

GLOBAL FOREST RESOURCES ASSESSMENT 2015

COUNTRY REPORT

Denmark

Rome, 2014

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

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

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Introductory Text

Place an introductory text on the content of this report

The main source of information on forest resources in Denmark is provided by the National Forest Inventory (NFI). Results from the NFI is reported in Skove og Plantager (Forests and Plantations) 2006, 2008, 2009, 2010, 2011 and 2012. The publications on the Danish NFI are available at:

http://sl.life.ku.dk/erhverv_og_myndigheder/myndighedsbetjening/skovovervaagning.aspx

The most recent of the publications is:

Johannsen VK, Nord-Larsen T, Riis-Nielsen T, Suadicani K and Jørgensen BB (2013): Skove og plantager 2012, Skov & Landskab, Frederiksberg, 2013. 189 s. ill.

The NFI is a sample-based forest inventory initiated in 2002. Today (2013), we are on the third five-year rotation of the measurements. 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.

Other sources of information include forest statistics collected in forest census, performed before the initiation of the NFI in 2002.

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.

StatBank Denmark (2012). www.statistikbanken.dk. 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>

Johannsen, VK. et al. (2013): Evaluering af indsatsen for biodiversiteten i de danske skove 1992 - 2012. 90 s. ill.

Provides collection on biodiversity information for Denmark, especially area managed for protection of biodiversity.

http://sl.life.ku.dk/erhverv_og_myndigheder/myndighedsbetjening/~/_media/SI/Erhverv_Myndigheder_Collaboration/Myndighedsbetjening/Evaluering%20biodiv1992%202012net.ashx

Desk Study?

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

Desk Study?	no
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1. What is the area of forest and other wooded land and how has it changed over time?

Documents for this question:

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

1.1 Categories and definitions

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

1.2 National data

1.2.1 Data sources

	References to sources of information	Variables	Years	Additional comments
1	Johannsen et al., 2013	Forest and other wooded land	2005 2010 2015	Definitions of forest and other wooded land is in accordance with the FAO definition

2	Larsen and Johannsen, 2002	Forest	2000	The forest definition is in general in accordance with the FAO definition.
3	Zangenberg and Hansen, 1994	Forest	1990	The forest definition is in general in accordance with the FAO definition.
4	Danmarks Statistik, 2013. http://www.dst.dk/pukora/epub/upload/17956/SAA2013.pdf	Other land, Other land with tree cover Inland water bodies	2015 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.
5	Nielsen et al., 2013	Forest	2000 1990	The National Inventory Report for UNFCCC and the Kyoto Protocol include a description of mapping of forest area in 1990 using satellite imagery. This data complements the forest census in 1990 and 2000

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.
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).

1.2.3 Original data

Year	1990	1995	2000	2005	2010	2012
	ha					
Forest area	543,249	566,270	585,454	553,621	587,077	608,078
OWL	136,000	136,000	136,000	43,557	47,002	45,468

1.3 Analysis and processing of national data

1.3.1 Adjustment

Forest area

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

1.3.2 Estimation and forecasting

Forest area

The estimation and forecasting of forest and other wooded land cover are based on two questionnaire based forest surveys in 1990 and 2000, forest inventory data from 2002-2012 and forest maps based on satellite imagery using Landsat 5 data.

The two surveys in 1990 and 2000 were questionnaire surveys, where forest owners reported the forest area and species and age class distribution. In 2000, more questionnaires were sent to respondents compared to the 1990 survey, which caused an increase in forest area. To obtain consistent estimates, the forest area was mapped using satellite imagery using Landsat 5 data. Subsequently, the forest area in 2000 was estimated using the forest area in 1990, observed afforestation from 1990 to 2005 and known deforestation from 1990 to 2000.

The forest area in 2005 is estimated using NFI data from 2002-2005. The forest areas in 2010 and 2012 is estimated based on NFI data from 2006-2010 and 2008-2012, respectively.

The forest area in 2015 is forecasted based on the 2012 forest area and assuming an annual afforestation of 1,900 ha/year and an annual deforestation of 518 ha/year. This is consistent with a previous development of business-as-usual scenarios for the forest carbon pools in Denmark.

OWL

In previous reporting (FRA 2005 and FRA 2010), other wooded land cover in 1990 and 2000 was obtained from the Area Information System (AIS) Land Cover Plus themes (Miljø- og Energiministeriet and Danmarks Miljøundersøgelser). Other wooded land cover in 2005, 2010 and 2012 is estimated using NFI data.

The differences in other wooded land cover between the previous and present forest inventories are probably to some extent 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.

Other wooded land cover in 2015 is forecasted assuming an unchanged area.

Forest expansion, reforestation

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.

1.3.3 Reclassification

Forest area

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

Forest expansion, reforestation

No reclassification has been done

1.4 Data

Table 1a

Categories		Area (000 hectares)				
		1990	2000	2005	2010	2015
	Forest	543.2	585.5	557.7	587.1	612.2
	Other wooded land	136	136	41.6	47	45.5

	Other land	3563.8	3521.5	3643.7	3608.9	3585.3
	... of which with tree cover	7	8	4.2	3.8	3.1
	Inland water bodies	66	66	66	66	66
	TOTAL	4309.00	4309.00	4309.00	4309.00	4309.00

Table 1b

Categories		Annual forest establishment / loss (000 hectares per year)				...of which of introduced species (000 hectares per year)			
		1990	2000	2005	2010	1990	2000	2005	2010
	Forest expansion	4	4	4	5	1	1	4	2
	... of which afforestation	4	4	4	5	1	1	4	2
	... of which natural expansion of forest	0	0	0	0	0	0	0	0
	Deforestation	0	0	1	1	0	0	1	1
	... of which human induced	0	0	1	1	0	0	1	1
	Reforestation	N/A	4	3	3	N/A	3	2	2
	... of which artificial	N/A	4	3	3	N/A	3	2	2

Tiers

Category	Tier for status	Tier for reported trend
Forest	Tier 3	Tier 3
Other wooded land	Tier 3	Tier 3
Forest expansion	Tier 3	Tier 3
Deforestation	Tier 1	Tier 1
Reforestation	Tier 3	Tier 3

Tier criteria

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

Category	Comments related to data definitions etc	Comments on the reported trends
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. We used satellite imagery to mitigate these inconsistencies.	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.
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 2015 is based on the forest area assessed from the NFI measurements 2008-2012, assuming no change in area.	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, 2013) and the area of Other land is found by subtracting the area of Forest, Other wooded land and Inland water bodies.	N/A
Other land with tree cover	Numbers are reported by Statistics Denmark (Danmarks statistik, 2013) and includes only the area of fruit orchards.	N/A
Inland water bodies	Numbers are reported from Statistics Denmark (Danmarks statistik, 2013). 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.	N/A
Forest expansion	N/A	N/A
Deforestation	N/A	N/A

Reforestation	Reforestation was assessed in the forest census in 2000, where respondents were asked to provide the reforested area within the past 10 years. In the forest inventory, reforestation is assessed using information on stand age and stand origin, including stands up to five years of age as reforestation. This approach might underestimate actual aforestation as especially natural regeneration may take longer to establish.	The change in reforestation from 1990 to 2000/2005 is to some extent due to differences in the methodology. However, changes in the price structure in 1999/2000 may have severely affected the reforestation area through the effects of prices on harvesting.
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Other general comments to the table

N/A

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

Documents for this question:

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

2.1 Categories and definitions

Term	Definition
Naturally regenerated forest	Forest predominantly composed of trees established through natural regeneration.
Naturalized introduced species	Other naturally regenerated forest where the tree species are predominantly non-native and do not need human help to reproduce/maintain populations over time.
Introduced species	A species, subspecies or lower taxon occurring 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).
Category	Definition
Primary forest	Naturally regenerated forest of native species where there are no clearly visible indications of human activities and the ecological processes are not significantly disturbed.
Other naturally regenerated forest	Naturally regenerated forest where there are clearly visible indications of human activities.
...of which of introduced species (<i>sub-category</i>)	Other naturally regenerated forest where the trees are predominantly of introduced species.
...of which naturalized (<i>sub-sub category</i>)	Other naturally regenerated forest where the trees are predominantly of naturalized introduced species.
Planted forest	Forest predominantly composed of trees established through planting and/or deliberate seeding.
...of which of introduced species (<i>sub-category</i>)	Planted forest where the planted/seeded trees are predominantly of introduced species.
Mangroves	Area of forest and other wooded land with mangrove vegetation.
...of which planted (<i>sub-category</i>)	Mangroves predominantly composed of trees established through planting.

