

SCOTTISH WOODLAND HISTORY DISCUSSION GROUP

notes, IV



FOURTH MEETING – 23 NOVEMBER 1999

**SCOTTISH NATURAL HERITAGE COUNTRYSIDE CENTRE
BATTLEBY, PERTH**

ACKNOWLEDGEMENTS

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

 The National Trust for Scotland



We are also indebted to Argyll Publishing for kind permission to utilise the drawing by Irene MacKenzie of the birch tree which appears in Hugh Fife, *Warriors and Guardians: Native Highland Trees*, shown on the front cover of this compilation of papers.

Please Note:

Fiona Anderson, Editor of *Tree News* (the journal of The Tree Council) would be glad to add any members of SWHDG, who wish it, to the mailing list to receive future issues. It is a lively publication, full of items of interest to members. Write to her at The Tree Council, 51 Catherine Place, London, SW1E 6DY.

ISSN 1470-0271

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INTRODUCTION

RICHARD TIPPING

USING THE PAST IN THE FUTURE OF SCOTLAND'S NEW NATIVE WOODLANDS

REPORT ON A MEETING OF THE SCOTTISH WOODLAND HISTORY DISCUSSION GROUP

As the millennium approaches, Scotland's new 'native' woodlands are taking shape. But what shape should they be taking? To what extent should they be new? How much should they be recreations of the past? Should they at all reflect now-lost landscapes? Can they? Is the search for the authentic essentially chimeric or rooted in observation? Are there ways in which understanding the past can aid, even direct, the planting of new woods and forests?

This volume presents the contributions that were presented at the conference. This was the fourth one-day conference of the Scottish Woodland History Discussion Group, co-ordinated for the first time through the Centre for Environmental History & Policy (CEHP) at the Universities of Stirling and St. Andrews. The organising committee of Richard Tipping, Fiona Watson (CEHP Stirling) and Robin Turner (The National Trust for Scotland) would like here to acknowledge the commitment to the SWHDG of Chris Smout (CEHP St. Andrews), and as ever are utterly indebted to the real organiser, Margaret Richards of the CEHP at St. Andrews. Members of the Discussion Group fully appreciate Margaret's involvement over the last several years.

The conference would not have been possible without the financial support of Millennium Forest for Scotland and The National Trust for Scotland, and the generosity of Scottish Natural Heritage in hosting the event at the excellent Battleby Conference Centre. To all these we are very grateful, and of course to the membership of the SWHDG and others who made the day so memorable.

The contributions presented here are very close to the spoken presentations, with minimal editorial interference, to maintain the informality of the Discussion Group proceedings. Speakers and the afternoon discussants (James Fenton (NTS) and Roland Stiven (SNH)) were asked to address the role of history in woodland restoration, and in particular issues of 'authenticity', if this is indeed an issue.

Chris Smout (University of St. Andrews) opens the proceedings with a plea for individuals and organisations to re-evaluate what exactly is meant by 'native' in woodland restoration. This introductory talk, purposefully provocative, is followed by one from **George Peterken**, who has perhaps done most to focus our thoughts on what we want from our 'new native woodlands', and who has crystallised the choices ahead. There then follow contributions from the leading organisations in Scottish woodland conservation, from **Syd House** (Forestry Commission) and **John Hunt** (Millennium Forest for Scotland), though these discussions are personal responses to the theme of the meeting.

We then move to a series of case studies, with **Peter Quelch** (Forestry Commission) linking morning and afternoon talks. **Tipping, Davies & Tisdall** (University of Stirling) pursue the use of palaeoecology in contributing to new woodlands on the NTS estate of West Glen Affric, stressing the antiquity and complexity of woodland development and loss, and how simplistic assumptions in conservation are being challenged by new data. **Andrew Bachell** takes on the role of respondent for the NTS, in a thought-provoking and challenging piece on how and whether we should use such information.

Jane Begg (Woodland Trust) and **Fiona Watson** (University of Stirling) pursue the theme of ‘using the past’ in discussing the documentary history, present ecology and conservation value of ‘upland wood pasture’ at Glen Finglas, and Philip Ashmole (Wildwood Group, Borders Forest Trust) concludes the presentations with an invigorating review of what the Carrifrans project can take away from knowledge of the past, in terms of fund-raising as much as woodland restoration.

The day-meeting was, we hope, a success. At the least it served to gather together under one roof the members of the SWHDG, one of the liveliest and informed groups, to talk and reflect. But we hope it did more — to allow people to assess where, and for what reasons, we are building our new woodlands.

RECREATING NATIVE WOODLAND: A PLEA FOR MORE THINKING

CHRIS SMOUT

In the last fifteen years there has been an impressive drive to restore (or perhaps more exactly to recreate) Scottish native woodlands. Reforesting Scotland helped to start it. Now, it is subscribed to by government agencies like the Forestry Commission and Scottish Natural Heritage. It is a major concern of the large charities, the Woodland Trust, the National Trust for Scotland, the Royal Society for the Protection of Birds and the Scottish Wildlife Trust. It is supported by millennium money, funnelled through the Millennium Forest Trust for Scotland. It has given birth to a host of other initiatives with lots of energy, like the Borders Forest Trust, with their wildwood project at Carrifran, and the Royal Scottish Forest Society's "Forest for a Thousand Years" at Cashel — and many, many more, often quite local ventures.

Perhaps it is time to take stock of what we are trying to do. The movement originally had a large element of restitution in it, driven by Fraser Darling's image of a wet desert created by the recent hand of man, and the need to restore an ecosystem degraded by gross human maltreatment. That vision has been dimmed, but not extinguished, by historical work, and especially by paleoenvironmental archaeology, showing how ancient was the deforestation, and hinting at natural rather than human causes for much of it. If the wet desert, with its leached soils and impervious podsol layer, is primarily a feature of 6000 years of climate change, should we not describe it as altered by nature rather than degraded by man, and, if so, exactly what are we up to by trying to cover the moors again with native trees? Are we even going against nature?

Some of us — the most ambitious and brilliant example is the Borders Forest Trust at Carrifran — are unimpressed by such a line of argument and point out that, but for a few thousand years of intensive pastoral activity, Scotland's bare uplands would in many places where deep peat did not form, still hold large native woods. So a vision of restoring the original wood locally lives on. But can we ever know enough to make any recreation of the wildwood authentic? Can we sow the herbs as well as plant the trees: without the ground flora, is it not doomed to be a shadow of reality? Where do we get the social consensus for the wolves and the beavers, let alone the problems over genetically-reconstituted aurochs?

Others seek in the management plans to perpetuate cultural landscapes from the relatively recent past. Coppicing to bring sunlight into the woodland floor to release a flush of flowers and benefit fritillaries mimics the woodman's art of past centuries. It has delightful consequences, as most forms of gardening for nature conservation do. Is it a long-term strategy, in the absence of a vibrant or assured market for coppice wood? It often depends on volunteers, but many of them are growing old and the next generation shows less interest than the last in spending its weekends remaking the world of Oliver Rackham. Can we in practical terms expect to go on like this? Perhaps we should rid ourselves of the image of nature as a primal state, a thing to be recovered by going back 6000 years, or at least a primal state enriched by pre-industrial human activity, to be recovered by going back 200 years. Should we start to think of nature not as history but as process, and simply cover the land with native trees and let time do the rest? But it is widely agreed in our anthropocentric century that "woods are for people", so we presumably will want to manage the ensuing woods for access and for timber; if so, does the native woodland movement become any different from a broad-leaf plantation movement? Does this matter?

This sets off another set of questions about what we mean by native, and why "nativeness" should matter? As some black ecologists describe it, the native woodland movement comes dangerously close to racism in denying native citizenship to sycamore (that has been here for 500 years) or to beech (present in Scotland for at least 300 years). Both trees, though invasive, have high nature conservation value, and are of considerable potential for economic uses. What are the reasons for not allowing them in native woodland schemes, unless these schemes really are about trying exactly to recreate the most remote past?

At the moment, the Scottish Executive is examining a range of ways to make the voice of local communities more effective in local decision-making. Unless this is mere political window-dressing, it is likely to lead eventually to changes in woodland grant policy. Local communities seldom know or care very much about the niceties of ecological purity or historical authenticity, but they do care for visual amenity: in terms of trees, they ask for what is beautiful, and may reasonably press for sycamore and beech because of their aesthetic appeal, perhaps to modify the schemes to include the great conifers introduced by David Douglas and others in the nineteenth century — the grand fir, the noble fir, the Douglas fir, the Wellingtonia and potentially many others. I can easily imagine a national scenic improvement scheme — almost on an eighteenth-century model — supplanting or at least supplementing a native woodland restoration scheme in the course of the next few decades. As a supplement, it would be a vision worth pursuing.

So the native woodland movement needs to address some questions and not take the answers for granted. What are we trying to do? Why are we doing it like this? Are we trying to create woods of a specific period? Is this practical and can we keep it up? Our gut feeling that native woodland recreation is a good thing in itself, even if we cannot always quite explain what we are trying to do, might have sufficed when everyone believed in the myth of a Great Wood of Caledon surviving until recent centuries. It won't wash now. Yet, careful reasoning and explanation, different perhaps in different individual cases, can still carry conviction — as I believe it does in the very different management plans for Carrifran and Glenfinglas, described below. Quite simply, we need to think harder and to explain more clearly and insistently if the native woodland recreation movement is to persuade the taxpayer and the charitable giver in the next century.

HISTORICAL CONSIDERATIONS IN FUTURE WOODLAND MANAGEMENT AND RESTORATION

GEORGE PETERKEN

SEVERAL TYPES OF NATURALNESS

I have long advocated using historical perspectives in woodland conservation (Peterken 1981). Three aspects of this are briefly discussed. Forest and woodland managers often seek to maintain or generate native or natural (and semi-natural) woodland. As explained in my 1996 text, it is necessary when deciding which species are acceptable to ask in each circumstance what type of naturalness is sought:

1. the last forest not significantly affected by people (original-naturalness)
2. the natural forest that we would have inherited if people had not influenced the forest in the past (present-naturalness)
3. the components of the existing forest which we have inherited directly from original-natural forest (past-naturalness)
4. the forest that would result if human influence were removed and the resultant succession took place infinitely quickly (potential-naturalness)
5. the forest that would eventually result from existing forests if human influence were removed (future-naturalness)

In much of Britain no two types of naturalness would result in the same stand composition. Pollen studies and historical research provide insight into 1-3, whereas interpretation of species performance within the present landscape provides a basis for predicting 4-5. In Scotland, and elsewhere, it may be more practical to recognise just three types:

- ❖ **Inherited natural:** this represents a combination of 2 and 3, the default position in which site managers retain or generate woodland composed solely of site-native species.
- ❖ **Restoration of original-natural:** in Scotland this would include, for example, restoring the lost broadleaved component to some native pinewoods, or the former mixtures to woods that are now almost pure oak coppice. Historical and palynological research is needed to define requirements in each locality.
- ❖ **Generating future-natural** by (i) unregulated succession, from which the outcome cannot be predicted, or (ii) regulating composition to include, say, beech, beech+sycamore, or any species.

Whenever a wood is to be managed as semi-natural woodland, or when ground is to be planted with native mixtures, it is desirable to specify which of the above types is sought and thus to decide which species are acceptable.

FOREST RESTORATION ON AN HISTORICAL BASIS

I was recently asked by the Forestry Commission to consider two approaches to forest restoration in central Lincolnshire, (i) historical and (ii) designed. Armed with copious historical and archaeological information, I could reconstruct the extent and boundaries of ancient woods back to the 11th century. If the lost ancient woodland were reconstituted, there would be many positive features when judged against the criteria for generating a forest habitat network:

- ❖ most existing woods would be expanded
- ❖ concentrations of woods would be reinforced
- ❖ wood sizes would generally exceed 20ha
- ❖ historical precedents would be followed
- ❖ a visually interesting landscape would result.

However, the historical approach did not generate long-distance links. The 11th century woods were also a scatter of isolated woods with poor connections. If the aim is to generate a forest habitat network in the district, these links would have to be designed into the pattern according to the best ecological and other advice.

RESTORATION OF A FOREST HABITAT NETWORK IN THE WESTERN HIGHLANDS

In a report completed for SNH in February 1999, I came to the conclusion that most of any new woodland would have to be strongly associated with pasture within the main valleys. Whilst some additional woodland could be inserted into this landscape, preferably by expansion from existing woods, the proportion of the total valley area that could be devoted to woodland would still be limited. In these circumstances, there was a strong case for restoring wood-pasture as a matrix habitat:

1. it is suitable for many of the key species, e.g., epiphytic lichens.
2. it would cause least change to current pastoral land use
3. open space habitats, such as herb-rich grassland, would not be lost to new woodland
4. historical tradition: wood-pasture was a widespread land use, which can still be seen locally and as remnants in some of the closed woods that succeeded it.

I would argue the case principally for reasons 1-3, but 4 represents an additional justification, and knowledge of past practices and conditions could provide guidance for future developments.

References

- Peterken, G.F. 1981. *Woodland Conservation and Management*. London: Chapman and Hall.
- Peterken, G.F. 1996. *Natural Woodland*. Cambridge: Cambridge University Press.

AUTHENTICITY AND ADMINISTRATION OF THE WOODLAND GRANT SCHEME

SYD HOUSE

BACKGROUND

The Woodland Grant Scheme (WGS) is the main mechanism, outside of the Forest Enterprise's own forest estate, by which forestry policy on forest management and expansion is delivered in Scotland. Since the launch of the Broadleaves Policy in 1985 the importance of native woodlands has grown significantly and, as a consequence, the incentives available and the silvicultural practices encouraged under the WGS have evolved to support this policy as it has been adapted for native or semi-natural woodlands. Today about half of the £17M or so spent in Scotland under the WGS is spent on native woodland management and expansion.

Expertise and interpretation on how best to encourage appropriate management and expansion of native woodlands has also evolved since 1985. The key steps in this process in Scotland have included the development of enhanced native woodland, including Caledonian Pinewood, supplements and other special incentives under the WGS, the appointment of specialist native woodland advisors, involvement with other partners in promoting the interests of native woodlands including the setting up of various initiatives such as Tayside Native Woodlands, the setting up of a Native Woodland Advisory Panel to the Forestry Commissioners, increased research and survey on native woodland issues, and the publication of Forest Practice Guides, Bulletins and other promotional material outlining best management practice. Inevitably more remains to be done but these steps represent a huge effort since 1985.

