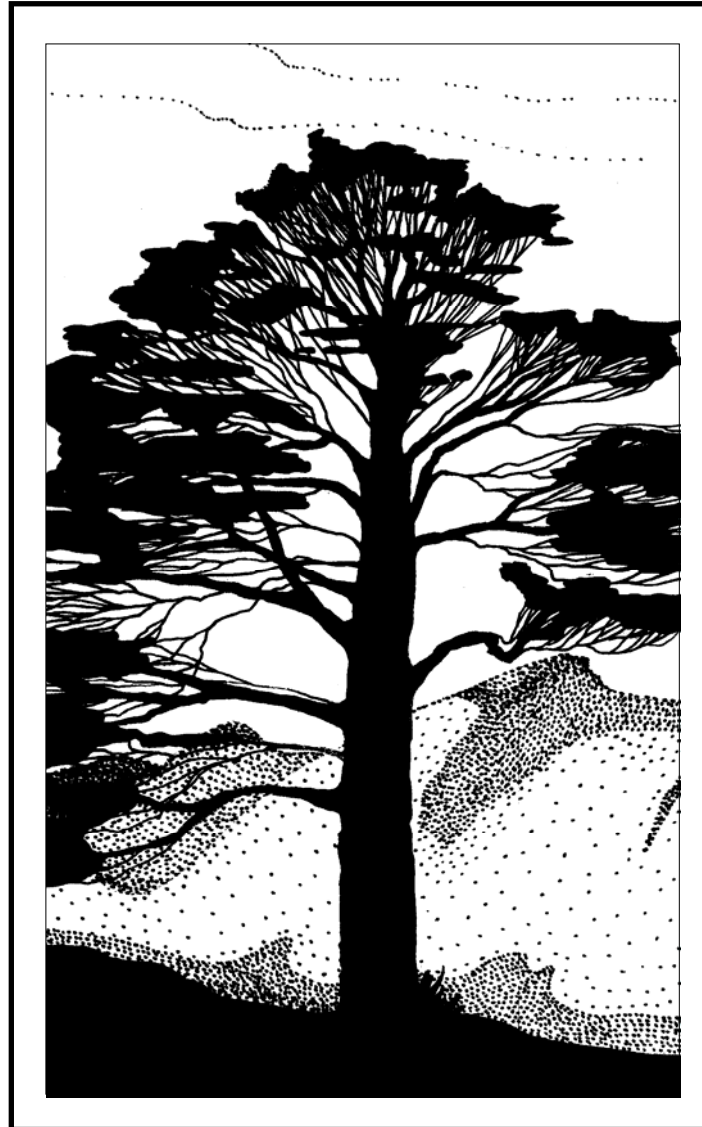


SCOTTISH WOODLAND HISTORY DISCUSSION GROUP

notes, II



SECOND MEETING – 7 APRIL 1997

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

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The Economic and Social Research Council



Scottish Natural Heritage

We are also indebted to Argyll Publishing for kind permission to utilise the drawing by Irene MacKenzie of the pine tree which appears on page 153 in Hugh Fife, *Warriors and Guardians: Native Highland Trees*, shown on the front cover of this compilation of papers.contributors.

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INTRODUCTION

Chris Smout

The second meeting of the Scottish Woodland History Discussion Group took place at the Scottish Natural Heritage Countryside Centre at Battleby, Perthshire, on 7 April, 1997. It was organised round the theme of “Sustainability in Woodland History”, and funding for the meeting was provided by the ESRC under their Global Environmental Change Initiative (Grant Reference L320236065).

Four papers emerged from work also financed by the ESRC Global Environmental Change Initiative. First comes Andrew Mather’s paper from a project at the University of Aberdeen, ‘Modelling the Forest Transition’ (Grant Reference L320253151). The next three contributions, my own, Fiona Watson’s and Alan Macdonald’s emerged from a project organised by the Institute for Environmental History at the University of St. Andrews, ‘Sustainability in the Management of Scottish Semi-Natural Woodlands, 1600-1900 (Grant Reference L320353166). Mairi Stewart’s paper emerged from postgraduate study at the Institute at St. Andrews, financed by Scottish Native Woodlands; the paper by Althea Davies, Richard Tipping and Eileen Tisdall from work at the Department of Environmental Science conducted at Stirling University in association with the National Trust for Scotland. Peter Quelch’s paper arose from his work on native woodland as a staff member of the Forestry Authority, and Mike Phillips from his interest as a private consultant to the forestry industry. Finally, we were privileged to have among us a scholar who started the modern approach to woodland history in Scotland with his thesis and associated articles in the 1970s, James Lindsay of the University of North London. This set of papers represents the abstracts of what was presented on the day: what cannot be reproduced is the lively discussion that accompanied them all.

The Scottish Woodland History Discussion Group is run jointly by the Institute for Environmental History at the University of St. Andrews, and the Department of History at the University of Stirling. For further information, please write to Mrs. M. Richards, University of St. Andrews, Institute for Environmental History, St. John’s House, South Street, St. Andrews, Fife KY16 9QW.

