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Ancient Woodland

Ancient woodlands are irreplaceable features of our landscapes that can be high in biodiversity or cultural value. This POSTnote summarises the challenges of conserving the biodiversity and cultural heritage of these sites to provide social and economic benefits, while still meeting the development needs of society.

Overview

- Ancient woods cover 2%[1] of UK land and are viewed by NGOs and statutory agencies as important natural and historic resources.
- Ancient woods are recognised in UK planning policy, but do not have statutory protection.[2-4]
- Areas of ancient woodland were originally mapped to act as a proxy for areas of high biodiversity, but it is difficult to conclusively identify and value ancient woodland.
- Ancient woods cannot be recreated so conservation efforts focus on improving the condition and resilience of existing sites.
- Opinion varies on which measures could effectively contribute to environmental compensation if ancient woods are unavoidably lost to development.

Ancient Woodland in the United Kingdom

Ancient woods are defined in the UK as areas that have been continuously wooded since 1600 (or 1750 in Scotland).[5-7] Ancient woods have been used by humans for centuries, providing timber and grazing for livestock,[8] and can be subdivided into two types:

- Ancient Semi-Natural Woodland (ASNW), which is composed of native trees and shrubs, though it may have been previously managed.[8,9]
- Plantations on Ancient Woodland Sites (PAWS), which were planted with (often non-native) broadleaved trees and conifers after the First and Second World Wars.[5,10] PAWS are often less biodiverse than ASNW, but can retain some features of ancient woods.[11-14]

The UK's varied climate and geology has led to a diversity of ancient woodland forms, classified according to the variety and frequency of native tree species present.[15] They cannot be recreated, as their composition is a product of environmental conditions and historic management that will not occur again. In addition, many environmental and cultural benefits provided by ancient woods cannot be replicated by recently developed or planted woods, although some benefits are provided by all woodland types (Box 1). The Woodland Trust argues that the irreplaceable status of ancient woodland is not adequately recognised at present and that all sites should be fully protected from development. However, the need for development is growing; the Government is committed to increasing housing availability[16-19] and to improving infrastructure through projects like the High Speed Rail Link (HS2).[20-22]

Box 1. Benefits of Ancient Woodland

- The longevity and historical management of ancient woods have given rise to rich, distinctive communities of plants and animals,[23,24] some of which are of international importance (e.g. lichen in Scottish ancient pinewoods).[25]
- Ancient woodland soils are relatively undisturbed, and may preserve distinct species communities and natural ecological processes, such as decomposition and nutrient cycling.[26,27]
- Ancient woods are often high in biodiversity,[23] which can enhance the value of environmental and social wellbeing benefits of woods.[28,29]
- The soils and veteran (ancient) trees in ancient woods are important carbon stores[30] and may help to reduce net carbon emissions.[31]
- Ancient woods are a rich historical, cultural and symbolic resource. They often contain archaeological relicts of previous ways of life, such as hearths or kilns.[32] Veteran trees are also archaeological relicts, as their age and structure are often a result of past human use.
- Like all green spaces, woods provide a range of social benefits for humans, including improving physical and mental wellbeing.[33]
- All woods, including ancient and recently planted woods, can contribute to flood mitigation, fuel production, carbon sequestration and reduction of air and noise pollution.[34]

The Status of Ancient Woodland

The extent and distribution of UK ancient woodland is suggested on the Ancient Woodland Inventory (AWI).[5] According to the AWI, ancient woodland is widely dispersed, covering approximately 2% of the UK's land mass.[1,5]

Identifying Ancient Woodland

The AWI was first developed in the 1980s to map ancient woodland as a proxy for likely areas of high biodiversity. The AWI provisionally identifies ancient woods by comparing current and historical maps, but identification can be supported with other lines of evidence.[5] In England, Wales and Northern Ireland, the initial maps used to develop the AWI date back only to the 1800s.[5,35] With some map interpretation, the presumption is that any woods existing in the 1800s were likely to be present since 1600 unless evidence is provided to the contrary.[36] In Scotland, the definition of ancient woodland was shifted to coincide with the earliest sufficient map evidence (1750).[36] Identification is still not conclusive in any country, as map evidence is not infallible, but classifications can be supported using multiple lines of evidence, including:

- Historical evidence, such as earlier historical maps and documents detailing woodland management.[37]
- Archaeological relicts of traditional woodland management, such as hearths and kilns. Woodland boundary features are also considered archaeological structures that are distinctive in ancient woods.[37]
- Biological features such as coppice stools and veteran (ancient) trees that can indicate how long the wood has been in existence. In addition, the presence of ancient woodland 'indicator species' can help to identify ancient woods.[38] These are species of plants, animals and lichens that have a strong association with ancient woodland, such as Herb-Paris, the Black Hairstreak butterfly and Tree Lungwort.[8,39]
- The landscape context, such as whether the land is particularly steep or infertile, as ancient woods are likely to be located in areas unsuitable for agriculture. Ancient woods are also often close to old parish boundaries or common land.[37]

Interpretation of this evidence involves expert judgement as combinations of these features can also be found in recent woods.[38,40-42] The identification of ancient woods on the AWI is ongoing, but the evidence for these classifications is not peer-reviewed.