AUTHENTICATING WGS PROPOSALS

The purpose of this presentation is to outline the way in which the WGS is influenced by the "authenticity" of native woodland proposals whether for existing semi-natural woodlands or for proposals for establishing new native woodlands.

Defining exactly what is meant by "authenticity" is not straightforward. Most people would probably best understand it as maintaining the genetic and environmental integrity of existing semi-natural woodland and extending this approach to the creation of new woodlands where the intention is to simulate the original native woodland cover which historically covered a large part of Scotland after the last Ice Age. "The UK Forestry Standard" produced by the UK Government in 1998 set out clearly the aims for such woodlands:

- ❖ to maintain and restore natural ecological diversity
- ❖ to maintain and improve their aesthetic value
- ❖ to maintain the genetic integrity of populations of native species so far as is practicable
- ❖ to enlarge the woods, where possible, by creating new woodlands

Understanding more about what these benefits are and how they might be perpetuated and enhanced requires knowledge of both natural and human history. Thus woods with ancient trees and strong indicators of longevity on the site may require a different approach to Scots pine plantations established 50 years ago.

Knowledge of the history of the woodland or of the suitability of the site conditions for establishing new native woodlands is therefore fundamental to the way the WGS is administered and is built into the guidance and management options outlined in the FC's Forest Practice Guides for "The Management of Semi-Natural Woodlands" and Bulletin 112 on "Creating New Native

Woodlands” and, not surprisingly, these are the main references staff in the FC will use when “authenticating” proposals for the management of existing or the creation of new woodlands.

The extent to which the surviving native woodland remnants have been managed, altered and changed is worth emphasising even to the extent of their true “Scottishness”. In a significant number of woods, especially oakwoods such as in the Loch Lomond oakwoods, the natural tree components were supplemented by the planting of trees grown from seed collected elsewhere other than Scotland. The business of forestry has been practised for a long time and inevitably has had a significant impact on native woodlands whether it be in the cleaning out of non-commercial species in the pinewoods or the practice of regular coppicing in oakwoods. Indeed it may be that some of the results of these management actions are worth maintaining themselves either for conservation, landscape or cultural reasons. A significant degree of flexibility and pragmatism is therefore required in administering the WGS in order to put in place the most appropriate management regime for any particular woodland. This approach can be summarised as trying to achieve the right balance between:

- optimising the benefits of native woodlands by cherishing their inherent characteristics
- recognising the significant influence of man
- exercising flexibility and pragmatism in considering the best compromise between “laissez-faire” and intensive management.

DEFINING SEMI-NATURAL AND NATIVE WOODLANDS

When considering how to go about seeking WGS for native woodlands, identifying the history and value of any remaining woodland is clearly important. There are no virgin natural forests in Scotland. In fact the area of native woodland remnants has declined to only between 1 and 2% of the land area from their former extensive range. Those surviving semi-natural woods vary in their condition and relative importance. They are generally classified as:

“Ancient woods are those occupying sites which have been continuously wooded for several hundred years at least since the time the first reliable maps were made. In Scotland ancient woods are those which were present before 1750 when the first national survey was made by General Roy.”

“Semi-natural woods are stands which are composed predominantly of native trees and shrubs which have not been planted. By “native” we mean locally native.”

“Ancient semi-natural woodlands (ASNW), because of their combination of naturalness and a long continuous history, are generally richer for wildlife and support more rare habitats and species than more recent or less natural woods.”

Inventories of ASNW were prepared some time ago by the former NCC from map and historical records and some field survey. Although not always definitive they provide the best record of these types of woodlands and, by classification, help identify the most important. The Inventory of ASNW is a critical support tool to the FC in considering applications for semi-natural woodlands as a means of “authenticating” WGS applications and proposals and in setting the right balance for management.

In practice the value of surviving native woodlands can normally, but not exclusively, be recognised by its ranking on this inventory allowing for the fact that the inventory is not exhaustive nor error-free. It is however a good starting point. Highest value woodlands may of course already be designated as SSSI’s or even National Nature Reserves.

In recent years there has been much interest in establishing significant new woodlands of a more natural character which seek to emulate the characteristics of semi-natural woodland. Clearly the greater the degree of emulation so the value of these new native woodlands is significantly enhanced though inevitably there will be a degree of artificiality through silvicultural management and site manipulation in order to “kick-start” the natural processes.

REQUIREMENTS OF THE WGS FOR NATIVE WOODLANDS

The WGS has as one of its main objectives:

“to encourage good management of forests and woodlands . . . particularly looking after the needs of ancient and semi-natural woodlands.”

Proposals for grant-aid under the WGS should comply with best practice as described in the Forest Practice Guides for semi-natural woodlands and in Bulletin 112 “Creating New Native Woodlands”. Both of these publications recognise that:

“sensitive management which takes account of the individual character and circumstances of woods, and also the particular objectives of owners, is essential if their values are to be successfully maintained . . . One thing which is certain is that positive management will be needed.”

Natural processes will be preferred as much as possible and will be encouraged. The Forest Practice guides state under the management principles for semi-natural and native woodlands that “natural regeneration will be preferred to planting wherever practicable”. For each woodland type, such as native pinewood, upland oakwood, or birchwoods, detailed guidance is given in the appropriate guide. For semi-natural woodlands of the highest value such as the Black Wood of Rannoch it may be that natural regeneration is the only acceptable form of woodland establishment.

Where it is proposed to create new woodlands applicants will be expected to take advantage of any opportunities for natural regeneration from existing native trees or woods. Indeed expansion out from existing native woods in this way is much preferred because other floral and faunal components of native woods will be better able to colonise. In practice in recent years most new native woodlands have been planted on bare land well away from any substantial chances of successful regeneration.

Planting is acceptable in agreed circumstances but will be required to follow NVC assessment, as outlined in Bulletin 112, to select species which were native or probably native to the site. The choice of seed source is one of the most important decisions faced by the forest manager in establishing new or replanting felled woodlands. Accordingly foresters should think very carefully about their management objectives and ensuring that the trees that they establish come from the most appropriate genetic origins to meet those objectives.

In fact foresters have been well aware for some time of the importance of provenance and genetic origin. The Caledonian Pine supplement available under the WGS requires applicants to use local origin Scots pine plants wherever natural regeneration is unlikely to occur. Since its introduction it has been extremely successful in encouraging the creation of many large new native woodlands in the highland area of Scotland where Scots pine was originally native. Foresters have become used to sourcing pine plants grown from seed collected from the most appropriate provenance of Caledonian pinewoods.

For broadleaves the situation has been less straightforward. However the recently published FC Practice Note 8 “Using Local Stock for Planting Native Trees and Shrubs” has helped clarify the requirements. The source of planting material used should follow the guidance given in this Note which aims to match seed source to planting site on the basis of the same seed zone and altitude band by outlining local seed zones.

By sub-dividing existing recognised Provenances and considering altitude zoning as a separate issue, the zones were established using:

- ❖ major geographical features
- ❖ major watersheds
- ❖ other features such as rivers and roads

The WGS will require the use of local stock where conservation of habitat is a major objective. Where this is less critical, greater flexibility will be applied. A similar approach is adopted in finding the balance between the use of natural regeneration and planting.

The extent to which natural regeneration should be utilised and accepted under the WGS will depend, to a large extent, on the history of previous management, the degree of “naturalness” in the condition of the wood, the genetic integrity of the existing trees, and the viability of the natural regeneration proposals as defined by the Forest Practice guides.

The surviving oakwood remnants in the Loch Lomond and Trossachs area are a good example of how this is being interpreted. The history of these woods is generally quite well-known as is their significant ecological and scenic value. Yet they are woods which have been much influenced by man including the introduction and planting of oak from England and elsewhere, the removal of the natural associates of oak such as ash and birch, and the inevitable heavy grazing by domestic and wild stock. Woodland managers, when bringing these woods back into management under the WGS, are choosing and are being urged to encourage natural regeneration as a first option. However if certain species are missing or if the oak does not regenerate over an agreed time-scale (and many factors such as lack of mast years or continuing difficulties with grazing animals can impact on this) then it may be quite appropriate to plant to help meet management objectives.

OPPORTUNITIES AND SUPPORT FOR NATIVE WOODLANDS UNDER THE WGS

The details of grant support for native woodlands are outlined in the WGS literature. Financial incentives are available for:

(i) Existing Woods

Natural Regeneration Grants
Annual management Grants
Woodland Improvement Grants
(including special challenge funds in the Cairngorms and Argyll to encourage woodland habitat management for biodiversity)

(ii) New Woodlands

Natural Regeneration Grants
New Planting Grants
Native Pinewood supplements

Critical to receiving grant aid will be the need for proposals to meet the spirit and intentions of the published guidance.

OBSERVATIONS AND CONCLUSIONS ON THE WGS AND “AUTHENTIC” NATIVE WOODLANDS

Finally a few personal observations on the use of the WGS over the last few years in helping manage and expand native woodlands.

1. Determining what is truly “authentic” in relation to native woodlands is extremely difficult given the various issues of genetic and environmental integrity, and the past history of management and interference. There are also cultural overtones surrounding perceived historic landscapes and a desire amongst many to recreate these as much for aesthetic and landscape reasons as for scientific conservation reasons. Proposals to manage and establish native woodlands should seek to consider all of these legitimate objectives and be as practical and pragmatic as possible when seeking to optimise the benefits of native woodlands
2. The WGS to date has been successful in stimulating interest and activity in native woodlands mainly by adopting such a pragmatic approach.
3. Best practice on maintaining genetic integrity and utilising natural processes is continually evolving. Guidance through the WGS needs to be applied with common sense to achieve realistic forest management outcomes including owners’ objectives.
4. The guidance applied to sourcing Caledonian Scots Pine is a good example of (3). The new guidance recently published for broadleaves will encourage a similar approach.
5. Whilst the vision of restoring the mythical “Forest of Caledon” is attractive it should be tempered with pragmatism in forest operations.
6. The principles of multi-purpose forestry apply equally to native woodlands. They should be managed to provide a range of benefits to optimise the choices for future generations without compromising their inherent values.

References

- FC (1994) *The management of semi-natural woodlands* Forest Practice Guides 1-8. FC, Edinburgh
- FC (1994) *Creating New Native Woodlands*. Bulletin 112. FC, Edinburgh
- FC (1998) *The UK Forestry Standard*. FC, Edinburgh
- FC (1999) *Using Local Stock for Planting Native Trees and Shrubs*. Practice Note. FC, Edinburgh.
- NCC (1989) *Inventories of ancient semi-natural woodland*. Focus on Nature Conservation No. 6 (2nd edition). NCC, Peterborough.

THE MFS APPROACH TO NATIVE WOODLAND RESTORATION

JOHN HUNT

The restoration of native woodland has been the inspiration and driving force behind the MFS Initiative. The many organisations that helped to set up MFST have all been strongly motivated by the vision of expanding and improving the much depleted native woodland resource in Scotland — in the firm conviction that this would bring many social as well as environmental benefits.

The Millennium Forest for Scotland is celebrating the new millennium by restoring and regenerating Scotland's native woodlands, and by bringing these woods back into management for the widest possible public benefit. Its two main objectives are:

1. Encouraging and supporting practical work designed to extend the cover of native trees and improve the stewardship of native and other woods.
2. Helping to re-establish social, cultural and economic links between communities and their local woodlands, thereby promoting an interest in and commitment to the sustainable management of native woodlands in the long term.

Altogether MFST is supporting about 85 capital projects with a total cost of over £25 million, with grants from the Millennium Commission of about £8.5 million. The balance of the project costs come from a range of bodies, most notably FC, but also European funds, Local Enterprise Companies, SNH etc. The projects are widely distributed across Scotland from Shetland to Galloway including the Inner and Outer Hebrides.

Seventy two projects are specifically to do with native woodland restoration and management and involve over 400 actual sites covering over 15,000 ha. The main woodland outputs will be approximately as follows:

	<u>Area — ha</u>
New woodland created by natural regeneration	6000
New native woodland created by planting	3000
Woodland into management	5500
Non-woodland habitats	1000

The thirteen projects which are not specifically woodland restoration include inventory, demonstration and experimental work. The latter includes a project led by the Woodland Trust to identify the best means of restoring native flora to newly planted native woods. Of the 72 woodland restoration projects, 16 are in what might be called the urban fringe in and around towns and total about 1500 ha. The remaining 56 projects are in the wider countryside and cover over 13,000 ha.

When MFS was set up Guidelines were prepared to give applicants a reasonable idea of the criteria which had to be met if projects were to be accepted. For establishment of new woodland these were:

- ❖ natural regeneration should be favoured where possible
- ❖ existing habitats and features of interest should be safeguarded
- ❖ ground preparation should be kept to a minimum

- ❖ only native species should be planted - suited to soil types and predicted NVC communities
- ❖ trees/shrubs planted should be of local provenance as far as practicable
- ❖ non-native species should be removed or reduced in extent (some exceptions)
- ❖ ecological monitoring required
- ❖ long term management plan required.

Also required were:

- ❖ appropriate public access
- ❖ community involvement and support.

Of the above only the production of a management plan requires knowledge of the history of the site and past land use – and collecting this information from various possible sources has been strongly encouraged. With some MFS projects the need to complete the work within a limited timespan has meant that the management plan has had to be written after work has started, which is not ideal. With some projects there were management plans already in existence while with others the production of a detailed management plan was the first step in order to identify the work needed.

Though providing the above guidance, MFST has not wished to dictate to applicants what their projects should consist of: indeed it was felt important that project proposals should be what the community wanted and what they thought would benefit them.

In the urban fringe situation, new woodland establishment has been mainly by planting and the detailed proposals have usually owed more to local opinions and the requirements of WGS than to a careful examination of past woodland cover and current ecological requirements. That is not surprising in situations where the community benefits of new woodland are seen as paramount with nature conservation considerations of lesser importance.

On land which has not seen natural woodland for more than 2000 years, true native woodland habitat will not be restored by simply planting trees — or at least not for a very long time. The woodland flora and many components of woodland wildlife will be absent and unable to colonise readily, and introductions of selected plant species may be very worthwhile for certain sites.

