Measuring UK Woodland Area and Timber Resources

Authors: Jawed Khan and Kah Wei Hoo; Office for National Statistics

Abstract

This paper presents the experimental physical asset accounts for UK woodland area and timber resources for 2011-12. These accounts have been developed in accordance with the System of Environmental Economic Accounting (SEEA) Central Framework, while showing some flexibility in its implementation due to UK specific context and needs. The compilation of these physical asset accounts will help to monitor changes in UK woodlands and timber resources. This paper provides the methodology used to develop these accounts, discusses issues in implementing SEEA and provides suggestions on improving these accounts over time.

Background

In November 2011, in response to the Natural Environment White Paper (NEWP) commitments, the Office for National Statistics (ONS) published a paper "Towards a sustainable environment – UK Natural Capital and Ecosystem Accounting" to outline its approach to deliver the 'early changes by 2013' to the UK Environmental Accounts. The paper suggested that a pilot study to produce a woodland asset account should be prioritised in the first instance. In December 2012, ONS published a roadmap "Accounting for the value of nature in the UK" to incorporate natural capital into the UK Environmental Accounts. As part of the roadmap, ONS set out a timetable to develop woodland physical and monetary asset accounts. **This paper is a first step in developing experimental statistics on physical asset accounts for UK woodland and timber resources in line with the SEEA Central Framework.** This work is being completed as part of the Measuring National Well-being Programme, working with the Forestry Commission and the Department of Environment, Food and Rural Affairs.

The compilation of these physical asset accounts will help to monitor changes in UK woodlands and timber resources. ONS has published the following publications that include experimental statistics as a first step towards providing comprehensive physical and monetary asset account for UK woodland.

1) Land Use in the UK
2) Measuring UK woodland ecosystem assets and ecosystem services
3) Monetary valuation of UK timber resources

As discussed in the paper "Towards a sustainable environment – UK Natural Capital and Ecosystem Accounting", the conceptual model adopted by the UK and the international statistical community for environmental accounts is the United Nations' System of Economic and Environmental Accounts (SEEA), a satellite system of the System of National Accounts (SNA). The accounts produced under

this standard bring environmental and economic information together within a common framework.

A multi-year process of revision to SEEA was initiated by the United Nations Statistical Commission (UNSC). The revised SEEA consists of three parts:

- The Central Framework of agreed concepts, definitions, classifications, accounting rules and tables which, following a period of global consultation, was adopted as the international statistical standard for environmental-economic accounts by UNSC in February 2012
- Experimental Ecosystem Accounting, which following a global consultation has been endorsed by the UNSC as international guidance in February 2013
- Extensions and Applications, which outlines applications of environmental economic accounting.

ONS aim is to develop woodland area and timber resources accounts in accordance with SEEA Central Framework; however, ONS has taken a flexible approach in implementing SEEA as it also acknowledges that countries could show flexibility in implementing the standards depending on their specific context and needs. Therefore, this paper implements SEEA whenever possible, discusses and highlights the issues in implementing SEEA, and adopts a flexible approach on developing experimental woodland and timber resources accounts.

This paper starts with a brief discussion on woodlands and timber resources. It then discusses the account structure for woodland asset account and presents an experimental physical asset account for UK woodland area. The next section discusses the account structure for timber resources and presents an experimental physical asset account for UK timber resources. The last two sections discuss the frequency of the accounts and future work on addressing the data gaps.

Woodlands and timber resources

The terms woodlands and forests can be used interchangeably. In SEEA Central Framework, forests are considered a form of land cover and forestry is a category of land use. Often woodlands are seen predominantly in terms of timber resources i.e the volume of standing timber, but woodlands are used in the production of a wide range of products and hence woodlands and timber resources are not equated[1].

SEEA Central Framework provides a distinction between physical asset accounts for woodland and timber resources. A key distinction is that the scope of timber resources is not limited to timber from woodlands. For example, orchards would fall within scope of timber resources but are not considered areas of woodlands. Another key distinction is that the asset account for timber resources is focused on the volume of timber resources rather than the area of land covered by woodlands. Notwithstanding the clear distinctions in purpose and scope, there are strong connections between asset accounts for woodland and asset accounts for timber resources. This is

[1] Source: SEEA Central Framework

because the majority of timber resources are found in woodlands. Therefore, SEEA suggests that these two asset accounts should be compiled in conjunction with each other.