SUSTAINABILITY AND WOODLAND HISTORY: A WORLD PERSPECTIVE

Alexander Mather

Sustainability has many definitions and many dimensions. For woodland sustainability, forest area is one of these dimensions. Positive trends in forest area are not always perceived positively, but negative trends can be warning signs that sustainability is probably not being achieved. In the United Kingdom, forest cover (i.e. area) is the first of five sustainability indicators used by government (DoE, 1996). In this paper, the focus is initially on the transition from declining to increasing trends in forest area that has occurred in many European countries during the last two hundred years^{1, 2}. Thereafter it switches to contemporary trends in forest resource management at the global scale.

France offers an interesting example of a forest-area transition (Mather, 1992). Prior to the early part of the 19th century, it suffered deforestation at an apparently accelerating rate³. Thereafter, however, the forest area began to increase, and now is approximately twice that of 1800. France's pre-transition forest history resembles that of developing countries in the modern world: a key question in the context of world forest sustainability is whether developing countries will effect a transition similar to that of developed countries. A prerequisite for answering this question is an understanding of the causes or driving forces of the forest transition in countries such as France.

The drivers of change in land use and land cover in the modern world are not easily understood, and it follows that the causal factors of past change are not easily identified. Part of the problem is that causal factors can be identified at different levels, ranging from the immediate to the ultimate. Furthermore, some factors can operate in different ways at different levels, and complex interaction can also occur between factors at the same level. In the French case study, the approach has been informed by a framework heavily modified from Merchant (1989). In relation to ecological revolutions in New England, she considers the roles played at different levels by population, 'mode of production' and 'consciousness'.

In France, population pressure was a powerful driver of deforestation until the first half of the 19th century. At a time of relatively stagnant agricultural techniques, increasing demand for food was reflected in expansion of the arable area, and hence in conversion of forest and heathland to cropland. Further pressure on the dwindling forest area came from the grazing and browsing activities of domestic animals, whose numbers increased in line with the human population, and from demand for fuelwood. In short, stresses of a quasi-Malthusian type clearly existed. From the 1840s, however, a rural exodus began (though total population was increasing rapidly) and urban-industrial development took off. Pressures on the forest lessened: in some areas land was abandoned and the forest began to regenerate.

These demographic trends operated within a setting that can be labelled 'mode of production'. For present purposes, this term includes both technical and economic aspects of agriculture and other rural activities. During the early part of the 19th century, agricultural intensification became more widespread. Increases in food production could now be achieved without increases in the arable area, and the increasingly widespread use of sown grasses provided a means by which livestock numbers could be increased without increased pressure on the forest. In addition, the growth of the market economy and its physical infrastructure in the form of lines of communication now loosened the imperatives of local subsistence. Furthermore, the substitution of coal for charcoal and fuelwood was becoming more widespread in both domestic and industrial applications.

Demographic, agricultural and economic trends all operated in the wider setting of a changing climate of thought. At one level, Enlightenment belief in rationality and quest for improvement were the bases for advances in silviculture. At another, deforestation and its perceived effects such as floods and erosion were regarded as symbols of an 'angry nature' and of national decay (e.g. Corvol, 1987). At another level again, the role of the state was widening to encompass what would now be regarded

as environmental management. A crucial factor in the French forest transition appears to have been the perception of forest-related crises, of both general and specific types. By the end of the 18th century, the residual forest area was under severe pressure (it has been said that the crisis of the *ancien régime* was also an ecological crisis (Woronoff, 1984)). Forest depredations during the French Revolution exacerbated the crisis. Later, during the first half of the 19th century, severe floods in the Alps in particular were attributed to deforestation (e.g. Ponchelet, 1995). A new *Code forestier* was introduced in 1827⁴, and state power was such as to ensure its enforcement. Later, a programme of 'Restoration of Mountain Terrain' was launched by the state in 1860. The first of these measures played a significant role in halting deforestation, as did the second in promoting forest expansion.

In short, the forest transition in France can be explained in terms of a crisis-response model operating against a background of favourable demographic, technical and economic trends. Forest expansion was triggered by government intervention (in response to crises) but was facilitated or made possible by trends of socio-economic 'development'.

The turning point in the graph of forest-area trends coincided with a fundamental shift in the prevailing perception of the forest. Prior to the forest transition, most French forests could be regarded as 'pre-industrial' (Mather, 1990), in the sense that they yielded a variety of products for local use and were under communal control (*de facto* if not *de iure*: in practice peasant use for grazing and firewood was widespread). From the introduction of the *Code forestier* of 1827, however, a paradigmatic shift became widespread. Local peasant use of the forest for grazing, fodder, firewood and other traditional products was increasingly restricted in the public-sector forests to which the *Code* directly applied, and commercialising trends had similar effects in private forests, from which agriculture and other traditional uses were progressively excluded. The consequence was that the forest became an increasingly specialised area of commercial timber production. The exclusion of peasant users met with strong opposition manifested in *La Guerre des Demoiselles*, a struggle which lasted for several decades (e.g. Sahlins, 1994). The exclusion of grazing in particular reduced pressures on the forest, but in effect the costs of the shift towards sustainability (in terms of area) was borne by the peasantry. Some have claimed that the *Code* may also have had indirect effects in encouraging rural depopulation (and hence paving the way for forest expansion): without traditional access to the forest, peasant life may have become unsustainable in some areas (e.g. Désert, 1976).

