Forestry Department
Food and Agriculture Organization of the United Nations

GLOBAL FOREST RESOURCES ASSESSMENT 2010

COUNTRY REPORT

DENMARK

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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 2010 (FRA 2010).

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

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

Mette Løyche Wilkie
Senior Forestry Officer
FAO Forestry Department
Viale delle Terme di Caracalla
Rome 00153, Italy

E-mail: Mette.LoycheWilkie@fao.org

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

Contents

Report preparation and contact persons

The present report was prepared by the following person(s):

Name (FAMILY NAME, First name)	Institution / address	E-mail	Fax	Tables
NORD-LARSEN, Thomas	Forest & Landscape, Denmark Faculty of Life Science Copenhagen University	tnl@life.ku.dk	35331517	
BASTRUP-BIRK, Annemarie	Forest & Landscape, Denmark Faculty of Life Science Copenhagen University	abb@life.ku.dk	35331517	
JOHANNSEN, Vivian Kvist	Forest & Landscape, Denmark Faculty of Life Science Copenhagen University	vkj@life.ku.dk	35331517	

Introduction

The main sources of information on forest resources in Denmark in the period 1990 - 2005 are the following:

Nord-Larsen, T., Johannsen, V. K., Bastrup-Birk, A and Jørgensen, B. B. (eds.) (2008). Skove og plantager 2006. Skov og Landskab and Skov- og Naturstyrelsen, Hørsholm. 185 p. ISBN: 978-87-7903-368-9
This National Forest Inventory (NFI) is the first sample-based forest inventory in Denmark. The NFI is based on a 2 x 2 km grid covering the Danish land surface. At each grid intersection, a cluster of four circular plots for measuring forest factors (e.g. wood volume) are placed in a 200 x 200 m grid. Each circular plot has a radius of 15 meters. When plots are intersected by different landuse classes or different forest stands, the individual plot is divided into tertiary sampling units.

About one third of the plots was assigned to be permanent and will be remeasured in subsequent inventories every five years. Two thirds are temporary and are reassigned in subsequent inventories. The sample of permanent and temporary field plots has been systematically divided into five non-overlapping, interpenetrating panels that are each measured in one year and constitute a systematic sample of the entire country. Hence all the plots are measured in a 5-year cycle.

Based on analysis of maps and air photos, each plot is allocated to one of three basic categories, reflecting the likelihood of forest or other wooded land cover in the plot (0) Unlikely to contain forest or other wooded land cover, (1) Likely to contain forest cover, and (2) Likely to contain other wooded land cover. Heath and wetlands are viewed as likely to become forest/wooded land, and included in the "likely to contain other wooded land cover" category. All plots in the last two categories are to be inventoried in the field. Plots are included for inventory regardless of the forest status of the other plots in the cluster.

The first 5-year rotation of NFI measurements entailed a total of 42 793 plots of which 7 610 were classified as "Likely to contain forest cover" or "Likely to contain other wooded land cover". A total of 5 099 plots classified as forest were measured in the field.

Larsen, P.H. and Johannsen,V.K. (eds.) (2002). Skove og plantager 2000. Danmarks Statistik, Skov & Landskab og Skov- og Naturstyrelsen. 171 p. ISBN: 87-501-1287-2
This National Forest Census is based on questionnaires sent to all forest owners, resulting in information on area, main species, age class distribution and productive indicators. The number of respondents for this survey was 32.300, which is considerably higher than in the 1990 survey. The change in the number of respondents may cause differences in estimates of forest variables such as forest area between the 1990 and 2000 census.

Since the data are collected from questionnaires and not based on field observations, the actual forest definition may vary. The basic definition is that the forest area must be minimum 0.5 ha. There are no specific guidelines on the crown cover or the potential height of the trees.

All values for growing stock are estimated based on questionnaire data on main species, age class and site productivity.

Zangenberg, C.U. and Hansen, C.P. (1994). Skove og plantager 1990. Danmarks Statistik og Skov- og Naturstyrelsen. 131 p. ISBN: 87-501-0887-5
This National Forest Census is based on questionnaires sent to all forest owners (number of respondents was 22.300), resulting in information on area, main species, age class distribution and productive indicators.

Since the data are based on questionnaire and not field observations, the actual forest definition may vary. The basic definition is that the forest area must be minimum 0.5 ha. There is no specific guideline on the crown cover or the height of the trees.

All values for growing stock are estimated based on questionnaire data on main species, age class and site productivity.

Miljø- og Energiministeriet, Danmarks Miljøundersøgelser: Arealanvendelseskortet 1:25.000. http://www2.dmu.dk/1_Viden/2_Miljoe-tilstand/3_samfund/AIS/index.htm
The Area Information System (AIS) was developed based on combination of several cartographic information. The area classifications are uncertain. The Land Cover Plus theme has been used in the FRA reporting. The information is based on analysis of satellite images from the period 1992-1997 (AIS). The cell size was 0.0625 ha, however the minimum mapped unit was twice this size (0.125 ha).

StatBank Denmark (2008). www.statistikbanken. Statistics Denmark.
Provides official statistics on total land area, trade statistics, wood removals.

Beredskabsstyrelsen, Danish Emergency Management Agency
Records all occurrences of fire, also in forest.
http://www.beredskabsstyrelsen.dk/uk/index.htm

Other references:

Danish Forest and Nature Agency (2001). Den biologiske mangfoldighed i skove - status for indsats og initiativer, Skov- og Naturstyrelsen.
Danish Forest and Nature Agency (2008). Habitat skovnaturtyper i Danmark: Status for kortlægning pr. 1.1.2008. Skov- og Naturstyrelsen.
Danmarks Statistik (2008). Statistical yearbook. ISBN 978-87-501-1674-5. 601 pp.
Danmarks Statistik (2002). Landbrug 2001. Statistik om landbrug, gartneri og skovbrug. ISBN 87-501-1263-5. 274 pp.
Johannsen, V.K. (2002). Dokumentation af beregninger i forbindelse med Skovtælling 2000. Center for Skov, Landskab og Planlægning (FSL), Skovstatistik, Arbejdsnotat nr. 6.
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Ministry of Environment (1994). Strategi for de danske naturskove og andre bevaringsværdige skovtyper, Skov- og Naturstyrelsen, København. 48 pp.

Ministry of Environment (2002). Danmarks Nationale Skovprogram. Miljøministeriet, Skov- og Naturstyrelsen, København. 83 pp.

Moltesen, P. (1988). Skovtræernes ved. Skovteknisk Institut, Akademiet for Tekniske Videnskaber. ISBN 87-87798-52-2.

Nihlgård, B. and Lindgren, L. (1977). Plant biomass, primary production and bioelements of three mature beech forests in South Sweden. Oikos 28: 95-104.

Schöne, D. and Schulte, A. (1999). Forstwirtschaft nach Kyoto: Ansätze zur Quantifizierung und betrieblichen Nutzung von Kohlenstoffsenken. Forstarchiv 70: 167-176.

Skovbrugstabeller (1990). Det Forstlige Forsøgsvæsen. København. 270 pp.

Stoltze, M. and Pihl, S. (eds.) (1998). Rødliste 1997 over planter og dyr i Danmark (*Redlist 1997 for flora and fauna in Denmark*). Miljø- og Energiministeriet, Danmarks Miljøundersøgelser og Skov- og Naturstyrelsen.

Söderberg, U. (2000). Designing a sample-based National Forest Inventory for Denmark. Background for selection of variables, based on international and national processes, agreements and obligations. Danish National Forest Inventory, Report No. 1. 40 pp.

Söderberg, U. 2000. Designing a sample-based National Forest Inventory for Denmark. Outline of the sample-based National Forest Inventory. Danish National Forest Inventory, Report No. 2. 27 pp.

Söderberg, U. and Johannsen, V.K. (2000). Designing a sample-based National Forest Inventory for Denmark. Field manual. Danish National Forest Inventory, Report No. 3. 73 pp.

Vande Walle, I. Mussche, S., Samson, R., Lust, N. and Lemeur, R. (2001). The above- and belowground carbon pools of two mixed deciduous forest stands located in East-Flanders (Belgium). Annals of Forest Science 58: 507-517.

Vedel, H. (1985). Træer og buske i landskabet. Politikkens forlag. 253 pp.

Vejre, H., Callesen, I, Vesterdal, L and Raulund-Rasmussen, K. (2002). Carbon and nitrogen in Danish forest soils - contents and distribution determined by soil order. Soil Sci. Soc. Am. J., 67, 335-343.

1 Table T1 – Extent of Forest and Other wooded land

1.1 FRA 2010 Categories and definitions

Category	Definition
Forest	Land spanning more than 0.5 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
Nord-Larsen et al. (2008)	H	Forest and other wooded land	2010 2005	Definitions of forest and other wooded land is in accordance with the FAO definition
Larsen and Johannsen (2002)	M	Forest	2000	The forest definition is in general in accordance with the FAO definition.
Zangenberg and Hansen (1994)	M	Forest	1990	The forest definition is in general in accordance with the FAO definition.
Danmarks Statistik (2008)	H	Other land, Other land with tree cover Inland water bodies	2010 2005 2000 1990	Other land with tree cover includes only fruit orchards because information on the extent of parks with tree cover of more than 10 % is not available.
AIS	M	Other wooded land	2000 1990	

1.2.2 Classification and definitions

National class	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*. The definition includes temporarily unstocked areas and smaller, permanently unstocked areas necessary for forest management. 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 not classified as "Forest" or "Other wooded land".
Other land with tree cover	Land with tree cover not defined as forest or other wooded land according to the above definitions. Includes only fruit orchards as information on tree covered park landscapes is not available.
Inland water bodies	Inland water bodies generally include major rivers, lakes and water reservoirs.

1.2.3 Original data

Forest and other wooded land from Skove og plantager 1990 (Zangenberg, 1994), Skove og plantager 2000 (Larsen and Johannsen, 2002), and Skove og plantager 2006 (Nord-Larsen et al., 2008).

FRA Categories	Area (1000 hectares)		
	1990	2000	2006
Forest	445	486	534
Other wooded land	136	136	47

Planned and realized afforestation with subsidy 2000-2006 used in the estimation of forest area in 2010 (Danish Forest and Nature Agency, pers. comm.)

	2000	2001	2002	2003	2004	2005	2006
Planned private afforestation	1,764	1,288	1,497	1,534	463	2,454	3,061
Realized afforestation	1,611	1,478	1,289	1,465	1,074	759	1,599
Of which realized:							
Private afforestation	1,233	1,244	1,054	1,082	823	533	1,435
State afforestation	196	175	200	300	200	150	100
Other public afforestation	182	59	35	83	51	76	64

For 1990 and 2000 an estimate other wooded land cover has been obtained from the AIS Land Cover Plus Themes. The results refer to the period 1992-1997. The classes used for the estimate are indicated in the following table.

AIS LCP class	Area (1000 hectares)	Contribution (%)	Area (1000 hectares)
10: Bush and grass dominated heath land	28	50	14
11: Bush dominated heath land	36	100	36
14: Bush and forest area	84	100	84
38: Juniperus dominated heath land	2	100	2
Total	150		136

1.3 Analysis and processing of national data

1.3.1 Calibration

No calibration performed for the forest area or area of other wooded land.