ONS has published land use accounts alongside this publication, and the woodland accounts presented here feed into the land use accounts. Woodlands provide a number of ecosystem services and to measure these ecosystem services, the first step is to measure woodlands area. This paper develops experimental statistics on UK woodland area and timber resources; whereas woodland ecosystem services are discussed in "Measuring UK woodland ecosystems and ecosystem services" paper, which is being published alongside this paper.

a) Woodland

The physical asset account for woodland area is an example of a land account. The scope of the account follows a land use perspective. Thus, it is not strictly defined on the basis of changes in the tree covered areas (land cover perspective).

SEEA provides an accounting structure for constructing forest and other wooded land accounts. It defines forest land as land spanning more than 0.5 hectares with the trees expected to reach a minimum height of 5 metres along with a canopy cover of more than 10%. This also includes areas that have been clear felled but are expected to be restocked or regenerated in the future. A clear felled area remains as forest land because the purpose of land use does not change even though the area is not covered by trees. On the other hand, forest land excludes land that is predominantly used for agriculture or other uses even if the area is covered by trees, such as fruit and tree orchards.

Other wooded land are defined as that part of land which is not classified as forest land, but also spans more than 0.5 hectares with trees higher than 5 metres and a canopy cover of 5-10%. It does not include land that is predominantly for other land use, such as agricultural and urban land use.

In the UK, the definition of forest land differs slightly compared with SEEA definition given above. The Forestry Commission defines woodland as land covered in trees spanning more than 0.5 hectares and with a canopy cover of more than 20%. The Forestry Commission, like SEEA, includes felled areas because the purpose of land use does not change even though the area is not covered by trees. In the UK, there is no clear definition of other wooded land; however, the Forestry Commission has used wood pasture as a proxy for other wooded land in the Forest Resources Assessment (FRA) submission to the Food and Agricultural Organisation of the United Nations (FAO).

Accounting structure

SEEA Central Framework is an international standard that provides a framework to develop physical asset accounts for woodland area. Table 1 presents the accounting structure recommend by SEEA Central Framework.

Table 1: Physical asset account for forest and other wooded land

	Type of forest and other wooded land				
	Primary forest	Other naturally regenerated forest	Planted forest	Other wooded land	**Total**
Opening stock of forest and other wooded land					
Additions to stock					
Afforestation					
Natural expansion					
Total additions to stock					
Reductions in stock					
Deforestation					
Natural regression					
Total reduction in stocks					
Closing stock of forest and other wooded land					

Source: SEEA Central Framework

The purpose of the above accounting structure is to measure the total woodland assets and to capture the extent of sustainable management or depletion due to human activities. It records the opening and closing stock, and changes in the area of forest and other wooded land. SEEA suggests that afforestation and deforestation represent the changes in stock due to human activities; whereas natural expansion and natural regression record the changes in stock for natural reasons.

SEEA classifies forest land into different types of forest - primary forest, other naturally regenerated forest and planted forest[2], and suggests that the asset accounts should be compiled using these breakdowns whenever possible because, in some countries, these distinctions are important to evaluate sustainable management in forestry.

In the UK, almost all woodlands have had some form of human intervention at some point, hence there is not considered to be any primary forest. According to SEEA, the definition of *other naturally regenerated forest* requires at least 50% of the area to be naturally regenerated, whilst *plantations* are defined as having more than 50% of the area planted. Identifying whether a woodland has been naturally regenerated or not (or how much of it has been naturally regenerated) is extremely difficult and would require a considerable amount of subjective assessment. As a result, any figures produced are likely to have limited usefulness. Another challenge in completing Table 1 is estimating the breakdown of additions and reductions in stock. Further work is required to explore what is feasible and whether a more meaningful breakdown could be produced.