The case of France is a source of both encouragement and concern in relation to the modern developing world. It shows that dramatic transitions can occur in trends in forest areas, and that downward trends can be halted and reversed, even when total population is growing rapidly. It also suggests that positive trends in forest area are correlated with positive trends in socio-economic development. On the other hand, the picture is not all bright. One cause for concern, if not pessimism, is that the transition in forest area was linked to a paradigmatic shift, from the 'pre-industrial' to the 'industrial' forest. Neither transition nor shift was achieved without cost and hardship, borne primarily by the peasantry.

A further paradigmatic shift, towards the 'post-industrial' forest, has been evident in recent years in many developed countries. It is a reaction against the primacy of timber production that characterises the 'industrial' forest, and is reflected in increasing regulation of forest management and in an enhanced role for the provision of environmental services (such as recreation and wildlife conservation). Essentially, it reflects a shift back towards the multiple-product forest of the pre-industrial paradigm. One of the Forest Principles agreed at UNCED (at Rio in 1992) states that 'Forest resources and forest lands should be sustainably managed to meet the social, economic, ecological, cultural and spiritual human need of present and future generations' (UN, 1993): ideally all forests would conform to this prescription for sustainability. That worthy goal, however, is far from being achieved at present.

There are some encouraging signs that declining trends in forest areas in developing countries are now slowing down, and that forest transitions will eventually occur in parts of the South. There are, however, several worrying issues. One is that a gentle slide towards sustainability (as indicated by stable or expanding forest area) is unlikely to occur, on the basis of experience in France and several other European countries. A forest transition would seem to be more likely to occur as a 'jolt' or

response to a perceived crisis, which itself would be a source of various forms of stress. In other words, 'things have to get worse before they get better'. Secondly, the model or paradigm of the 'industrial' forest is clearly being imposed on several developing countries at present, notably in the form of timber plantations (many of which are managed by transnational corporations). The evidence of France would suggest that this trend may be favourable in terms of association with a forest-area transition, but that the cost in terms of hardship to local populations may be great. Thirdly, there is the question of whether a forest transition can be achieved in conjunction with a direct paradigmatic shift from the 'pre-industrial' to the 'post-industrial' forest, without the intervening 'industrial' forest stage and its associated environmental and social costs. At present there is no empirical evidence that it can. On the other hand, we should not be too pessimistic: there is both national and international evidence to suggest that socio-economic development is not incompatible with progress towards forest sustainability.

Notes

1. This paper is based on the 'Modelling the forest transition' project carried out within the Global Environmental Change programme of the ESRC, and as part of a project on 'North-South interaction in forest resources' conducted under the auspices of the United Nations University and Finnish Forest Research Institute. This support is gratefully acknowledged, as is also assistance from J Fairbairn, C Needle and J Coull.
2. The 'Modelling the forest transition' project involved, in addition to a theoretical section, cross-sectional analyses (at the global scale and for recent decades) of the relationships between changes in forest area and other socio-economic variables, and longitudinal analyses of individual countries that have effected the forest transition. The cross-sectional analyses indicate that trends in forest area are related to type of government, level of development, population trends and some indicators of agricultural trends. In general terms, the results of the cross-sectional and longitudinal analyses are in agreement.
3. This paper draws heavily on Fairbairn (1996). Unless otherwise indicated, factual points are referenced to that source.
4. Previous state intervention in the form of the forest ordinance of 1669 (associated with Colbert) was significant but failed to curb the long-term decline in forest area, especially in the more peripheral parts of the country. This failure may be attributed partly to an inability of state power to enforce its provisions, and partly because the factors 'necessary' for a forest transition were not yet in operation.

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THE WOODLAND HISTORY OF DENMARK AND IRELAND, 1600-1800

Chris Smout

In order to place Scottish woodland history in perspective, it is useful to look at neighbouring countries: none are more appropriate than Ireland to the west and Denmark to the east. In all three countries there was clearly some decline in woodland cover in the seventeenth and eighteenth centuries. In 1600, a starting point with rather uncertain figures, it has been suggested that Denmark was perhaps 20-25% wooded, Ireland perhaps 12%, Scotland perhaps between the two. By 1800, Denmark and Scotland were probably around 4% and Ireland around 2% wooded. If all these figures have large margins of error, the downward trend in each case is clear. It is also a trend which indicates that at the starting point there had already been a severe decline from the post-Ice Age maxima of 60-90%.