1.3.2 Estimation and forecasting

The estimation and forecasting of forest and other wooded land cover are based on inventories undertaken in 1990, 2000 and 2006. The two former inventories were questionnaire surveys, where forest owners reported the forest area and management class distribution. In 2000 more questionnaires were sent to respondents compared to the 1990 survey, which probably explains some of the difference in observed forest area. The 2006 inventory represent the first rotation of a sample-based national forest inventory in Denmark and mark a change in methodology from previous inventories. The difference in forest area between current and previous inventories is 48500 ha or 9 % of the current forest area. The majority of this change is assumed to be caused by changes in methodology.

Although the observed change in forest area is at least in part caused by changes in methodology, differences between different inventories are highly confounded with temporal changes in forest cover due to changes in politics and economics in the forest sector. Hence no effort has been made to estimate the actual change in forest area. Efforts are underway to obtain a more accurate estimate of the forest area for 1990 and 2000 in relation to the reporting requirements for the Kyoto protocol.

The forest area in 2005 is assumed equal to the estimated forest area in the 2006 survey (Nord-Larsen et al., 2008). Forecasting of the forest area in 2010 is made using the forest area in 2006 and the expected afforestation. Expected afforestation with subsidy for the period 2006-2009 is estimated as the average realized afforestation with subsidy during the period 2000-2006 (1325 ha/year). The expected afforestation without subsidy is estimated as the average realized private afforestation 2000-2006 with subsidy (1058 ha/year). The total estimated afforestation 2006-2009 is thus 9530 ha, corresponding to an average of 2383 ha per year.

In the previous reporting (FRA2005), the other wooded land cover was obtained from the Area Information System (AIS) Land Cover Plus themes (Miljø- og Energiministeriet and Danmarks Miljøundersøgelser). The differences in other wooded land cover between the previous and present forest inventories are probably to some extend caused by the differences in methodology. However, nature restoration projects have to some extent restored open land nature types, such as heather, on previously tree covered areas. Hence, the actual change in other wooded land area is difficult to assess.

1.3.3 Reclassification into FRA 2010 categories

No reclassification was done as the results are obtained from the National Forest Inventory, which use international definitions in accordance with the FRA.

1.4 Data for Table T1

FRA 2010 categories	Area (1000 hectares)			
	1990	2000	2005	2010
Forest	445	486	534	544
Other wooded land	136	136	47	47
Other land	3,663	3,622	3,662	3,652
...of which with tree cover	7	8	7	6
Inland water bodies	66	66	66	67
TOTAL	**4,310**	**4,310**	**4,310**	**4,310**

1.5 Comments to Table T1

Variable / category	Comments related to data, definitions, etc.	Comments on the reported trend
Forest	The numbers presented in this assessment denotes a shift from questionnaire based survey to a sample based survey. Differences in the perception of the definition of "forest" between forest owners and trained professionals will lead to changes in the forest area. The reported forest areas in 2005 and 2010 is based on the forest area assessed from the NFI measurements 2002-2006 and average observed afforestation in Denmark 2000-2006.	The observed increase in forest area from 1990 to 2010 is caused by two factors. Since 1989 it has been a forest policy objective in Denmark to double the forest area – corresponding approximately to obtaining a 20- 25% forest cover within a tree generation (100 years) from the base-year 1994. Private afforestation is encouraged by subsidies and total afforestation is estimated at 2,383 ha/year. The second reason for the observed trend is the increase in the number of respondents from the 1990 to the 2000 survey and the change in methodology from the 2000 survey to the 2006 inventory. As private afforestation undertaken without subsidy is unknown, it is not possible to estimate a consistent time series based on e.g. the 2006 survey.
Other wooded land	The numbers presented in this assessment denotes a shift from a survey based interpretation of maps to a sample based survey. The reported other wooded land area in 2010 is based on the forest area assessed from the NFI measurements 2002-2006.	The observed decrease in other wooded land cover from the FRA2005 to the current reporting may in part be due to changes in methodology and reported figures for 1990 and 2000 are probably overestimated. However, nature restoration projects have undoubtedly affected the area of other wooded land. Hence, it is not possible to estimate the extent of other wooded land in 1990 and 2000 based on the 2006 census.
Other land	Total land area is reported by Statistics Denmark (Danmarks statistik, 2008) and the area of Other land is found by subtracting the area of Forest, Other wooded land and Inland water bodies.	
Other land with tree cover	Numbers are reported by Statistics Denmark (Danmarks statistik, 2008) and includes only the area of fruit orchards.	

Inland water bodies	Numbers are reported from Statistics Denmark (Danmarks statistik, 2008). According to FAOSTAT figures (official figures reported by Denmark) the total land area in 1990 is 4239 and the inland water 70. However these figures were based on a survey from 1959 and we thus rather assumed that inland water area is unchanged from 1990 to 2000.	

Other general comments to the table
The Danish National Forest Inventory (NFI) is a continuous survey with a five-year rotation and partial replacement of sample plots. The first measurements were carried out in 2002, and the first five-year rotation of measurements was completed in 2006. The second rotation of measurements was initiated in 2007. About one third of the plots was assigned to be permanent and are remeasured in subsequent inventories every five years. Two thirds are temporary and are reassigned in subsequent inventories. The sample of permanent and temporary field plots has been systematically divided into five panels, each covering the entire Danish land surface, that are each measured in one year. The cyclic inventory and the combination of permanent and temporary sample plots will support future consistency in the estimation of forest and other wooded land area and related variables. However, consistency between previous and present forest inventories is unattainable because temporal differences in methodologies and actual trends are confounded, making the distinction between different effects impossible.

Expected year for completion of ongoing/planned national forest inventory and/or RS survey / mapping	
Field inventory	Continuous
Remote sensing survey / mapping	2009

2 Table T2 – Forest ownership and management rights

2.1 FRA 2010 Categories and definitions

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

2.2 National data

2.2.1 Data sources

References to sources of information	Quality (H/M/L)	Variable(s)	Year(s)	Additional comments
Nord-Larsen et al. (2008)	H	Forest area	2010 2005	Based on interpretation of maps in the land registry GIS-theme (KMS-matrikel-matrikelregister)
Larsen and Johannsen (2002)	M	Forest area	2000	Based on registrations of forest owners in the land registry
Zangenberg and Hansen (1994)	M	Forest area	1990	Based on registrations of forest owners in the land registry

2.2.2 Classification and definitions

National class	Definition
Public ownership	Forest owned by the State; or administrative units of the public administration; or by institutions or corporations owned by the public administration.
Private ownership	Forest owned by individuals, families, communities, private co-operatives, corporations and other business entities, private religious and educational institutions, pension or investment funds, NGOs, nature conservation associations and other private institutions.
Individuals *(sub-category of Private ownership)*	Forest owned by individuals or families.
Private business entities and institutions *(sub-category of Private ownership)*	Forest owned by private corporations, co-operatives, companies and other business entities, as well as private non-profit organizations such as NGOs, nature conservation associations, and private religious and educational institutions, etc.

2.2.3 Original data

The original data for the reporting of the ownership distributions in 1990 and 2000 were provided by the respondents in the two questionnaire surveys. In the sample-based survey from 2006 ownerships at the individual sample plots were determined from an analysis of maps provided by the Danish land registry (Kort og Matrikelstyrelsen, KMS).

FRA 2010 categories and national categories	1990	2000	2006	1990	2000	2006
	Area (ha)			Area (%)		
Total	**445,391**	**486,300**	**534,489**	**100**	**100**	**100**
Private ownership, total	**305,535**	**348,500**	**367,171**	**69**	**72**	**69**
Privately owned forests	202,102	224,000	344,157	45	46	64
Foundations, organizations etc.	28,786	30,500	23,014	6	6	4
Joint stock companies, partnerships, cooporative societies, and other societies	74,647	94,000	-	17	19	0
Public ownership, total	**139,856**	**137,800**	**160,100**	**31**	**28**	**30**
National Forest and Nature Agency	114,099	112,900	123,597	26	23	23
Other state-owned forests	5,214	5,400	7,562	1	1	1
Counties and municipalities	20,543	19,500	28,941	5	4	5
Other ownership	**0**	**0**	**7,218**	**0**	**0**	**1**

2.3 Analysis and processing of national data

2.3.1 Calibration

As national data are available for all reporting years no analysis or processing was needed. There is no information available on the ownership of other wooded land in 1990 and 2000, as the statistics on

2.3.2 Estimation and forecasting

The distribution of ownerships in 2005 and 2010 is assumed unchanged and equal to the findings of the Danish National Forest Inventory 2006 (Skove og plantager 2006). In the 2006 survey, the nature of private ownership was not observed, i.e. no distinction was made between forests owned by individuals and private companies. Hence, in the reporting of the distribution of privately owned forest was assumed equal to the distribution observed in 2000.

2.3.3 Reclassification into FRA 2010 categories

No reclassification has been carried out although individual classes in the Danish Forest Inventories have been aggregated to form the FRA2010 categories.

2.4 Data for Table T2

Table 2a - Forest ownership

FRA 2010 Categories	Forest area (1000 hectares)			
	1990	2000	2005	2010
Public ownership	140	138	160	163
Private ownership	306	348	367	374
...of which owned by individuals	202	224	236	241
...of which owned by private business entities and institutions	103	124	131	133
...of which owned by local communities	0	0	0	0
...of which owned by indigenous / tribal communities	0	0	0	0
Other types of ownership	0	0	7	7
TOTAL	**445**	**486**	**534**	**544**

Note: If other types of ownership are reported, please specify details in comment to the table.

Does ownership of trees coincide with ownership of the land on which they are situated?	x	Yes
		No
If **No** above, please describe below how the two differ:		

Table 2b - Holder of management rights of public forests

FRA 2010 Categories	Forest area (1000 hectares)			
	1990	2000	2005	2010
Public Administration	140	138	160	163
Individuals	0	0	0	0
Private corporations and institutions	0	0	0	0
Communities	0	0	0	0
Other	0	0	0	0
TOTAL	140	138	160	163

2.5 Comments to Table T2

Variable / category	Comments related to data, definitions, etc.	Comments on the reported trend
Public ownership	Public ownership includes state forests, forests owned by the military, municipalities and churches of the national church.	A decreasing proportion of the forests are owned by public forest owners (the shifts in methodology partly hides the actual effect). This is expected as the reported area of private afforestation is larger than the area of public afforestation.
Private ownership	In the 2006 survey, the nature of private ownership (private persons vs. private corporations) was not observed. Hence, in the reporting of the distribution of privately owned forest was assumed equal to the distribution observed in 2000.	An increasing proportion of the forests are owned by private forest owners. This is expected as the reported area of private afforestation is larger than the area of public afforestation.
Other types of ownership	The Other types of ownership includes only areas where ownership could not bee established in the 2006 survey.	
Management rights	Management rights in Danish forests are generally concurrent to ownership.	