[2] See glossary for definitions

UK woodland physical asset accounts

The experimental UK woodland account presented in this paper is based on the UK definition of woodland. Other wooded land is not considered in this paper because of lack of reliable estimates. Due to the limitations discussed in the previous section, it is not possible to break down the UK forestry data as suggested by SEEA. ONS has implemented a similar accounting structure with opening and closing stock, but have broken down the forest land into conifers and broadleaves, and ownership type. Two ownership types are shown: *public* is used here to refer to woodland owned or managed by the Forestry Commission (in Great Britain) or the Forest Service (in Northern Ireland), and *private* is used to refer to all other woodland. The figures for *private* woodland include some publicly owned woodland (e.g. owned by local authorities).

An experimental physical asset account for UK woodland for 2011-12 is given in Table 2. The Forestry Commission provides substantial disaggregated data on the species and ownership types. The data are taken from Forestry Statistics 2012; however, data on reduction in stock is currently not available.

Table 2: Physical asset account for UK woodland (thousand hectares)

2011-2012	**Woodland by ownership and species type**				
	Forest				**Total**
Species type	**Conifers**		**Broadleaves**		
Ownership	**Public**	**Private**	**Public**	**Private**	
Opening stock of forest and other wooded land as at 1 April 2011	753	850	115	1348	**3067**
Additions to stock					
Total additions to stock	1	3	1	9	**13**
Reductions in stock					
Total reduction in stocks[3]	-	-	-	-	-
Balancing Item[4]	3	0	0	14	17
Closing stock of forest and other wooded land as at 31 March 2012	757	853	116	1371	**3097**

Source: Forestry Commission

[3] Annual estimates of woodland loss are not available. The National Forest Inventory has estimated that there were around 0.5 thousand hectares of observed permanent woodland loss since the last inventory, equating to less than 100 hectares per year, on average. This does not cover other woodland loss that may not be detected from a comparison of aerial photographs from each inventory.

[4] Data on reduction is not available and data are compiled using various sources and surveys, therefore, to balance the opening and closing stock, balancing is calculated as residual of opening, closing and addition to stock.

b) Timber resources

SEEA defines timber resources as the volume of trees, living or dead, and include all trees regardless of diameter, tops of stems, large branches and dead trees lying on the ground that can still be used for timber or fuel. Timber is an important natural resource in an economy. It provides inputs for the construction industry as well as for the production of paper and other wood products. Much of the wood and wood products consumed in the UK are produced elsewhere, with imports accounting for around 80% of all wood in the UK[5].

Conceptually, the asset account for timber resources covers all timber, not just timber in woodlands. However, given that the volume of timber in other areas in the UK is likely to be relatively small, the focus here is on the timber resources found in areas of woodlands.

Accounting structure

SEEA Central Framework has provided a framework to develop physical asset accounts for timber resources. Table 3 presents an accounting structure recommended in SEEA Central Framework. The purpose of the accounting structure in table 3 is to show the total stock of timber resources and changes in stock over an accounting period in physical terms. Ideally, the changes in stock should capture the factors behind these changes to provide a more complete picture for analysis.

For additions to stock, natural growth records the volume of gross increment over time based on the timber resources available at the beginning of the accounting period. SEEA suggests that increases in the area of woodlands and other areas of land that lead to increases in the volume of available timber resources should not be considered as natural growth, but instead should be recorded as reclassifications. The reclassifications may also occur due to changes in management practice that shift timber from cultivated to natural or vice versa.

For reductions in stock, the main reduction is the removal of timber from woodlands and other land area during the accounting period. This includes removals of trees felled and removal of dead trees or trees that have been damaged by natural causes. The stock will also decrease due to natural losses - dead or damaged trees that have not been removed - catastrophic losses and reclassification[6].