Existing woodland in the urban fringe is rarely native woodland to start with, so a pragmatic and flexible approach towards its management is required. MFST has invariably wished to see the natural qualities of the woodland improved but has recognised that some non-native species have a valuable role to play, such as mature conifers or beech. Landscape and amenity considerations rule out drastic measures to remove non-native species and a sensitive and gradual approach has usually been adopted.

Looking at projects in the wider countryside, the “Forest for a Thousand Years” at Cashel on Loch Lomond is a good example of the approach taken with a number of MFS projects. Here the Royal Scottish Forestry Society Forest Trust purchased a 1200 ha sheep farm with the aim of establishing a new sustainably managed native forest.

Only 20 ha of semi-natural woodland exists at Cashel (oak, ash, alder and birch) and most of the farm has been treeless for over 200 years. However it is at the southern end of the important oak woodlands which extend up the east side of the loch. Quite a lot is known about the history of these woods and this helped to inform the proposals for Cashel. An Environmental Assessment was prepared which included an NVC survey of most of the farm as well as other information on landscape, archaeology, soils, birds etc. This led to proposals to plant about 400 ha of the farm over a period of five years with a wide variety of native broadleaves plus some Scots pine. About

300 ha has now been planted — this includes alder with a little ash on the richer soils (W7), oak and birch on the lower ground (W11 and W17), and birch and Scots pine (W4 and W18) at higher altitudes. Since one of the objectives is to establish forest cover from lochside to hilltop there will also be some plantings of dwarf birch and montane willow species on the high ground up to 400 metres ASL. Areas of peatland, other wet ground and much of the higher ground are being left to develop naturally. Planting has been of variable density in clumps and “drifts” attempting to mimic a natural woodland in structure and distribution.

The choice of Scots pine is debatable as it could be argued that Cashel is just outwith the native Scots pine range since the most southerly accepted remnant is at Glen Falloch 15 miles to the north. All the seed for this has come from the Coille Coire Chuilc pinewood near Tyndrum which is the nearest source for significant quantities of seed. The seed for the broadleaved species has come from other local sources.

The establishment work at Cashel is using conventional forestry methods with mounding, fertilising and bracken spraying within a boundary deer fence. Considerable thought has gone into what should be planted and where, and the eventual proposals have had to satisfy FC and other grant giving bodies. However it is fair to say the outcome has only been moderately influenced by what was known of the past history of the farm.

Cashel adjoins a substantial area of genuine semi-natural woodland which, as well as providing an insight into the sort of woodland to aim for, also provides a reservoir of plants and other woodland wildlife which may colonise Cashel in the future. Other woodland restoration schemes are not necessarily so fortunate. There may be very little existing remnant native woodland and one has to be careful not to assume that what is there now is a reliable indication of what the truly natural woodland cover might be. Existing remnants may merely be an indication of what tree species can survive long periods of grazing, burning and felling.

Some overall thoughts on native woodland restoration include:

1. the use of natural regeneration as much as possible is advocated since this is most likely to lead to the development in the long term of native woodland that is appropriate to the site. However much is known about the past history of woodland on a site (and usually information is scant), it is very difficult if not impossible to accurately mimic the distribution and diversity of native woodland by planting. Unfortunately the desire to achieve quick results and the greater financial incentives of the WGS often lead to the decision to plant rather than embark on the less predictable and financially less rewarding approach of natural regeneration. However if planting is the route taken then it is important to allow as much space as possible for future natural regeneration.
2. the earliest history of vegetation cover on a site is fascinating to know about (if it can be determined by pollen analysis or whatever) but may not be very relevant to decisions taken today about native woodland restoration when climate, soils and wildlife have changed so much since the primeval wildwood.
3. the more recent history of a site (last 250 years or so) is likely to be very relevant to detailed proposals for restoring native woodland and this information should be obtained as far as is possible. It will probably provide important clues to the future management.
4. the opinion of local people as to the sort of woodland they want is important and should be taken into account. In some locations their views may be equally legitimate to those of the ecologist and historian.
5. a lot of new native woodland is being established at present whether as part of MFS or not. The kind of native woodland that we end up with is going to depend crucially on the way it is managed in future. This is why a carefully thought out management plan is so important.

**THE WEST AFFRIC FOREST RESTORATION INITIATIVE:
PALAEOECOLOGICAL APPROACHES**

RICHARD TIPPING, ALTHEA DAVIES AND EILEEN TISDALL

INTRODUCTION

It is intended to restore to the NTS-owned property at West Affric, in northern Scotland, its former 'native' woodlands (Bachell this volume), a project co-funded by the National Trust for Scotland (NTS) and the Millennium Forest for Scotland (MFS). This simple intention, however, conceals a series of major and highly important uncertainties. Critical in these is the necessity in, for instance, Native Woodland Grants Schemes, for the tree species to be planted to be those that formerly grew in that area, in short, for the tree species to be within their geographic range (House this volume). In West Affric, as in so many areas of Scotland, it is not possible to demonstrate from desk-top survey what that native woodland should be (Tipping 1998). Firstly, there is virtually no woodland remaining on this upland/montane part of the NTS property; secondly, it cannot be assumed that the remaining scrubby and isolated trees bear any clear relation to the woodlands intended to be restored (Davies, Tipping & Tisdall 1997).

There are, of course, no requirements and many dangers in replacing former woodland in any dogmatic or rigid manner. Peterken (1996) has suggested three approaches to woodland restoration, past-natural, present-natural and future-natural modelling, of which only the first makes any effective reference to an historic basis for future planning. In the total absence in Scotland of present-natural woodlands that could serve as appropriate models (Tipping 1994), the choice is restricted to the first or third options, although Peterken (1998) argues that a compromise position needs to be sought where knowledge of past conditions is linked to 'ecological know-how'.

In general, the approach to native woodland restoration in Scotland, for instance in the overwhelming majority of MFS-supported projects, has been to seek future-natural woodlands. The approach is justified, if at all, on suggestions that factors such as climate or soils have changed too greatly from the original woodlands to be restored, although this assumption has never been tested.

Past distribution patterns are necessary, however, to define the geographic range of taxa, but they are used in rather superficial ways. The geographic ranges of major woodland types are usually assessed on the map of Scottish woodlands expected to exist in the absence of human settlement and deforestation, prepared almost 40 years ago by McVean & Ratcliffe (1962). This reconstruction remains a remarkable achievement in many ways and has in general stood the test of time, but remains speculative.

We now have a more comprehensive understanding of past-natural woodland in Scotland (Tipping 1994; Edwards & Whittington 1997), from two principal sources: pollen analysis and the presence of wood remains preserved in peat. Reconstructions based on these sources in general conform to McVean & Ratcliffe's (1962) model although there are critical differences in northern Scotland and with increasing altitude; McVean & Ratcliffe (1962) probably under-estimated the maximum altitudes reached by the tree-line in montane regions. The maps are, however, based on pollen analyses which are frequently 10-20 years old and which are not prepared to modern quality standards (Tipping 1994). A second major difficulty is that mapping at national scales does not allow the original woodlands at particular localities or sub-regions to be mapped. There is an inherent imprecision in such reconstructions that is mostly derived from the selection of sites used for pollen analysis (Davies *et al* 1997; Tipping *et al* 1999).

RESEARCH ISSUES AT WEST GLEN AFFRIC

Glen Affric stretches east-west from Cannich in the eastern lowlands, close to Loch Ness, to Kintail on the west coast. Land-ownership divides the upland landscape, above 200m OD, into

two estates; East Affric and West Affric. East Glen Affric is widely renowned as the site of perhaps the finest native Caledonian Scots Pine (*Pinus sylvestris*) forest in Scotland (Steven & Carlisle 1959). This pine and pine-birch woodland thins westward to the end of Loch Affric, and birch increases in abundance. West Affric is almost entirely treeless.

The initial approach to re-afforestation in West Affric (Halcrow unpub.) is a curious mix of the application of past-natural models (i.e. what should have been there) and many assumptions, many of which are readily testable by the application of palaeoecological analyses. It was hoped that such work could serve as a model for a more empirically based approach to native woodland restoration in other localities in Scotland (Tipping *et al* 1999). Several simple but fundamental questions could be asked:

- ❖ was West Affric ever wooded? Present-day climatic gradients are extreme between the west end of West Affric and East Affric, and a legitimate concern was to understand whether West Affric ever supported abundant woodland.
- ❖ was West Affric part of the former extent of Caledonian pine forest?
- ❖ if not, what was the structure and composition of these western woods?
- ❖ why did these woodlands in West Affric disappear so completely when those in East Affric survived? The common assumption is that anthropogenic activity, either indirect through grazing pressures or direct through woodland clearance (Fraser Darling 1955) destroyed woodlands in northern and western Scotland, but these ideas have been questioned recently (Tipping 1993; Smout 1997).
- ❖ could the woodlands have been lost naturally, by past climate change? Recent suggestions (Huntley, Daniell & Allen 1997) are that *Pinus sylvestris* in some locations in northern Scotland was highly sensitive to climatic deterioration around 4200 years ago. Other suggestions are that natural blanket peat spread is inimical to woodland regeneration (Fenton 1997).
- ❖ what implications would our data on the cause/s of woodland reduction and loss have for future re-afforestation plans? Damaging human activities can be legislated against, and new woodlands protected, but if a natural change was causal, could re-afforestation be justified? If natural, was the change irreversible?
- ❖ could palaeoecological data be used to map at appropriately high spatial resolutions a mosaic of past woodlands in West Affric that could be demonstrated to have been robust to natural change, and which could be suggested to be resistant to future changes? Could we identify a best-fit analogue from the past for future woodlands?

Two components were seen as critical:

- (a) the reconstruction of vegetation patterns through time, from the beginning of the present interglacial (the Holocene) when Glen Affric last became ice-free, to the present day.
- (b) the reconstruction of climatic change over the same period.

These two approaches are both based on sediment-stratigraphic evidence, from organic deposits like peat bogs or lake sediments (below), unified by a comprehensive programme of radiocarbon (¹⁴C) dating to permit correlations. These two components have remained the core of the project. The work generated to date by Althea Davies and Eileen Tisdall is described next.

PRIMARY WOODLAND COMPOSITION IN WEST AFFRIC

The analysis of pollen preserved in stratigraphic sequences such as peat and lakes is a powerful technique for reconstructing past vegetation. In the past there has been much

palynological research in the Highlands. However, most of this work was intended to reconstruct regional patterns of vegetation. Consequently the results are difficult to understand at the spatial and temporal scales employed by ecologists, and are difficult to apply to ecological problems because the pollen records are a composite of many plant communities, with different habitats, soil requirements and differing sensitivities to change.

The work in West Affric approaches the pollen record from a different perspective, using sequences from small rock basins, with a diameter of 10-50 m, to produce records which are sensitive to the composition and dynamics of the stands or communities surrounding each site. This is because most of the pollen deposited in these basins derives from *c* 50-100 m or, in largest case, perhaps around 300 m around site. The pollen records produced also have a sufficiently fine temporal resolution to be applicable to ecological data.

In addition, the sites selected are located in different environmental settings in order to characterise patches of vegetation which formed a mosaic across the landscape in response to different local factors. The analysed peat basins are located (1) in the undulating and presently blanket peat-dominated hillside of central Affric, (2) at the junction between the alluvial floodplain grassland and lower heath and peat-covered hillslopes in West Affric, (3) in a meadow-like alluvial fan in far West Affric, and (4) in the lowland grass- and heathland at Kintail. This fourth site is not discussed in this paper. The sites thus lie in a transect through Central and West Affric, providing data on east-west vegetational transitions, which may reflect climatic gradients, especially relating to relative oceanicity, and possibly human activity, since adjacent lowland glens are traditionally thought of as the focus of occupation in the Highlands.

The work from Central Affric suggests that early Holocene deciduous woods of birch with rowan, poplar, hazel and willow were relatively short-lived, replaced by pine as it migrated into the area around 7000 BP, forming pine-dominated woodland with heather and birch on moraine-derived soils in the hillsides. These may have been similar to present day East Affric. However, from sites further west the past woodland can be seen to have been far more diverse, forming a varied mosaic, and that pine decreased in importance further west, forming only small stands on marginal soils, which were more acidic and nutrient poor, where it was able to out-compete other species.

Palynological evidence from alluvial soils on the valley floor and an alluvial fan in West Affric suggest that from *c* 9500 BP until around 4000 BP the deciduous woodlands consisted of a diverse mixture of birch with rowan, willow, some hazel and later alder, reflecting local conditions (*e.g.* moisture, drainage). Alder was never abundant, even in favourable habitats due to possible altitudinal constraints on seed production (McVean 1956a, b). This is important in relation to mid-Holocene changes in woodland composition, discussed below. There was also a range of herbaceous taxa, many of which favour more base-rich environments, including fen species and tall-herbs like meadowsweet with ferns, and ruderal communities with dock on unstable soils such as gravel bars and riverbanks.

The pollen evidence suggests that soil processes were one of the primary factors controlling woodland composition: alluvial soils were intermittently rejuvenated by sediment deposition during flooding, which maintained higher soil nutrient status and pH, unlike hillside soils developed from acidic, nutrient-poor Moinian rocks, with little evidence for inwashing. There is also evidence that these mixed deciduous woods were adapted to frequent, small-scale disturbance by these flood events, which maintained a higher species diversity than in the pine-birch-heather communities on morainic soils. This is still evident at present, as a comparison of species-rich alluvial grassland and heath (*Vaccinium* and *Calluna*) dominated understorey of the birchwoods of East Affric indicates.

In addition, there is stratigraphic and pollen evidence for fire in alluvial woods, which may have promoted persistent grassy areas. In contrast, fire appears to have been far less frequent or intense in the hillside pine-heath communities, contrary to frequent speculation in the ecological and palynological literature.

