Forestry Department
Food and Agriculture Organization of the United Nations

GLOBAL FOREST RESOURCES ASSESSMENT

COUNTRY REPORTS

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The Forest Resources Assessment Programme

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

FAO, at the request of its member countries, regularly monitors the world's forests and their management and uses through the Forest Resources Assessment Programme. This country report forms part of the Global Forest Resources Assessment 2005 (FRA 2005), which is the most comprehensive assessment to date. More than 800 people have been involved, including 172 national correspondents and their colleagues, an Advisory Group, international experts, FAO staff, consultants and volunteers. Information has been collated from 229 countries and territories for three points in time: 1990, 2000 and 2005.

The reporting framework for FRA 2005 is based on the thematic elements of sustainable forest management acknowledged in intergovernmental forest-related fora and includes more than 40 variables related to the extent, condition, uses and values of forest resources. More information on the FRA 2005 process and the results - including all the country reports - is available on the FRA 2005 Web site (www.fao.org/forestry/fra2005).

The Global Forest Resources Assessment process is coordinated by the Forestry Department at FAO headquarters in Rome. The contact person for matters related to FRA 2005 is:

Mette Løyche Wilkie
Senior Forestry Officer
FAO Forestry Department
Viale delle Terme di Caracalla
Rome 00100, Italy

E-mail: Mette.LoycheWilkie@fao.org

Readers can also use the following e-mail address: fra@fao.org

Report preparation and contact person

This report has been prepared by:

Name: Mr Friedrich Schmitz (officially nominated National Correspondent to FRA)
Title: -
Organization: Federal Ministry of Consumer Protection, Food and Agriculture
Address: Section 533, Rochusstrasse, D 53123 Bonn, Germany
Tel/Fax: +49 228 5294318
Email: friedrich.schmitz@bmvel.bund.de

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1 Table T1 – Extent of Forest and Other wooded land

1.1 FRA 2005 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 *in situ*; or with a combined cover of shrubs, bushes and trees above 10 percent. It does not include land that is predominantly under agricultural or urban land use.
Other land	All land that is not classified as "Forest" or "Other wooded land".
Other land with tree cover (Subordinated to "Other land")	Land classified as "Other land", spanning more than 0.5 hectares with a canopy cover of more than 10 percent of trees able to reach a height of 5 meters at maturity.
Inland water bodies	Inland water bodies generally include major rivers, lakes and water reservoirs.

1.2 National data

1.2.1 Data sources

References to sources of information	Quality (H/M/L)	Variable(s)	Year(s)	Additional comments
Bundeswaldinventur 2	H	Forest	2002	Field campaigns were in the year 2001 and 2002
Bundesamt für Kartographie und Geodäsie, Frankfurt	H	Total	2002	
Flächenerhebung	H	Inland water bodies	2001	
BML, 1992 Bundeswaldinventur 1986-1990	H	Forest area	1987	Geographical coverage: Federal Repibilc of Germany and western Berlin before 1990
BML, 1994 Der Wald in den neuen bundesländern	M	Forest area	1993	Geographical coverage: New federal states

1.2.2 Classification and definitions

National class	Definition
Forest	Wald im Sinne der BWI ist, unabhängig von den Angaben im Kataster oder ähnlichen Verzeichnissen, jede mit Forstpflanzen bestockte Grundfläche. Als Wald gelten auch kahl geschlagene oder verlichtete Grundflächen, Waldwege, Wald-einteilungs- und Sicherungsstreifen, Waldblößen und Lichtungen, Waldwiesen, Wildäsungsplätze, Holzlagerplätze, im Wald gelegene Leitungsschneisen, weitere mit dem Wald verbundene und ihm dienende Flächen einschließlich Flächen mit Erholungseinrichtungen, zugewachsene Heiden und Moore, zugewachsene ehemalige Weiden, Almflächen und Hutungen sowie Latschen- und Grünerlenflächen. Heiden, Moore, Weiden, Almflächen und Hutungen gelten als zugewachsen, wenn die natürlich aufgekommene Bestockung ein durchschnittliches Alter von fünf Jahren erreicht hat und wenn mindestens 50 %der Fläche bestockt sind. In der Flur oder im bebauten Gebiet gelegene bestockte Flächen unter 1.000 m2, Gehölzstreifen unter 10m Breite und Weihnachtsbaum- und Schmuckreisigkulturen sowie zum Wohnbereich gehörende Parkanlagen sind nicht Wald im Sinne der BWI. Wasserläufe bis 5 m Breite unterbrechen nicht den Zusammenhang einer Waldfläche. Quelle: Allgemeine Verwaltungsvorschrift zur Durchführung der Bundeswaldinventur 2

	Translation: Forest within the meaning of the FFI is any area of ground covered by forest vegetation, irrespective of the information in the cadastral survey or similar records. The term forest also refers to cutover or thinned areas, forest tracks, firebreaks, openings and clearings**{** XE "openings" **}**, forest glades, feeding grounds for game, landings, rides located in the forest, further areas linked to and serving the forest including areas with recreation facilities, overgrown heaths and moorland, overgrown former pastures, alpine pastures and rough pastures, as well as areas of dwarf pines and green alders. Heaths, moorland, pastures, alpine pastures and rough pastures are considered to be overgrown if the natural forest cover has reached an average age of five years and if at least 50% of the area is covered by forest. Areas with forest cover in open pasture land or in built-up areas of under 1000 m², coppices under 10 m wide and the cultivation of Christmas trees and ornamental brushwood as well as parkland attached to country houses are not forest within the meaning of the FFI. Watercourses up to 5 m wide do not break the continuity of a forest area.

1.2.3 Original data

1.3 Analysis and processing of national data

1.3.1 Calibration

1.3.2 Estimation and forecasting

Forest areas have been estimated with standard methods used for the FFI (BWI² - Das Wichtigste in Kürze. Bonn, 2004). Data for 1990 are not fully comparable because the methods for area calculation in the 1st FFI were slightly different and the 1st FFI (reference year: 1987) covers only the territory of the Federal Republic of Germany before 1990. They are complemented by the estimate for the new federal states published in BML 1994. The reference year of the 2nd FFI is 2002. The annual rate of area change is relatively small and no interpolation between 1990 and 2002 has been tried to report on the year 2000. Results of the 2nd FFI were directly used for reporting on the years 2000 and 2005, without inter- or extrapolation.

1.4 Reclassification into FRA 2005 classes

1.5 Data for National reporting table T1

FRA 2005 Categories	**Area (1000 hectares)**		
	1990	**2000**	**2005**
Forest	10741	11076	11076
Other wooded land	NDA	NDA	NDA
Other land	24154	23819	23819
...of which with tree cover [1)]	NDA	NDA	NDA
Inland water bodies[2)]	808	808	808
TOTAL	**35703**	**35703**	**35703**

1) Area of "Other land with tree cover" is included in the area reported under "Other land" and should therefore be excluded when calculating the total area for the country.
2) FAOSTAT figure

1.6 Comments to National reporting table T1

Areas used for 1990 are those of the 1st FFI (year 1987) for the old federal states and those from the forest database of the former GDR (BML, 1994) for the new federal states. Areas reported for 2000 are those from the year 2002 found in the 2st FFI.

2 Table T2 – Ownership of Forest and Other wooded land

2.1 FRA 2005 Categories and definitions

Category	Definition
Private ownership	Land owned by individuals, families, private co-operatives, corporations, industries, religious and educational institutions, pension or investment funds, and other private institutions.
Public ownership	Land owned by the State (national, state and regional governments) or government-owned institutions or corporations or other public bodies including cities, municipalities, villages and communes.
Other ownership	Land that is not classified either as "Public ownership" or as "Private ownership".

