

The Geographer

Winter 2023

The magazine of the Royal Scottish Geographical Society

The Power of Trees Future Forests and Fragile Landscapes



"By leaves we live."

Patrick Geddes, RSGS Council 1895–96



- Woodland and Wildland
- Fungi and *Phytophthora*
- Bonn, Bogs and the Borders
- Farming and Fishing
- Town Trees and Hyrax Homes
- Memories of Millennia
- In My Community Essay Winner
- Atlas Mountains Earthquake
- Reader Offer: *How to Read a Tree*



plus news, books
and more...

The Geographer trees

This edition of *The Geographer* is devoted to trees in their many and varied guises: as individual sentinels, as woods and as forests. With the help of expert commentators, we look at trees from many perspectives in Scotland and internationally: industry, community, farming, environment, climate and carbon.

Scotland is one of the least wooded countries in Europe. Successive governments over the past century have sought to increase tree cover, following the early experiments using non-native species around Loch Ossian. Today there are plans for more planting, with a new strategy and accompanying targets, given the need to reduce the amount and exchequer cost of imports and to supply growing need, and to capture carbon as part of climate change amelioration. There are many initiatives of varying scales aimed at restoring poorly managed woodlands and restoring tree cover that was lost in earlier centuries due to felling and over-grazing. And there are opportunities for community and charitable society ownership and management, and for use of forests and woodlands for formal and informal recreation.

At present, increasing tree cover is not without controversy, especially in those parts of the country where there are community views of 'enough is enough', such as in Galloway. Issues abound as discussed in this edition. Who should decide what trees and where they should be planted? Why can't local communities have a determining role? How much planting should there be and where? What species should be used? How does tree planting and woodland management fit into the wider land use of an area? Can farmers be stimulated into planting more trees as shelter for livestock? Can more tree planting have a positive effect on landscape and on river and water management? How much of government support should be for maintenance of existing woodlands? Debate is taking place through a variety of reports, conferences and media across Scotland.

As a learned society and an educational charity, we want to encourage greater interest in our world and on the issues that affect us all. We hope that you will be stimulated by reading these articles and will be persuaded to look anew at the role which trees, individually and collectively, play in our lives and in our landscapes. And we hope that you will play your part in ensuring that we increase our tree cover in Scotland with nature and people in mind.

Roger Crofts CBE FRSE FRSGS, RSGS Vice-President

RSGS, Lord John Murray House,
15-19 North Port, Perth,
PH1 5LU
tel: 01738 455050
email: enquiries@rsgs.org
www.rsgs.org

Follow us on social media



Charity registered in Scotland no SC015599

The views expressed in this newsletter are not necessarily those of the RSGS.

Cover image: Winter is Coming. Millarochy, Loch Lomond and The Trossachs. © Christopher Swan (christopherswan.co.uk)

Masthead image: Martin Sanchez from Unsplash

RSGS Medals and Awards

The RSGS's prestigious Medals and Awards allow us to recognise outstanding contributions to geographical exploration and learning. Visit www.rsgs.org/Pages/Category/medallists for more information and to access the nomination form. The deadline for nominations is 31st December each year.

The gift of the future

Mike Robinson, RSGS Chief Executive

It feels like we are in a new phase for RSGS. Possibly for the first time in our nearly 140-year history we have an opportunity to build a more robust future for the Society and our work. This is driven by the Trustees' determination to plan ahead, and is made possible thanks to a recent legacy donation which has, for now at least, eased the pressure to battle for income just to stay afloat.

Of course, if we aren't able to attract more legacy gifts, the immediate pressure of financial insecurity will come back with a vengeance, so future gifts in people's Wills remain vital for our success. As a charity with a small turnover, every legacy we receive makes a huge difference; just two or three larger legacies could secure the future of the Society for another 50 years.

The past 15 years have been incredibly busy as we tested and proved what the role of a modern geographical society should be. Many in the global geographical community look to that example, and we are widely seen as one of the most dynamic societies and one which people continually remark on as being able to pack a punch well above its weight. But to be successful we need to secure our short-term financial future, and legacies are probably the most important element of that.

If you would like to discuss the possibility of leaving a gift to RSGS in your Will, please contact me at our headquarters in Perth.

Young Geographers

After our successful Young Geographer magazine launches in 2017, 2019 and 2021, and with the help of our Future Generations Fund, RSGS has been able to form a new Young Geographers Committee. The foundation of this group is driven by empowering young people and offering them rewarding opportunities. Leveraging RSGS's network and strategies, the Committee is committed to addressing critical global issues that concern young people.

The Committee held its first meeting at RSGS HQ in early September, led by Chief Executive Mike Robinson. And the group met again in early November for a mentoring session led by policy expert Lloyd Austin FRSGS; this session aimed to provide exciting opportunities for policy influencing. RSGS staff will provide guidance in support of the Committee's projects, including the production of a fourth Young Geographer magazine.

Together, let's inspire future generations: www.rsgs.org/donate/future.

RSGS: a better way to see the world

Professor Danny Dorling FRSGS, President's Medallist

We were pleased to present the RSGS President's Medal to Danny Dorling, Halford Mackinder Professor of Geography at the University of Oxford, at his talk at the Royal Society of Edinburgh in August, hosted by the David Hume Institute.



Throughout his career as a geographer, Danny's dedication to exploring the intricacies of social and economic differences has helped bring attention to many issues which may have otherwise gone unnoticed. His latest book, *Shattered Nation*, acts as the perfect example of this.

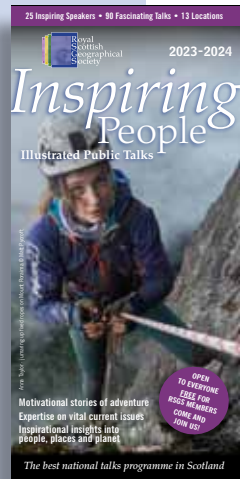
He has the rare ability to translate complex data into accessible narratives, and has developed highly distinctive methods of mapping inequalities, empowering individuals from all walks of life to engage with these critical topics, influencing policy decisions and sparking conversations that have the potential to bring about positive change.

Inspiring People 2023-24

Since September, it has been wonderful to see so many of our members and supporters attending the *Inspiring People* talks hosted at our Local Groups across Scotland.

Now we are looking forward to the amazing talks to come in 2024: cyclist **Mark Wedgwood**, talking about cycling 7,300 miles across all 204 Ordnance Survey Landranger maps; author **Cameron McNeish**, chronicling Scotland's majestic landscapes and the outdoor communities who inhabit them; filmmaker **Mandi Stark**, taking us behind the scenes of filming natural history across the globe; historical geographer **Professor Charles Withers**, examining the achievements, inspiration and 'afterlife' of Mungo Park; filmmaker **Joe Bunyan**, sharing stories of the incredible people he has encountered; author **Katherine MacInnes**, depicting the lives, loves and losses of the 'snow widows'; adventurer **Sue Stockdale**, recounting highlights and challenges from her travels to over 70 countries; cyclist **Kate Rawles**, recounting cycling the length of South America on a bamboo bike she built herself; photographer **Shahbaz Majeed**, taking us on a spectacular visual journey to show Scotland from a different perspective; explorer **Mark Evans**, on recreating Harry St John Philby's pioneering 1917 journey across Arabia; mountaineer and writer **Ruth Nyakerario**, explaining how mountaineering and creative living has been part of her 'becoming' journey; academic **Roger Crofts**, celebrating the role of trees in our lives and considering how to ensure that we have well-maintained trees, woods and forests.

Admission to face-to-face talks is FREE for RSGS members, students and under-18s, and £10 for others. Tickets are available through www.rsgs.org/events or at the door (cash only).



come to the talks!

book your tickets now

Shahbaz Majeed FRSGS

At his *Inspiring People* talk in Dundee in November, we were delighted to present RSGS Honorary Fellowship to landscape photographer Shahbaz Majeed, for engaging audiences effectively in the beauty and intricacies of Scottish landscapes. A Dundee local, Shahbaz is an entirely self-taught photographer, who learned many of his skills from the Dundee Photographic Society. Today he has created several books and his images have been displayed all over the world, including on the £5 polymer banknote for the Clydesdale Bank and the £20 note for the Bank of Scotland.



Alice Roberts: Ancestors

We are delighted to be hosting anthropologist and presenter Professor Alice Roberts at the University of Strathclyde on Saturday 20th January for her talk titled *Ancestors*, based on her book of the same name. In it she explores what we can learn about the very earliest Britons from their burial sites, exploring the stories that are told through the bones and funerary offerings left behind, preserved in the ground for thousands of years.

Told through seven fascinating burial sites, this ground-breaking prehistory of Britain teaches us more about ourselves and our history: how people came and went and how we came to be on this island. Tickets are available to book now at www.rsgs.org/events.

20th January



book now

The Antarctic Book

Mike Robinson, RSGS Chief Executive

In a moment of pure serendipity during the Shackleton Autumn School in Athy (see page 5), an opportunity arose to fill one of the more obvious 'gaps' in the RSGS collections. For decades, we have owned Volumes 1 and 2, *The Heart of the Antarctic*, of a three-volume limited-edition book by Ernest Shackleton. Only 300 sets of these special white vellum-covered books were ever printed.

In a chance conversation, a book collector and participant in Athy offered to sell us his copy of Volume 3, *The Antarctic Book*, to complete our set. This volume contains the signatures of Shackleton and his landing crew from the *Nimrod* expedition, and a number of illustrated plates, mostly drawings of crew members.

Thanks to generous donations made a few years ago in memory of former RSGS member Bob Scott, and more recently from other RSGS members who were aware of this wonderful opportunity, we are delighted to report that we now have a complete set of this book in our archives.



Nursery visit

We were pleased to welcome a group of children from Perth's Oakbank Nursery at the Fair Maid's House in October, where RSGS staff member and storyteller Lindsey Gibb excitedly shared the story of *Mikku and the Trees*. She also taught our young visitors about our Climate Storymat, which we developed to create awareness of the Earth, including habitats, biodiversity, climate and weather, and to teach young children to think about personal actions we can take to reduce the effects of climate change on the environment.



Postgraduate students visit

Margaret Wilkes FRSGS, RSGS Collections Committee

In October, RSGS enjoyed a visit by 35 University of Edinburgh Postgraduate MSc in GIS students, led by School of GeoSciences staff members Bruce Gittings FRSGS, Dr Neil Stuart and William Mackaness. There was a welcome component of students from other countries, including Georgia, Morocco, Sudan, China and the US. They toured the Fair Maid's House, where three books by RSGS Bartholomew Globe winner Professor James Cheshire of University College London caught their eye. And it's always a joy when students ask further about our map collections, as they did. Many thanks to Pat Brown and Michael Cairns from our Collections Team for their support; both enjoyed the chance to chat with our visitors, as did I.

Lightning fires threaten forests

A study published in *Nature Geoscience* in November (doi.org/10.1038/s41561-023-01322-z) has found that extratropical forests are increasingly at risk due to lightning fires. The scientists used reference data from seven world regions in a machine-learning approach. They found that c77% of the burned area in extratropical intact forests currently stems from lightning, and that these areas will probably experience 11–31% more lightning per degree of warming. Extratropical forests are of global importance for carbon storage. They currently experience high fire-related forest losses and have, per unit area, among the largest fire emissions on Earth. Future increases in lightning in intact forest may therefore compound the positive feedback loop between climate change and extratropical wildfires.

trees

Celebrating 40 years of ScotRail

Joanne Maguire, Chief Operating Officer, ScotRail

On 22nd September 2023, we celebrated ScotRail's 40th birthday. Since 1983, we have witnessed numerous significant milestones. We have unveiled 81 new or reopened stations. Many stations have undergone remarkable renovations. The revival of four disused or abandoned railway lines has significantly expanded the rail network, and the upcoming Levenmouth Rail Link will mark another milestone when it opens in 2024.

Our commitment to electrification and modernisation has led to a more efficient, reliable, and green railway. Our commitment to inclusivity has made travel more accessible. Improved travel information and enhanced security measures have contributed to a safer and more informed experience for customers. And a six-month trial for cheaper and simpler fares on our services is allowing passengers to travel all day on off-peak fares until the end of March 2024.

Doug and Libby in Perth



We were delighted to have RSGS Mungo Park Medallist Doug Allan and 2022–23 *Inspiring People* talks programme speaker Libby

Penman visit RSGS HQ in October to create a short film for the Open University Art and Ecology project. They were filming at multiple locations around Perth for the project on the relationship between Scottish artists, explorers, and the Arctic regions, focusing on polar bears specifically.



Curriculum design

In September, we hosted the first of a series of webinars on aspects of education reform emerging from recent Scottish Government reports, offering the opportunity for geographers to share their views on the Hayward Review and its recommendations, and to consider the implications for Geography and Geography teachers. See www.rsgs.org/blog/curriculum-design-a-programme-for-discussion-and-feedback for a summary of the outcomes of this discussion.

Blog update



We continue to make weekly additions to our blog (www.rsgs.org/blog), covering a range of interesting topics and news about our work. Recent posts include:

- *Manifesting Climate Change*. RSGS Chief Executive Mike Robinson shines a spotlight on Scotland's potential to lead the charge against climate change.
- *John Rae: an Orkney upbringing and the call of the sea*. Born in 1813, John Rae became one of the most accomplished Arctic explorers of the 19th century.
- *Gertrude Bell, 'Daughter of the Desert'*. Single-minded and fiercely intelligent, Gertrude Bell found peace and fulfilment as a desert traveller in the Middle East.
- *Sandy Irvine: from the Carneddau to Everest's North Col*. Aged just 22, Sandy Irvine disappeared near the summit of Everest in 1924; his story is one of skill, athleticism and fascinating coincidence.

Professor Laurence Tubiana FRSGS, Shackleton Medallist

European Climate Foundation Chief Executive and leading academic Professor Laurence Tubiana spoke at a special event hosted by RSGS at the University of Edinburgh in October. She was presented with RSGS Honorary Fellowship and the prestigious RSGS Shackleton Medal for her work as an internationally recognised leader in the global climate arena. Professor Tubiana is most widely known for her instrumental role in the development and negotiation of the Paris Agreement in 2015, when she was appointed as France's Special Representative for COP21.



Ambulance Radio Programme

A new life-saving in-cab navigation system is being rolled out across all Ambulance Trusts in Great Britain with the aim of improving patient care and at-scene response times. The Ambulance Radio Programme was established by the Association of Ambulance Chief Executives and the Department of Health and Social Care to deliver critical technological system improvements, providing enhanced communications between Ambulance Trusts, the NHS and other emergency responders.



The navigation system is underpinned by accurate mapping data from Ordnance Survey. Around 20,000 updates are uploaded to its database on a daily basis, ensuring that any new roads, routing restrictions or housing estates are included: essential information for ambulance services when response times could be critical to patient care. And cabs no longer need to come off-road for mapping updates, as these can be streamed to the cabs using designated Wi-Fi hubs at key operational sites.



Open Orchard

The Open Orchard project connects communities through the planting of fruit trees in public places. These trees provide free fruit to local residents, and greenery and environmental benefits to urban areas. Since the trees are planted on public land it is necessary to have buy-in from the local council, but for the project to really be sustainable, engaged communities need to act as the custodians of the trees.

"I really believe that if more of us were doing things we cared about locally, the world would be better and we'd be much happier. Open Orchard provides a way for people to come out, plant a fruit tree and in so doing connect with neighbours and care for the environment," said Open Orchard Co-Founder Wayne Trevor.

See www.changex.org/gb/openorchard for more information.

trees

Fair Maid's House tour

In October we hosted a sold-out exclusive tour of the Fair Maid's House visitor centre, guided by RSGS volunteer Graham Ferguson who shared his knowledge and passion of our history and mission. Visitors were left inspired and informed as Graham explained the story behind one of Perth's most iconic buildings and gave an insight into the very best of geography and exploration. Be on the lookout for announcements about more upcoming tours in the future.

Doors Open Day 2023

We had a brilliant time at Doors Open Day on Saturday 16th September, as we welcomed over 100 visitors of all ages from around the world to the Fair Maid's House. For Perth and Kinross Heritage Trust's 'Living Heritage' theme this year, the special display of maps put together by our volunteers majored on themes of New Towns living heritage, to include planning, architecture, geographical locations, physical boundaries, geology, industrial development and how these influenced and defined their layouts. Thank you to our wonderful volunteers and staff who helped organise and host the event.

Tristan Gooley FRSGS

We were pleased to present an RSGS Honorary Fellowship to Tristan Gooley at his *Inspiring People* talk in September, for his efforts to share knowledge of the natural world and make nature more accessible to all of us.

As an expert in natural navigation and reading our landscape and natural world, Tristan has spent decades hunting for clues and signs in nature across the globe, and sharing that learning through his many critically acclaimed books, TV programmes and short courses. Tristan has rekindled our relationship with the countless natural clues that have guided humanity for millennia, bridging the gap between ancient wisdom and contemporary life and reminding us that nature is not just a backdrop to our existence but an integral part of it.

See page 17 for a short extract from Tristan's new book, *How to Read a Tree*, and see the back page for details and a special offer for our readers.



New Chalk Talks

We have added two new Chalk Talks to our collection of video lessons, focusing on Assignment at National 5 and Higher levels. They are available to watch for free at www.rsgs.org/chalk-talks, along with another 29 lessons covering a range of relevant topics from the Geography curriculum, to allow students to study from home. Many thanks to Elgin High School and Musselburgh Grammar School for their great work in creating these lessons, and to all who donated to our Helping Hand for Schools appeal for allowing us to continue this project.

Discovery Day: Everest 70th



We had a great time in early September at our Discovery Day themed on Everest and the Himalayas, where we were delighted to welcome so many people to the Fair Maid's House and share stories and pieces from RSGS collections about some of the greats of mountaineering.

Guests heard from filmmaker and Everest summiteer Keith Partridge, and RSGS Chief Executive Mike Robinson, Writer-in-Residence Jo Woolf, and Head of Collections Margaret Wilkes, who all brought stories from the Himalayas to life. Everyone seemed to really enjoy the day. Look out for details of our next Discovery Day in 2024.



Potential threats to UK forests

In a study published in November in the journal *Forestry* (doi.org/10.1093/forestry/cpad047) a team of 42 experts from across Europe identified the top 15 overlooked and emerging issues (threats and opportunities) that are likely to have a significant impact on UK forests over the next 50 years. The top threat is catastrophic forest ecosystem collapse, where multiple interrelated hazards have a cascading effect on forests, leading to their total or partial collapse. Other threats include competition with society for water, viral diseases, and extreme weather affecting forest management.

Lead author Dr Eleanor Tew, visiting researcher at the University of Cambridge's Department of Zoology and Head of Forest Planning at Forestry England, said, "The next 50 years will bring huge changes to UK forests: the threats they face, the way that we manage them, and the benefits they deliver to society. We hope the results from this horizon scanning exercise serve as an urgent call to action to build on, and dramatically upscale, action to increase forest resilience."

A climate change plan

With a postponement to the Scottish Government's Climate Change Plan, there is a real fear that action to tackle the climate emergency will be delayed, making the targets for 2030 impossible to hit, and increasing the risks of climate impacts. And although the political will is waning, it feels like we are in a new era for tackling climate change. The impacts could not be clearer, with increasing ocean temperatures, heat records, drought, wildfires and intense floods. Yet the spotlight has moved on for many people and we have lost much of the positive momentum from 2019, when there was a real determination across every sector of society to step up and deliver net zero. So how do we get the momentum back? Working with the Stop Climate Chaos Scotland coalition, we have been helping bring together many of the agreed steps identified by civil society into a single compendium of solutions, a manifesto for change, which Mike Robinson presented to the First Minister and Cabinet Secretary, and sent to party leaders and the Scotland Office in August. Details can be found at www.stopclimatechaos.scot/manifesto.



Beyond the Map

Professor Jo Sharp FRSGS, Geographer Royal for Scotland and RSGS Trustee, has launched a new podcast series, *Beyond the Map*. Aimed at a general audience, it looks beyond the obvious to help us understand the hidden geographies that make our world. It is available on Spotify, Apple and Google, and from zencastr.com/Beyond-the-Map. The first episodes are *The Geopolitics of the Fire Age* (with Simon Dalby), *Who Does International Development?* (with Emma Mawdsley), *Carbon Colonialism* (with Laurie Parsons), *Whose City?* (with Leslie Kern), and *A Dusty World* (with Jay Owens).

listen



Shackleton Museum, Athy

Kevin Kenny, Athy Shackleton Committee Member, and Shackleton Autumn School Director

Athy, County Kildare, Ireland has become one of the principal 'go-to' locations for researchers, authors and those with an interest in Ernest Shackleton. Its credentials derive from proximity to the childhood home of Ernest Shackleton (born in the townland of Kilkea, 1874) and its broader connections with the Shackleton family who arrived to the nearby Quaker settlement in Ballitore in the early years of the 18th century.

From its location on the edge of what was historically the centre of administrative power in Ireland, at a river crossing which in the Middle Ages formed an interface between the territories of the native Irish chieftains and Crown rule, Athy grew to be a thriving market town benefitting from its rich agricultural hinterlands and the patronage of the Dukes of Leinster.

The current phase of the Athy Shackleton story began when a local committee campaigned for the establishment of a centre in the town to highlight its rich heritage. Generally, the exploits of the heroic age explorers had dropped out of the public consciousness soon after their achievements, with a few blips in the intervening years on anniversaries of polar related events. The 1990s saw a revival of interest in the subject. From a Shackleton perspective, several landmark publications emerged covering a range of related topics, such as Caroline Alexander's magnificent *The Endurance* illustrated with rare Frank Hurley photographs, and Morrell and Capparell's *Shackleton's Way* on person-centred leadership.

