

D. Timber and other forest products

- D1. Volume of growing stock**
- D2. Harvesting compared with annual increment**
- D3. Timber production and future availability**
- D4. Home-grown timber as % of consumption**
- D5. Carbon storage**

Timber and other forest products – Summary

The expansion of our forest cover in the 20th century has supported the development of timber processing industries. Although the UK will always be dependent on imports for the bulk of its timber needs, the domestic processing industry makes a positive contribution to employment and national income and reduces our ecological footprint on other countries.

Changes in the stock of timber growing in UK woodlands (D1) are determined by the annual increment and annual volume harvested (D2). The stock of timber and the age of the trees determines how much will be available for harvesting (D3); the actual volume harvested in the future will depend on a number of factors, including the competitiveness of UK manufacturers of forest products compared with manufacturers in other countries as well as prices of forest products, which are set by the international market. The contribution that UK woodlands make to our timber needs is shown in D4.

The volume of growing stock can be used to estimate the quantity of carbon stored in woodland (D5). A full analysis of carbon storage must also consider forest soils and wood products, which have not been included in this indicator.

Forest products also include non-wood goods (e.g. venison, mushrooms and berries) that can be important for commercial or local use, but comprehensive statistics or estimates are not available for the UK. Woodlands also provide social and environmental benefits that are not marketed (see Indicator F5), one of which is recreation (see Indicator E1).

D1. Volume of growing stock

Relevance An increased volume of growing stock provides a reserve of timber for future use by wood processing industries. The figures presented here are limited to growing stock of adequate quality to be harvested as timber, but their value as timber will also be affected by the quality (e.g. straightness), ease of harvesting and other factors.

Key Points The total growing stock of potential timber is around 350 million m³, of which two-thirds is conifers (softwood). On average at present, the conifers are growing by around 7% a year, and broadleaves by around 4% a year. Growing stock is increasing over time, as annual increment exceeds the volume harvested – see indicator D2.

Volume of growing stock and gross annual increment

	Conifers			Broadleaves		
	Area (thousand hectares)	Growing stock (million m ³)	Annual Increment (million m ³)	Area (thousand hectares)	Growing stock (million m ³)	Annual Increment (million m ³)
England	434	102	4.3	510	88	3.3
Scotland	891	107	10.1	109	17	0.7
Wales	145	21	1.8	61	12	0.4
N Ireland	51	6	0.6	2	0	0.0
UK	1,521	236	16.8	682	117	4.4

Source: Based on NIWT 1995-1999, volumes adjusted from UK to international definitions of overbark standing volume.

Note: This table is based on a summary of data compiled in 2001 for the European Forestry Sector Outlook Studies (EFSOS – see the EFSOS website). It only covers growing stock of timber quality (and Northern Ireland is FS only).

D. Timber and other forest products

Background These estimates are based on the National Inventory of Woodland & Trees for 1995-99, broken down by species group and age band, using assumptions about conifer yield classes consistent with the forecasts in D3. The Inventory is based on a complete digital map for woodland over 2 hectares, and specified 1-hectare squares for field sampling that should provide a representative sample, so the estimates should be complete and unbiased.

The international definition of timber volume agreed for the Forest Resources Assessment 2000 includes trees of all sizes, all stemwood and large branches (i.e. 0 cm minimum diameter), but excludes the stump. The pre-existing UK definition excludes trees smaller than 7 cm diameter at breast height, excludes the part of the stem that is less than 7 cm diameter, excludes branches (except major forks), but includes the stump. For this indicator, volumes were adjusted from UK definitions to the internationally agreed definitions.

Future Revised figures will be available by the end of 2002 covering a wider definition and based on more comprehensive modelling.

D2. Harvesting compared with annual increment

Relevance This is an indicator of the sustainability of timber production over time. Long run sustainability requires the volume of growing stock to be maintained, so the gross annual increment in growing stock must exceed the volume harvested. The difference must be at least enough to cover the volume of unrecovered natural losses (e.g. fire) and the volume of unrecovered timber left after harvesting; these losses are not recorded in UK statistics, but are both estimated to be relatively small.

Key Points The annual volume of conifer (softwood) timber harvested is around 60% of the gross annual increment in conifer growing stock. Both the annual increment and the volume harvested each year are increasing, as new plantations created in the 1950s to 1970s are approaching the end of their first rotation. The volume of broadleaves (hardwood) harvested is only around 20% of the gross annual increment in broadleaved growing stock.

