SCOTTISH WOODLAND HISTORY DISCUSSION GROUP (SWHDG)

NOTES VIII

EIGHTH MEETING

THURSDAY 27TH NOVEMBER 2003

SCOTTISH NATURAL HERITAGE CENTRE
BATTLEBY, PERTH

A C K N O W L E D G E M E N T S

The Scottish Woodland History Discussion Group is indebted to the undernoted for their sponsorship and help in making the seventh meeting of the group a success:

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Front cover photograph: Pine Seedling (Dr Fiona Watson, AHRB Research Centre for Environmental History)

C O N T E N T S

The eight annual meeting of the Scottish Woodland History Discussion Group was held at Battleby on Thursday 27th November 2003. The following papers were presented

ROUND-UP OF WOODLAND HISTORY NEWS

PETER QUELCH

I will summarise a range of mainly field-based initiatives that I have been involved in or just come across over the last year. There are a surprisingly large number!

SWHDG Visit to Darnaway Estate, (June 03) A successful meeting, thanks to organiser Mairi Stewart, and locally Mike Phillips. We were shown inside the great hall itself, with impressive medieval roofing timbers, private family heirlooms and estate maps etc. Then we saw the well-known Darnaway veteran oaks, and also tall timber oaks in the forest, and remains of old park pale dykes. Lord Moray was pleased to have the thoughts and interest of our group. Hopefully a field visit in the summer will be a tradition the group keeps up.

Heritage Trees. In the first several years of this group, we explored veteran trees and helped put them on the map. During the FC's Treefest 2002 year, a web-based Heritage Trees of Scotland initiative was run, culminating this year in a new FC/SNH/Tree Council book of 100 selected trees (Rodger, Stokes and Ogilvie). For example the book contains the largest of the Darnaway oaks. It is very popular with the communities whose trees have been recognised, as certificates have been presented, and local people involved. Also it as spawned a new type of 'Munro bagger' whose aim is to visit all 100 trees! So in a year or two a sequel will be needed to keep those people motivated!

Big Tree Country of Perthshire. This successful tourism oriented initiative by FCS has publicised a number of sites in Perthshire with big trees and impressive forest stands, and is linked to the history of the great Scottish plant collectors. Note that these sites are all readily accessible, whereas the Heritage Tree book does contain many private trees for which permission is needed for access.

Wood Pastures. Some of us tree-huggers have therefore moved on from heritage trees to the more ecological aspects of veteran trees in wood pastures and old-growth forests. A few examples:

Arran whitebeams: there is a renewed multi-agency interest in the conservation of the main refugium of the endemic Arran whitebeam species in Glen Diomhan. Cuttings are being taken by FC Research, and sites for new planting explored.

Dumfries and Galloway Wood Pastures: an initiative is under way to survey, classify and to look at incentives and management for this habitat, flagged up in the LBAP. I have promised to help with an initial guide to types, looking at more than the classic ancient wood pastures but also the other situations of tree in the agricultural landscape. I invited members of the steering group to send me photos of their favourite wooded landscapes for me to build on.

Glenroy: New wood pasture sites are being discovered and reported all the time, and Mike Smith is continually updating the SNH Inventory of such sites. Glenroy is one in Lochaber that we visited with FE's Dave Whitaker who is looking at PAWS restoration in FE held oakwoods in that glen. The wood pasture is located beside the historic mass-stone where Catholic masses were once held when the holding of mass in churches was banned. The wood contains some huge old ash pollards.

Native Woodland Discussion Group visits

Geltsdale where the East Cumbria Countryside project (Iris Glimmerveen) and RSPB are looking after old wood pasture relicts, and are interested in creating a much expanded area of native woods in the north Pennines, an area which has had no extensive new forestry for 30 years.

Glenamara, a NT site above Ullswater which is an old parkland full of interesting veteran trees and archaeology, both prehistoric, medieval and woodland management related. Discussions with Cumbria Woodlands, National Park, Defra, National Trust, and English Nature staff were very helpful.

Altagalvash wood pasture – birch stub pollards on stone-cleared farmland, visited on the 'long walk in' from Skipness to Tarbert, Loch Fyne, by NWDG in 2002, subject of a article by me speculating on their history in the recent edition of the Kist (65).

Islay, the NWDG and the Continuous Cover Forestry Group also visited Islay Estates in June, looking at woodland management in an important Designed Landscape, which includes plantations and trees of up to 200 years old. These were planted on bare land by improving lairds, and many have never been cleared completely. The resulting biodiversity is remarkable for this windswept island, but the challenges for future management are considerable. The group were lucky to have the benefit of local experts on hand, including Margaret Storrie on the remarkable history of the estate.

Wood Pastures in Wales. This summer I carried out an advisory visit for CCW looking at the range of wood pastures and rural non-woodland trees in Wales to help them decide on a new inventory. ***Ancient Tree Forum*** people (Ted Green and Jill Butler) participated in some of the tour, at Gregynog Old Wood and the Elan Valley ancient wood pasture.

ATF visited **Romania** this autumn *(not seen a report yet, and no, I did not manage to get on that one as well!)*, while Helen Read of that group and ecologist at Burnham Beeches has been on an extensive tour of **Pollards in Europe** this summer. I hope that she publishes her work to the same high standard of previous Corporation of London booklets on veteran trees and pollard management.

North Spain. SNH advisers and myself had a short visit to Spain to meet up with Bob Bunce in the Pyrenees and the Picos. I could spend an hour showing what we saw, but the main focus was on old growth near-natural beech forest in the Pyrenees, abandoned beech pollards not unlike the Burnham Beeches situation, and cultural landscapes in the Picos which included ash and poplar recently shredded for livestock fodder.

Professor Haeggstrom Tour

A big step forward in understanding Scottish wood pastures came about from a tour arranged by Kate Holl (SNH) of some key wood pasture sites with Prof Carl-Adam Haeggstrom of Helsinki University. He looked at **Glenfinglas** in particular and gave his views on the orchard-like hazel trees there. He also gave us the traditional Swedish name for epiphytic rowan trees in alders as 'bird trees' (since they are invariably bird-sown!) rather than Neil Sanderson's tropical sounding 'air-trees' – but take your pick, they have no other name as far as I know!

We visited the **Ardnamurchan** area where the Sunart Archaeology Research Group guided us to some familiar but also new sites, including **Ardery wood pasture** and old oaks at **Mingary**, but also **Shielfoot wood** which contained the most man-modified oaks I think I have ever seen. There is of course a unique local history which explains this phenomenon, due to centuries of communal use by the township.

Huge oak pollards were also seen adjacent to remarkably large and well-built stone platforms in open woodland high above **Loch Eilt** near Lochailort. Prof H in his report did not comment in detail on anything at Sunart for in his opinion ' *the Sunart Research group were quite well aware of the archaeological and historical features of the areas visited'* and so he reported only on Glenfinglas and on Rassal NNR, where there were misunderstandings in his view.

Rassal Ashwood: Recognition that Rassal is primarily a cultural landscape and that the ash trees have a certain place in that landscape, and that it is in no way a near-natural woodland is a big step forward. Prof H was forthright in his criticism of the management of the trees, especially the planting up of the old terraces, and also the loss of plant species in the ungrazed calcareous grasslands.

The ash trees are a sort of biocultural heritage at Rassal, in the same way as the orchard-like hazels at Glenfinglas, the oak pollards at Loch Eilt, the many oak stubs in Shielfoot wood, and the many other Scottish examples I have shown you. They are similar to the olive and fig trees in Greece in these pictures of the sequence of abandonment of terraced farmland where the adjacent forest is claiming the old landscape. One day our grandchildren will indeed be able to puzzle over why fig trees can be found

inside dense conifer forests! The swallowing up of biocultural features within the forest following agricultural abandonment can be seen all over Europe.

NWDG Italian Visit, (Sept 03)
For example, the NWDG visited the Abruzzo and Majella national parks in central Italy and found exactly similar situations. Features from abandoned crofting land with cultivation terraces and stone dykes have been and still are being swallowed up into both planted and seminatural forests. Even the ancient beech pollards in Abruzzo national park can be seen to be sited on the stone clearance cairns at the edge of old cultivation terraces.

Future Management Actions in Wooded Cultural Landscapes
We have had an interesting time over the last few years identifying and recognising the cultural features within seminatural woodlands and planted forests. However this is maybe now the time to decide what to do about these features, and how to manage them.

Veteran tree management
For example we can do practical things such as FE did in **Knapdale** this year by pollarding ancient ash and sycamore trees overhanging and threatening an early Christian burial site beside Loch Sween. This action prevented the tall trees (now isolated by felling of surrounding conifers) from windthrow, and certain disruption of the burial ground. Some living branches were left to help support the tree and allow it to throw out new shoots. By pollarding at 3m height hopefully the trees will continue to live, thus conserving their value as lichen and bryophyte hosts, but also continuing to give ambience to an ancient sacred site.

Biocultural Heritage – an EC Life project between Sweden and France.
The previous year I visited Sweden to see how they tackle the problem of what exactly to do with biocultural heritage in forests once you have identified it. *(For details of this project see my article in Reforesting Scotland, autumn 2003).* I cannot say that I saw a lot of imaginative solutions to the management apart from cutting back trees from cultural features, and preserving some very small examples of old croft-lands by mowing rather than grazing. There was a desire to continue traditional cattle grazing in the long grazed pasture woodlands of north Sweden but no mechanism was demonstrated to ensure this is actually done. The decline in traditional cultural and farming practices is it seems inexorable across Europe.

Cultural heritage in Scottish woods and forests
A lot of cultural heritage restoration is going on in forests, but I feel there is scope for a more imaginative approach to restoration and interpretation of cultural features and also the history of the forests themselves. After all, the FC is now nearly 100 years old and has a long history of activity in the Scottish countryside. Brent Meakin will be speaking about a new initiative in Knapdale, **'Dalriada, landscapes in time'**.

Also the **Borders Forest Trust** conference this year raised the possibility of linking native woodland restoration in the ancient **Forest of Ettrick** to the wider historic or cultural landscape of that district, and this gives scope for a new and imaginative approach. Perhaps this would be a topic that could be explored in a future field meeting of SWHDG (*next year?).*

Another thing that the more artistic amongst us can contribute is to just celebrate the biocultural heritage that has been passed down to us, and that we have spent much of our lives conserving. Peter and Christopher Wormell's new and beautiful book on the **Pinewoods of Black Mount** is therefore very welcome.

Also at the Borders conference the idea of creating **new wild lands** was discussed, and there is a general move to explore the creation of new wild landscapes involving grazing by large herbivores as is being demonstrated in Holland. English Nature has just announced new research into this area in the paper entitled **'Fresh Woods and Pastures New'**. SNH, FCS, FWAG and other bodies are becoming involved in research work and initiatives to explore the practical aspects of a new style of conservation grazing in

woodlands and other habitats, and even in extensive new wild landscapes. There may be new opportunities for funding this type of work through **CAP reform**.

So these are exciting times, with the likelihood of quite substantial and far-reaching changes in Scottish land-use. For example a consultation paper on the whole future extent and aims of state forests in Scotland will shortly be issued, and the place of woodland history and cultural heritage are discussed in that paper. I don't need to remind you that the discussions in this group, which is itself a veritable think-tank, can often precede new policy directions.

DALRIADA PROJECT
LANDSCAPES IN TIME

BRENT MEAKIN

Dalriada Project: What is it?

