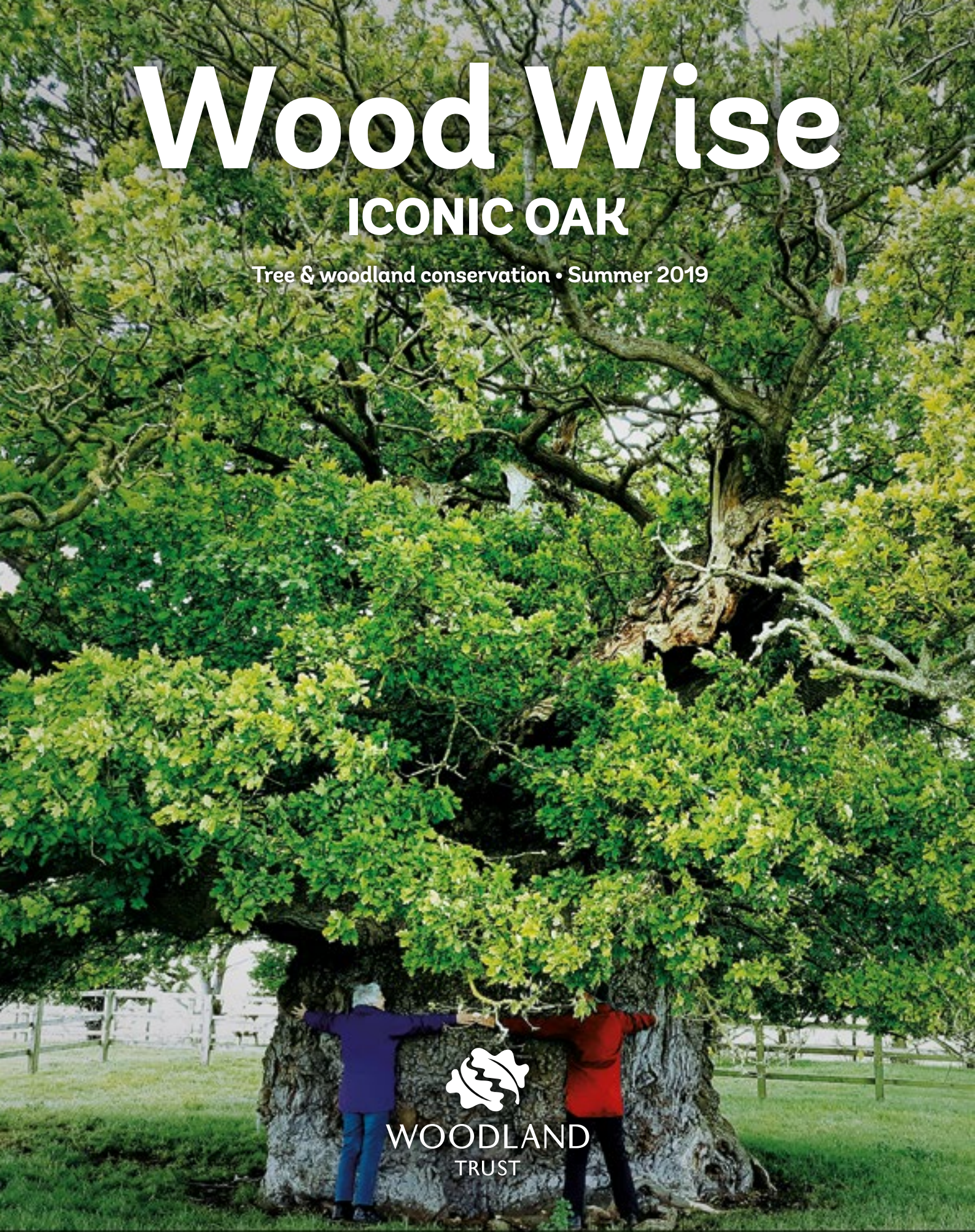
Wood Wise

ICONIC OAK

Tree & woodland conservation • Summer 2019



WOODLAND TRUST

LITERATURE, LEGACY AND LORE

WHERE CAN OAKS GROW OLD?

HOW MANY SPECIES DOES OAK SUPPORT?

CONCERNS ABOUT OAK HEALTH

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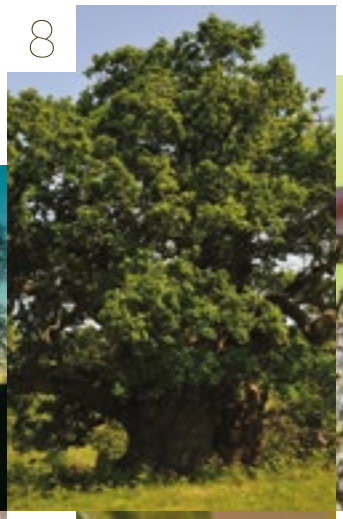
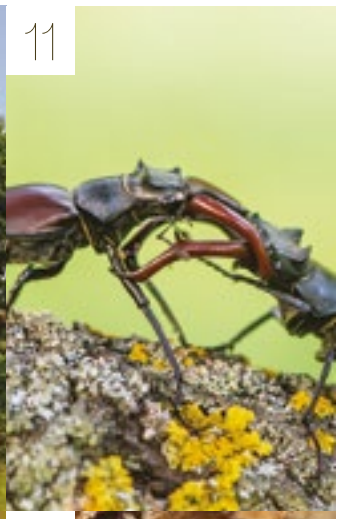
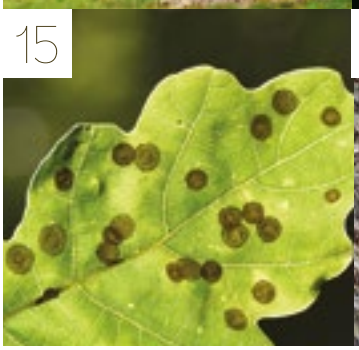

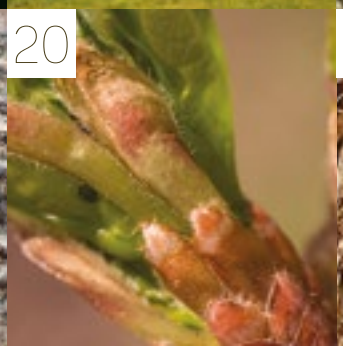


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The mighty oak

A strong and enduring species, you'd be forgiven for taking the oak for granted. But although it is our second most common broadleaved tree, and there are more gnarly old oak trees in England than the whole of Northern Europe put together, this species is under more pressure than ever.

This issue is a celebration of oak. One of the UK's most beloved species of tree, the oak is renowned in history and legend, home to thousands of species and valued for centuries for both the societal and economic benefits it provides. Julian Hight, author of the forthcoming *Britain's Ancient Forest – legacy and lore*, relays some of this colourful history as well as the stories of three famous ancient oaks. Dutch botanist Aljos Farjon explains why England is so rich in ancient native oak trees. He would know, having visited all 115 living oaks with a girth over nine metres in England and recorded more than 600 ancient oaks.

While it is well recognised that oaks support a huge amount of biodiversity, until recently we didn't know exactly how many species rely on oak. Dr Ruth Mitchell from the James Hutton Institute led a study which has produced the most comprehensive list yet of all species known to use oak trees. The team has identified which other tree species will support oak-associated biodiversity, so these species can be established in the case of a significant loss of oak in the future. Although oak is currently faring relatively well in the face of climate change and a rise in tree pests and diseases, there are still multiple threats to our oak. Professor Chris Quine, chief scientist at Forest Research, gives an overview of the current and potential threats to oak health and what is being done to secure its future in the UK.

Many pests and pathogens of oak are yet to arrive here, but one particular pest – oak processionary moth – was inadvertently introduced in 2005. Dr Matt Elliot explains how the introduction and establishment could have been avoided. Finally, Dr Gabriel Hemery explores why there is no longer an easy answer to the question 'How much is an oak tree worth?'

Dr Karen Hornigold is an assistant conservation adviser at the Woodland Trust and editor of Wood Wise.

British oak – lore and legacy

Julian Hight

British oak has had an innate and profound effect on people from the earliest times. These trees are living links to a rich, colourful history.

Coming in from the cold

Approximately 600 species of oak are found across the northern hemisphere. Some are deciduous, others evergreen; some have lobed leaves and others spiny; yet all share that common, familiar, cupped seed: the acorn. North America has the lion's share, with the United States alone hosting around 90 different species.

Britain can claim but two species of native oak: the common or pedunculate, *Quercus robur*, and the sessile or durmast, *Q. petraea*. They made their way north before the land bridge connecting Britain with the European mainland was flooded by rising sea levels, around 8,000 years ago. Along with the trees came other native species of flora and fauna, as well as nomadic people – on whom the nature of British oak has had an innate and profound effect from the earliest times.