Other general comments to the table

3 Table T3 – Forest designation and management

3.1 FRA 2010 Categories and definitions

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

3.2 National data

3.2.1 Data sources

References to sources of information	Quality (H/M/L)	Variable(s)	Year(s)	Additional comments
Nord-Larsen et al. (2008)	L	Primary designated function	2010 2005	The information on designated areas is uncertain.
Larsen and Johannsen (2002)	L	Primary designated function	2000 1990	The information on designated areas is uncertain.
Danish Forest and Nature Agency (2001)	M	Protected areas	2000 2005	Summary statistics on Protected Forest Areas.
Danish Forest and Nature Agency (2008)	M	Protected forest nature types in NATURA 2000 areas	2005 2010	

3.2.2 Classification and definitions

National class	Definition
Forest reserve	According to the Danish Forest Act it is mandated to manage so-called forest reserve land with sustainable management - with respect to economic, ecological and social values. Approx. 90 % of the forest area is designated forest reserve land.
Strict Nature Protection Areas	Areas closed to the public due to special scientific values or very fragile ecology.
Non-intervention forest	Smaller areas of semi-natural (deciduous) forest left unmanaged with no removal of wood and no drainage.
Areas managed according to the Strategy for Natural Forests	Smaller areas of forest designated for historic management practices, selective cutting and continuous forest cover.
Natura 2000	Include all NATURA 2000 areas according to the EU Habitat Directive and Bird Protection Directive. Protected forest-naturetypes have been appointed by the Danish Forest and Nature Agency and management restrictions are implemented on these areas.
Protection of soil	Areas where forests have a protective function for the soil.
Protection of ground water	Areas designated for drinking water extraction.

3.2.3 Original data

Data for the designated areas of production and multiple use forest and areas with no designation is provided by Nord-Larsen et al. (2008) (see previous tables). The area of forests designated for conservation of biodiversity is provided by the Danish Forest and Nature Agency (2001 and 2008). Original data is shown below.

Strict nature protection areas, nonintervention forests and forests managed according to the Strategy for natural forests by category, designation year, and ownership (Danish Forest and Nature Agency, 2001 and 2008).

	Private forests			**State forest**	**Total**
	Agreements according to the Forest law (2001)	Agreements according to the Forest law (2008)	Conservation (2001)	Total (2008)	
Non-intervention forest	1,500		530	5,444	7,474
Selection forestry	1,650		1,400	4,509	7,559
Forest grazing	870		200	1,984	3,054
Coppice	50		120	155	325
Other			70	361	431
Oak scrubs		2,310		614	2,924

Forest habitat protected by NATURA 2000 (categories are in Danish).

Forest nature type (in Danish)	Area (ha)
Skovklit	551
Bøg på mor	2,882
Bøg på mor med kristorn	831
Bøg på muld	5,397
Bøg på kalk	305
Ege-blandskov	1,568
Vinteregeskov	70
Stilkege-krat	1,291
Skovbevokset tørvemose	2,864
Elle-askeskove	2,694

In the table below figures presented above are distributed to individual reporting years. It is assumed that the distribution of protected forest on Natura 2000 areas among private and public owners is similar to the overall distribution of forest ownership.

	1990	2000	2005	2010
Public				
Strict nature protection areas, nonintervention forests and forests managed according to the Strategy for natural forests	5	13	13	13
Protected forest on Natura 2000 areas	0	0	0	6
Private				
Strict nature protection areas, nonintervention forests and forests managed according to the Strategy for natural forests	0	6	9	9
Protected forest on Natura 2000 areas	0	0	0	13
Total	5	19	22	40

3.3 Analysis and processing of national data

3.3.1 Calibration

No calibration has been carried out.

3.3.2 Reclassification into FRA 2010 categories

It is generally assumed that public forests are managed according to the criteria for multiple use and that private forests are production forests (see Comments to Table 3). Hence, the projected areas of primary designation follow the general development in the distribution of ownership. It is further assumed that the distribution of protected forest on Natura 2000 areas among private and public owners is identical to the overall distribution of forest ownership.

3.4 Data for Table T3

Table 3a – Primary designated function

FRA 2010 Categories	Forest area (1000 hectares)			
	1990	2000	2005	2010
Production	280	317	310	299
Protection of soil and water	0	0	0	0
Conservation of biodiversity	5	19	22	40
Social services	0	0	0	0
Multiple use	135	125	149	146
Other (please specify in comments below the table)	0	0	0	0
No / unknown	25	25	53	58
TOTAL	**445**	**486**	**534**	**544**

Table 3b – Special designation and management categories

FRA 2010 Categories	Forest area (1000 hectares)			
	1990	2000	2005	2010
Area of permanent forest estate	445	461	481	485
Forest area within protected areas	5	19	22	40
Forest area under sustainable forest management	445	461	481	485
Forest area with management plan	254	254	254	254

3.5 Comments to Table T3

Variable / category	Comments related to data, definitions, etc.	Comments on the reported trend
Production	Most Danish forests are productive, managed for the purpose of producing wood for industry and bioenergy. However, as stated in the forest act, the forests are at the same time managed for multiple uses. For the state forests this is stated directly in the strategy for management of the state forests (Ministry of Environment, 2002). Consequently, all state forests are perceived as managed for multiple use. For the private forests, most owners manage their forests according to multiple goals where hunting, aesthetic value and nature preservation are often as important as wood production. However, as this is not often stated directly in the management plan or similar all private forests are perceived as production forest. It should however be stressed that most privately owned forests are in fact managed according to the principles of multiple use.	

Protection of soil and water	Danish forests play a significant role in the protection of ground water resources. According to the 2006 survey, 200.000 ha of the Danish forests were in areas with specific drinking water interests ("særlige drikkevandsinteresser"). However, in these areas the forests are not designated for production of drinking water and thus they cannot be assigned this category. Large areas in the costal and heathland regions in Denmark were afforested in the 19th century for the protection of soils against sand drift. These forests still protect the soils from erosion, but their primary designation is "multiple use" rather than ""protection of soil". In conclusion, no areas are put in this category as the designation of the forests is rather "Multiple use" than "Protection of soil and water".	
Conservation of biodiversity	The area of forests designated for conservation of biodiversity comprises protected forest nature types in Natura 2000 areas, forests designated for the protection of biodiversity (Danish: fredninger) and areas with specific management goals such as untouched forest in the state forests or by appointment to the Forest and Nature Agency (Danish: udlægning af urørt skov og gamle driftsformer).	The increase in forest area designated for conservation of biodiversity from 1990 to 2000 is due to the implementation of the Strategy for Natural Forests in 1994. The increase from 2005 to 2010 is caused by the implementation of the Habitat directive.
Social services	Most Danish forests are to some extent managed for social services such as recreation. However, this is seldom the primary objective explicitly stated in a management plan or similar. Therefore, although social services play a significant role in Danish forest management, the forests are managed for multiple uses rather than solely for social services.	
Multiple use	The Danish forest act, which covers all forests in forest reserves, states that the forests must be managed for multiple uses. For the state forests this is further stated in the strategy for management of the state forests (Ministry of Environment, 2002). Consequently, all state forests are perceived as managed for multiple use.	
Other		

No / unknown designation	Forest that is not forest reserve cannot be expected to be managed according to the criteria for multiple use. Also, no information is available on the designation of such areas. Hence, this category includes forests that are not designated as forest reserve.	
Area of permanent forest estate	In Denmark about 90 % of the forest area is declared forest reserve (Danish: fredsskov). According to the Forest Act, such forest is permanent and the area must be stocked with trees, which form or will come to form, a closed canopy forest of high-boled trees within a reasonable period of time.	In 1990 all forest is assumed to be forest reserve but according to the subsequent surveys the percentage of forest reserve is approx. 90 %. The reason for the observed trend is that in 1990 questionnaires were only sent to known forest owners, i.e. owners with forest declared as forest reserve. In the 2000 survey, many more questionnaires were sent out, also to land owners not previously known to have forest on their land. In 2006, all the land was surveyed based on a systematic sample. In the two latter inventories also land not declared as forest reserve was inventoried which explains the decrease in forest reserve percentage.
Forest area within protected areas	The area of forest within protected areas is comprised of areas within Natura 2000 areas and national parks. As the first national park was established in 2008, no estimate is available on the forest cover in national parks.	
Forest area under sustainable forest management	As the forest act explicitly states that forests declared as forest reserve must be managed sustainably, the reported area corresponds to the total area of forest reserve. A number of forests in Denmark have been certified according to sustainability criteria. The total certified forest area in Denmark is 207 000 ha.	In 1990 all forest is assumed to be forest reserve and hence under sustainable forest management. However, according to the subsequent surveys the percentage of forest reserve is approx. 90 %. The reason for the observed trend is that in 1990 questionnaires were only sent to known forest owners, i.e. owners with forest declared as forest reserve. In the 2000 survey, many more questionnaires were sent out, also to land owners not previously known to have forest on their land. In 2006, all the land was surveyed based on a systematic sample. In the two latter inventories also land not declared as forest reserve was inventoried which explains the decrease in forest reserve percentage.
Forest area with management plan	Forest management plans may take different forms. The reported number include only areas have a specific plan for future management.	

Other general comments to the table
In Denmark it may be inappropriate to distinguish between designated functions of the forests. Although most of the Danish forests are productive, the designated function may best be characterized as “Multiple use”. For the state forests this is stated directly in the strategy for management of the state forests (Ministry of Environment, 2002). For the private forests, most owners manage their forests according to multiple goals where hunting, aesthetic value and nature preservation are often as important as wood production. The Forest Act requires that the forests are managed sustainably on both private and public forest lands. Sustainable management entail the inclusion of economic as well as ecological and social values on areas designated as forest reserve land and the administration of the Forest Act take a holistic approach to:

1) promote the establishment of robust forests,
2) ensure the productivity of the forests,
3) conserve and increase the biological diversity of the forests, and
4) ensure that proper attention be given to landscape, natural history, cultural history, environmental protection and outdoor recreation.

The following shall apply to the individual area designated as forest reserve land:
1) The area must be stocked with trees, which form or will come to form, a closed canopy forest of high-boled trees within a reasonable period of time.
2) Logging, except thinning, may not be carried out before the stand or the individual tree has reached the rotation age (defined by age and/or dimension).
3) No later than 10 years after such logging of a stand, the area must meet the requirement of no. 1.
4) Livestock farming is prohibited. This prohibition does not, however, apply to areas that may be legally kept without trees, cf. section 10.

The reported figures are different from what was reported in the FRA 2005. In the previous survey it was arbitrarily assumed that 50 % of the forest area could be categorized as 'Production forestry' and 50 % as 'Multible use'. Further, it was assumed that forests planted in the sandy coastal areas on previous sand drift areas are designated for soil protection.

In the current reporting it was emphasized that the designation should be documented either by legal prescription, by a documented decision of the forest owner, or a documented study. The abovementioned method for assigning the primary designated function of the forest does not concur with these requirements. Therefore the methodology was changed in this survey to better accommodate the requirements of the FRA 2010.

4 Table T4 – Forest characteristics

4.1 FRA 2010 Categories and definitions

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

4.2 National data

4.2.1 Data sources

References to sources of information	Quality (H/M/L)	Variable(s)	Year(s)	Additional comments
Nord-Larsen et al. (2008)	H	All	2010 2005 2000 1990	The data was collected in the first measurement rotation of the Danish NFI (2002-2006). Numbers from this survey is represented for 2005. Numbers of the other years are estimated by extrapolation.