CLIMATIC CHANGE IN WEST AFFRIC AND ITS SIGNIFICANCE FOR WOODLAND DYNAMICS

In interpretations of Holocene woodland dynamics, climate change should be considered a key forcing mechanism. Within north west Scotland the climate is predicted to become warmer but also stormier and wetter. Already the 30 year climate data trends are indicating that the climate is warming with less snow cover at lower altitudes, and that the west does appear to be getting wetter and windier (Harrison 1997). It becomes a pressing concern to understand how woodlands have responded to changes in past climate so that woodland restoration and management can be accommodated within these near-future climatic scenarios. The linkages between climate change and the long-term history of Scots Pine woodland in north west Scotland discussed here will seek to emphasise the role of climate change in woodland dynamics, and the questions and issues this at present tentatively drawn climate record raises.

Previous research into the long-term dynamics of pine woodland in northern Scotland has stressed the links with rapid climate change. In north west Scotland pine seems to have expanded rapidly at around 4400 years ago, up to 80km north of its previous limits south of Ullapool (Gear and Huntley 1991). However about 400 years later, at around 4000 years ago, pine then rapidly declined. Radiocarbon dating of tree stumps suggests that the majority of them are from within this 400 year period. Warmer drier summers are thought to have dried out formerly wet peat surfaces, allowing for the expansion of pine. After 4000 years ago climatic deterioration forced peat surfaces to become wetter; pines died out in these areas. Tree-ring data suggests that these trees lived only for one or two generations before dying out. The date of 4000 years ago has been associated with a single pine decline within northern Scotland (Bennett 1984), considered to be synchronous across Scotland. Climatic change was proposed as the forcing mechanism for this reduction in pine woodland. Recent research is suggesting that the pine decline is more variable in timing, with declines occurring from 4200-3500 years ago. (Anderson 1998; Anderson *et al* 1998; Bennett 1995; Daniell 1997; Gear & Huntley 1991). Although the 4000 BP event is considered to be the strongest, it was not necessarily an isolated event.

Woodland change is, however, not an unambiguous indicator of past climate because of other controls, pedogenic and anthropogenic. Research into climate change needs to concentrate on proxy indicators that (1) are climatically sensitive, providing a less ambiguous record, (2) are capable of analysis at high temporal resolution and (3) allow good spatial resolution. A multi-proxy approach has been taken to the work in Glen Affric, with the two climate proxy data-sets being (a) independent of the other and (b) showing differing sensitivities to changing climate.

Lakes fluctuate in depth in response to changes within the hydrological balance of the catchment. Lakes have been shown to be particularly responsive to changes in precipitation (Harrison & Digerfeldt 1993; Vassiljev *et al* 1998). The level of the lake fluctuates in response to changes in the amount of precipitation, an increase in rainfall over long periods resulting in a rise in lake-level. We have worked on Loch Coullavie, at the eastern end of West Glen Affric and at the head of Loch Affric itself. Cores of sediments taken from out across the lake are used to identify lake level changes. The fen peat accumulating at the margins of the lake are considered to be particularly sensitive to changing water levels, and sedimentological and geochemical analyses show that the fen surface dried out periodically, during lowered lake levels, and was also inundated by lake mud during periods of higher lake level. These fluctuations in lake-level are considered to be small in scale, and perhaps lasting for fewer than hundreds of year, scale suggesting that lakes are also sensitive to these ephemeral and subtle shifts in precipitation. Larger scale shifts in lake-level are indicated by changes in the stratigraphy with sediments associated with deeper water such as gyttjas and shallower water such as fen peat.

Changes in the surface wetness of blanket peats are recorded within the peat stratigraphy. If the peat surface dries out the organic material at the surface decays, becoming more humified and this is noted in the peat stratigraphy as darker peat. If the peat surface becomes wetter organic material does not decay so readily and appears as lighter, less humified peat. At each of four sites throughout West Glen Affric, changes in surface wetness have been recorded, probably as a result of changes in 'effective' precipitation (that is, precipitation minus evapotranspiration). Research has suggested that the peat surface is most sensitive to changes in seasonal (summer) effective precipitation (Blackford & Chambers 1991, 1995).

A detailed chronology of change is currently being generated. A sequence of 36 AMS radiocarbon dates are being determined from which to define the sequence and synchronicity of lake-level fluctuations and blanket mire shifts in surface wetness. At present these radiocarbon dates are not yet available. Using the chronology, the combination of the two climate data sets will define the magnitude and intensity of the climatic shifts and how they varied both temporally and spatially.

The data obtained to date suggest that climate during the Holocene within Glen Affric was highly temporally variable. The lake-level fluctuation record suggests that there were a number of large-scale shifts in precipitation but that there were also more frequent smaller scale shifts. These smaller scale shifts are very abrupt and may have been short lived. This record of highly variable climate is also noted from the ombrotrophic blanket mire record. Within this climatic record is evidence for the strong influence throughout the Holocene of the west-east precipitation gradient noted today. If climate change occurred as a series of abrupt short-lived shifts in the past, then this may be the future scenario also.

MID-HOLOCENE WOODLAND DECLINE: THE IMPACT OF CLIMATIC, ANTHROPOGENIC AND GRAZING PRESSURES

Vegetation in West Affric appears to have responded to climatic changes throughout the Holocene (above), especially the pine-heath communities of Central Affric. This suggests that this ecosystem may have been in a more delicate balance than mixed deciduous woods on alluvial soils, which might have been buffered by soil rejuvenation. However, in terms of woodland survival, the most important period was the mid-Holocene. There is evidence for increasing stress on woodland regeneration around 5000 BP, particularly so after 4400 BP. The regional transition to wetter, more oceanic conditions around 4000 BP resulted in extensive soil waterlogging across the north-west Highlands. There was a marked reduction in woodland cover in West Affric, affecting not only pine communities on poorer, more marginal soils, but also previously apparently more robust deciduous alluvial woods.

This coincides, however, with increased evidence for grazing, burning and human presence in West Affric, so that two key questions are: what was the relative impact of climatic and anthropogenic stresses? what would have happened without human or grazing interference? Although woodland reduction was dramatic, in many cases seeming to have occurred within a single tree generation, this was not a synchronous event in Affric: there was clear temporal and spatial variability, the severity and rate of change affected by local environmental factors, particularly soils.

From the present data, it is argued that climatic change made woodlands more vulnerable to grazing and anthropogenic pressures, since there is *no* evidence for intensive land-use and woodland survived on alluvial fan soils where human activity was most intense.

It is difficult to predict what might have happened without human or grazing interference:

- it appears very likely that woods would still have disappeared from acidic soils on the hillsides due to a combination of a long history of acidifying pine-heath vegetation cover, natural leaching and the almost inexorable spread of blanket peat due to natural pedogenic and climatic deterioration.
- some woodland survival may have been more likely on alluvial soils, perhaps as more open or restricted stands with an increase in grass- and heathland, especially on riverbanks and alluvial fans where flooding and sediment deposition may have been sufficient to counteract the effects of increased climatic wetness and leaching.

A marked decline in West Affric's woodlands between *c.*3800-3600 BP was succeeded by a stepped reduction in tree cover, possibly as stands failed to regenerate as peat expansion and grazing took their toll. Stands of trees may have remained on more favourable soils for centuries and even millennia. For example, the area of floodplain analysed appears to have been treeless by *c.*3000 BP, the Central Affric hillside was not treeless until *c.*2000 BP and some scrub persisted

until only *c.*600 years ago on the alluvial fan. In all the sites studied this long predates suggested impacts relating to felling and over-grazing during the historic period.

PALAEOENVIRONMENTAL PERSPECTIVES ON NEW NATIVE WOODLANDS IN WEST AFFRIC

From the above brief discussion, the following conclusions are drawn:

1. Forests were dynamic, not just static entities, some of which were more fragile than others.
2. There is evidence for more than one driving force behind vegetation change in Northern Scotland.
3. Of these, climate is potentially significant for the future, as, with suitable intervention, grazing and human impacts can be controlled.
4. There is therefore a need to build woods that are robust to projected future changes and not just able to cope with present conditions.
5. The very careful selection of species and planting sites are crucial factors for ensuring the success of future native woodlands.

This final section will attempt to summarise our initial and provisional thoughts on how our work might contribute to the re-forestation of West Affric. These are here kept to generalities, as ways in which we might develop these ideas. Specific recommendations relating to restoration plans for West Affric are not evaluated here — this is a ‘scoping’ exercise.

West Affric was certainly wooded in the past; climate did not limit the development of woods. But West Affric was not part of the Caledonian pine forest. A diverse and complex mosaic of birch, hazel, rowan and other taxa grew in West Affric. It is likely that over large parts of West Affric, human activity had little influence on woodland loss, although this has still to be clarified. Our best bets at present are either that woodland loss was the product of climatic deterioration or blanket peat spread, or quite likely both together.

Firstly, our methodologies have their limitations. Palynological approaches in particular have technical limitations that restrict the recognition of true diversity in past woodlands:

- ❖ many taxa cannot be identified to species, and often only genus or family are identified
- ❖ taxa that are not wind-pollinated are not represented well or at all in analyses
- ❖ several taxa are, through low pollen production &/or dispersal, ‘invisible’ as pollen
- ❖ pollen analyses do not thus provide anything like a species-list of past woodlands; herb floras are particularly poorly represented because arboreal pollen production is usually overwhelming. Not all tree species within a woodland will be recognised.

Although careful site-selection in this study (above) has succeeded in revealing past woodlands in much greater detail than previous work, woodland structure is difficult to understand because pollen sites are point sources trying to reflect two-dimensional spaces. An element of subjective interpretation based on modern-day ecological preferences allows us to place groups of plants together in appropriate ecological contexts, but it is not possible to demonstrate whether woodlands were mono-dominant and patchy or of inter-mixed species. Pollen analysis is much better at demonstrating trends in vegetation, and identifying mechanisms and causes of change, as demonstrated above, rather than describing vegetation in detail at any point in time.

Buchanan (1996) analysed the advantages and disadvantages of three approaches to native woodland restoration in northern Scotland: (a) using present stands as guides, (b) using the NVC predictors of Rodwell & Patterson (1994), and (c) using palynology as a guide. Buchanan's major criticism of pollen analysis was not the deficiencies in reconstruction (above) but the difficulties of choice presented to the forester, in selecting one of many past woodlands: pollen analysts provide examples of woodlands changing through time at any one site (Tipping *et al* 1999).

Our approach to this problem at present relies on the possibility of identifying past woodland types that were robust and adapted to environments that are expected to recur in the near future. This approach employs the advantage that palynology gives in identifying vegetation response to environmental change, an advantage that the NVC approach, relying on present climatic conditions as a control, is less able to do. Recent statistical analyses (Ritchie 1985; Jacobson & Grimm 1986) on pollen data-sets have succeeded in identifying patterning in plant community assembly and disassembly, including measures of long-term stability and instability (e.g. identifying periods when woodland 'communities' were stable and when they fragmented), and measures of rates of species richness and replacement (rates of species change or turnover). These allow us to have confidence that we can define past woodlands in West Affric that were stable.

It is then in part possible to define whether these woodland types were stable because the environment was unchanging, or were indeed robust and resistant to contemporaneous environmental change, because we are independently monitoring many of the key variable likely to exert stresses; climate change, soil change and human activity.

A second assumption in our approach is that we can recognise past environmental conditions that are expected to recur in the near future. It might be possible to identify past environments that changed in directions predicted for the near-future, i.e. that we can recognise past analogues for future change. The change we focus on is in the climatic environment. Our major concern in the near-future is the complex and, admittedly, poorly resolved shifts in climate loosely associated with 'global warming' (Harrison 1997). The most recent trends identified for north west Scotland, including West Affric, is for increasing precipitation in a region already wet. Currently we can identify that West Affric has experienced a number of quite abrupt climatic shifts from dry to wet; at present we do not know the timing of these, their magnitude or spatial extent. However, climate has probably been sufficiently unstable to perturb natural woodlands. In common with other workers in northern Scotland (Huntley *et al* 1997), we suspect that wet shifts, to greatly increasing precipitation, are the changes that most affect trees through oxygen depletion, nutrient losses and leaching, reductions in microbial activity and restricting rooting depth. Until we understand more about these controlling factors on woodland loss, in the next few months, this line of argument must remain theoretical and open to debate. Here we provisionally identify the period 4000 ¹⁴C BP as the critical turning-point in woodland history in West Affric. This date is significant for Scotland north of Glen Affric, and is important in West Affric (above), but we do not yet know that this is true for all areas of the glen or that near-future change will mimic this wet shift.

We can then identify the spatial patterning of woodlands that developed in the few hundred years following this climatic downturn, and this becomes our model for future woodlands: we do not yet in practice understand the stability of these woodlands. However, it is important to draw out the major implications of this reasoning, that in our reconstruction these future woodlands do not attempt to replicate those woods in the mid-Holocene climatic optimum, around 6500-6000 ¹⁴C BP, which were probably at peak arboreal diversity (Tipping 1994). This constraint may appear self-defeating in that we purposefully reject those woods that are most aesthetically attractive, but we do so because today's landscape developed after the mid-Holocene climatic peak, and is closer in appearance and dominant processes to the landscape of 4000 years ago than 6000 years ago.

Interestingly this is not a function of time; theoretically today's landscape could resemble that of any previous period if the effects of climate and soil deterioration could be fully reversed, but this appears not to have happened. For example, one of the principal objections to the application of palaeoecology as enthusiastically as we do here is that soils today are more nutrient poor than in the past, and so past woodlands cannot be used as a basis for restoration. This may be true for some landscapes, but there is evidence that in northern Scotland this is not a significant problem, because all detrimental changes (expansion of blanket peat; podsolisation) appear to have been

established earlier than the woodlands we seek to restore (Carter 1998; Pennington *et al* 1972). Woodlands in West Affric were developing on acid soils by the mid-Holocene, and soil acidification is not a factor that separates future woodlands from those growing 4000 years ago.