2.2 National data

2.2.1 Data sources

References to sources of information	Variables	Years	Additional comments
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1	Johannsen et al. (2013)	All	2015 2010 2005 2000 1990	The estimates for 2005, 2010 and 2015 are based on data collected with the Danish NFI 2002-2012. Estimates for 2005 are based on data collected in 2002-2006. Estimates for 2010 are based on data collected for 2006-2010. Estimates for 2015 are based on data collected in 2008-2012, assuming an annual afforestation of 1900 ha. Estimates for 1990 and 2000 are based on extrapolation.
2	N/A	N/A	N/A	N/A
3	N/A	N/A	N/A	N/A
4	N/A	N/A	N/A	N/A

2.2.2 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) Unevenaged, managed	Forests established by natural seed fall, but where there are evident traces of management.
5) uneven-aged, natural forest	Forests established by natural seed fall, where the forest structure is similar to natural forests.
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.

2.2.3 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.

managem_name	Total	Indiginous	Foreign	Temporarily unstocked	Auxiliary areas	Unknown
Total	608.078	300.932	277.957	12.057	8.299	8.834
Evenaged planting	402.792	155.297	241.605	2.024	110	3.755
Evenaged, natural regeneration	54.494	44.389	9.488	210		407
Unevenaged, managed	47.907	38.677	8.550			680
Unevenaged, natural	39.618	32.293	5.497	13		1.814
Ancient management forms	6.073	4.485	1.278			309
Protective forest	15.565	10.154	4.777	35	56	543
Other	21.709	14.635	5.546	735	68	725
Unknown	19.921	1.001	1.214	9.040	8.066	600

2.3 Analysis and processing of national data

2.3.1 Adjustment

To ensure that total forest areas sum up to

2.3.2 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.

2.3.3 Reclassification

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, undisturbed	Primary forest
Protection	Planted forest
Other	Temporarily unstocked and auxiliary areas.

To ensure that forest areas sum up to the same total, temporarily unstocked and auxiliary areas, totalling 20,356 ha, were assigned to "Planted forest". It would be better if the FRA table included a category named "Other" or similar.

2.4 Data

Table 2a

Categories		Forest area (000 hectares)				
		1990	2000	2005	2010	2015
	Primary forest	30	32	31	32	34
	Other naturally regenerated forest	102	110	104	101	114
	... of which of introduced species	24	26	25	21	25
	... of which naturalized	0	0	0	0	0

	Planted forest	412	443	422	454	464
	... of which of introduced species	239	258	246	255	256
TOTAL		544.00	585.00	557.00	587.00	612.00

Table 2b

Primary forest converted to (000 ha)								
1990-2000			2000-2010			2010-2015		
Other natural regeneration	Planted	Other land	Other natural regeneration	Planted	Other land	Other natural regeneration	Planted	Other land
0	0	0	0	0	0	0	0	0

Table 2c

Categories	Area (000 hectares)				
	1990	2000	2005	2010	2015
Mangroves (forest and OWL)	0	0	0	0	0
... of which planted	0	0	0	0	0

Tiers

Category	Tier for status	Tier for reported trend
Primary forest	Tier 3	Tier 3
Other naturally regenerated forest	Tier 3	Tier 3
Planted forest	Tier 3	Tier 3
Mangroves	Tier 3	Tier 3

Tier Criteria

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

2.5 Comments

Category	Comments related to data definitions etc	Comments on 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 2015.
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.
Mangroves	N/A	N/A

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 MCPFE report only the truly primary forest area was reported whereas the reporting in 2015 is in accordance with the abovementioned definition.

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

Documents for this question:

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

3.1 Categories and definitions

Category	Definition
Growing stock	Volume over bark of all living trees with a minimum diameter of 10 cm at breast height (or above buttress if these are higher). Includes the stem from ground level up to a top diameter of 0 cm, excluding branches.
Net Annual Increment (NAI)	Average annual volume of gross increment over the given reference period less that of natural losses on all trees, measured to minimum diameters as defined for "Growing stock".
Above-ground biomass	All living biomass above the soil including stem stump branches bark seeds and foliage.
Below-ground biomass	All biomass of live roots. Fine roots of less than 2 mm diameter are excluded because these often cannot be distinguished empirically from soil organic matter or litter.
Dead wood	All non-living woody biomass not contained in the litter either standing lying on the ground or in the soil. Dead wood includes wood lying on the surface dead roots and stumps larger than or equal to 10 cm in diameter or any other diameter used by the country.
Carbon in above-ground biomass	Carbon in all living biomass above the soil including stem stump branches bark seeds and foliage.
Carbon in below-ground biomass	Carbon in all biomass of live roots. Fine roots of less than 2 mm diameter are excluded because these often cannot be distinguished empirically from soil organic matter or litter.
Carbon in dead wood	Carbon in all non-living woody biomass not contained in the litter, either standing, lying on the ground, or in the soil. Dead wood includes wood lying on the surface, dead roots and stumps larger than or equal to 10 cm in diameter or any other diameter used by the country.
Carbon in litter	Carbon in all non-living biomass with a diameter less than the minimum diameter for dead wood (e.g. 10 cm) lying dead in various states of decomposition above the mineral or organic soil.
Soil carbon	Organic carbon in mineral and organic soils (including peat) to a soil depth of 30 cm.

3.2 National data

3.2.1 Data sources

	References to sources of information	Variables	Years	Additional comments
1	Johannsen et al. 2013	All	2015 2010 2005	Growing stock and net growth estimates for 2005 and 2010 are based on measurements of the Danish NFI. Stocks in 2015 are based on the the stocks in 2012, assuming no change in growing stock until 2015.

2	Larsen and Johannsen (2002)	growing stock Above-ground biomass Below-ground biomass Carbon in above-ground biomass Carbon in below-ground biomass	2000	Growing stock for 2000 calculated in Skove og plantager 2000 based on information on species and age distribution collected in 2000. Stocks have been scaled according to the estimated forest area based on satellite imagery and the observed species distribution in 2000.
3	Zangenberg and Hansen (1994)	Above-ground biomass Below-ground biomass growing stock Carbon in above-ground biomass Carbon in below-ground biomass	1990	Growing stock for 2000 calculated in Skove og plantager 1990 based on information on species and age distribution collected in 1990. Stocks have been scaled according to the estimated forest area based on satellite imagery and the observed species distribution in 1990.
4	N/A	N/A	N/A	N/A

3.2.2 Classification and definitions

National class	Definition
Growing stock	Volume over bark of all living trees more than 10 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.
Above-ground biomass	Same as FRA 2015
Below-ground biomass	Same as FRA 2015
Dead wood	Same as FRA 2015
Carbon in above-ground biomass	Same as FRA 2015
Carbon in dead wood	Same as FRA 2015
Carbon in litter	Same as FRA 2015
Soil carbon	Organic carbon in mineral and organic soils (including peat) down to 1 m of the mineral soil.

3.2.3 Original data

Forest area

	Area (hectares)				
	1990	2000	2005	2010	2015
Forest	543.249	585.454	557.719	587.077	608.078
Conifers	332.065	356.478	289.745	296.001	303.758
Broadleaves	113.448	130.678	245.625	269.709	281.863

Growing stock

Original data was collected in the inventories in 1990, 2000 and 2002-2005, 2006-2010 and 2008-2012. In 1990 and 2000, 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.