Working for a sustainable future by reviving the spirit of the past

To conserve and share the area's rich natural and cultural heritage

To use our heritage assets to increase local prosperity and quality of life

The Vision

The unique heritage of Knapdale and Kilmartin Glen will bring increased financial and cultural prosperity to Mid Argyll and Kintyre in a way that safeguards the interests of local people and enhances the area's heritage legacy.

There will be many opportunities for local businesses to co-operate in offering services to visitors, both enhancing the visitor attraction and bringing economic benefits to the area. There are natural treasures in the heart of ancient Dalriada.

Project in a nutshell

The Landscapes in Time Partnership is working to do more for Dalriada by making more of it.

Conserving and restoring a stunning 100 square mile landscape of woodland, mire, water and coast.

Protecting a rich concentration of archaeology that tells a unique 6000 year story.

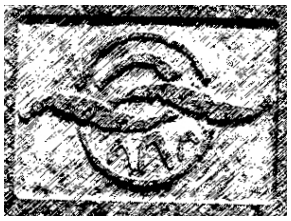
And working with local people to unlock it's economic potential through flagship features that honour the landscape, festivals and events that bring Dalriada to life.

A joined-up access network that does not depend on the car.

"The Crinan Canal will become a year-round hive of activity and an artery into the project area."

Core principals

1. Focus on investment in the area's natural and cultural heritage.
2. Vision that recognises the need for ambitious flagship features to put Dalriada on the map and bring economic benefits.
3. People: putting local communities at the heart of the project.
4. Accessibility: offering interesting, and joined-up ways to get around Dalriada without spoiling it.
5. Identity: building a strong Dalriada identity for orientation, interpretation and marketing.
6. Partnership: unlocking added value by public, voluntary and business partners working together and sharing assets.



Who's involved:

Argyll and Bute Council, Argyll Green Wood Workers Association, Argyll and the Islands Enterprise; British Waterways Scotland, Forestry Commission Scotland, Historic Scotland, Kilmartin House Museum, Scottish Natural Heritage, Scottish Wildlife Trust, The Waterways Trust Scotland, the area Tourist Board and the Woodland Trust.

What next

The next Step is to get funding to employ project officers, talk to local people about the partners ideas and the potential of the area. To collect your views and ideas, and facilitate turning these into reality

The project has the backing of the Mid Argyll Partnership, a grouping of local councillors, community councils, voluntary groups and agencies. We have also noted interest from a range of businesses and individuals.

We are looking for more supporters and ideas all the time, and would welcome your thoughts, ideas and interest. Tell us about the Dalriada Weekend and if we should run the event again. Please write into us including your contact details to:

The Dalriada Project, Forestry Commission Scotland, Whitegates, Lochgilphead, Argyll, PA31 8RS

PRACTICAL SYSTEMS FOR MANAGING VETERAN AND HERITAGE TREES

PAUL HANSON

Summary

This paper addresses the processes by which we can identify the requirements for the practical conservation, through both routine and remedial operations, of trees considered to have veteran and/or heritage value. The practical solutions for individual specimen and small groups of trees differ considerably from those employed in traditional amenity, woodland or commercial forest settings. The growing public awareness and increasing professional involvement in the management of 'old' trees have led to significant changes and new developments in the techniques engaged to ensure the continued wellbeing of the trees themselves and the associated flora and fauna. Having revisited historical management principles and practices and combined them with the best of modern technology, we are now in a position to safely conserve these unique habitats.

The older, mature, native and exotic trees often have the potential to be described as 'Veteran, or 'Heritage': ***Veteran*** describes those trees of extraordinary age for their species, and ***Heritage*** alludes to some human, cultural connection (folklore, religious or commemorative). In many cases Veteran and Heritage value may well be found in the same tree. Urban, sub-urban and rural development and land management practices have created the invaluable tree reserves we enjoy today. Whilst we should hope to continue to enjoy today's veteran and heritage trees for many years to come, we must not ignore their basic requirements. Often as a consequence of the conflict with human demands, water, sunlight, oxygen and nutrients are becoming increasingly unavailable to trees. Natural disasters (drought, storms, pest plagues) all play a part in the normal lifecycle of trees. Where these are coupled with human factors – pollution, development pressures, vandalism and ill-advised pruning - what chance is there for a tree reaching a ripe old age?

> ***"Certainly the largest living plants in any urban or rural landscape, trees present arguably the most diverse, essential habitat for many other plants and animals, contributing perhaps more significantly than any other factor to our human existence".***

It is thought that 80% of Europe's ancient trees reside in the UK: most within 20 miles of a town or village. Many of the oldest are associated with places of worship. Indeed Europe's oldest tree (perhaps), the 'Fortingall Yew' in Perthshire, may be in excess of 4000 years old. How does that equate with the perception of "old" in terms of man made structures? The sustainable management of this invaluable natural resource requires planning to ensure appropriate and adequate legal protection, supported through education and municipal funding, encouraging cyclical maintenance programs, interpretation and provision for replacement, to set the foundations for tomorrow's heritage trees.

Old trees have never been more 'popular' than they are today. We have seen the formation of increasing numbers of well intentioned, local and national 'old tree' groups and societies over the last ten years. The number of high quality publications, illustrating wondrous national and international old trees, is nothing short of astounding given the level of general public interest only ten years ago. Clearly veteran and heritage trees are on the public green agenda, and the 'feel good' factor continues to grow. Surprisingly, one anomaly in the growth of old tree appreciation is the absence of a corresponding development amongst our nation's professional tree managers. Horticultural landscape managers, foresters, arborists, conservation managers, wildlife managers and the organizations in which they work have been very slow to realise the importance of the veteran and ancient trees in their care and the responsibility they have for them. They have been slower still to embrace the techniques and expertise available, through which such trees can be properly conserved.

In the increasingly litigious world in which these old trees reside, there is the constant requirement for hazard and risk assessment: usually from the human perspective. Sadly, even in this enlightened age, trees presenting a significant hazard to persons or property are removed on the grounds of promoting safety. Often removal is undertaken because it is seen as economically the best solution, or it is the only approach the contractor is qualified and experienced to execute or because of the limited specialist knowledge and experience of the site manager. There are ways of reducing risk to acceptable levels that do not require trees to be felled and may actually place considerably less pressure on management budgets.

It is crucial that the trees and their dependent wildlife should be factored into a hazard and risk assessment, but, in many cases, human activity poses a greater threat to the tree habitat. Careful consideration of the individual tree(s) and associated flora and the requirements of permanent and transient animal populations must form the foundation of a basic management plan. It is impossible (and may be illegal) to manage in ignorance. Very often the initial data collection is undertaken by a specialist, who cannot be expected to operate outwith their own professional sphere. It would be wonderful to engage the arborist, entomologist and mycologist on each and every occasion. In most cases, however it would be neither practical, nor cost effective. It should not be unrealistic, though, to engage a professional arborist to manage the arboriculture, who has a good appreciation of the other specialist fields, knowing when to seek their guidance for further investigation. The arborist is fundamental in these cases: failure to manage the tree issues correctly may compromise safety or cause irreparable habitat damage or loss. One must be careful not to confuse the arborist with the forester or tree surgeon: veteran and heritage trees deserve Rolls Royce service. With the best will in the world the most, competent 'kwik fit' fitter will be out of his depth.

The identification of veteran and/or heritage trees has evolved into a broadly universal methodology with a wealth of informed literature, upon which the non-professional and very experienced professional alike can draw to formulate decisions and opinions. Having identified trees as suitable for inclusion in these categories, with inherent concerns for the safety both of themselves and the wider public, the managers' challenge is how to respond effectively and responsibly for all concerned. The remedial management requirements for these large, mature, and often ancient plants are very varied and invariably technical in nature, embracing innovations in the practice and science of woody plant care. Typical options available are:-

-non-intervention: to simply allow nature to take its course - perhaps a little ridiculous, given the high levels of human modification in our landscape to date.

-non-invasive assessment: a recognized 'Visual Tree Assessment 'methodology that relies on external consideration of the body language of the tree(s), (after Broeler and Mattheck 1995). This is a robust, quick, cost effective and non-damaging system for assessing tree health and condition.

-invasive assessment: several approaches can be made under this heading all of which are more or less damaging to trees, depending on the chosen system. A range of options is available: from simple, mechanical test boring, through increment core sampling, to sonic and sonic tomography testing. The benefits are the accurate, quantifiable and tangible results. The drawbacks are the limited availability, expense and arboricultural experience required to interpret the results.

-exclusion: to restrict access by fencing or by a combination of re-routing access roads and paths and subsequent fencing. This may well relieve the potential for personal injury and property damage, but it does not make any meaningful contribution to tree health and habitat conservation.

-assisted access: to provide a particular route of access, avoiding hazards, often utilising a rafted walkway above the root zone to minimise compaction.

-removal: to simply fell or cut off the offending tree parts, a much practised, usually knee jerk, reaction to perceived problems, often resulting in the loss of extensive, desirable, globally rare habitat.

-modification: to adjust by tree surgery, the mechanical forces acting upon the tree – typically by making the canopy smaller, by shortening and lightening the length and weight of branches and limbs to reduce wind and gravitational effects and by decompacting root zones to allow more effective root activity.

-support: where modification alone is not sufficient, support, through cable bracing and/or propping, is often very effective.

-monitoring: once trees are identified as having a special veteran or heritage value, it is essential that regular future monitoring is programmed and carried out to ensure the continued, safe conservation of that value.

In recent years the legislation governing the safety of persons at work has introduced many new systems that have changed the previous ways of working almost beyond recognition. In the area of tree surgery this has definitely been the case, and given the research that has been undertaken on tree decay pathogens and tree biology, tree work is now arguably safer than ever before. The safety of those persons undertaking remedial works to veteran trees that are often in, at best, a precarious state, has to be carefully considered in determining what form that remedial work might take, and how it might be carried out.

Traditionally tree pruning works have been undertaken from a rope and harness system. Where trees have been considered unsafe for climbing operations, then they have simply been felled! The latter approach has also been taken when the climbing expertise has not been readily available, or has been thought too expensive! What price our natural, wildlife habitat?

Improved design of Mobile Elevated Work Platforms (MEWPs) and all terrain cranes now allows safer and more flexible management options for more of the trees that fall into the dangerous category. This 'sky hook' approach is particularly suited to trees of important habitat value that are simply inaccessible in any other way. Crown alteration is possible where in the past only felling or exclusion were possible without putting the lives of tree surgeons in jeopardy.

Recent pruning development has seen the application of 'conservation pruning' techniques for crown modifications in structurally defective veteran trees and in some cases to introduce decay in trees to create habitat suitable for colonization by a range of wildlife. Conservation pruning requires unorthodox use of powersaws that is particularly hazardous from a rope and harness. Coronet cuts and tearing cuts are much easier and safer to execute from a MEWP or crane. Techniques for bird and/or bat roost conservation may involve the removal of timber sections from tree limbs at height and the refitting of those sections once they have been adapted to provide the desired roost type. This type of work is no longer restricted to access from ladders.

