Mapping methodology

Air pollution regulation

We measured the ability of the woodland and grassland habitats in South Yorkshire to absorb two key pollutants, particulate matter ≤10µm in diameter (PM_{10}) and sulphur dioxide (SO_2). Quantifying the physical flow of the air quality regulation service provided by the woodland and grassland was based on the absorption calculation in Powe & Willis (2004) and the method in ONS (2016). The deposition rates for PM_{10} and SO_2 in coniferous woodland, deciduous woodland and grassland were taken from Powe & Willis (2004). The average background pollution concentration in 2015 for PM_{10} and SO_2 were calculated using Defra data (Modelling of Ambient Air Quality (MAAQ) https://uk-air.defra.gov.uk/data/pcm-data). The surface area index of coniferous and deciduous woodlands in on-leaf and off-leaf periods was taken from Powe & Willis (2004). The proportion of dry days (rainfall <1mm) was taken from MET office regional value data for 2017 for the North of England (http://www.metoffice.gov.uk/climate/uk/summaries/datasets). The proportion of on-leaf relative to off-leaf days was estimated at the UK level using the average number of bare leaf days for five of the most common broadleaf tree species (ash, beech, horse chestnut, oak, silver birch) in the UK using The Woodland Trust data averages tool (http://www.naturescalendar.org.uk/findings/dataaverages.htm).

Valuation: The air quality regulation service was valued using guidance from Defra that provides estimates of the damage costs per tonne of emissions across the UK (Defra 2019). These are social damage costs based on avoided mortality and morbidity. Therefore, it was assumed that the value of each tonne of absorbed pollutant by the tree stock was equal to the average damage cost of that pollutant.

Carbon sequestration

Carbon sequestration was calculated based on the woodland areas in South Yorkshire and following the UK Woodland Carbon Code methodology and look-up tables (Woodland Carbon Code 2012a,b). The species mix of deciduous and coniferous woodland was taken from the Forest Inventory for Yorkshire and the Humber (2002). They are predominantly corsican pine, sitka spruce and larch, and oak, beech, birch, ash and sycamore. The average yield class was used for each species, as well as an average spacing between trees, and it was assumed that deciduous woodland was not thinned, but coniferous areas were. The sequestration rates were averaged over a 60 year period for coniferous plantations and 100 years for the deciduous woodlands (these being the time periods after which they are harvested). The average annual sequestration rates were then multiplied by the area of each woodland type and added together to give the total sequestration estimate for woodland at the site.

Please note that ideally we would want to estimate the carbon sequestration capacity of other habitats, especially the peat habitats, in the South Yorkshire area.

This is possible but we were not able to do this given the limited resource we had for this mapping work.

Timber production
The physical flow of timber production was estimated using the average yield classes of the woodland types present, as outlined above. The physical flow of this service was calculated by multiplying the yield class by the area of each woodland type.

References

Defra (2019) Air quality damage cost guidance January 2019. Crown Copyright 2019.

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Powe, N., A., & Willis, K.G. 2004. Mortality and morbidity benefits of air pollution (SO2 and PM10) absorption attributable to woodland in Britain. *Journal of Environmental Management,* 70: 119-128.

Woodland Carbon Code 2012b. Estimating woodland carbon sequestration from the Carbon Lookup Tables, Version 1.4, Forestry Commission. http://www.forestry.gov.uk/forestry/infd-8jue9t.