References

- Anderson, D. 1998. A reconstruction of Holocene climatic changes from peat bogs in north-west Scotland. *Boreas* 27, 208-224.
- Anderson, D.E., Binney, H.A. & Smith, M.A. 1998. Evidence for abrupt Holocene climatic change in Northern Scotland between 3900 and 3500 calendar years BP. *The Holocene* 8, 97-103.
- Bennett, K.D. 1984. Post-glacial history of *Pinus sylvestris* in the British Isles. *Quaternary Science Reviews* 3, 133-155.
- Bennett, K.D. 1995. Post-glacial dynamics of Pine (*Pinus-sylvestris* L.) and pinewoods in Scotland. In Aldhous, J.R. (ed) *Our Pinewood Heritage*, 23-39. Conference Proceedings, Forestry Commission, The Royal Society for the Protection of Birds and Scottish Natural Heritage.
- Blackford, J.J. & Chambers, F.M. 1991. Proxy record of climate from blanket mires: evidence for a Dark Age (1400BP) climatic deterioration in the British Isles. *The Holocene* 1, 63-67.
- Blackford, J.J. & Chambers, F.M. 1995. Proxy climate record for the last 1000 years from Irish blanket peat and a possible link to solar variability. *Earth and Planetary Science Letters* 133, 145-150.
- Buchanan, J. 1996. *Re-creating the Caledonian Forest. A Comparison of Different Approaches to Determining Tree Mix in the Expansion and Re-creation of Native Woodlands in Scotland*. Unpublished MSc thesis, Stirling University.
- Carter, S. 1998 Palaeopedology. In McCullagh, R.P.J. & Tipping, R. (eds) *The Lairg Project 1988-1996. The Evolution of an Archaeological Landscape in Northern Scotland*. Edinburgh: STAR, 150-161.
- Daniell, J. 1997. *The late Holocene palaeoecology of Scots Pine (Pinus sylvestris L.) in North-West Scotland*. Unpublished Ph.D. Thesis, University of Durham.
- Davies, A., Tipping, R. & Tisdall, E. 1997. Palaeoenvironmental perspectives on woodland sustainability. In Smout, C. (ed) *Scottish Woodland History Discussion Group: 2nd Meeting*, 16-19.
- Edwards, K.J. & Whittington, G. 1997. Vegetation change. In Edwards, K.J. & Ralston, I.B.M.R. (eds) *Scotland: Environment & Archaeology 8000 BC-AD 1000*. Chichester: Wiley, 63-82.
- Fenton, J. 1997. Native woods in the highlands: thoughts and observations. *Scottish Forestry* 51, 160-164.
- Fraser Darling, F. 1955. *West Highland Survey*. Edinburgh: HMSO.
- Harrison, J. 1997. Changes in the Scottish climate. *Botanical Journal of Scotland* 49, 287-300.
- Harrison, S.P. & Digerfeldt, G. 1993. European lakes as palaeohydrological and palaeoclimatic indicators. *Quaternary Science Reviews* 12, 233-248.
- Huntley, B., Daniell, R.G. & Allen, J.R.M. 1997. Scottish vegetation history: the Highlands. *Botanical Journal of Scotland* 49, 163-176.
- Jacobson, G.L. & Grimm, E.C. 1986. A numerical analysis of Holocene forest and prairie vegetation in central Minnesota. *Ecology* 67, 958-966.
- McVean, D.N. 1956a. Ecology of *Alnus glutinosa* (L.) Gaertn. V. Notes on some British alder populations. *Journal of Ecology* 44, 321-330.

- McVean, D.N. 1956b. Ecology of *Alnus glutinosa* (L.) Gaertn. VI. Post-glacial history. *Journal of Ecology* **44**, 331-333.
- McVean, D.N. & Ratcliffe, D.A. 1962. *Plant Communities of the Scottish Highlands*, Edinburgh: HMSO.
- Pennington, W., Haworth, E.Y., Bonny, A.P. & Lishman, J.P. 1972. Lake sediments in northern Scotland. *Philosophical Transactions of the Royal Society of London* B264, 191-294.
- Peterken, G.F. 1996. *Natural Woodland: Ecology and Conservation in Northern Temperate Regions*. Cambridge University Press: Cambridge.
- Peterken, G.F. 1998. Woodland composition and structure. In Newton, A.C. & Ashmole, P. (eds) *Native Woodland Restoration in Southern Scotland: Principles and Practice*. Occasional Paper No. 2, Borders Forest Trust. Ancrum: Borders Forest Trust, 22-26.
- Ritchie, J.C. 1985. Late-Quaternary climatic and vegetational change in the Lower Mackenzie Basin, northwest Canada. *Ecology* **66**, 612-621.
- Rodwell, J.S. & Patterson, G. 1994. *Creating New Native Woodlands*. Forestry Commission Bulletin 112. London: HMSO.
- Smout, C. 1997. Highland land-use before 1800: misconceptions, evidence and realities. In Smout, T.C. (ed) *Scottish Woodland History*. Aberdeen: Scottish Cultural Press, 5-23.
- Steven, H.M & Carlisle, A. 1959. *The Native Pinewoods of Scotland*, Edinburgh: Oliver & Boyd.
- Tipping, R. 1993. The "History of the Scottish Forests" Revisited: Parts I/II. *Reforestation Scotland* **8**, 16-21; **9**, 18-21.
- Tipping, R. 1994. The form and fate of Scottish woodlands. *Proceedings of the Society of Antiquaries of Scotland* **124**. 1-54.
- Tipping, R. 1998. The application of palaeoecology to native woodland restoration: Carrifrans as a case study. In Newton, A.C. & Ashmole, P. (eds) *Native Woodland Restoration in Southern Scotland: Principles and Practice*. Occasional Paper No. 2, Borders Forest Trust. Ancrum: Borders Forest Trust, 9-21.
- Tipping, R. Buchanan, J., Davies, A., & Tisdall, E. 1999. Woodland biodiversity, palaeo-human ecology and some implications for conservation management. *Journal of Biogeography*.
- Vassiljev, J., Harrison, S.P. & Guiot, J. 1998. Simulating the Holocene lake-level record of Lake Bysjon, Southern Sweden. *Quaternary Research* **49**, 62-71.

WEST AFFRIC: LEARNING FROM THE PAST — NEW WOODS IN AFFRIC

ANDREW BACHELL

INTRODUCTION

This paper is a mix of three things: place; past; preferences. By looking at one particular place and its past we discover something about our preferences for its future — learning from the past through the observation of events, some recent and some long past, and our struggle to interpret their meaning. But to policy makers and managers the real interest often lies in the extrapolation of those observations into the future. This process of analysis and understanding is one we as managers can use to ‘shorten the odds’ rather than to guarantee success. Knowledge of the past is an important part of that process but ultimately not something which in isolation provides us with the clear objectives by which success can be measured.

The concept of “New Native Woodlands” is about an activity or creative process. It relies on intervention in the way a place is managed. The concept of creating woods to provide for direct human needs is not new, of course. The role of foresters and wood-men go back through the ages, with outputs as diverse as building frames, firewood, pit props, ships, charcoal, cups and bowls and tool handles. In all cases woodland processes will have been harnessed to serve particular purposes, to create the materials that are to be put to use in so many ways. What makes the new native woodland movement different is that it started with a desire to restore natural conditions — a convenient ecological ideal that in reality has not always been particularly well defined. Thanks to Fraser Darling the starting point for many a worthy scheme has been the mental image of the West Highlands as a “wet desert”: we now need to reassess our activities in the light of alternative views. We need to think too of the global environment and our responsibilities to it as well as our local one. We need to learn from the last few thousand years and from the fashions of contemporary land use and conservation. We have been challenged (Smout this volume) to think again and to look afresh at our native woodland resource, and I hope to offer my own challenge to those who would make policies for it.

The objectives for which we have often set about creating new native woods are numerous but for simplicity they might all be classified into a number of types:

1. to create habitat which is part of a wider biodiversity programme.
2. to replace something less natural and to replenish the resource that people have taken away.
3. to act as a carbon sink.
4. to enhance landscape, particularly its aesthetics.
5. to create an economic resource.

I suggest that reasons 1 and 2 have been the prime motives for nature conservationists.

Some of the conclusions that have been drawn from the recent work at West Affric (Tipping, Davies & Tisdall this volume) have been provocative, if only because they do not accord with the received wisdom of massive woodland loss through over grazing and human activity including burning. Some of the results have been a surprise. That native woodlands might have been only a small component of our last wild (that is without people) landscapes in Scotland has confused us naturalists perhaps. The extent of human occupation through time and the degree of agricultural use 4000 years ago have also been a surprise, revealing as it has some serious misconceptions held by historians. I think neither conclusion is especially surprising since it was always likely that woodland was more scarce than people have often thought, at least in places like West Affric and

that the ingenuity of early settlers might have made them a little more potent than we 21st Century technocrats could comfortably admit. However, had we undertaken this type of historical research on the better soils — brown forest soils — near the coast and away from the shadows of the high mountains different results might have emerged. We need to be careful when and how we extrapolate our data to other places. Equally, when we consider the thinking of people like Fraser Darling we must be careful to consider on what assumptions it was based. Had Fraser Darling cast himself upon the Buchan or Ayrshire landscapes and not the Highlands he would have bemoaned the conversion of peat bog and mire to grazing and cultivated land and not the loss of woodlands. What a different set of cultural baggage biologists might be carrying around today if that had been the case.

But I am straying from the point. The tradition (I think it has been going long enough to call it that) of native woodland restoration has never been desperately concerned with exact replication of earlier times but more a matter of replenishing the resource. The concern with authenticity, about which we have read much in this volume, is a much more recent consideration and one which we don't yet know how to deal with at a policy level. For that reason the West Affric situation is an interesting one to look at. I will therefore take you back through the past to see what lessons we can learn from the place, it's past and about our preferences.

THE PAST

I will start with the past. The recent past I will define as starting in 1993, or thereabouts, around the time NTS acquired the estate of West Affric. Prior to this there was already work in hand on the neighbouring Forest Enterprise (FE) land under a partnership of FE and Trees for Life and there was the hope that this would continue on West Affric. It was in part with that purpose that NTS acquired the land and quickly defined some objectives for the estate. These hinged on woodland restoration and in particular the need to protect the few remaining seed sources from what appeared to be their inevitable decline. Trees for Life had been undertaking tree planting and without this being an express intent of NTS there has been tacit acceptance of this approach even though the detail was not, and is still not (November 1999) completely agreed. In 1995 the advent of the MFST and lottery money enabled the acceleration of work including the palaeo-environmental study which it might be argued should have preceded the development of other ideas. Immediately you see the Trust's dilemma — 'carts and horses' come to mind — money and opportunity coming in advance of site knowledge. What we had was the consensus that creating native woodland was a good idea, a part of the process of healing a landscape we perceived as being damaged. Whether that landscape is seen as being just the estate or in fact the whole of Scotland matters little - the consensus was driving policy. When NTS acquired West Affric it didn't question this consensus and perhaps therefore some of the other values associated with the land and the landscape were not promoted equally in the setting of objectives.

In May 1993 NTS put out a press release saying why it wished to be involved in the acquisition of West Affric, an acquisition which might have been made by Trees for Life had they had access to the necessary resources. The primary reasons for acquisition were (a) to guarantee access and (b) to pursue policies of nature conservation and sympathetic forestry regeneration. A major benefactor of the project wrote, "the regeneration of native species should be an objective".

In October 1993 the first meeting of the property committee recorded the following in its minutes:

'It was agreed that woodland management came in broad phases. Firstly the encouragement of regeneration around the present tree remnants and secondly, much further in the future, the possibility of new planting.'

A ten year forestry plan was produced which was questioned only on the basis of time-scale and not in principle. In 1994 woodland priorities were defined as follows:

1. protection of existing woodland remnants.

2. survey of seed sources, archaeology and landscape.
3. seed collection (with the implicit assumption that planting would take place quickly)
4. erection of two enclosures.

This is a picture familiar to anyone involved in native woodland projects. In early 1995 the palaeo-environmental work was being specified and the following objectives set:

1. to understand the composition, structure and disposition of native or primary woodland.
2. explore timing and causes of change in vegetation over the last 10,000 years.
3. establish in what ways and to what extent the landscape differs from the condition that supported past woodland.
4. to recommend species for replanting.

At the time the consideration of such data was probably considered to be radical for a practical nature conservation project, although once again we see mention of planting, almost as if such action was already preordained.

That then was the recent past. Moving back over the past few hundred years we know of the legal protection of woodland by legal superiors, and periods of heavy economic use of native woods, particularly for charcoal. Then following the advent of world wide exploration the development of forestry based on serious intervention - planting of exotic species, deer fences, ploughing, use of inorganic fertiliser and huge drainage schemes. Ecologists had since the 1930s been critical of such techniques but into the 1970s such methods were commonly used, even by the Nature Conservancy, who were perhaps the only body with a serious and sustained interest in extending the area of native woodlands. Large-scale native woodland experiments on Rum and at Beinn Eighe were later followed by a more enlightened approach at Creag Meagaidh where natural regeneration was to be the order of the day. That, though, was the rather late arrival of the techniques that we now consider to be best practice: no fences (well - not many), natural seed fall and grazing control.

But it is perhaps only when we move back to the early historic and the prehistoric past that the questions we should be asking start to emerge. When did we last have “authentic” primary woodland? How much was there in the first place? Do our remnants actually look like the real primary woodland? Do we care if they don't? But the bigger question is what is it we are trying to achieve? The findings of the palaeo-environmental work are undoubtedly very interesting, but if our objective is to create woodland anyway, then being told that there is little or no historical justification for that is only going to confuse us. Whether we can defend pursuit of such objectives is a rather different matter though, over which I believe we are now entering a period of debate. It raises questions about what tree species it is appropriate to use: any native tree that will survive, only trees still found on- site, or any tree which has been known to have lived there before - before people or climate or whatever brought about their demise? Naturalists have often argued that our woodlands are too uniform, forced into a straitjacket of homogeneity through past management regimes. Only now is evidence being found to support this view, mainly through the work of Richard Tipping and others. But enough of the past – what about the place?

THE PLACE

We have read (above) about the results of the palaeo-environmental work; work that has helped us in our planning and objective setting at West Affric, but only up to a point. Remember - the results came after much of the planning and certainly after project plans were drawn up. After all, the West Affric project and acquisition was spawned from the tremendous national interest in native woodlands and perhaps it was inevitable therefore that the results of the scientific work would provoke us in to re-evaluating what we trying to do.

In 1996 the MFST project was started, part of which was the palaeo-environmental work. The objectives here were stated as follows:

1. to protect existing woodland.
2. to undertake the palaeo-environmental work.
3. determine long term plans
4. Small scale planting to create additional seed sources.

