Detailed description of the spatial data used to map ES

The map of the forest cover was derived from the ecotope (i.e. small polygon with largely homogeneous ecological functions) map (version 2.7) of the LifeWatch project. The ecotope map was built from Walloon orthophotographs from 2015 (2 m resolution) by an automatic segmentation of homogeneous patches of land cover and topography combined with environmental data (e.g. soil, climate, and hydrology). Each ecotope (average size of 1.3 ha) is characterized by abiotic variables and the percentage of each land cover. The dominant land cover of each ecotope is determined from the percentage of each land cover based on the ESA (European Space Agency) land cover CCI (Climate Change Initiative) legend. This legend distinguishes 18 land cover classes from urban areas to broadleaved forests. The ecotope database can be downloaded for free from the LifeWatch website (http://www.lifewatch.be). (Radoux et al. 2019)

Only the forest land cover classes were considered to map the forest cover. They were regrouped to distinguish broadleaved forests from coniferous forests, as follows:

1. broadleaved forests: one class of broadleaved forests and three classes of mixed forests with a majority of broadleaved trees and
2. coniferous forests: one class of coniferous forests and three classes of mixed forests with a majority of coniferous trees.

The broadleaved forests were considered to be uneven-aged forests because it is their dominant management in the Ardenne while the coniferous forests are dominated by spruce in pure even-aged stands.

The ecological context was mapped based on the sensitivity soil map (version 2, 10 m resolution, 2015). Sensitive soils are defined as soils with low productivity or with a high ecological significance. The sensitivity soil map was produced from the Digital Soil Map of Wallonia (DSMW) (1/20,000; 2008), the Digital Elevation Model (10 m resolution; 2005) from the ERRUISSOL project and the flood hazard map (1/25,000; 2013), all of which are downloadable from the Walloon Geoportal (http://geoportail.wallonie.be). An order of priority was established because the sensitivity of a soil can be explained by several factors. A sensitive soil was first defined based on the presence of peat, then on the alluvial nature, afterwards on the soil moisture, its depth, the presence of podzol or sand, the flood hazard and finally, the slope. For example, if the soil is both alluvial and superficial, it was assigned to alluvial soil. This map distinguishes 36 sensitivity soil classes from non-sensitive soils to peat soils. They were clustered into six types, relevant to characterize the supply of the six ES (Jacquemin 2015) (Table 1).

Table 1. The 36 sensitivity soil classes sorted according to their order of priority and with their corresponding ecological context. Adapted from Jacquemin, 2015.

Soil type	Ecological context
Peaty soil	Peat soil
Peat soil	Peat soil
Spring area	Alluvial soil
Gravel soil at the bottom of the valley	Alluvial soil
Loam soil at the bottom of the valley	Alluvial soil
Very wet alluvial soil	Alluvial soil

Wet alluvial soil	Alluvial soil
Moderately wet alluvial soil	Alluvial soil
Dry alluvial soil	Alluvial soil
Very wet non-alluvial soil	Wet soil
Wet non-alluvial soil	Wet soil
Bedrock	Surface soil
Very surface soil (<20 cm)	Surface soil
Surface soil (<40 cm)	Surface soil
Podzolic soil	Podzolic soil
Degraded or newly developing podzolic soil	Podzolic soil
Sandy soil	Podzolic soil
Artificial soil	Artificial soil
Non-classified soil	Non-classified soil
Low flooding hazard	Alluvial soil
Moderate flooding hazard	Alluvial soil
High flooding hazard	Alluvial soil
Slope 15-20° cold exposure	Steep slope
Slope 20-30° cold exposure	Steep slope
Slope > 30° cold exposure	Steep slope
Slope 15-20° hot exposure	Steep slope
Slope 20-30° hot exposure	Steep slope
Slope > 30° hot exposure	Steep slope
Unmapped soil slope 15-20° cold exposure	Steep slope
Unmapped soil slope 20-30° cold exposure	Steep slope
Unmapped soil slope > 30° cold exposure	Steep slope
Unmapped soil slope 15-20° hot exposure	Steep slope
Unmapped soil slope 20-30° hot exposure	Steep slope
Unmapped soil > 30° hot exposure	Steep slope
Non-sensitive dry soil	Non-sensitive soil
Non-sensitive wet soil	Non-sensitive soil
Non-sensitive soil	Non-sensitive soil

The surface soil, scarcely represented on less than 1% of the area of the case study and artificial and non-classified soils were not included in the matrix.