# Ancient Woodland Restoration on Steep Slopes

**Liam Plummer** describes a project in the Upper Calder Valley aiming to revitalise ancient woods and reduce flooding.

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n much of the British uplands, ancient woodland persists predominantly on steep slopes and river valley sides, where land was less suitable for woodland clearance and cultivation. This is not to say that these woods weren't managed, as evidenced by many charcoal platforms, localised quarrying and historic trackways (Rackham, 2010). They were also not untouched by the widespread planting of timber crops in a historic drive to 'improve' timber productivity, resulting in those ancient woods differentiated as Plantations on Ancient Woodland Sites (PAWS) as opposed to Ancient Semi-Natural Woodland (ASNW).

The refreshed *Keepers of Time* policy (Defra, 2022) reaffirms strategic commitment to PAWS restoration, and English woodland management grants have recently been improved to include a PAWS restoration supplement. However, there is still a significant proportion of ancient woodland remaining as PAWS, and unique remnant

ancient woodland features continue to be threatened or in critical condition (Woodland Trust, 2018; Reid et al., 2021). Beginning the long-term process of restoring PAWS is thus an urgent priority before special features are irreversibly lost. Even in ASNW, poor ecological condition such as invasive non-native species (INNS) or a lack of deadwood, veteran trees and open space still indicates the need for sensitive, considered management to help reverse the UK's biodiversity crisis.

However, the steep terrain of valley-side ancient

woodlands presents additional challenges to using a gradual approach to PAWS restoration or nuanced management in ASNW to improve ecological condition (Woodland Trust, 2015; 2020). How can 'little and often' management be implemented when working conditions and the difficulty of extracting timber make this prohibitively expensive? This case study from Upper Calderdale, West Yorkshire, demonstrates the multiple benefits afforded by such an approach, as well as potential funding opportunities for expensive interventions.

## The Upper Calder Valley

The Upper Calder Valley is a well-wooded valley near the Yorkshire-Lancashire border, framing towns such as Mytholmroyd, Hebden Bridge and Todmorden (Figure 1). Although now associated with a creative community and increasingly popular tourism, hints of its industrial past can be seen in historic mills, the importance

of its canal links, and, less obviously, evidence of charcoal production and bark peeling in its ancient woodland (Lewis, 2019).

Another sylvan clue to past industry is the significant proportion of beech (and, to a lesser extent, sycamore) in ancient woods. Pre-dating the post-war coniferisation of many ancient woods described as the "locust years" by Rackham (2010), 19th century beech planting was undertaken to produce bobbin and shuttle wood for the numerous surrounding mills (Goddard, 2017). Although the



Figure 1. Calderdale valley: (left) map showing extent of ancient woodland in area (Photo: © Crown copyright 2024 Ordnance Survey AC0000813451), (right) view of Hebden Bridge and Upper Calder Valley, looking east, from the top of ancient woodland near Calderside. (Photo: Liam Plummer)

oldest of these planted trees are now developing interesting veteran features, it is generally accepted that beech has been planted on many NVC W11, W16 and W17 sites in the north of England. Its establishment in the local upland acidic oakwoods has significantly suppressed ground flora, simplified the woodland structure, and prevented the regeneration of more light-demanding native species. Later patchy coniferisation further compounded the threat to ancient woodland.

Remaining oak-dominated ASNW also show reduced ecological condition. Structural diversity has declined since the sudden cessation of traditional management, resulting in closed-canopy, even-aged stands of almost purely oak and birch. Deadwood is minimal and INNS,



Figure 2. Leaky dam at Hardcastle Crags, made with material from PAWS thinning. (Photo: National Trust/Paul Harris)

particularly Himalayan balsam and rhododendron, are frequent. Closed canopies favour beech regeneration from nearby stands, sowing the seeds for a slow future transition of the remaining semi-natural areas towards beech dominance and a loss of diversity. Meanwhile, whilst a native species with habitat value, holly has also exploited the shaded woodland and expanded considerably, further suppressing ground flora and preventing other species from regenerating.

#### Woodlands for water

Flooding is a significant issue in the Upper Calder Valley (Environment Agency, 2019). Natural flood management (NFM) measures are a key response, with ambitions for both woodland creation but also woodland management to improve hydrological regulation (Figure 2). Woodland management can improve light levels, stimulating ground flora recovery, and increase the amount of coarse woody debris. These features increase the hydrological roughness of the woodland floor, helping slow water run-off from steep woodland and improve water absorption within the woods, reducing peak flows in watercourses (e.g. Hornigold, 2022). This effect is particularly noticeable where ground flora has been previously inhibited, such as under beech or conifer PAWS.