Julian Hight is an author, photographer and musician specialising in historic ancient trees documented in his books *Britain's Tree Story*, *World Tree Story* and the forthcoming *Britain's Ancient Forest – legacy and lore*. Chair of Wessex Ancient Tree Forum, an ancient tree verifier for the Ancient Tree Inventory, Julian initiated Reviving Selwood Forest – a group that campaigns for ancient trees and woodland on the Somerset/Wiltshire border.

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Literature, legend and lore

Symbolising power and strength, renowned in history and legend, oak's seemingly constant presence among communities has proffered silent witnesses to generations of culture.

Tales of Druids worshipping in sacred oaken groves are deeply imbedded in British consciousness. They stem from Roman sources, notably Pliny's 1st century Natural History, yet a strictly oral tradition means no Druidic records survive, their customs shrouded in mystery. However, Shinto worship of ancient trees in Japan – where spirits or 'kami' are believed to reside – and similar beliefs such as those held by tribes-people of the Amazon, leave little doubt in my mind that similar observances were once held here.

Oak is celebrated prolifically in writing and poetry up to the present day, most famously mentioned by Shakespeare. Oak apples – growths caused by the tree's reaction to gall wasps laying eggs on it – provided the main ingredient for the ink that fuelled the writer's pen, and was used to scribe historic documents including Magna Carta – still legible over 800 years after it was written.

Oak apples also came to symbolise the 1664 Restoration of the English monarchy, traditionally celebrated on May 29th: Oak Apple Day. The restoration is indebted

Julian Hight

to the Boscobel Oak in Shropshire, as it was in the tree's branches that the young Charles II hid from pursuant Parliamentarian forces, allowing him to keep his head on his shoulders, unlike his father.

A nation built on oak

Long valued in construction due to its great strength, natural 'knees' (crooks or bends in trees) were selected for purpose from growing trees prior to felling, ideal for a ship's bow or A-frame of a pitched roof. Huge lengths of oak taken from Sherwood Forest to construct the roof of St Paul's Cathedral following the Great Fire of London hold firm after almost 450 years.

Elizabeth I, concerned at the decline of mature oaks used for shipbuilding, ordered a considered replanting. Many ancient oaks survive from this period, such as the giant 'Queen Elizabeth Oak' at Cowdray Park in Sussex. A tree of the same name stood at Hatfield Park where the Virgin Queen – sitting beneath its shade eating an apple or reading the bible – was informed of her imminent accession to the throne following Mary's execution in 1558.

In 1756, civil engineer John Smeaton was commissioned to design a lighthouse on Eddystone Rocks, 14 miles south-west of Plymouth. He set about the task by improving on two previous constructions, both of which had fallen into the sea. Inspiration for his design came as Smeaton observed the Victoria Oak in Windsor

Forest during a storm. He noted that flexibility was part of its strength, allowing it to sway with the wind, and constructed 1,493 interlocking blocks of stone – emulating the rings of a tree. Smeaton's lighthouse became the blueprint for most subsequent lighthouses.

In the 18th and 19th centuries, bark was stripped from oaks, exploiting its high tannin content to tan animal hides, and was ideally suited to the production of barrel staves for wine casks. Charcoal burners lived and worked in oak woods to supply fuel to iron works. Around 300 trees per year were required in charcoal form to fire a smelter, which translates to the region of four hectares of oak wood consumed per annum.

The practise of pollarding – a legacy which provides us with so many of our ancient trees today – lapsed around 200 years ago when coal largely replaced wood for heating. In sites such as Burnham Beeches, saved by the City of London Corporation in 1890 for 'the recreation and enjoyment of the people', traditional pollarding is still practised, maintaining many wonderful trees in the process, including the ancient Druid's Oak.

Historically the acorn provided 'pannage' – a common right for fattening swine – still observed in the New Forest each October and November. Prior to farming (and later in times of hardship), acorns were ground into meal to make bread, an important staple food.

Ageing the ancients

Britain may be one of the least wooded countries in northern Europe, yet is thought to boast the highest number of ancient oaks. Pinning an age on them, however, is problematic. Without a known planting date, counting annual growth rings is the only way to accurately confirm life-span. But decay and hollowing, shedding the dead inner heartwood in a symbiotic relationship with fungi and invertebrates, which creates compost for the tree itself, leaves only the more recent growth rings.

Alongside established age-estimators such as those provided by John White[1], historic records, art and archive photographs offer supporting evidence and visual dating. Oaks often show little change in shape and character over a century, lending credence to the old adage often applied to them: '300 years young, 300 more mature, 300 in decay.'

Descendants of Britain's original wildwood, these ancient oaks paint a picture at odds with the long-held perception of a country once covered in dense woodland. Oaks are light-loving trees that thrive in an open-grown environment sustained by grazing. Part of an historic patchwork landscape, their longevity could place them just 10 generations from the end of the last Ice Age, when they first colonised our island 10,000-12,000 years ago.

[1] White, J. (1998) Estimating the age of large and veteran trees in Britain. Forestry Commission Information Note, Forestry Commission, Edinburgh. Available at http://www.ancienttreeforum.co.uk/wp-content/uploads/2015/03/John-White-estimating-file-pdf.pdf

The Major Oak

Sherwood Forest hosts arguably Britain's most famous oak in the Major Oak near Edwinstowe, inextricably linked with England's favourite folk hero Robin Hood. Whether he existed or not, tales of the outlaw and his merry men are responsible for many of the tree's visitors, and since Victorian times have helped secure its survival, since its previous life as a working pollard lapsed.

The Major Oak circa 1915

Standing in ancient wood pasture, the tree is the centrepiece of Sherwood's tourist experience.

Fenced off in 1974 to protect it from damaging root compaction caused by the sheer volume of visitors, over 40 years later the topsoil remains densely compacted – depriving the upper roots of air and nutrients.

Formerly known as the Cockpen Tree (its hollow trunk was used to hold baskets of cockerels for fighting), it was then named after Major Hayman Rooke, who featured a drawing of the tree in his 1790 book *Remarkable Oaks*.

Age estimates of the 10.66-metre-girthed oak range from 600-1,000 years, a large margin for error, impossible to verify due to its cavernous hollow. However, comparing archive and contemporary photographs reveals unperceivable change over a century, lending credence to the idea that the tree could lean towards the upper end of the estimate, contemporary with Robin and his merry men.

The Major Oak circa 2016

The Bowthorpe Oak in 1915

The Bowthorpe Oak

The giant Bowthorpe Oak at Manthorpe in Lincolnshire holds the honour of being Britain's widest oak. It stands in a field at Bowthorpe Park Farm, formerly a priory that later became a manor house.

Its colossal girth spans an incredible 12.44 metres around a hollow bole, which in the mid-18th century comfortably sat 12 people for tea, and on another occasion 39 people crammed inside.

Graffiti from that time is clearly visible, carved into the internal walls of its cavernous trunk, which by then already measured 12 metres.

Through the ages the old pollard has been used as a pigeon roost and a cattle feeder, and in 1768 was fitted with flooring, benches and a door to host tea parties.

Ancient chains bind the branches together, and a recently erected fence protects its ancient roots from compaction by the many visitors who pay a small fee to see it, and may glimpse its current function as a roost for chickens.

Nominated as England's Tree of the Year in 2017, the Bowthorpe Oak featured in a TV programme celebrating the competition, where presenters managed to pack 30 people inside the trunk. While it fell short of its earlier record, it was nevertheless an impressive feat.

The Bowthorpe Oak in 2015

Wyndham's Oak

At 9.79 metres in circumference, Wyndham's Oak at Silton is one of Dorset's largest oaks. It stands in a field at a point thought to have marked the boundary of Selwood Forest with the neighbouring Forest of Gillingham.

Also known as the 'Judge's Tree', it was named after Judge Hugh Wyndham, who purchased the manor in 1641. Justice of the Common Pleas in the time of Charles II, he is said to have sat within the hollow tree to smoke his pipe, relax and contemplate. Local rebels are thought to have been hung from the tree after the Monmouth Rebellion of 1685.

Wyndham's Oak, painted by J G Surgey circa 1850

Wyndam's oak in 2015

The leading branch, visible in a 19th century painting by J G Surgey, was once high enough for a cart to be ridden beneath it, but fell in 1948, leaving the tree with the rounded shape seen today.

The current owner of the farm remembers losing a cow, only to find it two days later stuck firmly inside the hollow trunk.

Runner up in England's 2018 Tree of the Year competition, Wyndham's Oak benefitted from a grant for works from the Woodland Trust to help prolong its already considerable longevity.

Ancient oaks in the English landscape

Aljos Farjon

England has more ancient native oak trees than the rest of Europe combined. Many sites contain large numbers of oaks exceeding six metres in girth, but almost no comparable sites exist on the continent. What is behind this uncommon preservation? Why in England and not in other European countries? Did other countries have many ancient oaks in the past?

Jack of Kent's Oak, old deer park of Kentchurch Court, Herefordshire

To answer these questions, we must first determine in which kind of landscape oak trees could become ancient. It was not in what we now understand as 'forest', which is a more or less continuous stand of fast-growing trees invariably managed for timber. Trees do not grow old in such forests. Neither was it in ancient woods as described by Oliver Rackham, that were mostly managed as coppice woods, with or without standard oaks.