Overhearing conversations amongst arborists engaged in conservation pruning one imagines a candid camera crew to be close by. Where one would expect pride to be taken in the performance of accurate target pruning, we now hear comparisons in the methods employed to encourage massive ripping and tearing through branch removal and terms akin to the 'smashing up' of branch ends. While this approach would horrify the purists involved in amenity tree care, it is quite desirable in habitat conservation management to try and replicate storm damage through pruning. These conservation pruning techniques vary from simply, slowly cutting the branch to be removed from the top side and allowing gravity to do the rest, to elaborate, almost sculptural, pruning of branch stubs. Not only has the pruning evolved, but the notions of where to prune are now concerned with keeping (at least in part) structural defects such as cracks, splits, hazard beam limbs and fungally induced or colonised decay sites. In cases where the next generation of 'habitat trees' are 150 years or more away, extreme techniques are employed to replicate naturally occurring habitat. Such techniques range from winching limbs from mature healthy trees and re-erecting windblown trees, to using explosives to "blow" off limbs and branches from trees. The relatively new tree surgery approaches are currently only practised by an enlightened few, the more extreme by even fewer. They do go against the grain of traditional tree management systems and

demand a real commitment, supported by appropriate interpretation.
The notion of the 'little and often' approach being more beneficial than a major pruning event is especially relevant with these old plants. Often structurally defective, large trees, presenting significant hazard and risk, are recognized as having important wildlife and amenity value. While their retention is desirable, the efforts made to reduce the risk to persons and property are life threatening for the tree and the resident flora and fauna. The removal of whole or considerable portions of tree canopies in one event may result in shock, leading to significant stress to a tree, from which it may be unable to recover. The same amount of canopy removal, undertaken over a number of years in smaller pruning events, often allows a tree to reorganise biological processes to minimise any stress induced. This approach also has the added benefit of allowing flora and fauna to similarly adapt to smaller changes in conditions over time.

These old trees must be considered in the context in which they exist: local ecosystems within a larger global ecosystem. Given our political commitment to the sustainable management of bio-diversity, we cannot simply destroy tree associated habitat as a result of inadequate financial resource and ignorance. World wide this type of habitat is under threat. Perhaps we have a wealth of such habitat in the UK because we have been financially able to take advantage of foreign resources. Forestry has selected the best timber for harvesting for hundreds of years. Thankfully the non-commercially viable trees have been left and form the majority of the old tree habitat that we see today. Unrelenting human development, through commercial expansion, housing development and an increase in transport infrastructure, has subjected our natural 'green' environment to enormous pressure, resulting in some cases in irreversible damage.

In order to "improve" the quality of life for mankind, we have seriously impaired the quality of life for many other organisms. How long before we collectively pass the point of no return?

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THE OAKWOODS AT OLD CAERLAVEROCK CASTLE, DUMFRIESSHIRE: POLLEN EVIDENCE FOR MANAGEMENT FROM THE THIRTEENTH CENTURY

ALTHEA DAVIES

Introduction

Between the thirteenth and seventeenth centuries AD the Maxwells were one of most powerful families in south-west Scotland: they were sheriffs in Teviotdale before shifting their power base west around AD 1220, to become wardens of the West March (the western boundary between Scotland and England) and chamberlain to the king, reflecting the increased power and wealth of the family (Brann 2003).

It is no surprise, therefore, that their seat was an impressive castle at Caerlaverock. This strategic location provided access and presumably allowed them to exercise control over the Solway Firth close to the mouth of the River Nith, south of Dumfries. Despite partial demolition in the mid-seventeenth century, the red sandstone castle at Caerlaverock remains an impressive building, with a unique defensive triangular or shield-like shape.

However, this castle was not always the home of the Maxwells at Caerlaverock: the Old Castle was largely forgotten until recent excavations by the Scottish Urban Archaeological Trust (SUAT), funded by Historic Scotland. It is easy to understand why, since the Old Castle consists largely of earthworks and stone wall-footings, and lies in an unprepossessing location, hidden by trees and marshy ground between the surviving New Castle and the coast.

These trees are the subject of this paper. They are not recent; indeed the local woods have been in existence for at least as long as the castles and currently form part of a National Nature Reserve. This paper discusses the development, composition and management of the woods, and speculates as to why they may be so long-lived in a politically-sensitive location.

The story…

The evidence for woodland composition and management derives from a pollen record preserved in peat which has accumulated in the moat around the Old Castle since its construction more than 700 years ago (Davies in press). This is a very small site – the moat is only *c*.5 m wide – and as a result the pollen sequence provides a sensitive indicator of local vegetation development and change within a radius of 50-100 m around the Old Castle.

Occupation from around AD 1230

The Old Castle was built around 1229, dated by dendrochronology from a timber which formed part of a bridge across the moat (Baillie 1977). At this time, the moat was filled by open water with aquatic grasses and duckweed. However, the wider local environment was far from open as the pollen evidence suggests that the moat was overhung by alder and willow, indicating damp, possibly marshy conditions beside the ditches and watercourses that enclose the Old Castle site, with some oak on less waterlogged soils. Tree growth was well-established as the wooded habitat included species which are sensitive to disturbance, including ivy.

Unfortunately it is difficult to assess how extensive this wood was based on the pollen evidence alone. The woods did not form a closed canopy since open areas or lightly shaded glades also present locally. Work on the history of the sediments around the castles indicate that the early thirteenth century coast lay close to south side of Old Castle (Tipping *et al*. in press a, b).

This low-lying and marshy setting is hardly what would be expected from a wealthy family seat, but a sherd of Islamic glass found during excavation confirms the high status of site (Brann in press). However, the wood and marsh could be seen as defensive assets, as was clearly the case when King Edward I laid siege to the New Castle in 1300. A description dating from this period states that approach from the south (where the Old Castle lies) was "made difficult by wood, by marsh, and by trenches filled by the sea where it is wont to meet the river" (Fraser 1873). In this strategic location, close to the English

Border and to the unruly inhabitants of Galloway, to the west of the River Nith, such surroundings may therefore have been an asset.

The pollen data provide little evidence for agricultural activity associated with occupation. This is perhaps unsurprising given the nature of the local environment and its possible defensive purpose.

Abandonment, management & control after AD 1270

The Old Castle was abandoned just 50 years after its construction in favour of the New Castle, which was constructed some 200 m inland. The reasons may also relate to the setting of the Old Castle: not the woods in this case, but the sea. Examination and dating of the sediments around the castles and towards the coast suggest that the coastal environment may have become too unstable and changeable around this time (Tipping *et al*. in press a, b). Storms may have driven coastal floods by 1300, inundating the coastal side of the Old Castle moat and its outer ditches with marine sediment, forming a shingle ridge and causing the shoreline to retreat south by around 300 m, significantly changing the Old Castle's setting.

The moat continued to fill with sediment after the Old Castle was abandoned, changing from open water to a fen with bulrushes and sedges as sediment accumulated and water depth decreased. From around 1285 the woods were also changing: alder growth was cleared while ash and oak spread. Oak pollen values rise over period of 140 years, from 1280 to 1420, suggesting the gradual maturation of oak trees, which eventually shaded out most of the ash. This could be interpreted as a natural succession as a result of abandonment. However, there are numerous lines of evidence suggesting that the area was managed as a productive part of the Maxwell property.

Dendrochonological evidence indicates that oak was used for construction in both castles at Caerlaverock. The timbers included mature, old-growth oak trees that started growing in the eleventh century, but changed to young, fast-grown trees typical of regenerating woodland after the fourteenth century (Baillie 1977, Mills *et al*. in press). The pollen evidence shows that oak was not dominant around the Old Castle during the thirteenth century occupation, suggesting that oak timbers were available elsewhere at that time. As the focus of activity shifted inland to the present castle site around 1270, the Old Castle area may have taken on a timber producing role and the transition to younger building timbers may coincide with the growth of the new oakwood after abandonment.

Post-demolition activity at the Old Castle included smithing and the metal-working debris contained charcoal impressions, confirming the use of wood for fuel (Chadburn and Photos-Jones in press). Charcoal remains from the site were dominated by oak with smaller quantities of alder, birch, willow and heather (Hastie 2000). The proximity of the woods to the Old Castle may therefore have been seen as an advantage for metal-working activity (Chadburn and Photos-Jones in press).

Taken together, the pollen, tree-ring, smithing and charcoal evidence suggest an organised and deliberate management plan for this area of the Maxwell property. Part of this strategy may have included removing or suppressing opportunistic colonisers like birch and hazel, which were virtually absent from the pollen record, because they would have competed with timber trees for space, light and nutrients. As a result, much like a conifer plantation, medieval managers may have deliberately manipulated woodland structure and species composition, maintaining a relatively low diversity of trees to enhance timber production, producing larger, faster growing and better quality wood.

Disturbance by grazing animals does not appear to have been a major ecological factor in the woods around Old Caerlaverock Castle. This is inferred from the continued growth of ash, ivy, honeysuckle and holly, all of which are sensitive to disturbance or are palatable to animals. Some herbs often associated with grazing were present in the pollen record, but could have grown in coastal habitats to the south of the Old Castle as well as finding niches in woodland openings. If animals were present, grazing densities are suggested to have been low, perhaps indicating that access to the oakwoods was carefully managed to protect the timber resource.

These results provide an interesting contrast to the lands on the west side of the Nith Estuary, which were in the demesne of the Lords of Galloway when the Old Castle was in use. Here, documentary references

to woods disappear completely by the 1250s on ground that was used primarily for sheep with cereal production (Richard Oram, pers. comm.). This was also a highly regulated landscape, but clearly managed very differently to the Maxwell Castle grounds, as perhaps expected from an agricultural landscape and high status castle grounds. In a wider national context, the oakwood at Old Caerlaverock Castle was maturing during a period when the native oak resource appears to have been diminishing across Scotland (Crone and Mills 2002).

Around the Old Castle, oak became increasingly dominant, especially after 1590. The existence of the woods is confirmed by maps dating from the late sixteenth century onwards. The cartographic evidence supports the palynological interpretation that the wood was a deliberately maintained part of this landscape, since the surrounding land was evidently being managed for agriculture. This includes mid-eighteenth century land reclamation of the merse (coastal saltmarsh) which separates the castles from the sea, as well as numerous assarts and enclosures further west within the wood.

Location, location, location: why did the woods survive?

This evidence provides a picture of woodland continuity at Caerlaverock, despite significant changes in the fortune of its owners and inhabitants. Initially, the woods and marsh may have been a defensive asset for a powerful family in a potentially unstable part of the country. Following abandonment, the pollen evidence strongly suggests deliberate timber management from the thirteenth century, at least, which maintained a low diversity woodland habitat and probably imposed limits on agricultural exploitation. This continuity was maintained despite political instability, including the fall of the New Castle to King Edward I in 1300, its use as an English supply base followed by numerous changes of hands until a siege by Covenanters in 1640, after which the New Castle was partly dismantled to prevent further occupation.

The proximity of the New Castle and its politically-sensitive location throughout the thirteenth to seventeenth centuries are suggested to have protected the woods, ensuring their survival by excluding or regulating access by surrounding farming communities. Even when the power of the Maxwell family waned after this period, perhaps the existence of the nearby family seat protected the wood from clearance during succeeding centuries when the adjacent lands were certainly being exploited to increase agricultural productivity.

It is only within that last century that signs of neglect appear. In this period, the oakwoods have either encroached onto the castle mound, or have become denser around it, and by 1920 the mound was overgrown with trees (RCAHMS 1920). The trees growing on the Old Castle mound were cleared prior to archaeological excavations in 1978. Now, although still owned by the Maxwell family, the castle is in the care of Historic Scotland and the coastal ground forms part of a National Nature Reserve managed by Scottish Natural Heritage. The NNR designation is primarily for the tidal mudflats, merse and raised mires along the Solway coast – a rare and declining habitat which is scarce at a European level. As a consequence, the woods are now once more being actively managed. This includes the removal of conifers and building of paths to improve visitor access.