See it is there again — the “P” word: planting. The project plan at the time included some 410ha of new woodland in 21 blocks, of which only 50ha was to be planted. By 1999, following the findings which suggest that we may have got the thrust of the project wrong, this had changed to 360 ha in 12 blocks, including 170ha of planting. Was it that we were simply chasing grants? Have we become impatient for success, or is there a deeper rationale for this turn-around? A 300% increase in planting is not an insignificant change. Of course it followed site assessment, consideration of the viability of the current seed sources and our ability to control deer numbers. It was perhaps that we had an area of woodland in mind and this seemed the best way to produce it. But was that justified?

The answer to such questions must lie not only in the specifics of the West Affric situation but also in the wider context in which we are working. I have already alluded to the inherited beliefs in rapid de-forestation in the Highlands and this has been a powerful motivating influence. However there was also the post-Rio campaign to raise awareness of the boreal forest and the problems besetting it around the world. This again is a powerful motive for action and together these motives may have pushed us into using the Highlands to satisfy our lust for large-scale native habitat, and especially native woodland creation. Our commitment to the global cause could only be satisfied in the Highlands where land is cheap, where forestry was already a major land use and where landscapes are large. It is doubtful if the scale of changes desired would have been acceptable in the lowlands, although we should remember that the National Forests in England, and to some extent the Central Scotland Woodland, were attempts at such change. There was and still is a feeling that woodlands should exist on a big scale and not be confined simply to small pockets hemmed in by profitable land use, cultural landscapes and wild land. So ‘place’ might be as small as the confluence of two burns and pockets of alluvial soil, or as large as the Northern Hemisphere. At each scale there is a different set of issues and the likelihood of conflict between them. So what is our preference — our objectives?

PREFERENCES

What I think might be emerging is a problem of balance — not the sort of balance that implies unsatisfactory compromise — but a balance between expectations of different groups. We have to choose options at a site level, at a regional level, at a national level and at a global level. In striving to meet some perceived global need, are we justified in choosing options at a site level which are not entirely consistent with prevailing conditions or historical facts? Does the global bio-diversity imperative outweigh local cultural issues? If not, can we go seeking land on which trees may have a more definite historic presence but where because of its natural advantages such land has become in-bye croft land, gardens and farms?

Before I seek to provide any sort of steer on these matters, can I try to recap on some of the facts we now appear to have before us? Pine was absent or nearly so from West Affric for at least 4000 years and woodlands of any sort have been restricted, probably through climatic influences and the accumulation of peat. The best sites for woodland are, not unsurprisingly on the sites with the most significant archaeological evidence of human activity. We all like the best! About the time of the most rapid loss of woodland and climate change we have an increase in the level of human activity. What we don’t know is how these factors acted together. Did the human activity result from the wider environmental changes or did it result in the exaggeration of such changes? What was the net impact on browsing and grazing animals and their natural predators? We don’t know. What of the places with little peat but still no trees? Is that phenomenon explained by the

hypothesis that natural processes led to woodland loss or might the presence of barley-type pollen from 4000 BP suggest that the scale of human activity and their need for resources might have been significant? The removal of dead wood, the felling of trees and the changes in grazing and browsing might all be expected to be relevant, I suggest. The dynamics between people, wild animals (grazers and their predators) and the land might easily have been expected to tip the balance against the survival of trees or other species which were under stress due to climatic change. We don't know as yet but I would argue that there is nothing unnatural about human presence in such land and we cannot assume that left to itself nature would now produce anymore than an impoverished shadow of the potential it once had. To let nature go its' own way now would be to force it along a path that has been predetermined by past management and not necessarily along something which is, for the sake of a better term, more natural. For this reason the Trust's approach to woodland restoration, along with most other schemes is based on what George Peterken has described as "future natural" modelling — predicting what could be there and not being overly constrained by what was there.

Moving forward in time and outward across Scotland we need to look at other statistics. It has often been quoted that 90% of our natural woodland was gone before AD 1700. We cannot really be sure of that figure, nor of the reasons for such losses. However, documentary records from the 18th century do provide something of a baseline for that period and it is possible to conclude that since then 80% of the remaining woodland has gone. The origin of such figures can be found in Mackenzie, Smout and others. While these data are certainly imprecise, I am prepared to offer that even if it is an extravagant over estimate of the loss, there remains an inescapable conclusion that woodland has been lost at a very significant rate over the last 300 years. This is not a process that has been triggered by rapid climate shift. It is easily reversible simply by changing the nature of land use, and we can observe this process through the 20th century too; the replacement of native woods with conifers, clearance for other purposes and the continued loss of remnants of woodland through incessant grazing. But of course in other places new woods have arisen of their own accord, often for the most bizarre reasons. The building of new roads, creating pockets of "wild nature", and the departure to France in 1939 of many gamekeepers and shepherds tripped the delicate balance back in favour of trees, from loss to regeneration. The creation of woods cannot be seen as alien to the land but merely unfamiliar.

WHERE TO NOW?

So what is the future for the native woodland 'bandwagon'? Should we be striving to be entirely authentic to historical woodland cover, only considering the places we know to have had trees? Or should we pursue a greater responsibility to help replenish our part of the diminishing boreal forest? One might ask reasonably what is the point of creating new forests on sub-optimal land in places to which the trees are not ideally suited and died out long ago due to pressures which were linked closely to the natural conditions which prevailed at the time? If we can't have trees where they might have lived on had we not occupied their territory with farms and houses, should we bother at all?

Given all these questions I have to have pity on the humble site manager and policy maker who has to work with such facts as we have. Whatever they do — whatever you do — it will be wrong. It is therefore incumbent on us all to assess the significance of the resources we have before we start to change them.

I referred earlier to the issue of authenticity and I feel obliged to return to it. I don't remember authenticity being a particularly relevant concept in the teaching of ecology, certainly not the type of authenticity that is familiar to those whose interest is in preserving the works of human endeavour. Even the ecologist's pursuit of genetic purity — a particular interest of pinewood biologists — is not about authenticity in those terms, that is retaining the fabric as it is, intact and static. There really is no measure of authenticity in nature conservation. We are all familiar with the term 'naturalness' but this relies on continuity of processes not things, and accepts that systems are dynamic. Naturalness is an expression of the degree of interference, but is it fair to hypothesise on what the world would be like if people were not part of it? We can have relative freedom from interference, past and present, but to suggest that wild life is only authentic if it conforms to some pattern that might only exist if we were not here seems, to me, rather narrow-minded. Equally to suggest that nature can find its own way back to such a perfect state seems to

ignore that our starting point may be lacking in the necessary species and conditions to give any semblance of naturalness. I am happy to concede that nature conservationists may have been a little undisciplined in their work in the past. We have planted and ploughed in opposition to nature, we have fenced and culled deer. But let us not forget that nature conservation is in part, in large part perhaps, about the illusion of creating naturalness or wildness within a world which is perceived to be too highly modified by human pressures. Perhaps we need this illusion; perhaps it is part of our instinctive survival strategy – a form of self-regulation where we are prepared to place a higher value on the works of nature than we do on the works of people.

You might be forgiven at this point in thinking that these are merely the ramblings of an un-reconstituted naturalist whose beliefs have been challenged and who must therefore rationalise the activities undertaken in the name of nature conservation. But you may notice I have given you no answers today. The duty to reconcile these conflicting issues lies with us all — with you as managers and policy makers. An interest in the landscape is an interest in the past and the future, an interest in and understanding of our wild places and their less wild past. Our land lives because people and nature have occupied it together. Learning from the past is our best hope for designing for the future. At West Affric we are beginning to see that there is no easy route between the two. I do not believe that it is appropriate to restrict our woods to miniscule ‘ghettoes’ where they have survived only because they were too insignificant to destroy. Neither do I accept that nature will now know best — how can we be sure nature has all it needs to remember? But we cannot any longer be forgiven for ignoring the cultural imprint of earlier generations whose use of the land was not wanton destruction but a matter of survival. I do not condone the actions of early foresters who ring-barked oak woods to clear them for spruce, but I cannot condemn those who cleared trees from the best land at a time when an import was something from the next glen.

One of my environmental heroes is a Glasgow born landscape architect who worked in the USA. Ian McHarg once wrote, “The hierarchy of the requirements of man run the gamut from survival to fulfilment”. He argued that we should plan and design with nature, remembering that we are part of it. He accepted that “nature knows best” when nature is unfettered and not impoverished through exploitation. Equally he knew from his early experiences of landscapes in west Scotland that such ideal circumstances for the ecologist are not the norm. At West Affric we have begun to unravel the history of our relationship with that land and are beginning to see it as it is. For us it is a wild place, but also an impoverished one. It is a deserted place that once protected early settlers and a place in which we hold great hopes for nature to regain primacy, so that we may remember what it is like to be in awe of nature. Perhaps what NTS has started meets all of these conditions, or perhaps it meets none of them. We are reviewing our decisions to fence and plant, but in reality what has been planned remains true to the earlier objectives and may need little modification, even if the premises on which it started are no longer so secure.

Perhaps our efforts are nothing more than the next phase of harnessing nature to suit human needs. But if that leaves an imprint or design on the landscape for others to read long into the future then we will have achieved success in some way, for it means that the trees will have survived, and I do believe that when we sort out our objectives, we will want trees.

**INTRODUCTION TO THE CASE STUDIES:
GLENFINGLAS AND CARRIFRANS**

PETER QUELCH

The West Affric case study (Tipping *et al* this volume; Bachell this volume) represents one approach to using the past in native woodland restoration, and the issues and tensions that can arise from such an approach. The second case study, from work by Jane Begg and Fiona Watson in Glenfinglas, is used to illustrate a second historical approach and technique, document analysis, to explain how and why the remnant woodlands survived here. Also by investigating their history of management, we can try to explain the current structure, condition and species composition of today's woods.

The research which Fiona Watson will outline (which also led to practical decisions and work plans for Jane Begg of WT to put into effect), followed some pretty intensive field surveys on the archaeology, botany, wildlife etc. of this glen. Also studied were 'veteran' trees and their epiphytic lichen flora by Neil Sanderson, to give further field evidence for antiquity and ecological continuity.

Carrifran, our second case study, in contrast to Glenfinglas has almost no surviving native woodland cover. Quite different issues affect decisions about woodland 'restoration' (or recreation), and in many ways more freedom of action is possible as there are really very few woodland features left to preserve. Carrifran is not in a well-wooded area like Glenfinglas, where it is easy to imagine a forest habitat network linking this site to the extensive and high quality woodland remnants to the east. So Carrifran is in quite a different strategic context for woodland restoration.

Glenfinglas has provided me with a steep learning curve: from being at first intrigued by a reference in a press article of November 1996 to a hunting forest history, to three years later studying Gilbert's (1979) text on 'Hunting and Hunting Reserves in Medieval Scotland'. I am sure from my own field observations that it is not only in Glenfinglas that direct remnants of medieval hunting forests are to be found in the modern Scottish landscape.

In the meantime, we are struggling to devise sustainable management regimes for grazed native woodlands in general, and for historic wood pastures in particular. The challenge is how to conserve ancient pasture woodlands without altogether losing their distinctive character. I feel we have a duty to actively conserve at least some of the best selected examples of relict cultural landscapes, and it is worth noting that there is as yet no official designation for large-scale historic landscapes in Scotland.

This issue is echoed in a recent paper in the edited volume, 'European Woods and Forests — Studies in Cultural History' (Watkins 1998). The last paper in that book, by Tsouvalis-Gerber, is entitled 'Making the invisible visible: ancient woodlands, British forest policy and the social construction of reality'. It is rather a philosophical paper; I hope George Peterken has noticed that this paper concludes with a glowing testament to his work, and that of Oliver Rackham, in the field of British woodland history, a sentiment which I can thoroughly endorse. For me, the value of Tsouvalis-Gerbers' paper is her recognition that until a concept such as *ancient woodland* has been objectified, rationalised and indeed 'institutionalised' it does not become *reality* for most people. We are now well and truly beyond the stage of institutionalising ancient and native woodlands; the 'Biodiversity' process is clear evidence of that. But for *pasture woodlands* we are still at the very early stages of recognition of them as a concept.

So the Glenfinglas story has essentially been one of perceiving the concept of upland pasture woodlands, and beginning to give a meaning and definition to that reality. We are still very far from institutionalising the concept, as we have as yet published no definition, description, prescriptions or management guidelines. No doubt we will get round to doing that soon, though I

have a feeling that the concept loses something during that process. However, this first phase of *perception*, which a number of us in the room today have shared, has been an exciting period, and at times a moving experience.

References

Gilbert, J.M. 1979. *Hunting and Hunting Reserves in Medieval Scotland*. Edinburgh: John Donald.

Tsouvalis-Gerber, J. 1998. Making the invisible visible: ancient woodlands, British forest policy and the social construction of reality. In Watkins, C. (ed) *European Woods and Forests — Studies in Cultural History*. Oxford, CAB International.

GLEN FINGLAS: NATIVE WOODLAND RESTORATION AND DOCUMENTARY RECORDS

JANE BEGG AND FIONA WATSON

INTRODUCTION TO GLEN FINGLAS

The Woodland Trust acquired the Glen Finglas Estate in the Trossachs in 1996 with the support of the Heritage Lottery Fund and a very successful fund-raising campaign. The property extends to 4039ha (nearly 10,000 acres), including three glens, Finglas, Meann and Casaig, in addition to Lendrick Hill and low-lying ground around the village of Brig o' Turk and Loch Venachar. Scattered around the property are remnants of ancient woodland and more recent birch woods. The property has been run as a large upland farm, with about 4000 Blackface ewes and 100 Luing cattle. The Woodland Trust now aims to run the property as a multi-purpose land unit. Native woodland is to be restored to large areas of the property and in the long term might cover up to 75% of the land area. Livestock rearing is to continue, although sheep numbers are being reduced gradually as woodland cover increases. It is being farmed in hand and we have a Farm Manager, two shepherds and a general estate worker. Facilities for public access and interpretation are being developed and we hope that the property can be used to demonstrate native woodland restoration and integrated land use to a wide audience.