Comparison of annual increment and 2000 harvest volumes in the UK

million m³ overbark standing

	Conifers		Broadleaves	
	Annual Increment	Harvest 2000	Annual Increment	Harvest 2000
England	4.3	2.3	3.3	0.6
Scotland	10.1	5.7	0.7	0.1
Wales	1.8	1.3	0.4	0.0
N Ireland	0.6	0.3	0.0	0.0
UK	16.8	9.6	4.4	0.7

Sources: Increment based on NIWT 1995-1999, adjusted from UK to international definitions.

Harvesting from Forestry Statistics 2001 (FC, 2001d)

Note: 0.0 indicates values less than 0.05

D. Timber and other forest products

Background Other European countries have similar ratios of harvesting to increment (e.g. Germany is around 55%, France around 65%) while Sweden and Finland are both around 75%. This is one of the Environmental Indicators adopted by the UN Commission on Sustainable Development and included in the Eurostat pilot Indicators of Sustainable Development (EC, 1997).

The volume of timber available for harvesting is forecast to increase over the next 20 years (see D3). Annual increment is also increasing, as many plantations are in a period of rapid volume growth during the years before harvesting.

Future Updated comparisons can be compiled after the end of 2002, when revised data for annual increment become available, covering a wider definition and based on more comprehensive modelling.

D3. Timber production and future availability

Relevance The timber production statistics show that UK woodlands have been providing an increasing volume of timber, which has permitted the development of wood processing industries using home-grown logs and small roundwood. The softwood forecast shows that the current woodland area can provide more raw material to these industries in the future.

Key Points The annual volume of softwood harvested in GB has increased steadily, from 2.4 million m³ in 1970 to 3.4 million m³ in 1980, 5.7 million m³ in 1990 and 9.5 million m³ in 2000. Availability is forecast to increase by more than 60% to 15.5 million m³ by 2020, but then fall back to little more than the current level by 2050.

Timber production in GBmillion m³ overbark standing

Year	Softwood			Hardwood	GB Total
	FC woodland	Non-FC woodland	Total softwood		
1970	1.49	0.90	2.39	1.30	3.69
1980	2.41	0.98	3.39	1.30	4.69
1990	3.46	2.20	5.66	1.12	6.78
2000	5.53	3.97	9.50	0.72	10.22

Sources: Forestry Statistics 2001 (FC, 2001d) and British Timber Statistics 2001 (FC, 2002a)

Future availability of timber in GBmillion m³ overbark standing

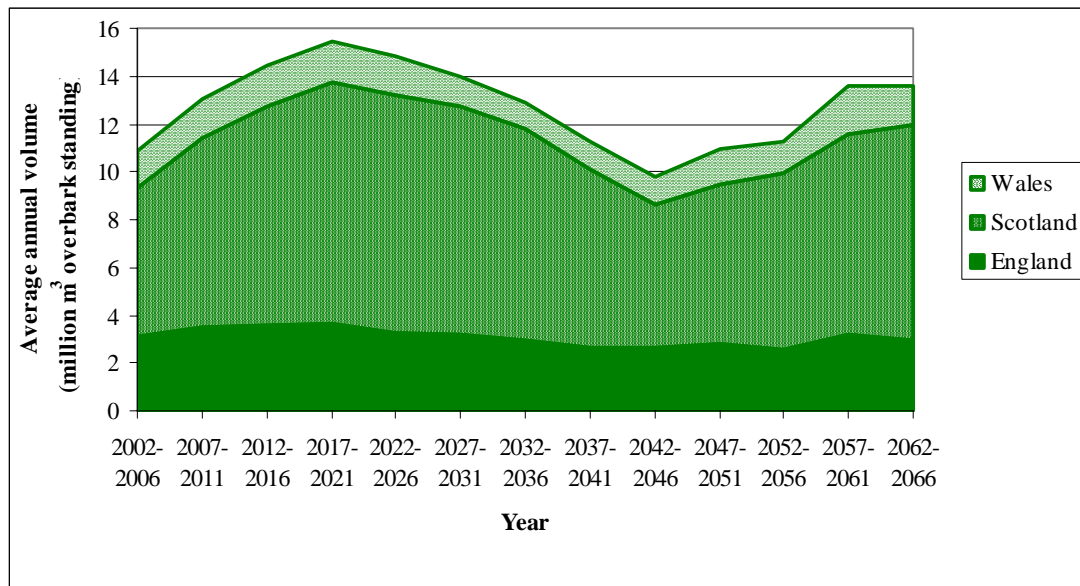
annual average in the five years:	Softwood			Hardwood	GB Total
	FC woodland	Non-FC woodland	Total softwood		
2002-2006	5.13	5.75	10.87	1.00	11.87
2007-2011	5.98	7.08	13.06	1.00	14.06
2012-2016	6.24	8.20	14.45	1.00	15.45
2017-2021	6.85	8.63	15.48	1.00	16.48

Source (softwood): Smith *et al* 2001.