DENMARK

The ownership of Danish woods was complex, unlike the situation in Scotland where all the timber belonged unequivocally to landowners. In Denmark, only a minority of woods were similarly in absolute ownership of the lords, open to peasant use with the revocable permission of the proprietor. Other woods were commons, where the peasants from the surrounding villages had the legal right to take what they needed — a situation not clearly paralleled in Scotland. Most Danish woods, however, were under a regime of mixed rights where the ground itself was owned by the lord (often the crown), the ‘overwood’ (defined as mature oak and beech) belonged also to the lord, but the ‘underwood’ (all saplings, plus mature wood of other species), and also the grazing in the wood, belonged to the peasants. In other words, peasants had *usufruct* of the underwood and the grass. This also had no close parallel in Scotland, where a ‘servitude’ might be possessed by one landowner in another landowner’s woods (as Farquhar of Invercauld had a servitude over the Earl of Fife’s woods in Mar); such a servitude might in practice be exercised by tenants, but it always left the woods in the hands of proprietors.

The decline of the Danish woods was perceived by the landed classes as a national disaster. It had been a matter of long standing, exacerbated in the mid-seventeenth century by the exigencies of the war against Sweden and the burden of aristocratic debt that led to large-scale felling. This itself had altered the age structure of the wood, increasing the underwood at the expense of the overwood, and in the eighteenth century a rising population of peasants and their animals, and rising prices for firewood in the towns, all combined to put pressure on the wood. Before about 1770 this did not so much diminish the area under wood as lead to a shortage of mature oak and beech, to the indignation of the lords. After 1770 much wood was reclaimed for agricultural uses, and the wooded area shrank in the next thirty years by about 35%.

One might expect that these pressures would have led to systematic protection of the wood as it became more of a scarce resource, presumably by enclosure, coppicing and planting, as happened over much of Scotland. That this did not take place on a large scale was due, firstly, to the fact that the landowners had no interest in coppice: this was underwood that belonged to the peasants. The peasants had a potential interest in coppice, or at least in not allowing underwood to become overwood, but they also had an interest in grazing and reclamation and, holding these rights in common, found it hard to organise to resolve individual conflicts over use. Also, the simplicity of importing building timber from Norway, and the possibility of importing fuel timber for Copenhagen from Holstein, kept timber prices within bounds. The result was an erosion of the Danish woodlands by grazing and unsystematic coppicing, much complained about by landlords but in practice never stopped.

The turning point came in the Napoleonic conflicts at the start of the nineteenth century, when trade was disrupted, Copenhagen attacked and, in 1815, Norway lost. The fuel shortages of the winter of 1804-5 led to a Forest Law in 1805 which was seen, in retrospect, to have been the turning point in

Danish woodland history. In effect, the woods became privatised: all ground containing any overwood was granted absolutely to the landowner, who had to maintain it as wooded land in perpetuity: rights of underwood and grazing were lost to the peasants, who were given full compensation.

The immediate effect of this legislation was not especially favourable: much wood that had been composed simply of underwood and fell beyond the scope of the Act was grubbed up and destroyed in the following decade under wartime pressures. The long term effect of the 1805 Act, however, was entirely beneficial. The loss of Norway made it more profitable for proprietors to own sources of building timber: the subsequent loss of Sleswig-Holstein later in the century also improved the returns for domestic firewood production. After some uncertainties, the yield and extent of the Danish forests improved steadily through the second half of the nineteenth century, and beyond. A 'tragedy of the commons' had thus been averted by resolving the ownership issue decisively in favour of one party. Today, something like 11% of the country is afforested: a significant gain on the low point of 4%, but still leaving Denmark barely above the UK, Netherlands, and Ireland, at the foot of the league of forest cover among European countries.

IRELAND

The situation in Ireland has been less thoroughly researched than that in Denmark, and the historiography has an old-fashioned ring about it, familiar in Scotland, attributing the fall of the woods exclusively to English wickedness, manifested in profligate use for iron works and ship building. It is certainly highly relevant that Ireland was a conquered country under a colonial yoke, where the landownership situation was analogous to Scotland — i.e. the woods belonged absolutely to the proprietor. However, in this case the landowner was very frequently English or Scottish in origin and may not, in the seventeenth century at least, have felt very secure in possession. This could have led to a more cavalier, extractive, attitude towards resource use than a secure, indigenous landed class would have possessed.

It is highly likely that parts of medieval Ireland had enjoyed a tradition of skills in wood management analogous to that in France, England and Lowland Scotland: insofar as it was a Norman and a monastic tradition, it must have been shared to some degree at least on the estates of the abbeyes. By 1700, however, there was very little indication of any surviving tradition of sustainability, despite shortages that were already causing complaint. The neglect of semi-natural woods, even by a precaution as elementary as enclosure against stock, has continued almost to the present day. Estate planting began in the eighteenth century but, despite an Irish literature, was not as widespread or as popular as in Scotland or England. Only in the present century has commercial forestry practice (heavily concentrated on North American conifers) seriously begun to increase the area under wood.

How can we account for all this? The principal commercial tree was the oak, though other broadleaves such as elm, ash and arbutus were also involved: such trees are not killed by felling for ship-building or for charcoal burning for the iron furnaces, as they coppice readily. To remove the woods there has to be deliberate intention to do so, or at least a perception that the woods were not worth protection after cutting.