4.2.2 Classification and definitions

National class	Definition
1) even-aged, planting	Forests established by planting
2) even-aged, natural regeneration	Forests established by natural seed fall after site preparation
3) uneven-aged, group cutting	Forests established by natural seed fall, where the trees are not of the same age. The predominant silvicultural regime is group cutting.
4) uneven-aged, selection cutting	Forests established by natural seed fall, where the trees are not of the same age. The predominant silvicultural regime is selective cutting.
5) uneven-aged, natural forest	Forests established by natural seed fall, where the forest structure is similar to natural forests.
6) other	-
7) coppice	Stands managed by coppice. Typically stands of salix species for energy production.
8) protective forest	Forests planted mostly for protecting agricultural lands
9) grazing forest	Forests with grazing animals. Mostly for preservation of specific ecotypes.
10) Christmas trees and greenery	Planted stands of Nordmann fir and noble fir for Christmas tree and greenery production.

4.2.3 Original data

Information regarding forest characteristics was collected in the 2006 forest inventory based on a visual inspection by the measurement crews. Similar information was not obtained in relation to the 1990 and 2000 inventories. The distribution of different management forms observed on the national forest inventory plots is shown in the table below.

Management	Introduced	Indigenous	Unknown	Total
	ha			
Even-aged, planting	188,614	153,007	13,741	355,362
Even-aged, natural regeneration	13,268	37,374	1,333	51,975
Historic management forms	1,571	3,817	1,134	6,522
Uneven-aged, managed	7,359	15,725	2,310	25,394
Uneven-aged, undisturbed	12,429	23,316	6,037	41,781
Protection	2,910	4,824	1,296	9,031
Other	12,845	16,160	15,418	44,423
Total	238,996	254,222	41,270	534,488

4.3 Analysis and processing of national data

4.3.1 Calibration

No calibration has been made

4.3.2 Estimation and forecasting

The identification of forest types for this survey is based on a visual assessment of management activity on the sample plots in the 2002-2006 survey. When estimating the area of forest types in the other years we have assumed that the distribution of forest types is

unchanged in the different years. It is further assumed that the Other category (of which much is really Unknown) is distributed among the other categories according to the share of the individual category.

The area of introduced species in the planted and naturally regenerated forests, respectively, represents only the area where introduced species have been observed and not areas where no species type have been recorded. Hence the true area of introduced species is probably a little larger.

In the 1990 and 2000 forest surveys, no assessment was made of the forest characteristics. Thus, the area of planted and naturally regenerated forest in 1990 and 2000 has been estimated under the assumption that the distribution is similar to that in 2005. The area in 2010 has been forecasted under the assumption that the distribution of planted and naturally regenerated forest in existing forests is unchanged and that all afforestation is planted.

4.3.3 Reclassification into FRA 2010 categories

National class	FRA 2010 category
Even-aged, planting	Planted forest
Even-aged, natural regeneration	Other naturally regenerated forest
Historic management forms	Other naturally regenerated forest
Ueven-aged, managed	Other naturally regenerated forest
Uneven-aged, undistirbed	Primary forest
Protection	Planted forest
Other	

4.4 Data for Table T4

Table 4a

FRA 2010 Categories	Forest area (1000 hectares)			
	1990	2000	2005	2010
Primary forest	21	23	25	25
Other naturally regenerated forest	93	102	112	112
...of which of introduced species	29	31	35	35
Planted forest	331	361	397	407
...of which of introduced species	159	174	192	192
TOTAL	**445**	**486**	**534**	**544**

Table 4b

FRA 2010 Categories	Area (1000 hectares)			
	1990	2000	2005	2010
Rubber plantations (Forest)	0	0	0	0
Mangroves (Forest and OWL)	0	0	0	0

Bamboo (Forest and OWL)	0	0	0	0

4.5 Comments to Table T4

Variable / category	Comments related to data, definitions, etc.	Comments on the reported trend
Primary forest	Only a very limited number of the forests are truly primary. The identification of primary forest types for this survey is based on a visual assessment of management activity on the sample plots.	There is a slight increase in the area of primary forest. The reason for this trend is that the Ministry of Environment in 1992 made the strategy for Danish natural forests and other important forest types (published in 1994). This strategy implied that previously managed forest was laid out as undisturbed forest. As the visible indications of human activity gradually disappear, these forest areas will gradually become 'primary' according to the definition in FRA 2010.
Other naturally regenerating forest	The identification of forest types for this survey is based on a visual assessment of management activity on the sample plots.	The reported trend is caused by the chosen methodology for calculating the distribution of forest management types in 1990 and 2000, which is based on the assumption that the distribution of management types is unchanged. As the forest area is increasing this also causes both planted and naturally regenerated forest to increase. This assumption may not be valid as focus on conversion to near-natural forest management in recent decades has probably increased the area of naturally regenerated forest stands.
Planted forest	The identification of forest types for this survey is based on a visual assessment of management activity on the sample plots.	The reported trend is caused by the chosen methodology for calculating the distribution of forest management types in 1990 and 2000, which is based on the assumption that the distribution of management types is unchanged. As the forest area is increasing this also causes both planted and naturally regenerated forest to increase. This assumption may not be valid as focus on conversion to near-natural forest management in recent decades has probably increased the area of naturally regenerated forest stands.
Rubber plantations		
Mangroves		
Bamboo		

Other general comments to the table
The amount of truly primary forest in Denmark is very limited (in fact only two forests are considered primary: Draved forest and Suserup forest). However, according to the definition in FRA 2010, the forests need not be undisturbed by man to be considered primary but there should be no visible indications of human activity. In the FRA 2005 and in the MCPFE report only the truly primary forest area was reported whereas the reporting in 2010 is in accordance with the abovementioned definition.

5 Table T5 – Forest establishment and reforestation

5.1 FRA 2010 Categories and definitions

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

5.2 National data

5.2.1 Data sources

References to sources of information	Quality (H/M/L)	Variable(s)	Year(s)	Additional comments
Nord-Larsen et al. (2008)	M	Reforestation	2005 2000	
Larsen and Johannsen (2002)	M	Reforestation	1990	
Danish Forest and Nature Agency	M	Afforestation	2005 2000 1990	Data on afforestation are collected from records of afforestation undertaken with subsides managed by the Danish Forest and Nature Agency. In 2000 and 2005, it is assumed that the private afforestation

5.2.2 Classification and definitions

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

5.2.3 Original data

In the Danish NFI, the origin and age of afforestation and reforestation is recorded on ordinary and supplementary sample plots. The estimated area of afforestation based on these data was unreasonably small when comparing with the area recorded by the Forest and Nature

Agency (Skov- og Naturstyrelsen) as part of the subsidy scheme for afforestation (see table below). The reason for this difference is apparently that afforestation was difficult to recognize on air photos and therefore often not recorded.

Planned and realized afforestation with subsidy 1997-2006 used in the estimation of forest area in 2010 (Danish Forest and Nature Agency, pers. comm.).

Year	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Planned private afforestation	-	137	3,271	1,764	1,288	1,497	1,534	463	2,454	3,061
Realized private afforestation	-		251	1,233	1,244	1,054	1,082	823	533	1,435
State afforestation	414	146	358	196	175	200	300	200	150	100
Other public afforestation	267	101	150	182	59	35	83	51	76	64

The assessment of reforestation in 1998-2002 and 2003-2007 is based on the recordings of the NFI because reforestation is easier to recognize on air photos than afforestation.

5.3 Analysis and processing of national data

5.3.1 Calibration

No calibration has been done.

5.3.2 Estimation and forecasting

In the present survey, the assessment of afforestation in 1998-2002 and 2003-2007 is based on the records of the Forest and Nature Agency, under the assumption that private afforestation without subsidy is similar to private afforestation with subsidy. In the period 1988-1992, afforestation was not subsidized in Denmark and the reported figures include only the public afforestation.

In the present survey, the assessment of reforestation 1988-1992 is based on the age-class distribution observed in the forest inventory from 2000. The reforestation is calculated as the five year average annual forest establishment in 1980-1989 and 1990-1999.

The assessment of reforestation in 2005 include only sample plots where reforestation can be recognized i.e. where the establishment of the new stand is instigated by a deliberate act. However, conversion to near-natural management and a general trend towards utilizing spontaneous natural regeneration has lessened the area regenerated by planting or selfseeding after soil preparation. This reduces the above assessment of reforestation compared to the overall area affected by some type of regeneration. This might explain some of the observed difference in reforestation in 1990 and 2000/2005.

5.3.3 Reclassification into FRA 2010 categories

No reclassification has been done

5.4 Data for Table T5

FRA 2010 Categories	Annual forest establishment (hectares/year)			...of which of introduced species [1)] (hectares/year)		
	1990	2000	2005	1990	2000	2005
Afforestation	269	1,833	2,193	0	756	968
Reforestation	11,812	5,027	2,115	4,959	2,388	1,326
...of which on areas previously planted	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
Natural expansion of forest	N.A.	103	91	N.A.	0	0

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

5.5 Comments to Table T5

Variable / category	Comments related to data, definitions, etc.	Comments on the reported trend
Afforestation	Unfortunately, no information is available on the species distribution of afforestation. We have assumed that the estimated private afforestation without subsidy is mainly carried out with conifers that are introduced species in Denmark.	
Reforestation	Unfortunately, no information on the origin of the previous stand is available.	The change in reforestation from 1990 to 2000/2005 is to some extend due to differences in the methodology (see 5.3.2 Estimation and forecasting). However, changes in the price structure in 1999/2000 may have severely affected the reforestation area through the effects of prices on harvesting.
Natural expansion of forest	Natural expansion of forest was in principle recorded by the NFI. However, such establishment of new forest is not common in Denmark and difficult to recognize on air photos. Therefore the estimated area is very small and the uncertainty of the estimate is large.	

Other general comments to the table

6 Table T6 – Growing stock

6.1 FRA 2010 Categories and definitions

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

6.2 National data

6.2.1 Data sources

References to sources of information	Quality (H/M/L)	Variable(s)	Year(s)	Additional comments
Nord-Larsen et al. (2008)	H	growing stock	2006	Growing stock estimates for 2005 and 2010 are based on the tree measurements of the Danish NFI
Larsen and Johannsen (2002)	M	growing stock	2000	Growing stock for 2000 calculated in Skove og plantager 2000 based on information on species and age distribution collected in 2000.
Zangenberg and Hansen (1994)	M	growing stock	1990	Growing stock for 1990 recalculated in Skove og plantager 2000 based on information on species and age distribution collected in 1990.
Madsen (1987)	H	commercial stock	1990 - 2005	Volume functions for deciduous and coniferous species.
Madsen and Heusérr (1993)	H	commercial stock	1990 - 2005	Volume functions for Picea abies.

6.2.2 Classification and definitions

National class	Definition
Growing stock	Volume over bark of all living trees more than 0 cm in diameter at breast height. Includes the stem from ground level up to a top diameter of 0 cm. Include branches to a minimum diameter of 0 cm for deciduous tree species.
Growing stock of commercial species	All Danish forest tree species may be considered “commercial”.

