, available technologies and productivity, investments and financing possibilities for this industry and also some questions regarding the environment and programs of social and environmental responsibility.</p> |
|---|---|

| | |
|----------------------------|--|
| 3. Other (please document) | <p>- Sustainable Use and Conservation of Forest Resources in Caatinga [1]: This work shows the knowledge of more than 25 years of study and research about one of the most important Brazilian biomes – “Caatinga” and its potential of providing the development of the Northeast Region of Brazil. This publication has a brief characterization of Caatinga biome; it deals with Caatinga’s forest resources management with emphasis in the sustainable forest management for wood products and also no wood products. It also shows the existing Forest Management nets in Caatinga and some case studies about Sustainable Forest Management and Biodiversity of the biome.</p> <p>- Technical Report Brazilian Production Native Forests [1]: This report analyzes how to balance the demand for wood products from the Brazilian native forests, mainly in Amazonian region, and at the same time, how to assure the preservation of the ecological functions of the ecosystems that provide local and global benefits.</p> <p>- Management of Public Forests (annual periodicity) [1]: This document reports the principal actions developed by Brazilian Forest Service relative to public forests management, such as the National Cadastre of Public Forests, the forest concession and the National Fund of Forest Development. In this publication one may find if the dealers of the concessions are paying properly their financial obligations, the Sustainable Management Forest Plans and their status in terms of execution, the inspections and audits that have been made and their results, as well as relevant information about the effectiveness of the goals of the public forest management.</p> <p>- Final Report of the Annual Plan of Community and Family Forest Management [1]: This report shows the results of the actions provided by the Community and Family Annual Plan of Forest Management regarding Amazon and Caatinga biomes. It shows a view of the community and familiar forests in Brazil; the evolution and the update situation of the community and familiar forest management; the areas that have been managed by community and familiar way; the main policies and the legal framework of the federal government related to the subject; principal needs and the required actions to mitigate it.</p> <p>- National Report to the Convention on Biological Diversity [10]: The Brazilian National Report to the Convention of Biological Diversity shows the country’s progress in terms of achieving the global goal of reducing significantly the rate of loss of biological diversity. This report presents a significant amount of data about local biodiversity. It is organized in a way to provide a wide view of the situation of the Brazilian biodiversity and ecosystems.</p> |
|----------------------------|--|

Other general comments

14. What is the area of forest under a forest management plan and how is this monitored?

Documents for this question:

- Guide for country reporting FRA 2015
- FRA 2015 Terms and Definitions

14.1 Categories and definitions

| Category | Definition |
|--|---|
| Forest area with management plan | Forest area that has a long-term documented management plan, aiming at defined management goals which is periodically revised |
| ...of which for production (<i>sub-category</i>) | Forest management plan mainly focused on production |
| ...of which for conservation (<i>sub-category</i>) | Forest management plan mainly focused on conservation |
| Monitoring of forest management plans | Government monitoring of forest management plan implementation conducted through field visits or audits of forest management plan performance |

14.2 National data

14.2.1 Data sources

| | References to sources of information | Variables | Years | Additional comments |
|---|--|--|------------------|--|
| 1 | Ministry of Environment (MMA), 2013. National Conservation Units Cadastre (CNUC). | Conservation Units with management plan (Area and year) | 2010 | N/A |
| 2 | Brazilian Forest Service (SFB). 2013. | Forest area with Sustainable Forest Management Plan at the Amazon and Caatinga biomes | 2010 | Personal Contact |
| 3 | Chico Mendes Institute for Biodiversity Conservation portal, 2013. Available at: http://www.icmbio.gov.br/ | Access to Management Plans of the federal Conservation Units | 1990-2013 | N/A |
| 4 | Research Institute Imazon portal. 2013. Available at: http://www.imazon.org.br/ | Access to Management Plans of the State of Pará Forest | 2011 | N/A |
| 5 | Brazilian government portal. 2013. Available at: http://www.planalto.gov.br/ | Federal Environmental Legislation that includes items required in forest management plans in Brazil. | 2006; 2007; 2012 | For consulting Decree n. 5,975, of 30th November 2006; Decree n. 6,063, of 20th March 2007 and Law n. 12,651, of 25th May 2012 |

| | | | | |
|---|--|---|------|--|
| 6 | Brazilian Environmental and Renewable Natural Resources Institute. Directorate of Sustainable Use of Biodiversity and Forests (IBAMA /DBFLO). 2007. Normas Florestais Federais para a Amazônia. | Environmental legislation that includes items required in forest management plans in Brazil | 2007 | For consulting Execution Rule n. 1, of 24th April 2007 and Execution Rule n. 2, of 26th April 2007 |
| 7 | Brazilian Association of Planted Forest Producers (ABRAF), 2011. Anuário estatístico da ABRAF 2011: ano base 2010. Available at: http://www.abraflor.org.br/estatisticas.asp | Forest Plantations | 2010 | N/A |

14.3 Data

Table 14a

| Forest plan type | Forest area 2010 (000 ha) |
|----------------------------------|---------------------------|
| Forest area with management plan | 57809.75 |
| ... of which for production | 17030.42 |
| ... of which for conservation | 40779.33 |

Table 14b

| Indicate which (if any) of the following are required in forest management plans in your country | |
|--|-----|
| 1 Soil and water management | yes |
| 2 High conservation value forest delineation | yes |
| 3 Social considerations community involvement | yes |

Table 14c

| Percent of area under forest management plan that is monitored annually | 5 |
|---|---|
|---|---|

Tiers

| Category | Tier for status |
|---|-----------------|
| Forest area with management plan | Tier 1 |
| Percent of area under forest management plan that is monitored annually | Tier 1 |

Tier criteria

| Category | Tier for status |
|----------|-----------------|
|----------|-----------------|

| | |
|---|---|
| Forest area with management plan | Tier 3 : Reports that describe national records 5 years old or less that contain long-term forest monitoring plans Tier 2 : Industry or other records indicating the presence of a long-term forest management plan Tier 1 : Other |
| Percent of area under forest management plan that is monitored annually | Tier 3 : Government documentation of monitoring extent Tier 2 : Reports from forest managers or other documental sources Tier 1 : Other |