Note: The figures for hardwood are a stylised projection - there has been not yet been a comprehensive assessment of the hardwood resource based on NIWT.

D. Timber and other forest products

Longer term trend in softwood availability for GB



Source: Smith *et al* 2001.

Background Forecasts for non-FC woodland are based on the woodland areas in NIWT 1995-99, using assumptions about average yield classes, rotation lengths and other parameters agreed with advisory groups representing woodland owners and wood processors. The forecasts take account of a broad classification of timber quality in NIWT, but not any detailed quality measures (e.g. straightness). They also do not take account of ease of harvesting or expected economic return.

Forecasts for the Forestry Commission were provided by the planning systems of Forest Enterprise. Hardwood figures are based on the assumption that production will remain at current levels in the foreseeable future, and are not based on availability.

The volumes harvested will depend on felling decisions by woodland owners and market demand. The decline in availability after 2020 may make it difficult to establish long-term industries. For hardwood, future availability is less of an issue; there is a large volume of over-mature timber which could be harvested, but only a small number of suitable markets.

Future A more comprehensive assessment of the hardwood resource based on NIWT should be available in late 2002. The new modelling may also lead to a revision of the softwood availability forecast, at a later date.

Equivalent figures for Northern Ireland can be compiled in the future.

D4. Home-grown timber as % of consumption

Relevance The resource costs of transporting timber for international trade and the impacts of harvesting from forests in other countries (the UK's ecological footprint) are considerations for sustainable development.

Key Points Home-grown timber meets about 16% of UK consumption of wood products (excluding recycled material). The percentage of home-grown timber has risen from around 7% in the 1960s to 10% in the mid-1970s and around 15% in the 1990s. It could rise to around 25% when UK timber availability reaches a peak in the period 2015-2025, if UK timber remains competitively priced compared with imported material.

Volume of imports, exports, and home-grown wood and wood products million m³ WRME underbark

Year	Imports ¹	Exports ¹	Home-grown	Apparent ² Consumption	Home-grown %
1960	36.0	0.8	2.7	37.9	7.1%
1965	39.1	0.8	3.0	41.3	7.3%
1970	40.3	1.2	3.2	42.3	7.6%
1975	30.9	1.0	3.4	33.3	10.2%
1980	34.7	2.3	3.9	36.3	10.7%
1985	37.5	2.3	4.7	39.9	11.8%
1990	48.4	4.7	6.5	50.2	12.9%
1995	44.3	6.0	7.6	45.8	16.6%
2000	48.6	7.7	7.5	48.5	15.5%

¹Source: HM Customs and Excise, 2001 and previous years, and conversion factors

²Apparent consumption = imports – exports + home-grown. It excludes recycled wood and waste paper of UK origin.

WRME is wood raw material equivalent, the volume of felled timber (measured without bark) required to produce these wood products.

D. Timber and other forest products

Background Total consumption of wood products has tended to increase with economic growth. However it is driven more strongly by specific requirements for construction timber and by the product life cycles for particular products. The growth in apparent consumption is less rapid, because of the increased use of recycled wood and waste paper, resulting in no net increase through the 1990s.

Future An alternative approach would be to estimate the volume (wood raw material equivalent) and/or value of apparent consumption for each category of products, and to estimate the proportion of each coming from UK timber. This would give a lower percentage share for UK timber, because the denominator would include products from recycled material (especially waste paper). An initial estimate (from work for Scottish Forestry Strategy indicators) suggests that home-grown timber produced about 10-11% of wood product consumption by quantity and 8-9% of wood product consumption by value for the UK in 2000.

It would be desirable to supplement this with information about the proportions of UK and imported material that comes from forests certified as being sustainably managed. However, this information is not currently available.

D5. Carbon storage

Relevance Plants absorb carbon dioxide (CO₂) and store the carbon, so they can help to reduce the CO₂ concentration in the atmosphere. Processes that lock up carbon are known as carbon sequestration. Although the main aim of the Kyoto Protocol to the UN Framework Convention on Climate Change is to secure agreement on reducing emissions of greenhouse gases at source, it also recognises forestry as a way of helping to reduce concentrations. The value of offsetting emissions by sequestration is controversial, but there is widespread international agreement that the store of carbon represented by forest ecosystems should be protected and enhanced.

Key Points The amount of carbon in tree wood varies with the volume of growing stock and tree species; the rate of carbon take-up by woodland depends upon the species and age of trees. The growing stock has been increasing in recent years (see indicator D1). There is currently around 140 million tonnes of carbon stored in UK woodland, with a net addition of 2 million tonnes of carbon each year.