Implications and conclusions

The pollen record from the Old Castle moat at Caerlaverock reveals the story of a wood that owes its composition and survival to a unique combination of factors which regulated management and use for over 700 years. This record from a rather unassuming location has provided substantially more than a simple backdrop for the archaeological or conservation story of this small part of the Solway Firth. In fact, a reconstruction of this area of the coast, based on pollen and sediment data (Davies in press, Tipping *et al*. in press a, b), bears little resemblance to an Historic Scotland postcard showing an artist's impression of Caerlaverock around the fifteenth century, in which the area is depicted as open with clear views from the New Castle to the sea.

The pollen story thus provides historical and ecological detail with clear implications for archaeological reconstruction and conservation management. It adds to the tale of a high status family castle unexpectedly obscured by woodland, possibly not unlike the present day mix of oakwood and wooded marsh. However, this was far from an under-used or overlooked resource and the current woods are a cultural artefact, despite their rather neglected appearance. It is important for conservation managers to

recognise that the woods are the relict of a designed woodland within the NNR. Past manipulation and the long survival of the oakwood make significant contributions to habitat diversity in the wider modern landscape. This knowledge should add ecological and cultural depth to current conservation values in a NNR with European-level designations for the surrounding raised bog, tidal mudflats and saltmarsh which have also been features of the changing fortunes of Caerlaverock Castle.

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GLEN FINGLAS WOOD PASTURE – REFLECTING ON THE PAST FOR THE FUTURE

ANGELA DOUGLAS

Glen Finglas is a 4,089 hectare estate typical in its physical characteristics of many Scottish hill farms. The Woodland Trust acquired the property in October 1996 with the support of the Heritage Lottery Fund and a very successful fundraising campaign to deliver public benefits and subsequently our four corporate objectives:

- Protecting ancient woodland
- Enhancing biodiversity
- Increasing the area of native woodland
- Increasing people's enjoyment and understanding of woodland

The previous owner ran 4,000 breeding blackface sheep and 100 Luing cattle. As well as considerable open hill, there were remnant ancient and secondary native woodland areas and a somewhat "past its best-before-date" infrastructure. The property is stunning and very diverse starting at just below 90m at the shores of Loch Venachar to 800m at Ben Ledi. Today there are 1800 blackface ewes, 66 Luing/Sim-Luing cattle and over 27 kilometres of paths and access routes. Glen Finglas can be described as an integrated property – an in-hand sheep and cattle farm combined with extensive native woodland restoration and regeneration. In addition, there are improvements to public access and interpretation as central aims of the Management Plan.

Originally three main areas were identified to become the cores of native woodland expansion. When Glen Finglas was first acquired, no-one appreciated that it was an ancient wood pasture and most thought it just another rather moth eaten piece of woodland. The objectives were set in this context though this was hardly surprising. At that time wood pasture was thought of as a lowland habitat, we even had the UK LOWLAND wood pasture and parkland Habitat Action Plan. However, it was Peter Quelch who had the first dawning realisation brought to a head by a chance meeting with Richard Smithers from the Trust, at Glen Finglas. This resulted in Neil Sanderson being contracted to undertake an historical ecological review of the estate in association with Fiona Watson. In early 1998 it became apparent that there was at least 250 hectares of relic wood pasture of considerable historic and cultural significance. We now know there are at least 920 hectares of scattered trees with a canopy cover of less than 20%. The term Wood Pasture is used to identify a habitat where there is sustainable grazing in semi-natural woodland or parkland.

Glen Finglas is known by some, as the ancient hunting forest of the Stewart Kings who used to visit, coming from Stirling and also possibly Doune castle. This wild, sparsely wooded landscape with its tiny flecks of distant sheep on the hill is spectacular. Its name is derived from old Gaelic meaning glen of the white water, and has inspired romantic writers from Scott to Wordsworth, important artists too frequented. They came to revel in the glen's austere beauty, but its bare appearance belies a history of continuous use and occupation stretching back to Neolithic times. It is certainly no wilderness, but it is wild, and fortunately it is only because of the glen's distinctive past that the ancient trees are still alive today. The gnarled alders and hazel which lie scattered on the slopes of the upper glens are one of Britain's most significant examples of upland wood pasture – a way of living and working on the land that has now mostly vanished. Perhaps Glen Finglas acted as a catalyst to realisation of the wider existence of upland wood pasture? The result is that Glen Finglas is not only important as a relic, it has also been a vital catalyst, opening people's eyes to upland wood pasture, which is now popping out of the woodwork across the length and breadth of the UK. This has stimulated a greater understanding of the vital role of grazing in Scotland's woodland history and indeed in woodland history further a field in England and Wales and potentially in Northern Ireland.

The Glen Finglas wood pasture is of considerable interest and consequently there has been much advice from various experts on what the Trust should or could do with this area. There's no apology for cribbing extensively from the advice and information received! This paper summarises what's been

gleaned so far about the wood pasture at Glen Finglas and then outlines the thinking behind management principles.

Glen Finglas has a striking beauty particularly the upper glens with their scattered trees combined with the high hills and water, notably the reservoir created in Glen Finglas itself. This alone is not what's special but rather the sense of continuity, a living link with the past, which this landscape evokes especially with knowledge of some of its history. Many of the features can be found elsewhere – the designation of part as a royal hunting forest for example; however at Glen Finglas particular circumstances have led to the landscapes survival in a form our forebears living in the glens would recognise. It is interesting to reflect that in the 15th century royal hunts were markedly different to our approach to deer management today. Fences were built in a large Y formation. Men, frequently numbering a hundred plus, were sent to drive the deer into the wide front while hunters gathered at the narrow end where they would attack the driven deer and no doubt any other unfortunate animal, with a variety of hand held weapons as well as with arrows.

One, if not the key, element in the creation of this landscape is the intertwined relationship between the human, animal and natural components of the land. This connection with our natural world sadly is all too often lacking for many today. These ancient relationships can and will inform future decisions though clearly these need to be practicable, robust and achievable especially over the longer term. In essence the Woodland Trust Scotland will be informed by history not ruled by it. Not seeking to recreate a particular point in history but as Holland and Rawles in 1993 put it 'negotiating the transition from past to future in such a way as to secure the transfer of maximum significance'.

King David II acquired the barony of Strathgartney as a hunting forest in 1364 in exchange for land near Alloa. This royal forest was visited by King Robert II and remained a favourite hunting ground of the first five Jameses. Glen Finglas along with other nearby lordships was used by the Kings of Scots as parts of dowries given to their wives. This could indicate a conflict of interests: it was in the queens' interests to maximise the profits from rents, both for the farms and for the grazing which seem to have existed in the forests; whilst the kings wished to maintain the status quo in relation to deer and hence trees. This is a recurring issue and there is no doubt that there was increased encroachment on the forest for grazing. So long as the forest was actively hunted there was, at least technically, a limit placed on the numbers of animals allowed into the forest.

Most of the documentary evidence relates to the three farming townships of Grodich, Achnahard and Duart and somewhat disconcertingly virtually all had the surname Stewart. The returns for these areas existed for hundreds of years, and the townships are now sadly mostly underneath the Glen Finglas reservoir constructed during the1950s/60s and completed in 1965. From the mid 1600s onwards the returns show that sheep were grazed on the property from the earliest documented period. However it's important to recognise that they were much smaller pre-improvement animals

The keepership of the royal forest at Glen Finglas fluctuated under a number of families in the later middle ages and early modern period. These appointments appear to have been political to gain support. For example, Mary of Guise the queen mother and dowager wife appears to have been given control of Glen Finglas by her late husband James V. She granted "to Archibald, earl of Argyll and Colin Campbell, his son by Margaret Graham, and the longer-liver of them and to their deputes or subtenants of the keeping of the forest of Glenfinglas and the other lands in the lordship of Menteith, with the steading of Brigend, for the granter's lifetime. I give and provide that the forest be well kept and that they be not enemies to me….". The Campbells did not maintain their interest in Glen Finglas for long as Mary appears subsequently to have appointed William, earl of Montrose as captain of Doune castle, chamberlain and steward of the lordships of Menteith and Strathgartney and "foresters of all the woods and the forest of Glenfinglas and others". This was confirmed by her daughter, Mary Queen of Scots in 1560 at the time of the death of her first husband, the king of France. The fact that the monarch was absent and political circumstances dictated that offices, such as keepers of royal forests, could be used to purchase friends, must have contributed to a much laxer form of management in the absence of any actively hunting kings. The actual work of protecting the forest would have been delegated to under-foresters and their officers about whom we know very little. It's likely they were local men and possibly

tenants of lands in the area. Undesirable practices, such as people living nearby the forest stalking deer or allowing their cattle to eat the grass were almost certainly the norm and the king's interest, not to mention his presence, was the exceptional part.

In the 17th century the word forest related to an area of legal jurisdiction rather than the modern definition of a large tract of trees and the necessities of the hunt usually presupposed the presence of trees, not least as shelter for the deer.

By the end of 16th century, up to the 20th century, the earls of Moray became hereditary Keepers of the forest. In 1602 the Earl of Moray accounted for his "keepership of the forest and trees at Glenfinglas, and other trees, scrub wood or *nemor*, and *rubor*. The revised medieval wordlist lists under definitions of *robur* broom (which is not abundant in the Trossachs), dead tree or pollard, an intriguing possibility. With control passing to the earls of Moray and with documentary evidence becoming more common the history of Glen Finglas becomes fuller after 1600. However, the earls were less interested in the forest for hunting presumably as there were no kings to please and their main family seat at Darnaway is some distance away, this had quite a bearing on what happened next. Importantly the area was still a royal hunting forest.

There is documented a presumption that foresters were in the habit of allowing the pasturing of animals beyond that permitted to the lease-holders in Glen Finglas itself and this may have done damage to the trees through over-grazing, though most writers did not bother to go and look for themselves. Even if takings from this extra pasturing were pocketed it is clear that grazing was not a free for all. Evidence demonstrates a considerable extent of regulation, especially if compared to other Scottish estates where there was tacit permission for the whole scale admittance of cattle. Owners of forests knew that a well-stocked forest in terms of potential shooting material was dependant on the maintenance of adequate tree cover. However, by 1743 Glen Finglas's primary role as a hunting forest was dying out, not because the tenants had managed to destroy the woods and the deer, but due to no one being particularly interested in hunting there.

That tenants at Glen Finglas wanted to graze their animals throughout the forest is not doubted, but the forest appears unusual in the extent to which prohibition of most grazing was adhered to. In fact the only reference to animals actually in the forest in the mid 1700s appear to be horses or ponies. In 1666 for example, two men had their horse and six mares stolen by some reprobates from Lochaber. In 1743 it was said, "the most valuable part of Glenfinglas was then kept as a Forest, and of this part the lessees had no possessions, except each of them being allowed to pasture five or six horses or mares upon two valleys (probably Glen Meann and Glen Finglas), for which they paid….". The inventory of deceased tenant possessions in the table below can be used to give a rough estimate of populations of people and domesticated animals.

Animal	**No.**	**Total**
Work horses	22	319
Mares in forest	242	
3-year old horses	55	
Milk cows	363	451
2-year old cows	88	
Sheep	308	517
Lambs	209	
Goats	330	550
Kids	220	
Total	**1,837**	

These figures are constant for two examples from 1666 and also 1707. There were 30 men implying a total population of well over 100 factoring in women and children. If all tenants had as many animals as the deceased example then there would have been over 1800 domesticated animals. If the majority, as appears the case, were not pastured in the forest itself they would still have had an impact on trees in the

townships. There would also have been considerable movement as they were taken to and from shielings on the hillsides. The idea of 242 mares moving around the forest in the two glens is difficult to imagine today.