14.4 Comments

| Category | Comments |
|----------------------------------|--|
| Forest area with management plan | Forest area with management plan for conservation: It was considered areas from Conservation Units with management plan, including National Forests and State Forests [1, 3, 4]. Forest area with management plan for production: Besides the areas of production located inside the National and State Forests, it was considered forests located in private lands in Caatinga and Amazon biomes with approved Sustainable Forest Management Plan [1, 3, 4]. The sources of these data are IBAMA and the environmental state departments that are in charge of forest management in Caatinga and Amazon biomes. The other Brazilian biomes were not considered because their areas for production with Sustainable Forest Management Plan are negligible [2]. Planted Forest area was also considered as forest with management plan for production. The areas for production with Sustainable Forest Management Plan in areas under forest concession were already considered as production area of National Forests. In the enquiry to the environmental state departments, it was considered just the Sustainable Forest Management Plan under their responsibility. Since 2006, after the approval of the Law n. 11,284/2006, the management of forest resources was decentralized and it was transferred from Federal Government to State governments. |

| | |
|--|--|
| Items required in forest management plans | Brazilian legislation that guides the Sustainable Forest Management includes all three items [5, 6]. The Law n. 12,651/2012 and the Decree 5,975/2006 consider that the Sustainable Forest Management Plan must include procedures that are in harmony with the environment in terms of the existing trees in the area. The technical and scientific assumptions must include: characterization of physical and biological environment and of the existing stock, besides that it must include the measures to mitigate social and environmental impacts. At The Sustainable Forest Management Plan for management units inside areas under forest concession, as defined in the Decree n. 6,063/2007, it is mandatory to prepare an Environmental Preliminary Report. This Report must consider, among many things, the description of the soil, the landscape and water resources. Besides that, it must include the characterization of the areas for community use, priority areas for conservation, indigenous lands and quilombola communities that are in the neighborhood of the management units. It must also identify the potential environmental and social negative impacts in order to avoid and mitigate them. The Execution Rule n. 1/2007 describes the basic guidelines to the presentation of Sustainable Forest Management Plan. It includes, among other items, the following: - description of social environment, showing the land use; different types of existing social organization; possible improvements in the life quality of local people from the activities of forest management; the benefits from the integration between the project and the community; and the possibility of use of local labor; - list containing the forest species to be protected and to be managed. It also must explain the measures to be adopted to protect the trees located in the Permanent Preservation Area; - The Macrozoning of the property, indicating the Permanent Preservation Area; the areas of Legal Reserve and also the other areas that must be preserved, such as, Areas with High Value for Conservation; Absolute Reserves and areas of cultural or historical values. |
| Area under forest management plan that is monitored annually | After the required authorization to start the management activities, the environmental departments in charge of the area must do an auditing and monitoring of these exploring activities by visiting the areas in order to ensure that the law is been enforced. A model of methodology of field visit may be seen as Manual of Field Visit to Timber Forest Management in Amazonian Region (Execution Rule n. 2/2007). In this manual, the auditors must analyze, among other items, if the trees selected to be cut and the ones that have been already cut are not located in Permanent Preservation Areas. They also must look for any signals of camping sites, invasion, exploration or skid trails inside the Permanent Preservation Areas [6]. In Brazil, the total area under Management Plan is divided in portions which are allowed to be explored in a given year, during the term of management plan. The sum of these allowed areas for exploration of each year that is monitored annually by the environmental departments, which means around 5% of the total area under Sustainable Forest Management Plan. |

Other general comments

15. How are stakeholders involved in the management decision making for publicly owned forests?

Documents for this question:

- [Guide for country reporting FRA 2015](#)
- [FRA 2015 Terms and Definitions](#)

15.1 Categories and definitions

| Category | Definition |
|-------------------------|---|
| Stakeholder involvement | Stakeholder involvement is defined as significant inputs into at least one aspect of forest management at the operational scale |

Table 15

| Please indicate the type of stakeholder involvement in forest management decision making required in your country | |
|---|-----|
| 1. Planning phase | yes |
| 2. Operations phase | yes |
| 3. Review of operations | yes |

Tiers

| Category | Tier for status |
|----------------------------|-----------------|
| Type of stakeholder inputs | Tier 2 |

Tier criteria

| Category | Tier for status |
|----------------------------|--|
| Type of stakeholder inputs | Tier 3 : Government (national or sub-national) documentation of stakeholder inputs Tier 2 : Government (national or subnational) requirement but stakeholder inputs not documented Tier 1 : Other |

15.2 Comments

| Category | Comments |
|----------|----------|
| | |

| | |
|--------------------|--|
| Conservation Units | <p>According with the National System of Conservation Units, established by Law n. 9,985/2000 and regulated by the Decree n. 4,340/2000, the Conservation Units must have a Management Council. One of the core competencies of this Council is to supervise the preparation, implementation and review of the Management Plan of the Conservation Unit to guarantee their participative feature. This Management Council may be consultative or deliberative depending on the category of the Unit. All the Conservation Units belonging to the group of Integral Protection must have a Consultative Council, as well as the National Forests, that are from the group of Sustainable Use. The Extractive Reserves and the Sustainable Development Reserves, both from the group of Sustainable Use, must be managed by a Deliberative Council. The Management Council from the Conservation Units may be formed by representatives of public bodies, representatives of the organized civil society and from the resident population, depending on the situation. This Law also defines that it must be ensured broad participation of the local population in all the steps of preparing, updating and implementation of the Management Plan of the Extractive Reserves, of the Sustainable Development Reserves, of the Areas of Environmental Protection, of the National Forests and of the Areas of Relevant Ecological Interest. In the cases of Community Forest Management in Extractive Reserves, Sustainable Development Reserves and National Forests it must have a Contract of Concession of Use with the beneficiary traditional population. Also the proponent and the beneficiary of the Sustainable Forest Management Plan must be an entity legally formed by beneficiary traditional populations which will be also responsible for the administrative and financial management of the forest undertaking (Normative Instruction n. 16/2011). In the Conservation Units with Sustainable Use, in the categories of Extractive Reserve and Sustainable Development Reserve, it may be done a Participative Plan. This Plan must consider, among many other considerations, the promotion of the necessary and appropriate ways of an effective participation of the traditional populations in the decision-making processes and also their main role in the management of the Unit. Besides the Deliberative Council, the systems of organization and social representation and the spaces of collective decision, formal or informal, of the traditional communities that live in the area; the public decisions and work groups with the majority of representatives of the traditional population are considered spaces and instances of participation.</p> |
|--------------------|--|

| | |
|---|--|
| Public Forests under Forest Concessions | In the process of concession of public forests, stakeholder involvement in forest management decision is evidenced in all the steps. During the preparation, the population must be heard. There must be a Public Audience before the publication of the bidding documents of each lot of forest concession. And also at any time any person can have access to the contracts, decisions or opinions related to the bidding or related to the concessions. The Public Audiences have the target to allow to the many different stakeholders the possibility of participating with comments and suggestions about the subject in discussion (Decree n. 6,063/2007). In the cases of concession of National Forests, State Forests and Municipal Forests in order to elaborate the bidding and the contract of forest concession, it must be heard the respective Consultative Council. This council must follow all the steps of forest concession process. The concessionaire that win the bidding will be responsible for the preparation, execution and monitoring the execution of the Sustainable Forest Management Plan (Law n. 11,284/2006). |
| N/A | N/A |