2.2 National data

2.2.1 Data sources

References to sources of information	Quality (H/M/L)	Variable(s)	Year(s)	Additional comments
Bundeswaldinventur 2	H	Area, private and public ownership	2002	
BML, 1992 Bundeswaldinventur 1986-1990	H	Area, private and public ownership	1987	Geographical coverage: Federal Republic of Germany and western Berlin before 1990
BML, 1994 Der Wald in den neuen Bundesländern	M	Area, private and public ownership	1993	Geographical coverage: New ferderal states

2.2.2 Classification and definitions

National class	Definition
	FRA categories were used

2.2.3 Original data

2.3 Analysis and processing of national data

2.3.1 Calibration

2.3.2 Estimation and forecasting

Areas used for 1990 are those of the 1st FFI (year 1987) for the old federal states and those from the forest database of the former GDR (BML, 1994) for the new federal states. Areas reported for 2000 are those from the year 2002 found in the 2st FFI. Forest managed by the "treuhand" for reprivatisation are included in the category "private ownership".

2.4 Reclassification into FRA 2005 classes

2.5 Data for National reporting table T2

FRA 2005 Categories	Area (1000 hectares)			
	Forest		Other wooded land	
	1990	**2000**	**1990**	**2000**
Private ownership	4979	5230	NDA	NDA
Public ownership	5762	5846	NDA	NDA
Other ownership	0	0	NDA	NDA
TOTAL	**10741**	**11076**	**NDA**	**NDA**

2.6 Comments to National reporting table T2

3 Table T3 – Designated function of Forest and Other wooded land

3.1 FRA 2005 Categories and definitions

Types of designation

Category	Definition
Primary function	A designated function is considered to be primary when it is significantly more important than other functions. This includes areas that are legally or voluntarily set aside for specific purposes.
Total area with function	Total area where a specific function has been designated, regardless whether it is primary or not.

Designation categories

Category / Designated function	Definition
Production	Forest / Other wooded land designated for production and extraction of forest goods, including both wood and non-wood forest products.
Protection of soil and water	Forest / Other wooded land designated for protection of soil and water.
Conservation of biodiversity	Forest / Other wooded land designated for conservation of biological diversity.
Social services	Forest / Other wooded land designated for the provision of social services.
Multiple purpose	Forest / Other wooded land designated to any combination of: production of goods, protection of soil and water, conservation of biodiversity and provision of social services and where none of these alone can be considered as being significantly more important than the others.
No or unknown function	Forest / Other wooded land for which a specific function has not been designated or where designated function is unknown.

3.2 National data

3.2.1 Data sources

References to sources of information	Quality (H/M/L)	Variable(s)	Year(s)	Additional comments
BML, 1994: Nationaler Waldbericht der Bundesrepublik Deutschland	M	Formally protected areas	1994	Protected areas under different legislations (forest legislation, nature conservation, water protection and others)
BML, 1996: National Progress Report in Forestry – Report on the sustainable management of forests in Germany (based on the criteria and indicators adopted by the MCPFE 1993) as of 1996	M	Areas managed primarily for Soil and water protection and for recreation	1994	Protected areas under different legislations (forest legislation, nature conservation, water protection and others)
Survey on protected and protective forest areas according to MCPFE-classification (Federal Ministry of Consumer Protection, Food and Agriculture, 2003, unpublished)	M	protected and protective forest areas	2002/2003	Main findings are included in MCPFE 2003: State of European Forests 2003

3.2.2 Classification and definitions

Forest planning belongs to the federal states (laender) in Germany. Important forest functions are mapped by the forest planning authorities of the laender for their whole territory or parts of it. These forest function maps serve authorities as a basis for decision making on land-use and infrastructure development and help local forest managers in adopting management practices which take into account all relevant forest functions. Forest function mapping in Germany does not set priorities between functions; several functions may overlap on the same area of land. In general all forests in Germany have to fulfil more than one specific function at the same time so that the whole forest area could be considered to be managed for multiple purposes.

A specific function can however be considered a "primary" function where the forest area has been allocated to a legal protection status. This interpretation has been followed in this report. Protected areas can be designated under several legislations in Germany, in particular under Forest, Nature Conservation and Water legislation and some other specific legislations. The Federal Forest Act and the Federal Nature Conservation Act set a general framework which is further specified and complemented by the laender.

Forest areas without specific legal protection status are likely to be mainly managed for production or for multiple purpose. Since information on the targets set by forest owners is not available, these areas are reported under "unknown function".

The categories used as a basis for reporting in this report are those defined by the Ministerial Conference on the Protection of Forests in Europe (MCPFE). In its surveys among the laender (1994, 2002-2003), the Federal Ministry of Consumer Protection, Food and Agriculture requested the laender to allocate their laender specific categories to the most appropriate MCPFE category.

National class (MCPFE-classes)	Definition
1	Main Management Objective "Biodiversity"
2	Main Management Objective "Protection of Landscapes and specific Natural Elements"
3	Main Management Objective "Protective Functions"

3.2.3 Original data

The original data are available only at laender level and belong to diverse area categories. For aggregate data cf. publications listed in 3.2.1

3.3 Analysis and processing of national data

3.3.1 Calibration

3.3.2 Estimation and forecasting

The estimate for the category "Social services" for 1990 is too high and misleading as a result of double counting due to important overlaps between the natural parks and landscape protection areas included in this category. The available data do not allow for the elimination of these overlaps. In the survey 2002/2003 such overlaps were avoided resulting in a smaller but more realistic area estimate. In reality, areas should show an upward trend between 1990 and 2000 because additional natural parks have been designated since the 90ies. Under 1990,

the estimates from the survey in 1994 are reported and data for 2002/2003 were used both for reporting on 2000 and 2005, without inter- or extrapolation.

3.4 Reclassification into FRA 2005 classes

Forest areas are based on the national forest definition; no calibration to fit them to the FAO Forest definition has been undertaken.
Under 1990, the estimates from the survey in 1994 are reported and data for 2002/2003 were used for reporting on 2000 and 2005, without inter- or extrapolation.
Only the primary functions can be reported, based on the information on protected areas as specified above.

MCPFE-categories were reclassified as follows:

MCPFE		**FRA2005 Primary function**
1	Main Management Objective "Biodiversity"	Conservation of biodiversity
2	Main Management Objective "Protection of Landscapes and specific Natural Elements"	Social services
3	Main Management Objective "Protective Functions"	Protection of Soil and Water

While landscape protection is important for both, biodiversity conservation and recreation, in Germany MCPFE category 2 includes protection areas which are mainly designated for scenic values and recreation, such as natural parks and landscape protection areas. Recreation forests under forest law were also included in this category. Therefore MCPFE-category 2: main management objective "Protection of Landscapes and specific Natural elements" is allocated to the FRA2005-class "social functions".

Within MCPFE category 3, two subclasses were defined:
3.1 Protective Forest mainly for the protection of soil and water
3.2 Other protective forests
For reporting to FRA2005, the area of class 3.1 only was included.
Other protective forests (e.g. forests which protect residential quarters against noise, air pollution or visual injuries from industry and traffic) counted for about 556 thousand ha in 2002.

Aggregate results of the forest function planning for reporting of the total areas with function are not available at federal level.
No information is available on "other wooded land".

3.5 Data for National reporting table T3

FRA 2005 Categories / Designated function	Area (1000 hectares)					
	Primary function			Total area with function		
	1990	2000	2005	1990	2000	2005
Forest						
Production	ID	ID	ID	NDA	NDA	NDA
Protection of soil and water	1880	2424	2424	NDA	NDA	NDA
Conservation of biodiversity	397	2138	2138	NDA	NDA	NDA
Social services1)	(6505)	4686	4686	NDA	NDA	NDA
Multiple purpose	ID	ID	ID	not appl.	not appl.	not appl.
No or unknown function	1959	1828	1828	not appl.	not appl.	not appl.
Total - Forest	**10741**	**11076**	**11076**	**not appl.**	**not appl.**	**not appl.**
Other wooded land						
Production	NDA	NDA	NDA	NDA	NDA	
Protection of soil and water	NDA	NDA	NDA	NDA	NDA	NDA
Conservation of biodiversity	NDA	NDA	NDA	NDA	NDA	NDA
Social services	NDA	NDA	NDA	NDA	NDA	NDA
Multiple purpose	NDA	NDA	NDA	not appl.	not appl.	not appl.
No or unknown function	NDA	NDA	NDA	not appl.	not appl.	not appl.
Total – Other wooded land	NDA	NDA	NDA	**not appl.**	**not appl.**	**not appl.**

1) Area for 1990 is overestimated, due to spatial overlaps between different categories of protected areas, such as the natural parks and landscape protection areas, included in this category.