Ever since the Neolithic age, several thousand years ago, people had grazed their animals on land that was not intensively managed for crops, haymaking or forms of forestry. In the lowlands, this land would originally have been wooded, so the animals were grazed in those woods less suitable for intensive management. This created a park-like landscape, or pasture woodland (Domesday Book's Latin *silva pastilis*), but Rackham and others called it 'wood pasture'.

Only here oaks could grow old

These pasture woodlands were widespread in medieval Europe. Trees may have been pollarded - cut at the stem at a height above the reach of the cattle - but were retained for future use. Coppicing - cutting them at ground level - wasn't an option as the animals would eat the regrowth, preventing regeneration. It was in these pasture woodlands that deer parks were created, and in these enclosures

Oak pollard in snow at Richmond Park

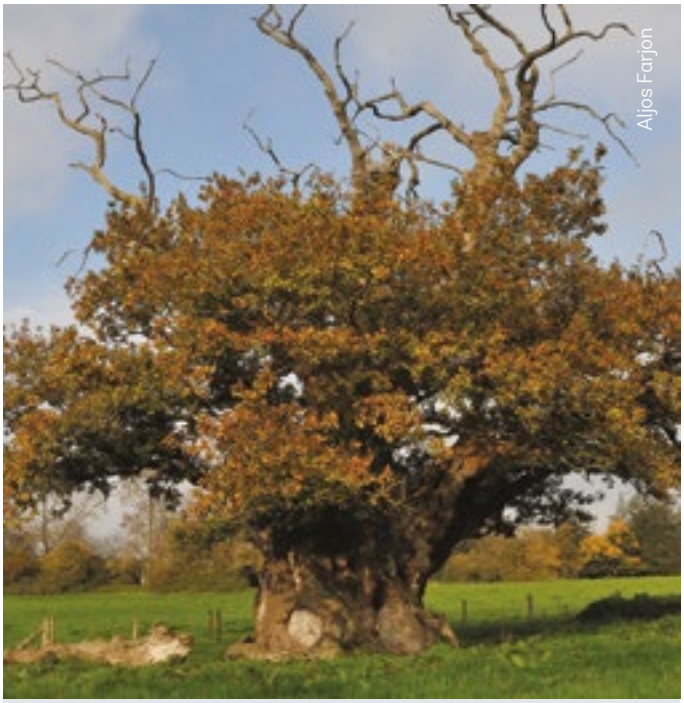
Aljos Farjon is a botanist at the Royal Botanic Gardens, Kew, known mainly for his global work on conifer systematics and conservation. He has recently shifted his scientific research to native ancient oaks and their associated biodiversity.

pollarding was often prohibited. While there were deer parks in other countries, in England it became a craze; every nobleman wanted a deer park and some owned many.

There may have been more than 3,000 deer parks in England, probably more than in the rest of Europe. Royal forests used for hunting by the king also included pasture woodland; such hunting forests existed in other countries, too. The word 'forest' (Latin *forestis*) has changed its meaning; in the Middle Ages it was about exclusive deer hunting, not about trees. Today, however, forestry is all about trees and many hunting forests in Europe were converted into tree plantations. No trees had been planted there, or in the deer parks, during the Middle Ages.

We can now discover why England has most of the ancient oaks. Despite great losses, private landownership preserved many of the ancient parks in England. Forestry as a serious enterprise developed in England only after the launch of the Forestry Commission (FC) in 1919, while it had been business as usual for centuries in France, Germany, Poland and elsewhere. The idea that these old 'dodders' have a value in terms of conservation and landscape history came only in the 1980s, just in time to save the last few in the former Royal Forests, now all managed by the FC. On the continent it came too late. You will not find a single ancient oak in the Forêt d'Orléans, which is both older and larger than the New Forest. Private owners in England mostly declined offers to convert their parks into plantations and were more interested in pheasant shooting.

The lack of destructive wars ravaging the countryside in England must also count as a positive factor, given what was done to Royalist estates during the English Civil War (1642-51), the only major episode of this destructive nature here for more than 500 years. In much of Europe, another war followed the previous one, with only short interruptions.



Ancient oak with a girth of 9.9 metres

The situation today

Many deer parks in England have however been lost, along with their trees. This is predominantly due to the conversion to agriculture. Royal forests, chases and commons also largely went under the plough. In a study of 12 counties that had many medieval deer parks, it was found that 75% had completely disappeared. Of those that are still a park, many had been 'landscaped' to such an extent that all ancient trees that were likely present before had gone. Some 60 parks (8%), despite being landscaped, still have ancient oaks from before 1603, although few of these parks have retained their medieval character. There are, however, 24 sites in England that can be considered 'most important', with substantial numbers of large ancient oaks in an essentially medieval landscape. This situation is indeed unique in Europe.

Discovery

Recording ancient or remarkable trees has been a pastime of many people in many European countries for decades. We therefore have fairly comprehensive data on the large (in terms of stem girth) trees, although data coverage varies among countries. No inventories are complete and 'new' old trees are continually recorded. However, by now we know which European countries are rich and which are poor in ancient trees. The Ancient Tree Inventory (ATI), a partnership project between the Woodland Trust, the Ancient Tree Forum and the Tree Register of the British Isles, is the UK's most comprehensive database of ancient and veteran trees, with 14,000 ancients recorded as of March 2019.

The ancient oaks in England are either pedunculate oak, *Quercus robur*, or sessile oak, *Q. petraea*, or their hybrids. I have visited many important sites, as well as all 115 living oaks in England with a girth over nine metres and recorded more than 600 ancient oaks. For each oak with a girth greater than six metres I tried to determine land use prior to 1603, the end of the Tudor dynasty. An oak of six metres girth is, on average, about 400 years old, while the larger ones (up to 14.02 metres in England) are likely older. Out of 3,433 oaks it was possible to determine past land use for 95%, albeit sometimes by inference and not with certainty. Of all the oaks older than 400 years, around 50% are associated with ancient deer parks. Some 12% were/are in royal forests or chases, 6.5% on wooded commons, and around 20% on a manor that did not have a deer park. Hedgerow oaks are common, but rarely this big. Their large oaks have usually disappeared where there was no prohibition or restriction to cut them, to be supplanted (or not) by younger trees. Only in recent times have these been allowed to grow big and, if left, will eventually become old.

Biodiversity and conservation

Their significance for biodiversity is profound. No other microhabitat in this country supports a greater diversity of life than a big ancient oak. Especially where growing in some numbers together, there are large amounts of fungi, lichens, mosses, insects and other invertebrates, as well as various birds and mammals, all living in or on the ancient oaks. Having more than a few of such big hollow trees on site, as well as younger oaks to succeed them when they disappear, has continued this habitat for centuries, possibly for millennia in some cases.

Many species are uniquely associated with the various stages of decaying wood, several are very rare and some have so far been found on just one site with ancient oaks. A survey is currently underway of the biodiversity of High Park; this section of Blenheim Park in Oxfordshire has the greatest number of ancient oaks over six metres girth of any site in England (and of Europe, of course). The number of rare organisms found is growing every month, with a first for the UK found in 2017. More such in-depth surveys on important ancient oak sites are highly desirable; most have not been surveyed extensively. It would give us a strong argument for their conservation.

Conservation of ancient oaks is now on the agenda of almost all land owners, especially since their importance for biodiversity has become better understood. However, legal protection of individual oaks is often lacking and in this respect England trails behind countries like the Czech Republic, Germany and Sweden. If not on a Site of Special Scientific Interest or National Nature Reserve the trees are at the owner's disposal, whether ancient or not. Fortunately some land-owning organisations such as the National Trust and the Woodland Trust preserve ancient trees on their land in perpetuity.

Farjon, Aljos (2017). *Ancient Oaks in the English Landscape*. Kew Publishing, Royal Botanic Gardens, Kew.

Aljos Farjon

WTML/iStock

Dr Ruth Mitchell is a plant and soil ecologist at The James Hutton Institute, Aberdeen, with a particular interest in the impacts of tree diseases on biodiversity.

More than an oak tree?

Ruth Mitchell

Oak trees have long had a reputation for supporting a lot of other species, but until recently we had no idea just how many and what those species were. Recent work has listed 2300 species associated with oak, 320 of which are only found on oak and a further 229 species which are rarely found on any species other than oak.

Why be concerned?

Oak trees are currently at risk from a range of pests and pathogens[1] including acute oak decline, chronic oak decline, oak processionary moth and powdery mildews. In addition, a changing climate and multiple other threats are thought to increase the susceptibility of oak trees to pests and diseases. It is therefore hugely important to gain an understanding of which species are dependent on oak as well as the role of oak in the functioning of woodland ecosystems. This would allow assessments to be made of the impact of oak declines on the wider environment and for mitigation measures to be put in place.