Other general comments

16. What is the area of forest under an independently verified forest certification scheme?

Documents for this question:

- Guide for country reporting FRA 2015
- FRA 2015 Terms and Definitions

16.1 Categories and definitions

| Category | Definition |
|---|--|
| FSC certification | Forest area certified under the Forest Stewardship Council certification scheme |
| PEFC certification | Forest area certified under the Programme for the Endorsement of Forest Certification scheme |
| Other international forest management certification | Forest area certified under an international forest management certification scheme with published standards and is independently verified by a third-party, excluding FSC and PEFC certification. |
| Certified forest area using a domestic forest management certification scheme | Area certified under a forest management certification scheme with published standards that are nationally recognized and independently verified by a thirdparty |

16.2 Data

Table 16a

| International forest management certification | | Forest area (000 ha) | | | | | | |
|---|-------|----------------------|---------|---------|---------|---------|---------|---------|
| | | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 |
|  | FSC | 638.41 | 940.09 | 1240.68 | 1336.83 | 1615.27 | 3119.28 | 3281.87 |
|  | PEFC | 0 | 0 | 0 | 0 | 0 | 554.99 | 554.99 |
|  | Other | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | |
|  | FSC | 4839.64 | 5385.81 | 5331.21 | 5169.33 | 6382.95 | 6479.54 | |
|  | PEFC | 882.65 | 1114.41 | 1285.22 | 2183.01 | 1858.88 | 2204.67 | |
|  | Other | 0 | 0 | 0 | 0 | 0 | 0 | |

Table 16b

| Domestic forest management certification | | Forest area (000 ha) | | | | | | |
|---|--------|----------------------|------|------|------|------|------|------|
| | | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 |
|  | 1.Name | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
|  | 2.Name | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
|  | 3.Name | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

| | | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | |
|---|--------|------|------|------|------|------|------|--|
|  | 1.Name | 0 | 0 | 0 | 0 | 0 | 0 | |
|  | 2.Name | 0 | 0 | 0 | 0 | 0 | 0 | |
|  | 3.Name | 0 | 0 | 0 | 0 | 0 | 0 | |

Tier criteria

| Category | Tier for status |
|--|--|
| International forest management certification | Tier 3: International forest management scheme records maintained by the certifying organization for the reporting year Tier 2: International forest management scheme records reported by the certifying organization for a period 2 years prior to the reporting year Tier: 1 Other |
| Domestic forest management certification | Tier 3: National registry reports for domestic forest management certification maintained by the certifying organization for the reporting year Tier 2: Domestic forest management scheme records reported by the certifying organization for a period 2 years prior to the reporting year Tier: 1 Other |

Tiers

| Category | Tier for status |
|--|-----------------|
| International forest management certification | Tier 3 |
| Domestic forest management certification | Tier 3 |

16.3 Comments

| Category | Comments related to data definitions etc |
|---|---|
| Certified forest area using an international forest management certification scheme | At Brazil, there are forest areas certified under Forest Stewardship Council and under Programme for the Endorsement of Forest Certification scheme. The Brazilian Forest Certification Program – Cerflor was assessed and endorsed by PEFC in 2005, therefore it was considered in the international forest management certification scheme category. The information about forest area certified under the Forest Stewardship Council certification scheme was obtained through personal contact with the FSC's office in Brazil. The information about forest area certified under the Programme for the Endorsement of Forest Certification scheme was obtained through personal contact with the Directorate of Compliance of the National Institute of Metrology, Quality and Technology (INMETRO). |
| Domestic forest management certification | There is no domestic forest management certification, because the Brazilian Forest Certification Program – Cerflor was assessed and endorsed by PEFC, therefore it was considered in the international forest management certification scheme category. |

Other general comments

| |
|--|
| |
|--|

17. How much money do governments collect from and spend on forests?

Documents for this question:

- [Guide for country reporting FRA 2015](#)
- [FRA 2015 Terms and Definitions](#)

17.1 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 revenue include: <ul style="list-style-type: none"> • <u>Goods</u> : roundwood; sawnwood; biomass; woodbased panels; pulp and paper and non-wood forest products. • <u>Services</u> : including concession fees and royalties, stumpage payments, public timber sales revenue taxes and charges based on forest area or yield, taxes on domestic trade and export of forest products, special levies on forestry activities and payments into forest related funds, other miscellaneous inspection, licence and administrative fees levied by forest administrations, permit and licence fees for recreation and other forest related activities. |
| Public expenditure on forestry | All government expenditure on forest related activities. |

17.2 National data

17.2.1 Data sources

| | References to sources of information | Variables | Years | Additional comments |
|---|---|--|----------------|--|
| 1 | Brazilian Statistics Institute – IBGE, Pesquisa Industrial Anual – Produto. www.ibge.gov.br | Government revenue collected from domestic production and trade of forest products | 2000 2005 2010 | Refers to data on industrial production in Brazil, by product. |
| 2 | AFONSO and MEIRELLES. Carga Tributária Global no Brasil, cálculos revisitados, Caderno nº 75, NEPP- Unicamp | Government revenue collected from domestic production and trade of forest products | 2000 2005 2010 | Refers to sources of information on tax rates for calculating forest revenue: - Goods and Services Tax (ICMS); - Industrial Products Tax (IPI). |
| 3 | Brazilian Statistics Institute – IBGE. Extração Vegetal-Silvicultura (Plant Extraction-Silviculture): PEVS Available at: www.ibge.gov.br | Government revenue collected from domestic production and trade of forest products | 2000 2005 2010 | Refers to data on the production of products from “Native Forests and Planted Forests” and of “Non-Wood Forest Products”. |
| 4 | Ministry of Environment/ Brazilian Forest Service - SFB. Concession Management Office. Data upon special request. | Government revenue (forest services) | 2010 | Refers to data on Public Forest Concession. |