3.6 Comments to National reporting table T3

4 Table T4 – Characteristics of Forest and Other wooded land

4.1 FRA 2005 Categories and definitions

Category	Definition
Primary	Forest / Other wooded land of native species, where there are no clearly visible indications of human activities and the ecological processes are not significantly disturbed.
Modified natural	Forest / Other wooded land of naturally regenerated native species where there are clearly visible indications of human activities.
Semi-natural	Forest / Other wooded land of native species, established through planting, seeding or assisted natural regeneration.
Productive plantation	Forest / Other wooded land of introduced species, and in some cases native species, established through planting or seeding mainly for production of wood or non wood goods.
Protective plantation	Forest / Other wooded land of native or introduced species, established through planting or seeding mainly for provision of services.

4.2 National data

4.2.1 Data sources

References to sources of information	Quality (H/M/L)	Variable(s)	Year(s)	Additional comments
BWI² - Das Wichtigste in Kürze. Bonn, 2004	H	Forest area	2002	
BML, 1994: Der Wald in den neuen Bundesländern	M	Forest area	1993	Geographical coverage: New federal states
BML, 1992: Bundeswaldinventur 1986-1990 – Inventurbericht und Übersichtstabellen für das Bundesgebiet nach dem Gebietsstand vor dem 3.10.1990 einschließlich Berlin (West)	H	Forest area	1987	Geographical coverage: Federal Republic of Germany and western Berlin before 1990

4.2.2 National Classification and definitions

4.2.3 Original data

Original data are available in the references given in 4.2.1

4.3 Analysis and processing of national data

4.3.1 Calibration

The forest areas reported in this section are drawn from the results of the 1st and 2nd Federal Forest Inventory (FFI) and information on forest area included in BML 1994 and are based on the national forest definition used in the FFI. No calibration to the FAO Forest definition has been undertaken.

4.3.2 Estimation and forecasting

Areas have been estimated with standard methods used for the FFI (BWI² - Das Wichtigste in Kürze. Bonn, 2004). Data for 1990 are not fully comparable because the methods for area calculation in the 1st FFI were slightly different and the 1st FFI (reference year: 1987) covers only the territory of the Federal Republic of Germany before 1990. They are complemented by the estimate for the new federal states published in BML 1994. The reference year of the 2nd FFI is 2002. The annual rate of area change is relatively small and no interpolation between 1990 and 2002 has been tried to report on the year 2000. Results of the 2nd FFI were directly used fore reporting on the years 2000 and 2005, without inter- or extrapolation.

4.4 Reclassification into FRA 2005 classes

The above-mentioned publications provide information on different aspects, such as forest area, species composition and share of natural regeneration in the youngest forest stands.
A national classification comparable to the classification proposed in table T4 does however not exist. Furthermore, the national forest definition (cf. table T1) includes some areas of non-wooded ground (i.e. permanently unstocked areas such as forest roads, forest glades, feeding grounds for game, landings, rides located in the forest etc.) for which a forest type classification does not make sense.

Forest have been used and influenced by man for centuries since the middle ages in Germany; therefore no undisturbed primary forests are left.
The categories “productive plantation” and “protective plantation” are not applicable, as explained below.
Information on the type of regeneration is only available for the youngest stands. Therefore, it is not possible to separate between the FRA2005-classes “modified natural” and “semi-natural” and all forests where classified “semi-natural”. Results for the youngest stands from the 2nd FFI show however, that more than two thirds of these result from natural regeneration.

4.5 Data for National reporting table T4

FRA 2005 Categories	Area (1000 hectares)					
	Forest			Other wooded land		
	1990	2000	2005	1990	2000	2005
Primary	0	0	0	NDA	NDA	NDA
Modified natural	0	0	0	NDA	NDA	NDA
Semi-natural[1)]	10 741	11 076	11 076	NDA	NDA	NDA
Productive plantation	0	0	0	NDA	NDA	NDA
Protective plantation	0	0	0	NDA	NDA	NDA
TOTAL	**10741**	**11 076**	**11 076**	NDA	NDA	NDA

1) Of this total, in 1990 333 000 hectares are non wooded ground and in 2000 and 2005 355.000 hectares are non wooded ground.

4.6 Comments to National reporting table T4

Semi-natural, of this total, in 1990 333 000 hectares are non wooded ground and in 2000 and 2005 355 000 hectares are non wooded ground.

Forest can be classified by different aspects, e.g. the degree of human influence on forest structure and species composition, the regeneration type or forest function. The 2nd FFI provides extensive information on forests in Germany. However it is not possible to present the information in the format required in table T4 which, unfortunately, is mixing different aspects in a single table.

Whereas information from the FFI is available on the regeneration type of young forest stands, this information is not available for older stands. Furthermore, the regeneration type should not be the most important criteria for the degree of naturalness of a forest stand.
In particular, the distinction between productive and protective plantations is not adequate for countries with a long tradition in multifunctional forestry.

The FAO should continue to refine the forest classification, especially with respect to FRA 2010, to better take into account the specific conditions of European countries with their long tradition of multifunctional forestry.

Forest area 1990 is an interim Result from BWI I and the Forest Database of the former GDR (BML, 1994)
Forest area 2000 Data from 2002 was used
Forest area 2005 Data from 2002 was used

5 Table T5 – Growing stock

5.1 FRA 2005 Categories and definitions

Category	Definition
Growing stock	Volume over bark of all living trees more than X cm in diameter at breast height (or above buttress if these are higher). Includes the stem from ground level or stump height up to a top diameter of Y cm, and may also include branches to a minimum diameter of W cm.
Commercial growing stock	The part of the growing stock of species that are considered as commercial or potentially commercial under current market conditions, and with a diameter at breast height of Z cm or more.

5.2 National data

5.2.1 Data sources

References to sources of information	Quality (H/M/L)	Variable(s)	Year(s)	Additional comments
Bundeswaldinventur 2	H	Cubic meters over bark	2002	
BML, 1994 Der Wald in den neuen Bundesländern	M	Cubic meters over bark	1993	Geographical coverage: New ferderal states
BML, 1992 Bundeswaldinventur 1986-1990	H	Cubic meters over bark	1987	Geographical coverage: Federal Republic of Germany and western Berlin before 1990

5.2.2 Classification and definitions

National class	Definition
X	7 cm
Z	7 cm

5.2.3 Original data

5.3 Analysis and processing of national data

5.3.1 Calibration

5.3.2 Estimation and forecasting

5.4 Reclassification into FRA 2005 classes

5.5 Data for National reporting table T5

FRA 2005 Categories	Volume (million cubic meters over bark)					
	Forest			Other wooded land		
	1990	2000	2005	1990	2000	2005
Growing stock	2759	3381	NDA	NDA	NDA	NDA
Commercial growing stock						

Specification of country threshold values	Unit	Value	Complementary information
1. Minimum diameter at breast height of trees included in Growing stock (X)	Cm	7	
2. Minimum diameter at the top end of stem (Y) for calculation of Growing stock	Cm	7	
3. Minimum diameter of branches included in Growing stock (W)	cm	7	
4. Minimum diameter at breast height of trees in Commercial growing stock (Z)	cm	7	
5. Volume refers to "Above ground" (AG) or "Above stump" (AS)	AG / AS	AG	
6. Have any of the above thresholds (points 1 to 4) changed since 1990	Yes/No	No	
7. If yes, then attach a separate note giving details of the change	Attachment		

5.6 Comments to National reporting table T5

Data is only available for the Reference years 1987 and 2002.