Not all tree species are equal in terms of the biodiversity they support and how they impact on the functioning of the woodland in terms of shade and nutrient cycling. While obvious to all foresters and ecologists, these differences between tree species are rarely quantified.

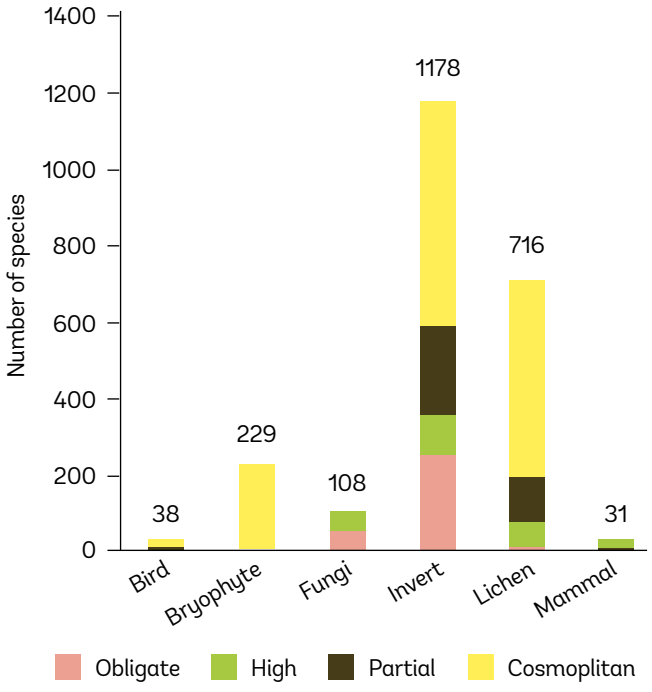
Oak biodiversity

Recent work[2] has used existing data sources to collate and produce the most comprehensive list yet of all species known to use oak trees (*Quercus petraea* and *Q. robur*) in the UK. In total 2300 species were listed; this consisted of 38 bird species, 229 bryophytes, 108 fungi, 1178 invertebrates, 716 lichens and 31 mammals. Bacteria and other micro-organisms that are associated with oak were not included,

so the true number of species that use oak trees, although unknown, is much greater.

Of these 2300 species, 326 were obligate species (found only on oak) consisting of 57 fungi, 257 invertebrates and 12 lichens (Fig. 1). Examples of such obligate species include the moths oak lutestring, great oak beauty and oak nycteoline; the fungi oak polypore, oak leaf blister and oak mildew and the lichens *Arthonia byssacea, Calicium adspersum, Sclerophora farinacea*. There were 229 species classified as highly associated with oak (rarely found on other tree species) consisting of 51 fungi, 104 invertebrates and 74 lichens - for example the oak leaf-roller, cobweb and twig cutter beetles. These 555 species were considered most at risk from a decline in oak health as they don't or rarely use other tree species.

Data to compare oak with other tree species is limited but a similar study on ash[3] produced a list of 955 species, of which 45 were obligate. This indicates the greater diversity of species supported by oak compared to ash.



Note only obligate and highly associate fungi identified

Figure 1. The number of species in different taxon groups associated with oak trees. Obligate = species only uses oak trees, High = species rarely uses tree species other than oak, Partial = uses oak more frequently than its availability, Cosmopolitan = uses oak as frequently or lower than its availability

Replacement tree species?

Although a significant loss of oak is not predicted imminently, this could occur in the future with a combination of climate change and current or future diseases. It may therefore be desirable to encourage a greater diversity of other tree species to support oak-associated biodiversity. Given that the greatest diversity of oak-associated species is supported by mature and veteran trees, it is important to start managing woods for the long-term and thinking about mature tree species composition in 200 years' time. If oak abundance were to significantly decline due to either climate change or disease, species that are most reliant on oak (obligate, highly associated and partially associated species) would be at risk of declining in abundance. One method to mitigate such impacts is to establish other tree species that will support oak-associated biodiversity. It is first necessary, however, to know which other tree species might be the most suitable to support oak-associated biodiversity.

Information on each of the 2300 oak-associated species was collated to find out if they will or will not use each of 30 other tree species. The 30 tree species selected are only a subset of the range of species which could be used and were selected as they are either currently already found in oak woods, and therefore might expand to fill canopy gaps created by the loss of oak, or are known to grow on site types that support oak. In particular shrubs, such as hazel, may support some of the oak-associated biodiversity but these are not included in our list of 30 tree species.

Ash supports the greatest number of oak-associated species; 613 species in total (28%) (Fig. 2). However, this tree is not currently a viable alternative to oak, as many ash trees are currently dying due to ash dieback. Beech supports the second greatest number of oak-associated species (347 or 16%) followed by alder (11%). Of the remaining 16 native tree species assessed, each support less than 10% of the oak-associated species. No single tree species will provide support for the majority of oak-associated species, so mixtures of tree species are likely to be the only viable option to conserve oak-associated species. Of the non-native tree species assessed, sycamore supports the greatest number of oak-associated species (292 or 13%) with Turkey oak and sweet chestnut ranked second and third (Fig. 2). The suitability of many non-native tree species to support biodiversity is unknown and this is identified as a key knowledge gap.

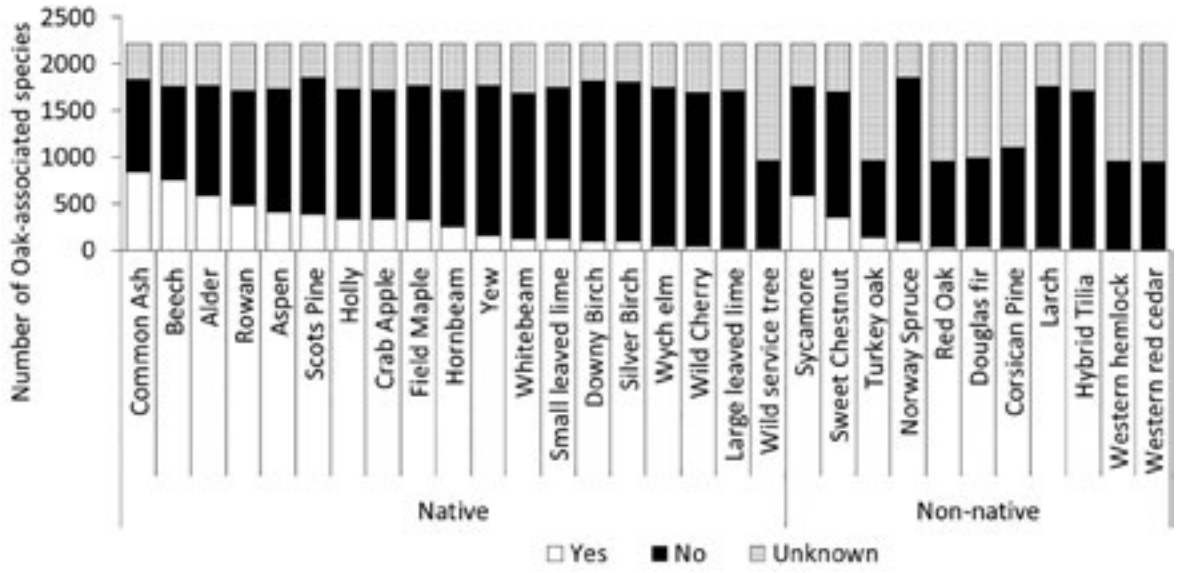


Figure 2. Use by oak-associated species of 30 alternative tree species. Yes = oak-associated species known to use that tree species, No = oak-associated species known not to use that tree species, Unknown = data lacking to assess if the species will or will not use that tree species.

Oak ecosystem functioning

If oak trees did decline and other tree species replaced oak, it would not only be the biodiversity that would change but the ecosystem functioning as well. The term 'ecosystem function' of a tree species covers a wide range of processes, and data is not available to allow a comparison of oak against other tree species for many functions. However, it is possible to compare oak with 16 tree species for leaf litter decomposition (a direct measure of function) and metrics related to function (leaf litter chemistry and soil chemistry).

For the functions studied, oak is in the middle of the range (Fig. 3). At one end of the spectrum are species like ash, alder and sycamore, which have low levels of carbon and lignin and high levels of nitrogen in their leaf litter, fast leaf litter decomposition and soils with low levels of carbon and high levels of nitrogen. At the other end of the spectrum are species such as western hemlock and western red cedar, with high levels of carbon and lignin and low levels of nitrogen in their leaf litter, slow leaf litter decomposition and soils with high levels of carbon and low levels of nitrogen. As oak is in the middle of this spectrum, it may mean that it is possible to maintain a similar level of functioning to oak by using a mixture of other tree species, if oak declines in abundance. However, these are just some of the ecosystem functions provided by oak and there are other considerations to be taken into account when deciding upon which trees to plant/encourage to establish by natural regeneration.

There are, of course, a number of other functions provided by oak and it may not be possible to replicate these using other tree species.