The Shackleton connection was well known in the Athy area where the surname still lives on. In wider Ireland, his connection with the country was largely unknown – the contradiction that arguably the best known 'Irish' person worldwide and 'our' greatest polar explorer was little known in his country of birth. Some of this amnesia is due to popular and inaccurate lore; more is down to Shackleton's bad timing. One of the greatest feats of seafaring, the voyage of the *James Caird* with a crew half of whom hailed from Ireland, departed Elephant Island on Easter Monday 1916, the precise day the Irish uprising began.

While history and the timing of events have served in some way to denigrate the national recognition of contributions of Irish people in a variety of fields outside of the country, a sign of the positive change in recent times is that the Shackleton Museum project (www.ShackletonMuseum.com) did get Shackleton's *Endurance* exploits listed among the events in Ireland's recent 'decade of commemorations'. With regard to Shackleton, the objective of the Athy initiative is to reclaim his 'Irishness' – where we feel his Irish Quaker background explains much of his *modus operandi*.

A local committee quickly recognised the opportunity presented by the resurgence of interest in Shackleton. A two-pronged strategy evolved (to call it 'planned' would be overstatement; the committee was and remains voluntary,

constantly responding to what is unfolding – in that way, true inheritors of the Shackleton spirit!) It ran with the establishment of the town's Heritage Centre and its permanent Shackleton exhibit, along with an active outreach campaign ranging from local schools to national media. The Shackleton Autumn School, first held in 2001, became the spearhead of that outreach.

The Autumn School takes place over a weekend in late October and comprises a range of activities, all presented within the frame of high standards in a friendly and informal atmosphere. A series of lectures broadly falling within the themes of 'Polar history', 'Shackleton' and 'Human

endeavour', bookended by masterclasses with senior level exam students, a dinner, and arts/cultural performances, forms the framework on which other activities are hung. The organising committee takes a flexible approach, willing to introduce new initiatives while retiring worn-out or unsuccessful ones. The event is run on a break-even basis; credit to the stellar lineup of past speakers, nobody has ever refused due to the absence of a stipend (travel, accommodation and out-of-pocket expenses are of course covered for lecturers). Over the years, the Autumn School has established a loyal band of followers: individuals and those representing institutions focused on similar topics. As a result, the local authority and national government have recognised the efforts to raise Shackleton's profile and responded, as evidenced by Mark Richards' public statue of Ernest H Shackleton, and the initiative to develop the Heritage Centre into an

"With regard to Shackleton, the objective of the Athy initiative is to reclaim his 'Irishness'."

international calibre, dedicated Shackleton Museum.

Among the bodies which have supplied speakers and with whom cooperative relations have developed, the RSGS is one of the recent additions. In 2021, Jo Woolf, Writer-in-Residence at RSGS, delivered a session on Ernest Shackleton's time as Society Secretary, filling in a significant gap at a pivotal point in his life story. And this year, we welcomed RSGS Chief Executive Mike Robinson to Athy where, as well as giving a masterclass to senior geography students, he addressed the Shackleton Autumn School with a lecture title drawn from a Shackleton quote: "Difficulties are just things to overcome, after all."



Mark Richards' statue of Ernest Shackleton in Athy, unveiled on 30th August 2016, the centenary of the rescue of the 22 *Endurance* crew from Elephant Island.



Trees, woods and forests: past, present and future

Professor Roger Crofts CBE FRSE FRSGS, RSGS Vice-President

We can justly celebrate trees in Scotland. There are many sentinel, ancient trees that stand on their own, as the Fortingall Yew or the Birnam Oak, or in woodlands such as the ancient managed oaks of Cadzow and Dalkeith. We now recognise our Atlantic rainforest stretching from Kintyre to north-west Sutherland, and the many areas of Caledonian pines in the drier east of the country.

A little history

The history of trees in Scotland since the late glaciation is one of variation and change. Beginning with the growth of birch as a pioneer species, pollen analysis shows the rise and decline of alder, elm, hazel, oak and pine. Many are the reasons: climate change, especially the cooling periods with increased wetness, felling for building, fuel for heating and cooking, and clearing land for agriculture. Tree cover probably reached an all-time low by 1900. The 'Great Wood of Caledon' is a myth, as there was much wetland and soil-less rocky areas; a point to be remembered in restoration activity.

Perhaps the greatest era of reduction was with the onset of farming from the Stone Age onwards, followed a millennium and a half later by the Agricultural Improvement period when perhaps two species were prized: the beech and the hawthorn. In livestock areas these changes are still conspicuous and welcomed in the landscape. Traditional use of tree materials for dyeing fabrics, for bedding, for fuel and for fencing are very evident in the intergenerationally stewarded oaks.

Without doubt the major change in tree cover resulted from the series of experiments led by Sir John Stirling Maxwell at his Ossian Estate in the central Highlands, where many non-native species were trialled, with the Sitka spruce from the Pacific north-west of the USA having the best timber production prospects. Since then, with the formation of the Forestry Commission, the increasing demand for supplying homegrown timber has meant that Sitka spruce remains the dominant tree planted and harvested.

Restoration and revival

Much good work has been done in recent decades to revive tree planting and recover degraded areas. Herbivore control on former sporting estates, such as Mar Lodge

and Glenfeshie, has restored ecosystems. State-owned forests have been managed for conservation, such as Glen Affric and the Galloway Forest Park.

Previously degraded areas have been restored by charitable bodies, including the Woodland Trust in Glen Finglas, the Borders Forest Trust at Carrifran and the Devil's Beef Tub, and RSPB at Abernethy.

Community ownership stimulated by government and lottery grants has taken off in many areas. National Nature Reserves managed by NatureScot have grown and planted trees, for example on Beinn Eighe and on Rum. Perhaps the greatest change over a lifetime has been in the Flow Country where the senseless deep ploughing and planting of lodgepole pine and Sitka spruce has been turned on its head, with trees felled, drains blocked and the water table raised. Unfortunately, the seed sources of non-native trees persist and are marching unchallenged across the wet heaths.

The future?

The Woodland Trust states that, "Just 18% of Scotland has tree cover compared to a European average of 37%. And only 4% of Scotland is native woodland and over half of those woods are in poor condition. Just 1% of our land area has ancient woodland."

There is a substantial job needing to be done collectively by the Scottish Government, its agencies, and with private and charitable owners informed by new knowledge. But precisely what?

Changing the incentive regime is essential. It is wrongly directed, with insufficient resources provided for managing existing woodland and an insufficient focus on species diversity. Hopefully, Scottish Forestry's review will correct these inadequacies, prompted by the findings of the Royal Society of Edinburgh report. Incentives for improving management and restoration of existing degraded woodlands such as the Atlantic rainforest, encouraging farmers to plant trees, and developing a scientific basis for dealing with pests and pathogens are priorities. The new regime should provide financial support for climate change and biodiversity gain, not for commercial operations. An internationally verifiable carbon certification scheme is also necessary.

A spatial plan which places trees of all types within their regional and local landscape and land use context is essential. This can be done through implementation of Regional Land Use Strategies. It should include planting plans for increasing tree cover next to drought-prone agricultural areas in eastern Scotland, based on the science that trees provide water to the land downwind. Each plan should make special provision for reducing the effects of climate change and for increasing biodiversity.

Fundamentally a change of mindset is necessary – from 'Sitka rules' to one that works with nature and people to produce landscapes that are productive and appealing to natural and human life, for our well-being as well as for our planet's.

"The new regime should provide financial support for climate change and biodiversity gain."



Glen Affric trees and watercourses. © Roger Crofts

The Power of Trees

Peter Wohlleben, forest scientist and author

How many of you have done this? You've gone for a walk in fall and brought home a beechnut or an acorn that you've then planted in a pot and set on the windowsill to watch it grow into a small tree. It doesn't last long – because it's not exposed to winter. Trees, like many animals, must rest in the cold season. Shorter days and increasing cold trigger hibernation. Without these stimuli, trees cannot fall asleep, and instead of hibernating, they die. Potted tree seedlings, therefore, can only survive in the long term if they live outside.

But even out in nature, it's getting warmer. Winter is setting in later and ending sooner. It seems to follow that the trees' winter sleep is also getting shorter. In Germany today, April feels almost like summer. We need to change the month in the title of the famous German folk song *May Has Come, the Trees Are Leafing Out*. The tender green of the trees' unfurling leaves now appears on branches weeks earlier. The German weather service reports that when you add in warmer fall days, the downtime for plants has shrunk by two weeks in recent decades.

As you probably suspected, this is not good for trees. Sure, they can satisfy their hunger sooner by cranking up photosynthesis in April, but climate change has barely affected one seasonal danger that still lurks out there: a late frost. On clear nights, the thermometer regularly plunges below freezing as late as the middle of May – as it did in 2020. Most of the freshly formed leaves freeze, severely impacting the health of the trees, which must now mobilize the last of their reserves and leaf out once again. If they become sick at this time, they will have hardly any strength left to fight off fungi or bacteria.

*"If we wake up in the dark,
we cannot tell how late it is."*

The milder the winter, the greater the danger of leafing out too early. One January it was so warm that the cranes returned from Spain. Then, in February, winter arrived in full force, prompting the birds to fly back south. Trees, anchored in place, can't travel back and forth like this. They have to bide their time and be patient. Beeches don't get their cues from temperature alone. They also wait until the spring days last at least thirteen hours – only then do they dare unfurl new leaves. Their fear of potential late frosts is apparently greater than the hunger that gnaws at them after their period of winter rest. In Germany, the average date by which the days are this long is 23rd April. On spring forest walks, look to see if the beeches in the woods in your neighbourhood are keeping to this timetable.

But back to the need for cold. In Germany, in the absence of this stimulus, our native trees don't know that there really has been a winter between fall and spring or that another six months have passed. Perhaps trees are like us. If we wake up in the dark, we cannot tell how late it is or whether we can turn over and can go back to sleep without first checking the clock.

For beeches and maples, the temperature must drop below 39° Fahrenheit (4° Celsius) if their buds are to open as they should later in spring. Without this drop in temperature, the trees don't wake up at the right time from their winter sleep – it's as though they're still waiting for winter to arrive. In extreme cases, the buds on some branches never do open. Contrary to the popular belief that warm winters will prompt trees to leaf out early, they can cause exactly the opposite to happen.



This article was extracted with permission of the publisher from the book *The Power of Trees: How Ancient Forests Can Save Us if We Let Them*, written by Peter Wohlleben (author of *The Hidden Life of Trees*) and published by Greystone Books in May 2023.

The oak: an icon of the British countryside

George McGavin, entomologist, author and broadcaster

Of all the trees in Britain, the common oak (*Quercus robur*) has shaped our history and permeated our culture more than any other. To uncover the story of the oak you have to dig deep. In some special locations, peat deposited since the end of the last ice age has given us a window into the past, allowing us to know exactly what species of plants were growing and, by inference, what the climate must have been like. Nine thousand years ago oak pollen appeared for the first time, and the trees growing today are the descendants of those early pioneers.

Much of what has made the oak such a successful survivor has also made it very useful to us. For centuries, oak-timbered buildings protected us from the elements, and thanks to the durability of the wood, many very old buildings survive to this day. By slicing and shaping oak trunks and boughs we built ships able to withstand the awesome power of the sea. HMS *Victory*, Lord Nelson's flagship at the battle of Trafalgar, was one of the most complex objects ever created from oak. The ship was the product of almost 6,000 trees shaped and sculpted by Britain's finest shipwrights.

I live right next to Windsor Great Park where there is one of the biggest concentrations of veteran oak trees anywhere in the world. Many of these trees are seven hundred years old or more, and will have been saplings at the time of the Black Death. They have lived through the battles of the English Civil War and were maturing as Britain underwent its industrial revolution.

It is the longevity and endurance of the oak that makes it such an interesting species. The oak sits at the centre of an incredibly complex web of life and it is crucial to the survival of many hundreds of other species. Even in death, the oak supports a huge number of fungi and other decomposers which slowly return the body of the tree to the soil from which it sprang. The loss of natural oak woodland habitat has led to the rapid decline of many species, including one of Britain's biggest insects, the stag beetle.

More insect species use oak in some way or another than any other tree growing in Britain. Among the most interesting of these are the gall wasps, whose larvae develop inside strange growths, or galls, made by the oak tree itself in response to the tiny wasps laying eggs in its tissues. The exact way each species of gall wasp manages to induce such an individual and unique gall is still somewhat of a mystery, but recent research suggests that the wasps are able to influence the early development of oak cells in very specific ways – genetically engineering the oak tissues to grow a protective nursery and larder for their developing young. Some galls, such as the oak apple made by the gall wasp *Biorhiza pallida*, are large and spongy, while others, known as spangle galls, are small and flattened.

But there is one type of oak gall that has recorded our history, because for a thousand years it was the source of the ink with which nearly all our official documents were written. Crushed, mixed with water, iron sulphate and gum Arabic, the tannin-rich marble gall of *Andricus kollari* was transformed into a cheap and extremely long-lasting ink. This little quirk of evolution has brought us the Magna Carta and the American Declaration of Independence. It preserved the music of Mozart and Bach and the drawings of Rembrandt and Leonardo da Vinci, and thanks to gall ink we can still read Newton's theories and the letters of Charles Darwin.

"More insect species use oak in some way or another than any other tree growing in Britain."



The gall wasp larvae inside the oak apple gall are not safe from all enemies. Some, like these parasitic wasps, have ovipositors just long enough to reach them through the spongy tissue of the gall. © Anne Riley



Modern materials may have replaced oak, but it remains a keystone species in our landscape and we need its services more than ever. Photosynthesis is undeniably the single most important natural process in the world. Powered by sunlight, carbon dioxide pulled in from the atmosphere is combined with water and turned into sugars that plants feed on. The waste product of the immensely complex biochemical reactions taking place within each leaf is oxygen – a gas that we and all animals need to survive. The amount of oxygen I require in a single year, about a quarter of a million litres, can be produced by one single large oak tree.

Today as we face a climate and ecology crisis of our own making, we need to cherish the veteran oak trees that survive and give this icon of the British Isles a helping hand by planting as many acorns as we can.

A germinating acorn sends out a sturdy tap root to anchor the young sapling as it grows. © George McGavin

"The amount of oxygen I require in a single year can be produced by one single large oak tree."

The role of trees in a sustainable future

Roger Crofts CBE FRSE FRSGS, CIEEM Patron; Annie Robinson, CIEEM Scotland Policy Officer

Some 130 professionals on various aspects of trees gathered to present projects and discuss the role of trees in a sustainable future, early in October 2023 at the CIEEM (Chartered Institute of Ecology and Environmental Management) Scottish Conference. Three main topics came under the spotlight.

What are the issues facing the future of trees?

There was no dispute about the need for more trees for a variety of reasons. Trees lock up carbon if kept standing for a long time, provide a micro habitat for biodiversity, produce essential timber for domestic use, retain water, provide nutrients and shade to improve river water quality, retain the soil and aid slope stabilisation. However, many issues are obstructing the improvement in the quality and quantity of ancient trees and undermining the restoration of native woodlands.

Overgrazing, particularly by deer and to a lesser extent sheep, is a major factor. The incentive regime from government has historically favoured commercial species, and has resulted in a proportionate decline in native species planting targets. It was recognised that at times there is a false dichotomy between native and non-native species of trees as there are emerging examples of a more nature-focused management of commercial species. Nevertheless, there was insufficient incentive for and focus on the restoration, management and planting of new native woodlands.

How are solutions best determined?

One obvious route is the use of the various expert decision support tools which were described to attendees. However,

"The solutions should not be a single-purpose objective of planting more trees."

users should be clear of what they are seeking to achieve, and recognise the crucial role of resource owners as well as other interests, such as local communities. The solutions should not be a single-purpose objective of planting more trees, but place that into a wider landscape setting and recognise the importance of the benefits of appropriate tree planting to the functioning of the ecosystem.

The question of where to start the decision-making process remains.

One starting point is assessment of the natural resource base, but it is equally reasonable to begin by defining the ambition of owners and

other stakeholders, rather than deciding at the outset on 'what trees where', as the rubric of the 'right trees in the right place' should be later in the process.

How can changed practices be achieved on the ground?

Many examples of good practice around Scotland were presented in talks and on posters. Top-down approaches created problems with lack of local ownership, and many of the examples presented were a combination of national and local interests joining together to demonstrate new approaches, such as with farmers or with landowning charities demonstrating new approaches to overcome the negative practices of the past. Scientific approaches for dealing with threats from pests and pathogens, and novel resolution of overgrazing by deer, were presented. The further development of Regional Land Use Strategies was favoured by some participants as the most appropriate way of engaging with local stakeholders and rights holders, providing there was government support for resourcing the process.

The Royal Scottish Forestry Society

Wilma Harper, President, Royal Scottish Forestry Society

The Royal Scottish Forestry Society (RSFS) owns and manages Cashel on the eastern shores of Loch Lomond.

Cashel is a native forest, a mix of ancient woodlands and early 21st century planting. But like many contemporary forests, it is much more. There's a heritage orchard and a hydro scheme. At the top of the hill, work is underway to restore the peat and, on suitable sites, plant montane trees and shrubs. The visitor centre provides a focus for a range of events, with access to a network of paths. Together they provide facilities and access for education, research, leisure and wellbeing – it's a window into the wider work of RSFS. RSFS is an educational charity, focused on meeting the needs for practical forestry and woodland education, integrating these into forestry and woodland management, and promoting sustainable forestry more widely. RSFS has a long history, dating back to 1854. We continue to prosper by remaining relevant, and since 2022 we have been developing a refreshed strategy.

We have a long-standing recognition of the need for a dynamic balance and synergy between the economic,

environmental and social functions of forests and woodlands. The nature of the forest and the management objectives determine their relative importance. We welcome, value and support all those with an interest in Scotland's trees, woods and forests, whatever their focus and priorities, and are always keen to diversify our membership to better reflect those active in the sector.

We provide relevant, practically focused Regional Study Days and an Annual Study Tour, and work with forestry employers to offer Continuous Professional Development. We believe there is real value in bringing people together to promote better links and foster open discussion on forestry topics. *Scottish Forestry* is the journal of the RSFS, and our members also receive the most comprehensive summary available of forestry news and events in a fortnightly e-newsletter.

Our motto may talk about trees 'growing while we are sleeping', but Scotland's forests of the future will continue to need the practical expertise and active engagement of all who value them.

"There's a heritage orchard and a hydro scheme."

Saving Scotland's rainforest

George Anderson, Woodland Trust Scotland

Scotland's rainforest comprises the semi-natural woodlands of our west coast. High rainfall, relatively mild temperatures and clean air provide the perfect conditions for mosses, liverworts and lichens to thrive on the trees. The sheer abundance, diversity and rarity of species make this unique habitat internationally important.

Even though much of it is fragmented and damaged, it is the best remaining temperate rainforest in Europe. Only 30,000 hectares of rainforest remains. It suffers from numerous threats, but the main problems are overgrazing by deer, invasion by *Rhododendron ponticum* and planting through with non-native commercial conifer crops.

In recent years, Woodland Trust Scotland has been prioritising action to save our rainforest: working on our own land, advising other landowners and campaigning for public policy to safeguard and expand the habitat.

The Trust purchased Torridon's Ben Shieldeag Estate in 2019. With conditions perfect for rainforest, the mountain hosts a native pinewood on one flank and an ancient semi-natural birchwood on the other, both in relatively good condition and totalling around 100ha. Our plan was to secure and expand these habitats largely through natural regeneration. In 2021, we acquired the neighbouring Coudoran Estate, which is largely treeless and historically overgrazed, giving the opportunity to expand native woodland cover by nearly 350ha across the combined estate now called Gleann Shilideag. Nearly half a million native trees will be planted, starting in March 2024; mostly Scots pine, birch and willow, but also oak, aspen, alder, hazel and juniper. Trees alone do not immediately create a rainforest, but with the rare habitat on the mountain already, the range of mosses, liverworts, lichens, ferns and other species that characterise it will be able to colonise the new areas of woodland over time.

Loch Arkaig Pine Forest in Lochaber is also in the rainforest zone and contains rare fragments of ancient Caledonian pinewood and oakwood. In the 1960s it was planted through with non-native conifers. Now mature, these trees are crowding out the remaining pines and other native trees. A total of 70,000 tonnes of mainly Sitka spruce and lodgepole pine is being removed over five years so that the remaining native trees can reclaim the site with their offspring.

Part of the forest known as The Gusach is so remote that the only practical way to reach it is over the loch itself. A modular barge has been custom-built so that a forwarder laden with logs can drive onto its deck to be ferried across the loch to the roadside on the opposite bank. The deployment of such a barge is thought to be a UK first for timber transport over freshwater – innovation created by the drive to save Scotland's rainforest. Many non-native conifers were planted around Scotland in the 1960s and 1970s. Often there was no clear plan on how the mature crop could be moved to market. Our barge negates the need to build many miles of expensive and destructive track. Its modular design means it can be taken apart to be moved by road for deployment on other lochs.

Beyond our own sites, we have been working hard to establish public and political impetus on rainforest restoration. The Alliance for Scotland's Rainforest was formed thanks to the efforts of Woodland Trust Scotland and Plantlife Scotland. It currently involves more than 20 organisations, including

public bodies such as NatureScot and Forestry and Land Scotland; environmental NGOs such as John Muir Trust, RSPB Scotland, Scottish Wildlife Trust, Buglife and the British Lichen Society; and representative bodies such as Scottish Land and Estates. All are committed to collaborative action for the benefit of the rainforest.