| | | | | |
|---|---|---|----------------|--|
| 5 | Ministry of Environment/ Chico Mendes Institute for Biodiversity Conservation – ICMBio. Relatório de Gestão de 2010. Brasília: ICMBio, 2011. | Government revenue (forest services) | 2010 | Refers to data on Government revenue from conservation units: a) Recreation fees; b) Licensing and c) Rent regarding other services such as restaurants, etc. |
| 6 | Ministry of Environment/ Brazilian Environmental and Renewable Natural Resources Institute (IBAMA). Data upon special request. | Government Revenue (forest services) | 2010 2005 2001 | Refers to data on Government revenue from conservation units - a) Recreation fees; b) Licensing and c) Rent regarding other services such as restaurants, etc. - (only for 2000 and 2005) and other forest revenues such as fines and commerce of forest products (2000, 2005 and 2010). |
| 7 | BRAZIL, Annual Budget Law, LOA. Senado Federal (Siga Brasil). | Governmental Operational expenditure | 2010 2005 2001 | Data on government forest expenditures does not include personnel and management expenditure because it is not possible to disaggregate this source only for the forest sector. Data provided for 2000 refer to 2001. |

17.3 Data

Table 17

| Category | Revenues / expenditures (000 local currency) | | |
|--------------------------------|--|---------|---------|
| | 2000 | 2005 | 2010 |
| Forest revenue | 2476978 | 5628343 | 6371309 |
| Public expenditure on forestry | 166206 | 156146 | 287973 |
| | 2000 | 2005 | 2010 |
| Name of Local Currency | Real | Real | Real |

17.4 Comments

| Category | Comments related to data definitions etc |
|----------|--|
|----------|--|

| | |
|--------------------------------|---|
| Forest revenue | The high increase of 127% from 2000 and 2005 reflects an underestimation of PIA data for 2000 based on two methodological factors. The first one refers to the fact that some forest related sectors were covered only up to 60%. The second factor refers to the number of enterprises included in the industry registry. In fact, the number of industries included in the Annual Industry Survey went from 10.623 in 2000 to 33.200 in 2005. The small increase (13%) between 2005 and 2010 can be explained by the decrease of IPI and ICMS on GDP. Estimates for 2010 include government revenues collected from goods and services. Revenues from services represent around 5% of total government forest revenues. Revenues from other services from conservation units (recreation fees, licensing, fines, rent, etc.) represent the majority of total government forest revenues, around 87% in 2000, 2005 and 2010. |
| Public expenditure on forestry | Operational expenditure Data based on consultation to the Federal Budget. The programs selected were those related to forest activities. Data does not include personnel and management expenditure since available data refers to total environmental activities, not only forests. Between 2000 and 2005 public expenditure on forests had a small decrease and between 2005 and 2010 an increase of 84%. |
| Other general comments | N/A |

Other general comments

18. Who owns and manages the forests and how has this changed?

Documents for this question:

- [Guide for country reporting FRA 2015](#)
- [FRA 2015 Terms and Definitions](#)

18.1 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. |
| ...of which owned by the state at national scale (<i>sub-category</i>) | Forest owned by the State at the national scale or administrative units of the public administration or by institutions or corporations owned by the public administration. |
| ...of which owned by the state at the sub-national government scale (<i>sub-category</i>) | Forest owned by the State at the sub-national government scale 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 cooperatives corporations and other business entities, private, religious and educational institutions, pension or investment funds, NGOs, nature conservation associations and other private institutions. |
| ...of which individuals (<i>sub-category</i>) | Forest owned by individuals and families. |
| ...of which private business entities and institutions (<i>sub-category</i>) | Forest owned by private corporations cooperatives companies and other business entities as well as private nonprofit organizations such as NGOs nature conservation associations, and private religious and educational institutions etc. |
| ...of which local tribal and indigenous communities (<i>sub-category</i>) | Forest owned by a group of individuals belonging to the same community residing within or in the vicinity of a forest area or forest owned by communities of indigenous or tribal people. The community members are coowners that share exclusive rights and duties and benefits contribute to the community development. |
| Unknown ownership | Forest area where ownership is unknown includes areas where ownership is unclear or disputed. |
| Categories related to management rights of public forests | Definition |
| 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 companies | Forest management rights and responsibilities are transferred from the Public Administration to corporations, other business entities private cooperatives, private nonprofit 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. |

18.2 National data

18.2.1 Data sources

| | References to sources of information | Variables | Years | Additional comments |
|---|---|--------------------------------------|----------------------------|--|
| 1 | Ministry of Environment - MMA / Brazilian Forest Service – SFB, 2012 National Public Forestry Registry. Available at: www.florestal.gov.br | Forests in Public Lands | 2012 | It was assumed 2012 data for 2010. |
| 2 | Brazilian Statistics Institute – IBGE, 1980, 1985, 1995 and 2006 Agriculture and livestock Census | Forests area in private properties | 1980, 1985, 1995, and 2006 | This data includes private agriculture and livestock establishments from Brazilian Census and Remnant quilombola. It is not possible to discriminate the Census data for individual ownership or private business entities and institutions. |
| 3 | SEPPIR Management Report 2003-2006. Available at: http://www.seppir.gov.br/publicacoes/relatorio_gestao_2003_2006.pdf and http://www.incra.gov.br/index.php/estrutura-fundiaria/quilombolas/file/108-titulos-expedidos-as-comunidades-quilombolas | Forests area in private properties | 2000, 2005 and 2010 | Area belonging to remnant quilombo communities with legal title. |
| 4 | Brazilian Indigenous Agency – FUNAI. 2013. Available at: http://www.funai.gov.br/ | Areas of Indigenous Lands | 1990, 2000, 2005 and 2010 | N/A |
| 5 | Ministry of Environment - MMA, Department of Protected Areas, 2013. National Registry of Conservation Units - CNUC. | Public forests and management rights | 1990, 2000, and 2005 | N/A |

18.2.2 Classification and definitions

| National class | Definition |
|-------------------------|---|
| National Forest (FLONA) | 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 (FLOTA) | 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 (RESEX) | Federal or state Conservation Unit, used by local populations , whose subsistence is based on extractive activities, and complemented by subsistence agriculture and breeding of 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 (RDS) | According to definition of the National System of Conservation Units – SNUC, this is a natural area that shelters traditional populations whose existence is based on sustainable exploration 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 unavailable 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, these lands 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. They are descendent of slaves, fugitives of their owners when slavery was still in place in Brazil, that found refuge in areas designated by them as Quilombos. |
| Natural Heritage Private Reserve | Private area, with the objective of conserving its biological diversity for perpetuity. |

18.2.3 Original data

Forests in Public Lands

The Brazilian Forest Service from the Ministry of Environment coordinates the National Registry of Public Forests (NRPF), created by the Law of Public Forest Management (n. 11,248, 2006) which includes Federal, State and Municipal Public Forests Registries.

