myForest Inventory

Having an understanding of how much timber is in your woodland is fundamental to sustainable forest management in accordance with the UK Forestry Standard. In simple terms, an accurate inventory enables owners and land managers to plan harvesting operations and prepare budgets. However an inventory can be used for many purposes.

Some of these are:

- understanding how fast your trees are growing
- estimating carbon sequestration
- ensuring thinning interventions are sustainable
- marketing
- managing natural regeneration
- planning for resilience

Mensuration is the measurement of trees and forests. The main parameters are land area, stocking (the number of measurable trees per hectare), basal area (the breast height cross-sectional area of all the trees on a given area), and a measurement of timber volume. Basal area can be used to assess thinning intensity, and timber volume is obviously useful to know how much useable timber could be harvested, or how much carbon is stored in the tree stems.

Because it is impractical to measure every tree in a woodland, sample points or plots are usually used to estimate the number and sizes of trees in a forest or woodland. It is important that the sample is as representative of the population of trees as possible. This can be done through stratification into areas of similar characteristics, by spacing sample locations to ensure even coverage whilst avoiding bias, and by choosing an appropriate size and number of plots for the variability of the trees over the area.

In myForest, stratification is done by sub-compartment. If your existing sub-compartments are not sufficiently uniform, you may need to re-define them.

Other parameters include growth rates, tree heights and the proportions of different species and ages.

How inventory data are collected will depend on many factors. Professional foresters can often arrive at remarkably accurate estimates based on an experienced eye. On the other hand, small woodland owners may have the enthusiasm and the time to carry out detailed measurements.

myForest offers two different ways of entering your inventory data for a sub-compartment.

From the mensuration data you enter, myForest automatically calculates:

- basal area, derived by combining the mean DBH with the stocking.
- timber volume - for information on how volume is calculated, see Appendix A.

Bear in mind that the accuracy of the calculations is dependent on the accuracy of your data!

Inventory Data Entry

Method A: Enter Plot Data:

Use this method if you wish to record the information from sample plots. For each plot you will need to record:

- plot size
- species, diameter at breast height (this is at 1.3m above the ground and known as DBH) and height for each measurable tree in the plot (at least 7cm DBH).
- tree form - an assessment of shape and timber potential (optional)

The following is a brief description of the plot sampling methodology:

1. Locate sample plots of a suitable size (containing between 7 and 20 trees) and number (see below), evenly spaced through the sub-compartment. To avoid bias, walk a set number of paces in a given direction to arrive at the centre of each plot, or mark the plots on a map beforehand and navigate to each one.
2. Measure the height and dbh of every tree in each plot.

The number of sample plots varies according to the size of the sub-compartment and the variability of the trees. The following can be used as a guide and is taken from Forestry Commission Booklet 49 “Timber Measurement”:

Area of sub-compartment (ha)	Uniform crop	Variable crop
0.5-2	6	8
2-10	8	12
Over 10	10	16

Once you have measured all the sample plots in a sub-compartment, input the data into myForest.

myForest presents an Inventory summary for each combination of species and year planted:

- mean DBH
- height range
- range of tree forms (optional)
- yield class (optional)

myForest calculates the following on a per hectare and per sub-compartment basis:

- stocking by species
- stocking by species grouped by DBH range
- overall stocking (per hectare only)
- volume by species
- volume by species grouped by DBH range
- total volume
- basal area

Method B: Enter Completed Inventory Data:

Use this method if you are not measuring sample plots, or you already have mensuration data derived from sampling (or any other method).

Remember the data should relate to the whole Sub-compartment.

You can enter as much or as little information as you wish, however the following would normally be considered requisites:

- percentage of each species
- mean dbh (diameter at breast height) and height for each species
- stocking per hectare

From this information, myForest can provide estimates of

- basal area for the sub-compartment (you can also use your own data)
- volume for each species (you can also use your own data)

The following optional information can also be recorded:

- tree form - an assessment of shape and timber potential
- yield class - a measure of productivity

Appendix A: How myForest calculates timber volumes

The volume of the main stem of a tree is a function of two basic factors: height and cross-sectional area.

Height is a relatively easy measurement to make in conifers, although in the case of broadleaves it can be complicated by the need to estimate the “timber height”, or height to the spring of the crown above which there can be assumed to be no millable timber.

Cross-sectional area varies along the stem, and taper is usually not constant. However, diameter at breast height (dbh) has been shown to be a good proxy for the mean diameter along the length of the stem.

By combining dbh with the species tariff number (a figure expressing how the cross-section of the stem varies along its length), the mean cross-sectional area can be estimated.

The Forestry Commission have published the results of mensuration, or forest measurement, research since the 1960s, in the form of complex tables and charts for the majority of tree species commonly encountered in UK forestry.

Using 21st century computing power, Sylva have now condensed the Forestry Commission data related to height, DBH and tariff number into lookup tables so that for any given combination of species, height and DBH, the volume can automatically be calculated, saving much time in manually looking up tariff numbers and consulting tariff tables.

Appendix B: Disclaimer

The following limitations should be borne in mind:

• myForest Inventory is based on a digitised version of data initially published by the Forestry Commission in the 1970s, with the latest edition having been published in 2006. Sylva Foundation, having led the digitisation of this database, claims no ownership over the data itself.

• myForest Inventory provides a list of over 140 species which can be added to a Sub-compartment inventory. However, not all of these species are present in the published data which was digitised by Sylva Foundation (see Appendix C). In these cases data from the species most taxonomically related was used. Users are therefore advised to use the results with caution as, in some cases, they are based on data for similar species rather than the same species.

• Depending on the ultimate use of the inventory and the data required to make management decisions other methodologies may be better suited. myForest Inventory provides an easy-to-use option which is suited to many requirements, however it is advised that expert advice is sought where applicable and other methodologies and tools are considered.

• As with any forest stand inventory methodology which requires manual data collection, human error should be a key consideration when assessing the accuracy of results. To maximise the reliability of the results, data collection must be carried out by individuals who understand the process and methodology, with the correct equipment.

Appendix C: Species included in the “blue book” single tree tariff charts

Scots pine	Pinus sylvestris
Corsican pine	Pinus nigra var. maritima
Lodgepole pine	Pinus contorta
Sitka spruce	Picea sitchensis
Norway spruce	Picea abies
Omorika spruce	Picea omorika
European larch	Larix decidua
Japanese and hybrid larch	Larix kaempferi
Douglas fir	Pseudotsuga menziesii
western hemlock	Tsuga heterophylla
western red cedar	Thuja plicata
Lawson cypress	Chamaecyparis lawsoniana
grand fir	Abies grandis
noble fir	Abies procera
oak	Quercus robur / quercus
beech	Fagus sylvatica
sycamore, ash, birch	Acer pseudoplatanus, Fraxinus excelsior, Betula spp
poplar	Populus spp