6.2.3 Original data

Original data was collected in the inventories in 1990, 2000 and 2006. In the former two, growing stock estimates were based on the observed species and age class distribution of the forest area and common yield tables for Danish forest tree species. In the latter inventory, growing stock was calculated based on the individual tree measurements on the national forest inventory plots.

	1990	2000	2006
	1000 cub. metres		
Deciduous	**25,774**	**28,983**	**56,256**
Beech/*Fagus sylvatica*	17,769	18,199	26,590
Oak/*Quercus robur*	3,781	4,808	9,577
Ash/*Fraxcinus excelsior*	1,010	1,292	4,234
Sycamore/*Acer pseudoplatanus*	819	1,210	5,109
Other deciduous	2,395	3,474	10,746
Coniferous	**39,111**	**45,330**	**50,065**
Norway spruce/*Picea abies*	20,513	23,067	22,030
Sitka spruce/*Picea sitchensis*	5,793	6,195	7,274
Fir/*Abies* spp.	3,249	4,124	4,023
Pine/*Pinus* spp.	2,071	5,662	7,174
Nordmann fir/*Abies nordmanniana*	965	1,981	1,152
Noble fir/*Abies procera*	600	1,206	1,219
Other coniferous	5,920	3,095	7,193
Total	**64,885**	**74,313**	**106,321**

6.3 Analysis and processing of national data

6.3.1 Estimation and forecasting

When forecasting the growing stock in 2010 it is assumed that the volume per hectare for deciduous and coniferous forest and on other wooded land, respectively, is unchanged. It is also assumed that afforestation carried out on public lands or with public subsidy is made with deciduous species (this is encouraged in the way the subsidy is calculated) whereas afforestation on private lands without subsidy is made with coniferous species.

When calculating the growing stock on other wooded land in 1990 and 2000 it is further assumed that the growing stock per hectare is identical to the growing stock per hectare in 2005.

6.3.2 Reclassification into FRA 2010 categories

No reclassification done.

6.4 Data for Table T6

Table 6a – Growing stock

FRA 2010 category	Volume (million cubic meters over bark)							
	Forest				Other wooded land			
	1990	2000	2005	2010	1990	2000	2005	2010
Total growing stock	64.9	74.3	106.3	108.4	3.7	3.7	1.1	1.1
... of which coniferous	39.1	45.5	50.1	50.8	0.4	0.4	0.1	0.1
... of which broadleaved	25.8	28.8	56.2	57.6	3.3	3.3	1.0	1.0
Growing stock of commercial species	64.9	74.3	106.3	108.4	3.7	3.7	1.1	1.1

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

FRA 2010 category / Species name			Growing stock in forest (million cubic meters)		
Rank	Scientific name	Common name	1990	2000	2005
1st	*Picea abies*	Norway spruce	20.5	23.1	22.0
2nd	*Fagus sylvatica*	Beech	17.8	18.2	26.6
3rd	*Picea sitchensis*	Sitka spruce	5.8	6.2	7.2
4th	*Pinus spp.*	Pine	2.1	5.7	7.3
5th	*Quercus robur*	Oak	3.8	4.8	9.6
6th	*Abies spp.* (excl. *normanniana* and *procera*)	Fir	3.2	4.1	4.0
7th	*Abies normanniana*	Kaucasian Silver fir	1.0	2.0	1.2
8th	*Fraxinus exelsior*	Ash	1.0	1.3	5.1
9th	*Acer pseudoplatanus*	Sycamore	0.8	1.2	4.2
10th	*Abies procera*	Noble fir	0.6	1.2	1.2
Remaining			8.3	6.6	17.9
TOTAL			**64.9**	**74.4**	**106.3**

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

Table 6c – Specification of threshold values

Item	Value	Complementary information
Minimum diameter (cm) at breast height[1] of trees included in growing stock (X)	0	Applies to all calculations
Minimum diameter (cm) at the top end of stem for calculation of growing stock (Y)	0	Applies to all calculations
Minimum diameter (cm) of branches included in growing stock (W)	0	Only included for deciduous trees.
Volume refers to "above ground" (AG) or "above stump" (AS)	AG	

[1] Diameter at breast height (DBH) refers to diameter over bark measured at a height of 1.30 m above ground level or 30 cm above buttresses if these are higher than 1 m.

6.5 Comments to Table T6

Variable / category	Comments related to data, definitions, etc.	Comments on the reported trend
Total growing stock		Large changes have been observed in the volumes of especially deciduous trees. Part of the reason is that unfavourable prices in the recent decade have led to postponing thinning in broadleaves and a build up of biomass. Another and perhaps more significant reason is the change in methodology from the questionnaire surveys in 1990 and 2000 to the sample-based survey started in 2002. Apparently, the models underlying the calculation of growing stock in 1990 and 2000 have predicted generally lower volumes per hectare than observed in the field. Among the reasons for this are less intensive thinning regimes and overlapping generations, especially in beech. As the actual reason for the change in stocking level is not known and because effects are probably confounded we did not attempt to recalculates growing stock in 1990 and 2000 based on the 2006 inventory.
Growing stock of broadleaved / coniferous		A large increase in volume have been observed for all broadleaved species and especially so for beech. The apparent reason for this is less intensive thinning and tending regimes in young stands than used in the models underlying the estimates in 1990 and 2000. Another reason is a general change towards near-natural forestry that has spurred natural regeneration and overlapping generations in broadleaves and hereby generally higher volumes per hectare.
Growing stock of commercial species	All forest tree species in Denmark may be considered as "commercial".	
Growing stock composition	Some of the categories are a group of species. There is a difference between the two data sources with respect to the species group *Pinus spp*. In 1990 it only included *Pinus mugo*, whereas it in 2000 included all pines, especially *Pinus sylvestris*. The species *Fagus sylvatica*, *Pinus sylvestris*, *Quercus robur*, *Fraxinus exelsior* and *Acer pseudoplatanus* are considered native tree species. The remaining trees are introduced species	

Other general comments to the table

7 Table T7 – Biomass stock

7.1 FRA 2010 Categories and definitions

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

7.2 National data

7.2.1 Data sources

References to sources of information	Quality (H/M/L)	Variable(s)	Year (s)	Additional comments
Nord-Larsen et al. (2008)	H	Above-ground biomas Below-ground biomas Dead wood	2010 2005	
Larsen and Johannsen (2002)	M	Above-ground biomas Below-ground biomas	2000	
Zangenberg and Hansen (1994)	M	Above-ground biomas Below-ground biomas	1990	

7.2.2 Classification and definitions

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

7.2.3 Original data

The biomass stock is calculated from the volume estimates reported in relation to T6. Biomass is calculated by multiplying species wise growing stock volume with species specific density factor and expansion factor. Hereby the estimates of total biomass are obtained.

7.3 Analysis and processing of national data

7.3.1 Calibration

No calibration has been made.

7.3.2 Estimation and forecasting

Biomass has been calculated, using the same standard as in the EEFSC reporting of carbon balances in Denmark. Growing stock has been converted to total volumes using expansion factors (1.8 for conifers and 1.2 for broadleaves). It is assumed that for both conifers and broadleaves, the below ground biomass can be calculated by an expansion factor of 0.2.

Biomass is calculated using commonly observed wood densities for the different tree species (see table belowTable 1). The biomass of deadwood is calculated using the densities in Table 1 and a reduction factor according to the structural decay of the wood (see table belowTable 2).

Table 1. Wood density of common tree species in Denmark.

Broadleaves	Density	Conifers	Density
	Tons per m^3		Tons per m^3
Beech	0.56	Norway spruce	0.38
Oak	0.57	Sitka spruce	0.37
Other broadleaves	0.56	Mountain pine	0.48
Sycamore	0.49	Contorta pine	0.37
Ash	0.56	Scots pine	0.43
		Other pines	0.43
		Silver fir	0.38
		Nordmann fir	0.38
		Noble fir	0.38
		Douglas fir	0.41
		Larch	0.45
		Other conifers	0.38

Table 2. Reduction factor according to the degree of structural decay for conifers and broadleaves.

Structural decay	Reduction factor	
	Broadleaves	Conifers
1	0.804	0.895
2	0.607	0.632
3	0.429	0.605
4	0.304	0.447

No measurements of deadwood were carried out in 1990 and 2000. Forecasting the amount of dead wood in the forest was made by assuming that the amount of dead wood per hectare is unchanged in 1990, 2000, 2005 and 2010.

As with the estimation of growing stock in 2010, it is assumed that the average above- and belowground biomass per hectare for deciduous and coniferous forest, respectively, is

unchanged. It is also assumed that afforestation carried out on public lands or with public subsidy is made with deciduous species (this is encouraged in the way the subsidy is calculated) whereas afforestation on private lands without subsidy is made with coniferous species.

7.3.3 Reclassification into FRA 2010 categories

No reclassification has been done.

7.4 Data for Table T7

FRA 2010 category	Biomass (million metric tonnes oven-dry weight)							
	Forest				Other wooded land			
	1990	2000	2005	2010	1990	2000	2005	2010
Above-ground biomass	38.3	44.2	62.2	63.4	1.7	1.7	0.6	0.6
Below-ground biomass	5.9	6.7	10.1	10.3	0.3	0.3	0.1	0.1
Dead wood	0.8	0.9	1.0	1.0	0.1	0.1	0.02	0.02
TOTAL	45.0	51.8	73.3	74.7	2.0	2.0	0.7	0.7

7.5 Comments to Table T7

Variable / category	Comments related to data, definitions, etc.	Comments on the reported trend
Above-ground biomass	As with the above tables on growing stock, the change in methodology from questionnaire surveys (1990, 2000) to sample based surveys (2006) denoted a shift from model-based estimation of above-ground biomass to actual measurements.	
Below-ground biomass	The estimation of below-ground biomass relies on expansion factors. The applied expansion factors in this study are quite simple. New expansion factors are currently being developed for common tree species in Denmark.	
Dead wood	The assessment of dead wood biomass in the Danish forests was undertaken for the first time in 2006. Consequently, dead wood biomass in 1990 and 2000 was estimated under the assumption that dead wood biomass per hectare is unchanged.	

Other general comments to the table

8 Table T8 – Carbon stock

8.1 FRA 2010 Categories and definitions

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

8.2 National data

8.2.1 Data sources

References to sources of information	Quality (H/M/L)	Variable(s)	Year(s)	Additional comments
Nord-Larsen et al. (2008)	H	Carbon in above-ground biomass Carbon in below-ground biomass	2010 2005	
Nord-Larsen et al. (2008)	H	Carbon in dead wood Carbon in litter	2010 2005 2000 1990	
Larsen and Johannsen (2002)	M	Carbon in above-ground biomass Carbon in below-ground biomass	2000	
Zangenberg and Hansen (1994)	M	Carbon in above-ground biomass Carbon in below-ground biomass	1990	

8.2.2 Classification and definitions

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

8.2.3 Original data

The carbon stock is calculated from the biomass estimates reported in relation to T7. The carbon content is estimated by multiplying total biomass with a factor of 0.5 tC/t biomass. The conversion from growing stock to biomass is described for T7: Biomass stock..

Estimation of carbon in the litter layer is based on the measurements of the litter-layer in the sample plots of the Danish NFI.

8.3 Analysis and processing of national data

8.3.1 Calibration

No calibration has been carried out.