The final main part of this history comes in a period of political turmoil leading up to and including the Jacobite rebellion of 1745/6. A court case between the Dowager Countess of Moray and the Glen Finglas tenants relating to leases sheds light on the forests fate from 1740 onwards when the earl granted the lands and forestry of Glen Finglas to his wife Margaret as part of her wedding settlement. The key date was 1743 when they finally succumbed to the temptation of the potential for higher rent offered by allowing grazing in the part of Glen Finglas still preserved as a deer forest. It seems most likely that the increase of annual rent from some £83 sterling up to over £188 proved the deciding factor. To this end the deer were deliberately dislodged, marking an end of an era. It is interesting to note that records state that the farms were mostly grass with very small areas of arable, which underlines the pastoral nature of the economy of Glen Finglas. It could be argued that the final removal of deer in 1743 was the last chapter in a long standing process of erosion; equally it should also be clear that there was some grazing occurring in the forest long before it was finally opened up officially. Remaining a royal forest even without deer appears to have been partly responsible for its survival and ultimately what's perhaps more remarkable is that it was not destroyed by the introduction of cheviot sheep as happened elsewhere.

In summary, the history of Glen Finglas forest is largely dictated by the fact it was a royal forest. This has certainly contributed to its survival in that the symbiotic relationship between trees and deer meant that up to c.1500 its management was aimed at the maintenance of both. The period 1500 to 1800 was perhaps more crucial. The keepers of the forest, the earls of Moray did occasionally have concern about transgressions of their tenants in relation to killing deer, the pasturing of livestock in the forest and remarkably rarely in the taking of timber. However it's perhaps more significant that as the earls did not live in the locality this meant that their primary concern was to ensure the smooth running of the estate and maximising their returns from it. After 1743 when the earl could no longer see the point in maintaining an exclusive deer forest in which no-one went hunting, he got rid of the deer and secured an increase in rent which reflected the desire of locals to pasture their animals throughout the estate and this was made possible.

The activities of the tenants in the forest are also of interest. One writer in 1707 could not comment on the state of the forest and this suggests the area was regarded as remote and difficult to access. So long as rents were paid and there was not too much trouble from the inhabitants, the estate managers and owner generally left Glen Finglas alone. Thus, as the use of the forest for hunting declined the competing needs of the tenants appears to have become more prominent. The big question is whether this management was sustainable? The fact that the forest remnants survive indicates that grazing was not overly destructive; although we must remember that that the animals from days past were not as large as today's equivalents. It is a shame that records are not known of the removal of timber. Hazel provided many populations with low-grade timber for domestic and agricultural uses. Alder was generally important for building before stone became common. It is likely that the forest provided a regular supply of timber.

Glen Finglas's survival as a beautiful wooded glen has partly been chance and partly the combination of circumstances – distant landowner, no commercial tree interest, active tenant management, isolation and ecological conditions existing at the right time in the right place. Glen Finglas illustrates many things, not least that in the last 200 years large-scale sheep farming has had an impact at odds with the multi-purpose landuse with strict management controls which were the norm for a very long time previously. Traditional methods of animal and tree management enabled a healthy balance to be maintained. Could the requirement under CAP reform to maintain land in "good agricultural and environmental condition" be an opportunity to restore that balance over a larger area? There have inevitably been periods of instability but nature's ability to cope with these fluctuations in a multi-purpose extensive scale is resilient.

Today the wood pasture is dominated by hazel with alder, birch, rowan, hawthorn, ash and bird cherry. Crab apple and oak are occasional. Collapsed and vegetative regrowth of hazels are a feature. Many

individual trees are remarkable. For example, a spectacular alder which is multi-stemmed and high cut or pollarded with a girth of 5.28m and individual branches of up to 0.66m girth. A birch with a girth of almost 5m and a remarkable thicket of bird cherry, some 50m across, with a largest stem of 0.9m. A hazel stool of 7.56m girth. Rowan “air-trees” or “bird-trees” are also a feature – growing in the crowns of alders. The density of the woodland is very uneven averaging 217 trees/hectare and ranging from hazel at 450/hectare to almost park like areas of 25 trees/hectare or less.

The Trust wants to conserve the key features linking the past to the future, being informed by history and not ruled by it. Management must conserve and seek to enhance these key features. The history of Glen Finglas and its survival has resulted in numerous facets of conservation importance. For example: the continuity of ancient trees reaching back into the past and the development of many old growth features such as the rowan 'air-trees' or “bird-trees”, the individual large coppice stools; the complex mosaic of important open-ground semi-woodland and woodland habitats; a richness of lichens for which, between Neil Sanderson, Sandy and Brian Coppins 119 species have been identified to date.

A long-term view needs to be taken and we have a broad vision of moving habitats with young trees, maturing and senescing. Open ground areas being dynamic and successional with wooded ones. Processes as natural as possible co-existing with trees living 500 years plus at variable stocking densities, some scattered veteran trees, some sparse wood pasture areas probably some dense natural regeneration areas. Grazing will form an integral part - low input and low output. The information accrued over the last five years has helped to highlight the top line key features of Glen Finglas and is refining the Trust’s vision, whilst actions to date have a significant bearing on where to go from here in the short to medium-term in reaching a long-term sustainable solution. Deciding how to nurture these features in order to conserve this attractive and bio-diverse landscape, which tells the story of this area’s fascinating history, is the challenge now. Through the monitoring programme types and numbers of wild and domestic stock will be refined, based on their impact on the habitats, the key features; timing and timescales too will become better informed. A robust landscape at an extensive scale where fluctuations over a few years will become irrelevant is the ultimate goal.

WOOD PASTURE: DEGRADED HIGH FOREST OR NEAREST MODERN ANALOGUE OF THE PRIMEVAL VEGETATION?

FRANS VERA

I am hesitant about presenting this case here, as the argument may not fit the Scottish situation exactly. Nevertheless, it may start to encourage you to look at familiar material in a new light.

I will start with a statement: *We can't understand our cultural heritage without understanding our natural heritage*. If we take that statement as a starting point, can we form a view of what is commonly thought to be the natural vegetation of Europe? There has been a generally accepted theory '…that in the natural state, that is, had there been no human intervention, the lowlands of central and western Europe with their temperate climate, would have been covered in places where trees can grow with a closed canopy forest'. According to this theory the regeneration of this climax forest took place in gaps in the canopy that were created when one or several trees died or were blown down by storms. This theory has been constructed, or more correctly reconstructed, along three important lines: study of abandoned agricultural land, historical texts and palynology.

It has been widely recognized that abandoned agricultural land – arable and pasture - will be overgrown spontaneously by forest after Man has withdrawn. British plant geographers, like Moss, Tansley and Watt, have played an important role in the development of this idea. They in turn have drawn on German foresters like Cotta and Krause and Swiss foresters like Landolt. Their basic idea was that man had destroyed the natural vegetation by introducing agriculture, and that this vegetation returned spontaneously after man stopped his intervention. Because it was forest that developed then, forest was considered to be the vegetation that was present before the introduction of agriculture.

Historical texts were also used as a rich source of data supporting this view. There are, for example, numerous customals or regulations from the past about how to use the wilderness. They show that the wilderness is called in several languages respectively *wald, wold, weld, weald, woud, Forst, vorst, voorst, foreest, forest and forêt,* should be temporarily closed to livestock for 3 to 6 up to 9 years to permit "regrowth". This is often interpreted and used as an argument, particularly by foresters and forest ecologists, to show that the wilderness was originally forest; that people knew how damaging grazing animals were to the forest; and that in the Middle Ages people started to regulate grazing by livestock in order to preserve the forest.

The third strand is palynology. It can be a contentious form of evidence, because the first palynologists claimed that they were reconstructing the history of the forest. Their premise was, therefore, that the original wilderness was forest. But how did they prove that? They did by means of fossil pollen of the past vegetation, found in sedimentary layers in raised bogs in Europe. They made pollen diagrams for central and Western Europe, for example, charting colonisation by tree species from the end of the last ice age to the present. The diagrams show the arrival of birch (*Betula*), pine (*Pinus*), hazel (*Corylus avellana*), ash (*Fraxinus*), maple (*Acer*), elm (*Ulmus*), oak (*Quercus*) and lime (*Tilia*), with beech *(Fagus sylvaticus)* and hornbeam (*Carpinus betulus*) entering very late in the process. The theory states that the Atlantic era covering the period 8000-5000 Before Present (BP with 1950 as the year of reference) represented the optimum for the primeval forest. They counted the percentage of pollen of tree species together with the pollen of the shrub hazel. This gave a total figure of 95% tree and hazel pollen to only 5% grass and herb pollen. Their conclusion from this has been that the preponderance of tree pollen and hazel pollen proved the existence of a closed canopy forest, with hazel as a shrub layer in this primeval forest.

Based on this three-strand theory is a further theory postulated by the Danish palaeoecologist Iversen. He has formulated the so-called *landnám* theory, which proposes that Neolithic settlers entered the primeval forest, made clearings by cutting trees for raising crops and grazing animals, and the animals were sent in to the remnant forest. The animals had in the long run a detrimental effect on it by preventing regeneration of the trees. The British plant geographers Moss and Tansley played an important part in this theory through formulation of the so-called *retrogressive succession*. They said that by the grazing

of livestock the closed canopy forest went eventually through a stage of park-like landscape, and, as grazing continued, degenerated into open grassland. This process can be seen, for example, in the New Forest, where parts of the so-called 'Ornamental Woods' become from the centre onwards more and more open, because regeneration of trees in these woods is prevented by grazing cattle and horses. The belief is that if these animals are excluded, then regeneration of tree species, especially oak, can start again. Therefore some parts of Ornamental Woods have been fenced off in the past.

In many places in Europe, because of this opinion livestock has been excluded from forests. The Dalby Soderskov National Park in southern Sweden is an example. It is a part of a former park like wood-pasture that was grazed by cattle and domestic horses at least for centuries. The National Park was founded in 1921. It lies on a good, loamy soil. The part of the wood-pasture that became a National Park however, was closed to grazing by cattle and horses. They were considered to be alien elements introduced by men and therefore did not belong in a National Park. The result was the development in the exclusion zone of a closed canopy forest. Other things happened as well. Within about 50 years, the coverage of hazel diminished by almost 50%, the number of vascular plants diminished also by almost 50%, and oak (pedunculate oak; *Quercus robur*) was disappearing. There was no oak regeneration whatsoever. Old oaks died because they became overgrown by shade tolerant species like beech, elm, and ash that established themselves underneath or next to the oaks. This happens in forest reserves all over Europe with both pedunculate oak and sessile oak (*Q.* petraea). It also happens in the fenced parts of the Ornamental Woods in the New Forest. Even where there were gaps in the forest canopy in these forest reserves, there are few or no young oaks in it. If there are, they are eventually displaced by shade-tolerant species such as beech, hornbeam, lime, elm, ash, field maple and sycamore that overgrow them and kill them by their shade.

Looking at diametrical classification of trees from the Swedish National Park we can see that the shade tolerant tree species exhibit a so-called inverse j-curve profile. It means that there are many specimens in the low diameter class and, by self-thinning, you get a steadily diminishing curve until you end up with a few very big trees (highest diameter class) producing a 'classic' closed canopy forest. According to foresters and forest ecologists, such a distribution of diameters is the distribution [I avoid saying "normal distribution", because it is a statistical way of saying there is a bell forming distribution] that is normally to be seen in a healthy population, *i.e.* a population that regenerates well Contrary to the shade tolerant species oak' being a light demanding species, exhibits a so-called 'bell-forming' distribution, which means that it is a declining population that is dying out. There is little or no regeneration, resulting in the eventual elimination of the species, a process accelerated by crowding out by more and more individuals of shade-tolerant tree species.

