

Position Statement



Woodland management and its contribution to flood reduction and bio/habitat diversity

- *A managed woodland can make a significant contribution to flood reduction and increasing bio/habitat diversity.*
- *It may appear to be counterintuitive but sometimes broad leaf non-native tree species need to be felled as part of a recognised woodland management plan.*
- *Some broad leaf non-native trees such as beech cause problems because their canopy block light to the woodland floor preventing the growth of other plants and trees.*
- *A bare understory leads to poor hydraulic roughness allowing surface water to run faster and increased soil erosion.*
- *A poorly managed woodland leads to poor quality timber and restricted bio/habitat*

The benefits of woodland and tree planting have long been recognised for reducing flooding, the key benefits are summarised by the Environment Agency ⁽¹⁾:

- Intercepting overland flow – by obstructing overland flow paths and physically slowing the rate at which water is delivered to rivers through increased hydraulic roughness.
- Encouraging infiltration and soil water storage – tree roots enable water to be delivered to the soil, which encourages infiltration and the storage of water within the soil.

A Europe wide assessment by the European Environment Agency of the water retention potential of forest cover across 287 sub-basins found:

- water retention to be 25% higher in water basins with 30% tree cover and 50% higher in those with 70% tree cover compared with basins with 10% tree cover,
- water retention was typically 25% greater in summer than in winter,
- basins with conifer forests generally retained 10% more water than those with broadleaved or mixed forests.

Position Statement



The benefits of woodland for carbon sequestration are also now well understood ⁽²⁾ and other multiple environmental benefits are listed by the Environment Agency⁽¹⁾ and summarised below:

- Water quality – well managed woodlands are generally associated with very low or no inputs of fertiliser and pesticides.
- Habitat provision – woodlands provide habitats that benefit diversity.
- Social benefits – evidence suggests that woodland can have significant health benefits, studies have shown that the presence of trees reduces health inequalities and mortality.
- Air quality – afforestation improves air quality through pollutant ‘scrubbing’ and carbon sequestration.

Given this background, how can it make sense to fell trees in our existing woodlands?

Britain’s woodland biodiversity is in trouble. Reports show that 60 percent of our woodland species have decreased, and 34 percent have decreased strongly over recent decades. Species decline is attributed to a lack of structural diversity in our woodlands with low management intervention and increased deer numbers resulting in uniform and aging woodlands. We want to do what we can to reverse this trend and help save Britain’s natural heritage.

A good example of a woodland management programme that includes selective tree felling is underway in Hardcastle Crag near Hebden Bridge in West Yorkshire, UK. The intention is to reverse this decline and help save Britain’s natural heritage.

Most of the woodland at Hardcastle Crag was planted in the 1870’s as an attractive approach to Lord Savile’s shooting lodge at Walshaw. A notable feature of parts of the woodland is the abundance of large non-native beech trees which were planted by mill owners for the manufacture of bobbins. Their presence to this day is explained by the invention of the first plastic, Bakelite, which rendered the beech trees obsolete from a commercial perspective. The beech were never thinned which explains why so many survive in close proximity to each other, shading out even their own saplings from new growth. Beech trees are shallow rooted and particularly unsuited to clough woodland planting where they are susceptible to wind damage. The age of the beech trees also leaves them susceptible to limbs dropping causing a safety problem. As beech leaves take longer to decompose this contributes to the extensive bare earth beneath the canopy.

Position Statement



The density of the woodland and the limited diversity are having a detrimental effect on the overall health of the woodland, the key issues are:

- Poor light levels due to a dense canopy
- Poor age structure with many trees at a late stage in their lifespans and little new growth
- Bare woodland soils formed due to poor light penetration limiting understory growth
- Invasive species particularly Himalayan Balsam which compete with our native flora and prevent tree regeneration.

A structured tree felling and replanting programme is currently underway with a target completion date of 2027. Even though beech in the Craggs are not native the programme will respect their landscape and heritage value and the planned work will retain many of them while reversing the environmental decline. Specifically, the programme will:

- Increase light levels to the woodland floor through tree thinning and selective felling, this is essential if we are to see the regeneration of new native trees and native wildflowers.
- Plant between 10,000 and 15,000 trees where regeneration does not occur naturally, to diversify age structure
- Create deadwood, both standing and fallen. Deadwood is a key component of our woodland ecosystems, providing habitat for a host of species, from fungi, to beetles, ants and birds.
- Progressively work to towards the removal of invasive species.

The benefits of this programme go beyond the restoration of the poor age structure and diversity of woodland trees; a restored and vegetated ground flora would intercept precipitation, impede surface run off through increased hydraulic roughness, reduce erosion and sediment transport and effectively slow the rate of water flow into the system of ditches and natural water courses throughout the woodland. The felling operations also make available the timber resources required for the Natural Flood Management interventions installed since 2017 by Slow The Flow volunteers.

Introducing woody debris in streams to slow the flow is in effect mimicking natural wild woodlands and streams where trees will have fallen naturally either by windfall, decay or at the end of their lives into stream beds. The woody debris eventually rots allowing colonisation of woodland plants and invertebrates providing food for mammals, birds and aquatic life. The process of wetting the woodland has added benefits for a richer diversity of plants and trees as well as reducing the flood peak.

Position Statement



Plate 1: Wet woodland created by volunteers placing woody debris along contours at Hardcastle Craggs

References

- 1) Working with Natural Processes – Evidence Directory, (2018), Environment Agency, Bristol, p.61 – 70.
- 2) Read, D.J., et al, (2009), Combating climate change – a role for UK forests. An assessment of the potential of the UK's trees and woodlands to mitigate and adapt to climate change. The synthesis report. The Stationery Office, Edinburgh.

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