Four reasons suggest themselves, possibly in ascending order of significance. First, in the seventeenth century the woods were associated with the resistance of the Irish population to the invaders: the guerrilla fighters (or bandits, it depends on your perspective) were 'woodkernes' who used the forests as a base. The physical removal of woods, either by the army or by the new landowners, became a security measure, and if it coincided with opportunities to make money by selling the timber for ships, barrels, buildings or fuel, that suited the new and perhaps insecure landed class. It would, however, defeat the security purpose to allow their regrowth.

Secondly, the economics of operating Irish iron works in the seventeenth century seem to have been extremely marginal. Fuel (charcoal from the woods) was cheap, but skilled labour was expensive as it had to be drawn from England, transport costs were high and most of the ore also had to be imported. Anything that increased the cost, such as systematic coppicing or enclosure, might make them uncompetitive with English charcoal-iron producers. This would increase the temptation for landowners to regard an iron-works as a short-term, one-off, extractive opportunity. It is interesting to consider how far similar circumstances would have operated in Highland Scotland: certainly the Irish

partnership at Glenkinglass was apparently profligate (or at least not properly controlled by the local landowners), and it is not until the arrival of the Lorne Furnace Company in the 1750s that one can certainly detect sustainable practices being properly promoted and enforced, possibly as competitive conditions changed to encourage them. By then, the Irish industry was extinct, so one cannot judge if it would have adapted in the same way.

Thirdly, Irish population underwent extraordinary expansion throughout the seventeenth and eighteenth centuries, a continuous steep upward trend without parallel in Europe: experience elsewhere (e.g. in Scotland and Denmark) was of population stagnation or decline, 1650-1750, flanked by periods of moderate growth before and after. This unrelenting demographic pressure would have exerted an exceptional strain on the woods: in many places the returns in rents from land on grubbed-up wood would have exceeded the return from timber products.

Lastly, the growth in animal population was still greater than the growth in human population, which meant that stock levels on grazing land were probably such as to preclude the regrowth of trees after felling, and, with a need for every inch of pasture, enclosure would seem pointless. The number of cattle led to an equal volume of skins to be tanned, and Irish tanners were looking to Scotland, Wales and north-west England for supplies of tanbark even before the end of the seventeenth century. They themselves regretted the neglect of enclosure and care of woods in their own country, but apparently the pressures of people and animals there made it largely impossible, or at least uneconomic.

CONCLUSION

Denmark, Ireland and Scotland experienced a similar scale of woodland decline, 1600-1800. Each country, though to differing degrees, experienced pressure on the woods from rising populations of people and stock. In each country, however, there were differing views of what woodland was for. In Denmark, it could be said that it was equally for timber production and for grazing until the Forest Law of 1805, which resolved the question decisively in favour of timber production. In Ireland, the dominant ethos treated woodland first as a place from which to extract a one-off cash crop, and then to treat as grazing or convert to farmland. In Scotland, woodland was valued partly for grazing, partly for timber production and partly for game preservation, with differing emphases and consequences at different periods and in different localities. From the point of view of sustainability, however, overall, Scotland did much better than Ireland and has little to be ashamed of in a comparison with Denmark.

Further Reading

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T. Kjærgaard, *The Danish Revolution 1500-1800: an Ecohistorical Interpretation* (Cambridge, 1994).
See also: C.L. Needle and J.R. Coull, 'The forest transition in Denmark': working paper 7 of the 'Modelling the Forest Transition' project, Department of Geography, University of Aberdeen, AB24 3UF.

2. Ireland:

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Since writing this piece my attention has been drawn to a useful publication:

J.R. Pilcher and S. Mac an tSaoir (eds.), *Wood, Trees and Forests in Ireland* (Dublin 1995).

I also gained greatly from conversations in the Modern History seminar at Trinity College, Dublin, November 1996.

SUSTAINING A MYTH: THE IRISH IN THE WEST HIGHLANDS

Fiona Watson

It is already well-established that the commercial exploitation of timber, far from exacerbating the extent of woodland destruction, might rather have had a beneficial effect through the introduction of more systematic and effective management strategies.¹ Nevertheless, it would also appear that perceptions of the deleterious effects of large-scale enterprises are not limited to our own time; so long as such exploitation has taken place, there have been those who, for all number of reasons, have desired to point the finger of blame at others. In terms of the west Highland woods, which were opened up to comprehensive exploitation only in the eighteenth century, one group of operators stand out as exemplifying the destructive force of the new commercialism: the Irish.

The evidence for local feeling about the activities of five particular Irishmen is both explicit and unmistakably hostile. In 1725, only two years after he had entered into a contract with them, the earl of Breadalbane noted this reaction to the cutting of his oakwoods in Glenorchy: 'I never was so out of humour as yesterday I went about to see all the oak timer the Irishmen have cutt, they have not left one standing oak tree in the countrie'. This sentiment is echoed by the Rev. Joseph MacIntyre writing for *The Statistical Account* at the end of the century: 'The higher parts of the parish abounded once with forests of the largest and best pines; but these were cut down, about 60 years ago, by a company of adventurers from Ireland, with little benefit to themselves, and less to the noble proprietor of the country'. However, MacIntyre goes on to note that: 'There are still some tracts of natural firs in Glenorchy; a good deal of oak, intermixed with ash, birch and alder'.