Without action, invasive rhododendron will increasingly dominate the rainforest, suppressing tree regeneration and shading out the internationally important plants that form a key part of rainforest biodiversity.

It is estimated that £500m is needed over at least ten years to deal with the problem.

Scotland's environmental NGOs have pledged to raise the rest if the Government can put up half of that funding. This money will pass through local communities supporting green jobs in economically fragile areas, so should be looked on as an investment in the future of people, nature and climate.

If that level of funding is not yet forthcoming, the rainforest's plight is now firmly on the political agenda and in the public consciousness. Five years ago, there was almost no awareness outside of extremely specialist circles. At the last Holyrood elections, Scotland's rainforest was mentioned in three of the major party manifestos. There are references in the Bute House Agreement and the current Programme for Government. During COP26 in Glasgow the Scottish Government pledged to secure and expand the habitat. Woodland Trust Scotland and many others will be holding Ministers to that promise. More information can be found at www.savingsscotlandsrainforest.org.uk.

"It is the best remaining temperate rainforest in Europe."



Transporting timber on Loch Arkaig. © John Macpherson, Woodland Trust



Ben Shieldeag, Woodland Trust, showing birchwood on the left and pinewood on the right. © Steve CarterMacpherson, Woodland Trust

Evolution in future forests

Dr Mas Smyth FRSGS, Crichton Carbon Centre Co-founder, and RSK Group Non-Executive Director

When the UK signed up to the Rio Biodiversity Convention in 1992, we signed up not just to conserve species and ecosystems, but also to conserve genetic diversity. This third strand has often been overlooked, but in many ways genetic conservation is the most exciting concept of all: it's about survival of the fittest, the very underpinning of biodiversity.

The Anthropocene is causing climate change, sea level change, and the rapid spread of new pests and diseases, so humans now have a moral duty to help protect the ability of species and ecosystems to adapt to those changing conditions. Pessimists may point out that we are changing the climate faster than most species can evolve. But there is still an argument over the rights of species to exist, the chance for species to find for themselves the most appropriate genes for the future.

In a future adapted world, we will need trees that can survive future wild pathogens. Most tree saplings being planted today have been grown from limited seed sources or cloned material, nursed in commercial nurseries, carefully dosed with fungicides, insecticides and fertilisers as necessary. Natural regeneration of wild trees provides a wild alternative to nursery saplings, and woodland gene conservation involves creating spaces for woodland ecosystems to adapt, managing specific areas with the intention of allowing the full cycle of natural processes to occur. This is wonderful.

There is now a Europe-wide network of forest sites, called Gene Conservation Units, and in Scotland the wild genetics of our best-known trees (pine, birch, oak and rowan) have been protected since 2019 (starting at the Beinn Eighe National Nature Reserve in Wester Ross).

In Galloway, aware of the slow disappearance of wild apples from the landscape, we have registered a gene conservation unit for Scotland's wild apple tree. Usually called the crab apple, the wild apple is native to Scotland, and is one of the genetic parents of the whole world's orchard apples, our beloved eating apples, cooking and cider apples. Clearly, wild apples have an inherent right to exist, but there's a commercial angle too, for if the £80 billion value of the world apple crop is to thrive, and if our commercial orchards are to stay healthy in the future, we should preserve genes from their wild cousins.

Most trees use wind for pollination and seed dispersal, but some rely on third parties to help out. Jays, squirrels and voles famously plant acorns and hazelnuts, but many of the northern hemisphere's fruit trees rely on mammals. Badgers, foxes and boar eat fruit, but being

omnivores, seem able to digest apple pips. Sheep and deer eat fruit, but their droppings seem too small to safeguard apple pips. Bears, horses and bison/cattle eat fruit, and their dung is the perfect size to act as plant pots for wild apple seedlings to develop. Clearly, we no longer have bears in the UK, but cow pats are a perfect place for wild apples to germinate, thus creating beautiful wild-apple wood pastures for the future. Since cattle and ponies try to avoid eating around their own dung, wild apple seedlings can emerge and survive in lightly grazed wood pasture.

There are also potential feedback loops, which we are beginning to understand thanks to DNA testing. Apples are insect-pollinated, and most trees require cross-pollination: pollen from a different tree. Apples therefore contain pips with genes from various other trees. Wild and orchard apples freely hybridise (which is why orchard apples are usually grafted). In Galloway, it seems that our purest wild apple seedlings are able to survive better in the wild than domestic seedlings. We think this is because domestic apple seedlings are soft and leafy, and need protection from a plastic tube, whereas wild apples are spiky and tough. This creates a positive feedback loop, in a wild and remote situation, favouring the wild apple genes. It is not clear just how important ruminants are in wild apple reproduction, but it is possible that in the UK, out-wintering cattle and perhaps ponies may be essential for the wild apple's reproductive strategy.

This is great news: healthy and beautiful 'future forests' will require a wide variety of silvicultural, agricultural and ethno-cultural practices, and a geographical mindset!

"Wild apple seedlings can emerge and survive in lightly grazed wood pasture."



Wild apple tree on a farm in Galloway. © Mas Smyth

Dr Smyth acknowledges thanks to discussions with Richard Cunningham, DNA work by the Royal Botanic Garden Edinburgh, and Rick Worrell and others for inspiration and articles, and GCU registration by Forest Research.

A farming perspective

Andrew Barbour FRSGS, Fincastle, Perthshire

Given the ambitious Scottish Government afforestation target, the current Scottish Forestry Strategy is an important guiding document. Its vision calls for forests and woods to be well integrated with other land uses. But the impression of many of us in the farming community is of little integration, with the programme focusing on land use change. The planting targets cannot be met just through the churn of the land market. Without farmers being enabled to participate, the targets will not be met.

"The planting design creates a woodland which is attractive for grazing animals."

So, the vexing questions are how to persuade farmers to plant trees and woodlands on their land, and what should any such new plantings look like? In the past, such programmes have concentrated on shelter belts. The 1950s and 1960s saw many woodlands of this type established on farms, following the severe winters of 1947 and 1963. These woodlands, planted as mini plantations of largely exotic conifers, were simply designed to provide wind breaks for animals in adjacent fields. But this design has brought problems: a poor fit with many landscapes, difficulty in managing remote, small woodlands, and overcrowding by animals trying to get shade along the wood margins, resulting in soil disturbance and weed problems.

This need for shelter hasn't gone away. The changing climate is starting to get the attention of animal welfare interests within the farming community. With an increasing emphasis on enabling adaptive behaviour in farmed animals, there is

a growing awareness of the need to provide shade from sun and rain, as well as shelter from wind. A modern take on the traditional shelter belt is starting to emerge, where the planting design creates a woodland which is attractive for grazing animals to enter once the trees are established. In other words, this is an agroforestry land use. And this mix of trees and farming is being championed by pretty much every study identifying the path to net zero for farming. So, in theory, farmers should be wanting to increase tree cover on their farms for the benefit of their animals. But how to make it happen? Fleshing out how that vision of integration can be achieved is a starting point, along with developing the tools to deliver the vision, including the appropriate incentive packages. But ultimately it is up to both farmers and foresters to want integration to happen, and that is a cultural barrier apparently still to be overcome.



Fincastle cattle in trees. © Andrew Barbour

Landscape

John Thomson, Chair, Association for the Protection of Rural Scotland

Almost everyone loves trees. Cutting them down often provokes outrage, whilst calls for volunteers to plant more are enthusiastically embraced. But not everyone loves a forest; proposals for large-scale afforestation frequently trigger a very different reaction.

Part of the reason is no doubt an instinctive aversion to change, more sympathetically viewed as an attachment to the familiar: landscapes often cherished since childhood. Cultural factors are unquestionably central to people's attitudes: forested landscapes and forest living are not a deeply embedded feature of Scottish experience. For many generations, Scotland was one of the most tree-less countries in Europe. Open landscapes were characteristic and even totemic. Remnant woodlands too were often greatly prized – but as special places, not the everyday norm.

The past century has seen a major expansion of new plantations, with tree cover in the areas of most radical change, notably the south-west, now approaching average western European levels. These have not, by and large, inspired the affection enjoyed by their continental counterparts, or indeed by small woodlands and hedgerow trees in Scotland.

Why so? Two reasons stand out: the nature of the forests and the forestry practices that shape them, and the lack of influence that local people have over their creation and

management. The plantations are in most cases all too obviously just that: straight-edged near-monocultures, as much a time-limited crop as any field of wheat or barley. But unlike most farmland, they do not obviously support day-to-day activity. Though living, they can appear dead.

In most places the limited efforts made to mitigate adverse visual impacts can be seen as what they essentially are: cosmetic tokenism. People do not have to be ecologists to see that blanket plantations as they are currently created and managed are far removed from natural ecosystems, with the richness and diversity that these can offer as landscapes as much as habitats.

In most of Scotland, more trees in the landscape would probably be welcomed, even where their presence significantly altered the current character. But this welcome will only be extended if their overall effect is to add variety and interest to the landscape; to enrich its texture, not to impose a stifling uniformity. Woodlands need to be much more subtly inter-meshed with other land cover and land uses, and the woodlands themselves to be more diverse and accessible.

"More trees in the landscape would probably be welcomed."

Entangled Life

Merlin Sheldrake, biologist and author

There are many ways to form a mycorrhizal relationship: it is a way of life that has evolved on more than sixty separate occasions since algae first migrated onto land. Most plants – from a potted snapdragon to a giant sequoia – will develop differently when grown with different communities of mycorrhizal fungus. Basil plants, for example, produce different profiles of the aromatic oils that make up their flavour when grown with different mycorrhizal strains. Some fungi have been found to make tomatoes sweeter than others; some change the essential oil profile of fennel, coriander and mint; some increase the concentration of iron and carotenoids in lettuce leaves. By smelling a flower, by chewing on twigs, leaves or bark, by drinking a wine, how many other aspects of a plant's mycorrhizal underground might we be able to taste? I often wonder.

The findings of Toby Kiers, a professor at Vrije Universiteit Amsterdam, suggest that neither plant nor fungus is in complete control of the relationship. In one set of experiments, she found that plant roots were able to supply carbon preferentially to fungal strains that provided them with more phosphorus. In return, fungi that received more carbon from the plant supplied it with yet more phosphorus. Exchange was in some sense negotiated between the two depending on the availability of resources. Kiers hypothesised that these 'reciprocal rewards' have helped to keep plant and fungal associations stable over evolutionary time. Because both partners share control of the exchange, neither partner would be able to hijack the relationship for their own exclusive benefit.

Nonetheless, different species of plant and fungus have different symbiotic manners. Some fungi make more cooperative partners; some are less cooperative and will 'hoard' phosphorus rather than exchange it with their plant partners. However, even a hoarder might not hoard all the time. Their behaviour is flexible, a set of ongoing negotiations that depend on what is taking place around them and in other parts of themselves.

"Fungal networks form physical connections between plants."

One can think of mycorrhizal relationships as stretched along a continuum, with parasites at one pole and cooperative mutualists at the other. Some plants benefit from their fungal partners under some conditions and not under others. Grow plants with plenty of phosphorus, and they might become less picky about which fungal species they partner with.

Grow cooperative fungi alongside other cooperative fungi, and they might become less cooperative. Same fungus, same plant, different setting, different outcome.

Most plants are promiscuous and can engage with many mycorrhizal partners.

Mycorrhizal fungi, too, are promiscuous in their relationships with plants. Separate fungal networks can fuse with each other. The outcome is complex collaborative systems of shared mycorrhizal networks sometimes known as 'wood wide webs'. Lots of organisms interact. If one makes a map of who interacts with whom, one sees a network. However, fungal networks form physical connections between plants. It is the difference between having twenty acquaintances and having twenty acquaintances with whom one shares a circulatory system. These shared mycorrhizal networks – known by researchers in the field as 'common mycorrhizal networks' – embody the most basic principle of ecology: that of the relationships between organisms. Alexander von Humboldt described the living world as a 'net-like, entangled fabric' – a complex of relationships in which organisms are inextricably embedded. Mycorrhizal networks make the net and fabric real.

I spent many months doing fieldwork in tropical forests in Panama, studying the relationship between plants and their mycorrhizal fungal partners. The jungle bristled with life. There were sloths, pumas, snakes, crocodiles; there were basilisk lizards that could run across the surface of water without sinking. In just a few hectares there lived as many woody plant species as in the whole of Europe. But of the many organisms that lived there, I was most enthralled by a species of small flower that sprouted from the ground. These plants were the height of a coffee cup, their stalks spindly

A *Cladonia* lichen. © Wolfgang Brandl



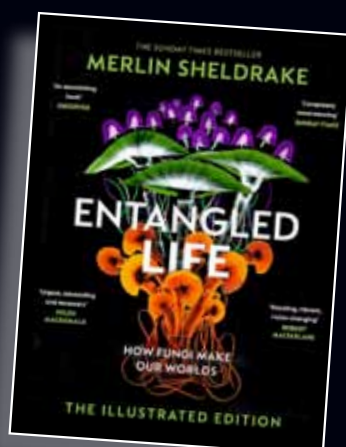


Bioluminescent ghost mushrooms,
Omphalotus nidiformis. © Stephen Axford

and pale white with a single bright blue flower balanced on top. They were a species of jungle gentian called *Voyria*, and had long ago lost the ability to photosynthesise.

In doing so, they had lost their chlorophyll, the pigment that makes photosynthesis possible and gives plants their green colour. I was perplexed by *Voyria*. Photosynthesis is one of the things that makes plants plants. Imagine encountering a species of monkey that doesn't eat, and instead harbours photosynthetic bacteria in its fur, which it uses to make energy from sunlight. It's a radical departure.

The solution is fungal. *Voyria* – like the majority of green plants – depend on their mycorrhizal fungal partners to survive. However, their symbiotic manners differ. 'Normal' green plants supply energy-rich carbon compounds, whether sugars or lipids, to their fungal partners in exchange for mineral nutrients from the soil. *Voyria* have worked out how to sidestep the exchange part. Instead, they receive *both* carbon and nutrients from mycorrhizal fungi, and don't appear to give anything back.



Mycelium of a wood-rotting fungus exploring a log. © Alison Pouliot

This article was extracted with permission from *Entangled Life* by Merlin Sheldrake, published by Vintage Publishing.

The ITCC: the most team-oriented solo sport

Marcus Floyd, International Society of Arboriculture

The first tree climbing competitions (TCC) taught skills that would prepare a climber to perform an aerial rescue. As the competition grew, more tree companies encouraged their workers to participate. Eventually, the event expanded to include European climbers, which brought more innovation to the competition.

Today, besides the International Tree Climbing Championship (ITCC), the International Society of Arboriculture (ISA) holds three regional events in Europe, North America, and Asia Pacific. The winners of these events and the winners of competitions held by ISA Chapters and associate organisations compete in the ITCC.

Competitions not only provide educational opportunities for arborists but also encourage the use of industry safety standards and best practices, create an environment that allows educational interactions between tree care industry professionals, educate the public about the industry, and make positive public exposure for the profession. “[Tree climbing championships] are always a great opportunity to expand our industry and share knowledge on the latest tree climbing techniques and gear,” said John Gauthier, the head judge over the 2019 North American Tree Climbing Championship.

Tree climbing competitions simulate the working conditions of arborists in the field. Male and female competitors are scored individually in each event: Aerial Rescue, Work Climb, Ascent, Belayed Speed Climb, and Throwline. The competitors’ scores from all five events are combined, and the male and female competitors with the highest combined scores compete in the Masters’ Challenge Championship. The Masters’ Challenge judges the contestant’s overall productivity and skill with a rope and saddle in the tree.

The ITCC takes place in a different place every year. This year, the ITCC was held in Albuquerque, New Mexico, US, with 46 male and 35 female competitors, making it the ITCC with the highest number of female competitors. Women first began competing in the ITCC in 2001. Christina Engel of Germany was the first women’s champion. Today, nearly a third of the competitors at the world championship are women.

Although ITCC is a competition, its impact on the tree climbing community goes beyond a skills contest. The ITCC serves as a learning opportunity for many participants. “If [anyone] competes, they will win,” said Eduardo Medina, the committee chair for the ITCC Operations Committee. “The problem with society is that it believes in a medal, but they forget that when you’re competing, you’re gaining so much.

“Tree climbing competitions simulate the working conditions of arborists in the field.”



You’re gaining peers, friends, techniques, and much more than people who couldn’t compete.”

Although most sports encourage good sportsmanship, they typically advise against helping the competition. However, at TCCs, as competitors begin their ascents into the trees, other competitors can be seen from the sidelines giving advice and cheering one another on. Due to the high level of camaraderie, the ITCC offers competitors the ability to share knowledge and climbing techniques. Many climbers, like Dustin Goodman, a 2023 ITCC competitor from Texas, US, take the opportunity to compete in tree climbing championships to learn and improve their craft.

“It’s been amazing to compete at this level with so many climbers from around the world,” said Goodman, who competed in his first TCC in 2018. “I’ve grown exponentially through these events because I’m not only able to make my own mistakes and problem solve, but I also get to learn from people who are problem solving on the highest level and who see different problems from all over the world.”

The winners of the 2023 ITCC were Barton Allen-Hall from Arboriculture Australia and Josephine Hedger from the United Kingdom/Ireland Chapter. This year, Hedger broke the record for female competitors with the most ITCC Championships. Hedger has currently won the ITCC Masters’ Challenge six times. Chrissy Spence from New Zealand previously held the record. “It’s an honour,” said Hedger. “I work hard for it and do a lot of training. The level goes up yearly, so although I’ve won it before, I’m a better climber each time.”

The 2023 ITCC was the second time Allen-Hall has won the competition. “There’s almost no better feeling,” said Allen-Hall. “What I and the other competitors give to this sport is everything. It’s amazing when you are recognised as the best in the world at what you do.”

How to Read a Tree

Tristan Gooley FRSGS, natural navigator and author

A tree is a map

I made my way north along the gentlest of rolling ridges in the mountains of the Sierra de las Nieves National Park in southern Spain. There was no path, but I picked dusty threads that twisted between rocks, gorse bushes and thistles. The heat from the August sun rose off the land.

The sharp rocks meant I had to scan the ground, and every couple of minutes I'd pause and lift my eyes to take in the land around me. This is an old habit: when a path is difficult, we see too much ground, and when it is easy, we see too little. If you want a full picture of the land you move through, it helps to look down on good ground and up on bad terrain. But pause before looking up from a difficult path or your face will meet the rocks. When passing trees, tricky paths mean you see the roots and miss the canopies; easy paths mean you see whole trees, but miss the roots.

The scan paid off. Down in the gentlest of dips between hills I saw a green beacon, a clump of trees that didn't fit the pattern at all. I made my way down towards the greenery. Suddenly I could hear and see more birds, and some pale butterflies danced across my view. There was a slight change in the smell of the air. I took in slow, deep lungfuls. It wasn't a specific odour, just the familiar rich whiff of verdancy and decay. Then I noticed the animal trails start to funnel together and intertwine, like strands of a rope. Minutes later I was standing under a grove of magnificent walnut trees, the only ones for miles around. Near it there was a stone watering trough for goats, a confusion of their hoof prints in the wet mud around it.

The trees had signalled change: they had led all the animals, including me, to water.

Trees describe the land. If the trees change, they are telling us that something else has also changed: there has been a shift in the levels of water, light, wind, temperature, soil, disturbance, salt, human or animal activity. When we learn how to spot these changes, we have the keys we need to see the map the trees are making. We shall meet the keys soon, but first we will tune into two of the big broad changes we will see.

Where conifers call the shots

After leaving the walnut grove, every large tree I saw for the rest of my walk in the Spanish mountains was a conifer. There is a good reason why.

A very long time ago, there wasn't much going on, but then evolution rolled up its sleeves. Algae appeared in the sea, then mosses and liverworts appeared on land. Soon, and by soon I mean a few hundred million years later, ferns and horsetails were spreading their simple fronds above the mosses.



Beech avenue near Insch, Aberdeenshire. © Roger Crofts

Evolution is a genius at solving problems. It worked out that seeds meant you could give offspring a start in a different location and that led to most of the plants that grow today. Next it discovered that a woody trunk allowed you to stay above the competition for many seasons without starting at ground level again each year. Boom! Trees were born.

The earliest trees belong to the gymnosperm group of plants and include conifers. They bear their seeds in cones. About two hundred million years later another tree family evolved, the angiosperms or flowering plants, and this group includes most of the broadleaf trees. They are much more diverse in appearance than conifers but tend to have flowers that are easy to see and bear seeds in fruits. Most conifers are evergreens and most broadleaves are deciduous, losing and re-growing their leaves each year.

We can normally easily identify which of these two main groups we are looking at. If a tree has dark, needle-like foliage, it is almost certainly a

conifer. If a tree has wide flat leaves and doesn't look like a conifer or a palm, it's very likely to be a broadleaf. (Palms have their own world that we will come back to.)

Conifers and broadleaves are in competition in many habitats and structural differences determine which group will succeed. The basic rule is that conifers are tougher: they can survive in many situations where broadleaves struggle. Evergreen conifers can photosynthesise all year round, even at very low levels, which means they do better than broadleaves in zones where the

summers are cool and the sun is low. The further from the equator we travel, the weaker the sun and the more likely it is that conifers will dominate. For example, we can expect to see more conifers in Canada and Scotland than in the US and England. (At even higher latitudes, as we approach the polar limits, it flips again and broadleaves reappear.) At these extremes, trees can't maintain leaves throughout the year.