6 Table T6 – Biomass stock

6.1 FRA 2005 Categories and definitions

Category	Definition
Above-ground biomass	All living biomass above the soil including stem, stump, branches, bark, seeds, and foliage.
Below-ground biomass	All living biomass of live roots. Fine roots of less than 2mm diameter are excluded because these often cannot be distinguished empirically from soil organic matter or litter.
Dead wood biomass	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.

6.2 National data

6.2.1 Data sources

References to sources of information	Quality (H/M/L)	Variable(s)	Year(s)	Additional comments
BML 1994: Der Wald in den neuen Bundesländern	M	Growing stock m3	1993	Geographical coverage: new federal states
BWI² - Das Wichtigste in Kürze. Bonn, 2004	H	Growing stock m3; dead wood, m3/ha	2002	
BWI-Ergebnis-Datenbank	H	Growing stock m3; dead wood, m3/ha	1987, 2002	Covers old federal states for 1987 and Germany as a whole for 2002 Dead wood only available for 2002
Federal Environmental Agency 2005: German Greenhouse Gas Inventory 1990 -2003; National Inventory Report 2005, Submission under the United Nations Framework Convention on Climate Change	H	Basic wood density, volume expansion factors and functions, biomass carbon conversion factor	1987 - 2003	Chapter 7.1 and Annex 14.5.1

6.2.2 Classification and definitions

National class	Definition
Above-ground biomass	Living biomass above the soil, including stem, stump, branches, bark, and, in the case of conifers, foliage. Seeds and foliage of deciduous trees not included.
Below-ground biomass	Same definition as FRA 2005
Dead wood	Includes standing and lying dead stems and branches equal or larger than 20 cm at the larger end. Stumps were included if 50 cm or more in height or more than 60 cm in diameter

6.2.3 Original data

Above-ground biomass, below-ground biomass and dead wood were calculated back from the carbon stocks included in table T 7, using the carbon factor 0,5 t C/t dm.

6.3 Analysis and processing of national data

6.3.1 Calibration

6.3.2 Estimation and forecasting

6.4 Reclassification into FRA 2005 classes

6.5 Data for National reporting table T6

FRA 2005 Categories	Biomass (million metric tonnes oven-dry weight)					
	Forest			Other wooded land		
	1990	2000	2005	1990	2000	2005
Above-ground biomass	1569	1868	2020	NDA	NDA	NDA
Below-ground biomass	424	534	585	NDA	NDA	NDA
Dead wood biomass	ID	54	54	NDA	NDA	NDA
TOTAL	**(1993)***	**2456**	**2660**	NDA	NDA	NDA

* living biomass only (without dead wood)

6.6 Comments to National reporting table T6

7 Table T7 – Carbon stock

7.1 FRA 2005 Categories and definitions

Category	Definition
Carbon in above-ground biomass	Carbon in all living biomass above the soil, including stem, stump, branches, bark, seeds, and foliage.
Carbon in below-ground biomass	Carbon in all living 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 biomass	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 a minimum diameter chose by the country for lying dead (for example 10 cm), in various states of decomposition above the mineral or organic soil. This includes the litter, fumic, and humic layers.
Soil carbon	Organic carbon in mineral and organic soils (including peat) to a specified depth chosen by the country and applied consistently through the time series.

7.2 National data

7.2.1 Data sources

References to sources of information	Quality (H/M/L)	Variable(s)	Year(s)	Additional comments
BML 1994: Der Wald in den neuen Bundesländern	M	Growing stock m3	1993	Geographical coverage: new federal states
BWI² - Das Wichtigste in Kürze. Bonn, 2004	H	Growing stock m3; dead wood, m3/ha	2002	
BWI-Ergebnis-Datenbank	H	Growing stock m3; dead wood, m3/ha	1987, 2002	Covers old federal states for 1987 and Germany as a whole for 2002 Dead wood only available for 2002
BML 1997: Deutscher Waldbodenbericht 1996 Bd. I; Bd. II	H	C-Stock in litter and soil	1990	Results of the Forest Soil Inventory conducted between 1987 and 1993; 2 volumes
Federal Environmental Agency 2005: German Greenhouse Gas Inventory 1990 -2003; National Inventory Report 2005, Submission under the United Nations Framework Convention on Climate Change	H	Basic wood density, volume expansion factors and functions, biomass carbon conversion factor	1987 - 2003	Chapter 7.1 and Annex 14.5.1

7.2.2 Classification and definitions

National class	Definition
Growing stock	Volume of above-ground woody biomass with a minimum diameter over bark of at least 7 cm
Carbon in above-ground biomass	Carbon in living biomass above the soil, including stem, stump, branches, bark, and, in the case of conifers, foliage. Seeds and foliage of deciduous

	trees not included.
Carbon in below-ground biomass	Same definition as FRA 2005
Dead wood	Includes standing and lying dead stems and branches equal or larger than 20 cm at the larger end. Stumps were included if 50 cm or more in height or more than 60 cm in diameter
Carbon in litter	The humus layer included in the estimation of soil carbon includes the fine fractions of litter are included in soil carbon.
Soil carbon	Includes carbon in the humic and fumic layers (including litter) and in mineral and organic soil from 0 to 30 cm in depth. Data reported for 2000 and 2005 are those from the Forest Soil Inventory for around 1990 (1987-1993).

7.2.3 Original data

Wood Volumes as described above from the FFI and from BML 1994. C-contents in humus layer and soil from the Forest soil inventory (BML 1997). Data on other wooded land are not available.

7.3 Analysis and processing of national data

7.3.1 Calibration

7.3.2 Estimation and forecasting

Data on the growing stock which were the basis for calculations are available for Germany as a whole from the second FFI for the year 2002. The first FFI which took place in 1987 covers only the old federal states.

In a first step, the above-ground biomass in 1987 was calculated for the old federal states based on single tree data from the first FFI. Above-ground biomass has been estimated from the growing stock using biomass expansion factors and tree species-specific basic wood densities from literature. It includes stems, stump, branches and bark, and, for evergreen trees, foliage. Neither the foliage of deciduous trees, which is on the tree during half of the year only, nor seeds, which show considerable inter-annual variation are included. Below-ground biomass was derived using root-shoot-ratios for temperate oak forests, other broadleaved forests and conifer forests from the IPCC Good Practice Guidance for Land use, Land-use change and forestry (Annex 3A.1, Table 3A.1.8) and does not include non-tree belowground biomass. Biomass was converted to carbon using the conversion factor 0,5.
The same calculation was done for 2002, based on data from the 2nd FFI, separately for old and new federal states.
For the new federal states, the carbon stocks in above-and below-ground biomass as of 1993 were calculated using data from BML (1994).
Then the carbon stocks for 1990, 2000 and 2005 were estimated separately for old and new federal states, using linear extra- and interpolation and finally were added for each of the three years to get total amounts of C in above-ground and below-ground biomass. Due to this calculation procedure, biomass stocks are not directly comparable to the growing stocks reported in table T5.

For dead wood, basic wood densities of spruce and beech from Knigge & Schulz 1966 were used to get a preliminary estimate of the mass to which then the carbon factor 0,5 t C/t dm was applied to estimate the carbon content. It was assumed that the amount of dead wood did not significantly change between 2000 and 2005 and the amount calculated for 2002 was used both, for 2000 and 2005. Dead wood was measured for the first time at the 2nd FFI; for 1990, no data are available.

The assessment of the C-content of soil including the humus layer was part of the forest soil inventory. For more information cf. BML 1997. C-contents have been measured down to 90 cm. For reporting to the Climate secretariat, the data of the upper 30cm including the humus layer are used, for comparability with the results from agriculture. The same data are used in the present FRA2005-table.

Calculation-methods and underlying assumptions are further explained in the National Inventory Report to the Climate secretariat due by the 15 April 2005.

7.4 Reclassification into FRA 2005 classes

Data cover all areas defined as a forest for the FFI without reclassification to the FRA2005 forest definition. The national definition of carbon in aboveground and below-ground biomass and dead wood is so close to the FRA 2005 definition that there is no need for a reclassification.