8.3.2 Estimation and forecasting

Carbon in biomass and dead wood (se table 7) has been estimated by multiplying biomass by a factor of 0.5.

Estimation of carbon in the litter layer is based on the measurements of the litter-layer in the sample plots of the Danish NFI. The depth is converted to volume per hectare and to biomass per hectare by applying observed density of the litter layer for different species (see table below**Error! Reference source not found.**). Carbon content in the litter layer was obtained by multiplying the biomass with a factor 0.5.

The carbon content of the litter layer in 1990 and 2000 was obtained by assuming unchanged litter layer and using the species-wise estimates of carbon per hectare obtained from the above analyses. Carbon in the litter layer for 2010 was forecasted in a similar fashion.

Density of the litter layer in forest stands for different tree species (Vesterdal & Raulund-Rasmussen, 1998).

Deciduous species	Density	Coniferous species	Density
	Tons per m^3		Tons per m^3
Beech	0.55	Norway spruce	1.09
Oak	0.36	Sitka spruce	0.86
Ash	0.55	Silver fir	1.09
Sycamore	0.55	Pines	0.79
Other broadleaves	0.55	Nordmann fir	1.09
		Noble fir	1.09
		Other conifers	0.94

8.3.3 Reclassification into FRA 2010 categories

No reclassification has been undertaken.

8.4 Data for Table T8

FRA 2010 Category	Carbon (Million metric tonnes)							
	Forest				Other wooded land			
	1990	2000	2005	2010	1990	2000	2005	2010
Carbon in above-ground biomass	19.1	22.1	31.1	31.7	0.87	0.87	0.30	0.30
Carbon in below-ground biomass	2.9	3.4	5.1	5.2	0.14	0.14	0.05	0.05
Sub-total: Living biomass	***22.1***	***25.5***	***36.2***	***36.9***	***1.0***	***1.0***	***0.4***	***0.4***
Carbon in dead wood	0.4	0.4	0.5	0.5	0.05	0.05	0.01	0.01
Carbon in litter	5.5	5.9	6.7	6.8	1.74	1.74	0.60	0.60
Sub-total: Dead wood and litter	***5.9***	***6.3***	***7.2***	***7.3***	***1.8***	***1.8***	***0.6***	***0.6***
Soil carbon	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
TOTAL	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.

Soil depth (cm) used for soil carbon estimates	

8.5 Comments to Table T8

Variable / category	Comments related to data, definitions, etc.	Comments on the reported trend
Carbon in above-ground biomass		
Carbon in below-ground biomass		
Carbon in dead wood	Estimates in 1990 and 2000 are based on the assumption that the amount of dead wood per hectare is similar to the observed in 2005. Forecasting dead wood carbon in 2010 is done in a similar fashion.	
Carbon in litter	Estimates in 1990 and 2000 are based on the assumption that the litter layer for individual species is similar to the observed in 2005. Litter carbon content is subsequently calculated based on the species distribution in different years. Forecasting the 2010 litter carbon content is done in a similar fashion.	
Soil carbon		

Other general comments to the table

9 Table T9 – Forest fires

9.1 FRA 2010 Categories and definitions

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

9.2 National data

9.2.1 Data sources

References to sources of information	Quality (H/M/L)	Variable(s)	Year(s)	Additional comments
Beredskabsstyrelsen	H	Fire	2008	
Beredskabsstyrelsen	H	Fire	2002	

9.2.2 Classification and definitions

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

9.2.3 Original data

Beredsskabsstyrelsen collects statistics on fires in Denmark. Generally the number of forest fires is very limited and such fires seldom affect more than a few hectares. Occasionally larger forest fires occur, but still they are in the range of 20-100 hectares. Due to the limited extend of forest fires in Denmark statistics does not include information on the type of tree covered land (forest or other wooded land). Due to the structure of the database we assume that all the reported fires on tree covered lands are forest fires.

9.3 Analysis and processing of national data

9.3.1 Calibration

No calibration has been made.

9.3.2 Estimation and forecasting

No estimation or forecasting has been made.

9.3.3 Reclassification into FRA 2010 categories

No reclassification has been made.

9.4 Data for Table T9

Table 9a

FRA 2010 category	Annual average for 5-year period					
	1990		2000		2005	
	1000 hectares	number of fires	1000 hectares	number of fires	1000 hectares	number of fires
Total land area affected by fire	n.a.	n.a.	0.001	4	0.01	3
... of which on forest	n.a.	n.a.	0.001	4	0.01	3
... of which on other wooded land	n.a.	n.a.	0	0	0	0
... of which on other land	n.a.	n.a.	0	0	0	0

Table 9b

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

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

9.5 Comments to Table T9

Variable / category	Comments related to data, definitions, etc.	Comments on the reported trend
Area affected by fire	Fires on other land include fires on farmlands, heather, dune areas and other natural areas.	
Number of fires		
Wildfire / planned fire		

Other general comments to the table

10 Table T10 – Other disturbances affecting forest health and vitality

10.1 FRA 2010 Categories and definitions

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

10.2 National data

10.2.1 Data sources

References to sources of information	Quality (H/M/L)	Variable(s)	Year(s)	Additional comments
Skove og plantager 2006	M	Insects Diseases Other biotic Abiotic	2005	
Skove og plantager 2000	M	Windthrow	2000	

10.2.2 Classification and definitions

National class	Definition
Disturbance	Damage caused by any factor (biotic or abiotic) that adversely affects the vigour and productivity of the forest and which is not a direct result of human activities.
Invasive species	Species that are non-native to a particular ecosystem and whose introduction and spread cause, or are likely to cause, socio-cultural, economic or environmental harm or harm to human health.
Disturbance by insects	Disturbance caused by insect pests.
Disturbance by diseases	Disturbance caused by diseases attributable to pathogens, such as bacteria, fungi, phytoplasma or virus.

Disturbance by other biotic agents	Disturbance caused by biotic agents other than insects or diseases, such as wildlife browsing, grazing, physical damage by animals, etc.
Disturbance caused by abiotic factors	Disturbances caused by abiotic factors, such as air pollution, snow, storm, drought, etc.

10.2.3 Original data

Damage to forests and other wooded lands caused by biotic and abiotic agents is recorded with the National Forest Inventory initiated in 2002. On the individual sample plots, damages are recorded if the damage is judged to cause a more than 10 % reduction in forest productivity or affects more then 10 % of the trees. More than one agent may be recorded on the individual plot if for example a stand is damaged by storm and remaining trees subsequently are attacked by bark beetles.

Before 2002, no recordings have been made regarding forest damage except for damages caused by windthrow, where reports are limited to major windthrows. Windthrow frequently causes damage to Danish forests. Previous large storms occurred in 1902, 1934, 1967 and 1981, 1999 and 2005. The storm of 1999 damaged the largest forest area in Denmark during the recent history. A rough estimate of the area affected by windfall is 20,000 ha. On the majority of this area there was practically no standing trees left.

Due to the erratic nature of damage caused by various agents, no additional effort has been made for attempting to provide estimates of forest damage caused by other agents than wind in 1990 and 2000.

10.3 Analysis and processing of national data

10.3.1 Calibration

No calibration has been made.

10.3.2 Estimation and forecasting

Estimation of the forest area affected by various agents is made by estimating the proportion of the sampled area affected by the individual agent. The affected forest area is subsequently estimated by multiplying the proportions for the individual agents with total forest area. In the estimation, only the most significant or the initiating agent was used to make certain that the total affected area was estimated correctly.

The estimation of affected areas is based on the occurrence of damage, irrespectively of when the damage has occurred.

Woody invasive species are at present not recorded in the Danish NFI. However, only few of such species are known and the forest area affected by such species is estimated to be 0.

10.3.3 Reclassification into FRA 2010 categories

No reclassification has been made.

10.4 Data for Table T10

Table 10a – Disturbances

FRA 2010 category	Affected forest area (1000 hectares)		
	1990	2000	2005
Disturbance by insects	n.a.	n.a.	4.3
Disturbance by diseases	n.a.	n.a.	1.5
Disturbance by other biotic agents	n.a	n.a	15.4
Disturbance caused by abiotic factors	3	20	34.2
Total area affected by disturbances	n.a	n.a	**55.2**

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

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

Description / name	Tree species or genera affected (scientific name)	Year(s) of latest outbreak	Area affected (1000 hectares)	If cyclic, approx. cycle (years)
Ips typhographus	*Picea abies (L.) Karst.*	2006	n.a.	
Dendroctonus micans	*Picea sitchensis*	2008	n.a.	
Elatobium abietinum	*Picea sitchensis*	2008	n.a.	

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

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

Scientific name of woody invasive species	Forest area affected 2005 (1000 hectares)
Total forest area affected by woody invasive species	0

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

10.5 Comments to Table T10

Variable / category	Comments related to data, definitions, etc.	Comments on the reported trend
Disturbance by insects	Includes only areas where the damage affects more than 10% of the trees or the damage is judged to result in a larger than 10% loss in productivity.	
Disturbance by diseases	The category includes mainly damage caused by fungi. The most severe damage caused by fungi en Denmark is root rot caused by *Heterobasidium annosum.* As the rot in stems and roots is difficult to recognize, the area affected is presumably much larger than reported. No other estimates are available for the area affected by diseases.	
Disturbance by other biotic agents	This category includes mainly damage caused by red deer and roe deer. These animals frequently forage on young stands and strip the bark of especially coniferous trees.	
Disturbance caused by abiotic factors	This category includes damage caused by wind (44.8 % of the total damaged area) and other abiotic agents (9.1 % of the total damaged area).	
Major outbreaks	Major outbreaks of insect pests are not often observed in Denmark. Following large windthrows and in combination with warm and dry summers bark beetles (*Ips typographus*) may reach epidemic levels. Such outbreaks were observed in 1970, 1975-1976, 1982-1983, 1986, 1992-1995 and 2006, but the total affected area is not known. Of other insect pests that may affect considerable areas of forests are *Elatobium abietinum* that causes production losses but in extreme cases (such as 2008) may cause scattered death of Sitka spruce trees. Also great spruce bark beetle (*Dendroctonus micans*) may cause production losses and general unstability of affected trees.	
Invasive species	Invasive species are at present not recorded in the Danish NFI.	

Other general comments to the table
The reported figure on disturbances reflects the cumulative damage but as the duration of the disturbances are seldom more than five years, the reported figures are not believed to be far from five year averages

11 Table T11 – Wood removals and value of removals

11.1 FRA 2010 Categories and definitions

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

11.2 National data

11.2.1 Data sources

References to sources of information	Quality (H/M/L)	Variable(s)	Year(s)	Additional comments
Statistics Denmark (http://www.statistikbanken.dk/statbank5a/default.asp?w=1680: SKOV6: Felling in forests and plantation in Denmark by region, species of wood and area)	H	Industrial roundwood removals Woodfuel removals	2005 2000 1990	

11.2.2 Classification and definitions

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

11.2.3 Original data

The data is reported to Statistics Denmark by forest owners. The reported volumes of industrial roundwood are at roadside, i.e after removal of tops, branches stumps etc.

Total fellings in Denmark 1990-2007 in 1000 cubic metres over bark (Statistics Denmark, 2008).