The part of the property, which we are going to describe today, is the Finglas Glen itself. The lower part of this glen was flooded in the 1960s to form Glen Finglas Reservoir, which forms part of the Loch Katrine system, supplying water to Glasgow. The upper part of the glen is still quite well wooded with very old trees, many of which are 'on their last legs'. This glen and part of the neighbouring Glen Meann formed the ancient hunting forest of Glen Finglas.

In the original plans for restoration, the existing woodland on each side of the glen is in decline and there is an urgent need to establish new trees to take their place before the woodland is completely lost. The original Woodland Grant Scheme for restoration in Glen Finglas involved the inclusion of the woodland areas within a ring deer fence around this glen and Glen Meann. All the deer within this were to be culled. The majority of the areas were to be regenerated naturally from seed fall from the existing trees but areas bereft of trees were to be planted. The floor of the glen was to be kept open by grazing to keep the open views and to ensure that archaeological sites were not encroached with trees.

"DISCOVERY" OF WOODLAND PASTURE

A little time after the Woodland Grant Scheme had been approved, Peter Quelch (Native Woodland Adviser for FC Scotland) re-visited Glen Finglas. On a close inspection of the trees on the north side of the glen, he noticed some unusual characteristics. One was an area of almost pure hazel extending to about 5ha, at the lower end of the glen. Virtually all of these trees had the same unusual form; they have a single bole up to about 1m in height from which multiple branches emerge. This is unlike the normal form of hazel bushes, which usually sprout many stems at ground level. He also noted that the woodland is made up of areas of quite thick tree cover interspersed with little open glades forming an intimate mosaic. This led him to think about the area having been used as woodland pasture and that this historical use may have created these particular characteristics. As he looked further he also noticed that many of the birch trees also looked as though they had been pollarded.

Peter let me know that he thought there might be something 'special' about the wood but felt he needed to look a bit further before voicing his thoughts. In January, Richard Smithers, a member of the Woodland Trust's staff based at Grantham was visiting to discuss a grant claim. His visit coincided with Peter returning to have another look at Glen Finglas. Unbeknown to me at the time, it turned out that Richard has had a long-standing interest in woodland pasture and was well aware of the importance of this habitat. As soon as Peter pointed out the areas he considered

to have been used as woodland pasture, Richard endorsed this view. They then scrambled around discovering various lichens, which are able to survive in the niches created by this type of woodland habitat.

It was decided that further investigations were required and Neil Sanderson, an ecologist with experience in identifying lichens and knowledge of woodland pasture systems, particularly that of the New Forest in Hampshire, carried out an initial survey of the area during the snows of February. Initially a little sceptical when he was first asked to come and do the survey, having looked at the wood he became convinced that it was in fact “upland woodland pasture”. This is rather different from the traditional lowland pasture with its individual trees set in park-land, like the Cadzow Oaks or the trees in Dalkeith Park, but nevertheless important in its own right. Neil returned in the summer to look at individual trees in this glen and also to look at other areas of the property to discover if these also showed similar traits.

To complement Neil’s field survey work an initial search of the historical maps and documents was made by Fiona Watson to see if these endorsed the idea of woodland pasture, and to give us some clues about how the woodland would have been used in former times.

THE DOCUMENTARY RECORD FROM GLEN FINGLAS

Glenfinglas Forest, stretching north-west above Brig O’ Turk, is a rare landscape indeed. Its natural beauty, comprising particularly the upper glen with its light covering of trees, is certainly striking but that alone is not what makes it special. Rather, it is the sense of continuity, of a link with the past which this landscape evokes that gives it an important place in Scotland’s natural and cultural history. Many of the features of the history of Glenfinglas can be found elsewhere - part of the estate’s designation as a royal forest, for example; however, particular circumstances have led to the landscape’s survival in a form that would not have been too unfamiliar to previous generations of inhabitants of the glen. One of the key elements in the creation of the landscape has been the relationship between the human, animal and ‘natural’ occupiers of the land, reminding us that trees, animals and people have lived together, in varying degrees of harmony, for thousands of years. That in itself should indicate that Glenfinglas is not just important as a relic of the past but as an unusual living indicator of a series of ancient relationships which have a bearing on future management.

THE ROYAL FOREST IN ACTION

The Stewart monarchs are renowned for their love of the hunt and there is no doubt that Glenfinglas served them well, even to the extent of prompting James II to build a hunthall, reputedly at Tom Buie on the west side of the reservoir which now covers most of the old townships. Glenfinglas was doubtless popular partly because it is relatively easily accessible from the central belt where the kings spent much of their time.

However, Glenfinglas, together with the rest of the lordship of Menteith, the lordships of Strathgartnay and Balquidder, and Doune castle, was also used by the kings of Scots to provide part of the doweries given to their wives. As a result it could be argued that there was a conflict of interests here: it was in the queens’ interests to maximise profit from rents, both for the farms and for the grazings which seem to have existed in the forest; while the kings seem to have wished to maintain the status quo in relation to deer and, by implication, trees. This issue is one that recurs throughout the forest — and the estate’s — history and there is no doubt that competing interests did result in increasing encroachment upon the forest for grazing. However, so long as the forest was actively hunted — and even long after this does not seem to have been the case — there was, technically at least, a limit placed on the numbers of animals allowed in the forest. Sheep were certainly grazed on the estate from the earliest documented period, though they were apparently not usually grazed in the forest itself. Unfortunately, there is very little evidence for the management of the forest during this period, though some insight into what went on can be derived from later evidence. However, with James VI’s accession to the English throne in 1603, the Crown effectively lost interest in the forest as a hunting ground and management seems to have become less hands-on.

However, we should not presume that lack of interest in management by the *owner* was automatically detrimental to the state of the forest, since the primary concern of the former was with the deer. On the other hand, there was certainly an understandable belief that widespread and uncontrolled grazing did neither the trees, nor the deer, any good. The key word here is, of course, *uncontrolled*.

One final point about Glenfinglas prior to the 17th century is the fact that specific mention is made in many of the documents relating to the forest of the trees themselves. While Gilbert is quite right in stating that the word forest relates to an area of legal jurisdiction, rather than the modern definition of a large tract of wood, the necessities of the hunt usually presupposed the presence of trees, not least as shelter for the deer. In 1591 the steward of Menteith (Moray), in accounting for the farms of the area, also referred to his custody of “the forest and trees of Glenfinglas and other trees and scrub (*nemorum*). Eleven years later the earl of Moray again accounted for his “keepership of the forest and trees of Glenfinglas, and other trees, scrub wood (*nemor*) and broom (*rubor*). However, it should be noted that the Revised Medieval Wordlist also has listed under the definition of *robur* pollard or dead tree, a tantalising, but ultimately unhelpful hint of the potential state of the forest at the turn of the 17th century.

THE FOREST AND THE EARLS OF MORAY

With control of the forest passing to the earls of Moray, and the fact that the documentary evidence generally becomes fuller after 1600, the history of the Glenfinglas estate becomes much clearer. However, it is also clear that the earls were generally not particularly interested in the forest as a hunting reserve (presumably since there were no kings to please and the main seat of the Moray family, at Darnaway, was too far away) and this had a considerable bearing on what happened next. Equally importantly, the fact that it was nevertheless still a royal forest was also crucial.

The Glenfinglas estate was originally (ie. from when the earls of Moray’s acquired it, if not before) divided into quarters; it also appears, certainly in the 18th century, that the leases of each quarter also included the right to pasture horses (5 or 6 horses or mares were specified) within the forest itself. In 1707 there were 11 tenants. Two foresters were appointed from among them. In that year someone, probably James Ramsay, the factor on the Doune estate, suddenly started to take an interest in the state of the forest, particularly in relation to the deer, and found its supposed caretakers sadly deficient. In the first instance, the earl was told about the terrible state of affairs in Glenfinglas, where, apparently, the killing of deer was rife.

The earl, unusually, seemed bent on action and the foresters were suspended, their duties taken on by Ramsay. It was noted that one of the foresters had received payment from a widow in Glenbuckie “as a reward for the grassing of beasts in the Forest and for getting timber out of it”, a privilege which was likely to have been extended to many others.

The author of this report did not actually know what state the forest had been reduced to, although his comments that “if your lordship’s woods be destroyed in your forest, your lordship may resolve to quit the deer, for no woods, no deer” is extremely revealing. There was clearly a presumption that the fact that the foresters were in the habit of allowing the pasturing of animals beyond that permitted to the lease-holders in Glenfinglas itself must have done damage to the trees through over-grazing. Whether this was actually the case is not something the historian can determine and the fact that the writer had not bothered to go and look suggests that he was less interested in the trees and the deer than in the fact of transgression. However, given that the lady from Glenbuckie made payment to McHamish for the use of the forest, this does suggest that the latter was still exerting a degree of control. Even if the profits went straight into his pocket, it cannot be said that the local inhabitants were allowed to graze their animals in the forest at will. Indeed, what is striking about the, admittedly limited, evidence to be found in the Moray papers is the extent of regulation of grazing, especially when compared with other Scottish estates where it is quite clear that custom had long tacitly permitted the wholesale admittance of cattle particularly.

The writer’s remark that ‘no trees, no deer’ is certainly extremely interesting. One might only wish to know for certain that such a belief was generally held. And yet it would make sense to

suggest that previous owners of forests, particularly if they indulged in hunting themselves, knew perfectly well that a well-stocked forest, in terms of potential shooting material, was dependent on the maintenance of adequate tree cover. However, Glenfinglas's *raison-d'être* as a hunting reserve was fast dying out, presaged by the writer's parting shot that "there are measures taken there to destroy the woods and deer that they may get your lordship's forest in rent". By 1743 this was exactly what had happened, but not because the tenants had managed to destroy the woods and the deer [see below]. The fact that the forest had lost its deer once already [c.1640] indicates perhaps the difficulty in maintaining a hunting reserve when there was no-one particularly interested in hunting there.

That the tenants wished to be able to graze their animals throughout the forest is not to be doubted. But that is not the same as saying that they actually did so without any regulation. It has already been remarked that the Forest of Glenfinglas actually appears unusual in the extent to which the prohibition on the grazing of most animals was generally adhered to. In fact, the only references to animals actually in the forest relates to horses. In 1666, for example, James and Neill Stewart in Glenfinglas were considerably exercised about the theft of their horse and six mares which had been stolen by some reprobates from Lochaber, to their alleged loss of 480 merks. This corresponds well with the assertion made over 100 years later that, prior to 1743, "the most valuable part of Glenfinglas was then kept as a Forest, and of this part the lessees had no possession, except each of them being allowed to pasture five or six horses or mares upon two valleys (presumably Glen Finglas itself and Gleann nam Meann), for which privilege they paid among them to the earl £200 Scots (£16 13s 4d sterling)".

Table 1

Rough Guesstimate of Animals Owned by Tenants of Glenfinglas

<u>Animal</u>	<u>Numbers</u>
work horses	22
mares in forest	242
3-year old horses	55
milk cows	363
2-year old cows	88
Sheep	308
Lambs	209
Goats	330
Kids	220

By 1740 the Moray estate at Glenfinglas seems to have been undergoing a degree of modernisation, which included the first references to the payment of salaries to two officers in Glenfinglas and one forester, who was apparently paid £100 Scots per annum (c.£8 sterling). But more changes were yet to come. Thanks to a court case engaged upon between the Dowager Countess of Moray and the tenants of Glenfinglas, some light can be shed upon the fate of the forest from 1740 onwards. 1743 when the earl of Moray finally succumbed to the temptation of the potential for higher rents offered by allowing grazing in that part of Glenfinglas still preserved as a deer Forest. Perhaps the tenants really had ruined it, but it seems more likely that the prospect of increasing the annual rent from £83 6s. 8d. sterling up to £188 17s. 9d. proved the deciding factor. To this end, the deer were deliberately dislodged, marking the end of an era. It was also noted that "the Farms are mostly grass, a very small part of them being arable", underlining the pastoral nature of the economy in Glenfinglas. To some extent it could be argued that the final destruction of the deer forest 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. But the very fact that Glenfinglas was a royal forest, even without the deer, appears to have been partly responsible, in this case, for its survival: as noted in a valuation of the earl of Moray's lands in the parish of Callendar in 1762, "as it's a king's forrest it can never be turned into arable land from the nature of the ground and the earl is no more but keeper of the forrest'. Ultimately, what seems most remarkable is not the fact that the forest of Glenfinglas survived until then, but that it was not, as was so often the case, destroyed subsequently by the introduction of Cheviot sheep.

Glenfinglas has survived as a beautiful wooded glen through chance, but only in the sense that the right combination of circumstances — distant landowner, lack of commercial interest in the trees, active tenant management, isolation, helpful ecological conditions — existed in the right place at the right times. Scotland probably contained many more such woods up until comparatively recently. We also tend to be less than convinced that local, essentially peasant, economies can maintain a relative equilibrium in terms of natural resources. Glenfinglas illustrates many things but not least that multi-purpose landuse — under strict management controls — has been the norm for thousands of years and traditional methods of animal and tree husbandry have should not be dismissed without a proper investigation of their impacts.

We often have too many choices, about what we wish to (re)create and which management system should be employed to effect it. However, in Glenfinglas we have a landscape that is undoubtedly both beautiful and rare; and yet symbolises what was once ubiquitous and practical. Trees, for most of their history, have not existed in isolation from the landscape in which they have taken root and that includes the human-orientated systems which have evolved in the last few thousand years. At Glenfinglas we have an all-too-rare opportunity to maintain and re-establish that relationship in a controlled manner, to reintegrate trees into the working landscape.

REVISED THOUGHTS AND PLANS

Neil Sanderson's work showed that the woods in Glen Finglas were special in that they provided a habitat for many, different lichens. His original list was added to by Sandy and Brian Coppins, resulting in a list of 119 species of lichen growing on the old trees and rocks. This diversity is due to the structure and age of the woodland, with its shady areas where the canopy is thicker, its open glades and areas in between.

Fiona Watson's report gave us an understanding of how the forest might have been used by people in the past and how it was or was not protected. From this we can make some educated guesses at the type of management which resulted in its current structure.