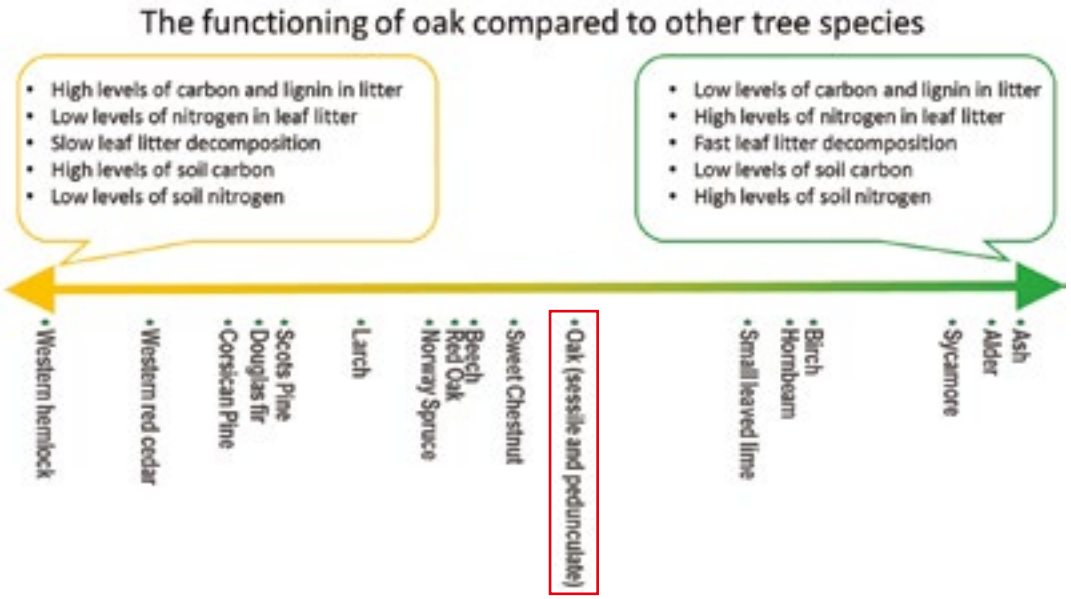


Figure 3. The functioning of oak compared to other tree species

Management options

While the general message is around diversifying woodland to support oak-associated biodiversity using tree species other than oak, the results presented here can be tailored to specific sites. All the information about oak-associated species and their use of other tree species is available at OakEcol[4]. Using site-specific species lists it is then possible to refine the list of potentially suitable tree species and identify management options. Examples of this approach are provided for 30 oak woodland case studies across the UK, which are available at **www.hutton.ac.uk/oak-decline.**

Acknowledgements

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Further information about this work is available at: **www.hutton.ac.uk/oak-decline** or by contacting Ruth.Mitchell@hutton.ac.uk

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Ariundle oak wood, Scotland. An Atlantic oak wood rich in biodiversity.

Ruth Mitchell

The challenge and conundrum of oak health

Chris Quine

Concerns have recently been expressed about the health of our oak trees. New threats may emerge as the climate changes and new pests and diseases arrive. For future generations to enjoy oak trees in all their glory the necessary tree management must be in place and regeneration encouraged. The Action Oak Initiative seeks to secure the future for oak by encouraging research, evidence gathering and good management.

Professor Chris Quine is chief scientist at Forest Research, Britain's principal organisation for research into trees, woods and forests.

Oak trees are among the most loved and valued trees in Britain, due to their contribution to landscapes, biodiversity, culture and economy. However, these contributions must not be taken for granted as the benefits can take decades or even centuries to be realised. Over that time the trees will experience fluctuations in both their environment and the care and attention received from their owners and managers.

Timespans beyond comprehension

The lifespans of individual oak trees and the timescales over which the dynamics of oak ecology play out can be hard for humans to conceive. All our native oak trees represent successors of populations which re-established after the last Ice Age from refugia in southern Europe - approximately 9000 years ago. Since the recolonization, successive generations have become adapted to the maritime conditions experienced in the UK. These have been supplemented by introductions (of other *Quercus* species, and of genetic material of the two native species from further afield) and by the movement of plants around the country. This mixing of genetic material affects adaptation to current and future conditions in complex ways.

Population dynamics – in credit or debit?

Future access to the unique benefits associated with the population of oak should not be taken as a given. We need to have some confidence that deaths and losses are being balanced by new arrivals and regeneration; if not on an annual basis - which might not be possible through natural processes given the propensity for masting (infrequent heavy seed production) - then at least on a decadal one. This broad-scale balancing requires natural processes to operate unconstrained on a grand scale and/or managers and owners to wrestle with mortality and regeneration, then managing the woodlands securely over periods of many decades. Britain hasn't always been good at this - and there have been previous supply shortages of oak for building ships - prompting both replanting of woodland and a thriving timber import trade from Europe (and elsewhere in the empire in the case of other hardwoods).

Specific threats to oak health

Recently, the health of Britain's oak trees has been thrown into sharper focus due to a combination of observations around declining tree health and a realisation of the potential for new threats, whether from climate change or new pests and diseases.

Taking stock, there are clearly multiple threats to our oaks. Some very specific 'primary' pests and pathogens can cause widespread mortality in oak. Fortunately, some of the most damaging are not yet present in the UK. However, the recent apparent rise in introduced pests and diseases is of concern. For example, the oak processionary moth was introduced in 2005/2006 on plants for urban landscaping and is now widespread in Greater London. It is particularly unwelcome as it affects human health as well as oak growth. A foliar disease, powdery mildew, could also become more prevalent, particularly if new species are introduced.

There is growing recognition of acute oak decline (a phenomenon in which trees enter a steep decline in health) becoming more widespread. It may be linked to a combination of environmental pressures, an insect vector and bacteria able to exploit weakened trees. Future projections of increased frequency of summer droughts may lead to more stressed trees. There are many other pests and diseases (including the bacteria *Xylella fastidiosa* and the wilt disease *Ceratocystis fagacearum*) yet to arrive on these shores, which could threaten health even more. Their arrival must be prevented.

The more chronic threat of lack of successors to the current generation of oaks can be linked to several factors. Neglect and loss of woodland (e.g. due to building developments or transport infrastructure) is a serious concern. Deer, when they are overly abundant (as is the case in many parts of the country), prevent regeneration and the recruitment of new oak trees into the population. Grey squirrels remove acorns (nipping out the radicle to prevent germination) and strip bark from growing trees, which threatens survival, stature and timber value.

What is being done?

There are examples of enhanced protection for oak woodland, and ambitions to secure the place of the species through incorporation of oak into major woodland expansion plans (such as the National Forest and the Northern Forest).

Recent initiatives give some cause for optimism:

- There is increasing interest in growing broadleaved woodland - as a habitat, a source of wood fuel and of quality timber;
- Action Oak is a partnership being developed to encourage action by managers and the research community;
- Scientists and managers have recently taken stock of what evidence is available - and what more is required.

WTML/Paul Sterry

The recent Action Oak Knowledge Review[1] has emphasised the values of oak and profiled the threats being faced. Over 40 scientists summarised recent evidence, compiling listings of relevant research and identifying the most glaring gaps in the knowledge required to secure the long-term future of oak.

One conclusion was that despite the place of oak in our culture, it is rather remarkable what we don't yet know. The lack of consistent long-term monitoring has meant that it is very difficult to be sure of the overall health status of our oak – and whether recent concerns are unique and justified, or part of longer-run perturbations. It is hoped that more work can be encouraged in the coming years – though this may well require a step change in the resourcing for such monitoring and research.

The review identified a host of possible researchable topics which provide ample scope for those wishing to initiate new studies. Six broad themes emerged:

1. **Securing long-term commitment**. A need to tackle the dearth of long-term records through a renewed commitment to existing monitoring, trials and exploration of new survey methods (such as via remote sensing).
2. **Understanding oak demography and its dynamics**. A need to improve our understanding of the population dynamics, especially in non-woodland settings, so that our interpretation of trends in mortality takes a long view.
3. **Uncovering the functioning of tree systems**. A need to undertake more holistic studies of oak health (and that of other tree species) to understand the extent to which pests and pathogens interact with other environmental stressors, and how natural systems may control some of the unwanted organisms.
4. **Profiling the threats**. A need to characterise the many potential new threats on the horizon by improving our understanding of pests and diseases already in Britain and those yet to arrive, including the single and compound nature of these threats.
5. **Fostering management and engagement**. A need to find new ways of encouraging stewardship of oak trees and woods which will counter the lack of management of (oak) woodland and lack of engagement of owners and publics in tree health.
6. **Establishing the nature of interactions and complexity**. A need to adopt new integrative methods of research and evidence gathering, combining many disciplines and both expert and lay knowledge, to address the immensely complex interactions.

It is hoped that these challenges, and many of the specific research questions, will encourage greater resourcing of tree health, bring new funders to support such work and inspire a wide range of environmental scientists to look anew at oak and other UK trees.

> “There is growing recognition of acute oak decline becoming more widespread.

What can you do?