7.5 Data for National reporting table T7

FRA 2005 Categories	Carbon (Million metric tonnes)					
	Forest			Other wooded land		
	1990	2000	2005	1990	2000	2005
Carbon in above-ground biomass	784.5	934	1010			
Carbon in below-ground biomass	212	267	293	NDA	NDA	NDA
Sub-total: Carbon in living biomass	**997**	**1201**	**1303**	NDA	NDA	NDA
Carbon in dead wood	ID	27	27	NDA	NDA	NDA
Carbon in litter*	*	*	*	NDA	NDA	NDA
Sub-total: Carbon in dead wood and litter				NDA	NDA	NDA
Soil carbon to a depth of _30_ cm	858	858	858	NDA	NDA	NDA
TOTAL CARBON	**1855**	**2086**	**2188**	NDA	NDA	NDA

* included in soil carbon

7.6 Comments to National reporting table T7

8 Table T8 – Disturbances affecting health and vitality

8.1 FRA 2005 Categories and definitions

Category	Definition
Disturbance by fire	Disturbance caused by wildfire, independently whether it broke out inside or outside the forest/OWL.
Disturbance by insects	Disturbance caused by insect pests that are detrimental to tree health.
Disturbance by diseases	Disturbance caused by diseases attributable to pathogens, such as a bacteria, fungi, phytoplasma or virus.
Other disturbance	Disturbance caused by other factors than fire, insects or diseases.

8.2 National data

8.2.1 Data sources

References to sources of information	Quality (H/M/L)	Variable(s)	Year(s)	Additional comments
Waldbrandstatistik der BLE	H	Disturbance by fire	1999 - 2003	

8.2.2 Classification and definitions

8.2.3 Original data

8.3 Analysis and processing of national data

8.3.1 Estimation and forecasting

8.4 Reclassification into FRA 2005 classes

8.5 Data for National reporting table T8

FRA-2005 Categories	Average annual area affected (1000 hectares)			
	Forests		Other wooded land	
	1990	2000	1990	2000
Disturbance by fire	n.a.	0.5	n.a.	n.a.
Disturbance by insects	n.a.	n.a.	n.a.	n.a.
Disturbance by diseases	n.a.	n.a.	n.a.	n.a.
Other disturbance	n.a.	n.a.	n.a.	n.a.

n.a.= not available

8.6 Comments to National reporting table T8

Reason for the absence of estimates for other disturbances is that only the affected timber volume is covered.

9 Table T9 – Diversity of tree species

9.1 FRA 2005 Categories and definitions

Category	Definition
Number of native tree species	The total number of native tree species that have been identified within the country.
Number of critically endangered tree species	The number of native tree species that are classified as "Critically endangered" in the IUCN red list.
Number of endangered tree species	The number of native tree species that are classified as "Endangered" in the IUCN red list.
Number of vulnerable tree species	The number of native tree species that are classified as "Vulnerable" in the IUCN red list.

9.2 National data

9.2.1 Data sources

	Quality (H/M/L)	Variable(s)	Year(s)	Additional comments
IUCN Red List (www.redlist.org)		Plant species, worldwide	1998	
KORNECK, D.; SCHNITTLER, M.; VOLLMER, I. (1996): Rote Liste der Farn- und Blütenpflanzen (Pteridophyta et Spermatophyta) Deutschlands. - In: LUDWIG, G.; SCHNITTLER, M. [Red.]: Rote Liste der gefährdeten Pflanzen Deutschlands. - *Schriftenreihe für Vegetationskunde* **28**: 21-187	H	Vascular Plant species occurring in Germany and their protection status	1996	Red list of vascular plants. Geographical coverage: Germany
SCHMIDT, M., EWALD, J., FISCHER, A., VON OHEIMB, G., KRIEBITZSCH, W.-U., ELLENBERG, H., SCHMIDT, W. et al. (2003): Liste der Waldgefäßpflanzen Deutschlands. – *Mitteilungen der Bundesforschungsanstalt für Forst- und Holzwirtschaft Hamburg* **212**, 34 S. mit Anhang (Liste)	H	Vascular plants occurring in forests in Germany		
SCHÜTT, P., SCHUCK, H.J., STIMM, B. (1992): Lexikon der Baum- und Straucharten. – Hamburg (Nikol Verlagsges,), 581 S.	H	Definition of a „tree"		

Only the main information sources are included in this table. A full list of references is given at the end of chapter 9.4

9.2.2 Classification and definitions

Classification used in the Red List of vascular Plants for Germany

National class	German Definition and explanation [1)]	Corresponding IUCN-Class
0	Ausgestorben oder verschollen (Extinct)	Extinct in the wild
1	Vom Aussterben bedroht (Critically endangered)	Critically endangered
2	Stark gefährdet (endangered)	endangered
3	Gefährdet (vulnerable)	vulnerable
R	Extrem selten (extremely rare)	
G	Gefährdung anzunehmen (considered endangered, but available data do not allow for a clear attribution to one of the	

	classes 1, 2 or 3)	
D	Daten mangelhaft (data deficient)	
*	Ungefährdet (considered not to be endangered)	

1) for further explanation of the national classification cf. SCHNITTLER, M.; LUDWIG, G. (1996)

9.2.3 Original data

Original data are those included in KORNECK, D.; SCHNITTLER, M.; VOLLMER, I. (1996).

9.3 Data for National reporting table T9

FRA 2005 Categories	Number of species (year 2000)
Native tree species	62
Critically endangered tree species	2
Endangered tree species	1
Vulnerable tree species	5

9.4 Comments to National reporting table T9

To establish the total number of native forest trees it was necessary to identify out of the total number of plant species occurring in Germany those vascular plants which typically occur in forests and which qualify as trees. This assessment has been made jointly by experts from the Federal Agency for Nature Conservation (BfN) and from the Federal Research Centre for Forestry and Forest Products, based on the information included in the botanic information system www.floraweb.de and SCHMIDT et al. 2003. The full list of forest trees occurring in Germany is given in the annex. The numbers of species vary pendent on whether closely related "microspecies" are pooled to single broader species which are considered as "aggregates" by specialists or whether they are considered as separate species. As a pragmatic way to deal with this problem, the list in the annex includes those Sorbus species which are included as a separate species in the IUCN red list but excludes some additional endemic "microspecies" of the Sorbus latifolia group.

The scientific nomenclature and the information on the floristic status (indigenous, archeophyte, neophyte) is based on WISSKIRCHEN & HAEUPLER (1998):
I= indigenous: naturally occurring in Germany
A=archeophyte: introduced before the beginning of modern times (i.e. before 1492)
N=neophyte: introduced after the beginning of modern times

"Indigenous" corresponds with the FAO definition of native trees, whereas according to the Federal Act on Nature Conservation (§10 (2) Nr.5) all wild-living plants which are reproducing without human assistance are considered "native".. Endemic species are those the range of which is limited to Germany or only a part of it or to Germany and a few areas in neighbouring countries. The information on endemic species was taken from KORNECK et al. 1996. The numbers reported in Table T9 correspond to the FAO-definition of "native trees" and their classification in the IUCN red list.

For the identification of plants typically occurring in forests, the forest definition from Schmidt et al. 2003 was used. This definition is very similar to the FAO-Definition and the national forest definition but, from a floristic point of view, excludes permanently un-stocked areas such as forest roads, fire-brakes, forest glades, feeding grounds for game, wood yards, Christmas tree plantations and other non-wooded ground.

Trees cultivated in parks, gardens and orchards which may exceptionally occur in forest (e.g. *Ailanthus altissima, Malus domestica, prunus cerasus, Prunus domestica, Pyrus communis*) were excluded whereas introduced tree species which are frequently used for forestry purposes, such as *Picea sitchensis, Picea omorica, Pinus nigra, Pinus strobus, Pseudotsuga menziesii* and *Quercus rubra* where included. The latter were not included in the 1996 red list, hence no classification according to the red list is available for them.
Some other introduced species less important for forestry which are planted only on small areas, partly for experimental purposes, were not included in the list of forest trees.