This is also what happens in the oldest forest reserves in Europe, namely La Tillaie and le Gros Fouteau in the forest of Fontainebleau. These reserves were established between 1853 and 1861. In Le Gros Fouteau all the oaks (sessile oak) have disappeared now, while in La Tillaie.only a very few from the originally present specimens are left. All the oaks in both reserves dated from the period when there was grazing of livestock there. The oldest ones established themselves in the beginning of the 16th century. Foresters and forest ecologists suggest that, because oak is a light-demanding species, it needs open space in which to grow. This, they suggest, would be obtained where natural gaps in the canopy occur or when large tracts of forest are blown down by storms. However, neither in gaps nor where storms produced large clearings, has oak regenerated successfully in these reserves. It was the shade-tolerant species that regenerated and edged out the young oaks that came up.

In forest reserves shade tolerant species often have already formed a so-called advanced regeneration, that is a pool of seedlings that can thrive for a relatively long time under the canopy because of their shade tolerance. As soon as the light conditions improve because a gap or a windblown clearing develops, they grow up. The final result in all these forest reserves is a closed canopy forest lacking almost all light-demanding species, not just oaks, but also wild fruit , like wild apple (*Malus sylvaticus)*, wild pear (*Pyrus pyraster*) and wild cherry (*Prunus avium*), whitebeam (*Sorbus aria*), service or chequer tree (*S. torminalis*) and whitty pear (*S. domestica*), and almost all shrub species, like sloe (*Prunus spinosa*), hawthorn (*Crataegus monogyna*), hazel, spindle tree (*Euonymus europaeus*), dogwood (*Cornus sanguinea*), Guelder rose (*Viburnum opulus*) and all the rose species (*Rosa spp.*).

The contrary is the case with the wood pastures. In such systems there is a lot of successful regeneration of oak and other light-demanding tree and shrub species (such as hazel), together with the shade-tolerant species that oust them in the forest reserves. The process works as follows. In grassland grazed by the large specialised grass eaters among the large herbivores cattle and horse, light demanding thorny shrub species such as hawthorn or sloe come up in the grassland. Seedlings of all tree species can also come up everywhere in the open grassland. However, they will be eaten away by grazing animals, except when they grow next to or within thorny shrubs. There the seedlings of oak and other tree and shrub species grow up, because they are protected by these thorny species against the large herbivores. These thorny species are called 'nurse species'. There is one peculiarity, namely the relatively numerous presence of oak in the wood pasture system. Why, are there so many oaks? The cause is the jay. This bird species 'plants' acorns and by preference on the fringe between areas of low and high vegetation like the fringe of a thorny sloe scrub, or at the base of the stem of a solitary shrub, like a hawthorn. They bury acorns to provide themselves with a food stock for the winter. A jay can recover up to 5000 acorns planted in autumn. Structures like fringes or stems of single shrubs act as a beacon for the jay to recover the buried acorn. Not all of these acorns are looked for during the winter. A part of them are left for the spring, when parent birds go with their fledglings to look for acorns they planted the previous autumn. These acorns have now sprouted and are characterised by the first ring of leaves and a green stem. It is the green stem that the jay recognised as a seedling from an acorn "planted" by in the previous autumn. The jay pulls such a seedling so far out of the ground until the acorn, which is still attached to the taproot, appears above ground. The acorn is removed, peeled and fed to the fledglings. The oak, which is not pulled fully out of the ground because of its long taproot, continues to grow afterwards. To give an indication of how important this bird can be for the regeneration of oak, 65 birds dispersed in 4 weeks at least 500,000 acorns.

The seedling oaks and seedlings of other tree species grow amongst the thorny species, almost as though fenced in for protection by their spines and thorns as if it is fenced by barbed wire. In clonally spreading species like sloe, the young trees (especially jay-planted oaks) come up in the fringe area and advance into the grasslands with the speed the sloe spreads into the grassland by its underground rootsuckers. The spreading thorn hedge of sloe moves forwards in an ever-widening circle of clonal spreading sloe, forming an ever expanding circular assemblage of trees. The established trees grow in height and begin to form a closed canopy. Thorny shrub species cannot survive there, because they cannot persist in the shade cast by the trees. They disappear under the trees. Eventually, you have a group of trees, a grove without a shrub layer underneath the closed canopy, surrounded by a thorny mantle and fringe vegetation. Viewed from outside from a distance, this plant structure appears as tall trees grouped together. In Dutch this is called a "bos". Literately translated in English it means a "bush", "bunch" or "truss" of trees like a bunch of flowers; trees that are grouped together, clearly distinguishable from its direct surroundings where trees are not present or not grouped together. This overall picture is of a park like landscape where groves and grassland interchange. In the grove, the oldest trees are roughly in the centre and the youngest in the edge and in the mantle and fringe vegetation. Only in the fringe does the regeneration take place. After several hundred years, the centre has aged and starts dying. In the classical closed canopy forest theory, this would induce natural regeneration. Seedlings would grow up because light can now reach the forest floor and eventually fill in the gap. What happens in the grove in the wood pasture system, however, is that animals also visit the gap. Grass seeds from their dung help to establish a lawn there and, as foresters have long understood, they prevent regeneration of trees. Over time, more and more aged trees die, a process that will be accelerated by drought and fungi. The more trees die the greater the lawn will become, and while some old trees may remain, so-called veteran trees, the system has moved from forest (the grove) to grassland. Eventually, the grove collapses and changes totally into grazed grassland. The larger the grassland becomes, the more parts of the grassland are less intensively grazed by the grazing animals during the growing season. It is there that the thorny species get established and trees will follow, repeating the cycle all over again. In effect, there is a cyclical process of grassland changing into groves and these groves changing into grassland again. In this process trees do regenerate with the help of grazing and nurse species. So, the common view that in general the animals prevent regeneration of trees is incorrect. They prevent it within the forest (grove) but facilitate it in open grassland through easing the establishment of light demanding plant species unpalatable to the large grazing mammals, *e.g.* thorny species.

The thorny species mentioned up till now are characteristic of the more productive soils. There are also thorny species on poor soils like for instance the juniper (*Juniperus* communis). The jays plant an acorn at the base of this shrub or several acorns alongside layering branches of the juniper. On poor acid soils also, non thorny species can act as a nurse species, like heather (*Calluna vulgaris*). This is the case if an area is not grazed by sheep, that is an alien species in the western and central European lowlands, but by the indigenous species cattle and horse. These larger mammals eat hardly any heather, enabling the shrubs to age. The old shrubs in their turn act as a nursery for young trees, especially for oak, originating from acorns planted by the jay. The result is a half-open *Calluna* dominated landscape peppered with single or little clumps of trees. This position can be seen in the sandy part of the Borkener Paradise in Germany, where you nowadays have a savannah-like landscape. All the isolated oaks there have grown up among heather shrubs or, where there is a loamy layer underneath the sand, solitary hawthorn (the loam allows hawthorn to grow). If we look at the indigenous large herbivores, we see several specialised groups: grazers (feeding mainly on grass), browsers (which specialise in eating leaves, twigs, and the bark of trees and shrubs), and so-called intermediate feeders, those in between grazers and browsers eating grass, as well as twigs and leaves and the bark of trees and shrubs). The typical grazers were the aurochs (*Bos primigenius*), the wild progenitor of domestic cattle, and the tarpan (*Equus przewalski gmelini*), the wild progenitor of domestic horse. These species are both extinct, the aurochs in 1627 and the tarpan in 1887. The diet of the still existing species like European bison *(Bison bonasus*), red deer (*Cervus elaphus*) and wild boar (*Sus scrofa*) also consists to a large extent of grasses. However, they are not able to digest cellulose to the extent cattle (the domesticated descendant of aurochs) and horse (the domesticated descendant of tarpan) can do. These two latter species graze young grass (with a low content of cell wall that is cellulose content) as well as old grass (grass with a high content of cell wall that is cellulose) that is difficult to digest. By grazing the old grass, they stimulate the sprouting of grass resulting in better digestible young grass. This more nutritious grass has the quality red deer, European bison and wild boar need for feeding themselves. In this way specialized grass eaters like cattle (aurochs) and horse (tarpan) facilitate these other wild ungulates. In times of very low nutritious value and hardly any regrowth of grass, that is in winter, European bison and red deer switch to bark of trees, while wild boar switches to protein rich food like carrion and larvae of insects in the soil and starch rich roots like those of bracken.

Contrary to what is often believed, the introduction of cattle and horse in Europe in the Neolithic period, was not an introduction of alien species. Therefore the introduction of these large grazing herbivores added nothing new to the mammalian profile and to the way the natural vegetation was influenced by large ungulates. Established plant species had already co-existed for millions of years with those large mammals. Concerning their impact on the indigenous plant species, the domesticated forms of the wild species can be considered as modern analogues of their wild progenitors as is the impact of their feeding strategy on the indigenous plant species. If we remove them from the system, as has been done in the forest reserves, we are creating an artefact. This artefact is a closed canopy forest that becomes abandoned by many other indigenous species as well. Closed canopy forests have, compared with park like landscapes, a very low bio-diversity. There is, however, still a shortage of knowledge about the role of some of the large herbivores in the natural situation, like for instance of the European bison. It will de-bark trees and so, presumably, speed up the cyclical progression from a grove to grassland. However, areas where this species lives do not give a decisive answer to the question of how these animals behave in nature. In Poland, for example, where they live in the Forest of Bialowieza, foresters prevent the bison from stripping bark, by giving them supplementary feed like hay and fodder beets in winter.

What, though, about the historical data that indicates that animals were deleterious to the regeneration of forests? Dutch romantic painting, such as the work of Barend Cornelis Koekoek (1803-1812), shows landscapes with cattle grazing amongst majestic oaks. Many foresters, forest ecologists and in their slipstream art historians consider these landscapes as fantasy, that these are not real trees and that the animals represent the destruction of the forest in general and trees in particular.

The image of the destructive role of large herbivores on trees through history is among others based on the interpretation of words in medieval charters and customals, concerning the use of the wilderness. It concerns the words *wald, weld* and *wold* in Saxon, *weald* in Anglo-Saxon language, *woud* in old Dutch

and *forestis* in charters in Latin. This Latin word is the origin of the German word "Forst", the French words "forest" (old French) and forêt, the old Dutch words "forest", "foreest", "voorst" and "vorst", and the English word "forest". These words are commonly interpreted as meaning forest in the modern sense of the word. If, however, you look to the contexts of those words in the original texts, it appears that this interpretation is wrong.

Sixteenth-century depictions of settlements in the landscape, for example, show distinct zoning into an 'outside', where the wild animals, such as deer and aurochs lived and an 'inside', which is the cultivated part of the wilderness, where the settlements were and arable land and hay land. According to the medieval mindset, there was a clear difference between these two zones. What is 'inside' belonged according to old Germanic law to somebody. Should someone build a house on a piece of land, or cultivates it (making arable land or hay land, that is land where the plough or the scythe went over), then, according to this law, he is the owner of these. The 'outside', however, the uncultivated wilderness, belonged to nobody. It had no clear owner and according to Germanic law it was common land. That meant that everyone was permitted to use it to meet household needs, such as cutting timber or firewood, and feeding his livestock by cutting fodder from trees and shrubs, pasture cattle and pannage pigs. In Germanic languages (to which Anglo-Saxon belonged), this 'outside' zone was called 'wold', 'wald', 'weld', woud and 'weald'. The dictionary definition of these words is 'a vast forest', but was it so? We can obtain a clearer view of the meaning of these words if we can see how the use of the area with these names was regulated, that is by looking to the context of these words in these regulations.