Calderdale sits within the White Rose Forest Community Forest, as well as the wider Northern Forest stretching from Liverpool to Hull. Objectives to contribute to natural flood management through woodland creation and management are supported strategically in the region by the Community Forest partnerships.

#### **Hardcastle Crags**

The woods of Hardcastle Crags, a National Trust property just north of Hebden Bridge, are a microcosm of the threats facing woods across the Upper Calder Valley. They form one of the largest contiguous areas of ancient woodland in West Yorkshire, with further connectivity to surrounding woods along the valley. Of over 100ha of ancient woodland, 36ha is PAWS, with different compartments illustrating the two 'waves' of historic beech planting and more recent coniferisation.

During a Heritage Lottery Funded PAWS restoration project in 2014-17, the Woodland Trust assessed ten PAWS compartments at Hardcastle Crags. Remnant ancient woodland features were identified and work recommended to secure and then enhance them. Concurrently, increasingly frequent flooding in Hebden Bridge and surrounding areas focussed attention on flood reduction measures. Hebden Beck flows from the moors through Hardcastle Crags' ancient woodland, and in heavy rain, can rapidly swell and carry large volumes of water downstream at pace. The National Trust were considering what they could do on their land to hold water back on the moors and in the woods for longer to prevent sudden deluges in the town below.

PAWS restoration and natural flood management were thus given prominence in the National Trust's objectives for the woods, and local consultancy Forest & Land Ltd produced a woodland management plan for the entire estate capturing these objectives.

## **Restoration silviculture**

Some of the most challenging PAWS restoration was within mature beech stands, which were thinned at a variable density. The dense canopies of mature beech made felling difficult, and so some beech were topped instead to leave dead standing monoliths; as a method of thinning, this had the additional benefit of creating valuable standing deadwood habitat (Figure 3). It also reduced the risk of collateral damage from felling. Where possible, felled timber and branchwood was left or moved to lie across slopes, contributing to natural flood measures through the steep woodland into Hebden Beck.

Where heavier thinning opened small canopy gaps, the Woodland Trust provided whips of typical W11/W17 species (given Calderdale's location on the transitional uplandlowland boundary) such as oak, birch, rowan, hawthorn and hazel for underplanting. Not only did variable thinning density increase structural complexity compared to a uniform thinning (Harmer et al., 2010), but patchy establishment of native species helps direct limited management resource to key areas for replanting and maintenance. Woodland resilience has improved through diversifying both the species and stand structure.

In younger, more typical post-war conifer PAWS, initial restoration involved thinning pine, larch and spruce stands to benefit ancient woodland ground flora and release scattered relict broadleaved trees. Again, trees were felled and left lying across slope, or bundled into leaky dams placed within the watercourse to slow water flow, moved into place with the help of local Slow the Flow volunteers.

## Funding

Only in stands close to the main track infrastructure was timber extracted, through winching to trackside and processing to heat the off-grid National Trust estate offices. Elsewhere, work was undertaken at cost, including the significant expense of arboricultural work required to remove beech crowns. The absence of timber income led instead to innovative stacking of various grant funding to deliver multipurpose outputs.

The estate's woodland management plan enabled



Figure 3. Beech thinning (including monoliths) and underplanting at Hardcastle Crags. (Photo: Liam Plummer)



Figure 4. Oak ring-barking in small groups and underplanting in ancient woodland in Cragg Vale. (Photo: Peter West)



Figure 5. Thinned beech and underplanting in ancient woodland in Cragg Vale. (Photo: Liam Plummer)



Figure 6. Small group felling and underplanting in ancient woodland near Wainstalls. (Photo: Liam Plummer)

Countryside Stewardship (CS) funding for woodland improvement (at that time £100/ha annually). However, ancient woodland restoration on difficult sites can cost thousands of pounds per hectare, and CS alone would not have funded significant restoration activity at Hardcastle Crags.

Concurrently, NFM funding was also available from Calderdale Metropolitan Borough Council and the Environment Agency. Eligible options support PAWS restoration work such as thinning (including tree surgery) and INNS management, as well as building 'leaky dams' for flood mitigation. The National Trust was able to stack both funding streams, supplementing approximately £61k of CS funding over five years with approximately £20k of NFM funding to enable work in otherwise impossible compartments. Slow the Flow volunteers inputted thousands of hours to move woody material into the best position to contribute to flood management.

## Expanding to landscape-scale restoration

Although Hardcastle Crags is a focal point of ancient woodland in the Upper Calder Valley, the wider network of woods offers scope for landscape-scale woodland restoration. In 2022/23 the White Rose Forest was awarded funding to identify key clusters of ancient woods across North and West Yorkshire, and then contact woodland owners within them. Owner details were accessed using the Land Registry, and letters were sent inviting them to online webinars about ancient woodland with the offer of follow-up site visits and advice.