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Total	**2,017.8**	**1,913.5**	**1,915.5**	**1,777.8**	**1,852.4**	**1,925.8**	**1,876.3**	**1,817.5**	**1,710.4**	**1,715.4**
Timber	1,612.2	1,451.8	1,430.2	1,236.5	1,296.5	1,365.2	1,248.9	1,192.2	1,163.5	1,159.0
Woodfuel total	**405.6**	**461.7**	**485.3**	**541.3**	**555.9**	**560.6**	**627.4**	**625.3**	**546.9**	**556.4**
Firewood	305.2	351.2	364	407.5	393.9	399.0	424.6	419.3	362.7	357.9
Wooden chips	100.4	110.5	121.3	133.8	162	161.6	202.8	206	184.2	198.5
Wood for energy. wood chips										

Wood for energy. logs

	2000	2001	2002	2003	2004	2005	2006	2007
Total	**3,671.5**	**1,792.6**	**1,606.9**	**1,807.7**	**1,866.8**	**2,962.3**	**2,349.0**	**2,566.2**
Timber	2,972.3	1107.5	876.7	900.4	917.0	1,681.5	1,193.6	1,460.5
Woodfuel total	**699.2**	**685.2**	**730.2**	**907.2**	**949.7**	**1,280.8**	**1,155.5**	**1,105.8**
Firewood	420.5	425.0	405.1	438.2	427.8	471.5	408.7	379.3
Wooden chips	278.7	260.2	325.1					
Wood for energy. wood chips				326.4	372	420.3	467.9	506.8
Wood for energy. logs				142.6	149.9	389	278.9	219.7

Value of total fellings in Denmark 1988-2007 in mio. DKK.(Statistics Denmark, 2008).

	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997
Total	**689**	**725**	**766**	**647**	**617**	**494**	**567**	**628**	**572**	**576**
Total, timber	**562**	**605**	**650**	**538**	**501**	**368**	**435**	**494**	**421**	**419**
Beech, timber	132	139	160	157	147	132	135	159	151	147
Oak, timber	31	38	34	38	26	22	37	35	27	23
Other deciduous, timber	23	32	29	24	26	23	24	25	18	17
Conifer, timber	376	396	427	319	302	191	239	275	225	232
Woodfuel, total	**127**	**120**	**116**	**109**	**116**	**126**	**132**	**134**	**151**	**157**
Firewood	90	87	86	76	80	86	83	85	90	96
Wood chips and other wood fuels	37	33	30	33	36	40	49	49	61	61

	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Total	**546**	**537**	**918**	**511**	**414**	**446**	**459**	**637**	**553**	**725**
Total, timber	**417**	**409**	**767**	**365**	**271**	**274**	**281**	**421**	**348**	**538**
Beech, timber	132	143	212	123	57	46	37	35	40	44
Oak, timber	27	23	36	36	33	34	34	37	38	39
Other deciduous, timber	21	18	24	23	16	16	19	25	28	32
Conifer, timber	237	225	495	183	165	178	191	324	242	423
Woodfuel, total	**129**	**128**	**151**	**146**	**143**	**172**	**178**	**216**	**205**	**187**
Firewood	84	82	94	96	81	93	92	97	88	83
Wood chips and other wood fuels	45	46	57	50	62	79	86	119	117	104

11.3 Analysis and processing of national data

11.3.1 Calibration

No calibration is carried out. As I understand the guidelines, removals are defined as "removed product", which is in agreement with the definition from Statistics Denmark.

11.3.2 Estimation and forecasting

No estimation or forecasting has been made. As figures were unavailable for 1988-89, figures for 1990 are averages of 1990-1992.

11.3.3 Reclassification into FRA 2010 categories

No reclassification has been made.

11.4 Data for Table T11

FRA 2010 Category	Industrial roundwood removals			Woodfuel removals		
	1990	2000	2005	1990	2000	2005
Total volume (1000 m^3 o.b.)	1,498	1,456	1,231	451	644	1,080
... of which from forest	1,498	1,456	1,231	451	644	1,080
Unit value (local currency / m^3 o.b.)	381	306	303	261	217	178
Total value (1000 local currency)	571,200	445,800	372,400	117,600	139,400	191,600

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

	1990	2000	2005
Name of local currency	Danish crowns (DKK)	Danish crowns (DKK)	Danish crowns (DKK)

11.5 Comments to Table T11

Variable / category	Comments related to data, definitions, etc.	Comments on the reported trend
Total volume of industrial roundwood removals	Reported figures are at roadside, i.e. after removal of branches, stumps etc.	
Total volume of woodfuel removals	Reported figures are partly at roadside (see above) and partly including branches etc. when whole trees are harvested.	Encouraged by government initiatives an increasing proportion of the total fellings are marketed as wood fuel.
Unit value	Unit value is an average across all species and qualities. However, variation in prices between individual assortments is quite large.	The reported prices reflect generally declining prices in recent years. Especially large windthrows in Scandinavia and Europe in 1999 and 2005 have had large impact on prices of wood.
Total value		

Other general comments to the table
In the Danish national forest inventory, stumps judged to be less than a year old are recorded and measured for diameter on the sample plots. This data is intended for making estimates of actual harvested volume. However, in the estimation of the felled volume using this data we found very low estimates of wood removals. One possible explanation for this result is that stumps are often removed prior to planting which in turn leads to biased estimates of wood removals. Due to the apparent bias in the estimated wood removals, we used wood removals recorded by StatBank Denmark (2008). This data is based on reported values from forest owners. As permanent sample plots are being remeasured it will be possible to make estimates of the actual wood removals based on the national forest inventory data, but unfortunately only two years of remeasured sample plots is currently available which is too little for obtaining accurate estimates.

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

12.1 FRA 2010 Categories and definitions

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

NWFP categories

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

12.2 National data

12.2.1 Data sources

References to sources of information	Quality (H/M/L)	Variable(s)	Year(s)	Additional comments
Nord-Larsen et al. (2008)	H	Ornamental plants (Christmas trees, greenery and moss) Wild game	2005	

12.2.2 Classification and definitions

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

12.2.3 Original data

The annual production and value of Christmas trees and greenery is reported by Dansk Juletræsdyrkerforening, and published by Nord-Larsen et al. (2008).

The annual kill of wild game is reported by the hunters to the Danish forest and Nature Agency. The numbers of killed animals are reported in Vildtinformation 2005/06 and collected by Nord-Larsen et al. (2008).

12.3 Analysis and processing of national data

12.3.1 Calibration

No calibration has been carried out.

12.3.2 Estimation and forecasting

Numbers of felled Christmas trees has been estimated using the export statistics from Dansk Juletræsdyrkerforening and assuming a total domestic consumption of 1.7 mio. trees. Similarly, the total production of greenery has been estimated using the export statistics from Dansk Juletræsdyrkerforening and assuming a total domestic consumption of 20,000 tonnes of greenery.

The total values of Christmas trees and greenery has been estimated by multiplying the average price obtained for exported trees and greenery with the total production.

The numbers of killed animals related to forest is estimated as the total number of deer (red deer, roe deer, fallow deer and sika deer) as these are most commonly having the habitat in forests. The total number of forest birds is assessed as the total number of killed woodcock.

12.3.3 Reclassification into FRA 2010 categories

No reclassification has been made.

12.4 Data for Table T12

Rank	Name of product	Key species	Unit	NWFP removals 2005		NWFP category
				Quantity	Value (1000 local currency)	
1st	Christmas trees	Abies nordmaniana	pcs	11,550,000	795,000	6
2nd	Greenery	Abies procera	tonnes	35,000	416,900	6
3rd	Mosses		sq. m	600,000	17,000	5
4th	Game	Deer	pcs	115,200	n.a.	12
5th	Game	Forest birds	pcs	38.200	n.a.	12
6th						
7th						
8th						
9th						
10th						
All other plant products						
All other animal products						
TOTAL						

	2005
Name of local currency	Danish crowns (DKK)

12.5 Comments to Table T12

Variable / category	Comments related to data, definitions, etc.
10 most important products	The annual production and value of Christmas trees and greenery is reported by Dansk Juletræsdyrkerforening. The annual kill of wild game is reported by the hunters to the Danish forest and Nature Agency. In this report I included only the kill of deer and woodcock, which has the forest as natural habitat. Consequently the numbers will include some animals killed on farmlands.
Other plant products	
Other animal products	
Value by product	The marketed value of deer and woodcock is not known. Most of the animals are however not traded but consumed by the hunter's households.
Total value	

Other general comments to the table

13 Table T13 – Employment

13.1 FRA 2010 Categories and definitions

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

13.2 National data

13.2.1 Data sources

References to sources of information	Quality (H/M/L)	Variable(s)	Year(s)	Additional comments
StatBank Denmark (2008)	H	Employment	2005 2000 1990	
Nord-Larsen et al. (2008)	H	Employment	2005 2000 1990	

13.2.2 Classification and definitions

National class	Definition
Primary production of goods	Employment in activities related to primary production of goods, like industrial roundwood, woodfuel and non-wood forest products.

13.2.3 Original data

Original data was provided by Statistics Denmark (www.statistikbanken.dk, ATR1: Årligt arbejdstidsregnskab efter branche (Std.-gr.), type, socio-økonomisk status og køn) (see table below). A year of full time employment was defined as having 1700 hours. Values are reported in Skove og plantager 2006.

1000 hours of work for different categories of workers (Statistics Denmark, 2008).

	1995	1996	1997	1998	1999	2000	2001
Employment in primary production of goods	3,397	3,564	3,543	3,477	3,681	4,116	4,044
...of which paid employment	2,251	2,288	2,254	2,122	2,206	2,602	2,452
...of which self-employment	1,146	1,276	1,289	1,355	1,475	1,514	1,592
Employment in management of protected areas	99	65	25	25	21	25	25

	2002	2003	2004	2005	2006	2007
Employment in primary production of goods	3,964	3,791	4,046	4,106	4,047	4,285
...of which paid employment	2,321	2,022	1,965	2,108	2,157	2,156
...of which self-employment	1,644	1,769	2,081	1,998	1,890	2,129
Employment in management of protected areas	26	23	22	8	14	15

13.3 Analysis and processing of national data

13.3.1 Calibration

No calibration has been done.

13.3.2 Estimation and forecasting

Employment in 1990 is estimates as the average employment in the years 1995-1997, which is the oldest data available.

13.3.3 Reclassification into FRA 2010 categories

Employment in management of protected areas represents the reported values of non-market production.

13.4 Data for Table T13

FRA 2010 Category	Employment (1000 years FTE)		
	1990	2000	2005
Employment in primary production of goods	3.50	4.12	4.11
...of which paid employment	2.26	2.60	2.11
...of which self-employment	1.24	1.51	2.00
Employment in management of protected areas	0.06	0.02	0.01

Note:

13.5 Comments to Table T13

Variable / category	Comments related to data, definitions, etc.	Comments on the reported trend
Employment in primary production of goods		
Paid employment / self-employment		
Employment in management of protected areas	Employment in management of protected areas represents the reported values of non-market production.	