3D - forest							3D-OWL				
Year	1990	2000	2005	2010	2012		1990	2000	2005	2010	2012
Area	543.249	585.454	557.719	587.077	608.078		139.000	139.000	41.579	47.002	45.468
Volume			114.335	118.017	125.176		3.683	3.683	1.102	1.026	613
Biomass - ag			62.613	64.470	68.464		1.917	1.917	573	539	334
Biomass -bg			12.283	12.676	13.516		456	456	136	128	73
Carbon - ag	29.313	31.654	31.306	32.235	34.232		958	958	287	269	167
Carbon - bg	4.721	5.096	6.142	6.338	6.758		228	228	68	64	36
Deadwood volume			3.005	3.248	3.449		100	100	30	89	65
Deadwood biomass			1.255	2.470	2.763		40	40	12	41	31
Deadwood carbon	466	526	628	1.235	1.381		20	20	6	21	15
Litter carbon	6.710	6.500	5.620	6.958	7.470		1.324	1.324	396	413	398
Mineral soil carbon	91.700	99.415	95.277	99.369	103.012		29.234	29.234	8.745	10.358	9.464

3B	1990	2000	2005	2010	2012
Fagus sylvatica	17300	18267	29157	29062	31462
Picea abies	18900	25150	23185	21426	22036
Quercus robur	3600	4835	9667	11626	11760
Picea sitchensis	4900	6578	7368	7640	7518
Fraxinus exelsior	1000	1292	5493	5410	5402
Acer pseudoplatanus	800	1210	4877	5106	6114
Pinus sylvestris		5761	4867	4831	4913
Betula sp.	1200	3483	4358	4279	4810
Larix sp.		3646	3750	4099	4627
Abies alba	3100	4405	2462	3738	3743

Dead wood

Dead wood biomass and carbon is estimated from measurements with the Danish NFI 2002-2012

Litter

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

Mineral soil

Mineral soil carbon is estimated based on average carbon on different soil types and the distribution of the NFI plots to those types.

Mineral soil carbon

3.3 Analysis and processing of national data

3.3.1 Adjustment

Biomass and carbon stock

No adjustment has been made.

3.3.2 Estimation and forecasting

Growing stock

When forecasting the growing stock in 2015 it is assumed that the volume is unchanged from the volume estimates for 2012.

Growing stock in 1990 and 2000 is estimated based on the average volume of broadleaves and conifers in 2005, the estimated forest area based on satellite imagery and the observed area distribution for broadleaves and conifers observed in the 1990 and 2000 inventories.

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

Biomass stock

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 biomass using species specific basic densities and expansion factors.

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 below Table 2).

Table1. 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

Table2. 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 and 2005.

As with the estimation of growing stock for 1990 and 2000, it is assumed that the average above- and belowground biomass per hectare for deciduous and coniferous forest, respectively, is unchanged using the observed area distribution to these forest types in the two surveys and the estimated forest area.

Carbon in biomass and dead wood (see 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). 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. C

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

3.3.3 Reclassification

No reclassification done.

3.4 Data

Table 3a

Category		Growing stock volume (million m ³ over bark)									
		Forest					Other wooded land				
		1990	2000	2005	2010	2015	1990	2000	2005	2010	2015
	Total growing stock	67	94	110	113	120	3.7	3.7	0.9	0.9	0.5
	... of which coniferous	38	59	51	52	54	0.4	0.4	0.1	0.1	0.1
	... of which broadleaved	29	35	59	62	67	3.3	3.3	0.8	0.8	0.4

Table 3b

Category/Species name	Growing stock in forest (million cubic meters)
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Rank	Scientific name	Common name	1990	2000	2005	2010
1 st	Fagus sylvatica	Beech	14	17	29	29
2 nd	Picea abies	Norway spruce	17	26	22	21
3 rd	Quercus robur	Oak	5	6	9	11
4 th	Picea sitchensis	Sitka spruce	5	8	7	7
5 th	Fraxinus excelsior	Ash	3	3	5	5
6 th	Acer pseudoplatanus	Sychamore	2	3	5	5
7 th	Pinus sylvestris	Scots pine	3	5	5	5
8 th	Betula sp	Birch	2	2	4	4
9 th	Larix sp	Larch	3	4	4	4
10 th	Abies alba	Silver fir	2	3	2	4
Remaining			12	17	17	19
TOTAL			68.00	94.00	109.00	114.00

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

Item	Value	Complementary information
Minimum diameter (cm) at breast height of trees included in growing stock (X)	10	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	N/A

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

Table 3c

Category	Net annual increment (m ³ per hectare and year)				
	Forest				
	1990	2000	2005	2010	2015

	Net annual increment	9	9.2	8.7	8.6	8.7
	... of which coniferous	7.2	7.2	6.2	6	6.3
	... of which broadleaved	1.8	2	2.5	2.6	2.4

Table 3d

Category		Biomass (million metric tonnes oven-dry weight)									
		Forest					Other wooded land				
		1990	2000	2005	2010	2015	1990	2000	2005	2010	2015
	Above ground biomass	59	63	63	64	68	2	2	1	1	0
	Below ground biomass	9	10	12	13	14	0	0	0	0	0
	Dead wood	1	1	1	2	3	0	0	0	0	0
TOTAL		69.00	74.00	76.00	79.00	85.00	2.00	2.00	1.00	1.00	.00

Table 3e

Category		Carbon (Million metric tonnes)									
		Forest					Other wooded land				
		1990	2000	2005	2010	2015	1990	2000	2005	2010	2015
	Carbon in above ground biomass	29	32	31	32	34	1	1	0	0	0
	Carbon in below ground biomass	5	5	6	6	7	0	0	0	0	0
	<i>Subtotal Living biomass</i>	34	37	37	39	41	1	1	0	0	0
	Carbon in dead wood	0	1	1	1	1	0	0	0	0	0
	Carbon in litter	7	7	6	7	7	1	1	0	0	0

	<i>Subtotal Dead wood and litter</i>	7	7	6	8	9	2	2	0	1	1
	Soil carbon	92	99	95	99	103	29	29	9	10	9
TOTAL		133.00	144.00	139.00	145.00	152.00	31.00	31.00	9.00	10.00	9.00

Tiers

Variable/category	Tier for status	Tier for trend
Total growing stock	Tier 3	Tier 3
Net annual increment	Tier 3	Tier 3
Above ground biomass	Tier 2	Tier 2
Below ground biomass	Tier 2	Tier 2
Dead wood	Tier 3	Tier 3
Carbon in above-ground biomass	Tier 2	Tier 2
Carbon in below ground biomass	Tier 2	Tier 2
Carbon in dead wood and litter	Tier 2	Tier 2
Soil carbon	Tier 2	Tier 2

Tier criteria

Category	Tier for status	Tier for reported trend
Total growing stock	Tier 3: Data sources Recent 10 years National Forest Inventory or remote sensing with ground truthing or programme for repeated compatible NFI 10 years Domestic volume functions Tier 2: Data sources/registers and statistics modelling or old NFI 10 years or partial field inventory Tier 1: Other data sources	Tier 3: Estimate based on repeated compatible tiers 3 (tier for status) Domestic growth functions Tier 2: Estimate based on repeated compatible tier 2 or combination tier 3 and 2 or 1 tier for status Tier 1: Other
Net annual increment	Tier 3: Scientifically tested national volume and growth functions Tier 2: Selection of volume and growth functions as relevant as possible Tier 1: Other	Tier 3: Confirmation/adjustment of functions used through scientific work Tier 2: Review work done to seek alternative functions Tier: 1 Other

Biomass	Tier 3: Country-specific national or sub-national biomass conversion expansion factors applied or other domestic or otherwise nationally relevant biomass studies Tier 2: Application of country specific national or sub-national biomass conversion factors from other country with similar climatic conditions and forest types Tier 1: International/regional default biomass expansion factors applied	Tier 3 : Estimate based on repeated compatible tiers 3 (tier for status) Tier 2 : Estimate based on repeated compatible tier 2 or combination tier 3 and 2 or 1 (tier for status) Tier 1 : Other
<ul style="list-style-type: none"> • Carbon in above ground biomass • Carbon in below ground biomass • Carbon in dead wood and litter • Soil carbon 	Tier 3: Country-specific national or sub-national biomass conversion expansion factors applied Tier 2: Application of country specific national or sub-national biomass conversion factors form from other country with similar climatic conditions and forest types Tier 1: International/regional default biomass expansion factors applied	Tier 3 : Estimate based on repeated compatible tiers 3 (tier for status) Tier 2 : Estimate based on repeated compatible tier 2 or combination tier 3 and 2 or 1 (tier for status) Tier 1 : Other

3.5 Comments on growing stock biomass and carbon

Category	Comments related to data definitions etc	Comments on the reported trend
Total growing stock	From the table comments it appears that growing stock definitions have been altered to include only trees exceeding 10 cm. As a general note, I find it unfortunate to have this definition for growing stock when the definition of above ground biomass and carbon pools in this and other reporting (e.g. for the UNFCCC) include all trees larger than 0 cm. Further it is unclear from the document if annual increment include trees smaller than 10 cm and if not whether the diameter limit refers to the diameter observed in the first or second inventory used for calculating growth. I believe that a much more sound and consistent definition would be to use a diameter limit of 0 cm.	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 recalculate growing stock in 1990 and 2000 based on the 2006 inventory.