The NRPF is a geo-referenced database with the following information on public forests: land tenure (federal or state governments), land use (forest production, biodiversity conservation, community use, military), as well as forests with pending use designation. Data is consolidated from other database from ICMBio/MMA, Funai/MJ, Incra/MDA, the Ministry of Defense, and state agencies of forest management, environmental protection and land tenure.

This data base, available since 2007, has been going through constant adjustments in order to update existing public forests and register different categories of land use. For this reason it was assumed the 2012 data for 2010.

Forests in Private Lands

Regarding private forests area, estimates are based on the sum of forests areas and woods of (private) agriculture and livestock establishments (Agriculture and Livestock Census for 1980, 1985, 1995, and 2006) and forests area from remnant quilombola communities (existing data for 2000, 2005 and 2010).

Data for agriculture and livestock establishments in Brazil is derived from the results of the Brazil-Agriculture and Livestock Census 1970/2006 carried out by IBGE (Brazilian Statistics Institute). 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 private 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 “forests” which was included in this work. In the “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.

Forest area 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 |
|----------------|-------------|-------------|-------------|-------------|-------------|-------------|
| Forests | 57 881 182 | 70 721 929 | 88 167 703 | 88 983 599 | 94 293 598 | 99 887 620 |

Regarding forests area from remnant quilombola communities data for 2000 and 2005 were taken from the Management Report of the *Secretaria de Políticas de Promoção da Igualdade Racial da Presidência da República - SEPPIR* and for 2010 from *Instituto Nacional de Colonização e Reforma Agrária - INCRA*. Since most of these areas are forests, it was considered the total area.

18.3 Analysis and processing of national data

18.3.1 Adjustment

Area of public forests (Public ownership)

The area of public forests for 2010 was taken from the National Registry of Public Forests (NRPF). It was assumed that the data of 2012 is the same as 2010 data since the majority of public forests in 2012 were already public forests in 2010.

Holder of management rights of public forests

Public Administration

For 2010 data, the area of forests under public management (publicly managed forests) was estimated by subtracting the areas destined for communities, private companies and other (forests which are in the process of having a final destination) from the total area of public forests. This area includes military destiny.

Private companies

The area of forests under private management considers area of public forest under concession by the Brazilian Forest Service (SFB) of forest use up to 2010.

Communities

The public areas destined for community use were considered summing up the following categories: Federal and State Extractive Reserves (RESEX), Federal and State Sustainable Development Reserves (RDS), Indigenous Land and federal and state agrarian reforms settlements. The base line to shape forests for 2010 data in these areas is from 2006.

Public Forests with Management Rights for Communities

| Categories | 2012 |
|-------------------|-------------|
| Indigenous Land | 111 315 650 |
| RESEX | 14 211 433 |
| RDS | 10 901 953 |

| | |
|---|--------------------|
| Other state and municipal Conservation Units with communities management rights | 2 895 714 |
| Agrarian reforms settlements | 12 608 552 |
| TOTAL | 151 933 302 |

Source: CNFP/SFB

Other

Forests with no destination include public areas with forests which are in the process of having a final destination. These areas could be forests under concession by the Brazilian Forest Service (SFB) but are still under study.

18.3.2 Estimation and forecasting

Area of private forests (Private ownership)

The area of private forests includes the summing of private agriculture and livestock establishments from Brazilian Census (see estimates below) and the area from remnant quilombola communities (existing data for 2000, 2005 and 2010).

The area of forests of private agriculture and livestock establishments in Brazil for 1990, 2000, 2005 and 2010 was estimated using a linear regression and considering the areas of woods and forests derived from the Agriculture and Livestock Census (IBGE) for 1980, 1985, 1995, and 2006.

Estimation of Forest Area based on agriculture and livestock establishments in Brazil, taken from the IBGE Agriculture and Livestock Census of 1970/2006 (ha) - regression graph not shown.

18.3.3 Reclassification

| FRA Categories | National Classes | Comments |
|----------------|------------------|----------|
|----------------|------------------|----------|

| | | |
|---|---|--|
| Private ownership | Forests in agricultural properties included in the IBGE's agriculture and livestock census and area from remnant quilombola communities. | Regarding IBGE's agriculture and livestock census, the years 1990, 2000, 2005 and 2010 were calculated using a linear regression from existing data (1985, 1995, and 2006) |
| ... Owned by individuals | Disaggregation not available. | |
| ... Owned by private business entities | Disaggregation not available. | |
| ... Owned by local, tribal and indigenous communities | Includes areas of quilombola communities with legal title | 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 | Disaggregation not available. | |
| Holder of management rights of public forests – Private companies | Area of public forest under concession by the Brazilian Forest Service (SFB) | It was considered all forest concessions up to 2010 |
| Holder of management rights of public forests – Communities | Federal and State Extractive Reserves, federal and state Sustainable Development Reserves, Indigenous Lands, other state and municipal conservation units and forest area in federal agrarian reform settlements. | Indigenous land is considered in this category |
| Holder of management rights of public forests – Other | Areas of public forests with no destination and military area | |

18.4 Data

Table 18a

| Categories | | Forest area (1000 hectares) | | | |
|--|------------------|-----------------------------|------|------|--------|
| | | 1990 | 2000 | 2005 | 2010 |
|  CFCQ | Public ownership | N/A | N/A | N/A | 308085 |

| | | | | | |
|-------|--|----------|----------|-----------|-----------|
| | ... of which owned by the state at national scale | N/A | N/A | N/A | 225729 |
| | ... of which owned by the state at the sub-national government scale | N/A | N/A | N/A | 82356 |
| | Private ownership | 92130 | 97591 | 100067 | 102492 |
| | ... of which owned by individuals | N/A | N/A | N/A | N/A |
| | ... of which owned by private business entities and institutions | N/A | N/A | N/A | N/A |
| | ... of which owned by local, tribal and indigenous communities | 0 | 774 | 907 | 988 |
| | Unknown ownership | N/A | N/A | N/A | 87881 |
| TOTAL | | 92130.00 | 97591.00 | 100067.00 | 498458.00 |