Finally, out of the total list of vascular plants occurring in forests, it was necessary to identify all trees.
For this purpose, the definition by SCHÜTT et al. (1992) was used, who define a tree as a perennial upright woody plant able to reach at least 6 m in height. For consistency with the FAO definition the minimum height was reduced to 5 m. Woody plants which reach 5m only by exception such as *Cornus mas, Crataegus spec., Laburnum, Mespilus* etc. were not considered as trees.

References:

KORNECK, D.; SCHNITTLER, M.; KLINGENSTEIN, F.; LUDWIG, G.; TAKLA, M.; BOHN, U.; MAY, R. (1998): Warum verarmt unsere Flora? Auswertung der Roten Liste der Farn- und Blütenpflanzen Deutschlands. - In: KLINGENSTEIN, F.; LUDWIG, G. [Bearb.]: Ursachen des Artenrückgangs von Wildpflanzen und Möglichkeiten zur Erhaltung der Artenvielfalt. - *Schriftenreihe für Vegetationskunde* **29**: 299-444.

KORNECK, D.; SCHNITTLER, M.; VOLLMER, I. (1996): Rote Liste der Farn- und Blütenpflanzen (Pteridophyta et Spermatophyta) Deutschlands. - In: LUDWIG, G.; SCHNITTLER, M. [Red.]: Rote Liste der gefährdeten Pflanzen Deutschlands. - *Schriftenreihe für Vegetationskunde* **28**: 21-187.

KRUMBIEGEL, A. (2002[2004]): Morphologie der vegetativen Organe (außer Blüten). - In: KLOTZ, S.; KÜHN, I.; DURKA, W.: BIOLFLOR - Eine Datenbank mit biologisch-ökologischen Merkmalen zur Flora Deutschlands. - *Schriftenreihe für Vegetationskunde* **38**: 93-118.

MUELLER-DOMBOIS, D.; ELLENBERG, H. sen. (1974): Aims and methods of vegetation ecology. – New York 547 S.

SCHMIDT, M., EWALD, J., FISCHER, A., VON OHEIMB, G., KRIEBITZSCH, W.-U., ELLENBERG, H., SCHMIDT, W. et al. (2003): Liste der Waldgefäßpflanzen Deutschlands. – *Mitteilungen der Bundesforschungsanstalt für Forst- und Holzwirtschaft Hamburg* **212**, 34 S. mit Anhang (Liste)

SCHNITTLER, M.; LUDWIG, G. (1996): Zur Methodik der Erstellung Roter Listen. - In: LUDWIG, G.; SCHNITTLER, M. [Red.]: Rote Liste der gefährdeten Pflanzen Deutschlands. - *Schriftenreihe für Vegetationskunde* **28**: 709-739.

THOMASIUS, H., SCHMIDT, P.A. (1996): Wald, Forstwirtschaft und Umwelt. – In: BUCHWALDT, K.; ENGELHARDT, W. (Hrsg.): Umweltschutz – Grundlagen und Praxis Bd. 10: 1 – 435. Bonn.

SCHÜTT, P., SCHUCK, H.J., LANG, U.M., ROLOFF, A.(1994–2003, ff): Enzyklopädie der Holzgewächse. Handbuch und Atlas der Dendrologie. – (Ecomed. Biowissenschaften), bisher 35 Lieferungen.

SCHÜTT, P., SCHUCK, H.J., STIMM, B. (1992): Lexikon der Baum- und Straucharten. – Hamburg (Nikol Verlagsges,), 581 S.

WISSKIRCHEN, R.; HAEUPLER, H. (1998): Standardliste der Farn- und Blütenpflanzen Deutschlands. – Stuttgart (Ulmer) 765 S.

Botanic information system run by the Federal Agency for Nature Conservation:
www.floraweb.de

Annex:

List of native forest trees and classification in the red list

The list includes all forest trees occuring in Germany according to the assessment described in chapter 9.4, including introduced species. Note that in table T9, only native species according to the FAO-definition are reported.
The column „Floristic Status" provides information on the floristic status according to WISSKIRCHEN, R.; HAEUPLER, H. (1998) and identifies endemic species. The following two columns provide information on the status in the national and the IUCN red list, respectively. n.c.= the species is occurring in Germany but is not classified in the national red list.

Name	Floristic status	Status according to National Red list	Status according to IUCN
Abies alba	I	3	-
Acer campestre	I	*	-
Acer monspessulanum	I	*	-
Acer negando	N	*	-
Acer opalus	I	R	-
Acer platanoides	I	*	-
Acer pseudoplatanus	I	*	-
Alnus glutinosa	I	*	-
Alnus incana	I	*	-
Betula pendula	I	*	-
Betula pubescens ssp. carpatica	I	*	-
Betula pubescens ssp. pubescens	I	*	-
Carpinus betulus	I	*	-
Castanea sativa	A	*	-
Fagus sylvatica	I	*	-
Fraxinus excelsior	I	*	-
Ilex aquifolium	I	*	-
Juglans regia	A	*	-
Larix decidua	I	*	-
Malus sylvestris	I	*	-
Picea abies	I	*	-
Picea omorica	N	n.c.	-
Picea sitchensis	N	n.c.	-
Pinus cembra	I	*	-
Pinus nigra	N	n.c.	-
Pinus sylvestris	I	*	-
Pinus strobus	N	n.c.	-
Pinus x rotundata	I	*	-
Populus alba	I	*	-
Populus nigra	I	3	-
Populus tremula	I	*	-
Populus x canadensis	N	*	-
Populus x canescens	I	*	-
Prunus avium ssp. avium	I	*	-
Prunus padus ssp. padus	I	*	-
Prunus serotina	N	*	-

Pseudotsuga menziesii	N	n.c.	-
Pyrus pyraster	I	*	-
Quercus petraea	I	*	-
Quercus pubescens	I	3	-
Quercus robur	I	*	-
Quercus rubra	N	n.c.	-
Quercus x calvescens	I	*	-
Robinia pseudoacacia	N	*	-
Salix acutifolia	N*	*	-
Salix alba	I	*	-
Salix caprea	I	*	-
Salix daphnoides	I	2	-
Salix fragilis	I	*	-
Salix pentandra	I	*	-
Salix x rubens	I	*	-
Salix x smithiana	I	*	-
Sorbus aria	I	*	-
Sorbus aucuparia ssp. aucuparia	I	*	-
Sorbus aucuparia ssp. glabrata	I	*	-
Sorbus badensis	I end.	*	vulnerable
Sorbus danubialis	I	*	-
Sorbus decipiens	I end.	*	critically endangered
Sorbus domestica	I	*	-
Sorbus franconica	I end.	*	vulnerable
Sorbus heilingensis	I end	*	vulnerable
Sorbus intermedia	N	*	-
Sorbus latifolia[1]	I	*	-
Sorbus mougeotii	I	*	-
Sorbus multicrenata	I end.	*	endangered
Sorbus pannonica	I	*	-
Sorbus parumlobata	I end.	n.c.	critically endangered
Sorbus pseudothuringiaca	I	*	vulnerable
Sorbus subcordata	I end.	*	vulnerable
Sorbus torminalis	I	*	-
Taxus baccata	I	3	-
Tilia cordata	I	*	-
Tilia platyphyllos	I	*	-
Ulmus glabra	I	*	-
Ulmus laevis	I	*	-
Ulmus minor	I	3	-

PLER (1998) classified this species as "probably undergoing introduction and cultivated"; meanwhile it can be considered as established in Germany

[1] Sorbus isen
ace

n
cis and S. acutisecta as part of the Sorbus latifolia group are not counted as seperate specie

Total number of forest tree species: 76 (74-78)
I 62 (60-64) of which 7 (5-9) endemic species
A 2
N 12

Status	Number of trees according to the national red list	Number of trees according to the IUCN red list
Critically endangered	0	2
Endangered	1	1
Vulnerable	5	5
Extremely rare	1	
n.c.	7	

10 Table T10 – Growing stock composition

10.1 FRA 2005 Categories and definitions

List of species names (scientific and common names) of the ten most common species.