Growing stock of broadleaved coniferous	N/A	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 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 <i>Pinus</i> spp. In 1990 it only included <i>Pinus mugo</i> , whereas it in 2000 included all pines, especially <i>Pinus sylvestris</i> . The species <i>Fagus sylvatica</i> , <i>Pinus sylvestris</i> , <i>Quercus robur</i> , <i>Fraxinus excelsior</i> and <i>Acer pseudoplatanus</i> are considered native tree species. The remaining trees are introduced species	N/A
Net annual increment	N/A	N/A
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.	N/A
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.	N/A
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.	N/A
Carbon in above-ground biomass	N/A	N/A
Carbon in below-ground biomass	N/A	N/A
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.	N/A

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.	N/A
Soil carbon	N/A	N/A

Other general comments to the table

N/A

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

Documents for this question:

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

4.1 Categories and definitions

Term	Definition
Primary designated function	The primary function or management objective assigned to a management unit either by legal prescription documented decision of the landowner/manager or evidence provided by documented studies of forest management practices and customary use.
Non wood forest product (NWFP)	Goods derived from forests that are tangible and physical objects of biological origin other than wood.
Commercial value of NWFP	For the purpose of this table, value is defined as the commercial market value at the forest gate.
Category	Definition
Production forest	Forest area designated primarily for production of wood, fibre, bio-energy and/or non-wood forest products.
Multiple use forest	Forest area designated for more than one purpose and where none of these alone is considered as the predominant designated function.
Total wood removals	The total of industrial round wood removals and woodfuel removals.
...of which woodfuel	The wood removed for energy production purposes, regardless whether for industrial, commercial or domestic use.

4.2 National data

4.2.1 Data sources

	References to sources of information	Variables	Years	Additional comments
1	Johannsen et al., 2013	Production forest/multiple use forest	2010 2005 2015	N/A
2	Larsen and Johannsen (2002)	Production forest/multiple use forest	2000	N/A
3	Statistics Denmark, LBFI1: Landbrugets bruttofaktoriindkomst efter type	Christmas trees and greenery	2010	N/A
4	Statistics Denmark, SKOV6: Hugsten i skove og plantager i Danmark efter område, træsort og areal	Forest Removals	1990-2011	N/A

4.2.2 Classification and definitions

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

N/A	N/A

4.2.3 Original data

4a Production forest/Multiple use forest

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.

Data on the the area covered by state forest in 1990 and 2000 are provided by the two questionnaire surveys, assuming that they assessed the state forest area correctly. Area covered by state forest in 2005, 2010 and 2015 were assessed using NFI data.

4b Christmas trees and greenery

Figures are provided by Statistics Denmark and represent the GDP of the two products.

4c Forest removals

Figures are provided by Statistics Denmark in volume o.b. and were converted to u.b. by dividing by 1.15. Values represent harvested product at roadside.

4.3 Analysis and processing of national data

4.3.1 Adjustment

No calibration has been carried out.

4.3.2 Estimation and forecasting

Forecasting of the multiple use forest area was made by assuming that all afforestation from 2012 to 2015 were conducted by private owners.

4.3.3 Reclassification

It is generally assumed that public forests are managed according to the criteria for multiple use and that private forests are production forests.

4.4 Data

Table 4a

Categories		Forest area (000 hectares)				
		1990	2000	2005	2010	2015
	Production forest	426	464	403	459	484
	Multiple use forest	110	96	117	90	91

Table 4b

Rank	Name of product	Key species	Commercial value of NWFP removals 2010 (value 1000 local currency)	NWFP category
1 st	Christmas trees and greenery	Abies nordmaniana, Abies procera	1055000	8
2 nd	N/A	N/A	N/A	N/A
3 rd	N/A	N/A	N/A	N/A
4 th	N/A	N/A	N/A	N/A
5 th	N/A	N/A	N/A	N/A
6 th	N/A	N/A	N/A	N/A
7 th	N/A	N/A	N/A	N/A
8 th	N/A	N/A	N/A	N/A
9 th	N/A	N/A	N/A	N/A
10 th	N/A	N/A	N/A	N/A
TOTAL			1055000.00	

2010

Name of local currency

DKK (Danish crowns)

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

Table 4c Pre-filled data from FAOSTAT

Year	FRA 2015 category (1000 m ³ u.b.)	
	Total wood removals	...of which woodfuel
1990	1755	353
1991	1664	401
1992	1666	422
1993	1546	471
1994	1611	483

1995	1675	487
1996	1632	546
1997	1580	544
1998	1487	476
1999	1492	484
2000	3193	608
2001	1559	596
2002	1397	635
2003	1572	789
2004	1623	826
2005	2576	1114
2006	2043	1005
2007	2217	952
2008	2062	918
2009	2091	1210
2010	2309	1184
2011	2231	1232

Tiers

Category	Tier for status	Tier for reported trend
Production forest	Tier 3	Tier 3
Multiple use forest	Tier 3	Tier 3

Tier Criteria

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

4.5 Comments

Category	Comments related to data definitions etc	Comments on the reported trend
Production forest	<p>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.</p>	N/A
Multiple use forest	<p>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.</p>	N/A
Total wood removals	<p>Total removals reported are reported by forest owners to Statistics Denmark. Recent estimates of harvest volumes based on the NFI, indicate that actual harvest may be larger. However, we use the numbers provided by Statistics Denmark to obtain a consistent time-series and to enable the division into total removals and wood fuels.</p>	N/A
Commercial value of NWFP	<p>The value reported correspond to the GDP of the two products mentioned. Other NWFP are important in Danish forestry, including revenues from hunting rights. However, no valid data is available for this NWFP.</p>	N/A

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.

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

Documents for this question:

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

5.1 Categories and definitions

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

5.2 National data

5.2.1 Data sources

	References to sources of information	Variables	Years	Additional comments
1	Johannsen et al. 2013	All	All	Reference to general information about forest ecosystem services in Denmark.

2	Nature Agency	Recreational areas	1990 and 2010, 2015	Stand registry of the Nature Agency
3	N/A	N/A	N/A	N/A
4	N/A	N/A	N/A	N/A

5.2.2 Classification and definitions

National class	Definition
N/A	N/A

5.2.3 Original data

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5.3 Analysis and processing of national data

5.3.1 Adjustment

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5.3.2 Estimation and forecasting

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5.3.3 Reclassification

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5.4 Data

Table 5a

Categories		Forest area (1000 hectares)				
		1990	2000	2005	2010	2015
	Protection of soil and water	0	0	0	0	0
	... of which production of clean water	0	0	0	0	0

	... of which coastal stabilization	0	0	0	0	0
	... of which desertification control	0	0	0	0	0
	... of which avalanche control	0	0	0	0	0
	... of which erosion, flood protection or reducing flood risk	0	0	0	0	0
	... of which other (please specify in comments below the table)	0	0	0	0	0

Other

N/A

Table 5b

Categories	Forest area (1000 hectares)				
	1990	2000	2005	2010	2015
Ecosystem services, cultural or spiritual values	2.4	2.4	2.4	2.4	2.4
...of which public recreation	2.4	2.4	2.4	2.4	2.4
...of which carbon storage or sequestration	0	0	0	0	0
...of which spiritual or cultural services	0	0	0	0	0
...of which other (please specify in comments below the table)	0	0	0	0	0