[5] Source: Forestry Statistics 2012
[6] Definitions of these terms are given in Glossary

Table 3: Physical asset account for timber resources (million cubic metres over bark)

	Type of timber resources			
	Cultivated timber resources	**Natural timber resources**		**Total**
		Available for wood supply	**Not available for wood supply**	
Opening stock of timber resources				
Additions to stock				
Natural growth				
Reclassification				
Total additions to stock				
Reductions in stock				
Removals				
Fellings residues				
Natural losses				
Catastrophic losses				
Reclassifications				
Total reduction in stocks				
Closing stock of timber resources				
Supplementary information				
Fellings				

Source: SEEA Central Framework

SEEA classifies timber resources into cultivated and natural timber, similar to the System of National Accounts classification of produced and non-produced assets. SEEA also recommends that the distinction of the types of timber can be made through the type of land on which the timber resources are found. In principle, timber grown in other naturally regenerated forests[7] is considered to be natural timber (non-produced assets); whereas timber grown in planted forests is considered to be cultivated timber (produced asset).

The determination as to whether timber resources are cultivated or natural is important in the application of the appropriate accounting treatment. By definition, the natural growth in cultivated timber resources is considered to be a process under the direct control and management of institutional units; whereas, the natural growth in natural timber resources is considered to be outside of the production boundary and only enters the production boundary at the time the tree is removed from the forest or other land area.

[7] Woodlands breakdown provided in an earlier section – linking timber resources with type of forest

The breakdown suggested by SEEA is not particularly useful in a UK context as there is no clear distinction between cultivated and natural timber resources and any estimates would require some level of subjectivity. This could be because the management practice in UK forestry is not aligned neatly to the production boundary of SEEA. In the UK, planted forests are established through human intervention i.e. planting, but are not necessarily cultivated or managed afterwards; they could be left to grow without intervention until harvested. Whereas, naturally regenerated forests might be cultivated during the growing process which should then technically be considered as cultivated timber.

SEEA also suggests making a distinction between timber resources available for wood supply and those not available for wood supply. This is because all timber resources may not be available for harvest because of forest legislation, or environmental, or economic reasons. Therefore, SEEA recommends that the volume of timber resources that cannot be harvested be separately identified as they should not be part of monetary valuation of timber resources. In the UK, all timber resources can be regarded as available for wood supply and therefore a distinction between available and not available for wood supply is not made while developing the timber resources asset accounts.

UK timber resources physical asset accounts

Due to the limitations discussed in the previous section, it is not possible to break down the UK timber resources as suggested by SEEA. Similar to the UK woodland asset accounts presented earlier, ONS has implemented a similar accounting structure with opening and closing stock but have broken down the timber resources into conifers and broadleaves, and ownership type.

An experimental physical asset account for UK timber resources for 2011-12 is given in Table 4 and the methodology to construct this table is given in Appendix A.

The timber resource account is compiled according to species and ownership types. A country break down is provided wherever data are available. The Forestry Commission provides substantial disaggregated data on the species and ownership types. Most of the data are taken from the Forestry Statistics 2012 and the National Forest Inventory (NFI) reports “Standing timber volume for coniferous trees in Britain” and “Preliminary estimates of quantities of broadleaved species in British woodlands, with special focus on ash”. Since the data collection is still ongoing, some of the data are interim estimates. Where possible, data for Northern Ireland are estimated[8] (if required) and included in Table 4. An estimate of natural losses has been obtained from the Forestry Commission’s submission to Forest Europe for the State of Europe’s Forests 2011 (SoEF 2011).

[8] Estimated data on Northern Ireland is provided by Forestry Commission

Table 4: Physical asset account for timber resources (million cubic metres over bark)[5]