From the 7th century, the Merovingian kings and their Carolingian successors adopted Roman law and rephrased it into Gallo-Roman Law. Roman law used the concept of "bona vacantis", *i.e.* goods that do not have a clear owner. According to the Codex Iustianus X, the "bona vacantis" belonged to the "government". In Gallo-Roman Law this was the king. In respect of the law, the kings declared the 'outside' as 'forestis nostra' (our forest). The most widely accepted theory is that the word "forestis" is derived from the Latin "foris" or "foras", which meant the "outside", "outside it" or "outside the settlement". The kings appointed officials (*forestarii*) to ensure that nobody exploited it without his authority. In common language the forestis was called "wald", "wold", "weld" and "woud". From the 600s, therefore, on the Continent "wald", "wold", "weld" or "woud"came under the 'ius forestis' or 'ius nemoris'
As mentioned before the Latin word 'forestus' became in Dutch forest, foreest, voorts and vorst, in German 'Forst' and the Old French word 'la forest', that later evolved into 'la forêt', and eventually in English the word 'forest'. In England, the word forest was only introduced from the later 11th century onwards, when William the Conqueror introduced the Forest Law.

Most modern usage of the word 'forest', especially on the Continent, implies a closed canopy forest. But this is not what the word meant originally. It was a legal term, applied to the wilderness and all plants and animals that lived in the wilderness, because they had no clear owner. If the wilderness was declared as "forestis", it meant that only the king had the right to use the wilderness and to authorise its exploitation by others. Of what, however, did the "forestis" (in common language wald, wold, weld or woud) comprise? There are ordinances as well as pictorial representations, for example, as depicted by Peter Breughel, that there was pasture for cattle in the "forestis" and the "wald". You could argue that pasture could be created easily by felling trees. But in general it was forbidden to fell or grub up trees in the "forestis. As an inhabitant of a settlement you could get permission to fell or grub up trees and shrubs to make arable land with a surface needed to fulfil the needs of your household. You could also get permission to cut or to grub a tree for timber to build your house or to repair it, but otherwise it was forbidden to fell or to grub up trees and shrubs. Therefore there are no indications that trees were felled in a "forestis" in order to make pasture for cattle. But how could such grass-eating animals survive in a wilderness that is supposed to have consisted of only trees, as the classical theory supposes? There are also regulations, which say that the animals were driven on the 'flowers' in the "forestis" or "wald". The season that was mentioned concerned the flowering period in summer. Herbs that flower in the summer are not the Wood Anemone *(Anemona nemorosa)* that is associated with woods, but are species that are associated with open grassland like Marguerite (*Chrysanthemum leucanthemum*) and Vipers Bugloss (*Echium vulgare*). Therefore, these ordinances indicate that open grassland was part of the "forestis" and "wald". There was also "pasture" for pigs in the "forestis" and "wald", referred to as the *acker, aecker*

and akker. These words as well as the Anglo-Saxon word *aecer* meant "acorns". The pasture for the pigs were the acorns that grew on the oaks. The pigs were fattened on the acorns, that is on the *acker*, the *akker, or aecer*. The place where the peasants pannaged their pigs was called the akker or acker. In Germanic languages "ackerman" or ackerbürger" drove the pigs on the "acker" or 'aecre'. The "ackerman" or "ackerbürger" had the privilege to mast his pigs on the acorns. The trees that were bearing the acker were called "acker"trees. These were the oak. Oak as well as other so-called mast trees like wild fruit were called fruitful or bearing trees. In English, the French word 'pannage' was adopted, but the word *aecer* still survives in the language as a measure. Originally in Anglo-Saxon as well in other Germanic languages an acker, aecker or aecer was the surface on which one pig could be fattened in case of a full mast (in Germanic a full acker). Only after Napoleon introduced the measures "are" and "hectare"at the beginning of the nineteenth century on the European mainland, did the words "acker" and akker disappear as measures in German and Dutch.

In the wilderness, then, there were many oak trees and an abundance of acorns on which to feed the pigs, which were the most important source of energy for those who lived in the settlements that exploited the wilderness resources. One could wonder how oak would have survived if this wilderness was a closed canopy forest. Especially in wood pasture system oak is common and regenerates spontaneously by grazing animals like cattle and horses. Therefore, also looking to the other arguments in favour of the openness in the "forestis" and "wald", it is very likely that what is called "forestis" or "wald" were natural ecosystems from which the wood pasture system with its grasslands was an analogue. There are also other indications that vast open areas were part of the "forestis" and "wald". In the Netherlands also treeless raised bogswere called "wald", "wold" or "woud". In my opinion it is clear, that words like "wald", "wold", "weld", "woud" (as well as the related AngloSaxon word "weald"), "Forst", "forêt" and "forest", often translated simply as 'forest' in the classic modern way do not refer to such a forest. Instead, they refer to a landscape in which there were areas where tree species that require open grassland to regenerate could be found, and where areas of open grassland were present. According to these texts, it cannot have been a closed canopy forest.

There is further evidence to support this interpretation, that for the cutting of firewood. We know that from the 13th century onwards cutting firewood was regulated. The right of cutting firewood was granted to peasant settlements by landlords. The lords, however, made one restriction: if you cut firewood you should leave young trees untouched. They were protected by the "ius forestis", "ius nemoris", the "Waldrecht" or "Forest Law". Accounts of what was cut as firewood show that it was mainly thorn and hazel. There were also regulations requiring that a certain number of young trees, especially oaks had to be spared. Officials of the king or the landlord (forestarii) would mark with a sign the trees that were not allowed to be cut. Why this restriction? It was because the officials (read landlords) wanted to have free, open-growing oakswhich flowered well and produced plenty acorns on which pigs could be masted. That was in the interest of the landlord, because according to the "ius forestis" the landlord was entitled to levy tithes. He could claim one-tenth of the pigs that were pannaged. The more pigs that could be fed, the more pigs the landlord could acquire to fulfil his own needs, that is of his court. Another method to create a large crowned tree is to pollard an oak. Besides a big crown, such a tree has a short trunk, which makes it easy to knock the acorns from the tree with a stick in order to feed the pigs. The regulation of the cutting of the firewood evolved to the coppice (the shrubs) with standards (the spared trees). The system has now been fixed as a cultural model, and modern conservationists are attempting to preserve this by cutting the shrub layer and preserving the standards.

Cutting the hazel and thorns for firewood, however, caused problems, for the young trees that were protected by the thorny species now became exposed to the grazing animals after the cutting of the shrubs. A response to this was the regulations from the 13th century onwards controlling livestock pasture in the wilderness. People were forbidden to pasture their beasts for periods of three to six years after the cutting of the firewood. So short a period makes little sense from a forestry point of view, if this concerned the protection of seedlings and young trees in the forest in order to protect the regeneration of the forest. If that was the case you would really need to exclude grazing animals for nearer twenty years to allow young trees to mature sufficiently to protect them from the effects of grazing. This short period of closure does however make sense if we look what happens after sloe and hazel are cut in mantle and fringe vegetations and closed for some time for grazing by livestock. Sloe stools sprout (regenerate) in

full daylight very rapidly after cutting, as also does hazel. Within one growing season the new sprouts of sloe are already 2 metres high and at the end of the first growing season, its thorns have hardened, rendering it unpalatable to most grazers. By this the sprouted sloe stools were sufficient to enclose young trees as well as the re-sprouted hazel stools again within its thorny protection from grazing and browsing animals. With this in mind, it makes sense that grazing in the Middle Ages was prohibited only for the short period of three to six years. Therefore, in my opinion the regulation of the grazing of livestock from the 13th century onwards had nothing to do with young trees in a closed canopy forest, as the classical theory claims. It was related to young trees and hazel shrubs in the mantle or fringe vegetation of grazed wood pasture. The young trees and young sprouts became threatened by the large mammals after their protection, the thorny scrub, was removed because they were cut for firewood. That made the regulation of grazing necessary. The regeneration of trees took place as I outlined before, in the mantle and fringe vegetation in a park like landscape, thanks to the grazing of large herbivores especially by the specialised grass- eaters cattle and horse. Are we to accept from this, then, that medieval people had full understanding of what they were doing, and that perhaps it is us who have come to the wrong conclusions, because of misinterpreting the medieval texts caused by a wrong theory about the natural vegetation?

To return to the wood pasture system, we see all kinds of trees coming up inside a protective screen of thorny species. In this kind of situation you have the whole diversity of tree species, that is light demanding and shade tolerant species. This system is also very rich in other plant species as well as animal species, because of the richness in biotopes among them the many edges between scrub, trees and open grassland, the mantel and fringe vegetation.

In my view, this wood pasture is not degraded high forest but is a system in itself which works very well for regeneration of trees. It is in my opinion the nearest analogy to the primeval vegetation, because it can explain the presence of both light demanding and shade tolerant plant species as well as the presence of many species that are characteristic for edges of forest and grassland.

What about the cattle and domestic horses that were introduced by man? I have already indicated that cattle and domestic horses are simply the modern analogue or the ecological substitutes of the indigenous aurochs and tarpan. The same goes for the wild boar and the domesticated pig. They lived at first together with the all the other large, natural mammals, *e.g.* horse, aurochs, wild boar, red deer, roe deer, elk, and European bison. As mentioned earlier, the introduction of livestock was therefore not the introduction of a new impact on the indigenous plant species. Established plant species had already co-existed with these species for millions of years.

What, then, about the pollen diagram? How can you explain such a low percentage of grass pollen in the pollen diagrams of the undisturbed natural vegetation in the prehistory when I am arguing for an analogue of the wood pasture system with a high degree of grasslands?

The first explanation is the percentage of pollen of hazel in those diagrams. In my park-like landscape, the hazel stands in the mantle vegetation in the full daylight. There it can flower abundantly, because to do so it requires an open landscape. Therefore, a high percentage of pollen of hazel is a good indication for open grassland in a park-like landscape. In the Atlantic era, it reaches values from 25 to 50% of the total pollen sum. Hazel is sensitive to shade concerning the amount of catkins it forms. If you have a coppice with standard and a canopy closed more than 30% hazel ceases to flower. Why, then, is there so much hazel pollen if it was a closed canopy forest? Also the percentage of oak pollen can be interpreted as an indication of openness, because this species only regenerates successfully in open grazed grassland, as in a park-like landscape. The percentage of this species reached in the Atlantic era 10 to 25% of the total pollen sum. The total percentage of the two open landscape species hazel and oak can reach a value up to 75% of the total pollen sum. This can be an important indication for a park-like landscape in prehistory, analogous to the wood pasture system. However, the question can be asked: what about the pollen of sloe and hawthorn? Why, when I have been placing so much stress on hawthorn and sloe, is their pollen absent from the diagram? Because they are insect pollinated. Insect pollinated species do not free pollen into the air. Their pollen, therefore, is not taken by the wind and deposited in bog sediments where, 6000 years later, we are taking our samples for the reconstruction of what was growing

in the surrounding area. In palynolgy , these species are called 'black holes' in the palæo-ecological landscape. Pollen samples collected in a park like landscape in mosses on the ground just a few metres outside an abundant flowering sloe scrub did not show any pollen of sloe. There is a further point concerning the low percentage of grass pollen. Most of the mammals I have discussed graze grass. Grass which is grazed is not flowering, so normally palynologists pose that there is a linear relationship between the openness of an area and the presence of grass pollen. I, however, would argue the opposite: there is an inverse relationship between the density of large mammals and the presence of pollen, because the more animals you have, the greater the impact on grazing, the less the grass is flowering, and the less pollen you find. Therefore, large tracts of grassland populated by high densities of grass eaters can result in a very low pollen production. The impact of grazing large herbivores on grasses may not be the only explanation for the low percentage of grass pollen. These data need to be combined with others. When hazel and trees are flowering, their pollen is taken up easily by the wind and transported over kilometres to be deposited in bog sediments. Grass pollen, however, does not rise very high and travels very short distances horizontally. The mantle vegetation acts as a filter for pollen, because the air hardly moves sideways through it. These factors can explain why tree pollen appears to be over-represented in the pollen diagrams.