"If the trees change, they are telling us that something else has also changed."



This article was extracted with permission from chapter 3 of *How to Read a Tree: Clues and Patterns from Roots to Leaves* by Tristan Gooley, published by Hodder Press and available at a special offer price to our readers; see back page for details.

How the very small can fell the very tall: the oomycete threat

Dr Dorte Villadsen, Lecturer in Conservation Science, University of Cumbria; **Dr Andrew Weatherall MICFor**, Principal Policy Officer (Woodlands and Forestry), RSPB

What are oomycetes?

Oomycetes are probably one of the most economically and socially important taxonomic groups you have never heard of.

Oomycetes can best be described as fungus or algae-like; they reproduce by spores, which means that the spread is difficult to control as spores can be carried on wind, water, equipment and people.

Oomycetes are classified as protists, which are eukaryotic organisms that are not plant, fungus or animal. Included in the group is the genus *Phytophthora* (from Greek, meaning plant destroyer); a prominent example is *Phytophthora infestans* which causes the potato blight that resulted in the Irish potato famine in the 1840s and to this day causes large yield loss in agriculture and horticulture.

Which tree species are affected?

There are several species of *Phytophthora* which are highly destructive to UK tree species. Once infected, trees develop lesions on the stem, lose leaves or needles, and eventually die. To date the most economically important attack has been that of *Phytophthora ramorum*, which in the UK attacks larch that is frequently planted for commercial forestry. To prevent the spread of *P. ramorum*, infected trees must be cut down, and the movement and procession of timber is strictly controlled by licensing. *P. ramorum* also infects several other species, including *Rhododendron* which can serve as a reservoir for spores, causing continuous reinfection.

Juniper is one of only three UK native conifer species, primarily found growing as part of rare upland ecosystems, where it supports a range of specialised invertebrates, fungi and lichens. Juniper is under threat from *Phytophthora austrocedri* which have left large parts of the population in unfavourable condition.

Effect of international trade and climate change. What can we do to prevent the spread of *Phytophthora*?

Phytophthora are true globetrotters. *Phytophthora pluvialis* was originally discovered in the USA in 2013 on a variety of trees, and was also found to cause red needle cast in Monterey pine in New Zealand. By 2021 it was detected in the UK on Douglas fir and western hemlock, as far apart as Cornwall and Cumbria, reflecting how our interconnected modern world makes it possible for not only us but also pathogens to travel far and wide. A key factor in preventing the spread of spores is maintaining good biosecurity measures, such as cleaning footwear and wheels between visits to forests. Potential sighting of infections, or more generally of unhealthy-looking trees, should be reported via Forest Research's Tree Alert online tool at www.forestresearch.gov.uk/tools-and-resources/fthr/tree-alert.

The effect of climate change on the battle between *Phytophthora* and trees is likely to favour *Phytophthora*, as

drier warmer summers will stress the trees, and wetter, milder winters will advantage the survival of the *Phytophthora* spores.

What can we do about *Phytophthora* in future?

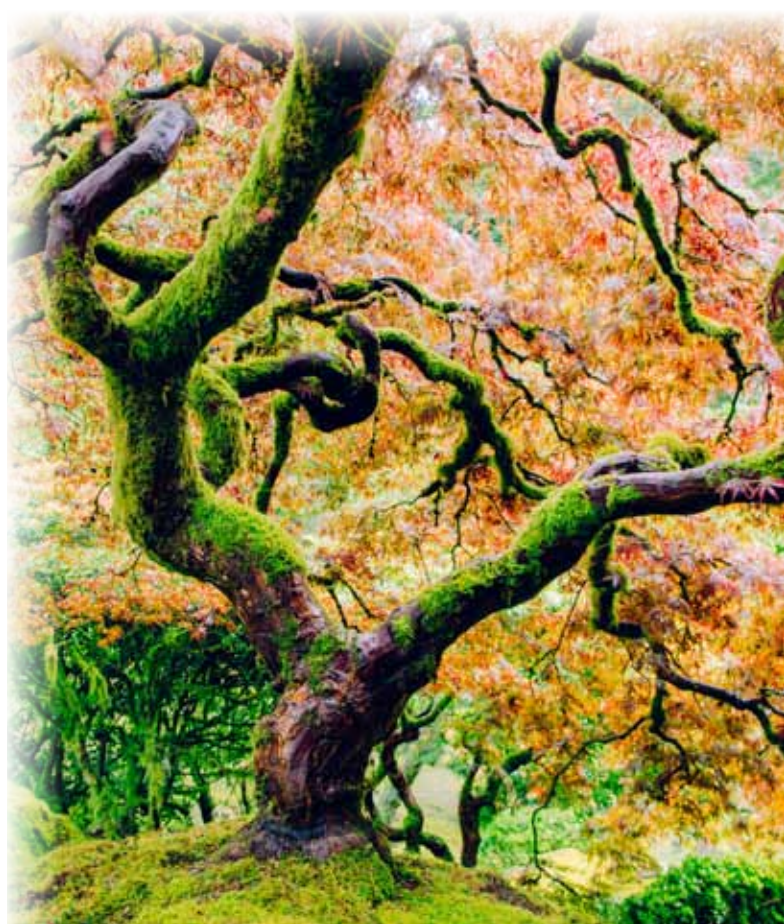
Biosecurity measures can help, but increasing resilience is the key to reducing the impacts of all kinds of pests, diseases and abiotic threats (such as drought, wind and fire). Unfortunately, all these threats are increasing in association with climate change. The level of damage they cause is often interconnected: abiotic factors can lead to stressed trees,

which then become more susceptible to pests and diseases. However, only some pests and diseases may be present within, or near to, a woodland or forest. The effect of a pest or disease on an individual host tree species and its closely associated biodiversity can be devastating, but if only one or two tree species, among a diverse range, act as hosts, the lost trees have less

impact on the woodland or forest as a whole. The continuity of canopy protects habitat and/or timber production and climate mitigation.

Oomycetes may be small, and little known, but their impacts have big lessons to teach us. Avoiding large contiguous single species blocks in commercial forest plantations by using a matrix of smaller blocks and/or species mixtures is a rational response to our experience of *Phytophthora ramorum* on larch (and our awareness of the establishment of the European spruce bark beetle *Ips typographus* in south-east England). The effects of *Phytophthora austrocedri* on juniper suggests that increasing the abundance of rarer tree species in our native woodlands would be a sensible measure.

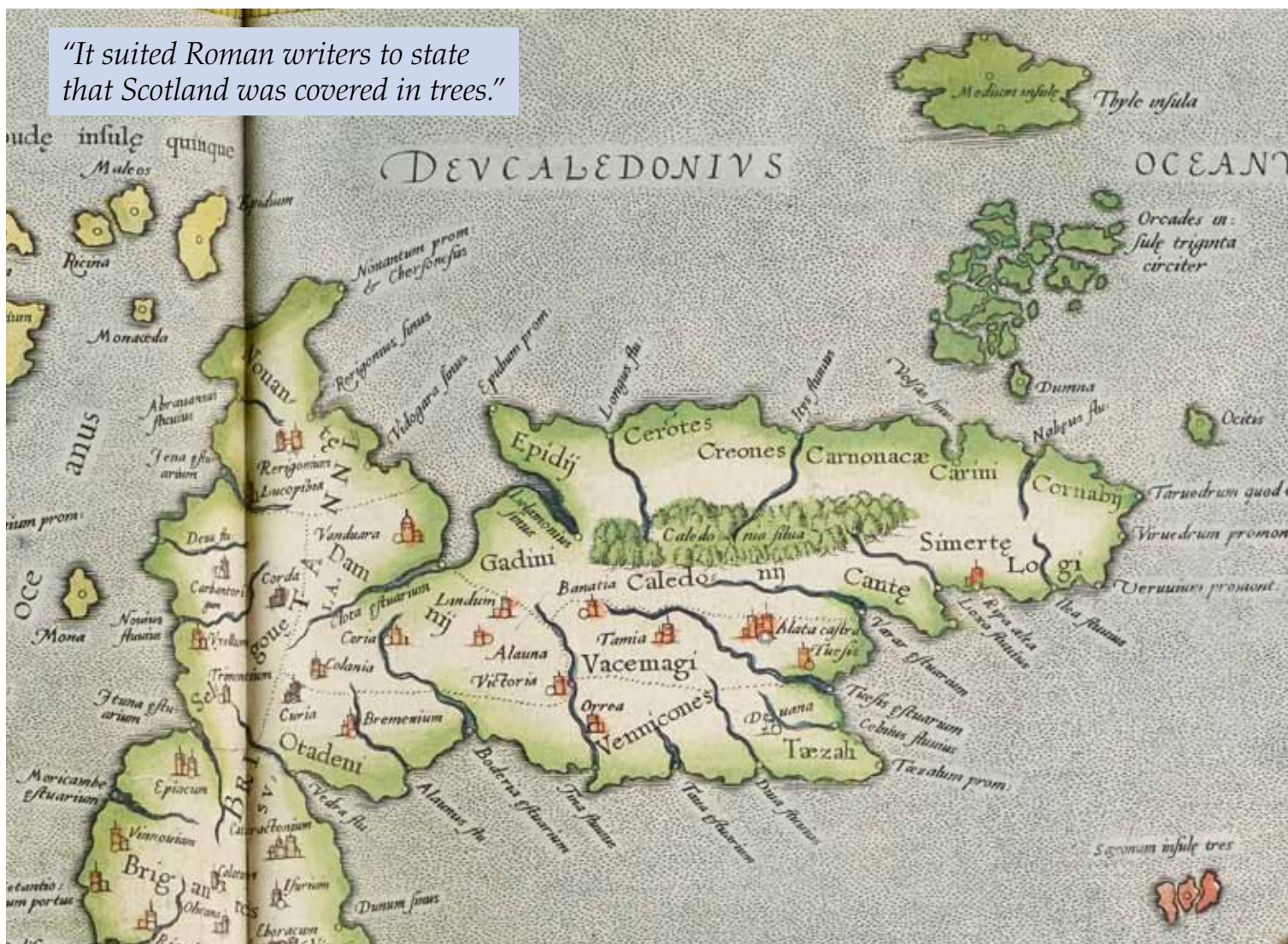
"Increasing resilience is the key to reducing the impacts of all kinds of pests, diseases and abiotic threats."



Researching trees with old maps

Chris Fleet FRSGS, Map Curator, National Library of Scotland

"It suited Roman writers to state that Scotland was covered in trees."



Ptolemy, EUROPAE I from *Geographiae libri octo recogniti iam et diligenter emendati; Cum tabulis geographicis ad mentem auctoris restituti ac emendatis*. Cologne, 1584. Image courtesy of the National Library of Scotland. View online at maps.nls.uk/view/120445502.

Lovers of trees and maps might like to think that historic maps are a vital documentary source for looking at distributions of trees and woodland in the past. However, this may only be partially true, especially if we look at the very earliest maps showing woodland in Scotland. These usually derive from the work of the Greek-Egyptian geographer, Ptolemy (Klaudios Ptolemaios, ca AD90–168). But Ptolemy never visited Scotland, and his information was drawn from a number of earlier Greek written accounts of voyages and travels, supplemented by more recent Roman and military narratives.

These latter sources often described 'the Great Wood of Caledon' – illustrated and named on this map as *Caledonia Silva* – covering a large swathe of the central Highlands. However, as Christopher Smout has argued, it suited Tacitus and other Roman writers to state that Scotland was covered in trees, not least as a way of excusing the failure of the Romans to fully conquer the natives. Research by environmental historians in recent decades has found very little evidence for the Caledonian forest covering large parts of Roman Scotland.

That said, once we speed forwards in time, we find that

maps can provide a wealth of more trustworthy information about Scottish woodland history. Woods and trees were important commodities, of value for timber, firewood, tanning and dyeing, as well as for their natural amenity and for landscaping. Where maps were compiled for those who recognised these values, such as landowners or foresters, the accurate depiction of trees and woodland became increasingly important. By the 19th century, Ordnance Survey were showing individual trees in urban areas, and various other specific land utilisation, botanical, and aerial surveys provide a wealth of detailed tree information coming up to the present day.

On the NLS maps website, we have recently put together a guide on 'Maps for researching Scottish Woodland History' (maps.nls.uk/guides/woodland), exploring how maps can help with researching trees and woodland.



An interview with Thomas MacDonell

Mike Robinson, RSGS Chief Executive; Holly McNair, RSGS Communications Officer

How did you become involved in conservation management, particularly deer management?

I was a car mechanic, then I started a fencing business with my brother. When I began thinking of nature conservation and talked to people like Dick Balharry, I began to see the flaws in what I had been doing for 15 years – erecting exclosures around the last remnant of native woodland, which in turn was the last bit of shelter and food for the poor starving deer that were in the area.

After five years, inside the fence was stuffed with regenerating woodland and outside was a billiard table, and the poor deer were standing there with glum faces because they couldn't get in, and I just realised that this is fundamentally wrong.

Have you seen the landscape change in your lifetime?

I think the biggest change I've seen has been in Glenfeshie. I could see that what we needed to do for a brighter future for everybody was to reduce the deer numbers, grow the woodland, then the native herbivores can live within the woodland and they're not excluded from certain areas by fencing. It was quite a difficult social ask, because for the majority of people that worked on the place (the gamekeepers) this was their livelihood.

Is that threat to livelihood the main reason that you met that opposition in the early days of reducing deer numbers, and is it still prevalent?

It may be there, but it's certainly diminishing considerably. I think most people see that it is a better way to deliver for the environment and for the herbivores themselves. It's an expensive time to go through; it's going to take 20 or 30 years, and someone's working life has to change.

But carbon credits, for example, might be the thing that makes it not so costly. We can see that the people buying land now are changing into corporates and pension companies, and the land value since 2015 has quadrupled in many places.

What did you say to Anders Povlsen to convince him about what should be done here?

He came to Glenfeshie and I asked him, "are you thinking about buying this place?" He said "yes" and I said "well I think we should have a chat about what you're actually buying, because I believe that the previous two owners didn't actually realise what they were buying." The two previous owners pretty much wanted to do sporting, which was against what society wanted to happen with Glenfeshie: the trees were designated under European law, and the compromise was too big. You can't have loads of deer and have trees as well. Anders was the first person to grasp the situation quickly and get totally behind how we remedy it and how we move forward. This is why we've managed to get to the place we are in 2023; because we had the backing of a willing owner who was visionary enough to see what needed to be done.

Have there been any unexpected consequences of what you've done here? Positive or negative things that have stemmed from the action you've taken that you only realise in hindsight?

I don't think there's many. We've more than doubled the natural regeneration of the Caledonian pine forest; we've planted six million trees. We bought the neighbouring estates

for 20% more than they were worth at the time, and now they're worth three times what they were then. The only thing is our running losses are still considerable. We still haven't been able to show how we can make the estate break even, and that is the real challenge. But the carbon credit market might be the thing that tips the balance, so I think it could be the biggest opportunity for land management but also the biggest threat.

Have you seen others take inspiration from Glenfeshie?

Yes, we came up with the 200-year vision for natural regeneration and there's loads of people that have adopted that kind of ethos. People in the south are trying to reduce the deer numbers now because they can't get into the carbon markets from the peatland auction because they've got too many deer. So, from an economic perspective, things on these estates are probably as good as they have been.

There's certainly a lot of people that are quite amazed with the change that has happened relatively quickly, and I'm the same – I thought it would be 60 years before we would be seeing what we're seeing now. You expect the woodland to crawl up the hill; the woodland's actually marching up the hill. We're standing here in Glenfeshie at the moment; if we go over to Glen Tromie, I believe that's going to be even more spectacular, and we only reduced the deer numbers there to the level you need to be at in 2017, so just five years and things are moving.

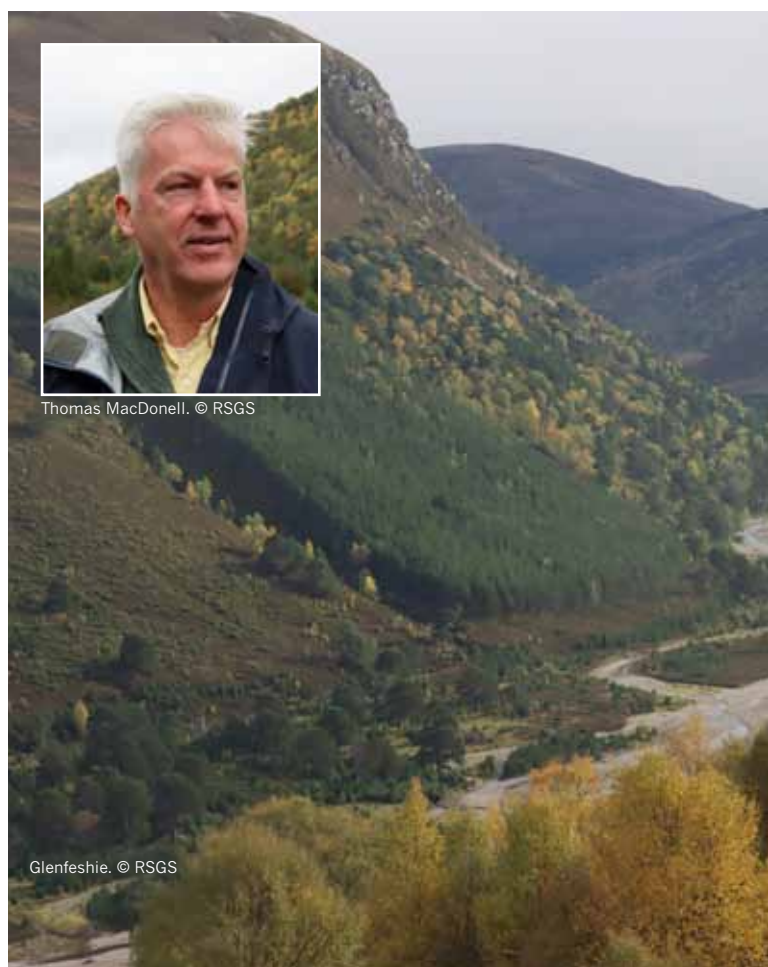
Have capercaillie got a future in Scotland?

I think that capercaillie are kind of on the edge, and it's probably to do with climate change and habitat loss. I spent some time out in Finland, and capercaillie were declining

"You can't have loads of deer and have trees as well."



Thomas MacDonell. © RSGS



Glenfeshie. © RSGS

out there as well and they were blaming habitat loss. I flew in a plane from Helsinki, over a desert of trees, and I was thinking, “bloody hell, if they’re blaming the lack of woodland and habitat loss, well then we’re snookered.” What I can say is that 20 years ago you never saw a capercaillie in Glenfeshie, and now we’ve got 13 cocks on the lek. So that’s quite significant. They’re sort of holding on by the beak, but our woodland expansion appears to be encouraging them to maintain their numbers here and let’s hope it continues.

What about other target species? Have you got other things in your sights that you are particularly keen to see?

I think the Cairngorms National Park Authority is out to consultation at the moment with beavers. We are prepared at Wildland to have a release site on our land down near Aviemore. Potentially for some farmers, they may be considered to be a pest, but in general in this kind of National Park they’re valued for biodiversity. We think that this is a good place to have some beavers, as they are ecosystem engineers. It’ll be fantastic to see what difference they make.

We’ve got ptarmigan, we’ve got a few capercaillie, we’ve got red grouse, we’ve got pine martens and badgers and ring ouzels. So, it’s not necessarily always about trying to reintroduce something; it’s about having a more robust landscape for the future. The one animal I’d be quite keen to see back here, bearing in mind that I am a crofter, would be lynx. It’s a proper predator and I think it could help control some of the more difficult species all over the place.

What is the key work you are doing with peatlands?

There were no carbon credits involved in it; we were just doing it because we wanted to make the peatlands better. And the best thing to do was to lift the water table, and therefore

pretty much the rest of it would take care of itself.

We’ve done something to 1,300 hectares of bog which we believe and hope is going to be restoration, but time will tell. At the moment it’s looking good; you can see that areas are revegetating the black areas of peat. I think we’ve still got a bit to learn, I think a bit more technique to develop to basically get the water table up. But all these are linked; it’s really a holistic approach. Although it’s good to single topical things out like peatland restoration, it’s only part of the catchment and we are trying to look at everything at a catchment scale.

What is Anders’ and Anne’s motivation for Glenfeshie?

Anders and Anne have been as much behind the 200-year vision as I have, and now we’re moving into smarter people than me within our company trying to work out how we collectively move this into the next 50 years. I think they want to use their wealth to do something good for the environment. I think he’s got an interest, he likes people, he likes the environment, it’s not too far away from his own country. I think we should just think how lucky we are that we have gotten that opportunity.

Anders and Anne Povlson, Geddes Environment Medallists

The Geddes Environment Medal was presented to Anders and Anne Povlson this summer, at an event by Loch Ness. Their company, Wildland Ltd, has the simple, yet profound, objective of repairing, restoring and protecting vulnerable habitats and ecosystems, and ensuring sustainable development of the properties they own. The Povlsons have demonstrated over their years of ownership of the Glenfeshie Estate, since 2007, that they are serious about repairing the ecological damage from poor previous management, by removing red deer and allowing the natural vegetation to recover, which they have done in abundance.

RSGS Vice-President Professor Roger Crofts remarked, “The company and the owners and manager are exemplary in my experience in having a long-term vision: a demand to make a real difference for nature and for local people, and to enhance the experience of visitors. It is clearly working in Glenfeshie and is beginning to take hold at the more recently acquired properties.”