2011-2012		Type of timber resources				
Species Types		**Conifers**		**Broadleaves**		
Ownership Types		**Public**	**Private**	**Public**	**Private**	**Total[4]**
Opening stock of timber resources as at 1 April 2011	England	26	61	8	174	269
	Wales	19	18	1	23	61
	Scotland	80	133	3	31	246
	Northern Ireland	7	2	0	1	10
	UK	***132***	***213***	***13***	***228***	***585***
Additions to stock						
Natural growth[1]	UK		15		7	22
Reclassification		-	-	-	-	-
Total additions to stock	**UK**		**15**		**7**	**22**
Reductions in stock						
Removals[2]	England	1.3	0.8	0.1	0.4	2.6
	Wales	0.8	0.6	0.0	0.0	1.3
	Scotland	2.8	4.2	0.0	0.0	7.1
	Northern Ireland	0.5	0.1	0.0	0.0	0.5
	UK	*5.4*	*5.6*	*0.1*	*0.5*	*11.5*
Fellings residues[2]	UK	0.6	0.6	0.0	0.1	1.3
Natural losses	UK	-[6]	-	-	-	0.1
Catastrophic losses[3]		-	-	-	-	-
Reclassifications		-	-	-	-	-
Total reduction in stocks	**UK**	**6**	**6**	**0**	**1**	**13**
Closing stock of timber resources as at 31 March 2012	**UK**		**347**		**247**	**595**

Source: Forestry Commission

Notes:

1. The natural growth for broadleaves is a notional figure. The estimates will be published in late 2013 by the Forestry Commission.
2. The data for removals and fellings relate to calendar years. For simplicity, it is assumed that felling activity is similar throughout the year and that the figures for financial years are similar to those for calendar years.
3. No data are currently available on catastrophic losses, although such losses are expected to be very small.
4. Components may not sum to totals due to rounding.
5. Zero figures are shown if the figures are less than 0.5.
6. "-"represents not available.

Frequency of accounts

The accounts presented in this paper are experimental statistics. The ultimate aim of developing these accounts is to incorporate them into the UK Environmental Accounts. Once these accounts are part of the UK Environmental Accounts, they will be published regularly to monitor the UK woodlands. Generally, woodlands area does not change significantly over a short period of time and therefore it is reasonable to develop comprehensive woodland accounts every few years. Since the main data source for woodland accounts is NFI, which is updated every five years, ONS recommends that woodland area accounts are published every five years, once data from the NFI has been released. The same is true for timber resources and therefore ONS recommends that asset accounts for timber resources should also be updated every five years. This would fit in with the NFI cycle.

Future work

There are a number of data gaps and limitations in implementing SEEA Central Framework accounting structure. Some of the breakdowns suggested by SEEA are not applicable to the UK; for others that are applicable, the data are not available. ONS will work with the Forestry Commission to determine priorities and explore the development of woodland and timber resources accounts, which are not only fit for purpose, but internationally comparable. Since it has been recommended that the accounts should be updated every five years, the focus during the next five years should be on improving the coverage of these accounts so they are fit for purpose.

Appendix A

Methodology

Opening stock

The 2011 opening stock of the volume of standing timber for Great Britain is taken from the NFI, together with an estimate for Northern Ireland. This gives a total of 585 million cubic metres over bark. (i.e. including the bark).

Addition to stock

Addition to stock consists of natural growth of the existing timber stock. The gross increment of 22 million cubic meters over bark covers timber in Great Britain only. As the increment for Northern Ireland is likely to be less than 0.5 million cubic metres over bark, it is assumed that Great Britain data is equivalent to UK data. The increment of broadleaves (7 million cubic metres over bark) is a notional figure as an estimate is currently not available. Data are not available on the reclassification of ownership types. New planting and restocking is not captured in the account because volume measurement only takes place when the trees reach 7 cm top diameter[9] over bark.

Reduction in stock

- Data for total UK removals are taken from Forestry Statistics 2012. In 2011, 10,540 thousand green tonnes of timber were removed from the forests, of which:
    - Coniferous wood were 9,999 thousand green tonnes[10]
    - Broadleaved wood were 541 thousand green tonnes

  The unit 'thousand green tonnes' is converted to 'thousand cubic meters over bark' by using a conversion rate[11] of 1.1 and 1.0 for coniferous wood and broadleaved wood respectively. This conversion rate provides 11.5 million cubic metres over bark of total removals in 2011

- Felling residues is calculated as the difference between total removals and total fellings. Total fellings are derived by converting total removal cubic metres over bark into standing volume using the conversion rate[12] of 1.1