Revision of the Ancient Woodland Inventory

The AWI is not a complete overview of ancient woodland status; not only can some sites be incorrectly included because of difficulties in interpreting evidence, but some sites are also incorrectly excluded. Depending on the purpose of the historical map source, woods may have been recorded inaccurately, if at all, as is often the case with wood-pasture.[36,37] Wood-pasture is a form of ancient woodland that has been managed for timber and grazed by domestic livestock and deer.[43] Veteran trees, which can be centuries old, are often present; they have high cultural value and are host to many rare species of plants and invertebrates.[44] However, wood-pasture is often not included on the AWI as it was rarely marked on historical maps due to its low tree density, and ancient woodland indicator plants may not be present.[5,36,41]

The original AWI also deliberately excluded sites that were smaller than two hectares;[5] there were simply too many small sites to identify, as it was traced by hand. Using current mapping software, the AWI has been revised to include these small sites for many areas of the UK. However, validating the identification of small sites is difficult and costly as the historical and biological evidence are often uncertain.[23,45] Continued revisions may provide a more complete overview of ancient woodland occurrence, but with uncertain accuracy. Revisions may also be quickly outdated as Local Authorities, land-owners and developers are not required to report ancient woodland loss. Data on woodland loss could be gained from the National Forest Inventory (NFI), which regularly uses aerial photographs to assess the area, amount and location of woods in Great Britain.[46]

Assessing the Value of Sites

The value of ancient woods will depend on the condition of the site. For instance, some small, poorly managed ancient woods have been found to be lower in plant diversity than larger, sustainably managed woods.[23] Readily available data on woodland condition could inform planning decisions by Local Authorities: loss of a high-condition site that provides greater environmental and cultural benefits or linkages to other sites may be less desirable than loss of a low-condition site providing fewer benefits. However, the AWI does not contain information on site condition beyond its status as PAWS or ASNW.[36] Local Authorities may lack the expertise or time to make these assessments: many no longer have in-house ecologists or archaeologists, or the funds to train or contract in these specialists.[47]

Even where expertise is available, environmental, cultural and wellbeing benefits are difficult to evaluate (POSTnote 378 and 421). Visual assessments of species occurrence can give an indication of a site's ecological condition,[41] but may be too superficial as they exclude other important features such as soil structure and fauna.[47] In addition, there is little information on the historical value of sites,[47] despite advances in remote sensing technology that aid identification of archaeological relicts.[48] It is even more difficult to assess site value in terms of its wider importance in the landscape and human wellbeing benefits. However, the 2011 UK National Ecosystem Assessment and its follow on projects are advocating new ways of valuing environmental and social benefits.

Planning Policy

As a habitat type, ancient woodland has no statutory protection *per se*, but it is explicitly mentioned in planning policy in Great Britain:

- English policy prohibits developments that damage ancient woods "unless the benefits of the development… outweigh the loss".[2] This is echoed in the Draft National Networks policy statement for developing nationally

important infrastructure[49] and Natural England's Standing Advice for Ancient Woodland and Veteran Trees.[50]

- Scottish policy recognises that the value of ancient woods should be considered in planning decisions.[3]
- Welsh policy states that ancient woods should be protected from development that would result in significant damage.[4]

Implementing these policies is challenging as it is difficult to conclusively identify and value ancient woods. This is not an issue in Northern Ireland, where planning policy does not specifically mention ancient woods, instead aiming to protect all existing woods "wherever possible".[51]

Additional Protection

Some features in ancient woods are protected (Box 2) and sites can also be designated for their wildlife value. Many ancient woods are Local Wildlife Sites[52] and are encompassed by the Biodiversity Action Plan list of priority habitats (NERC Act 2006). Some sites also have statutory designation as National Nature Reserves, Special Areas of Conservation, or Sites or Areas of Special Scientific Interest (SSSI/ASSI).[53] Statutory designation offers the strongest legal protection from loss and deterioration in condition, but only 20% of ancient woods are SSSIs.[53,54] In addition, there is no SSSI equivalent for culturally important woods, potentially leaving sites with high historic but low ecological value with less protection.