RSGS Chief Executive Mike Robinson presented the award, and said, “For most of my life I have watched the nature of Scotland diminish, surrounded as we have been by a denuded landscape of overgrazed ‘mamba’. It has felt as if we are watching our country slowly dying. But now, as you travel north to Glenfeshie, you pass significant pockets of landscape that are springing back to life: saplings bursting free of the heather, of all shapes and sizes, striding their way back up our mountains and across our hillsides. And the greatest jewel of these has to be Glenfeshie. Anne and Anders Povlson, and Thomas MacDonell, have worked wonders to bring our countryside back to life, and have demonstrated a remarkable and positive vision for the land, for buildings, for employment. It takes real foresight, selflessness and imagination to plan for the long term and to create a 200-year vision, and it takes determination, leadership and commitment, and a strong sense of purpose to enact that vision.”

“We are trying to look at everything at a catchment scale.”

Thomas MacDonell is Director of Conservation and Forestry for Wildland, which manages several Scottish Highland estates in a long-term programme of landscape-scale conservation, under the ownership of Danish billionaires Anders and Anne Povlsen.



1.



2.



3.

The tranquillity of trees

All images © Christopher Swan, Christopher Swan Photography, www.christopherswan.co.uk.

1. Legs, Knapdale, Argyll and Bute. | 2. Rock and Tree, Glen Nevis, Southern Highlands. | 3. Twisted, Loch Tulla, Southern Highlands. | 4. Woodland Colour, Glen Croe, Argyll and Bute. | 5. Prevailing Wind, Snow-Plastered Trees, Borders. | 6. Inchtavannach Autumn, Loch Lomond and The Trossachs. | 7. A Return to Halloween Woods, Perthshire. | 8. Birch Trees at Dawn, Mòine Mhòr, Crinan, Argyll and Bute. | 9. Winter is Coming, Millarochy, Loch Lomond and The Trossachs. | 10. Caorunn, Isle of Skye.



Imagining our future woodlands

Professor Roger Crofts CBE FRSE FRSGS, RSGS Vice-President

Watson Birds and the Galloway Glens Landscape Partnership jointly held a workshop involving community, environment, farming, forestry and landscape interests, to look forward collectively at our future woodlands.

A new mood is needed to move from confrontation to dialogue, and from consultation to engagement of all parties. More trees in all forms are part of our global future. More sensitive approaches to planting and management of woodlands and forests are urgently needed, using a greater variety of species and designs bearing in mind environmental needs and the communities' wishes. The forestry and timber industry should be less defensive and make greater effort in recognising the issues that others are concerned about, and address them in a positive manner.

Greater recognition of the wishes of people about landscape, scenery, beauty and amenity is needed in decisions about planting and management of trees, woods and forests. The emphasis must be on meaningful engagement of

communities throughout the cycle of decision making on woods and forests management, not just on consultation about planting proposals.

Scottish Government needs a more innovative regime for forest and woodland funding, with more integrated policy and action. Trees should be built into future farming. This requires a regime change in government and attitude change within the farming community. Among the suggestions for consideration were to divert government grant aid from commercial tree planting to provide an income stream for farmers for investment in trees; use a public interest test to stimulate on-farm tree planting similar to that for biodiversity in the National Planning Framework; rebalance planting grant to 50/50 conifer/broadleaf; and bring forestry down the hill, therefore creating woodland livestock grazing opportunities.

"More trees in all forms are part of our global future."

"By leaves we live"

Clive Mitchell FRSGS, Outcome Manager, NatureScot

So said Patrick Geddes about 100 years ago. From leaves we get soils, and soils regulate the global carbon cycle.

Our linear extractive economy short-circuits the global carbon cycle and is a cause of the climate–nature crisis. A circular economy will have to be part of the solution.

Maximising productivity and yield from the land has transformed biodiverse and complex, often wet, landscapes into simpler, drained and less diverse ones. From 'rough' to

'smooth'. Heavy machinery compacts soils which in turn prevents water flow into soil, impeding key natural processes. Land now accounts for 50% of Scotland's net greenhouse gas emissions. Land cover is more

"A circular economy will have to be part of the solution."

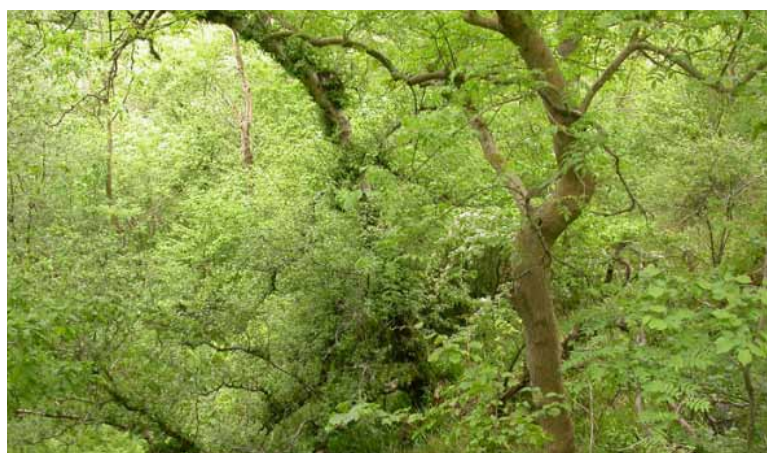
vulnerable to the pests, pathogens, disease, floods, fires and drought that come with a changing climate. This degraded landscape is illustrated in the top image.

In a circular economy, land use is based on regenerative practices for soil health, illustrated in the bottom image. Restored, re-wetted, peatlands sit alongside diverse woodlands, including some broadleaf commercial hardwood forests with an understory for nature and non-timber products. Woodland will be more fully integrated with farmland, with organic fertilisers from livestock on mixed farms, more inter-cropping, cover crops, hedges and trees in the landscape. Grazing pressure, especially from deer, will need to be much more carefully managed for these multiple benefits. Landscapes will, overall, be more complex and diverse: rougher, messier, more resilient.

Managing for more products from a given area of land over the course of a year, or multiple years, spreads risk. Hedging bets rather than picking winners will have to be routine practice in the more chaotic climate that comes with the next degree of warming by the 2050s, three times faster than the



Land use transformations for net zero, showing overgrazed and degraded woodland (above) and woodland with a healthy moist understory (below). © Kate Holl, NatureScot



last one. On land, addressing the triple challenge of net zero, climate risks and the state of nature is the key to food, fibre and water security.

The climate–nature crisis is a social and a scientific problem and requires working across boundaries. Spatial distribution, of land and its potential uses and of climate risks, puts geography at the centre. By leaves, indeed, we live.

Reviving southern Scotland's lost woodlands

Charles Dundas, Chief Executive, Borders Forest Trust

Founded nearly 30 years ago, on the belief that native woodlands can be re-established in the barren southern uplands where sheep have been grazed for centuries, Borders Forest Trust (BFT) is a conservation charity with a vision of the future which sees native woodland providing the base for whole damaged ecosystems to revive and regenerate.

This is not conservation in the sense of preserving what is left, nor restoration in the sense of returning the landscape to a fixed point in time, but rather returning nature to a state of health and balance, to work with nature, rather than against it, and to undo generations of degradation of the land.

Carrifran valley near Moffat was the first site BFT purchased. A symbol of the valley then was a solitary rowan clinging to the bank of Carrifran Burn. That same rowan won the award of Scottish and UK Tree of the Year 2020. It now is surrounded by its own little forest of progeny as well as 750,000 volunteer-planted new trees of different native species filling the valley.

Corehead Farm and the Devil's Beef Tub were brought under BFT's management in 2009, and over 200 hectares of new native woodland have been planted over the valleys of Tweedhope, Whitehope and Lochan Burn, alongside a new orchard, wetlands and flower-rich meadows.

The Talla and Gameshope estate came into the ownership of the Trust in 2013. The largest acquisition at over 1,800 hectares had only some remnant of vegetation left along the Gameshope Burn due to years of sheep grazing, but regeneration soon started to appear after sheep were taken off, and these fragments of woodland have already started to spread, joined by newly planted young trees. In 2021, coinciding with its 25th anniversary, Borders Forest Trust planted its two millionth tree at a ceremony by Talla.

In early 2023 the most recent acquisition was made: Ericstane North, which is contiguous with the existing Corehead and Devil's Beef Tub land. Excitingly, this includes a rare ancient wood pasture site at Dairy Wood, with several impressive veteran trees which are currently being assessed by a leading dendrochronologist.

Without focusing on any one species, the Trust plans its restoration work around three main native habitat types: creating woodland with native species appropriate to the terrain, extending this by restoring montane woodland species on higher ground (between 600m and 800m) above the natural line of tall trees, and restoring existing peatland,

which is mostly deep blanket bog, to a healthy condition.

This is all long-term work, of course, establishing habitats which will gradually evolve over decades, while the Trust maintains and monitors the natural development and interaction of these ecosystems. In just 20 years, as the woodland has developed, Carrifran has seen a change to woodland birds rather than grassland birds, with far greater species diversity. Flora that could not survive grazing pressure is now flourishing.

Montane woodland is an extremely rare habitat anywhere in Britain now, and there is little information on its extent in the past. But the topology of BFT's Wild Heart Sites where over 60% of the ground is at 600m or over means that this is an important habitat to establish. It is also the most challenging, in terms of both planting and funding. Fortunately, this neglected habitat has found funding support from the Woodland Trust and NatureScot's Biodiversity Challenge Fund.

The varied underlying geology means that the blanket bogs of the Wild Heart hold no fewer than 22 of the 39 British species of *Sphagnum* mosses. Over a third of the species of bryophytes in Scotland have been recorded on BFT land, so conserving and improving the quality of this habitat here is important for biodiversity at a national level. With its purchase of Carrifran back in 2000, BFT was one of the first landowners to start stabilising areas of peat erosion by stopping run-off. This peatland restoration work is now co-ordinated on a much larger scale and is funded through NatureScot's Peatland Action Programme, and private sources including sales of carbon.

At the root of BFT's work is a belief in nature's resilience. Nature can be revived where it has been exploited, and will repay those who support its processes rather than try to control them. Whole ecosystems can recover given the chance and some sympathetic help. It is not an overnight process, and the work of BFT's dedicated volunteers and supporters is central to the success which can already be seen. The vision of 'Reviving the Wild Heart of Southern Scotland' needs long-term commitment, but that determination already shows results.

"The Trust plans its restoration work around three main native habitat types."

Carrifran in 2000, before planting. © Borders Forest Trust

Carrifran in 2020, with trees spreading. © Borders Forest Trust

Imagining our future forests and woodlands in Galloway

John Paterson, EGGER

I was born and grew up on a small Galloway hill farm in the 1960s and 70s and have recently returned to build a new home there. I love to look at the wood I have used inside, and I'm fortunate to be able to view the forest where it was grown from my window.

Statistics paint a varied picture. In the latest UK Public Opinion of Forestry survey (2021), 88% said woodlands were important to them and 82% agreed "a lot more trees should be planted" to counter climate change. Woodland cover is only 14.5% in the UK, and 81% of all the wood products are imported, costing £8.5 billion in 2021. This isn't healthy for the environment, as exporting countries have lower forestry standards adding to pressure on fragile global forests. We must do better.

Wood is all around us. In Scotland, 85% of new homes are built with timber frames (but only around 25% in England) and it's vital we do even more, rather than constructing with energy intensive concrete, block and steel, which are costlier in both economic and environmental terms. Wood is also in our kitchens and bathrooms, and our floors. It's in our fences and decks, and the pallets that deliver vital goods, including food and medical supplies.

I've worked for over 35 years for EGGER, which produces a decorative chipboard for our homes at factories in Hexham, Northumberland and Auchinleck, Ayrshire. They employ close to 800 people, with the Ayrshire plant providing over 120 quality jobs and a thriving apprentice programme. Our company has sourced large quantities of timber from the Galloway forests for many years and we are committed to sourcing all our timber from within 100 miles of the plants.

So I'm a tree person. I've supported the increase in planting in recent years, but I know not everyone agrees. I understand that the so-called 'clearfell' of a forest can leave an area looking bare and unattractive. I know people don't like large timber lorries going through their villages, and some have a visceral hatred of Sitka spruce.

But I know the forestry industry works to the highest standards – the most regulated rural industry. It is very safety-conscious and constantly works to invest in rural roads to make timber movements safer, and examines policies on

when and how forests are felled, and what comes next. And I know for sure that the dense Sitka plantations of the 1970s and 80s are superannuated!

Modern forestry is all about mixed-species forests which deliver multiple benefits. Environmental impact assessments are detailed and rigorous. The local landscape, wildlife and people are at the heart of forest plans. If you think this isn't true, report bad examples of forestry practice to Scottish Forestry. It's not in the forest industry's interest to be a bad neighbour. Confor, the industry's representative body, is working hard to ensure that communication and consultation with communities where forests are planted and felled is high-quality and consistent. Like all industries, forestry will sometimes get it wrong. But the industry is working hard to do better, and wants to be that good neighbour.

I fully understand that rural Scotland has to balance forestry interests with a wide range of other land uses, including farming. One criticism is that trees are planted on high-quality agricultural land, which is very much not the case. There are clear guidelines for where forests should, and should not, be created. The focus is very much on planting on poorer-quality land that is not suitable for sustainable agriculture. More farmers are also understanding that forestry and farming can co-exist in a way that benefits a rural business, by providing shelter for animals, and a long-term income to help it diversify. The public forestry bodies are doing great work with the farmer-led Integrating Trees Network (www.farmingforabetterclimate.org/integrating-trees-on-your-land) to help break down the barriers and to encourage more farm forestry.

Forestry can also co-exist with recreation (walking, and mountain biking in Glentress, for example) and tourism. Across Scotland, it employs more than 25,000 people and adds £2 billion to the economy every year.

We should celebrate the success of our forest industries, as other countries do, and embrace a green future where Galloway is home to modern, mixed forests, supporting the local and national economy and environment. Do you want your timber decking, fences and kitchen units to come from local forests supporting Scottish jobs? I know I do.

And these forests can also attract people to Galloway. The south of Scotland is included among 30 global destinations in the Lonely Planet's *Best in Travel* guide for 2023. It highlights "extensive forest cover" as one of the reasons why tourists like to come here.

"Modern forestry is all about mixed-species forests which deliver multiple benefits."



Timber cladding sawn from larch, north Galloway. © John Paterson



Stand of Sitka spruce, Galloway. © John Paterson



Use of Galloway-grown Sitka spruce in sustainable house construction in north Galloway. © John Paterson

A fisheries perspective

Jamie Ribbens, Galloway Fisheries Trust

The poor health of keystone aquatic species, such as the rapidly declining Atlantic salmon and the critically endangered freshwater pearl mussels, indicates that all is not well in our rivers and burns. In order to deliver biodiversity improvements and increase resilience to the impacts of climate change, the restoration of freshwaters is crucial. The management of trees and forestry plays a significant role in this restoration by helping rivers to function more naturally, improving water quality and habitats.

The large-scale afforestation of the Galloway uplands with Sitka spruce since the 1950s has significantly degraded the water quality of its rivers. The extensive draining of deep peat, in order to create suitable conditions for growing trees, was particularly damaging and resulted in the acidification of many surface waters. Conifer trees are effective at scavenging pollutants from the atmosphere at higher altitudes and this has meant that pH levels further dropped. Acid flushes, particularly those below pH5, can stop salmonid eggs from hatching effectively, and increase the levels of labile aluminium which is particularly toxic to many aquatic species, especially fish. The base-poor geology typical of these uplands provides little opportunity to neutralise the acidic inputs.

This blanket afforestation occurred at a time when the environmental impacts from planting on deep peat were poorly understood, but this is not the case now. New planting schemes do not occur on deep peats (>50cm deep) but there is an urgent need when restructuring the existing forests to

stop all replanting of conifers on deep peat. Present-day forestry standards are helping to address the problems associated with old-style blanket forestry, and it is now possible to return afforested deep peat sites back to functioning peatlands.

Establishing more native riparian woodlands is essential in helping rivers to function more naturally and increase their resilience to the impacts of climate change. Scientific modelling has shown that Scotland's rivers are particularly vulnerable to increasing water temperatures, high enough to kill species like brown trout, as well as a higher occurrence of extreme flood events, driven by climate change. The shading from riparian trees is effective at lowering water temperature, tree roots help to strengthen riverbanks from erosion during large floods, and woody debris within watercourses plays an important role in helping to slow down water flows and provide natural flood management. There are many exciting initiatives now working to establish extensive riparian woodlands, including 'riverwoods'.

"Establishing more native riparian woodlands is essential."



Riparian woodland in Galloway. Image by tebizile from Pixabay

Communities and commercial forestry

Morag Paterson, 'Talking Forest' artist, mentor and community councillor

With tree planting in Scotland high on the government agenda, many communities are struggling to deal with the surge in new woodland creation initiatives and the perplexing consultation process.

What is so difficult to capture in writing is the genuine stress and anxiety caused by a complex mix of factors, including an inadequate framework for consultation, power imbalances, a lack of cumulative impact assessments, and not enough safeguarding to ensure a just transition in land use change policy. Discussions and meetings can be highly polarised and lacking in empathy.

Before completing this article, I had to 'pop out' to a local meeting. Residents from 16 local houses were trying to persuade a forestry company to guarantee their water supply over the lifetime of a forest rather than the five-year offer on the table, given the planting proposal was alongside the water supply extraction point. After the discussions ended in stalemate, it remains to be seen whether the regulator, Scottish Forestry, will find in favour of the residents.

These tensions may have contributed to declining public support for forestry, as reported by Forest Research. The industry body, Confor, described this trend as "sobering".

The forestry sector believes that communities need better education about forestry's merits, and that the industry is unfairly judged based on past mistakes. However, evidence

"Involving communities is about more than just mere consultation."

as reported by Professor Anna Lawrence and me, highlighted in our *Communities' experiences of new forest planting applications in Scotland* study, points in the opposite direction. Issues raised included the impact on private water supplies, loss of scenic views, alterations to the landscape, timber transportation, no assessments of cumulative effects, and concerns about biodiversity and resilience. Wildfires and excessive fencing-off of land are also emerging community concerns.

It's not all bad news, with, for example, Confor collaborating with Communities for Diverse Forestry to develop best practices and training for foresters. Still, there's an urgent need to do more to provide information and advice.

Involving communities is about more than just mere consultation. Engagement should fundamentally be part of a transition towards a community wealth-building approach to commercial forestry. The focus must shift from relying solely on broader societal, environmental and economic gains, to incorporating requirements for integrated benefits for local communities.

For this to happen, we need a mindset refocus by decision-makers and developers to allocate resources and training to empower communities to participate in local decision-making on woodland creation (and management) and to hard-wire local benefits into the upcoming changes to the forest grant scheme.

Branching Out: public involvement in street tree research

Dr Peter Wood, Associate Lecturer, The Open University in Scotland

A climate emergency has now been declared by local councils serving over 90% of the UK's population. Whilst stopping global warming means rapidly reducing the greenhouse gases let into the atmosphere, other measures are being deployed to remove CO₂, the most prominent of which is tree planting. This has the benefit of both removing existing emissions from the atmosphere and helping societies adapt to the new climate. Yet despite trees being an ever-present part of the landscape, surprisingly little research has been done on how people value them in social and cultural terms, particularly in urban areas. This matters because these important social and cultural aspects are rarely considered in decisions made about urban trees and treescapes.

The Branching Out project I'm currently involved with is researching how trees in urban landscapes are valued and understood by the people who live amongst them. We're working with panels of local citizens and professionals to create better understandings of the 'life frames' for how people live 'in, with, from and as' treescapes. In other words, how people live: *in* locations where trees create a sense of place; *with* or alongside trees that provide a space for nature, irrespective of humans; *from* trees, such as eating their fruit or enjoying their cooling shade; and *as* relationships with trees, such as families creating treasured memories of playing amongst trees.

Our research follows the principles of co-production, which holds that the beneficiaries of research, such as public and practitioner groups, should have opportunities to be involved in that research, not only professional researchers. One area where these principles are increasingly deployed is 'citizen science'. It is now recognised that citizen scientists should be included as active participants in the process of creating knowledge, so designing and carrying out experiments, contributing their own expertise and perspectives, rather than just getting the results handed to them when the professionals have finished. In turn, this means that citizen scientists do more than just collect data for free; through taking part they should become empowered and informed, so building the collective public understanding required by a healthy democracy. For example, better, wider understanding of how people value trees will strengthen our efforts to use trees to prevent climate breakdown.

In my courses for the OU, I'm used to supporting the Treezilla citizen science platform (treezilla.org) in student projects to map and measure trees. This free software allows students to

log the vital statistics of trees they visit in person, or that they visit through virtual fieldwork using Google Streetview. Treezilla then produces estimated financial values of some of the key benefits that those trees provide; ecosystem services such as CO₂ captured or potential flood water intercepted.

Branching Out does something a bit different. We're combining a truly diverse range of citizens and professionals from the cities of Cardiff, York and Milton Keynes, with researchers from The Open University, Loughborough and York, from the government's Forest Research, industry partners Ecologos Consulting, and the local councils of our host cities. Together, we are working to understand what trees mean to the people of those three cities, in the past and the present, in order to create visions for how each city's treescapes could improve lives in the future. As a geographer, I have found this a fascinating insight into the similarities and differences of how people live with trees across Britain. As an academic based in Scotland, I'm also working on our follow-up project, 'Branching Beyond', which will translate the findings to other local councils, including Edinburgh.