Other general comments to the table

14 Table T14 – Policy and legal framework

14.1 FRA 2010 Categories and definitions

Term	Definition
Forest policy	Forest policy is the set of orientations and principles of actions adopted by public authorities in harmony with national socio-economic and environmental policies in a given country to guide future decisions in relation to the management, use and conservation of forest and tree resources for the benefit of the society.
Forest law	Set of rules enacted by the legislative authority of a country regulating the access, management, conservation and use of forest resources.

14.2 Data for Table T14

Indicate the existence of the following (2008)			
1. Forest policy statement with national scope		x	Yes
			No
If Yes above, provide:	Year of endorsement	2002	
	Reference to document	A shared future – balanced development – Denmark's national strategy for sustainable development, The Danish Government, 2002	
2. National forest programme (nfp)		x	Yes
			No
If Yes above, provide:	Name of nfp in country	The Danish National forest programme	
	Starting year	2002	
	Current status	x	In formulation
			In implementation
			Under revision
			Process temporarily suspended
	Reference to document or web site	Ministry of the Environment (2002). The Danish national forest programme in an international perspective. ISBN: 87-7279-456-9.	
3. Law (Act or Code) on forest with national scope		x	Yes, specific forest law exists
			Yes, but rules on forests are incorporated in other (broader) legislation
			No, forest issues are not regulated by national legislation
If Yes above, provide:	Year of enactment	2004	
	Year of latest amendment	2007	
	Reference to document	Law nr. 453 of june 9. 2004 on forests. Amendments: § 22 in law nr. 430 (june 6. 2005), § 16 in law nr. 431 (june 6. 2005), § 9 in law nr. 564 (june 24. 2005), § 14 in law nr. 1571 (december 20. 2006), § 25 in law nr. 523 (june 6. 2007), § 42 in law nr. 533 (juni 6. 2007)	

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

Explanatory notes to the reporting table:

1. The national forest policy document or statement describes the objectives, priorities and means for implementation of the forest policy. It is endorsed when it is officially recognised as a government policy or instruction. The endorsement is formalised by the Minister in charge of forests by a dated and signed document.
2. The term "national forest programme" is a generic expression referring to a wide range of approaches towards forest policy formulation, planning and implementation at national and sub-national levels and providing a framework and guidance for country-driven forest sector development in consultation and participation of all stakeholders and in consistence with policies of other sectors and international policies.
3. The term "law on forest" refers to a Law (Act or Code) providing specific rules on forests and forest sector management, such as access, management and use of forest resources. The Law is enacted when the legislative authority adopted its text.
4. Same as (1) but the policy documents or statements refer to sub-national administrative units, e.g. States in a Federation or Autonomous Regions or Provinces.
5. Same as (3) but indicate if specific Laws on forests exist at sub-national level (at the level of regions/states/provinces).

14.3 Comments to Table T14

Variable / category	Comments related to data, definitions, etc.
Forest policy statement with national scope	
National forest programme (nfp)	
Law (Act or Code) on forest with national scope	
Sub-national forest policy statements	
Sub-national Laws (Acts or Codes) on forest	

Other general comments to the table

Table T15 – Institutional framework

14.4 FRA 2010 Categories and definitions

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

14.5 Data for Table T15

Table 15a

FRA 2010 Category	2008	
Minister responsible for forest policy formulation : please provide full title	Minister for the Environment	
Level of subordination of Head of Forestry within the Ministry		1st level subordination to Minister
	x	2nd level subordination to Minister
		3rd level subordination to Minister
		4th or lower level subordination to Minister
Other public forest agencies at national level	Danish Forest and Nature Agency (Skov- og Naturstyrelsen)	
Institution(s) responsible for forest law enforcement	Danish Forest and Nature Agency (Skov- og Naturstyrelsen)	

Table 15b

FRA 2010 Category	Human resources within public forest institutions					
	2000		2005		2008	
	Number	%Female	Number	%Female	Number	%Female
Total staff	N.A.	N.A.	N.A.	N.A.	434	30
...of which with university degree or equivalent	N.A.	N.A.	N.A.	N.A.	296	19

Note: Excludes people employed in State-owned enterprises, education and research, as well as temporary / seasonal workers.

14.6 Comments to Table T15

Variable / category	Comments related to data, definitions, etc.	Comments on the reported trend
Minister responsible for forest policy formulation	Among other ministries of relevance to the forest sector is the Ministry of Food, Agriculture and Fisheries, particularly due to the co-ordinating role of the ministry in the fields of land use and plant genetic resources. The international co-operation is mainly the responsibility of the Ministry of Foreign Affairs, and the work of the economic ministries is of importance to the economic framework conditions of the forest sector	
Level of subordination of Head of Forestry within the Ministry		
Other public forest agencies at national level	In Denmark, the forest sector is under the jurisdiction of the Ministry of Environment. The responsibility has been delegated to the Danish Forest and Nature Agency, which also includes 25 forest districts, which manage the 24% of the forest area owned by the state. The Ministry of Environment also includes three public sector research institutions with relevance to forestry. These institutions contribute significantly to knowledge building in the forest sector.	
Institution(s) responsible for forest law enforcement		
Human resources within public forest institutions	The Danish Forest and Nature Agency has undergone significant structural changes in recent years. It is therefore not possible to compare the number of employees in previous years to the number of employees today. We have therefore refrained from reporting the numbers of employees in previous years.	

Other general comments to the table

15 Table T16 – Education and research

15.1 FRA 2010 Categories and definitions

Term	Definition
Annual graduation of students	Number of students that have successfully completed a Bachelor's or higher degree in forest science or achieved a certificate or diploma as forest technician.
Doctor's degree (PhD)	University (or equivalent) education with a total duration of about 8 years.
Master's degree (MSc) or equivalent	University (or equivalent) education with a total duration of about five years.
Bachelor's degree (BSc) or equivalent	University (or equivalent) education with a duration of about three years.
Technician certificate or diploma	Qualification issued from a technical education institution consisting of 1 to 3 years post secondary education.
Publicly funded forest research centers	Research centers implementing research programmes on forest matters. Funding is public or channelled through public institutions.

15.2 National data

15.2.1 Data sources

References to sources of information	Quality (H/M/L)	Variable(s)	Year(s)	Additional comments
Forest & Landscape	H	All	2000 2005 2008	Forest & Landscape is a research centre subordinated Copenhagen University. Forest & Landscape provides several educations within forestry related subjects.

15.2.2 Original data

Data is provided by Forest & Landscape, Copenhagen University.

15.3 Analysis and processing of national data

15.3.1 Estimation and forecasting

No forecasting has been carried out.

15.4 Data for Table T16

FRA 2010 Category	Annual graduation of students within the country					
	2000		2005		2008	
	Number	%Female	Number	%Female	Number	%Female
Master's degree in Forest Science	20	25	29	21	23	22
Bachelor's degree in Forest Science	68	13	64	17	46	24
Forest technician certificate / diploma	102	11	67	13	54	15
FRA 2010 Category	**Professionals working in public forest research centres**					
	2000		2005		2008	
	Number	%Female	Number	%Female	Number	%Female
Doctor's degree (PhD)	N.A.	N.A.	77	29	92	32
Master's degree (MSc) or equivalent	N.A.	N.A.	63	33	65	65
Bachelor's degree (BSc) or equivalent	N.A.	N.A.	2	50	2	50

15.5 Comments to Table T16

Variable / category	Comments related to data, definitions, etc.	Comments on the reported trend
Annual graduation of students within the country	The education of masters in Forest Science has undergone many changes in recent year. One of the main changes is that many students from developing countries are offered education at the master level in Denmark in various programmes. The reported numbers in 2008 include masters in forest science (Cand. Silv.) and students from the Sufronama programme. Also the bachelor education in forest science has undergone significant changes. At the faculty of life sciences, the bachelor education is common to educations within forestry, landscape architecture, agronomy, etc. albeit the students can choose among different study programmes. The reported numbers in 2008 include Bs.C.'s in Forest and Landscape Engineering and Bs.C.'s in Natural Resources who have elected the study programme Nature & Society.	Due to changes in the structure of educations at the Faculty of Life Sciences it is difficult to compare the number of graduated students in different years.
Professionals working in public forest research centres	Due to structural changes it is not possible to assess the number of professionals working within forest research centres in 2000.	

Other general comments to the table

16 Table T17 – Public revenue collection and expenditure

16.1 FRA 2010 Categories and definitions

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

16.2 National data

16.2.1 Data sources

References to sources of information	Quality (H/M/L)	Variable(s)	Year(s)	Additional comments
Danish forest and nature agency	H	Forest revenue Operational expenditure Domestic funding External funding	2000 2005	
Forest and Landscape Denmark	H	Operational expenditure Domestic funding External funding	2000 2005	

16.2.2 Classification and definitions

National class	Definition
Forest revenue	All government revenue collected from the domestic production and trade of forest products and services. The revenues include: 1) Revenue from hunting permits 2) Other types of recreational permits The revenues do not include revenues from the production of wood on publicly owned lands. In Denmark lease concessions or cutting rights for harvesting in state forests are generally not sold to the private sector.
Public expenditure	All government expenditure on forest related activities (further defined below).
Operational expenditure *(sub-category to Public expenditure)*	All government expenditure on public institutions solely engaged in the forest sector. The expenditure include expenditures of the Danish Forest and Nature Agency, excluding the expenditures related to forest management on public owned lands.
Transfer payments *(sub-category to Public expenditure)*	All government expenditure on direct financial incentives paid to non-government and private-sector institutions, enterprises communities or individuals operating in the forest sector to implement forest related activities. The transfer payments include payments made to support research initiatives, support to sustainable management initiatives in private forests and support to reforestation after catastrophic windthows.
Domestic funding	Public expenditure funded from domestic public financial resources, including: retained forest revenue; forest-related funds; and allocations from the national budget (i.e. from non-forest sector public revenue sources).

16.2.3 Original data

The original data is provided by the Danish Forest and Nature Agency in their annual reports (Skov og Naturstyrelsen i tal) and by Forest and Landscape Denmark. Figures are reported in Skove og plantager 2006.

16.3 Analysis and processing of national data

16.3.1 Calibration

No calibration has been made.

16.3.2 Estimation and forecasting

No estimation has been carried out.

16.3.3 Reclassification into FRA 2010 categories

No reclassification has been done.

16.4 Data for Table T17

Table 17a - Forest revenues

FRA 2010 Categories	Revenues (1000 local currency)	
	2000	2005
Forest revenue	259,200	204,200

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

FRA 2010 Categories	Domestic funding (1000 local currency)		External funding (1000 local currency)		Total (1000 local currency)	
	2000	2005	2000	2005	2000	2005
Operational expenditure	666,000	598,800	0	0	666,000	598,800
Transfer payments	461,700	133,800	0	0	461,700	133,800
Total public expenditure						

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

16.5 Comments to Table T17

Variable / category	Comments related to data, definitions, etc.	Comments on the reported trend
Forest revenue	Data for 2000 are replaced with data for 2001 as no data was available for the former year. Data for 2005 consist of budget numbers for revenues from recreation as the actual numbers were not available.	
Operational expenditure	Data for 2005 consist of budget numbers for revenues from recreation as the actual numbers were not available.	
Transfer payments	Data for 2005 consist of budget numbers for revenues from recreation as the actual numbers were not available.	

Other general comments to the table