Biomass of trees and shrubs and mass of carbon stored in UK woodland

million tonnes

	Conifer	Broad-leaved	Total
Oven-dry biomass			
Trees in forest	102	97	199
Trees outside forest			27
Other woody biomass (shrubs/ bushes)			5
Stumps & roots			44
Total			275
Carbon			
Trees in forest	51	49	99
Trees outside forest			13
Other woody biomass (shrubs/ bushes)			2
Stumps & roots			22
Total			136

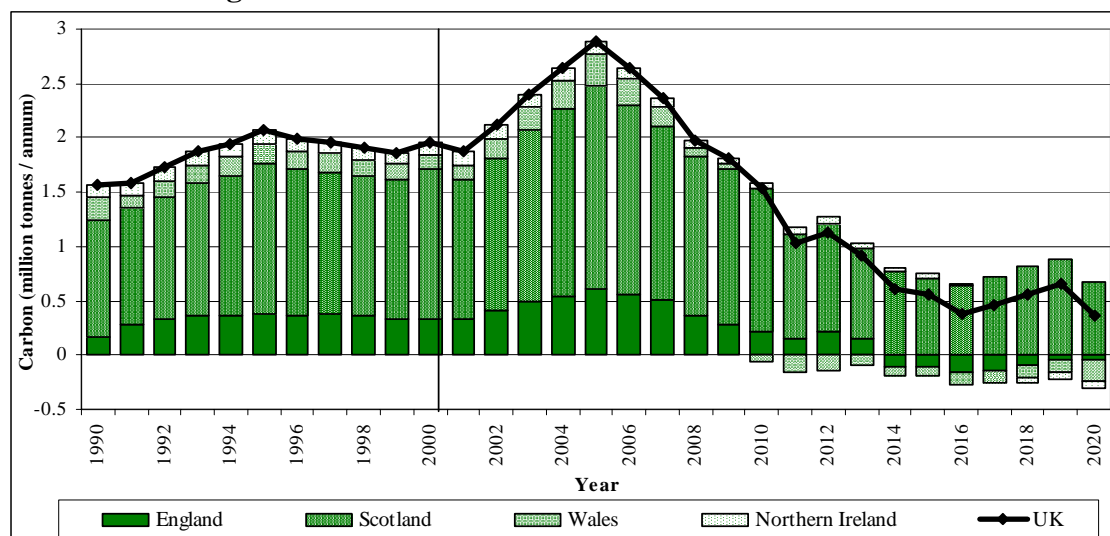
Notes:

Carbon is estimated as half of oven-dry biomass. Oven-dry biomass is estimated by multiplying the standing volume of timber by the following factors: conifers 0.43 and broadleaves 0.83.

Standing volume of trees in forest is based on NIWT 1995-1999 adjusted to international definitions (total above stump, including branches, not just stem - see indicator D1); others are estimates compiled for Forest Resources Assessment 2000.

D. Timber and other forest products

Net annual change in mass of carbon in UK woodlands



Source: CEH (2002)

Note: Future predictions of carbon uptake assume that commercial conifer plantations will be replanted when felled, and that planting of new woodland will continue at the same rate as in 2000.

Background The global atmospheric concentration of carbon dioxide (CO₂) has increased since industrialisation and it is now widely accepted that human activity has been the principal reason. Although much of the increase has been due to emission of CO₂ from burning of fossil fuels, a significant proportion has come from the clearance of forests especially in the tropics. CO₂ is released not only from burning or rotting of felled trees but also from the disturbance and subsequent mineralisation of the forest soil. Cultivating moorland for forestry can produce CO₂ emissions greater than subsequent carbon storage in trees. Protection of the carbon store in existing forests is a principle of sustainable forest management. Increasing the terrestrial carbon store through planting new forests is also encouraged by international agreements such as the Kyoto Protocol.

The amount of carbon stored in UK woodlands planted since 1920 was modelled by the Centre for Ecology and Hydrology (CEH, 2002). The amount of carbon sequestered by woodland (and other terrestrial ecosystems) does not increase continuously. At maturity, the carbon taken up by plant growth is balanced by losses from the decay of litter. Clearly harvesting also reduces the carbon stock, but only temporarily assuming replanting occurs. Because of the age structure of UK woodlands, the net rate of carbon uptake is predicted to peak in 2005 and to decrease over the following decades.

In addition to carbon stored in the woodland it is estimated that at present around 0.6 million tonnes are transferred to 'stores' in forest soils and litter each year, and 0.3 million tonnes are transferred to 'stores' in forest products.