A background in geography helps with interdisciplinary research. Although I am working on the project as part of the OU's faculty of Science, Technology, Engineering and Maths, some of our most interesting methods and findings have included storytelling, in which local citizens have let their creative juices flow as qualitative data. The visions have often mixed fears for climate change with a focus on continuity; valuing trees for having lives that span generations, and which provide a sense of stability amidst life's changes.

In coming months, we will be producing the project's findings; launching a 'life frames' model for practical use in government, landowner and community action, along with educational settings. Once released this will be a vital resource, and not only for valuing the social and cultural aspects of trees. Most importantly, it will support local citizens to take part in democratic decision making around how the places where they live will prevent and adapt to climate change.

"We are working to understand what trees mean to the people of those three cities."



To learn more about the Branching Out project, visit www.uktreescapes.org/projects/branching-out.

The urban forest: helping cities adapt to extreme heat

Dr Madalena Vaz Monteiro, Urban Forest Scientist, Forest Research

The urban forest, which includes all the trees in public and private spaces within an urban area, is an essential component of any urban fabric. An urban area without trees would make for a very bleak place, and while we may not always acknowledge the trees' value amid the wider built environment, they are always working towards making it more pleasant, liveable, and sustainable.

Trees give character to a place. They make urban landscapes more memorable, attractive, and affluent. They are vital to people's health and general wellbeing, they house and offer food to urban wildlife and help protect against traffic noise. They can also intersect storm rainfall, diminishing flooding, and capture and disperse harmful air gases and particles, improving air quality. While on occasions the presence of trees can raise issues in urban areas, these are normally outweighed by the range of benefits they provide, and problems can be reduced through good urban design strategies and expert tree selection.

One benefit offered by the urban forest that is becoming increasingly appreciated in large or densely urbanised areas arises from the trees' ability to impact air temperature. Periods of extreme heat are becoming more commonplace worldwide and these can be devastating for human lives and livelihoods. The most vulnerable, like the youngest or eldest, are particularly at risk of suffering from heat related illnesses or death. In urban areas, extreme heat can be exacerbated by the urban heat island, the effect where urban areas experience higher temperatures than their countryside surroundings. The urban heat island effect is derived from a combination of factors including the composition of the built environment (that tends to absorb and store large quantities of solar radiation during the day and release heat during the night) and the people living therein (who produce added heat through everyday activities).

"The urban heat island can be cost-effectively counterbalanced by the urban forest."

The urban heat island can be cost-effectively counterbalanced by the urban forest. Trees, like other plants, evaporate water and transpire the water vapour to the atmosphere. During this process a considerable amount of energy is used and so the tree canopy is cooled without warming the surrounding air. Urban trees also provide shade, protecting people directly from the warming sun, and absorb less solar radiation than many building materials, reducing the amount of heat stored and released.

As human beings, we inherently recognise the cooling properties of trees and have exploited them throughout history. Yet there is often a disconnect between this built-in knowledge and planning policy aimed at climate change retrofitting in many towns and cities. This is especially true in countries, such as in the global

north, where extreme heat events are only now becoming a concern. One way to bridge this disconnect is by collecting more localised evidence of the cooling properties of different urban trees, planted in different contexts, and Forest Research is working to help fill this knowledge gap. Preliminary results from an ongoing monitoring campaign measuring air temperatures in several streets in Bristol, UK with and without trees show that in warm periods, such as in the 2022 heatwave, streets with trees are on average 2.5°C cooler than those without trees. In some conditions, the difference has reached 5°C. There is more to unpick, but the research is starting to show the important role of street trees in providing urban cooling in temperate climates. This builds on work by Forest Research that previously demonstrated the cooling benefit of urban greenspaces. For example, cooling of up to 4°C over an area of up to 440m distant from large greenspaces.

Urban trees are only able to provide their cooling and wider benefits if they are healthy and attain their full size. Trees require the right start in life, space to flourish, and the water and resources to thrive throughout their lives. The right trees in the right places managed in the right way can help urban areas combat the challenges of the changing climate, including those posed by extreme heat.

You can find more information on Forest Research's work in this area at www.forestresearch.gov.uk/publications/the-role-of-urban-trees-and-greenspaces-in-reducing-urban-air-temperatures.

OS's crucial role in protecting our natural environments

Kate Patfield, Senior Press Officer, Ordnance Survey

Most people will quite rightly and fondly associate Britain's national mapping service, Ordnance Survey (OS), with walks in the countryside, clutching a compass and fold-out map, or heads-down checking routes on their OS Maps app. OS is proud of its longstanding heritage – creating maps for more than 230 years – and its proven world-leading expertise in location data. But it also has a crucial role to play in an increasing number of sustainability programmes, ultimately helping to protect and preserve our natural environments including trees, forests and vegetation in the face of climate change, as well as identifying where land has been left derelict or has been deforested.

Where the UK is leading the way in climate adaptation by using space-derived data to monitor and understand the effects of climate change, the role of location (or geospatial) data is crucial. The whole planet is being monitored in very regular cycles by satellite, producing Earth Observation (EO) data. But this data has to be anchored to actual locations to be effective and deliver powerful insight. We have to know we are looking in the right place to assess change, and this is where OS is playing a vital role. Having monitored and mapped the landscape of Great Britain for centuries, OS has been able to develop new capabilities, skills and the authority to bring EO and location data together to enable really effective monitoring.

OS is currently working with Natural England and scientists from Durham University at Thorne and Hatfield Moors in Yorkshire, where pioneering geospatial technology is helping to monitor the restoration of the nation's peatlands, which have been diminishing over centuries. Peatlands occupy 12% of the UK's land area and store vast quantities of carbon – but it is estimated that 80% has been degraded as a direct result of drainage for agriculture, burning and peat extraction for horticulture. Also known as moors, mires and bogs, peatlands are terrestrial wetland ecosystems formed from carbon-rich vegetation that has taken millions of years to decompose. They are the largest natural carbon store on land, storing more carbon than is currently in the global atmosphere, and have a cooling effect on climate change.

So how have OS experts been able to help? They have been using a new monitoring and verification service called OS VeriEarth®, which combines satellite and ground-based data with location intelligence to visualise a baseline of the habitat

in a target location. The data is used to accurately record different vegetation types, provide reporting on vegetation cover linked to greenhouse gas emissions, and monitor the water table. The data will enable Natural England to assess the site's condition and in future monitor changes across a large site area with a high degree of accuracy. This baselining and monitoring technique could be rolled out nationwide

to increase and validate investment for large-scale peatland restoration projects, from carbon offsetting or carbon credits to helping to protect against greenwashing claims.

Donna Lyndsay, Strategic Market Lead at OS, said, "We need to protect our peatlands so they are healthy and rich in wildlife. Using accurate geospatial data and our technical expertise we can provide valuable insights and evidence to ensure we are preserving carbon sinks and optimising site management.

This type of project highlights the need

for viable solutions to combat the risks of climate change and demonstrate how accurate geospatial data can provide credibility in nature-based restoration for investment. This ensures that organisations and landowners are effectively preserving and restoring our peatlands, woodlands or any other nature-based solutions."

In another project, backed by the UK Space Agency, OS collaborated with the National Centre for Earth Observation, using satellite data to monitor and map heat in urban locations. The aim was to provide meaningful insights for policymakers to manage the impacts of

climate change in hot spots across the UK and further afield. Geospatial data can be combined with other datasets such as weather to unlock insights into the impact of climate change.

Donna commented, "One of the really important aspects of this heat mapping imagery is proving definitively what we already suspected; that the presence of vegetation in urban neighbourhoods means these areas are much cooler than those without. Higher levels of tree cover and green space, or both, can make a drastic difference to temperature. So as we look to the future, there is a strong impetus to map cities as sustainably as possible, with more green space and tree cover, to help mitigate the risk of serious heat events."

Visit www.ordnancesurvey.co.uk/betterplaces/sustainable for further information about how OS can help protect and preserve the environment.



OS experts capturing field data onsite at Hatfield Moor.
© Thorne and Hatfield Moors peatlands project

"Higher levels of [urban] tree cover and green space can make a drastic difference to temperature."

An example of heat data overlaid on OS mapping. Heat data is provided by the National Centre for Earth Observation.



Forests for carbon

Dr Mas Smyth FRSGS, Crichton Carbon Centre Co-founder, and RSK Group Non-Executive Director

The UK Government targets for woodland expansion have resulted not only in the gradual creation of some beautiful native woodlands, but also in the rapid expansion of commercial conifer forestry in the more remote, western parts of the country. It used to be argued that these quick-growing spruce crops are carbon beneficial, but several recent papers now question the climate benefits of plantation forestry, and reveal that commercial plantations in Scotland are emitting much more carbon than expected. Ditches, streams and rivers in afforested catchments are now heavily loaded with carbon; plantations are losing carbon through the drains.

For decades, spruce crops were being planted on deep peaty soils. The plantations were engineered using heavy machinery: ditching, draining, and earth-moving, breaking up the soil which had been holding the carbon. Networks of ditches and drains are excavated in order to flush away water and encourage the rapid growth of Sitka spruce crops.

Natural England scientists have repeatedly shown that carbon is stored more permanently in the soil than in biomass, so this conversion of peaty grassland into conifer crop results in a loss of permanently stored soil-carbon. Forest researchers also recognise this, and Scottish Forestry guidelines were tightened in 2021 to discourage new plantations on deep peat and to reduce cultivation intensity. Yet in 2022, Scottish Forestry data show that clear-felled sites are still being replanted on deep peats, and drainage is still continuing on carbon-rich peaty soils, which would be better left intact for storing carbon and retaining biodiversity.

The carbon loss from plantations on peat is now damaging rivers. Afforested headwaters have become so polluted with organic sediment that they can no longer support their usual river life. The peaty colouration is becoming so strong that, in sunlight, the water becomes too warm, lacking sufficient oxygen for fish. Salmon have become locally extinct. Drinking water supplies are increasingly expensive to treat. The problem is acute in south-west Scotland, where data from SEPA and the Galloway Fisheries Trust show that afforested headwaters contain high levels of organic carbon, and lethal spikes of acidity.

Several researchers illustrate how woodlands interact with their soils and soil-life in wonderfully beneficial ways, reducing floods and conserving soil moisture, but few recognise that drained and cropped conifer plantations are not equivalent to woodlands. Papers from the Centre of Ecology and Hydrology state clearly that ditches and drains are the overriding reason for peatland losing its carbon.

“Acidity? Its aye been”

Some continue to argue that river water acidity results from historic air pollution, which caused soil pollution, and that soils can accept a ‘critical load’ of pollutants. But checking the underlying assumptions and methodology used by those acid-rain researchers shows they focused on the inorganic pollutants (NO_x and SO_x) and removed the organic acids from their peaty river water samples. Organic acids were indeed present in the rivers, but were assumed natural, from the peaty soil. Fast-forward 50 years, and in those areas where the protective mosses have been lost and where

the ditches have multiplied, the ‘natural’ organic acids in the headwaters have also multiplied. If you could peer through the dark spruce canopy, you would see acres of effectively bare peat eroding into the rivers. Persistent and increasing river acidity is not only a slow-recovery historic accident; it records the carbon flowing out of peat which has lost its layer of moss.

Too many spruce plantations are established and re-established by draining and disturbing peaty soils, which then release carbon and impair river ecosystems. The incentives, the grants and tax breaks driving these changes, need to be corrected if the UK wants a better kind of future forest. Surely investors and policy makers ought to consider the impact of draining peaty soils, and recognise the damage being done by rapid afforestation and restocking? Perhaps carbon offset payments should be audited, and carbon taxes made payable where necessary.

The wet west coasts of the UK lie within the Atlantic rainforest zone. The natural ecosystems favour wet woodlands and peatlands. Therefore, the best solution for carbon and biodiversity conservation would be to encourage recolonisation of those wet woodlands with a biodiversity-rich mosaic of bogs, pools and peat interspersed with more appropriate woodlands, using the species and silvicultural techniques not requiring drainage.

We wanted more forests. But in parts of the UK, we have been incentivising the wrong type of forest, in the wrong place, using the wrong techniques. If we want woodlands to lock up carbon for centuries, we need to move away from draining and disturbing peaty soils to suit plantations, and instead develop more sustainable models of forestry and soil conservation.

FURTHER READING

M A Smyth (2023) *Plantation forestry: Carbon and climate impacts* (Land Use Policy 130, doi.org/10.1016/j.landusepol.2023.106677)

“Drained and cropped conifer plantations are not equivalent to woodlands.”



Acidic peaty water from a Sitka spruce plantation flowing into Cairnsmore of Fleet NNR. © Mas Smyth

The tree in the bog

Clifton Bain FRSGS, IUCN UK Peatland Programme Adviser

Woodlands and peatlands are two of Scotland's most iconic and fascinating landscape features, each recognised as holding important biodiversity and providing valuable ecosystem services. But it is their coexistence that has often been overlooked. The 19th-century Irish folk song *The Rattlin' Bog* tells of the rare 'splendid' bog in which there was an equally significant tree. Sadly, there has been much confusion and polarised debate about the relationship between woodlands and peatlands that is overshadowing an urgent need to safeguard and restore both these ecosystems in a way that recognises their intimate ecological connections.

At a global level the International Union for Conservation of Nature (IUCN) has recognised the need for both peatlands and forests to be included in all intergovernmental agreements on climate change and biodiversity, and recommends member states to consider peatlands when undertaking forest activity. We have seen problems in the past when over-zealous forestry policy and financial incentives led to commercial conifers being targeted towards peatlands. The world-renowned blanket bogs of the Flow Country were a focal point for the land use conflict between peatlands and trees. The area also became a centre for research into the impacts of trees on peatlands. Studies showed that forestry with associated drainage and fertiliser application had an adverse effect on peatland habitats and species, with wider 'edge effects' compromising breeding bird productivity and the hydrology of adjacent areas. Furthermore, there are significant carbon consequences resulting from such damage to peatlands. Although questions remain over the exact carbon implication, it is understood that the net result of planting trees on peatlands is a compromised forest delivering less climate benefit, harming biodiversity and being of limited commercial use, as well as being a stressed forest more susceptible to disease and the effects of a changing climate. Over long-time horizons, afforestation translocates carbon from a

peat reservoir that is secure over millennia to a reactive wood store that can be lost to the atmosphere within a few decades.

"Tackling our climate and biodiversity crises requires both peatlands and forests."

Today forest policy seeks to avoid new planting on peatlands in recognition of their carbon and biodiversity significance, but we still have a legacy of over 18% (439,000ha) of UK peatlands under forestry. Fortunately, forestry policy also recognises the need for forest removal on

peatlands and there are proven methods for returning forest to bog habitat, with many successful restoration projects on public and private land. Unfortunately, there is no compulsion to remove what would now be considered unsustainable forests on sensitive peatland areas. Scaling up such peatland restoration will require greater levels of public funding as well as advancing options, such as the Peatland Code, aimed at securing additional private funding in return for the carbon and biodiversity benefits.

Arguably, where forest policy is less well developed is in addressing 'the missing trees' associated with peatlands. In looking at the relationship between trees and peat, it is important to recognise that, in the UK, our wet Atlantic climate does not facilitate trees on peatlands. The bog expanse is generally too wet and nutrient poor. Where we do see trees on peatlands is where they have been hydrologically disturbed by human activity, as well as in the shallower peats

and natural mineral-rich flushes or well-drained glacial deposits within peat mire landscapes. Fossil trees, including huge stems and stumps of oak and pine found preserved in peatlands, have long attracted attention. They generally grew four to five thousand years ago and are found at the base of the peat profile, before a major period of peat expansion due to climate change and human influence.

There are few places left in the UK where the natural distribution of forest and peatland reflects the underlying soil heterogeneity, providing a wonderful habitat mosaic. Major native woodland schemes operating on a landscape scale are increasingly being planned in tandem with the protection and restoration of open ground habitats such as peatlands.

Care is needed in timing of any new tree planting or regeneration to ensure the peatland is undisturbed or sufficiently rewetted to resist inundation from trees.

Today bog woodland, with its characteristic stunted individual trees scattered over the bog surface, is a priority habitat of European importance. Ecologically this is a rare and localised feature and not an excuse for retaining large areas of plantation forest on peatland.

Much of the effort in tackling the restoration of lowland raised bogs has been directed at recovering water tables to secure the

peatland, but they often remain as parched lenses of peat in an agricultural landscape where farming has removed the surrounding fen/carr woodlands that once occupied the bog margins and surrounding mineral soils. Similarly hill slopes below blanket bog cloaked summits often lack the natural surrounding scrub and woodland that provide hydrological stability for the peatland.

Tackling our climate and biodiversity crises requires both peatlands and forests, without compromising one for the other and without the prolonged distraction of determining which is better. We need to adopt strategic planning to help get trees in the right places and avoid putting pressure on peatlands, while also giving greater consideration to developing the right woodlands in association with peatlands.



Preserved 4,000-year-old pine stump at Strathvaich, exposed by peat erosion. © Clifton Bain



IIED Forest Programme

Duncan Macqueen, Director of Forests, International Institute for Environment and Development (IIED)

Can we save the world's tropical forests while also enhancing the prosperity of the world's 1.3 billion forest-dependent people? As human populations and consumption patterns have multiplied over the last 40 years, people's interactions with forests and trees have changed dramatically, and the prospects for achieving that win-win have narrowed.

Established in 1971, IIED's mission is to build a fair, sustainable world, using evidence, action, and influence in partnership with others. Since the 1980s, IIED's forest programme has wrestled with putting sustainable forest management at the heart of a just world.

We have tested many tools and methods that have informed our current approach. In the 1980s our emphasis was on forest governance, pioneering ways to shape policies governing the timber trade and sustainable forest management. This work helped frame the International Tropical Timber Agreement, and supported certification schemes for sustainable forest management (such as the Forest Stewardship Council, FSC). Yet, during this period it became obvious that agriculture, not forest exploitation, drove the bulk of forest loss.

The programme then focused on policies that could work for forests and people within Tropical Forest Action Plans and their successor National Forest Programmes. These plans aimed to grapple with power and politics beyond the forest sector. We pioneered 'learning groups' to share and spread knowledge, which became increasingly effective in challenging destructive economic models.

With greater understanding of the power of market forces, the forest programme helped to develop Payments for Ecosystem Services and how they might better preserve biodiversity, watersheds and carbon sequestration. It engaged with the corporate private sector to introduce sustainability concerns, frequently encountering unjust power dynamics and repression of local rights. In response, we acted quickly to use trade legality as a lever to reform forest governance, as with the China–Africa Forest Governance Project, and developed a wide range of participatory tools to challenge models of business and governance.

Facilitating a global dialogue on how to scale-up investment in locally controlled forestry, we also helped co-design a Forest and Farm Facility (FFF). With partners at FAO, IUCN and Agricorn, the FFF funds groups to shape enabling policy environments, build sustainable businesses that enhance climate resilience, mitigation and adaptation, and improve social protection, especially for women, youth and ethnic minorities. Two-thirds of its US\$56 million budget goes directly into the hands of Indigenous Peoples, local communities and forest and farm producer organisations.

The FFF partnership has shown that forest landscapes need not be places that perpetuate poverty. Rather, they can be places where local organisations are achieving that illusive win-win; saving the forests while enhancing the prosperity of forest-dependent people.

Organisations of Indigenous People and local communities are now widely recognised as the best guardians of the forest and its natural biodiversity, modestly supported by FFF grants to the new Global Alliance for Territorial Communities.

"Forest landscapes need not be places that perpetuate poverty."

Organisations of smallholder farmers, part-funded by FFF, are increasingly recognised as stewards of the world's agrobiodiversity, and the main agents of forest landscape restoration. These farmers, who frequently incorporate trees on their farmland, not only achieve higher agricultural yields, but provide greater nutritional diversity and climate resilience to aid future world food security.

Investing in this variety of local organisations is the fastest route to saving forests and forest-dependent people at scale. Producer organisations allow previously isolated people to do

things that are best done together. These groups and alliances form typically to share information, cut costs and strengthen their voice. Together, people recognise they can be much stronger. Local organisations form in all places and countries. Their

generally democratic nature in pursuit of the common good is a powerful force for justice.

Collectively, forest-dependent people and their organisations also have huge economic significance. While difficult to assess, smallholder forest and farm producers collectively constitute the largest private sector in primary markets such as food and biomass energy, construction and non-timber forest products, with a combined gross annual value of up to US\$1.3 trillion. Whilst secondary carbon markets can help incentivise production that involves tree-planting and forest management, there are increasing, and climate linked, threats from droughts and fires, extreme weather events, and pests and disease outbreaks. So finding ways to incentivise diversification for resilience in primary markets is probably a more reliable route to durable climate action.

We have been documenting the important benefits emerging from support to local organisations. Results include local empowerment helping to secure tenure, reduce poverty, improve access to markets, attract private-sector investment, formalise problematic sectors such as charcoal, deepen democracy and improve governance, scale-up climate change mitigation and adaptation. They also shape global agendas and deliver the Sustainable Development Goals across entire landscapes.