- Data on natural losses for 2011 are not available, but it might be available in the future once the NFI is completed; however, it is likely to be very small as it tends to be removed from woodlands. In the absence of any reliable data for 2011, we used estimates of natural losses from the Forestry Commission's submissions to Forest Europe for the State of Europe's Forests 2011 (*SoEF 2011)*, which provided an approximate estimate of 0.12 million cubic metres over bark

- There are no data currently available for catastrophic losses or reclassification. The figure for catastrophic losses is likely to be very small because significant and exceptional losses will usually be removed from the woodlands and therefore included within the removals of stock

[9] Top diameter: The diameter of the smaller (top) end of a length of stemwood, branchwood or log
[10] Green tonnes: Weight measurement of timber fresh felled before any natural or artificial drying has occurred
[11] Source: Forestry Statistics
[12] Source: Forestry Statistics

Closing stock

Data on standing volumes for 2012 are not available as the NFI runs on a 5 year cycle; therefore, the closing stock is calculated as a residual. It is calculated by adding additions to stock to the opening stock and then subtracting the reductions in stock.

References:

Forestry Commission, Forest Resources Assessment 2010 UK Report
http://www.forestry.gov.uk/forestry/infd-7z8k3k

Forestry Commission, Forestry Statistics 2012 http://www.forestry.gov.uk/forestry/infd-7aqdgc

Forestry Commission, National Forest Inventory: Standing timber volume for coniferous trees in Britain report http://www.forestry.gov.uk/pdf/fcnfi111.pdf/$FILE/fcnfi111.pdf

Forestry Commission, National Forest Inventory: Preliminary estimates of broadleaved species in British woodlands report
http://www.forestry.gov.uk/pdf/NFI_Prelim_BL_Ash_Estimates.pdf/$FILE/NFI_Prelim_BL_Ash_Estimates.pdf

Khan, Jawed (2012), Towards a sustainable environment – UK Natural Capital and Ecosystem Accounting, Office for National Statistics

Natural Environment White Paper
http://www.official-documents.gov.uk/document/cm80/8082/8082.pdf

Office for National Statistics (2012), Accounting for the value of nature in the UK

UNECE, State of Europe's Forests 2011 UK Report
http://www.unece.org/forests/fr/outputs/soef2011.html

United Nation, European Commission, International Monetary Fund et al. (2012) System of Environmental-Economic Accounting (SEEA) Central Framework
http://unstats.un.org/unsd/envaccounting/White_cover.pdf

United Nation, Experimental Ecosystem Accounting and Extension and Application
http://unstats.un.org/unsd/envaccounting/seearev/

Glossary[13]

Afforestation: An increase in the stock of forest and other wooded land due to either the establishment of new forest on land that was previously not classified as forest land or as a result of silvicultural measures such as planting and seeding. In particular, land previously classified as other wooded land may be converted to forest land as a result of silvicultural measures.

Broadleaves: Trees that do not have needles or cones, such as oak, birch and beech. A few, such as alder, have cone-like structures for their seeds which are not true cones.

Catastrophic losses: A reduction in growing stock when there are exceptional and significant losses of timber resources due to natural causes. Catastrophic losses should only be recorded when there is no possibility that the timber resource can be removed. All timber removed should be recorded as removals.

Conifers: Trees with needles and cones, such as spruce, pine and larch.

Deforestation: A decrease in the stock of forest and other wooded land due to the complete loss of tree cover and transfer of forest land to other uses (as agricultural land, land under buildings, roads etc.) or to no identifiable use. Removals of standing timber do not lead to decreases in forest and other wooded land if the use of the land does not change after felling.

Felling: Annual fellings are equal to the volume of standing timber that is felled during an accounting period. Fellings include silvicultural and pre-commercial thinning and cleanings.

Felling residues: These residues arise because, at the time of felling, a certain volume of standing timber is rotten, damaged or excess in terms of the size requirements. Felling residues exclude small branches and other parts of the tree that are also excluded from the scope of standing timber.