Between November 1721 and September 1722, a Dublin tanner, Roger Murphy, entered into contracts with the following west Highland gentlemen: Sir Duncan Campbell of Lochnell, Patrick Campbell of Barcaldine, Colin Campbell of Inveresregan, James Fisher and Patrick Campbell of Inveraray, Donald Cameron of Lochiel, John McDonald of Invergarry, John McDonald of Morar, Ewen Cameron bailiff of Morvern, John McLean of Ardgour, and John Campbell of Macorne as trustee for Lord Cadell. As noted above, a contract was also agreed with Breadalbane for his woods in Glenorchy and Lochetive. Murphy subsequently entered into partnership with four other Irishmen, Captain Arthur Galbraith, Edward Nixon, Charles Armstrong and William Kettlewell, to form the basis of what eventually became the Glenorchy Firwood Company and the Glenkinglass Furnace Company.

Clearly the extent of the area of woodland which these Irishmen had access to was, theoretically, extensive, stretching from Morar in the north to Glenorchy in the south, and encompassing many large tracts in between. In addition, Murphy and Nixon were also involved in setting up another Wood Company to exploit the oak woods on the north shore of Loch Maree in the 1730s. Considerable documentation remains, particularly for this Letterewe company, giving details of the amount of tan bark and timber extracted on a yearly basis (but which accounts never actually agree with each other!); unfortunately, it is very difficult to draw any firm conclusions from this evidence and it is proposed to deviate slightly from what was said at Battleby (not least in the light of discussion there). The more detailed example given below should, nevertheless, illustrate a more general principle which certainly ties in better with Dr. Lindsay's conclusions.

The documentation relating to the activities of Murphy, Galbraith et al certainly does not make elevated reading: Murphy was hanged in 1732 for murdering his servant; Nixon was constantly harangued by his partners in both the Glenkinglass and the Letterewe Company for mismanagement; Galbraith, perhaps the most responsible and dedicated of the quintet, was nevertheless sued by the chamberlain of Glenorchy, Hugh Campbell, for non-payment for timber. However, such accusations of professional misconduct, together with the apparent disapprobation of the local community, by no means proves the case for the long-term destruction of the woods under their control.

The documentary evidence — typically — tends to provoke more questions than it answers when trying to assess the extent to which these timber operations were sustainable. Nevertheless, as

mentioned above, we are fortunate to have a considerable archive relating to the Glenorchy, Glenkinglass and Letterewe companies at Ardchattan priory. The detail contained within the Breadalbane archive (which is becoming a perennial theme at the Woodland History conferences!) also permits us to examine the state of the woods sold by that earl over the longer term, together with the management practices engaged upon by his estate officers to deal with the perceived destruction caused during their exploitation. Since the worst accusations came from Breadalbane, it is useful to examine them and then make some assessment of any action subsequently taken to alleviate the damage.

In Breadalbane's instructions to Campbell of Barcaldine, who was responsible for selling the woods to Murphy and co., a number of stipulations were made to safeguard the woods. These included the reservation of all trees not exceeding 24 inches in circumference at breast height (3 feet from the ground) which 'will be too small for his work, and will grow to me'; a reduction in the proposed period of exploitation of 15 years partly in order to diminish the impact on the saplings of the effects of being squashed by fallen timber and trampled on by horses; the employment of 'a good substantial honest man' to ensure that the right trees were cut; all the trees to be cut were to be marked and numbered; the pinewood, which 'is not like oakwood, which must be cut at a season for the bark', was to be cut in one year, 'it is easy cutting down, and no harm to ly there, I mean drawn to the edge of the wood, except where there is no young wood, in that case it may ly in the wood'. Such stipulations are surely sensible and there can be no doubt that Breadalbane believed that they would preserve his woods.

However, the duration of the final contract, far from being reduced from fifteen, was increased to twenty years. Nevertheless, most of Breadalbane's other considerations found their way in: the 24 inch at 3 feet stipulation, together with the demand for the trees 'to be marked out by indifferent persons' were certainly included. It was also stated that the contractors should 'cutt down the saids trees according to the common and reasonable custom in such cases, and at the proper times and seasons and in such manner as the same may spring and that within the space of fifteen years'; they were also to 'take all care and protection to prevent any damnages to the young trees or growth by the falling or drawing of the foresaid timber', though they were exempted from responsibility for accidental damage. The oak was to be cut in hags. It could be argued that such vague exhortations towards good management practice (with the exception of the reference to hags) were unlikely to be sufficient. However, the clear evidence throughout the Breadalbane papers for the earl's knowledge of his own woods, and his care for them, might alternatively suggest that proper methods of timber extraction were regarded as being well enough known so as not to require explicit instructions.

On 3 August 1725 Breadalbane, who usually either resided in London or on his eastern estates at Loch Tayside, made one of his infrequent visits to his ancient western estates, to find, as he saw it, a scene of devastation: '... the Countrie looks like a desolation, and will be more, nor as there is already not one oak tree in the countrie for any use, so there will not be or they are done one fir tree'. The problem was that, having envisaged that the 24 inch regulation would preserve thousands for the future, the trees were in fact all above 30 inches. Clearly this implies that there were already problems with regeneration in these woods. However, the Irish were also accused of contravening the regulations for good management, having 'cut the oak so basely that it will never grow'; ignoring the proper season for cutting and clearing so that there was no time in the current year for regrowth 'and before next year the root and stock will be dead'; and, instead of cutting and clearing one wood thoroughly, rather returning to the same place year after year where it was easy, so that 'no young growth can ever get up'.