No Net Loss of Biodiversity & Ancient Woodland

Planning policy attempts to balance the value of ancient woodland with the need for development. If damage to ancient woodland cannot be avoided or mitigated, Defra suggests that developers in England should compensate for such damage by providing the highest biodiversity benefits possible in return. However, the Woodland Trust argues that there will be a net loss of biodiversity if ancient woodland is damaged, as compensation cannot re-create ancient woodland.

Offsetting and Compensation

Biodiversity offsetting provides a biodiversity gain through conservation activities (POSTnote 369). Guidance from the Business and Biodiversity Offsets Programme states that offsetting requires like for like replacement of biodiversity.[55] Replacement of ancient woodland, and hence offsetting, is not possible.[50,56,57] However, offsetting metrics for ancient woods have been produced for the HS2 development. The Environmental Audit Committee has considered whether offsetting metrics should be used to determine what compensation (as opposed to offsets) is adequate for damage to ancient woods.[58] Compensation through the creation of other habitats, such as new woods can provide habitats for many species of interest but does not replace lost ancient woodland features.[23,59] Studies suggest that compensatory habitat may be of higher value if well managed and located close to existing ancient woods while avoiding damage to other important habitats.[23,59,60]

Habitat Translocation

The Joint Nature Conservation Committee suggests that partial compensation for ancient woodland loss may be provided by habitat translocation (Box 3).[61] This process attempts to salvage some ancient woodland features by moving soil, ground flora, and coppice stools – along with the accompanying invertebrates – to a new area.[62,63] This will not replace the full value of the original habitat; the soil composition, structure, biodiversity and ecological processes cannot be replicated.[50] Practitioner guidelines have been compiled from case studies, but few long-term or experimental studies exist, so outcomes are uncertain.[64,65] Given the expense of translocation and the risk of failure, Natural England suggests that in addition to translocation, undertaking conservation activities to enhance the value of remaining ancient woodland sites would be a more appropriate form of compensation.

Monitoring and Management of Compensation Habitat

Long-term management and monitoring of compensation activities can help ensure that a high biodiversity gain is achieved[62] but there is no legal obligation for management or monitoring. Commentators suggest that if minimum requirements were in place, they must be sufficiently high to guarantee environmental benefits. There is also no automatic requirement for developers to assure funding for long-term activities (50-100 years).

Conservation Policy

UK forestry policy emphasises the importance of conserving ancient woods by improving and maintaining site condition.[67-70] Compensation for loss to development could include such conservation activities (Box 4).

Box 2. Legislation Protecting Features of Ancient Woodland

- Trees can be protected from felling through The Forestry (Felling of Trees) Regulations (1979 for Great Britain and 2013 for Northern Ireland) and Tree Preservation Orders.
- Many species that commonly inhabit ancient woods are protected by The EU Habitats Directive, the EU Wild Birds Directive, The Wildlife and Countryside Act 1981 (Great Britain) and The Wildlife (Northern Ireland) Order 1985, The Conservation of Habitats and Species Regulations 2010 (England & Wales), The Habitat Regulations 1994 (Scotland) and The Conservation (Natural Habitats, etc.) Regulations (Northern Ireland) 1995.
- Archaeological relicts in ancient woods may be scheduled and protected by The Ancient Monuments and Archaeological Areas Act 1979 and the Historic Monuments and Archaeological Objects (Northern Ireland) Order.

Box 3. Ancient Woodland Translocation for the Channel Tunnel

The development of the Channel Tunnel Terminal resulted in the loss of Biggins Wood, a five hectare ancient wood.[63] In 1986, the developers (Eurotunnel) attempted to preserve some of the site value by habitat translocation. Soil and ground flora were transferred to a receptor site using a dump truck and the site planted with native trees and shrubs. Six years after translocation, a woodland had developed on the receptor site that contained most of the plant species originally recorded in Biggins Wood (83 of 99 species), but also 93 additional species.[63] Some consider this to be a failure because of low similarity between the ancient wood and receptor site, but it is difficult to judge the outcome of this scheme given the lack of long-term monitoring.[66]

Improving Woodland Condition

Most UK ancient woods have been unmanaged for decades.[9] In some larger sites, natural ecological processes may maintain biodiversity but in others, lack of management has led to over-shading, reducing biodiversity.[9] Standing deadwood and overgrown vegetation because of lack of management can also lower accessibility, affecting social benefits.[71] Re-instating stages of felling and regrowth to woods that have been traditionally managed in this way may enhance the value of sites, and felled timber can be sold as wood fuel.