Tiers

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

Tier criteria

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

5.5 Comments

Category	Comments related to data definitions etc	Comments on the reported trend
Protection of soil and water	See specific comments below.	N/A
Production of clean water	Forests provide a valuable source of clean water, due to the less frequent disturbance regime compared to agriculture. However, there are no legislation limiting forest management in designated water protection areas. In Denmark, 230,660 ha of forest land is situated on caption areas for drinking water.	N/A
Coastal stabilization	Many of the forests in western and northern Denmark were established in 1850-1950 for hindering sand drift. Although, these forests may still protect agricultural lands, soil protection is not their designated function.	N/A
Desertification control	N/A	N/A
Avalanche control	N/A	N/A
Erosion, flood protection or reducing flood risk	N/A	N/A
Other protective functions	N/A	N/A

Ecosystem services, cultural or spiritual values	Almost 30,000 ancient monuments have been registered in Denmark - of these 61 pct. are found in the forests, and are protected by law. However, although the forests provide protection for the ancient monuments, this is nowhere the designated function of the forest.	N/A
Public recreation	Access to the Danish forests, including both private and public forests, is granted by law. With more than 70 mio. visits a year, the forests are very important for the public recreation. Especially in the state forests, extensive consideration to public recreation is made by forest management. However, only quite few forests are managed specifically for recreation. In this survey we included Jægerspørb Dyrehave (1100 ha) and Marselisborgskovene (1300 ha).	N/A
Carbon storage or sequestration	Carbon storage is an important asset of the Danish forests, but carbon storage is not the designated function of the forests.	N/A
Spiritual or cultural services	See comment for ecosystem services	N/A
Other ecosystem services	N/A	N/A

Other general comments to the table

Most Danish forests are managed for different ecosystem services, including the protection of soil and water, stabilizing sand dunes to the west of the country and at the same time providing protection for cultural inheritance and providing public recreation. This is stated in the forest act for all forests and specifically for the state forests in the strategy for management of the state forests (Ministry of Environment, 2002). Only very few forests are designated for producing a single ecosystem service as for example clean water or recreation, but most forest management take the production of ecosystem services into consideration - most pronounced in the state forests.

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

Documents for this question:

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

6.1 Categories and definitions

Category	Definition
Conservation of biodiversity	Forest area designated primarily for conservation of biological diversity. Includes but is not limited to areas designated for biodiversity conservation within the protected areas.
Forest area within protected areas	Forest area within formally established protected areas independently of the purpose for which the protected areas were established.

6.2 National data

6.2.1 Data sources

	References to sources of information	Variables	Years	Additional comments
1	Nord-Larsen et al. (2008)	Primary designated function	2010 2005	The information on designated areas is uncertain.
2	Larsen and Johannsen (2002)	Primary designated function	2000 1990	The information on designated areas is uncertain.
3	Danish Forest and Nature Agency (2001)	Protected areas	2000 2005	Summary statistics on Protected Forest Areas.
4	Danish Forest and Nature Agency (2008)	Protected forest nature types in NATURA 2000 areas	2005 2010	N/A
5	Danish Nature Agency	Areas with designated function, with reference to formal agreements and regulations	1992, 2002 and 2012	N/A
6	Johannsen et al. 2013b. Evaluering af indsatsen for biodiversiteten i de danske skove 1992-2012.	Designated function and protected areas.	N/A	N/A
7	Evaluering af indsatsen for biodiversiteten i de danske skove 1992 - 2012	Conservation of Biodiversity and Protected areas	N/A	http://ign.ku.dk/formidling/publikationer/rapporter/filer-2013/evaluering-biodiversitet-1992-2012.pdf .

6.2.2 Classification and definitions

National class	Definition
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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. 70 % of the forest area is designated forest reserve land. Forest reserves are not considered to be protected or designated for protection of biodiversity.
Strict Nature Protection Areas	Areas closed to the public due to special scientific values or very fragile ecology. These areas are considered to be protected and designated for protection of biodiversity.
Non-intervention forest	Smaller areas of semi-natural (mainly deciduous) forest left unmanaged with no removal of wood and no drainage. These areas have been designated for non-intervention, in principle for perpetuity and are consequently considered to be protected and designated for protection of biodiversity.
Areas managed according to the Strategy for Natural Forests	Smaller areas of forest designated for historic management practices, selective cutting and continuous forest cover. The areas are protected according to agreements between forest owners and the Danish Nature Agency. As the main objective is management for natural values, these areas are considered to be protected and designated for protection of biodiversity.
Natura 2000	NATURA 2000 areas include areas protected according to the EU Habitat Directive and Bird Protection Directive. restrictions are imposed on these areas, as forest owners are mandated to report planned activities to the Danish Nature Agency, which then has the possibility to prohibit such activities. As forest management in general is not restricted, Natura 2000 are not considered to be protected or designated for protection of biodiversity.
Forest Nature Types	Specific forest nature types within NATURA 2000 areas protected by the Habitat directive art. 17. Areas have been mapped and are protected from activities damaging the nature type and the organisms associated with it. These areas are consequently considered to be protected and designated for protection of biodiversity.

6.2.3 Original data

Original data consists of maps and data from agreements in reference to the Strategy for Natural Forests, the non-intervention forests, the protection of specific forest types (old oak scrubs) and the mapping of the forest nature types according to the Habitat directive in the Natura 2000 areas. The maps are available in GIS format as well as tables.

6.3 Analysis and processing of national data

6.3.1 Adjustment

The data have been analysed using GIS to avoid double accounting, as some areas have been designated according to more than one protection scheme.

6.3.2 Estimation and forecasting

The estimation for the period 1990 - 2010 have been based on the available data. The forecasting is based on the trend from the last period and the forest strategy from 2002 indicating a gradual increase in the forest area designated for protection of biodiversity to 10 percent by 2020.

The data was also analysed in the evaluation of activities to protect biodiversity in the forests in the period 1992-2012 (Johannsen et al. 2013)

6.3.3 Reclassification

no other reclassification than mentioned above was performed.

6.4 Data

Table 6

Categories		Forest area (000 hectares)				
		1990	2000	2005	2010	2015
	Conservation of biodiversity	5	22	35	36	36
	Forest area within protected areas	5	22	35	36	36

Tiers

Category	Tier for status	Tier for reported trend
Conservation of biodiversity	Tier 3	Tier 3
Forest area within protected areas	Tier 3	Tier 3

Tier criteria

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

6.5 Comments

Category	Comments related to data definitions etc	Comments on the reported trend
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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.
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.	N/A

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 #Multiple 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.

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

Documents for this question:

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

7.1 Categories and definitions

Category	Definition
Invasive species	Species that are non-native to a particular ecosystem and whose introduction and spread cause, or are likely to cause, socio-cultural, economic or environmental harm or harm to human health.

7.2 National data

7.2.1 Data sources

	References to sources of information	Variables	Years	Additional comments
1	Johannsen et al. 2013	Area grown with woody invasive species	2010, 2005	N/A
2	N/A	N/A	N/A	N/A
3	N/A	N/A	N/A	N/A
4	N/A	N/A	N/A	N/A

7.2.2 Classification and definitions

National class	Definition
N/A	N/A

7.2.3 Original data

Original data origins from the NFI and is estimated as the area covered by woody invasive species.