10.2 National data

10.2.1 Data sources

References to sources of information	Quality (H/M/L)	Variable(s)	Year(s)	Additional comments
Bundeswaldinventur 2	H	Cubic meters over bark	2002	
BML, 1994 Der Wald in den neuen Bundesländern	M	Cubic meters over bark	1993	Geographical coverage: New federal states
BML, 1992 Bundeswaldinventur 1986-1990	H	Cubic meters over bark		Geographical coverage: Federal republic of Germany and western Berlin before 1990

10.2.2 Original data

FRA 2005 Categories / Species name (Scientific name and common name)	Growing Stock in Forests (million cubic meters)	
	1990	**2000**
Picea spec, Fichte	1119	1231
Pinus spec, Kiefer	631	705
Fagus sylvatica, Buche	464	583
Quercus spec., Eiche	215	302
Larix spec, Lärche	65.1	92
Abies spec, Tanne	59	82
Pseudotsuga menziesii, Douglasie	22	50
Species with low age expectance, Andere Laubbäume mit niedriger Lebensdauer (ALN): Betula spec. Birkenarten, Sorbus torminalis Crantz Elsbeere, Alnus spec. Erlenarten, Populus spec. Pappelarten, Prunus serotina Traubenkirsche-Arten, Prunus avium L. Vogelkirsche, other brodleave as far not mentioned above, alle weiteren Laubbaumarten, soweit sie nicht gesondert genannt sind,	101	179
Species with high age expectance, Andere Laubbäume mit hoher Lebensdauer (ALH):Acer spec. Ahornarten, Platanus X acerifolia Ahornblättrige Platane, Edelkastanie, Fraxinus spec.Eschenarten, Tilia spec. Lindenarten, Juglans spec. Nussbaumarten, Robina pseudacacia Robinie, Aesculus hippocastanum Rosskastanie, Sorbus domestica L. Speierling, Ilex aquifolium Stechpalme, Ulmus spec. Ulme, Fraxinus Americana Weißesche,	82	157
Total	**2758.1**	**3381**

10.3 Analysis and processing of national data

10.3.1 Calibration

10.3.2 Estimation and forecasting

10.4 Data for National reporting table T10

FRA 2005 Categories / Species name (Scientific name and common name)	Growing Stock in Forests (million cubic meters)	
	1990	2000
Picea spec, Fichte	1119	1231
Pinus spec, Kiefer	631	705
Fagus sylvatica, Buche	464	583
Quercus spec., Eiche	215	302
Larix spec, Lärche	65.1	92
Abies spec, Tanne	59	82
Pseudotsuga menziesii, Douglasie	22	50
Remainder of species	183	336
TOTAL	**2758.1**	**3381**

10.5 Comments to National reporting table T10

Data is only available for the Reference years 1987 and 2002

11 Table T11 – Wood removal

11.1 FRA 2005 Categories and definitions

Category	Definition
Industrial wood removal	The wood removed (volume of roundwood over bark) for production of goods and services other than energy production (woodfuel).
Woodfuel removal	The wood removed for energy production purposes, regardless whether for industrial, commercial or domestic use.

11.2 National data

11.2.1 Data sources

References to sources of information	Quality (H/M/L)	Variable(s)	Year(s)	Additional comments
National wood removal staitstics	M	Cubic meters under bark	Annual	

11.2.2 Classification and definitions

11.2.3 Original data

11.3 Analysis and processing of national data

11.3.1 Estimation and forecasting

11.4 Reclassification into FRA 2005 classes

11.5 Data for National reporting table T11

FRA 2005 Categories	Volume in 1000 cubic meters of roundwood over bark					
	Forest			Other wooded land		
	1990 [1)]	2000	2005	1990	2000	2005
Industrial roundwood	36 989	42 826	54 497	NDA	NDA	NDA
Woodfuel	5 188	5 992	6 273	NDA	NDA	NDA
TOTAL for Country	**42 177**	**48 818**	**60 770**	**NDA**	**NDA**	**NDA**

1) Without new federal states

11.6 Comments to National reporting table T11

The wood removals of the years 1990 and 2000 are both influenced by damage from wind storms. The storms of the year 1990 touched all regions of Germany while the damages from the storm in late 1999 struck mainly the southern regions of Germany.

Starting from 2002, a new standardized method has been used for estimating removals in Bavarian private owned forests. This resulted in higher removals not only for this region but also the national removals raised significantly.

Presented data is over bark (bark factor 1,15).

12 Table T12 – Value of wood removal

12.1 FRA 2005 Categories and definitions

Category	Definition
Value of industrial wood removal	Value of the wood removed for production of goods and services other than energy production (woodfuel).
Value of woodfuel removal	Value of the wood removed for energy production purposes, regardless whether for industrial, commercial or domestic use.

12.2 National data

12.2.1 Data sources

References to sources of information	Quality (H/M/L)	Variable(s)	Year(s)	Additional comments
National wood removal staitstics	**M**	**Cubic meters over bark**	**1990 2000**	
BMVEL Testbetriebsnetz Forst	M	€/$	1990 2000	

12.2.2 Classification and definitions

12.2.3 Original data

12.3 Analysis and processing of national data

12.3.1 Estimation and forecasting

12.4 Reclassification into FRA 2005 classes

12.5 Data for National reporting table T12

FRA 2005 Categories	Value of roundwood removal (1000 USD)					
	Forest			Other wooded land		
	1990	2000	2005	1990	2000	2005
Industrial roundwood	2 859 997	2 579 415	NDA	NDA	NDA	NDA
Woodfuel	NDA	NDA	NDA	NDA	NDA	NDA
TOTAL for Country	**2 859 997**	**2 597 415**	**NDA**	**NDA**	**NDA**	**NDA**

12.6 Comments to National reporting table T12

13 Table T13 – Non-wood forest product removal

13.1 FRA 2005 Categories and definitions

The following categories of non-wood forest products have been defined:

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

13.2 National data

13.2.1 Data sources

Non-wood forest products have lost relevance in Germany since the 19th century. The only plant products which kept significant economic importance for forest holdings are Christmas trees and ornamental plant material. No detailed official statistics on non-wood plant products is available.

The Federal Forest Act and the forest legislation of the laender give free access to all forests, including private forest areas, for recreation activities. This includes the right to pick flowers, berries and mushrooms, subject to the restrictions defined by the nature Conservation legislation. There are no data available on these non-commercial removals.

For animal products some information can be derived from hunting statistics (bag statistics). Bag statistics are published on a yearly basis in the yearbook of the Deutscher Jagdschutzverband (DJV), the national umbrella organisation of regional hunters associations. This includes statistics on the amount of meat from game, which has been used in this report to derive information on "bush meat". Game is in general sold including hides, skins and bones.
No data are available on the amount of hides and skins which are further used e.g. for furs and leather. "Trophies" include very different parts of the animal. For some animal species, they are taken only from males. It was hence not possible to derive meaningful information from bag statistics on category 10 "Hides, skins and trophies".

References to sources of information	**Quality (H/M/L)**	**Variable(s)**	**Year(s)**	**Additional comments**
Deutscher Jagdschutzverband e.V.:	H	Amount of meat by	1991-2002	Meat including hides, skins and bones

DJV-Handbuch, 1990 ff.: Bag statistics, statistics on game meat from game		species; kg		

13.2.2 Classification and definitions

National class	Definition
Meat from animals of chase; by species	Covers animal species subject to hunting legislation; amounts of game from domestic hunting

13.2.3 Original data

13.3 Analysis and processing of national data

13.3.1 Estimation and forecasting

Bushmeat:
Due to the reunification of Germany in 1990, no comparable data are available for the years 1988 and 1989. Data reported for 1990 are the average 1990 to 1993.

For 2000, the five-year-average 1998-2002 is reported.