Tiers

| Category | Tier for status | Tier for reported trend |
|-------------------|-----------------|-------------------------|
| Public ownership | Tier 3 | Tier 3 |
| Private ownership | Tier 2 | Tier 1 |
| Unknown ownership | Tier 3 | Tier 3 |

Tier criteria

| Category | Tier for status | Tier for reported trend |
|-----------|--|---|
| Ownership | Tier 3: National forestry statistics registers of land titles or maps on land ownership or all forest area under one ownership category that is five years old or less. Tier 2: National forestry statistics registers of land titles or maps on land ownership or questionnaires that are more than five years old. Tier 1: Other | Tier 3 : Estimate based on repeated compatible tiers 3 (tier for status) Tier 2 : Estimate based on repeated compatible tier 2 or combination tier 3 and 2 or 1 (tier for status) Tier 1 : Other |

Table 18b - Holder of management rights of public forests

| Categories | Forest area (000 hectares) | | | |
|-----------------------|----------------------------|------|------|-------|
| | 1990 | 2000 | 2005 | 2010 |
| Public Administration | N/A | N/A | N/A | 79647 |

| | | | | |
|-------------------|-----|-----|-----|-----------|
| Individuals | N/A | N/A | N/A | N/A |
| Private companies | 0 | 0 | 0 | 96 |
| Communities | N/A | N/A | N/A | 151933 |
| Other | N/A | N/A | N/A | 76410 |
| TOTAL | .00 | .00 | .00 | 308086.00 |

| Category | Tier for reported trend | Tier for status |
|-----------------------|-------------------------|-----------------|
| Public Administration | Tier 3 | Tier 3 |
| Individuals | Tier 3 | Tier 3 |
| Private companies | Tier 3 | Tier 3 |
| Communities | Tier 3 | Tier 3 |
| Other | Tier 3 | Tier 3 |

18.5 Comments

| Category | Comments related to data definitions etc | Comments on the reported trend |
|-------------------|--|--|
| Public ownership | According to National Registry of Public Forests (NRPF) coordinated by the Brazilian Forest Service from the Ministry of Environment, total public forests represent 35% of the national territory. At the national level public forests represent 73% of the total while 27% belongs to sub-national governments. Around 75% of public forests have specific destinations such as community use (49%) and biodiversity conservation (25%). National scale public forests include Indigenous land (36% of the total area), conservation units (23%) agrarian reform settlements (5%) and military area (1%). Public ownership represent 68% of total forests in the country. | The NRPF is being improved since it depends on other primary data. |
| Private ownership | This category corresponds 23% of total forest area in the country. | N/A |
| Unknown ownership | This category corresponds to 8% of total forest area. | N/A |
| Management rights | The majority of public forests is managed by Communities (50%) and Public Administration (25%). | N/A |

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 improving the registry of the Brazilian public forests in order to have better quality of historical data.

19. How many people are directly employed in forestry?

Documents for this question:

- [Guide for country reporting FRA 2015](#)
- [FRA 2015 Terms and Definitions](#)

19.1 Categories and definitions

| Category | Definition |
|-----------------------------|--|
| Full-time equivalents (FTE) | A measurement equal to one person working full-time during a specified reference period. |
| Employment in forestry | Employment in activities related to production of goods derived from forests. This category corresponds to the ISIC/NACE Rev. 4 activity A02 (Forestry and logging). |

19.2 National data

19.2.1 Data sources

| | References to sources of information | Variables | Years | Additional comments |
|--|--------------------------------------|-----------|-------|---------------------|
| | | | | |

| | | | | |
|---|--|---|------------------|---|
| 1 | Labour and Employment Ministry / Ministério do Trabalho e Emprego - MTE. BASE Estatística da Relação Anual de Informações Sociais – RAIS. Available at: http://bi.mte.gov.br/bgcaged/login.php and Brazilian Statistics Office/ Instituto Brasileiro de Geografia e Estatística – IBGE/Diretoria de Pesquisas. Cadastro Central de Empresas. Data upon special request. | Employment in production of roundwood for the forest-based manufacturing industries (ISIC 16 and 17) as well as the extraction of gathering of wild growing non-wood forest products. | 2000, 2005, 2010 | Data based on 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 4, developed by the UN Statistics Division. Data for 2010 was aggregated at CNAE 2.0; data for 2000 and 2005 at CNAE 1995 and CNAE 1.0 respectively translated into CNAE 2.0 by the Brazilian Statistics Office – IBGE. There is no data available for 1990 since it is not possible to disaggregate information on silviculture from the agriculture sector. It should be highlighted that the statistics contained in this database are restricted to formal employment and does not consider seasonal and informal employment. The data includes employment with salary. It does not include owners who work in the forest business. According to RAIS/MTE and IBGE employment is considered the quantity of employment contracts existing on December 31 of the reference year. |
| 2 | N/A | N/A | N/A | N/A |
| 3 | N/A | N/A | N/A | N/A |
| 4 | N/A | N/A | N/A | N/A |

19.2.2 Classification and definitions

| National class | Definition |
|-----------------------|--|
| CNAE 0210 | This class is equivalent to ISIC Rev 4 class 0210 and 0230 |
| CNAE 0220 | This class is equivalent to ISIC Rev 4 class 0220 and 0230 |
| CNAE 0230 | This class is equivalent to ISIC Rev 4 class 0240 |

| | |
|--|--|
| CNAE 1610;1621;1622;1623 and 1629 | These classes are equivalent to the same classes in ISIC Rev 4 |
| CNAE 1710; 1721;1722; 1731; 1732; 1733; 1741;1742 and 1749 | These classes are equivalent to ISIC Rev 4 classes 1701; 1702 and 1709 |

19.2.3 Original data

Data on employment in production of roundwood for the forest-based manufacturing industries (ISIC 16 and 17) as well as the extraction of gathering of wild growing non-wood forest products is calculated from Statistical Base of the Annual List of Social Information – RAIS, Ministry of Labor. 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 4, developed by the UN Statistics Division. It should be highlighted that the Statistics contained in this database are restricted to formal employment.