In the meantime, there are actions which readers of Wood Wise can follow which will contribute to oak health:

- Don't risk it – don't bring plant material from overseas as this might carry some of the new undesirables which would add to the threats our oak species face.
- Keep it clean – keeping footwear and equipment (e.g. mountain bikes) clean of mud helps minimise the chance of the unwanted pests and diseases being moved from site to site.
- Observatree project – Forest Research and the Woodland Trust collaborate with seven other partner organisations to contribute to a tree health and early warning system. If you are inspired to do more, train yourself to look for signs of pests and diseases using the Observatree resources. See **www.observatree.org.uk/resources/watch-and-learn/videos/**.
- TreeAlert – if you see ailing trees (of any species) and think these should be investigated then you can report them online using the TreeAlert portal **treealert.forestresearch.gov.uk**.
- Support Action Oak – Action Oak welcomes donations to support research and offers of access to sites and facilities which help promote good management of oak into the future. See **www.actionoak.org**.

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Oak processionary moth – a biosecurity failure

Matt Elliot

Oak processionary moth, *Thaumetopoea processionea*, commonly abbreviated to OPM, is a non-native species which can cause severe defoliation of oak trees. The main concern, however, is to human health. After being inadvertently introduced into London in 2005, lack of swift action to eradicate means that it's likely here to stay.

Dr Matt Elliot is the Woodland Trust's conservation adviser for tree health.

WTML/David Crossley

OPM has been known to infest a large number of oak species including the native British species *Quercus robur* (pedunculate oak) and *Quercus petraea* (sessile oak). If infestations become extreme then other species can become hosts, including beech, *Fagus*, birch, *Betula*, hawthorn, *Crataegus* and *Robinia*[1]. However, oaks and beech are the only species known to support development of adult moths.

A cryptic pest

The cryptic nature of new OPM infestations has led to it spreading throughout Europe from its native regions in southern and central Europe[2]. The eggs of this moth are laid in small rectangular patches known as plaques (see photo) which are hard to spot, particularly on larger trees. OPM can therefore move around undetected through the trade in live trees, particularly large semi-mature specimens used in landscaping projects. The eggs hatch in spring (between March and late April) but the caterpillars can remain undetected because they usually initially feed high up in oak trees.

The first sign of an OPM infestation will often come in late spring to early summer when the caterpillars become larger (20-25mm) and start to move around in their distinctive nose-to-tail processions, the habit that gives the species its name. By now the caterpillars are dark in colour and are covered with many long white hairs. The caterpillars also construct distinctive white webbing nests on oak tree trucks which they spend much of the day in, leaving in processions to feed at dawn and dusk. By this stage, the irritant (urticating) hairs have developed, which can cause severe skin rashes and respiratory problems in humans and animals. In addition, as the caterpillars grow they moult in the nest which leads to a large build-up of urticating hairs. This makes the nests particularly hazardous to handle.

Here to stay

OPM was inadvertently introduced into London in 2005. Initially it was restricted to central London but has since spread (both naturally and through more accidental introductions) to all 33 London boroughs[3]. The Forestry Commission has been trying to manage this pest since its introduction by removing nests and treating trees with insecticide to kill the caterpillars as they feed. In addition, the Government introduced emergency measures on oak imports in 2008, requiring oak trees to have a plant passport. This was further strengthened in 2018 with new import restrictions on oak trees over 1.2m tall with a girth of over 8cm[4]. However, the import measures and management have come too late. They may have slowed the spread but it seems inevitable that we will now have to live with this pest in our cities, parks and woods.

Dense cluster of mature OPM caterpillars on an oak trunk

OPM egg plaque on an oak twig

Prevention is better than cure

This now familiar story of a new pest introduction could have been avoided. More decisive action as soon as OPM was discovered would have eradicated it and more swift and meaningful import restrictions would have prevented further introductions. This would also have made financial sense because spending a little up front to manage an outbreak is considerably cheaper than having to spend many millions of pounds managing it into the future.

It has become clear that importing trees and plants poses a huge pest and disease threat, and it is far more practical, cost-effective and beneficial to the environment to prevent a pest or disease epidemic than deal with the consequences of an outbreak. As such, the Woodland Trust introduced an assurance scheme in 2012 which guarantees that all the trees we plant and sell are sourced and grown in the UK. We are now urging others in the plant supply sector to do the same to help protect our trees and woods.

For help on management of OPM and more details on the management zones, Forest Research has produced an OPM manual which can be viewed on their website[5].

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Valuing oak

Gabriel Hemery

If we look at the utility of trees in a new light, and through a new lens, we may be surprised by what we can see and what we can value. Among all trees, the oak is perhaps best placed to gift us a renewed sight.

Dr Gabriel Hemery co-founded and is chief executive of the Sylva Foundation and a member of the Woodland Trust's conservation advisory committee. Author of *The New Sylva* (Bloomsbury 2014), his latest book *Green Gold* is a fictional biography of Victorian plant hunter John Jeffrey.
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> We had better be without gold than without timber.
> John Evelyn, 1664

Not so long ago, any article concerning utility and trees would have focussed solely on the properties of timber, how it could be grown faster or straighter, with fewer defects, or with greater structural density. There would be mention of hoppus cubic feet (the standard British volume measurement for timber before metric units), basal area, and yield class. Fortunately rising timber prices[1] are encouraging landowners to think again about investing in forestry, but there's more to tree valuation than timber prices. Times have changed, language evolved, and understanding deepened.

In the 21st century there's not only a new lexicon to use when considering societal and economic benefits, but there is a new rule book to adopt for a new world.

Wooden walls

To be utilitarian means to provide a range of benefits. It's well known that oak supports more life forms than any other tree, and people have relied upon the strength and durability of oak for centuries. It was John Evelyn, in his 1664 book *Sylva*, who wrote about Britain's 'wooden walls', meaning the importance of timber to build ships to defend our shores from enemies. Shipbuilders placed highest demand on oak, without which we would not have emerged as the world's first superpower.

In the 17th, 18th, 19th, and much of the 20th century, we 'conserved' our forests to ensure their utility for our own needs. We employed forest conservators to ensure that we had pit props, gun stocks, boiler fuel and more, to feed our engines of war. In between, for everyday society, our forests fuelled our bread ovens, supported our bridges and buildings, and heated our homes. Britain's oaks were champions among all trees, at least until the Victorian plant hunters were successful in introducing a greater diversity of tree species to our shores, offering faster growth rates even if not the durability.

Conservation

Environmental consciousness gave birth to a new meaning for conservation. So blind were we to our own utilitarian needs that it took those with foresight and determination to awaken society to the increasing impact of human activities on the natural world. Through no fault of these early pioneers, early conservation was closer to 'preservation' - putting boundaries around the most important biodiversity areas and giving them designated status, attempting to freeze time and ecological processes. Later, our understanding of ecology began to incorporate the interaction of man with other species of animals, and with plants and fungi. Ecologists realised that a woodland managed for its utility for centuries and then abandoned so it would become more 'natural' was not necessarily the right thing to do; species had adapted and often thrived under the conditions created by certain forest management practices, although the full complexities were not entirely understood.

Ugly words, vital meaning

In recent times, a plethora of ugly and impenetrable words have emerged to mean important and inspiring concepts. In their singular meaning, these words are appropriate, but it's human nature to use these as labels, aiming for simplicity where perhaps a few more words would avoid misunderstanding and misapprehension. Any mention of 'sustainable', 'natural capital' and 'ecosystem services' is liable to confuse and confound, but their concepts are vital to life on earth (see box over the page).

Sustainable development: meeting the needs of the present without compromising the ability of future generations to meet their own needs.

Natural capital: the earth's stock of natural assets. These include abiotic (geology, soil, water, air) and biotic (all living things).

Ecosystem services: a range of services derived from natural capital, which make human life possible. These include;

- provisioning (food, fibre, fresh water, genetic resources)
- regulating (climate, hazards, noise, diseases and pests, water/air/soil quality)
- supporting (soil formulation, nutrient cycling, water cycling, primary production)
- cultural services (spiritual enrichment, cultural heritage, recreation, tourism, aesthetics).

Real world environmentalism

Before 2000, the term 'green economy' was rarely used, but it grew to prominence in the United Nations' Agenda 21 action plan process, which aimed to support sustainable development while not degrading the environment. Businesses started to deploy 'corporate social responsibility' (CSR) in their business strategic planning. While governments came to view this as voluntary regulation, environmentalists or social activists can be sceptical about its real purpose, and critics sometimes call it 'green washing'. Businesses are thinking more deeply about their connection with the landscapes around them, how they can affect the health of their employees, attract a workforce, reduce their pre-processing costs and so on.