Collective action by women tree nursery growers supported by the Forest and Farm Facility in Zambia has led to an expansion of the Choma District Tree Nursery Association. © IIED

Forest landscape restoration: a global movement

Chetan Kumar, Carole Saint-Laurent and Pragyaj Raj Pokhrel, IUCN Forest and Grassland Team

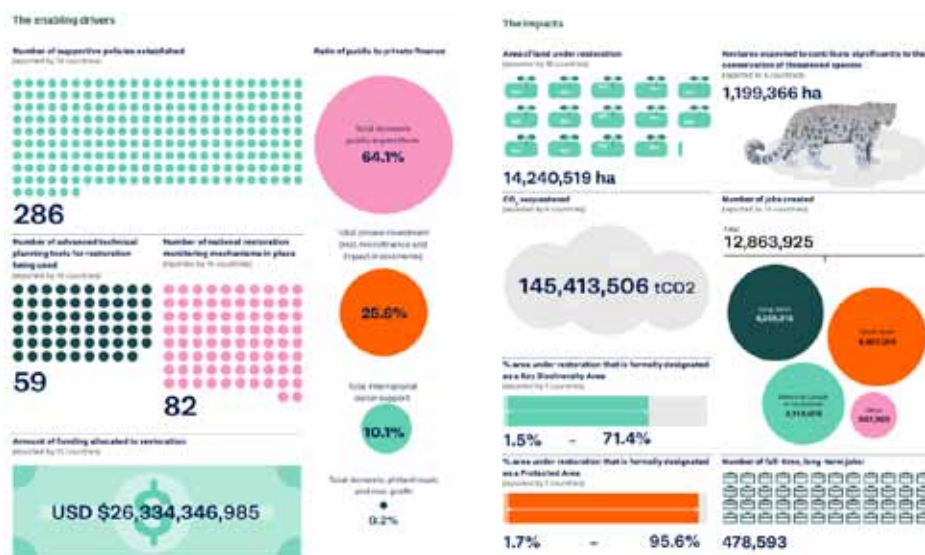
Forest Landscape Restoration (FLR) is a worldwide movement that holds one of the keys to addressing pressing global challenges such as climate change, biodiversity loss, and environmental degradation. At its core, FLR is about rejuvenating ecosystems while considering the well-being of nature and humanity. The Bonn Challenge, launched in 2011 by the Government of Germany and the International Union for Conservation of Nature (IUCN), is the flagship initiative driving this movement. It aims to bring 350 million hectares of degraded and deforested land into restoration by 2030. More than 70 countries and organisations have pledged to restore more than 210 million hectares, with Canada announcing the most recent pledge of 19 million hectares in December 2022. Scotland was the first country in Europe to pledge the Bonn Challenge by early 2030s: plant 165,000 hectares of new woodland, sequester some 130 million tonnes CO₂e, and improve the condition and extent of native woodlands.

The Bonn Challenge has raised global awareness about FLR and mobilised resources for restoration projects worldwide. Furthermore, it played a pivotal role in establishing the United Nations Decade on Ecosystem Restoration, running from 2021 to 2030, emphasising the urgency of ecosystem restoration on a global scale. The Bonn Challenge and the advancement of the forest landscape restoration movement were underpinned by the launching of the Global Partnership on Forest Landscape Restoration in 2002, by IUCN, WWF, and the (then) UK Forestry Commission. The latter emerged as a critical partner in the initiative's early days, providing strategic direction based on long experience with restoration in England, Scotland and Wales. One remarkable FLR project in the UK is the Whitelee Windfarm in Scotland. This project transformed a degraded peatbog into a thriving ecosystem by planting trees, building dams, and raising the water table. The restoration efforts have improved water quality, boosted biodiversity and reduced carbon emissions. There are many other examples in the UK: restoring ancient woodlands in County Durham to allow native trees and wildlife to thrive again; restoring the Great Trossachs Forest, including the Loch Katrine water supply catchment; or creating a green corridor for ramblers and wildlife from one end of Wales to the other.

Monitoring the progress of Forest Landscape Restoration is paramount to ensure restoration efforts are effective, sustainable, and aligned with global conservation goals. Recognising this, IUCN introduced the Restoration Barometer, a comprehensive tool that tracks restoration progress across all terrestrial ecosystems. The Restoration Barometer was first launched in 2016 as the Bonn Challenge Barometer. It was piloted in forest landscapes – including in Brazil, Rwanda, El Salvador, Mexico, and the United States – to measure the success of restoration programmes and understand the hurdles to both implementation and quantification of the benefits stemming from restoration efforts. Subsequently, the tool was rapidly adopted by a further 13 countries. In 2020, the Bonn Challenge Barometer was expanded and rebranded to extend its scope beyond forest ecosystems and Bonn Challenge signatories. By 2021, the Restoration Barometer was updated to include

all terrestrial ecosystem types, including coastal and inland waters. As of 2022, the Barometer has been endorsed by over 50 countries, with 22 countries actively reporting their restoration data. Notably, forests and woodlands constitute a significant 28% of the ecosystems reported in the Barometer. This tool measures the land area under restoration and evaluates the carbon sequestered, benefits to biodiversity, and socio-economic impacts, providing a holistic view of restoration outcomes. The IUCN Restoration Barometer bolsters the Bonn Challenge's efforts by fostering transparency and accountability. It aligns with other international milestones, such as the UN Decade on Ecosystem Restoration and the Global Biodiversity Framework.

In the past decade, the UK government has also actively supported FLR projects in developing countries in Africa, Asia, and Latin America in collaboration with organisations like the IUCN. For instance, the International Forestry Knowledge Programme (KNOWFOR), funded by the UK Government, provided policymakers and practitioners in developing countries and the international community with comparable evidence, reliable tools, and systematic analysis on forest landscape restoration to help them make informed decisions and design better policies and interventions. The UK's private sector also plays a vital role in advancing FLR. As we reflect on the journey of the Bonn Challenge over the past decade, this initiative, with its global reach and ambitious targets, has set the stage for transformative change in ecosystem restoration.



Restoration Barometer 2022: enabling drivers. © IUCN

Restoration Barometer 2022: impacts. © IUCN

Despite challenges, such as securing additional funding and ensuring equitable benefits for communities, FLR remains a powerful tool for biodiversity, combating climate change, job creation, and improved livelihoods. FLR has evolved from a concept into a global movement that offers solutions to some of our most pressing environmental challenges. As we progress, FLR will continue to be a powerful tool for building a more sustainable and resilient planet for current and future generations.

"Scotland was the first country in Europe to pledge the Bonn Challenge by early 2030s."

Forestry in Iceland's fragile nature

Sigfús Bjarnason, Andrés Arnalds and Sveinn Runólfsson, members of Friends of Icelandic Nature

Over a millennium ago, when humans first settled in Iceland, it is estimated that birch forest and shrublands covered

20–40% of the land. The Book of Icelanders paints a picture of a landscape covered with wood from the mountains to the sea. The settlers burned woodlands to establish grazing areas and to make charcoal for fuel. Over the centuries, vulnerable soils, sheep grazing, volcanic activities and colder climate resulted in a more or less treeless land, vegetation atrophy and eroded soils.

In Iceland, apart from the juniper shrub, there are no native coniferous species. Native tree and shrub species are birch, willow and rowan. Forestry involving

non-native species has been conducted since the dawn of last century, initially on a relatively modest scale. A majority of Icelanders are in favour of forestry, and there are local forestry associations in most Icelandic communities.

Forestry in Iceland is currently undergoing a profound transformation in terms of scale, methods and objectives. The international voluntary carbon market is showing growing interest in harnessing Iceland's potential for carbon capture projects. As a result, new stakeholders are entering the arena, and the state Forest Service anticipates a sevenfold increase in the annual allocation of land areas for forestry in the near future.

The 2019 Forestry Act required preparation of a ten-year forestry strategy. The appointed ministerial committee did not reach consensus. The majority favoured a vast increase of coniferous tree planting, using Sitka spruce, lodgepole pine and larch species, as well as the non-native black cottonwood. This was opposed by many individuals from the academic, scientific and environmental and cultural heritage communities, who eventually founded an NGO called Friends of Icelandic Nature. The main objective of the NGO is to promote a better ecosystems approach to forestry and to apply a precautionary principle when it comes to use of non-native species.

In August 2022, a new combined strategy for forestry and soil conservation was published, including as a guiding principle "to promote the protection, development and integrity of ecosystems based on an ecosystems approach."

A large part of Icelandic nature has little or no protection from the impacts of forestry. The Friends of Icelandic Nature regard the current forestry plans for carbon capturing as being a serious threat to biological diversity and bird life, cultural and geological heritage, and the unique open Icelandic landscape.

We focus on raising awareness of the risk of using non-native

species because of the significant impact they will have on the Icelandic nature and landscape in the coming decades when planted at the foreseen scale. Generally, our members acknowledge that forestry comes with various advantages, but it also comes with a significant downside. Forestry has to be planned with great care, considering the long-term effects, and honouring precautionary principles. Wide consultation is

essential to live up to the emphasis of the government strategy on an ecosystems approach. Our motto is 'Right tree in the right place'.

Over recent years, several actors in Iceland have offered tree planting to

companies and individuals (including tourists) to compensate for their carbon footprint. There is an increasing awareness in Iceland that buying these carbon offsets can be regarded as 'greenwashing', a view recently supported by the Forest Service. The projects are not certified, and the calculation of a neutral carbon footprint is based on offsetting a time-limited carbon footprint with the amount that the trees will possibly capture during their 50–60 years lifespan.

The Forest Service launched a set of requirements for carbon capture projects in 2022, making Icelandic forestry projects more attractive to the voluntary carbon market. The first project was certified against these requirements at the end of 2022. The standard addresses the greenwashing nature of earlier uncertified projects: the carbon units cannot be used to offset carbon release until after measurements show that the carbon has really been captured. The initiative is drastically changing the scale of funding from the voluntary carbon market.

The Friends of Icelandic Nature are opposed to many current and planned carbon capturing projects and claim that the Forest Service requirements do not provide sufficient guarantees for wide consultation, assessment of environmental risks, and protection of biodiversity. The NGO also claims that the estimate of the amount of captured carbon does not take into account possible changes in soil carbon. We also find the additionality of the carbon capturing projects to be questionable when compared to the carbon capturing potential of restored natural ecosystems. Furthermore, the fraction of the captured carbon that will be permanently removed from the atmosphere will certainly be much lower than in natural ecosystems.

The Icelandic forest and soil conservation services will be merged on 1 January 2024, providing an opportunity to change the direction of forestry towards an ecosystems approach.

"Forestry in Iceland is currently undergoing a profound transformation."

Last tree hyraxes of Africa

Hanna Rosti, Lammi Biological Station, University of Helsinki

Very few people have heard about tree hyraxes. They are cute, nocturnal, and strangely related to elephants and manatees.

Tree hyraxes live in the canopy of the tropical forests in Africa. They are medium-sized, and they only feed on leaves. They are one of the least-known mammals in the world.

Furry tree hyraxes have small tusks, a round body, and toes that make you wonder how they can climb in the trees. This is possible because they have very adaptable pads in their feet. Males have internal testes; testicles can be internal, as hyraxes' body temperature is lower than in other mammals. This is adaptation for an energy-poor and fibrous diet; leaves don't have much energy. Tree hyraxes have only a weak ability to control their internal body temperature. For this reason, they are dependent on the shelters that they use as extensions to control their body temperature. When it is hot, they go inside; when it is cold, they bask in the sun. Hot weather is more dangerous and limiting than cold weather. In fact, tree hyraxes can live all the way up to the tree line in the mountains of Africa.

The preferred shelter for a tree hyrax is a very large tree with holes. Nowadays very large trees are extremely rare, so tree hyraxes have had to adapt to use also underground caves, and buildings made by humans; these are typically storage buildings, abandoned buildings and other structures. There are, for example, tree hyraxes sheltering in the Karen Blixen old coffee factory. They spend a lot of time resting on their favourite spot, that is usually a large branch or tree hole.

A fascinating feature of tree hyraxes is their complex calling system. This varies according to species. Western tree hyrax (*Dendrohyrax dorsalis*) often calls as a chorus with the small family unit. Southern tree hyrax (*Dendrohyrax arboreus*) has rattles and screams that are given in sequences; these sound like a Halloween soundtrack. Eastern tree hyrax (*Dendrohyrax validus*), that live in the mountains of East Africa, seems to be the most social species of all, and highly variable calls are given as counter calls; for someone who is listening it sounds like they are having a discussion. Calls are bounced back and forth, and all individuals are using different calls. Eastern tree hyraxes also sing, and different mountains have different songs.

The real number of different species of tree hyraxes is unknown. Species recognised at the moment have been named by scientists more than 100 years ago, typically based on skins collected by local people. Very few direct biological studies exist. This is because even



Tree hyrax, Kilimanjaro, Tanzania. © Hanna Rosti

seeing tree hyraxes is difficult, and sometimes forests in Africa may be dangerous at night.

Recent technical advances, including small audio recorders combined with AI, thermal imaging cameras, GIS information combined with airborne and ground Lidar allow research of tree hyraxes to finally proceed. This combination of research methodology from different fields of science brings hope for tree hyraxes. It will be very important to study speciation, population sizes and ranges of tree hyraxes, as their conservation needs have been completely neglected due to lack of knowledge.

Many populations and possibly species of tree hyraxes have already been wiped out.

Indigenous forests of Africa have been under intensive destruction for agricultural land and exotic tree plantations. These pines, eucalyptus, cypresses have devastating consequences for local biodiversity. All local fauna and flora disappear when these monocultures of crop trees are grown in Africa. Poaching is also severe and an ongoing problem in some areas. Almost all tree hyrax populations are at high risk of extinction in many locations, where remaining individuals struggle to find shelter where they are safe from people or their dogs, as the natural shelters are gone.

One challenge of tree hyrax conservation is that the International Union for Conservation of Nature criteria for assessment of the threat level relies heavily on the estimation of the population numbers and their range. Population numbers of tree hyraxes are impossible to estimate, as finding all individuals is not possible. Moreover, only a few people in the whole world know how to study tree hyraxes, and they will never have the time needed to cover all possible habitats in Africa.

Nocturnal animals from the forests of Africa, and tree hyraxes in particular, still have many secrets, and it is important to tell their story before it is too late. They are part of the fantastic ecosystem that we as humans are dependent on.

"Almost all tree hyrax populations are at high risk of extinction."



Tree hyrax, Taita Hills, Ngangao, Kenya. © Hanna Rosti

The memory of trees

Jo Woolf FRSGS, RSGS Writer-in-Residence

“To dwellers in a wood,” wrote Thomas Hardy in *Under the Greenwood Tree*, “every species of tree has its voice as well as its feature.” Hardy was referring to the sounds made by specific trees in the wind – the rustling of beeches, the whistling of holly and the hissing of ash. Taking this idea a step further, every species of tree has its own memory of human connection, giving rise to a wealth of legends and customs. I’ve chosen four examples to illustrate this idea.



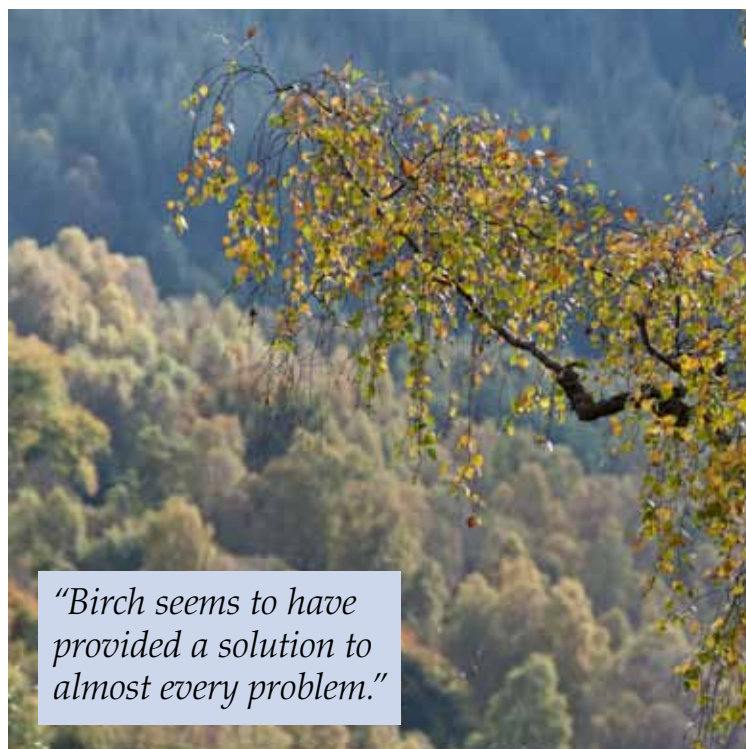
Fortingall Yew, c5,000 years old.

Yew

Yews are capable of living for thousands of years, and their branches can take root wherever they touch the ground, so it’s hardly surprising that they have long been associated with immortality and rebirth. The British Isles are home to most of the world’s ancient yews with over 80% found in graveyards. Yews were maybe traditionally planted to mark a hermit’s cell: the old chapel of Kilneuair, ‘the church of the yews’, by Loch Awe, is traditionally associated with St Columba.

All parts of the yew are toxic, apart from the red fleshy coating around its seeds. Its Latin name, *Taxus*, shares the same root as the word ‘toxic’; it’s hardly a coincidence that Macbeth’s witches tossed slips of yew into their bubbling cauldron. Yew has traditionally been used for bow-making: Neolithic longbows made of yew have emerged from

Somerset peat, and Robert the Bruce is said to have ordered yew wood from Ardchattan Priory on Loch Etive to make longbows for Bannockburn.



Birch at Killiecrankie.

“Birch seems to have provided a solution to almost every problem.”

Birch

For our ancestors, birch seems to have provided a solution to almost every problem. Infusions of leaves treated rheumatism, skin disorders and urinary infections; its wood supplied furniture, carts, ploughs, and all kinds of tools; sticks were gathered for kindling and thatching, bark for tanning, for smoking meat and fish. Just how far this association goes back is glimpsed in archaeological discoveries: excavations of 200,000-year-old Neanderthal sites in Europe have yielded stone axe heads that were glued to their hafts with birch-bark tar.

Birch brooms swept houses clear of dust and malevolent spirits alike; in spring, maypoles were traditionally cut from a tall, straight birch tree and decorated with flower garlands for May morning.

Offering strength and lightness, birch wood was often favoured for making arrow shafts. In *True Tales from the West Highlands and Islands*, Tony Dalton describes how the Fletchers settled at Achallader in Glen Orchy in the 12th or 13th century and used birch and yew in their calling as arrow-makers to Clan MacGregor. An old Gaelic verse (translated) reveals the sources of their materials:

*Bow of the yew of Easragan,
Silk of Galvinn,
Arrow of the birch of Doire-donn,
Feather of the eagle of Loch Treig.*





Ash in winter.

Ash

“May your footfall be by the root of an ash” is an old traveller’s blessing, reflecting the many positive aspects of this lovely tree. Ash leaves eased stomach complaints, and maybe cured warts provided the sufferer made a bargain with the tree. Snakes were said to avoid the morning and evening shadows of an ash; even in comparatively recent times, rods of ash were carried by roadside workmen to ward off adders.

In Norse legend, the immense world-tree known as Yggdrasil is often portrayed as an ash; a deer feeds on its leaves, and from the deer’s antlers flow all the rivers of the world. Irish legend speaks of five Guardian Trees of Ireland, of which three were ash. A descendant of one of these, the Sacred Tree of Creevna, was still growing at Killlura, County Cork, in the 19th century. It was believed that its wood offered protection against drowning: after the potato famines, Irish emigrants cut slivers for their voyage to America.



FURTHER READING

The New Sylva by Gabriel Hemery and Sarah Simblet (2014)

Trees and Woodland in the British Landscape by Oliver Rackham (1976)

Trees of Britain and Ireland by Edward Milner (2011)

Wayside and Woodland Trees by Edward Step (1904)

Jo Woolf’s book, *Britain’s Trees: A Treasury of Traditions, Superstitions, Remedies and Literature*, published by National Trust Books in 2020, looks in greater depth at 40 species of tree in Britain.

“Alder hugs the banks of burns and lochs.”



Alder catkins.

Alder

A lover of boggy places, alder hugs the banks of burns and lochs; as long as it remains waterlogged, its wood is resistant to decay. In *The New Sylva*, horticulturist Gabriel Hemery reveals that “the cities of Amsterdam and Venice were built mostly upon alder timber piles.”

When it is first cut down, alder wood is bright orange-red and appears to ‘bleed’ red sap. Perhaps for this reason, it has traditionally been seen as a warrior’s tree, and its wood was used for making shields. Fabric dyes in shades of brown, red and green were extracted from its twigs, bark, cones and flowers, and fairies were said to stain their clothes with alder to conceal them from human eyes.

In the Welsh *Mabinogion*, alder is the emblem of the Celtic giant-god, Bran, who gathers an army and marches to the aid of his ill-treated sister, Branwen. On finding the River Shannon impassable for his warriors, Bran extends his giant body from bank to bank so that they can cross; perhaps an allusion to alder’s natural empathy with water.



All main images © Jo and Colin Woolf.



New Scottish National Parks?

Nikki Sinclair, Scottish National Parks Strategy Project Manager, Scottish Campaign for National Parks (SCNP), and Action to Protect Rural Scotland (APRS)

In October 2023, the Scottish Government launched the chance for community groups to nominate areas of Scotland to be considered for designation as new National Parks. This opportunity is open until 29th February 2024, by which time nominees must submit a completed nomination form and be able to demonstrate a degree of local support for the proposal.

Nominations received will be evaluated against the criteria in the recently published appraisal framework; following that, recommendations will be made to Scottish Ministers. In the summer of 2024, one or more Proposed National Parks could be announced and there will then be a statutory Reporting process led by NatureScot for each proposed area. This includes a focused public consultation, and detailed consideration of issues such as the merits of designation and boundary options. The decision to proceed with designation of new National Park(s) will come after consideration of the report(s), and will require public consultation on and parliamentary scrutiny of a draft Designation Order for each new National Park, followed by the approval of the Designation Order(s) by the Scottish Parliament before the end of the parliamentary session in May 2026.