Managing Animal Species

Management of animal species may also help to improve site condition, but there are often different priorities to address from conservationists, hunters, land-owners and the public. For instance, pheasant rearing provides an economic gain to many woodland owners and can promote site management.[72] Although pheasant rearing may reduce biodiversity by overstocking, good management can seek to balance both ecological and economic benefits.[73-75] Overgrazing by deer can also reduce the number of plant and animal species present in ancient woods.[74,76,77] In Scotland, overgrazing is the biggest cause of damage to ancient woodland condition and loss, with development causing far fewer losses of ancient woods.[78]

Habitat Restoration

PAWS tend to have lower biodiversity than ASNW[13] but they can have high cultural importance and may still retain many valuable semi-natural features, such as pockets of ancient woodland indicator species.[14] The aim of restoration is to maintain and enhance these features by removing planted conifers or other non-native species.[81] However, conifers can provide economic benefits to the land-owners. It is uncertain which method of restoration – gradual conifer removal or clear-felling – is best for simultaneously conserving biodiversity and cultural heritage, whilst ensuring economic viability, as research on long-term effects is lacking.[74,82-85] However, the Woodland Trust favours gradual conifer removal in most cases.[86]

Mitigating Impacts from Surrounding Land-Uses

Small ancient woods are particularly vulnerable to impacts from surrounding land-uses, such as chemical pollutants from development and agriculture.[87,88] For instance, fertiliser from cropland can alter the soil chemistry, plant species presence and plant growth 100m into an adjacent ancient wood. Planting buffers around the site can help mitigate this damage, but the necessary width is not well defined.[89] In addition, buffers can alter the woodland boundary features, which archaeologists often see as historically significant and which can shelter many important species.[90-92]

Box 4. A21 Scheme Compensation

The approved development to widen the A21 will damage or destroy 9 ha of ancient woodland. This includes 5.1 ha of ASNW and 3.9 ha PAWS, planted with sweet chestnut trees. As compensation for loss, ancient woodland soil, ground flora and coppice stools will be translocated to sites with similar soil characteristics to original sites, which can increase the chances of success.[62] This will create 18.1 ha of new woodland (double the area lost); the Highways Agency, who are the developers, have made a commitment to manage the area for at least 25 years. 26.4 ha of remaining ancient woods will be managed for ten years to improve condition.[79,80]

Promoting resilience to environmental change

Ancient woods are likely to change character in response to future environmental change.[93] For example, lowland beech trees, which are vulnerable to drought, may be replaced by oak as summers become drier.[93,94] It may not be possible to mitigate the impacts of some pressures, such as nitrogen pollution (Box 5). In addition, it is unknown how different forms of environmental change will interact to affect woods.[83] For instance, tree diseases are a major threat to ancient woods,[9] but it is difficult to predict outbreaks under changing climatic conditions.[95,96] Increasing the species diversity of woods may maximise the chances that some species will survive unpredictable changes, particularly in Scotland where native tree diversity is lower.[97] This could be done by creating new woods to expand ancient woods, as larger sites tend to have higher biodiversity.[23] Woodland creation through planting offers the opportunity to use non-native or non-local trees that may be more resilient to environmental change.[98] Woods created through natural regeneration can be high in biodiversity if located close to ancient woods that act as seed sources.[23]

Increasing Landscape Connectivity

Ancient woods are often isolated and surrounded by human-dominated land-uses, such as agriculture. This can make it difficult for species to move between woods. Increasing landscape connectivity aims to enhance species movement through the landscape by increasing the amount of semi-natural habitat, such as woodland. With careful planning, increased connectivity may allow species to move to cooler areas as the climate warms, increasing their resilience to climate change without disrupting the historic landscape.[52] It is unknown whether this will aid ancient woodland plants,[99] as they tend to have very low mobility,[60,100,101] or whether it will instead help spread pests, pathogens and grazing deer (POSTnote 300). In addition, species may not survive if there are no areas to move to, but increasing the amount of high-quality woodland could be achieved by restoring PAWS and creating new woods.[99,102,103]

Box 5. Nitrogen Pollution

Over 90% of UK woods have exceeded the critical load of nitrogen: that is, the amount of nitrogen deposited to the ground from air pollution is high enough to affect sensitive aspects of the environment.[104,105] Nitrogen deposition can alter the composition of lichen and plant species in woodland,[25,106] and increase plant susceptibility to drought and disease.[106] The environmental impacts of nitrogen deposition are already visible in some sites[107] but little is known about how to mitigate these impacts.[83]

Endnotes

For references, please see:
http://www.parliament.uk/documents/POST/postpn465_Ancient-Woodlandreferences.pdf

POST is an office of both Houses of Parliament, charged with providing independent and balanced analysis of policy issues that have a basis in science and technology. POST is grateful to Adriana De Palma for researching this briefing, to BBSRC for funding her parliamentary fellowship, and to all contributors and reviewers. For further information on this subject, please contact the co-author, Dr Jonathan Wentworth.