

8 Table T8 – Carbon stock

8.1 FRA 2010 Categories and definitions

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

8.2 National data

8.2.1 Data sources

References to sources of information	Quality (H/M/L)	Variable(s)	Year(s)	Additional comments
R. Milne, I. Bradley, C. Jordan and T. A.W. Brown (2004) Development of an improved version of the soil carbon inventory for the UK LULUCF GHG Inventory. & D. Mobbs).	M	Soil Carbon	1990	In: <i>UK Emissions by Sources and Removals by Sinks due to Land Use, Land Use Change and Forestry Activities</i> . Annual report (2004) for DEFRA Contract CEPG1/GA01054 (Ed. By R. Milne & D. Mobbs).
I. Bradley (2003) UK soil database for modelling soil carbon fluxes and land use for the national carbon dioxide inventory. Final project report to Defra for Project SP0511	M	Soil Carbon	1990	
R. Milne, R. W. Tomlinson, D. Mobbs and T.D. Murray (2004) Land Use Change and Forestry: The 2002 UK Greenhouse Gas Inventory and projections to 2020.	M	Soil Carbon	Projecting from 1990 to 2000 and 2005	In: <i>UK Emissions by Sources and Removals by Sinks due to Land Use, Land Use Change and Forestry Activities</i> . Annual report (2004) for DEFRA Contract CEPG1/GA01054 (Ed. By R. Milne & D. Mobbs).
R. Milne (2004), Centre for Ecology & Hydrology, Pers. Comm.	M	Soil Carbon	All	
Forestry Statistics 2004	H	Woodland area, for soil carbon	2000	

Forestry statistics databases	H	Area afforested, for soil carbon	All	Used to estimate 1990 area, as in Table T1 and for changes 1990-2000-2005.
R Milne, personal communications, 2004-05	M	Carbon in litter, soil carbon	All	

8.2.2 Classification and definitions

National class	Definition
Soil carbon	Soil carbon to a depth of 100 cm, as modelled by the Centre for Ecology & Hydrology (CEH).

8.2.3 Original data

Carbon in litter

From model output from Centre for Ecology & Hydrology, for carbon in UK forests – covers around 1.5 million hectares, afforested since 1920 (Northern Ireland since 1900): 13 million tonnes carbon in litter (R Milne, CEH, personal communication, 2005).

Soil carbon

- Average soil carbon by country from Milne, Jordan, Bradley & Brown (2004) and Bradley (2003).
- Woodland areas by country for 1990 projected back using new planting, as done for UK totals in Table 1.
- Soil carbon change from Milne, Tomlinson, Mobbs & Murray (2004)

	SOIL CARBON	UK	England	Scotland	Wales	N Ireland
A	Average soil carbon tC/ha for woodland land cover		175.4	333.3	207.9	161.6
B	Area 1990 woodland (000 ha)	2611	1052	1201	284	74
C	Area afforested 1990-2000 (000 ha)	182	51	117	5	9
D	Area afforested 2000-2005 (000 ha)	72	26	40	2	4
E	Forest soil carbon change 1990-2000 (million tonnes) (from CEH model)	5.8	2.1	2.6	0.7	0.3
F	Forest soil carbon change 2000-2005 (million tonnes) (from CEH model)	2.8	1.0	1.4	0.3	0.2

8.3 Analysis and processing of national data

8.3.1 Estimation and forecasting

All estimations copied from a spreadsheet using unrounded data.

Forest:

Carbon in living biomass

For carbon in living biomass, take 50% of biomass figures from Table T7, and round to nearest million tonnes.

Above ground:

1990: $0.5 \times 211 = 106$

2000: $0.5 \times 207 = 104$

2005: $0.5 \times 221 = 111$

2010: $0.5 \times 234 = 117$

Below ground:

1990: $0.5 \times 28 = 14$

2000: $0.5 \times 31 = 15$

2005: $0.5 \times 34 = 17$

2005: $0.5 \times 38 = 19$

Carbon in deadwood

For deadwood biomass, take 50% of biomass figures from Table T7, and round to nearest million tonnes.

All years: $0.5 \times 2.8 = 1.4$ (round up to 2, as source thought to under-estimate total)

Carbon in litter

The area not covered by the CEH model is likely to have more carbon in litter per hectare, because it is mostly older forest. Including these other areas could increase the total from 13 Million tonnes Carbon (MtC) for the modelled area to 25-30 MtC in total (R Milne, personal communication). Use the lower end of this range (25 MtC) for all years.

Soil carbon

Forecasts for 2005-2010

	SOIL CARBON	UK	England	Scotland	Wales	N Ireland
G	Area afforested 2005-2010 (000 ha) – projected as for Table T1	47	15	27	2	3
H	Forest soil carbon change 2005-2010 (million tonnes) – assume same as 2000-2005 = D	2.8	1.0	1.4	0.3	0.2

million tonnes

SOIL CARBON	UK	England	Scotland	Wales	N Ireland
Soil carbon 1990 = (A x B)	655.8	184.5	400.3	59.0	12.0
Existing soil carbon in area afforested 1990-2000 = (C x average for previous use)	40.6	7.9	30.1	0.9	1.6
Forest soil carbon change 1990-2000 = E	5.8	2.1	2.6	0.7	0.3
Soil carbon 2000 (million tonnes) = (sum of above)	702.2	194.6	433.0	60.6	13.9
Existing soil carbon in area afforested 2000-2005 = (D x average for previous use)	13.5	4.0	8.4	0.3	0.8
Forest soil carbon change 2000-2005 = F	2.8	1.0	1.4	0.3	0.2

Soil carbon 2005 (million tonnes) = (sum of above)	718.4	199.5	442.8	61.3	14.9
Existing soil carbon in area afforested 2005-2010 = (G x average for previous use)	8.8	2.3	5.7	0.3	0.6
Forest soil carbon change 2005-2010 = H	2.8	1.0	1.4	0.3	0.2
Soil carbon 2010 (million tonnes) = (sum of above)	730.0	202.8	449.8	61.9	15.7

8.3.2 Reclassification into FRA 2010 categories

No reclassification undertaken.

8.4 Data for Table T8

FRA 2010 Category	Carbon (Million metric tonnes)							
	Forest				Other wooded land			
	1990	2000	2005	2010	1990	2000	2005	2010
Carbon in above-ground biomass	106	104	111	117	0	0	0	0
Carbon in below-ground biomass	14	15	17	19	0	0	0	0
Sub-total: Living biomass	120	119	128	136	0	0	0	0
Carbon in dead wood	2	2	2	2	0	0	0	0
Carbon in litter	25	25	25	25	0	0	0	0
Sub-total: Dead wood and litter	27	27	27	27	0	0	0	0
Soil carbon	656	702	718	730	3	3	3	3
TOTAL	803	848	873	893	3	3	3	3

Soil depth (cm) used for soil carbon estimates	100
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8.5 Comments to Table T8

Variable / category	Comments related to data, definitions, etc.	Comments on the reported trend
Carbon in above-ground biomass	Revised from FRA 2005 – see comments on biomass.	
Carbon in below-ground biomass		
Carbon in dead wood		
Carbon in litter		
Soil carbon	The soil carbon content is relatively high, because much of the new woodland creation in the 20 th century area consisted of conifer plantations on upland peaty soils. Also note that the carbon estimates are to a depth of 1m.	

Other general comments to the table