Forest land: Land spanning more than 0.5 hectares with trees higher than 5 metres and a canopy cover of more than 10%, or trees able to reach these thresholds *in situ*. The scope of the forest and other wooded land account follows a land use perspective. Thus, it does not include land that is predominantly under agricultural or urban land use. In the UK context, woodland is defined as land predominately covered in trees with a canopy cover of at least 20%, or the ability to achieve this, and with a minimum area of 0.5 hectares and minimum width of 20 m.

Green tonne: The weight measurement of timber freshly felled before any natural or artificial drying has occurred.

Hardwood: The wood of broadleaved trees, such as oak, birch and beech; a term sometimes used for the broadleaved trees themselves.

Natural expansion: An increase in area resulting from natural seeding, sprouting, suckering or layering. Where the expansion is into the area of another type of forest or other wooded land (e.g. natural expansion of other naturally regenerated forest into other wooded land), a corresponding entry for natural regression should be recorded.

[13] Sources: SEEA Central Framework and Forestry Statistics

Natural growth: Increase in the stock of timber resources. This is measured in terms of the gross annual increment. The calculation of natural growth should be based on the timber resources available at the beginning of the accounting period.

Natural losses: Losses to the growing stock (i.e. living, standing trees) during an accounting period due to mortality from causes other than felling. Examples include losses due to natural mortality, insect attack, fire, wind throw or other physical damages. Natural losses should only include those losses that would reasonably be expected when considering the timber resources as a whole. Natural losses should only be recorded when there is no possibility that the timber resource can be removed. All timber removed should be recorded as removals.

Natural regression: Natural regression is recorded when the stock of forest and other wooded land reduces for natural reasons. An entry for natural regression should be recorded together with an entry for natural expansion when there are natural changes in the areas of different types of forest and other wooded land (e.g. natural expansion of other naturally regenerated forest into other wooded land – i.e. a natural regression of other wooded land).

Naturally regenerated forest: Forest predominantly composed of trees established through natural regeneration. In this context, predominantly means that the trees established through natural regeneration are expected to constitute more than 50% of the growing stock at maturity.

Other naturally regenerated forest: Naturally regenerated forest with clearly visible indications of human activities. These include (a) selectively logged-over areas, areas regenerating following agricultural land use and areas recovering from human-induced fires, etc; (b) forests where it is not possible to distinguish whether they are planted or naturally regenerated; (c) forests with a mix of naturally regenerated trees and planted/seeded trees and where the naturally regenerated trees are expected to constitute more than 50% of the growing stock at stand maturity; (d) coppice from trees established through natural regeneration; and (e) naturally regenerated trees of introduced species.

Other wooded land: Land not classified as forest land, spanning more than 0.5 hectares; with trees higher than 5 metres and a canopy cover of 5-10%, or trees able to reach these thresholds in situ; or with a combined cover of shrubs, bushes and trees above 10%. It does not include land that is predominantly under agricultural or urban land use.

Overbark: A term used in measurements of wood volume that include the bark.

Planted forest: Forest predominantly composed of trees established through planting and/or deliberate seeding. Planted/seeded trees are expected to constitute more than 50% of the growing stock at maturity, including coppice from trees that were originally planted or seeded.

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. Key characteristics of primary forests are that (a) they show natural forest dynamics, such as natural tree species composition, occurrence of dead wood, natural age structure and natural regeneration processes; (b) the area is large enough to maintain its natural characteristics; and (c) there has been no known significant human intervention or the last significant human intervention was long enough ago to have allowed the natural species composition and processes to have become re-established.

Reclassification: Increases in the area of forest land, other wooded land and other areas of land that lead to increases in the volume of available timber resources should be recorded as reclassifications. Reclassifications may also occur due to changes in management practice that shifts timber resources from cultivated to natural or vice versa.

Removals: The volume of timber resources removed from forest land, other wooded land and other land areas during the accounting period. They include removals of trees felled in earlier periods and the removal of trees killed or damaged by natural causes.

Softwood: The wood of coniferous trees, such as spruce, pine and larch; a term sometimes used for the coniferous trees themselves.

Timber resources: The volume of trees, living or dead, and include all trees regardless of diameter, tops of stems, large branches and dead trees lying on the ground that can still be used for timber or fuel.