7.3 Analysis and processing of national data

7.3.1 Adjustment

No adjustments made

7.3.2 Estimation and forecasting

No estimation made

7.3.3 Reclassification

No reclassification made

7.4 Data

Table 7

Scientific name of woody invasive species	Forest area affected (000 ha)	
	2005	2010
Pinus contorta	11	11
Pinus mugo	21	17
N/A	N/A	N/A
Total	32	28

Tiers

Category	Tier for status	Tier for reported trend
Invasive species	Tier 3	Tier 3

Tier Criteria

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

7.5 Comments

Category	Comments related to data definitions etc	Comments on the reported trend
Invasive species	Invasive species are defined by the Danish Nature Agency. See http://www.naturstyrelsen.dk/Naturbeskyttelse/invasivarter/Arter/Plantearter/Plantearter.htm	N/A

Other general comments to the table

N/A

8. How much forest area is damaged each year?

Documents for this question:

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

8.1 Categories and definitions

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

8.2 National data

8.2.1 Data sources

	References to sources of information	Variables	Years	Additional comments
1	Bredskabsstyrelsen, https://statistikbank.brs.dk	Forest and nature fires	All	N/A
2	Johannsen et al., 2013	Outbreaks of insects and diseases	All	N/A
3	Larsen and Johannsen, 2002	Winthrow	1999	N/A
4	Danish Nature Agency (Evaluering af Stormfaldsordningen, 2012)	Winthrow	2005	N/A

8.2.2 Classification and definitions

National class	Definition
N/A	N/A

8.2.3 Original data

Fore location (Number)	2007	2008	2009	2010	2011	2012	2013	Total
Meadow, heathlands and similar	89	138	125	109	108	112	166	847
Garden	443	621	555	446	517	531	414	3.527
Cliffs, hill side etc.	70	125	108	78	69	114	141	705
Field	388	698	661	514	443	394	266	3.364
Field with cereals	43	105	130	104	50	107	70	609
Moors	18	49	40	29	28	20	25	209
Forest, scrubs etc	370	738	664	440	508	400	388	3.508
Beach	17	30	29	26	34	34	26	196
Lake	6	4	8	6	4	5	5	38
Stream	3	5	3	2	3	1	1	18
Other nature fires					34	158	138	330
Nature fires						4	9	13
Total	1.447	2.513	2.323	1.754	1.798	1.880	1.649	13.364

Only "Forest, scrubs etc" is considered as forest.

8.3 Analysis and processing of national data

8.3.1 Adjustment

No adjustments have been made

8.3.2 Estimation and forecasting

No estimation has been made

8.3.3 Reclassification

No reclassification has been made.

8.4 Data

Table 8a

Category		000 ha, number of fires									
		2003		2004		2005		2006		2007	
		000 ha	#	000 ha	#	000 ha	#	000 ha	#	000 ha	#
CFRQ	Total land area burned	0	N/A	0	N/A	0	N/A	0	N/A	0	1447
CFRQ	... of which forest area burned	0	N/A	0	N/A	0	N/A	0	N/A	0	370
Category		2008		2009		2010		2011		2012	
		000 ha	#	000 ha	#	000 ha	#	000 ha	#	000 ha	#
CFRQ	Total land area burned	0	2513	0	2323	0	1754	0	1798	0	1880
CFRQ	... of which forest area burned	0	738	0	664	0	440	0	508	0	400

Table 8b

Outbreak category	Description/name	Year(s) of latest outbreak	Area damaged (000 hectares)
2	Ash dieback (<i>Hymenoscyphus pseudoalbidus</i>)	2005-	19
3	Winthrow	1981	N/A
3	Winthrow	1999	20
3	Winthrow	2005	4
1	<i>Ips typhographus</i>	2007	0
1	Winter moth and others (<i>Operopthera brumata</i> and others)	2013	N/A

1	Green spruce aphid (Elatobium abietinum)	2008	0
1	Dendroctonus micans	2007	0
2	Neonectria neomacrospora	2013	5
N/A	N/A	N/A	N/A

Outbreak category

1 Insects
2 Diseases
3 Severe weather events

Tiers

Category	Tier for status	Tier for trend
Area affected by fire	Tier 3	Tier 3
<ul style="list-style-type: none"> • Insects • Diseases • Severe weather events 	Tier 3	Tier 3

Tier criteria

Category	Tier for status	Tier for reported trend
Burned area	Tier 3 : National fire monitoring routines Tier 2 : Remote sensing surveys Tier 1 : Other	Tier 3 : Estimate based on repeated compatible tiers 3 (tier for status) Tier 2 : Estimate based on repeated compatible tier 2 or combination tier 3 and 2 or 1 (tier for status) Tier 1 : Other
<ul style="list-style-type: none"> • Insects • Diseases • Severe weather events 	Tier 3 : Systematic survey (e.g. via inventory or aerial damage assessment) Tier 2 : Management records Tier 1 : Other	Tier 3 : Estimate based on repeated compatible tiers 3 (tier for status) Tier 2 : Estimate based on repeated compatible tier 2 or combination tier 3 and 2 or 1 (tier for status) Tier 1 : Other

8.5 Comments

Category	Comments related to data definitions etc	Comments on the reported trend
Burned area	Data include all fires on nature-areas such as heathlands, forests, beaches etc. The vast majority of these fires are very small with almost no area being affected. The total area affected therefore adds up to less than 500 ha's.	Forest fires are a relatively rare event in Danish forests, and seldomly affect larger areas.
Insects	N/A	N/A

Diseases	The area affected by ash dieback is estimated as of 2013. In addition to the area affected by Ash dieback, large areas of spruce are affected by root rot. However, the area affected by root rot is not assessed as it cannot be observed on live trees and does not have the characteristics of an outbreak. The area affected by <i>Neonectria neomacrospora</i> is estimated based on reports from christmas tree growers association.	N/A
Severe weather events	Denmark is often affected by winthrow. Mainly conifers are affected.	N/A

Other general comments to the table

N/A

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

Documents for this question:

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

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

Table 9

Category	Area of forest with reduced canopy cover (000 ha)
Reduction in canopy cover	N/A

Tiers

Category	Tier for reported trend
Reduction in canopy cover	N/A

Tier criteria

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

Comments

Category	Comments related to data definitions etc
Reduction in canopy cover	As the Danish NFI was initiated in 2002, it is not possible to estimate the area with a reduction in canopy cover of more than 20%.

Other general comments

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

Documents for this question:

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

10.1 Categories and definitions

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

10.2 National data

10.2.1 Data sources

	References to sources of information	Variables	Years	Additional comments
1	Danmarks Nationale Skovprogram, Miljøministeriet Skov- og Naturstyrelsen juni 2002	N/A	2002	National forest programme
2	Strategi for de danske naturskove, Miljøministeriet, Skov- og Naturstyrelsen, december 1992	N/A	1992	Strategy for natural forests in Denmark
3	Skovloven, Lovbekendtgørelse nr. 678 af 14. juni 2013 om skove.	N/A	2013	The Forest Law
4	Handlingsplan for naturnær skovdrift i statsskovene Miljøministeriet, Skov- og Naturstyrelsen, 2005	N/A	2005	Action plan for near-natural management

10.2.2 Classification and definitions

National class	Definition
N/A	N/A
N/A	N/A
N/A	N/A

N/A	N/A
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10.2.3 Original data

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10.3 Data

Table 10

Category				
	National	Sub-national		
		Regional	Provincial/State	Local
Policies supporting sustainable forest management	yes	no	no	no
... of which, in <u>publicly</u> owned forests	yes	no	no	no
... of which, in <u>privately</u> owned forests	yes	no	no	no
Legislation and regulations supporting sustainable forest management	yes	no	no	no
... of which, in <u>publicly</u> owned forests	yes	no	no	no
... of which, in <u>privately</u> owned forests	yes	no	no	no

10.4 Comments

Variable / category	Comments related to data definitions etc
Policies supporting sustainable forest management	N/A
Legislation and regulations supporting sustainable forest management	N/A

Other general comments

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

Documents for this question:

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

11.1 Categories and definitions

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

11.2 National data

11.2.1 Data sources

	References to sources of information	Years	Additional comments
1	Skovrådet (Forest Council) http://www.naturstyrelsen.dk/Naturbeskyttelse/Skov/Skovloven/skovraadet/	2013	N/A
2	N/A	N/A	N/A
3	N/A	N/A	N/A
4	N/A	N/A	N/A

Table 11

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

Category	Comments related to data definitions etc
National stakeholder platform	The Forest Council has members among the most important stakeholders including forest research, private and public forest owners and NGO's involved in environmental protection, public recreation etc

Other general comments

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

Documents for this question:

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

12.1 Categories and definitions

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

12.2 National data

12.2.1 Data sources

	References to sources of information	Variables	Years	Additional comments
1	Johannsen et al., 2013	Area of landuseclasses inside and outside forest reserve	2010	N/A
2	N/A	N/A	N/A	N/A
3	N/A	N/A	N/A	N/A
4	N/A	N/A	N/A	N/A

12.2.2 Classification and definitions

National class	Definition
Forest reserve	In Denmark about 70 % 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.
N/A	N/A
N/A	N/A
N/A	N/A

12.2.3 Original data

fredskov_name	landuse_nameDK	landuse_nameUK	Denmark
Not forest reserve	Skov, nål	Forest, conifers	56320,43
Not forest reserve	Skov, løv	Forest, broadleaves	57051,83
Not forest reserve	Skov, blandet løv og nål	Forest, mixture	24462,64
Not forest reserve	Juletræproduktion	Christmas_trees	17608,47
Not forest reserve	Midlertidig ubevokset skov	Temporarily unstocked	1961,439
Not forest reserve	Hjælpearealer i skov	Auxillary areas	1728,592
Forest reserve	Skov, nål	Forest, conifers	178355,9
Forest reserve	Skov, løv	Forest, broadleaves	178258,6
Forest reserve	Skov, blandet løv og nål	Forest, mixture	47217,97
Forest reserve	Juletræproduktion	Christmas_trees	9583,854
Forest reserve	Midlertidig ubevokset skov	Temporarily unstocked	8831,504
Forest reserve	Hjælpearealer i skov	Auxillary areas	5696,206

12.3 Analysis and processing of national data

12.3.1 Adjustment

No adjustment has been performed

12.3.2 Estimation and forecasting

The permanent forest estate area corresponds to the area of forest reserve ("fredskov" in Danish), which is protected by the forest law.