What is clear from all of the above is that no system of oversight was imposed on the Irishmen. Barcaldine, Breadalbane's man-on-the-spot, himself admitted that he had 'no more skill about firr woods then a chyld'. It is also clear from Breadalbane's comments, and more explicit references in other documents, that the marking out of the timber to be cut had not taken place. If it had, it would have been immediately obvious that the 24 inch rule didn't work. Ultimately, responsibility for ensuring proper management of the woods rested with the landowner and (particularly in this case, since he was effectively absentee) his officers on the ground. Breadalbane, who had, rather belatedly, gone personally on foot through his woods, seems to have immediately ordered that many of them, including those presumably recently cut by the Irish, be enclosed — it is remarkable that no such stipulation had been included in the recent contract. Some three years later, a survey was done, part of

the purpose of which was to ascertain the extent of the damage. Though it was asserted that one of the oakwoods had ‘little or no appearance of growth by the havock made there by the Irish in cutting of it’ and the pine woods at Loch Tulla were similarly noted as having been subject to abuse, most of the other woods appear by then to have been well-enclosed and in good condition. With regard to those that were not, the blame was laid at the door of ‘ill-keeping’, as a result of having been grazed when the trees were young and before the Irish had made their appearance in Glenorchy.

Ultimately, it is difficult to avoid the conclusion that the Irishmen perhaps merited the title of ‘adventurers’. Their attitude certainly compares unfavourably with the management regime instituted some thirty years later by the Lorne Furnace Company of English woodmasters. The Irish seem to have had no interest in the future of the woods sold to them since they intended to exploit them to the full only in the short-term, ie. there were sufficient trees already of the right size in the vicinity to sustain both the pinewood and the furnace company for the foreseeable future. Damage was almost certainly done but it is also clearly the case — as Breadalbane himself admits — that it was damage of a limited nature, which would entail a recovery period of around fifteen years. This was undoubtedly a problem, especially for the tenants who required an unbroken supply of timber of all different types and quality. But if grazing particularly was prohibited, there was no reason why the trees could not recover, unless there was some other, more deep-rooted, reason (which the lack of trees under 30 inches circumference perhaps hints at) for such a failure. Breadalbane himself seems to have had both sufficient know-how and the determination to contain the damage through proper measures; however, the fact that both he, and more, importantly, his commissioners, were so rarely in Argyll to oversee the situation and issue appropriate instructions must certainly lie at the root of the problem. It is always easy, and perhaps more romantic, to blame outsiders; sadly, the more mundane reality seems to be that responsibility lies a lot closer to home.

¹. I am very grateful to Dr. Jim Lindsay for providing me with a number of extremely useful offprints of his work, many of which convincingly illustrate this point.

CANONBIE IRONWORKS AND THE USE OF WOODLAND, 1699 – c.1730

Alan Macdonald

Recent work on the Register of Deeds at the Scottish Record Office has revealed the existence of a hitherto unresearched ironworks in the parish of Canonbie in Eskdale, eastern Dumfriesshire, on the Buccleuch estate.

In March 1699, some Cumberland ironmasters made offers to the Buccleuch estate for large tracts of woodland in Eskdale along with the rights to build forges and furnaces on the land. A contract was entered into in December of that year. It stated that, for 1,500 pounds Sterling, the partners would coppice all trees (mainly oak and ash) excepting hazel, thorn and 'other underwood' and trees less than 18 inches in circumference. They were bound to enclose areas as soon as they were cut and to maintain the enclosures for a further five years. They also undertook to pay damages for three years to tenants who would lose grazings as a result of the enclosures. The duchess of Buccleuch agreed that any tenants who damaged the enclosures or the growing wood would be dealt with by her bailie in his court.

By May 1700, the wood was being cut and enclosed, charcoaling was proceeding and some sort of ironworks, a forge or a furnace, had been built. In 1704, however, the partnership went bankrupt, leaving a substantial amount of charcoal for which a barn was built to store. There is some evidence that the ironworks were also operating and that the estate continued to cut, enclose and coal wood in the ensuing years.

In March 1713, a second contract for the ironworks was entered into between the duchess and her heir on the one part and two London merchants on the other. The contract included the ironworks but it did not include the woods. Perhaps because the last contractors had not fulfilled their obligations, the estate decided to maintain direct control of the coppicing and enclosure. The contract forbade the new partners from pasturing their livestock within areas 'where young woods are springing'. Later in that year, and in 1714, the agent of the new contractors bought wood from the estate and the estate paid for the enclosure of the ground on which it had been cut. From the date of this second contract, the estate employed a 'woodforester' to oversee the cutting, enclosure and preservation of the wood which was sold to the new contractors.