As one of eight identified clusters, the Upper Calder Valley returned by far the most interest from woodland owners. Following online webinars in March 2023, advisers and officers from the Woodland Trust and Forestry Commission visited woodland owners and assessed the ecological condition of their woods. Many of the issues and threats already mentioned were identified, along with the ubiquitous and challenging problem of deer overpopulation.

In contrast with Hardcastle Crags, many nearby woods are split into smaller ownership, often between 1-5ha and mostly below the (then) 3ha threshold for CS funding. Instead, the Woodland Trust supported owners to apply for felling licences and TPO consent and provided a small budget that was distributed as a challenge fund to which woodland owners were encouraged to apply.

Restoration work supported in this way includes further beech and conifer PAWS thinning, INNS management, thinning and small gap creation to diversify simplified oakwoods, and holly management to reduce its spread. Due to the steepness and inaccessibility of woods, and again some large beech requiring aerial works, thinning costs of £3-8k/ha were not uncommon; timber was again left on the woodland floor for natural flood management and deadwood habitat benefits. Underplanting with appropriate species and promoting new oak regeneration in small exclosures will again improve both the habitat value and the resilience of these woods, whilst remaining sympathetic to the character of the area's woodland (Figures 4, 5, 6 and 7).

Partnership working, most notably through the Local Authority's Wilder Calderdale partnership, offers scope for further restoration. Contact with the Local Authority will hopefully promote NFM funding applications to support appropriate woodland management, and locally active organisations such as the Rivers and Wildlife Trusts can support landowners with managing invasive species.

## Changes to the funding landscape

The changes to CS woodland management grants in January 2024 notably reduced the size threshold for eligibility, making restoration in small woods potentially fundable. Continuing work in Calderdale now includes helping owners produce small woodland

management plans for grant eligibility. WD2 supplements for PAWS restoration, ASNW management, improving resilience, and managing woods to contribute to flood reduction are all relevant to ancient woodland restoration in the Upper Calder Valley, and will help contribute towards this expensive and difficult work.

However, at up to £8k/ ha for thinning steep mature beech stands, even the new CS rates, though welcome, are unlikely to cover costs. The Woodland Trust will continue to

help owners access other funding, such as that available for natural flood management to support restoration. The benefits to both the ancient woods but also the local community impacted by flooding make this worthwhile to pursue, but the significant costs across the landscape beyond that possible through CS alone requires continued partnership working. Unfortunately, the Upper Calder Valley



Figure 7. Arborists working on beech in ancient woodland in Cragg Vale. (Photo: Peter West)

lies outside of nearby Protected Areas, where Farming in Protected Landscapes funding could be another option to support similar work.

Restoration is a long-term process, with further thinning required over decades to gradually reduce the proportion of non-native species. It will be necessary to manage the inevitable beech regeneration following thinning, and conversely work hard to establish locally native trees in the face of shade and deer browsing.

CS agreements have increased

from five to ten-year terms, which should be helpful in this regard, though some small owners have concerns about the ten-year commitment to various ongoing requirements and reporting, alongside the perceived bureaucracy, which may discourage them from applying.

al Lastly, long-term sustainability is only possible with deer management; young trees may be established in gap working with tree guards and fencing, but woodland flora

recovery and longer-term ecological processes ultimately require reduced deer numbers (Holl, 2017; Woodland Trust, 2020). Individually small parcels of land ownership can make meaningful deer management challenging, and Calderdale has a high roe deer population with significant impact. However, projects like this which span ownerships offer potential to introduce multiple owners to local stalkers

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and co-ordinate activity across a landscape, although this would require strong community engagement efforts to communicate the necessity of lethal control and ensure its broader social acceptance.

## Conclusion

It would be easy to dismiss valley-side woods such as those in the Upper Calder Valley as too difficult to manage, and to leave them 'for another day'. However, without significant funding, they will continue to decline in ecological condition, and ancient woodland features can be lost. Similarly, a purely productivist view of them as 'uncommercial' fails to capture the decline of multiple and varied ecosystem services, nor the loss of their intrinsic ecology, cultural heritage and local distinctiveness.

Instead, with increasing interest in 'multi-purpose forestry', Hardcastle Crags demonstrates how using multiple funding sources and organisational expertise facilitates both significant ancient woodland restoration activity and flood reduction. Outreach work by the Woodland Trust, stimulated by the White Rose Forest 'clusters project', illustrates expanding this at a landscape scale to build momentum around woodland management. The project shows the possibilities for woodland owners to access different sources of funding and organisational support to pursue the much-needed restoration and management of our valuable ancient woods, whilst delivering benefits beyond the woodland boundary.

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