The forest area intended to be permanent forest land use corresponds to the forest area minus the area of Christmas trees outside forest reserves, as Christmas tree plantations on agricultural lands are often converted.

12.3.3 Reclassification

No reclassification has been performed

12.4 Data

Table 12

Categories		Forest area 2010 (000 ha)
	Forest area intended to be in permanent forest land use	569
	... of which permanent forest estate	428

Tiers

Category	Tier for status
Forest area intended to be in permanent forest land use	Tier 1
Permanent forest estate	Tier 3

Tier Criteria

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

12.5 Comments

Category	Comments related to data definitions etc
Forest area intended to be in permanent forest land use	Forest areas outside forest reserves are not commonly converted to other landuse, such as agriculture because they are often situated on lands unsuitable for agricultural production. An exception is Christmas tree plantations on farmlands.
Permanent forest estate	In Denmark about 70 % 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.

Other general comments

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

Documents for this question:

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

13.1 Categories and definitions

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

13.2 National data

13.2.1 Data sources

	References to sources of information	Variables	Years	Additional comments
1	Johannsen et al., 2013	N/A	2012	National report on the NFI
2	Nord-Larsen et al., 2013	N/A	2011	National report on the NFI
3	Nord-Larsen et al., 2012	N/A	2010	National report on the NFI
4	Nord-Larsen et al., 2010	N/A	2009	National report on the NFI
5	Nord-Larsen et al., 2009	N/A	2008	National report on the NFI
6	Nord-Larsen et al., 2008	N/A	2006	National report on the NFI

13.2.2 Classification and definitions

National class	Definition
N/A	N/A

13.3 Data

Table 13a

Category	% of total forest area	Most recent year	Check all boxes that apply					
			Continuous	Periodic	Permanent ground plots	Temporary ground plots	Aerial/remote sensing sample based	Aerial/remote sensing full coverage
Forest inventory	100	2013	yes	no	yes	yes	no	yes
Other field assessments	N/A	N/A	yes	no	yes	no	no	yes
Updates to other sources	N/A	N/A	no	no				
Expert estimate	N/A	N/A						

Table 13b

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

Other type of forest reporting

Evaluation reports of eg. biodiversity - see references.

13.4 Comments

Category	Comments
N/A	N/A
N/A	N/A
N/A	N/A

Other general comments

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

Documents for this question:

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

14.1 Categories and definitions

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

14.2 National data

14.2.1 Data sources

	References to sources of information	Variables	Years	Additional comments
1	Larsen & Johannsen, 2002	Forest area with management plan	2010	Data was collected as part of the questionnaire based forest survey in 2000
2	N/A	N/A	N/A	N/A
3	N/A	N/A	N/A	N/A
4	N/A	N/A	N/A	N/A

14.3 Data

Table 14a

Forest plan type	Forest area 2010 (000 ha)
Forest area with management plan	254
... of which for production	254
... of which for conservation	0

Table 14b

Indicate which (if any) of the following are required in forest management plans in your country	
1 Soil and water management	no

2 High conservation value forest delineation	no
3 Social considerations community involvement	no

Table 14c

Percent of area under forest management plan that is monitored annually	N/A
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Tiers

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

Tier criteria

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

14.4 Comments

Category	Comments
Forest area with management plan	Forest management plans may take different forms. The reported number include only areas have a specific plan for future management. The area under forest management plan was surveyed in the forest questionnaire survey in 2000. We expect that the area with a forest management plan is unchanged. A new questionnaire survey is currently being conducted and will provide an updated estimate of the forest area under management plan.
Percent of forest monitored annually	Areas under forest management plan in the state forests may be monitored as part of updating existing plans. This is however not conducted systematically and not to check if the plans are being followed. Private forests with a management plan are not monitored by government in Denmark.
N/A	N/A

Other general comments

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

Documents for this question:

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

15.1 Categories and definitions

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

Table 15

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

Tiers

Category	Tier for status
Type of stakeholder inputs	Tier 2

Tier criteria

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

15.2 Comments

Category	Comments
Stakeholder involvement	In the state forests councils of users have been established for the individual forest districts. The councils are advisory, and include representatives from the larger groups of users, including environmental NGO's (Retningslinier for brugerråd, Miljøministeriet Skov- og Naturstyrelsen Januar 2007).
N/A	N/A
N/A	N/A

Other general comments

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

Documents for this question:

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

16.1 Categories and definitions

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

16.2 Data

Table 16a

International forest management certification		Forest area (000 ha)						
		2000	2001	2002	2003	2004	2005	2006
	FSC	0	0	0	0	0	0	0
	PEFC	0	0	0	7	12	14	24
	Other	0	0	0	0	0	0	0
		2007	2008	2009	2010	2011	2012	
	FSC	188	190	190	192	196	196	
	PEFC	205	210	219	227	246	253	
	Other	0	0	0	0	0	0	

Table 16b

Domestic forest management certification		Forest area (000 ha)						
		2000	2001	2002	2003	2004	2005	2006
	-	0	0	0	0	0	0	0
	N/A	0	0	0	0	0	0	0
	N/A	0	0	0	0	0	0	0

		2007	2008	2009	2010	2011	2012	
	-	0	0	0	0	0	0	
		0	0	0	0	0	0	
		0	0	0	0	0	0	

Tier criteria

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

Tiers

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

16.3 Comments

Category	Comments related to data definitions etc
Certified forest area using an international forest management certification scheme	There are no certification of forest in Denmark other than FSC and PEFC
Domestic forest management certification	There is no domestic certification in Denmark

Other general comments

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

Documents for this question:

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

17.1 Categories and definitions

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

17.2 National data

17.2.1 Data sources

	References to sources of information	Variables	Years	Additional comments
1	Danish forest and nature agency	Forest revenue Operational expenditure Domestic funding External funding	2000 2005 2010	N/A
2	N/A	N/A	N/A	N/A
3	N/A	N/A	N/A	N/A
4	N/A	N/A	N/A	N/A

17.3 Data

Table 17

Category	Revenues / expenditures (000 local currency)		
	2000	2005	2010
Forest revenue	250000	238000	227000
Public expenditure on forestry	648700	276800	192200
	2000	2005	2010
Name of Local Currency	Danish crowns (DKK)	N/A	N/A

17.4 Comments

Category	Comments related to data definitions etc
Forest revenue	Data on forest revenue is based on reported figures from the Danish Nature Agency. Figures include income from wood production in the state forests as well as income from recreational activities.
Public expenditure on forestry	Data on public expenditure is based on reported figures from the Danish Nature Agency. Figures include expenditures related to wood production in the state forests as well as expenditures on recreational activities and nature protection.
Other general comments	N/A

Other general comments

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

Documents for this question:

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

18.1 Categories and definitions

Category	Definition
Public ownership	Forest owned by the State or administrative units of the public administration or by institutions or corporations owned by the public administration.
...of which owned by the state at national scale (<i>sub-category</i>)	Forest owned by the State at the national scale or administrative units of the public administration or by institutions or corporations owned by the public administration.
...of which owned by the state at the sub-national government scale (<i>sub-category</i>)	Forest owned by the State at the sub-national government scale or administrative units of the public administration or by institutions or corporations owned by the public administration.
Private ownership	Forest owned by individuals, families, communities, private cooperatives corporations and other business entities, private, religious and educational institutions, pension or investment funds, NGOs, nature conservation associations and other private institutions.
...of which individuals (<i>sub-category</i>)	Forest owned by individuals and families.
...of which private business entities and institutions (<i>sub-category</i>)	Forest owned by private corporations cooperatives companies and other business entities as well as private nonprofit organizations such as NGOs nature conservation associations, and private religious and educational institutions etc.
...of which local tribal and indigenous communities (<i>sub-category</i>)	Forest owned by a group of individuals belonging to the same community residing within or in the vicinity of a forest area or forest owned by communities of indigenous or tribal people The community members are coowners that share exclusive rights and duties and benefits contribute to the community development.
Unknown ownership	Forest area where ownership is unknown includes areas where ownership is unclear or disputed.
Categories related to management rights of public forests	Definition
Public Administration	The Public Administration (or institutions or corporations owned by the Public Administration) retains management rights and responsibilities within the limits specified by the legislation.
Individuals households	Forest management rights and responsibilities are transferred from the Public Administration to individuals or households through long-term leases or management agreements.
Private companies	Forest management rights and responsibilities are transferred from the Public Administration to corporations, other business entities private cooperatives, private nonprofit institutions and associations, etc., through long-term leases or management agreements.
Communities	Forest management rights and responsibilities are transferred from the Public Administration to local communities (including indigenous and tribal communities) through long-term leases or management agreements.
Other form of management rights	Forests for which the transfer of management rights does not belong to any of the categories mentioned above.

18.2 National data

18.2.1 Data sources

	References to sources of information	Variables	Years	Additional comments
1	Johannsen et al., 2013	Forest area	2010, 2005	Based on interpretation of maps in the land registry GIS-theme (KMS-matrikel-matrikelregister)
2	Larsen and Johannsen (2002)	Forest area	2000	Based on registrations of forest owners in the land registry
3	Zangenberg and Hansen (1994)	Forest area	1990	Based on registrations of forest owners in the land registry
4	N/A	N/A	N/A	N/A

18.2.2 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.

18.2.3 Original data

owner_name	1990	2000	2005	2010
Total	543249	585454	557719	587077
Private, person	202102	224000	318574	368433
Privat, buisness	74647	94000	32322	42177
Foundations	28786	30500	23676	22689
Nature Agency	114099	112900	136176	109301

Other state owned	3996	5400	8670	5323
Other public	21761	19500	34107	24791
Unknown			4194	14363

18.3 Analysis and processing of national data

18.3.1 Adjustment

No adjustment was made

18.3.2 Estimation and forecasting

In estimating the distribution to ownership types in 1990 and 2000 it was assumed that all public owned forest was accounted for in the questionnaire surveys. The total forest area was obtained from the satellite based maps, described for table 1. The area of privately owned forest was estimated as the difference between total forest area and public owned forest. The distributions between different types of private ownership follows the distribution observed in the questionnaire surveys.

18.3.3 Reclassification

No reclassification was made.

18.4 Data

Table 18a

Categories		Forest area (1000 hectares)			
		1990	2000	2005	2010
	Public ownership	137	138	179	139
	... of which owned by the state at national scale	118	118	145	115
	... of which owned by the state at the sub-national government scale	22	20	34	25
	Private ownership	406	447	375	433

	... of which owned by individuals	297	315	319	368
	... of which owned by private business entities and institutions	110	132	56	65
	... of which owned by local, tribal and indigenous communities	0	0	0	0
	Unknown ownership	0	0	4	14
TOTAL		543.00	585.00	558.00	586.00

Tiers

Category	Tier for status	Tier for reported trend
Public ownership	Tier 3	Tier 3
Private ownership	Tier 3	Tier 3
Unknown ownership	Tier 3	Tier 3

Tier criteria

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

Table 18b - Holder of management rights of public forests

Categories	Forest area (000 hectares)			
	1990	2000	2005	2010
Public Administration	137	138	179	139
Individuals	0	0	0	0
Private companies	0	0	0	0
Communities	0	0	0	0
Other	0	0	0	0

TOTAL	137.00	138.00	179.00	139.00
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Category	Tier for reported trend	Tier for status
Public Administration	Tier 3	Tier 3
Individuals	Tier 3	Tier 3
Private companies	Tier 3	Tier 3
Communities	Tier 3	Tier 3
Other	Tier 3	Tier 3

18.5 Comments

Category	Comments related to data definitions etc	Comments on the reported trend
Public ownership	Public ownership includes state forests, forests owned by the military, municipalities and churches of the national church.	Some rather large fluctuations of public ownership can be observed in the data. The reason is inconsistent collection of data with the Danish NFI in the first years (2002, 2003) where access to private land could only be gained by permission from forest owners. Consequently, data was collected disproportionately on public lands. Although measures were taken to correct the bias these problems are still visible for reporting year 2005 in the data. Estimates after 2007 (and before 2002) are consistent and unbiased.
Private ownership	N/A	N/A
Unknown ownership	The Other types of ownership includes only areas where ownership could not be established in the 2006 survey.	N/A
Management rights	Management rights in Danish forests are generally concurrent to ownership.	N/A

Other general comments to the table

N/A

19. How many people are directly employed in forestry?

Documents for this question:

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

19.1 Categories and definitions

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

19.2 National data

19.2.1 Data sources

	References to sources of information	Variables	Years	Additional comments
1	StatBank Denmark (2011)	2010, 2005, 2000, 1990	N/A	N/A
2	Johannsen et al., 2013	2010, 2005, 2000, 1990	N/A	N/A
3	N/A	N/A	N/A	N/A
4	N/A	N/A	N/A	N/A

19.2.2 Classification and definitions

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

19.2.3 Original data

Original data was provided by Statistics Denmark (www.statistikbanken.dk , NAT18N: Beskæftigede og antal timer (1000 timer) efter branche og anvendelsesident and ATR11: Årligt arbejdstidsregnskab efter branche (DB07), sektor, type, socio-økonomisk status og køn (AFSLUTTET)). A year of full time employment was defined as having 1700 hours.

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19.3 Data

Table 19

Category		Employment (000 years FTE)			
		1990	2000	2005	2010
	Employment in forestry	3	4	4	6
	... of which female	1	1	1	1

19.4 Comments

Category	Comments related to data definitions etc	Comments on the reported trend
Employment in forestry	N/A	The observed increase in employees is possibly a consequence of forest owners increasingly employ themselves in the forest administration.

Other general comments to the table
N/A

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

Documents for this question:

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

20.1 Categories and definitions

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

20.2 Data

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

Category	Million	Currency	Year for latest available information
Gross value added from forestry (at basic prices)	2185	DKK	2011

20.3 Comments

Category	Comments
Gross value added from forestry (at basic prices)	The gross value added include forest products as well as Christmass trees and greenery from <i>Abies procera</i> and <i>Abies nordmaniana</i>

Other general comments

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

Documents for this question:

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

21.1 Categories and definitions

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

21.2 National data

21.2.1 Data sources

	References to sources of information	Variables	Years	Additional comments
1	Bemærkninger til Lov om Naturforvaltning, 24.5.1989, p.11	Government target/aspiration for forest area	2020, 2030	A doubling of the forest area from approx. 12 % to approx. 25 % within a tree generation was decided in 1989. A tree generation is usually understood as 100 years.
2	N/A	N/A	N/A	N/A
3	N/A	N/A	N/A	N/A
4	N/A	N/A	N/A	N/A

21.3 Data

Table 21a

Category	Forest area (000 ha)	
	2020	2030
Government target/aspiration for forest area	657	718

Table 21b

Category	Forest area (000 ha)
	2013
Forests earmarked for conversion	0

21.4 Comments

Category	Comments
Government target/aspiration for forest area	We assumed a linear trend in the development of the forest area. Such linear trend is not part of the legislation.
Forests earmarked for conversion	There may be new housing or roadbuilding planned that will lead to conversion into non-forest. However, such projects will usually require that new forest is established elsewhere to replace the forest lost. Therefore we set the forest earmarked for conversion at 0.

Other general comments

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