As a result of these investigations it was decided to amend the Woodland Grant Scheme for the first phase of the woodland regeneration. Although woodland pasture was thought to be the former land use over most of the property, it was decided that the best surviving remnants were those in the Finglas Glen itself. So, we felt this is where we should concentrate our attention on trying to mimic the conditions which prevail in such a system. Some grazing is felt to be important to ensure that the intimate mix of woodland and small glades is retained. Work elsewhere has also shown the value of ground disturbance by animals in achieving natural regeneration of trees, instead of the area being fenced and all deer removed. This area is now to be fenced with a stock height fence and we will try to reduce the deer numbers in this part of the property to a level which will allow sufficient tree regeneration.

On the north side of the glen we are also going to try allow for a very low number of sheep to graze, during the summer months only, and to see if tree regeneration can still occur. This is experimental and a monitoring programme has been set up to guide future decisions. The original WGS allowed for the usual 20% open ground but in the revised scheme we have included 30% open ground and forfeited the chance of grant aid on the additional 10%, because we in fact wish to create a more open structured wood.

You may wonder why we have thought the discovery of the importance of Glen Finglas as an historic landscape merited a change in our plans. We have found out that this type of woodland is an important habitat for a large variety of lichens and may well be for all sorts of beasts and bugs also. As such, it is important to try to conserve this special habitat. The historical research gave us

some clues about the conditions under which these habitats evolved. We cannot return to medieval systems of agriculture (I don't think our shepherds would be too happy about that!) but we have tried to see how we could adapt our plans to allow for tree regeneration and limited grazing, by deer and / or domestic livestock, on the same area. By doing so we hope to perpetuate the conditions in which these organisms can continue to thrive.

Another important factor is the interest that members of the public have shown in the historical aspects of the site. Visitors to the property and audiences at talks given locally by Fiona Watson and Chris Smout have found the history of this landscape used by past generations fascinating. If such woodland is valued and enjoyed by people it has a good chance of survival. The great hall of Stirling Castle has recently been wonderfully restored and now we hope to rejuvenate one of the favourite hunting forests of the Stewart kings at Glen Finglas.

**CARRIFRAN WILDWOOD AND
THE BORDERS FOREST TRUST — USING THE PAST?**

PHILIP ASHMOLE

INTRODUCTION

Richard Tipping provided the title of this talk, and the question mark is relevant. The past has been very important in the Carrifran Wildwood project, but mainly through the role of the Rotten Bottom Bow in inspiring people both to get involved and to give money. This 6000 year-old bow — the oldest known from Britain — has made it natural to promote the idea of re-creating the forest through which the hunter walked. The extraordinary response of private individuals to the fundraising appeal is evidently linked, in part, to the evocative power of the bow; the money probably would not have been raised without it.

In ecological terms, the starting point for the project was our realisation — from pollen and other evidence — that the Southern Uplands of Scotland would still be almost entirely covered by broadleaved woodland if it had not been for human intervention (e.g. Tipping 1998). As a result of this intervention, the Tweedsmuir and Moffat Hills, including Carrifran, are as ecologically degraded as almost any part of rural Scotland. In particular, the structural diversity of the vegetation is extremely low, except in a few rocky places inaccessible to sheep and goats.

Furthermore, timescales for deforestation in southern Scotland are long. Farmers seem to have moved into the uplands in the centuries following about 4500 BP, and after 2500 BP the scale of woodland clearance accelerated (Tipping 1997). Pastoralism was intense by the start of the present millennium (Badenoch 1994). The Roy map from the mid 18th century shows no woodland at Carrifran, and the 1857 Ordnance Survey map shows trees in exactly the same places as now, and in no others.

THE WILDWOOD GROUP OF THE BORDERS TRUST

It was concern at the ecologically degraded state of the Border hills, and realisation of the lack of public awareness that the local environment had once been so much more diverse, which led to the formation of the Wildwood Group in late 1995. The group formulated a Mission Statement:

“The Wildwood project aims to re-create, in the Southern Uplands of Scotland, an extensive tract of mainly forested wilderness with most of the rich diversity of native species present in the area before human activities became dominant. The woodland will not be exploited commercially and the impact of humans will be carefully managed. Access will be open to all, and it is hoped that the Wildwood will be used throughout the next millennium as an inspiration and an educational resource.”

When a suitable site for the project was eventually found, a plan for reconstructing a Wildwood had to be put in place. The first step was to organise a discussion meeting in the Botanic Garden in Edinburgh in November 1997, under the title: “*Native woodland restoration in southern Scotland: principles and practice*” (Newton & Ashmole 1998); this provided important insights on many aspects of the project. A Management Plan was then developed by consensus within the Wildwood Group, in a series of long evening sessions in a Peebles pub, with 10-25 participants.

After considering Peterken’s (1996) three options for the reconstruction of native woodland, it was decided that the general objective was ‘Original-natural woodland’, comprising the tree and shrub species present whenever the site last supported woodland largely uninfluenced by humans.

However, it was recognized that changed conditions since such woodland was last present on the site would constrain this objective to some extent.

Since the aim was to be minimum intervention after initial planting, it would not be possible to maintain a type of woodland that was no longer appropriate to the site. It was also recognized that no newly planted woodland could assume an old-growth structure in less than a century or so: a distant goal was considered acceptable, on the assumption that the intervening stages would anyhow be attractive and interesting.

An approximate species list for 'original-natural' woodland at Carrifran was provided by the pollen record; the area is as well known as anywhere in Britain, with three upland cores within 5km of Carrifran and a lowland site less than 15 km to the south (Tipping 1998). The pollen data were supplemented in a commonsense way from various other sources such as the composition of ancient woodland fragments in the area (Badenoch 1994).

BASELINE DATA?

At Carrifran itself, several species of trees and shrubs survive in tiny numbers: downy birch, ash, hazel, hawthorn, holly, bird cherry, rowan, several species of willow, ivy, honeysuckle, dog rose and burnet rose. In the pollen record one can find many of these, plus alder, oak and elm; and the latter three plus guelder rose are still present within a few kilometres.

An intriguing complication is that the appropriate baseline date for original-natural woodland in the Southern Uplands is around 6000 years BP, and this is within the period of the Climatic Optimum (7000-5000 BP) when temperatures were rather higher than at present. The relevance of this is that temperatures in Scotland are likely to be increasing significantly during the next century; one estimate is by about 2°C by 2050, adding 40 days to the growing season (Billington & Pelham 1991). A case can therefore be made for giving the benefit of the doubt to species that are now climatically marginal to the area: small-leaved lime, yew and spindle come to mind. A few pollen grains of the first two have been found in the cores near Carrifran, and although there is no adequate evidence that they were established locally, they do seem to have been present in the Cheviots (Tipping 1997, 1998), while spindle still just reaches the southern Borders (C. Badenoch, *pers. comm.*).

The exceptionally warm summer of 1995 provided a foretaste of future conditions, and was probably responsible for unprecedented seed set of lime species in the Glasgow area (Gray, Grist & Hansen 1999) and of aspen in the Highlands in 1996 (Worrell *et al* 1999); there was also an unusually good crop of hazel nuts in the Southern Uplands in 1996, providing many seedlings for planting at Carrifran.

A different implication of global warming is that it may be advisable to collect seed from lower altitudes than Carrifran, in the hope of establishing genotypes appropriate to a future climatic regime. At least there should be an effort to ensure that plenty of genetic variation is present in the planted population of each species (cf. Billington & Pelham 1991, Ennos *et al.* 1998).

ECOLOGICAL SITE CLASSIFICATION AT CARRIFRAN

Bearing in mind the historical record and possible future climate changes, decisions on the appropriate species composition of the new woodland to be established at Carrifran are being based mainly on the modern approaches of Ecological Site Classification (ESC; Pyatt & Suárez 1997) and the National Vegetation Classification (NVC; Rodwell 1991, Rodwell & Patterson 1994, Averis 1998). The former aims to predict what kinds of woodland might be possible under given conditions of climate and soil. The latter specifies appropriate native woodland types on the basis of existing plant communities on the site.

However, two cautionary points should be made. First, as George Peterken (1998) has pointed out, trees are not rigid in their ecological preferences, and in nature, colonist trees spread wider than in mature woodland; so some trees should be planted on "inappropriate" sites. Second, the

ESC and NVC approaches can only be as good as the tree data on which they are based, and in some respects these are inadequate. For example, absence of information as to the maximum altitude at which sessile oak can regenerate under current conditions in southern Scotland makes it difficult to decide on the appropriate pattern of planting within “upland oak-birch woodlands” W17 and W11 on sites with a large range of altitude (cf. Pyatt & Suárez 1997).

Another example concerns bird cherry, which grows high up in the Moffat Hills and elsewhere, in places where the normal approaches would not lead us to establish either W7 or W9 woodland (the two types for which this species is listed by Rodwell & Patterson 1994). Similarly, how can one prescribe, using the NVC approach, woodland with dominant hazel, which may have been present in parts of Carrifran in the past (Tipping 1998), as it is now in two ancient woodland fragments nearby? (And anyhow, how could such woodland be accommodated by the Woodland Grant Scheme, which specifies a maximum of 10% woody shrubs, including hazel?)

Tipping (1998) pointed out that the NVC approach may more or less adequately prescribe restoration of the most recent woodland type to occupy a site, but that these may be modified, degenerate and species-impooverished woodlands relative to what would have been present in the absence of human intervention. He asked: “If we are to restore native woodlands, then should we not set out to re-establish their true richness and variety?”

If we agree, we can address the problem to some extent by using pollen data from periods before degradation has occurred. Scots Pine is relevant, since it does not generally figure in lists of native trees for the south of Scotland. But it was here in the past. A piece of wood found in 1997 on the surface at the edge of Rotten Bottom has been identified as pine. There is some pine pollen in the cores from Rotten Bottom and Talla Moss, and at Crunklie Moss, only a couple of kilometres north of Carrifran, there was enough prior to about 7000 BP to indicate local growth in this cold valley (Tipping 1998). Climatic change and/or competition with alder may have led to its decline, but final extinction may perhaps have been anthropogenic. The plan at Carrifran is to plant a little pine as a component of W19 juniper woodland on the northeast-facing slopes of Priest Craig.

The past status of yew is also intriguing (Dickson 1993): it has recently turned up in the pollen record for the Cheviots (Tipping 1998) and one pollen grain was found in a pollen core at Talla Moss, close to Carrifran, from about 6000 BP (Chambers *et al* 1997). Peterken (1998) suggested that it might be suited to dry sites on relatively base-rich crags at Carrifran, but at present there are no plans to plant it there.

The pollen record, though a powerful tool, does not provide all the answers. For instance, a key question at Carrifran is whether to attempt to restore montane scrub communities, but the pollen record is of little help. Willows are key components of these communities, but willow pollen has limited dispersal and the species cannot be distinguished. Furthermore, the possibly restricted altitudinal width of the montane-scrub zone - if it existed in the past - might make it hard to detect in the pollen record (Tipping 1997). Even though it is impossible to be sure exactly what this habitat was like and how much there was of it in the past, the scarcity of modern examples and their precarious status (Gilbert *et al* 1997) generates a *prima facie* case for attempting restoration at Carrifran (cf. Mardon 1997).

It is appropriate to close with the admission that in trying to reconstruct a “natural” woodland on a large scale in a denuded landscape, we are in largely uncharted territory. We can expect some things to go wrong along the way, but with vigilant adaptive management and a determination to avoid planting in straight lines, it should be looking pretty good by the time I die.

References

- Averis, A.B.G. 1998. A Scottish guide identifying appropriate new native woodland NVC types based on an open ground survey. Woodnote 18, Tayside Native Woodlands, Scone, Perthshire.
- Badenoch, C. 1994. Woodland origins and the loss of native woodlands in the Tweed Valley. In Ashmole, P. (ed) Restoring Borders Woodland. Peebles: Peeblesshire Environment Concern, 11-26.
- Billington, H.L. & Pelham, J. 1991. Genetic variation in the date of budburst in Scottish birch populations: implications for climate change. *Functional Ecology* 5, 403-409.
- Dickson, J.H. 1993. The yew tree (*Taxus baccata* L.) in Scotland — native or early introduction or both? *Dissertationes Botanicae* 196: 293-304.
- Ennos, R., Worrell, R. & Malcolm, D.C. 1998. The genetic management of native species in Scotland. *Forestry* 71, 1-23.
- Gilbert, D., Horsfield, D. & Thompson, D.B.A. (eds) 1997. The ecology and restoration of montane and subalpine scrub habitats in Scotland. *Scottish Natural Heritage Review* No.83.
- Gray, R.K.S., Grist, N.R. & Hansen, M.H. 1999. Natural regeneration of limes (*Tilia* spp.) in Scotland. Warm summers produce an abundance of ripe seed. *Glasgow Naturalist* 23: 19-25.
- Mardon, D. 1997. Eight years of montane scrub restoration at Ben Lawers NNR. In Gilbert, D., Horsfield, D. & Thompson, D.B.A. (eds) The ecology and restoration of montane and subalpine scrub habitats in Scotland. *Scottish Natural Heritage Review* No. 83, 67-75.
- Peterken, G.F. 1996. *Natural Woodland*. Cambridge: Cambridge University Press.
- Peterken, G.F. 1998. Woodland composition and structure. In Newton, A.C. & Ashmole, P. (eds) *Native woodland restoration in southern Scotland: principles and practice*. Edinburgh: The University of Edinburgh and the Borders Forest Trust, 22-26.
- Pyatt, D.G. & Suárez, J.C. 1997. An Ecological Site Classification for Forestry in Great Britain. Forestry Commission Technical Paper 20.
- Rodwell, J.S. (ed) 1991. *British Plant Communities. Volume 1. Woodlands and Scrub*. Cambridge: Cambridge University Press.
- Rodwell, J.S. & Patterson, G.S. 1994. Creating New Native Woodlands. *Forestry Commission Bulletin* 112.
- Tipping, R. 1997. Vegetational history of Southern Scotland. *Botanical Journal of Scotland* 49, 151-162.
- Tipping, R. 1998. The application of palaeoecology to native woodland restoration: Carrifran as a case-study. In Newton, A.C. & Ashmole, P. (eds) *Native woodland restoration in southern Scotland: principles and practice*. Edinburgh: The University of Edinburgh and the Borders Forest Trust, 9-21.
- Worrell, R., Gordon, A.G., Lee, R.S. and McInroy, A. 1999. Flowering and seed production of aspen in Scotland during a heavy seed year. *Forestry* 72, 27-34.