Such thinking is related to ecosystem services; those provisioning, supporting, regulating, and cultural services derived from natural capital. Surely they are worth quite a lot of money, but who will pay for them? In one sense, the members of the Woodland Trust are paying through their annual membership, perhaps with a focus on spiritual enrichment, cultural heritage, recreation, tourism, aesthetics (ie. cultural services). But what about the 30,000 hectares of land that the Trust owns across Britain? Should someone be paying by results for the X-million cubic metres of water cleaned in rivers which run from and through its land? Should home owners near a well-managed estate pay for the view (after all, it would probably add considerably to the house value)? Should polluters and carbon-demanding industries pay for the carbon locked up by woodland owners? Identifying who should pay (it's worth noting that often many complimentary interests may be in play) is less of a challenge than identifying how much they should pay.

Treating a mature oak in a London park infected with oak processionary moth caterpillars

Gabriel Hemery

The time may not be too distant when all companies are required to complete natural capital reports. Many of these major landowning organisations, such as the Woodland Trust, are likely to realise the extraordinary value that they hold on behalf of the British public - and may yet benefit directly from it in unforeseen ways. Over the last three years, Forestry England (formerly Forest Enterprise) has begun calculating and reporting natural capital accounts for the public forest estate (PFE)[2]. The most recent accounts (2017/18) value the total net capital assets at £2.2 billion, effectively adding 10% on top of the last known valuation of the PFE. Perhaps the Government is relieved that it did not dispose of the PFE after all, especially as these are still early days in such accounting techniques. Indeed, as recently as 2014 (soon after the aborted PFE disposals), the social and environmental benefits of the PFE were estimated to be only £600 million[3].

There are a number of interesting and innovative approaches to answering the question as to who should pay, and how much, for ecosystem services. An emerging approach is to use market forces to decide who and how much. Intelligent web platforms can be used to broker deals between landowners and purchasers, and increasingly reverse or Dutch online auctions are being piloted as a means to ensure best value for the purchasers.

Environmentalism disconnected from the demands of society, whether economic or cultural, is surely doomed to failure in the 21st century. Many of the environmental problems of the past may justifiably be linked with such a disconnect. Instead, as society dives ever deeper into its ecological understanding, we may begin to view human life as an equal component alongside all others in the global ecosystem. As we do this, the realisation that we are not only reliant upon nature for our survival, but are part of nature itself, may help us survive long enough to look forward to a 22nd century. We need to care for nature, meanwhile the value of nature needs to be recognised and realised across society. When such thinking is mainstream among business, government and society at large, this will be the dawn of real-world environmentalism.

How much is an oak tree worth?

This is no longer an easy question to answer, at least until definitions, economic science and market forces have caught up with each other. Even then, should we be 'de-bundling' a single species to compare it with others? One way to apply an estimate to the value of oak might be to simply apportion it by its frequency in our forests: oak is our second most common broadleaved tree, covering 16% of forested land in Great Britain[4]. Given its great utility as a naturally durable timber, value in the landscape, its huge associated biodiversity and other ecosystem benefits, it is likely to contribute much more than simply 16% of the total.

A recent research paper has valued the cost from the loss of ash in the British countryside at £15 billion, as a result, not only of the costs of clear up, but from the loss of ecosystem services[5]. Compared to such a devastating outcome, oak is currently faring relatively well in the face of a rising tide of emerging pests and pathogens. Oak processionary moth is a significant hazard for human health, but usually without a major devastating effect on the trees. Meanwhile, we strive to better understand the causes of acute oak decline. Perhaps the same methodology could be applied to oak as it has to ash, and it may help focus the minds of economists. Sometimes we don't value something until we've lost it.

If we view ecosystem services as the colours of the rainbow, we would realise how carbon, air, habitat, water, soil, health, fibre and other benefits are derived side-by-side. Each colour (service) is valuable and beautiful in its own right, as is a whole rainbow (the tree). A rainbow is a beautiful thing to behold, and at its foot we know we should look for a crock of gold. Maybe, one day soon, we can finally move the green economy from the red into the black after all.

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Oak bud flushing

Gabriel Hemery

Wood Wise update

Latest happenings in tree and woodland conservation

Are dormice waking up to global warming?

WTML/Kate West

Expert spotlight • Expert spotlight • Expert spotlight •

Rachel Findlay-Robinson is a PhD student at the University of Cumbria, with an interest in the effects of climate change on wildlife. Email rachel.findlay-robinson@uni.cumbria.ac.uk

Hazel dormice are in steep decline across the UK, with the national population decreasing by around 72% since 1993[1]. A significant cause of this is loss and fragmentation of suitable habitat; however, the effects of climate change, particularly on hibernation behaviour and food availability, remain largely unstudied. This PhD project aims to address this by analysing the Woodland Trust's Nature's Calendar dataset[2] and the National Dormouse Monitoring Programme[3] dataset in conjunction with UK climate projections.

Climate change is altering the timings of natural events; trees are flowering, frogs are spawning and birds are laying eggs earlier than they did in the past. Due to unprecedented rates of environmental change, organisms are under pressure to adapt more rapidly, and differing abilities to adapt put some out of kilter with the world around them. Improving our understanding of such disruptions is crucial for the conservation of certain species.

Nature's calendar in disarray

The study of the timing of natural events is known as phenology, with individual events referred to as phenophases. Previous research[4] has shown that the spring phenophases of many species are happening earlier in the year, in synchrony with the warming occurring throughout the study periods. However, due to the varying environmental cues that different animal

and plant species use to time phenophases, in addition to physiological limits to their abilities to adapt, these changing weather patterns are decoupling previously coincident events. This can have a disruptive effect on the community dynamics of ecosystems, both within and between trophic levels.

Hungry hibernators

A common adaptation to resource-poor periods (generally winter in temperate environments) is the use of torpor or hibernation. An animal will lower its body temperature and metabolism to remain in a dormant state for prolonged periods. During this time they usually will not eat, and so the ready availability of food upon waking up from hibernation is crucial to their spring survival. Hibernators use various environmental cues to time their emergence from hibernation, which varies between species - these include air temperature and precipitation levels. This means that unseasonably warm and dry periods, such as those experienced in the UK in February this year, can bring animals out of hibernation far earlier than is optimal.

The hazel dormouse is a hibernating animal with specific dietary requirements. It cannot digest cellulose, and so is unable to feed on grass or leaves. Instead, it relies on the sequence of buds, flowers, insects, fruit and nuts that occurs across its active season, and hibernates through the winter months when these foods are unavailable. Early emergence from hibernation can therefore mean that dormice run the risk of starvation; some can survive on catkins and old hazelnuts, but this is rarely sustainable for a whole population. Understanding the potential influences of climate change on phenophase timings affecting dormice is therefore vital.

Looking to the future

By integrating long-term phenological records, including the Woodland Trust's Nature's Calendar dataset[2], and the National Dormouse Monitoring Programme dataset[3], it is possible to investigate how the timings of dormouse hibernation match up with food availability. Then, by using UK climate projections we can make predictions on how climate change might affect this. Understanding if, where and why these timing mismatches across trophic levels are happening will help conservationists and land managers create 'future-proof' woodlands and habitats to ensure ecosystems are resilient under a changing climate.

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You can join a growing team of citizen scientists tracking seasonal changes with Nature's Calendar. You'll be contributing to a long biological record that dates back as far as 1736!

https://naturescalendar.woodlandtrust.org.uk/

Ash dieback will cost £15 billion

Dr Nick Atkinson – Senior conservation adviser

A recently published study shows that the full cost to the UK's economy of ash dieback, a deadly disease caused by the fungus *Hymenoscyphus fraxineus*, could be at least £15 billion. A team of researchers led by the University of Oxford's Dr Louise Hill based the estimate on costs relating to the felling of sick ash trees, replanting lost trees and the loss of ecosystem services such as timber, flood mitigation and shading, for both woodland and non-woodland trees.

The study, published in Current Biology[1], found that the felling of trees for safety reasons could cost almost £5 billion alone. This is mainly because ash loses stability as the fungus infects it, leaving the wood brittle and liable to fracture, meaning that felling has to be done in stages. Replanting costs are relatively modest by comparison, at £611 million. By far the greatest cost, at around £9.4 billion, is through the loss of ecosystem services, with £5.4 billion of that caused by loss of non-woodland trees (for example street trees, trees on farms and riparian trees).

The recovery of ecosystem services to pre-ash dieback levels will happen faster if more is invested in replanting, the study's authors argue. However, even the best case scenario suggests that it will take decades, and other issues such as rising deer populations, climate change and other tree diseases could impact on the recovery process.

This is the first attempt globally to estimate the full economic cost of a major tree disease. The shocking results have thrown light on the overlooked nature of trees and suggest that greater investment in improving biosecurity measures is easily justifiable. The authors identified a further 47 tree pests and diseases from the UK's plant health risk register with the ability to cause over a billion pounds' worth of damage, should they become established.

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WTML/Thomas Kristos

The birds of Brede High Woods

Cliff Dean - Chair, Friends of Rye Harbour Nature Reserve

Brede High Woods falls within a local wildlife network area known as RX Wildlife[1] - a 20km radius of Rye which includes major bird reserves such as Rye Harbour Nature Reserve and RSPB Dungeness. Brede High Woods is itself important for rare as well as breeding and overwintering bird populations. In 2018, confirmation of lesser spotted woodpecker at Brede brought the total for the area to 250 bird species.