We already know that different groups interested in nominating more than ten areas have contacted Scottish Government, but more may be galvanised now that the process has started. They can access support for the process by emailing nationalparks@gov.scot and reading the guidance online.

Of the areas that have made their interest public at this stage, there is a wide geographic spread, with half coming from areas identified in the SCNP and APRS publication *Unfinished Business* from 2013. These include Lochaber, Glen Affric (and Affric to Alladale), and Galloway and the Borders – the last two have long-running local campaigns supporting them. The others are Eilean a' Cheo (Skye and Raasay), Tay Forest, Loch Awe, the Lammermuirs, and Largo Bay. The groups themselves vary from established volunteer campaigns and new groups of volunteers to community councils and a local authority. Several areas do, or potentially could, cover marine as well as terrestrial areas.

It is also noticeable that several of the areas have windfarm sites, either pre-existing or proposed, in or around them. Scotland's National Planning Policy (in NPF4) states that windfarms will not be permitted in National Parks, so this might have caused a stumbling block for their nomination. However, Scottish Government stated in the nominations guidance that it will publish bespoke planning guidance on windfarms for new National Parks. This could be a pragmatic approach to the nominations process, keeping it open to all of Scotland. The bespoke guidance is to be different to that

for existing National Parks (ie, the policy in NPF4) but the degree of difference being considered is not known at present.

National Parks also feature in the Scottish Government's *Tackling the*

Nature Emergency: consultation on Scotland's Strategic Framework for Biodiversity, open for comments until 14th December 2023. Section 7 contains proposed amendments to the National Parks (Scotland) Act 2000, and if taken forward would be included in a future Natural Environment Bill. Many of the changes proposed are intended to give a clearer remit on addressing biodiversity loss and climate change alongside the current National Park aims. So the purpose of a National Park Authority would have a reference to leadership on climate and reversing nature loss added to it, whilst the National Park Aims are to be modernised. One key proposal here is to split the first aim, which currently reads "to conserve and enhance the natural and cultural heritage of the area", into two new aims, the first focused on natural heritage (or as proposed 'natural assets, biodiversity and ecosystems') and the second on cultural heritage. One of the effects of this change would be that the "National Park principle" set out in section 9(6) of the Act would apply just to the natural heritage aim rather than natural and cultural heritage together. The principle's effect is to give greater weight to the first aim in the eventuality that there is a conflict between aims. Other proposals deal with duties on public bodies operating with National Parks and changes to governance arrangements; seeking to find a balance between national and local interests, with the required expert input, whilst keeping Boards of reasonable size.

"In the summer of 2024, one or more Proposed National Parks could be announced."

In My Community

Jo Sharp FRSGS, Geographer Royal for Scotland; Alastair McConnell FRSGS, RSGS Education Committee Chair

Earlier this year, we organised a writing competition for S1–S3 Geography pupils. We asked them to write up to 500 words of non-fiction or fiction, about a community that they felt was important to them. We had a good response, with imaginative ideas about a range of geographical communities and communities of interest. We are grateful to RSGS Chair John Briggs and RSGS Writer-in-Residence Jo Woolf who acted as the final judges.

The winner was Lorcán Morrison from Boroughmuir High School, and we are pleased to print his (unedited) text here. The runners-up were Sophia Whitbread and Forrie Taylor from St Ninian's High School in Giffnock, and Sofia Whall from Gairloch High School.

An ideal community, by Lorcán Morrison

An ideal community where I live is one where everyone young and old works together to support and help each other whilst at the same time ensuring they protect the environment and keeps that as the main focus. Everyone where we lived decided to get together to put a plan together on how everyone could change their habits and work together so that we all could benefit and help each other be sustainable whilst enjoying and protecting our local environment.

I live in a lovely neighbourhood where people grow all their own fruit and vegetables and share these with everyone else. Every garden grows different fruits and vegetables and we have enough to last all the year round. Some gardens grow strawberries, raspberries whilst

others have apple and plum trees in among their vegetable patches with delicious potatoes, carrots and onions. There is a plan, rota and everyone shares in the work but also the rewards and everyone is healthy and have fun together. The houses are powered naturally using solar panels on their

roofs and geothermal energy from the ground. There is no single use plastic. The people have opted to be vegetarian and to use bicycles and public transport wherever possible to get around to minimise the effect on the environment. Each house has a system to collect rain water and this is used for watering our plants, taking baths and washing dishes.

In our gardens everyone has a selection of trees and ferns that absorb carbon dioxide and animals such as goats, hens that are kept happy by roaming freely but provide us all with milk from the goats and eggs from hens.

"Our community is sustainable and everyone works together."

More importantly we do not waste anything with people sharing food made and only eating what they need and

whatever cannot be used to eat is used as compost. Every week people go into the nearby woods and help collect the plastic and rubbish that has accumulated and this protects the local wildlife including the foxes, deer and birds.

What is even more ideal is that our community is sustainable and everyone works together so that everyone feels safe, healthy and happy and that we all belong together. We truly value our environment and protect it from damage. As a result wild animals such as foxes, rabbits, deer and hedgehogs from the nearby woods are often found in the gardens.

Our ideal community is the way forward and is spreading to other neighbourhoods. I hope this continues so that the whole area and the country where we

live becomes more sustainable and environmental aware and friendly to protect and appreciate the environment that even becomes global. You too can get together with your local community and come up with a plan to make your environment better for all living creatures.



Copper beech, River Esk. © Roger Crofts

The Atlas Mountains earthquake

Dr Hamish M Brown FRSGS, writer, lecturer and photographer

The tragedy of the Atlas earthquake in September 2023 was sensationally reported for a week, only to be overtaken by the Libyan flood horror, and nothing more was reported. But that brief spell was only reporting on the fringes of the Atlas, the more accessible places; further up, further in, are hundreds of villages, many only reached by mule tracks; villages and small terraced fields carved out of barren mountains, all dependent on irrigation. Tracks, houses, fields, water channels, animals have all been destroyed at who knows what human cost.

The quake came at the harshest time of the year; only about the third week in September does the searing heat moderate, and in a couple of months the mountains are then covered in snow. What help was there by then? The tragedy went on and on, unreported, a deep hurt for those of us who have wandered the Atlas for half a century – including three RSGS groups I led in the Atlas, the 2002 group very much in the footsteps of Joseph Thomson, a Scottish hero and RSGS medallist.

To me, the saddest result of the quake was its effect on the most vulnerable: the very young, and the old (family life is strong: the elderly are cared for) but everybody works, from girls collecting wood or fodder on the slopes, to boys out all day attending the flocks of sheep and goats, or grannie watching a solitary cow on a terrace. In September the maize harvest is brought in, walnuts are shelled for market, life is preparing for the winter to come. Atlas life is crofting by any other name.



At the epicentre of the quake, Imi n'Tala was destroyed both by the quake and by a cliff above avalanching onto it.

In 1871 the explorers Joseph Hooker (director of Kew) and George Ball (first Alpine Club president) travelled into the mountains, and from a base at Imi n'Tala made the ascent of Jbel Gourza (3,280m). In 1888 Joseph Thomson went up the valley to cross a *Tizi* (pass) to descent to the Oued Nfis valley at Tinmel and be more or less arrested by the local chief. Later he returned to Amizmiz and Imi n'Tala before making a series of *Tizi* crossings and ascending Jbel Igdat (3,616m), an extraordinary feat, not helped by being chased up the peak by men with guns.

"Atlas life is crofting by any other name."



A child of the Oued Nfis valley. Family life is strong among the Berbers; they may be poor but children are much loved.

Imi n'Tala, the quake's epicentre, sits below a scarp of limestone, the blocks of which when fallen are so cleanly cut there were suggestions they were the work of masons, good building material. Alas, the cliff was to avalanche onto the village due to the quake. An unusually prosperous village was instantly wiped out. Part of its wealth was an unfailing large source (spring) gushing out of the rock; in 2002 the RSGS group camped beside its clear, cold basin and watched herds of goats being led to water. One of the joys of trekking and camping in the Atlas is having mules to carry everything. In many areas mules are the only carriers; there are no roads or wheeled vehicles. When two of us and two Berbers in 1995 made the 96-day 1,000-mile end-to-end traverse of the Atlas, we depended on two mules completely. We gave the invaluable beasts to their helpers. One of them, Hosain, lived at Imoullass, another village destroyed in the quake. Has he survived? The other, Ali, lived in Taroudant, the city also badly hit though situated to the south of the mountains. As a worked with tour groups he could be anywhere. Has he survived?

The 12th-century mosque at Tinmel, destroyed by the quake, is one of the most important sites in Morocco, the birthplace of the Almohad dynasty who would rule from Spain to the Sahara. The founder, Ibn Toumert, and the greatest ruler, Abd el Moumen, were buried there. It was rather ruinous when I first knew it and I became a friend of the *guardien* during its restoration. Our groups never passed this fascinating site by, and had many picnics at the local café. Has it gone? What of the people? On a minor note, there

was always an owl in the rafters of the interior, and bright rollers nested in the walls. We called in during our big traverse of course, and followed the Oued Nfis to its source on the Tichka Plateau, passing village after village on the way, all of which must have faced disaster. We have only heard a few notes of this lamentable saga.

"An unusually prosperous village was instantly wiped out."

In over fifty years of Atlas wanderings I only once felt a very slight – puzzling – tremor, that proved to be an earthquake. In half that time we never saw a flash flood, but, since, we have seen many. A pilgrimage to a shrine in the Ourika Valley saw a thousand people washed away from one such spate. (We never camped in valley bottoms.) 1960 saw 15,000 people killed in an earthquake that destroyed Agadir; in Al-Hoceima, on the north coast, 600 people died in a 2004 quake. With several hundred thousand people spread across the Atlas in small, remote villages, I hate to think of the overall loss. The meaningless numbers are made up of *individuals*, each, every one, a precious someone, loved and cherished, gone in a chance moment, to leave uncountable heartbreaks.

Let me end on a cheerier note. Joseph Thomson had a weird experience when camped at Imi n'Tala: their camp was visited by a wandering member of one of the religious brotherhoods. Between the *kif* pipe of the men and a Thomson bribe the



Everyone shares work. Here at Oued Dades girls are returning home from collecting fodder for the domestic animals.

fanatic was set to perform. Dancing into a trance he grabbed two snakes and let them bite his arms, then he bit off the head of one and carried on eating the snake between manic ravings on the ground. A great deal more is detailed, then Thomson withdrew into his tent, only to be called out again as the man had blown a piece of charcoal to white heat, and was chewing up and swallowing it. JT laconically noted, "Apparently the Aissawa had eaten his dinner first and was cooking it afterwards."



A group in Imoulass, another village destroyed, gathered to say farewell to Hamish, who had been visiting a companion, Hosain.

All images © Hamish M Brown.



Built in brick, the interior of Tinmel Mosque has rows and rows of fine arches.

Joseph Thomson is best remembered for East African explorations. On his first (1878–79), inland from Zanzibar, he had to take on the leadership when his boss died and did so successfully, not yet 21. He then made an exceptional journey from the coast to Lake Victoria and back through Masai country – the first person to come out of there alive. This led to the opening up of East Africa. His 1888 Atlas adventures he wrote up in popular fashion, *Travels in the Atlas and Southern Morocco*. A scarce volume, but cheap reproductions can be found. I've retold his Atlas adventures but have yet to find a publisher. Our big traverse was described in *The Mountains Look on Marrakech* (2007) and gave me the opportunity to describe much of the life and culture of the Atlas Berbers. (The book was short-listed for the Boardman-Tasker Prize.) I also put together *The High Atlas* (Cicerone Press, 2012) which narrates many of the best treks and climbs in areas few have explored.

Marrakesh–Safi earthquake: the fear, the aftermath and the recovery

Alice Morrison, adventurer, presenter and author

I was shocked out of sleep by a violent booming sound. Instinctively I knew it was an earthquake and dived for the door. The walls of my small house were moving towards me like something out of a nightmare. I ran barefoot in my nightie into the yard I share with my neighbours. It was pitch black. The ground under my feet was rippling in waves. The booming stopped and I was in dead silence, alone and terrified.



Imlil valley post-earthquake in good shape, viewed from my terrace.

My home is in an Amazigh (Berber) family compound in Imlil in the Atlas Mountains of Morocco, about two valleys away from the epicentre of the earthquake which measured 6.8. It killed around 3,000 people, injuring many more and making hundreds of thousands homeless.

Thankfully, no one in my village was hurt. We all sheltered together in the car park that night. The women and children were traumatised and full of fear. At dawn we went back to see our homes. We were totally cut off with no mobile signal or electricity and the road in was blocked. I got on my bicycle and set off to find out what had happened and to get a signal so I could phone my family.

The road was apocalyptic as though a giant had come down

and thrown his toy mountains and boulders around in a toddler's rage. That was when I understood that a catastrophe had happened. I spent the next few days cycling to the badly hit areas and seeing for myself the destruction and the aid effort.

"Many schools have been destroyed or made unsafe."

Our local market town, Asni, became a centre for aid which started flooding in immediately. A military hospital and a tented camp were set up as the army tried to reach the most remote villages and clear the roads. In the immediate aftermath, the focus was on finding and treating survivors and getting people food and basic supplies.

Six weeks on from the earthquake, the immediate needs of the victims have been met but the longer-term, and very difficult, issues need to be tackled.

The Moroccan government allocated support for everyone affected. This is around £11,600 to rebuild a house, £6,600 to repair a damaged home, and £200 per month assistance for each affected household. To put this in context, the minimum wage for an agricultural worker is £174 a month. Most people in this region are subsistence farmers or work in tourism. However, the money is slow to be distributed and there have been demonstrations in Amizmiz, one of the badly hit towns, demanding the process be speeded up.

Asni still has a tented camp in its main open square for those whose houses were destroyed. I went to talk to Khaddouja and Fadma, two Berber women who are living there with their families. Khaddouja showed me round her tent which is canvas and covered in a big plastic sheet to keep out the rain. She had mats on the floor and her kitchen was neatly arranged to one side. Two mattresses were at the other two corners. She said that four to five of her family stay here. Outside, a string of washing hung on the line.

"The children can't sleep," she told me. "They are scared. Then, last night in the rain, the power cable caught fire and dropped and we all ran out. If that touched our tents we would die." She pointed at the cable which runs between the street lamps outside.

There are basic daily problems too. "The toilets are very far away on the other side and it is hard in the rain and mud. Also, there is a tap but it is up the hill. We go and fill our plastic water containers and bring it back to do our washing."

"We lost everything. These are not my clothes; someone gave them to me. I need a coat. But thanks be to God we are all alive. Not everyone near me lived. May God be compassionate."

All the women are desperate to go home. I spoke to one of the husbands, Mbarak, and he told me that he didn't know when they would have one to go to. "It could be a year," he said. "My house is destroyed but we don't know when we can start building. The government is sending some money but it is little. They are rebuilding the schools first. Then, it will be the homes."

Schooling is a huge problem. Many schools have been destroyed or made unsafe. The older kids are being shipped elsewhere with long travel times or a need to board, and

Reconstruction

the younger ones are in tents, as is the case in my village. Othman and Khadija (both six) from my compound loved it at first. "We are in tents, Alice! Tents!" "But now we are cold," Khadija added. "They've put a plastic belt on but the wind comes through." It must also be hell for the teachers.

Tourism is an absolutely vital industry here and within a week of the quake, the guides were out clearing the mountain paths so that hikers could return. "Safety is the most important thing for us. We will never take our guests anywhere that is not safe," says Rachid Imerhane, the head of the Guides' Association.

They have done an amazing job. Most areas are now safe and I have been out solo hiking all my favourite routes. Mount Toubkal, North Africa's highest peak, has also had groups up.

"If your friends in Scotland want to help us," says Rachid, "ask them to come and visit. We will give them a wonderful holiday and it will be good for us as we need work."

"Tourism is an absolutely vital industry here."

Throughout it all, the Moroccan spirit remains indomitable. As I am talking to people in the camp in Asni, the invitations come thick and fast. "Come and have tea with us," Mbarak pleads. "Or stay for lunch. We have plenty." They may be wearing borrowed clothes and living in tents but the spirit of community and hospitality still burns bright.

If you'd like to make a donation, the British Moroccan Society is doing fantastic work in the region: www.gofundme.com/f/british-moroccan-society-earthquake-appeal.



Destruction in Ouirgane.



Day one, when the only way out of Imilil was on foot, bike or mule.



Aid effort in Asni.



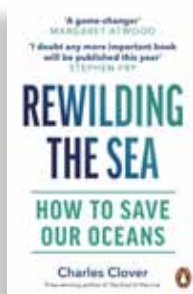
Khaddouja and Fadma and family.

Rewilding the Sea

How to Save our Oceans

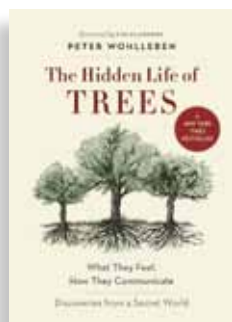
Charles Clover (*Witness Books, June 2023*)

Determined individuals are proving that the crisis in our oceans can be reversed, with benefits for both local communities and entire ecosystems. Charles celebrates what happens when we step aside and let nature repair the damage. Scientific research shows that trawling and dredging create more CO₂ than the aviation industry, and damage vast areas of our continental shelves, stopping them soaking up carbon. We need to fish in different ways, where we fish at all. We can store carbon and have more fish by stepping aside more often and trusting nature.



The Hidden Life of Trees

What They Feel, How They Communicate



Peter Wohlleben (*Greystone Kids, illustrated edition, September 2016*)

Peter explains the amazing processes of life, death and regeneration in the woodland. Much like human families, tree parents live together with their children, communicate with them, and support them as they grow, sharing nutrients with those who are sick or struggling, and creating an ecosystem that mitigates the impact of extremes of heat and cold for the whole group. He presents the science

behind the secret and previously unknown life of trees and their communication abilities, and describes how these discoveries have informed his own practices in the forest around him.

Reader Offer - 15% discount

Offer ends 31st March 2024

How to Read a Tree

Clues and Patterns from Roots to Leaves

Tristan Gooley (*Hodder Press, April 2023*)

Each tree we meet is filled with signs that reveal secrets about the life of that tree and the landscape we stand in. Tristan knows how to uncover the phenomena worth looking for: the clues are easy to spot when you know what to look for, but remain invisible to most people. Discover the simple principles that explain the shapes and patterns you can see in trees and what they mean. Learn rare skills that can be applied every time you pass a tree, whether you are in a town or a wilder spot.

Readers of *The Geographer* can buy a signed copy of *How to Read a Tree* from the Steyning Bookshop for only £18.70 (RRP £22.00), with UK P&P of £3.10. To order, please visit www.steyningbookshop.co.uk/product-category/signed-books/tristan-gooley, or phone 01903 812062 and quote code 'Geographer Mag'.



only
£18.70
(RRP £22.00)

The Treeline

The Last Forest and the Future of Life on Earth

Ben Rawlence (*Vintage Publishing, January 2023*)

The Arctic treeline is the frontline of climate change, where the trees have been creeping towards the pole for 50 years already. Scientists are only just beginning to understand the astonishing significance of these northern forests for all life on Earth. At the treeline, Ben witnesses the accelerating impact of climate change and the devastating legacies of colonialism and capitalism. But he also finds reasons for hope. Humans are creatures of the forest; we have always evolved with trees and *The Treeline* asks us where our co-evolution might take us next.

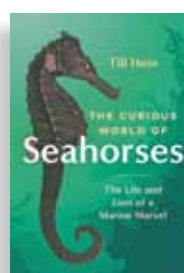
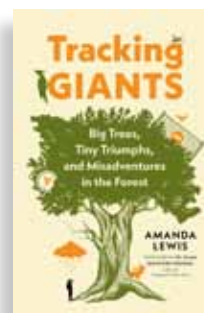


Tracking Giants

Big Trees, Tiny Triumphs, and Misadventures in the Forest

Amanda Lewis (*Greystone Books, August 2023*)

Amanda was a burned-out book editor who could barely tell a birch from a beech. But that didn't stop her from pledging to visit all of the biggest trees in British Columbia, a Canadian province known for its rugged terrain and gigantic trees. Her lack of wilderness experience, the upsetting reality of old-growth logging, the ever-changing nature of trees, and the pressures of her one-year timeframe complicated her quest. Realising that her 'checklist' approach to life might be the problem, she reframed her search for trees to something humbler and more meaningful: getting to know forests in an interconnected way.



The Curious World of Seahorses

The Life and Lore of a Marine Marvel

Till Hein (author), Renée Von Paschen (translator) (*Greystone Books, November 2023*)

Of all the creatures in the ocean, there are none more charming and magical than the seahorses. Masters of disguise, graceful dancers, and romantic lovers, seahorses are found in the seagrass meadows and mangroves of the world, and throughout the annals of human history and culture. Equipped with a pouch like a kangaroo, a long snout like an anteater, and a crown unique as a human fingerprint, the seahorse defies easy categorisation. The only fish to swim in an upright position, seahorses are terrible swimmers, but they make up for it with an incredible talent for holding onto seagrass or coral.

RSGS: a better way to see the world

Phone 01738 455050 or visit www.rsgs.org to join the RSGS. Lord John Murray House, 15-19 North Port, Perth, PH1 5LU Charity SC015599

Follow us on social media