The ultimate test is to go to such a landscape and collect pollen. Some palynologists have done this and found that pollen spectrum produced in a landscape with an openness to that which I am proposing was like that they would normally expect from a closed canopy forest. Landscapes with a tree coverage of 20%– 50% showed a pollen image of 90% tree pollen. The percentage of tree pollen in the samples proves to be very important in relation to where those trees stood and the place where the pollen samples are taken. Pollen samples taken in South America, in a lake surrounded by gallery forest and with open grassland beyond it, found little evidence for the presence of this open grassland. This was because the gallery forest was filtering out the grass pollen. We can see, then, that there are many biases working towards the situation where a grass-rich landscape grazed by large herbivores can deliver a pollen diagram with tree pollen comprising 90% to 95% of the total.

One recent criticism of my theory focuses on evidence for the number of dung beetles present. If there were as many mammals as I postulate, why are there so few remains of dung beetles? Evidence from the Neolithic – that is after livestock were introduced by Man - appears to suggest that such insects were abundant then, whereas there are very few earlier than that. This should be a reflection of densities of wild ungulates that are much lower than the densities of the domestic animals. Therefore densities like those in the wood pasture system, that I postulate as an analogue of the primeval situation were not present, is concluded by the opponents. The difference in the amount of remains may lie in the sampling method. The Neolithic evidence was obtained from samples taken from pits in settlements, adjacent to the areas where animals were penned. Therefore, in the Neolithic in fact a pit next to the stable or corral is sampled, while before the Neolithic, the chances of finding an area where there should be a concentration similar to that in the Neolithic settlements is, almost nil, because the animals just roamed freely through the wilderness, and special circumstances for concentration and fossilisation of beetles remains are almost lacking in nature. Therefore a bias in the sampling can explain the apparent paradox.

I would argue that it in these grazed landscapes you find all the biotopes we currently consider to be produced by agriculture and forestry. You have open grassland, scrub, mantle and fringe vegetation, free-standing trees and forest I argue that Man added nothing to the natural landscape, contrary to what is often thought in circles of nature conservation. All biotopes were already formed by Nature. A caveat to add here is this only obtains in situations where the animals have no supplementary feeding, *i.e.* that the number of animals that can survive the winter is the same number that is there in the summer. However, my story is also a theory, and therefore should be tested. This is done nowadays in several areas in the Netherlands where there are wild roaming animals, mostly horse and cattle. Alongside the river between the city of Rotterdam and the village of Lobith, where the Rhine enters the Netherlands from Germany, lie several pieces of landscapes, grazed by free-roaming horses and cattle. These landscapes develop towards park like landscapes, because of the establishment of thorny shrubs and trees. In these areas the grasslands are also populated by species that are commonly associated with agricultural hay land, like the corncrake. The reason for their establishment is that the large grazing animals that are not supplementary fed during the winter do not graze everything in the summer. Therefore, parts are left more or less

ungrazed during the growing season. They are grazed in winter. These are the parts where the corncrakes appear in spring. The hay land with which the corncrake is always associated is in fact an analogue of this more natural situation.

Another area, called the Oostvaardersplassen, shows that there might be an exception to the rule that the large herbivores always facilitate the establishment of thorny species. The exception is the very productive soils. The Oostvaardersplassen lie in the polder Zuid Flevoland, about 50 km from Amsterdam. It is a young nature reserve that only came into existence in 1968 when this polder was reclaimed from the IJsselmeer (Lake IJssel). Wild cattle, wild horses and red deer were introduced in the Oostvaardersplassen, It is an area of some 6000 ha (10,000 acres), but roughly 3000ha of it is used by large herbivores. At present, there are about 650 wild cattle, 650 wild horses and 1200 red deer. This large number of animals is there because the soil is calcareous clay and very fertile. It produces about 10 tonnes of dry matter per hectare and probably in these areas the intensity of animal grazing is locally so heavy that in these places even thorny species do not get a chance to harden their thorns. There are, however, parts of this area where the animals only come in winter. In those places you can find some hawthorns, so you get a separation between what is intensively and what is not grazed. In the intensively grazed areas, you have during autumn, winter and early spring huge flocks of up to some ten thousand barnacle, greylag and white-fronted geese. This is also where you find red deer for most of the year. It may not be news to a Scottish audience that the deer favour an open country rather than a forested landscape, but in the Netherlands and Germany, red deer has always been associated culturally with a forested landscape. Here, then, you have a naturally grazed and almost self-regenerating landscape. It has a high biodiversity, attracting for instance a bird species long rare or absent from the Netherlands, such as the spoonbill with up to 300 breeding pairs, the great white heron, with 52 breeding pairs present in 2003, the first re-established colony of this bird in the country and the first pair of ospreys in the Netherlands building their nest in 2003.

In conclusion: On places where trees can grow and large herbivores like aurochs, tarpan, red deer, elk, roe deer and European bison lived, the wilderness in the lowlands of Western and central Europe was not a closed canopy forest, but a park-like landscape consisting of a mosaic of grasslands, scrub, solitary trees and groves. In this landscape large herbivores played an essential role in the process of the regeneration of trees and had a determining effect on the succession of the vegetation. This succession was a non-linear, cyclical succession. In grassland grazed by specialised grass eaters, thorny or otherwise unpalatable shrub species established themselves in which trees grew up. The trees remained solitary or formed groves. In the groves, there was no regeneration of either trees or shrubs. The grazing animals eventually caused the grove to change into grassland again, because they prevented any regeneration, until unpalatable shrubs came up again acting as nurse species for trees. These processes can be developed again by reintroducing the large herbivores. In this way the indigenous biodiversity can be restored and maintained. Allowing wilderness to development again is not only important for safeguarding our biodiversity, but also for the conservation and understanding of our culture. After all, it is the wilderness that shows us the framework in which our cultural landscape developed. *It is therefore only by knowing the wilderness that we can understand our cultural landscape.*

SOCIAL AND ECONOMIC CHANGES IN FORESTRY IN THE INTER-WAR YEARS

EVE RENDLE

During research into my family history I came across a considerable number of letters written by my father, A.E. Rendle, in the 1930s when he was appointed by the Ministry of Labour to undertake the establishment of Government Training Centres on Forestry Commission land. These Centres were designed to recruit and train long-term unemployed in forestry work. I was fascinated by his accounts of this early pioneering forest work which was invaluable in opening up and developing many of our forests, yet is a largely undocumented history.

The Government had established the Forestry Commission in 1919 to take over the state forests and increase timber production as national timber reserves had been seriously depleted in the First World War. In an ever expanding industry it became necessary to train a workforce and in a unique partnership with the Ministry of Labour, the Forestry Commission designated some thirty-five forest sites for training centres and devised extensive schedules of work. The Ministry of Labour then established the training centres and implemented the work schedules. Of the thirty-five training centres, four were in Scotland:

Cairn Baan, Glenbranter, Glenfinart and Glentress

Many communities dependant on the hard hit industries of mining and shipbuilding had suffered severely and the Government designated these as 'special areas' with priority for re-training.

My main research and field work has been in Hamsterley Forest, County Durham. Hamsterley Centre was established in 1934 within the actual forest. The North Mail and Newcastle Chronicle reported in July 1936 that Hamsterley appeared to be extremely popular with many trainees requesting an extension of their time in order to see the completion of a road or causeway on which they had worked. I have been able to identify some of this work from early photographs.

The training centre added greatly to the area economy by providing work for local people as gangers, orderlies, cooks etc. Although trainees worked an eight hour shift, great emphasis was put on leisure time and the centre became an integral part of the community with concert parties invited to perform on a regular basis alongside trainees who organised their own entertainment with great enthusiasm and a medley of talent. Other leisure events were organised Toc H and the Y.M.C.A. One of the innovations introduced by my father was the playing of ‘hot’ jazz for the 6a.m. reveille which seems to have been a popular, if somewhat unorthodox, morning call!

In July 1936 the Commissioner for the Special Areas, Mr. Malcolm Stewart, visited Hamsterley and was so impressed with the work and training being undertaken, he sought to expand forestry work still further. The Forestry Commission was invited to suggest how this could be achieved and their report was accepted by the Government on Malcolm Stewart's recommendation. The Forest Fund was subsequently increased by the Chancellor of the Exchequer from £450,000 to £500,000 a year which, together with other revenues, allowed a planting programme of 30,000 acres a year, a 50% expansion[1]. This expansion not only brought employment for former trainees, but further benefited the local communities.

Such was the success of Hamsterley that after training 26% of men obtained immediate employment, many in permanent forestry work while others were able to undertake seasonal work. Special summer camps were also organised. In September 2002 an interpretive board covering Hamsterley Centre history was erected in the forest. This has generated considerable interest and correspondence.

A former trainee wrote of his experience on arrival at a training centre in 1934: 'The Camp was typical army style, all the huts were new and shining corrugated iron cladding and the Union Jack in the centre of the lawn. We were introduced to the Manager and Staff and shown to our hut which would be home for the next thirteen weeks. Each bed had a locker with padlock for personal possessions. The novelty of

[1] G.B. Ryle, Forest Service -The first forty-five years of the Forestry Commission of Great Britain. 1969.

hot water at the taps and showers was luxury for many of us who had the taps and WCs out in the backyard. We were formed into gangs and learned the skills of drain-laying , trenching and timbering up to safety standards. Many worked with the Forestry Commission planting trees and making fire roads. This was life with a purpose! We had 4/- pocket money and that to me was some collateral allowing me a packet of woodbines every day at 2d a packet, 2 nights at the cinema at 6d a trip, 2 pint. of scrumpy, one Saturday, one Sunday at 4d a pint. Total expenditure for week 2/10d leaving 1/2d for cards and the odd razor-blade.'
(This former trainee is now in his late 80s.)

Although I presume that most of the training centres were run on similar lines, my research of the Scottish centres is limited and I only have brief experience of the Cairn Baan Centre where my father was appointed Manager in 1939. This centre took mainly unemployed men from the Glasgow area. During the Second World War Cairn Baan Centre became a prisoner-of-war camp and some of the original huts are still in use by the Forestry Commission.

During a brief visit to Cairn Baan in 1996 I encountered a local family who well remembered the centre and told an amusing tale of three trainees from Glasgow who would pool their weekly allowance and take it in turns to cycle into Lochgilphead for a night out, Lochgilphead being the nearest they would get to Glasgow on a Saturday night!

Glenbranter House, once the home of the MacBrayne family, became part of Glenbranter Centre with the addition of further huts to accommodate the trainees. This centre too became a prisoner-of-war camp and Glenbranter House was demolished in 1956.

These training schemes were a success in that some 300,000 unemployed men were trained in forestry up to the Second World War and their pioneering work was invaluable in opening up many of our forests. Unfortunately very few official records of the training centres remain, but I do have a unique collection of photographs and letters which present a fascinating history of the time.

I would welcome further discussion and communication on this topic.

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