Bag statistics of the past five years show an upward trend for roe deer, red deer and boars. This trend has been carefully extrapolated for 2005.

13.4 Reclassification into FRA 2005 classes

Bushmeat:

Only hoofed wild-living animals which live mainly in forests (even if they use open land for browsing) were included, namely different deer species and wild boar. The chamois which lives mainly over the tree-line as well as small game (such as rabbits, hares and birds) were excluded.

13.5 Data for National reporting table T13

FRA 2005 Categories	Scale factor	Unit	NWFP removal		
			1990	2000	2005
Plant products / raw material			NDA	NDA	NDA
1. Food			NDA	NDA	NDA
2. Fodder			NDA	NDA	NDA
3. Raw material for medicine and aromatic products			NDA	NDA	NDA
4. Raw material for colorants and dyes			NDA	NDA	NDA
5. Raw material for utensils, handicrafts & construction			NDA	NDA	NDA
6. Ornamental plants			NDA	NDA	NDA
7. Exudates			NDA	NDA	NDA
8. Other plant products			NDA	NDA	NDA
Animal products / raw material			NDA	NDA	NDA
9. Living animals			NDA	NDA	NDA
10. Hides, skins and trophies			NDA	NDA	NDA
11. Wild honey and bee-wax			NDA	NDA	NDA
12. Bush meat	1000	kg	32907	32799	34000
13. Raw material for medicine			NDA	NDA	NDA
14. Raw material for colorants			NDA	NDA	NDA

15. Other edible animal products			NDA	NDA	NDA
16. Other non-edible animal products			NDA	NDA	NDA

13.6 Comments to National reporting table T13

14 Table T14 – Value of non-wood forest product removal

14.1 FRA 2005 Categories and definitions

The following categories of non-wood forest products have been defined:

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

14.2 National data

14.2.1 Data sources

Non-wood forest products have lost relevance in Germany since the 19th century. During the past 15 years, the total value of non-wood forest products (excluding products from hunting) counted for only about 5 to 6 percent of the total value generated by forest holdings. Detailed statistics on non-wood forest products is not available. Official statistics provide an overall estimate of the total value of non-wood forest products. This may include some products which are not included in the FAO-Definition of non-wood products (e.g. sand and stones from quarries belonging to a forest holding) as well as services provided by forest holdings. Products from hunting are not included.

Some data on animal products are available in hunting statistics (c.f. comments on table T13)

References to sources of information	**Quality (H/M/L)**	**Variable(s)**	**Year(s)**	**Additional comments**
BMVEL: Ernährungs- und Agrarpolitischer Bericht der Bundesregierung, Tabelle 50: Forstwirtschaftliche Gesamtrechnung	H	Value of non-wood forest products; €	1991-2002	Non-wood forest products; including certain services, excluding products from hunting
Deutscher Jagdschutzverband e.V.: DJV-Handbuch, 1990 ff.: Bag statistics, statistics on game meat from game	H	Value of game from domestic hunting; €	1991-2002	Value of the meat including hides, skins and bones

14.2.2 Classification and definitions

National class	**Definition**

"other products" of forestry	All products of forest holdings excluding timber.
Value of game from domestic hunting; €	Based on prices paid to the holders of the hunting-grounds; € per kg including hides, skins and bones

14.2.3 Original data

Estimates for the total value of non-wood forest products have been drawn from the official Statistics on Food and Agriculture (BMVEL: Ernährungs- und Agrarpolitischer Bericht der Bundesregierung, Table 50). The value reported for 1990 is the 3-year average 1991 to 1993. Comparable data for 1988 to 1990 are not available, due to the existence of two German States before 1990. The value reported for 2000 has been averaged over five years from 1998 to 2002.

Data on bushmeat have been derived from hunting statistics. The same game categories as in table T13 have been used. Values reported for 1990 are averaged over the years 1990 to 1993. For 1990 to 1992, data on the value of the game were only available for the old federal states. For up-scaling to Germany as a whole the amount of meat by animal species has been multiplied with the prices per kg which were paid in the old federal states.

Original data from 1990 were in DM and have been converted to € (1 €=1,95583 DM). Since no €/USD-exchange rate was available for 1990, the USD/DM exchange rate was averaged over the years 1990 to 1993 and used to calculate the value in USD for 1990 (1 USD=1,6228 DM).

Values reported for 2000 have been averaged from the years 1998 to 2002.
Exchange rate as of 2000 from Appendix 4 have been used for conversion to USD.

FRA 2005 Categories	**Value of the of NWFP removed (1000 €)**		
	1990	**2000**	**2005**
All non-wood products (excluding products from hunting)	59'650	101'400	120'000
Animal products / raw material 12. Bush meat	176'027	146'425	151'800

14.3 Analysis and processing of national data

14.3.1 Estimation and forecasting

To forecast the total value of non wood forest products for 2005, the upward trend from previous years (in €) was extrapolated and then the USD exchange rate as of 2003 was applied to the result. The sharp increase (in USD) between 2000 and 2005 is largely due to exchange rate fluctuation.

For 2005, the amount of meat estimated for 2005 in table T13 was multiplied with the price in € per kg from 2000 and the result multiplied with USD exchange rate as of 2003.

14.4 Reclassification into FRA 2005 classes

For plant-products it was not possible to reclassify the national data into FRA 2005 classes.

An additional line has been included in the table to report the total value of non-wood forest products, excluding products from hunting.

For Bush meat, see explanations in chapter T13.

14.5 Data for National reporting table T14

FRA 2005 Categories	**Value of the of NWFP removed (1000 USD)**		
	1990	**2000**	**2005**
Plant products / raw material			
1. Food	NDA	NDA	NDA
2. Fodder	NDA	NDA	NDA
3. Raw material for medicine and aromatic products	NDA	NDA	NDA
4. Raw material for colorants and dyes	NDA	NDA	NDA
5. Raw material for utensils, handicrafts & construction	NDA	NDA	NDA
6. Ornamental plants	NDA	NDA	NDA
7. Exudates	NDA	NDA	NDA
8. Other plant products	NDA	NDA	NDA
Animal products / raw material			
9. Living animals	NDA	NDA	NDA
10. Hides, skins and trophies	NDA	NDA	NDA
11. Wild honey and bee-wax	NDA	NDA	NDA
12. Bush meat	212152	136209	191650
13. Raw material for medicine	NDA	NDA	NDA
14. Raw material for colorants	NDA	NDA	NDA
15. Other edible animal products	NDA	NDA	NDA
16. Other non-edible animal products	NDA	NDA	NDA
TOTAL	**ID**	**ID**	**ID**

14.6 Comments to National reporting table T14

Changes in the USD exchange rate have a significant distorting influence on the values reported in table T14. The value of all non-wood products (excluding products from hunting and including sand and stones) is estimated to 71.6 million USD for 1990, 94.3 million USD for 2000 and 150 million USD for 2005.

15 Table T15 – Employment in forestry

15.1 FRA 2005 Categories and definitions

Category	Definition
Primary production of goods	Employment in activities related to primary production of goods, like industrial roundwood, woodfuel and non-wood forest products.
Provision of services	Employment in activities directly related to services from forests and woodlands.
Unspecified forestry activities	Employment in unspecified forestry activities.

15.2 National data

15.2.1 Data sources

References to sources of information	Quality (H/M/L)	Variable(s)	Year(s)	Additional comments
Landwirtschaftszählung 1999	H	Person-yaers	1999	

15.2.2 Classification and definitions

National class	Definition
	FRA-Definitions are applied

15.2.3 Original data

15.3 Analysis and processing of national data

15.3.1 Estimation and forecasting

15.4 Reclassification into FRA 2005 classes

15.5 Data for National reporting table T15

FRA 2005 Categories	Employment (1000 person-years)	
	1990	2000
Primary production of goods	NDA	NDA
Provision of services	NDA	NDA
Unspecified forestry activities	NDA	70.3
TOTAL	**NDA**	**70.3**

15.6 Comments to National reporting table T15