In 1990 the “Silviculture” and “Agriculture” classes of economic activities were aggregated to the RAIS database, making it impossible to complete the information for that year.

Estimation and forecasting

IBGE's employment data is processed taking into account data from RAIS database and compared with labour surveys and enterprises inventory. Data includes employment with salary. It does not include owners and other type of ownerships who work in the forest business. Data for female employment in 2000 and 2005 were estimated based on female proportion from RAIS database for the same years. Classes of activities 1732 and 1742 disaggregated in 2010 are included in classes 1733 and 1749, respectively, for the years 2000 and 2005.

Employment with salary in forestry, by classes of activities, 2000

| ISIC Code | Classes of Activities - 2000 | Employment with Salary |
|-----------|---|------------------------|
| 02101 | Forest production - Planted forests | 18,588 |
| 02209 | Forest production - Native forests | 20,734 |
| 02306 | Support services to forestry | 17,684 |
| 16102 | Sawing of wood | 91,005 |
| 16218 | Manufacturing of laminated wood and boards from plywood, pressed wood | 54,701 |

| | | |
|-------|---|----------------|
| 16226 | Manufacturing of wood door/window frames; prefabricated wood houses; wood structures; and carpentry items | 31,714 |
| 16234 | Manufacturing of tanning articles and wood packaging | 9,433 |
| 16293 | Manufacturing of several wood, straw cork and braided material - except furniture | 27,373 |
| 17109 | Manufacturing of cellulose and other pastes for paper production | 7,388 |
| 17214 | Paper manufacturing | 25,923 |
| 17222 | Manufacturing of plain cardboard and construction paper | 7,796 |
| 17311 | Manufacturing of paper packaging | 12,152 |
| 17338 | Manufacturing of cardboard packaging and corrugated cardboard | 40,019 |
| 17419 | Manufacturing of tapes and fanfold paper - whether printed or not | 13,700 |
| 17494 | Manufacturing of other paste, paper, cardboard, construction paper and card items | 27,736 |
| | Total | 405,946 |

Source: IBGE, Diretoria de Pesquisas, Cadastro Central de Empresas

Employment with salary in forestry, by classes of activities, 2005

| ISIC Code | Classes of Activities - 2005 | Employment with Salary |
|-----------|-------------------------------------|------------------------|
| 02101 | Forest production - Planted forests | 25,598 |
| 02209 | Forest production - Native forests | 28,592 |
| 02306 | Support services to forestry | 40,094 |

| | | |
|-------|--|----------------|
| 16102 | Sawuing of wood | 102,232 |
| 16218 | Manufacturing of laminated woodand boards from plywood, pressed wood | 63,029 |
| 16226 | Manufacturing of wood door/ window frames; prefabricated wood houses; wood structures; and carpentry items | 38,879 |
| 16234 | Manufacturing of tanning articles and wood packaging | 15,247 |
| 16293 | Manufacturing of several wood, straw cork and braided material - except furniture | 25,362 |
| 17109 | Manufacturing of cellulose and other pastes for paper production | 6,832 |
| 17214 | Paper manufacturing | 35,560 |
| 17222 | Manufacturing of plain cardboard and construction paper | 6,018 |
| 17311 | Manufacturing of paper packaging | 16,239 |
| 17338 | Manufacturing of cardboard packaging and corrugated cardboard | 45,953 |
| 17419 | Manufacturing of tapes and fanfold paper - whether printed or not | 16,398 |
| 17494 | Manufacturing of other paste, paper, cardboard, construction paper and card items | 30,539 |
| | Total | 496,572 |

Source: IBGE, Diretoria de Pesquisas, Cadastro Central de Empresas

Employment with salary in forestry, by classes of activities, 2010

| ISIC Code | Classes of Activities - 2010 | Employment with Salary | Female |
|-----------|------------------------------|------------------------|--------|
| | | | |

| | | | |
|-------|---|--------|--------|
| 02101 | Forest production - Planted forests | 58,024 | 7,018 |
| 02209 | Forest production - Native forests | 5,858 | 590 |
| 02306 | Support services to forestry | 40,174 | 3,767 |
| 16102 | Sawing of wood | 90,027 | 10,038 |
| 16218 | Manufacturing of laminated wood and boards from plywood, pressed wood | 48,844 | 9,780 |
| 16226 | Manufacturing of wood door/window frames; prefabricated wood houses; wood structures; and carpentry items | 37,305 | 6,080 |
| 16234 | Manufacturing of tanning articles and wood packaging | 17,138 | 2,329 |
| 16293 | Manufacturing of several wood, straw cork and braided material - except furniture | 22,859 | 5,796 |
| 17109 | Manufacturing of cellulose and other pastes for paper production | 10,471 | 1,588 |
| 17214 | Paper manufacturing | 26,688 | 3,783 |
| 17222 | Manufacturing of plain cardboard and construction paper | 13,087 | 1,920 |
| 17311 | Manufacturing of paper packaging | 18,975 | 5,373 |
| 17320 | Fabricação de embalagens de cartolina e papel cartão | 10,422 | 2,552 |

| | | | |
|-------|---|----------------|---------------|
| 17338 | Manufacturing of cardboard packaging and corrugated cardboard | 41,544 | 7,109 |
| 17419 | Manufacturing of tapes and fanfold paper - whether printed or not | 30,888 | 10,140 |
| 17427 | Fabricação de produtos de papel para usos domésticos e higiênicco-sanitário | 29,935 | 9,067 |
| 17494 | Manufacturing of other paste, paper, cardboard, construction paper and card items | 10,266 | 3,068 |
| | Total | 512,505 | 89,998 |

Source: IBGE, Diretoria de Pesquisas, Cadastro Central de Empresas

19.3 Data

Table 19

| Category | Employment (000 years FTE) | | | | |
|----------|----------------------------|------|---------|---------|---------|
| | 1990 | 2000 | 2005 | 2010 | |
| CRQ | Employment in forestry | N/A | 405.946 | 496.572 | 512.505 |
| CRQ | ... of which female | N/A | 52.772 | 74.486 | 89.998 |