Management practices since the wood's acquisition by the Woodland Trust in 1999 have resulted in an intricate mosaic of habitats which benefit a wide variety of birds. Several protected species have been recorded including hobby, firecrest and red kite.

Damp, broadleaf areas benefit marsh tit, while lesser spotted woodpecker favour the rotting alders that have been left alongside the many streams. Tall plantations of Scots pine attract siskins and crossbills, both of which have bred. Progressive thinning allows bramble to grow and young trees to establish, which give shelter to a range of common scrub birds and a good number of garden warblers.

Lesser spotted woodpecker

Open rides with dense linear thicket once benefitted nightingales until the scrub inevitably grew up and the nightingales dispersed to other suitable locations. Another linear clearing, created to access the power line which runs through the wood, is used as a corridor by ravens, connecting their pylon nest sites in the vicinity.

A glance across the forest however provides a stark reminder that these bird-rich woods were once the busy site of iron production.

1. http://www.rxwildlife.info/about/

Woodland Trust research update

Research update

Dr Christine Tansey - Research and evidence coordinator

The impacts of deer

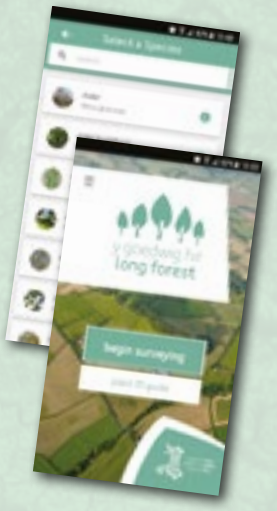
A recent Woodland Trust commissioned review examined the impacts of deer and other factors on woodland and their biodiversity across Great Britain. Researchers led by Dr Anita Diaz at Bournemouth University found considerable variation in the evidence available and identified major gaps in our knowledge. Further work to address these gaps will help inform future management decisions.

The benefits of agroforestry

Since late 2018, we have been working with PhD researcher Rafael Pompa at Dartington Estate in Devon. Rafael's work is evaluating the impacts of an agroforestry trial and he will be looking at the various benefits agroforestry can provide, from carbon sequestration and the provision of wildlife habitat to the impacts of agroforestry on farm economics. His research will help identify barriers to the uptake of agroforestry, improving our understanding of how to encourage it in the future.

New hedgerow surveying app launched in Wales

Clare Morgan – Senior outreach adviser



Members of the public are needed to help survey Wales' amazing hedgerows. Download the free bilingual 'Long Forest' app from Google Play or Apple App Store. You would be contributing vital information about hedgerow condition and the tree species within them. No experience necessary!

The Long Forest project is a partnership between Keep Wales Tidy and the Woodland Trust (Coed Cadw), with support from the National Lottery players through the Heritage Lottery Fund (HLF) and Esmée Fairburn Foundation.

New life blood for Observatree project

Charlotte Armitage – Citizen science officer

We have been hard at work over the past few months recruiting for Observatree – a multi-partner project that utilises highly skilled volunteers to carry out tree health surveys.

Volunteers receive expert training on 22 priority pests and diseases that have discernible symptoms that can be readily identified in the field. Reports are fed straight back to tree health teams across the UK so appropriate actions can be taken.

We can't wait to start receiving volunteer data – hopefully of healthy trees - up and down the country and we are raring to go with this year's round of training workshops. With over 100 new recruits, we will be able to keep a close eye on our precious trees and woods.

Crisis meets crisis

Dr Nick Atkinson – Senior conservation adviser

The Committee on Climate Change (the CCC) recently revised its advice to Government, recommending it commits to reaching net zero greenhouse gas emissions by 2050. This exceeds the previous target of cutting carbon emissions by 80% below 1990 levels, yet the CCC argues that it would now cost the economy no more as a result of significant reductions in the price of technologies such as offshore wind power generation.

However, to meet net zero targets most sectors, such as transport, construction and energy, will need to employ some form of domestic carbon sequestration. The CCC concludes that the two most effective approaches are the restoration of degraded peatlands and the expansion of woodland cover from 13% now to 17% by 2050 (revised from 19% in an interim report last November).

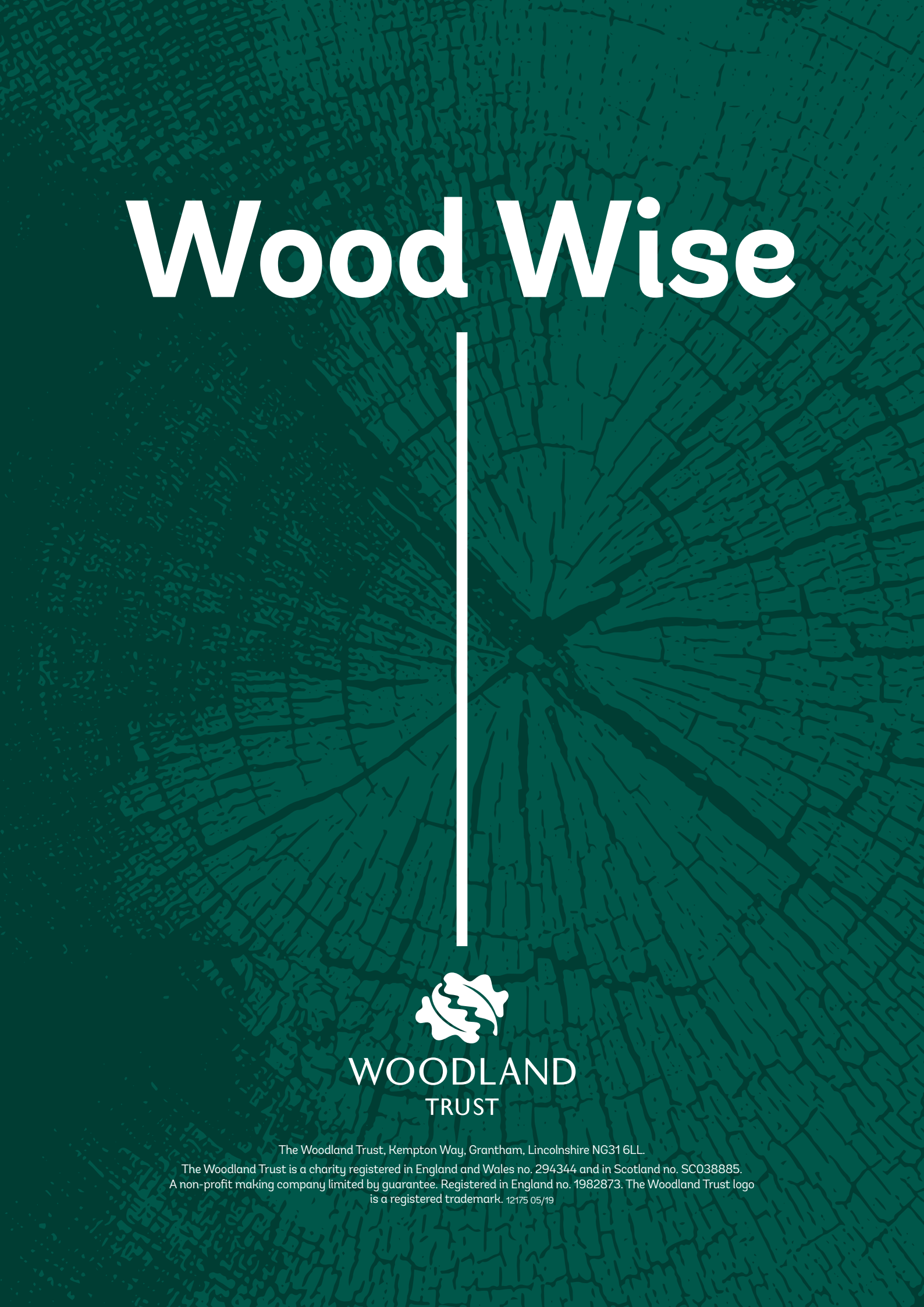
If Government accepts the recommendation this will mean one million hectares of new tree canopy over the next 30 years, delivered as a mixture of native and non-native woodland and trees outside woods. If done well this could deliver multiple co-benefits to people and wildlife alike.

Within days of the CCC's report, the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) published a damning assessment of the state of global biodiversity, declaring a million species to be at risk of extinction. It ranked the major threats to wildlife as changes in land and sea use, direct exploitation of organisms, climate change, pollution and invasive alien species.

The pattern of loss and drivers of loss is reflected in the UK yet could be addressed, at least in part, through delivering the CCC's land use targets. By focusing on the four main principles of increasing wildlife habitat area, improving its quality, creating new habitats and increasing ecological connectivity, we could tackle the twin crises of climate and biodiversity at the same time.

All back issues of Wood Wise are available online at **www.woodlandtrust.org.uk/woodwise**

Wood Wise



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