19.4 Comments

| Category | Comments related to data definitions etc | Comments on the reported trend |
|----------|--|--------------------------------|
| | | |

| | | |
|------------------------|---|---|
| Employment in forestry | Data provided by the Brazilian Silviculture Society in 2008 show a total of 239 165 direct and 937 592 indirect jobs in forest plantation in 2008, summing up to 1 000 000. These figures are considerably higher than those found in IBGE data, probably because they take into account both temporary and informal jobs. In the case of RAIS and IBGE databases, only formal, supposedly full time jobs are considered. (Fatos e Números do Brasil Florestal 2008 - http://www.sbs.org.br/FatoseNumerosdoBrasilFlorestal.pdf) | There has been a clear increase in forest sector employment. Between 2000 and 2010 the stock of employment increased around 27%. This shows that the forest labour market in Brazil is undergoing an expansion process. |
|------------------------|---|---|

Other general comments to the table

According to ISIC rev 4 the activity 02 of Forestry and logging includes divisions 16 and 17. Please see below: 02 - This division includes the production of roundwood for the forest-based manufacturing industries (ISIC divisions 16 and 17) as well as the extraction and gathering of wild growing non-wood forest products. Besides the production of timber, forestry activities result in products that undergo little processing, such as fire wood, charcoal, wood chips and roundwood used in an unprocessed form (e.g. pit-props, pulpwood etc.). These activities can be carried out in natural or planted forests.

20. What is the contribution of forestry to Gross Domestic Product (GDP)?

Documents for this question:

- Guide for country reporting FRA 2015
- FRA 2015 Terms and Definitions

20.1 Categories and definitions

| Category | Definition |
|---|--|
| Gross value added from forestry (at basic prices) | This category corresponds to the ISIC/NACE Rev. 4 activity A02 (Forestry and logging). |

20.2 Data

Table 20 (Pre-filled data from UNdata/EUROSTAT)

| Category | Million | Currency | Year for latest available information |
|---|---------|----------|---------------------------------------|
| Gross value added from forestry (at basic prices) | 17028 | Real | 2011 |

20.3 Comments

| Category | Comments |
|---|--|
| Gross value added from forestry (at basic prices) | This category corresponds to the ISIC/NACE Rev. 4 activity A02 (Forestry and logging). |

Other general comments

21. What is forest area likely to be in the future

Documents for this question:

- [Guide for country reporting FRA 2015](#)
- [FRA 2015 Terms and Definitions](#)

21.1 Categories and definitions

| Category | Definition |
|--|---|
| Government target/aspiration for forest area | Government target/aspiration for forest area for a specific year. |
| Forests earmarked for conversion | Forest area that is allocated/classified or scheduled to be converted into non-forest uses. |

21.2 National data

21.2.1 Data sources

| | References to sources of information | Variables | Years | Additional comments |
|---|---|---------------------------------|--------------|---|
| 1 | Brasil - Comitê Interministerial Sobre Mudança Do Clima. Plano Nacional Sobre Mudança do Clima - PNMC. | Reduction of deforestation rate | 2006 to 2017 | According to Plano Nacional Sobre Mudança do Clima (National Plan on Climate Change) the goal of Brazil is to reduce deforestation by 30% every four years until 2017. |
| 2 | Brasil - Comitê Interministerial Sobre Mudança Do Clima. Plano Nacional Sobre Mudança do Clima - PNMC. | Planted forest | 2020 | According to Plano Nacional Sobre Mudança do Clima (National Plan on Climate Change) the goal of Brazil is to increase the area of planted forest to 11 000 000 hectares in 2020. |
| 3 | Ministry of Environment (MMA)/ Brazilian Environmental and Renewable Natural Resources Institute (IBAMA) - Center of Remote Sensing (CSR), 2011. Relatório Técnico Monitoramento Do Desmatamento Nos Biomas Brasileiros Por Satélite – Monitoramento do Bioma Caatinga/Cerrado/Pampa/ Pantanal 2008-2009. | Deforested area | 2008-2009 | Deforested area in the biomes Caatinga, Pampa, Pantanal |

| | | | | |
|---|---|-----------------|-----------|--|
| 4 | Ministry of Environment (MMA)/ Brazilian Environmental and Renewable Natural Resources Institute (IBAMA) - Center of Remote Sensing (CSR), 2012. Relatório Técnico Monitoramento Do Desmatamento Nos Biomas Brasileiros Por Satélite – Monitoramento do Bioma Mata Atlântica 2008-2009. | Deforested area | 2008-2009 | Deforested area of Atlantic Forest biome |
| 5 | Ministry of Environment (MMA)/ Brazilian Environmental and Renewable Natural Resources Institute (IBAMA) - Center of Remote Sensing (CSR), 2011. Relatório Técnico Monitoramento Do Desmatamento Nos Biomas Brasileiros Por Satélite – Monitoramento do Bioma Cerrado 2009-2010. | Deforested area | 2009-2010 | Deforested area of Cerrado (Savanna) biome |
| 6 | National Institute for Space Research (INPE)/PRODES, 2014. Available at: http://www.obt.inpe.br/prodes/index.php | Deforested area | 2013 | Deforested area of Amazon biome in 2013 |

21.3 Data

Table 21a

| Category | Forest area (000 ha) | |
|--|----------------------|--------|
| | 2020 | 2030 |
| Government target/aspiration for forest area | 493422 | 489254 |

Table 21b

| Category | Forest area (000 ha) |
|----------------------------------|----------------------|
| | 2013 |
| Forests earmarked for conversion | 1417 |

21.4 Comments

| Category | Comments |
|----------|----------|
| | |

| | |
|--|--|
| Government target/aspiration for forest area | To calculate the possible forest area in 2020, it was considered the objectives of government described in the Plano Nacional sobre Mudanças do Clima (National Plan on Climate Change). It was used the area of natural forest in 2012 and the deforestation rate for 2012 calculated as described in Chapter 1. The subsequent deforestation rates were forecasted according to the objective of government to reduce approximately 7,5% of deforestation each year until 2017 [1]. This same rate of reduction was used until 2020. The estimated natural forest area for 2020 calculated using the reduced deforestation rates was added to the intended area of planted forest in 2020 (11 million hectares) [2]. Once there is no official plan with information for the estimation of forest area in 2030, we proceeded the same way that for 2020. That is, it was used an reduction of approximately 7,5% of deforestation each year. |
| Forests earmarked for conversion | Forest earmarked for conversion is the area that will be probably deforested in 2013. The same deforested area from years 2009/2010 for Caatinga [3], Cerrado [5], Atlantic Forest [4], Pampa [3] and Pantanal [3] were used to forecast the possible deforested area in 2013. For Amazon biome, it was used the data of 2013 provided by PRODES Project [6] to estimate the total deforested area in 2013. |

Other general comments