Financial problems also dogged this venture and the second contract fell through in the summer of 1715. Almost immediately, a third contract was agreed between another group of London merchants and the Buccleuch estate. This contract was almost the same as the previous one, word for word, except that wood was specifically excluded. This set of contractors was more successful than their predecessors and they remained in possession of the lands for nearly 15 years. As with the previous contractors, wood was bought by them from the estate every year but it was probably cut and coaled by the contractors. Throughout the period of this contract, the estate accounts record payments for enclosing newly cut coppice and other payments to tenants to compensate them for loss of grazings.

In about 1730, this enterprise also collapsed and, in spite of another offer to run the ironworks, it was not until 1737 that another attempt was made to make money from the woods in Eskdale. In that year, the woods of the parish of Canonbie were sold by public roup to a tanner from Hexham for 1,650 pounds Sterling. They were to be cut over six years in 13 hags, at least one to be cut per annum. The purchasers were to leave enough brushwood as would 'beard and fence the dykes and ditches'; presumably this referred to the dykes already in place as a result of the operations since 1699. The trees were to be cut without dishing 'so that the young spring be not damnished' and livestock were to be excluded from the hags for a year.

By 1737, it is thus clear that the estate had developed a much stricter view of how coppice should be treated than it had had in 1699. After the first contract had collapsed, the enclosing of coppiced wood was paid for by the estate. They had got rid of their woodforester for the parish of Canonbie

when the first contract was made, his last salary having been paid in 1700. At the same time as they entered into the second contract, a new woodforester was appointed and he continued in post until the 1730s and, until the sale of 1737, the estate continued to maintain dykes around the hags and continued to make payments of compensation to tenants for loss of grazings.

In the early 1790s, John Russell, minister of Canonbie, wrote in his entry for the Statistical Account that there were about 1000 acres of wood in the parish which had suffered unspecified 'depredations' at an equally unspecified point in the past. He reassured his readers, however, that these had been compensated for by replanting by the duke of Buccleuch. The fact that a great deal of wood had been cut during the first half of the century clearly remained in local memory. That it had actually had a detrimental effect on the extent of the woods is difficult to demonstrate. Similar misunderstandings of coppice, as if destruction was being undertaken, were noted by Jim Lindsay in research he carried out in relation to the ironworks there. An estate plan of 1714 shows extensive woods in the parish of Canonbie and General Roy's 'Military Survey' of around 1750 would suggest that neither the activities of the ironmasters nor the tanner from Hexham had done anything at all to reduce the extent of the woods in the first half of the eighteenth century.

SUSTAINABILITY AND LOCHTAYSIDE'S SEMI-NATURAL WOODLANDS IN THE 18TH CENTURY - CAN WE JUDGE?

Mairi Stewart

This paper is based on the findings of an M.Phil. research project carried out by me at the Institute for Environmental History, St Andrews, on behalf of Scottish Native Woods. The project set out to examine the history of Lochtayside's semi-natural woodlands, between 1650 and 1850. Lochtayside was chosen for the following reasons:

- It is a very distinctive geographical area which lies at the heart of the district long known as Breadalbane, roughly equating with the upper catchment of the River Tay, from Aberfeldy in the east, to its headwaters near Tyndrum.
- The woodlands of Breadalbane are now largely concentrated along the valley, river and loch sides, and Lochtayside itself supports some of the finest examples of native woodlands in Perthshire. These are mainly composed of oak, ash, alder, birch and hazel.
- The area was once part of the Breadalbane estates, a vast Campbell stronghold extending to Lismore in the west, which remained under their control for nearly 500 years.
- There exists in the Scottish Records Office a very fine and extensive estate archive relating to the Breadalbane lands, which formed the basis of this research.
- It is regarded as a key native woodland area in relation to SNW's Highland Perthshire Native Woodland initiative. The project is therefore regarded as an important promotional tool for the initiative in its strategy for encouraging the management of existing native woodlands.

The Campbell Earls of Breadalbane were among a group of landowners, including the Dukes of Atholl, who in the late 18th and 19th centuries were leading the way in the development of forestry in Scotland. The Campbell Earls of Breadalbane must be regarded as fundamentally important in the development of management strategies (sustainable or otherwise) for Lochtayside's woods, for they controlled absolutely, the land, and its inhabitants, from their principal residence at Taymouth Castle near the east end of Loch Tay, all the way to the west coast. While social, political and economic factors played an important role in this decision-making process, the individual character and educational background of the various Earls was equally important.

The utilisation of semi-natural woodland can usefully be split into two types — commercial and non-commercial. The study therefore focused on the relationship between these two kinds of utilisation, (of the produce and area of the woodlands), including for grazing, shelter, game management, bark, timber and charcoal.

Every aspect of life on Lochtayside required woodland produce. Wood-based materials were particularly important for house building. By the 18th century, this was largely for roofing, using alder, ash, birch, pine and hazel. Oak was too highly valued to be made available for the tenantry. There were countless other uses. For example, in 1721 there were ten coopers around Kenmore alone, "cutting several thousand young oaks and ash for girds" — to the annoyance of the 2nd Earl! A variety of sizes of timber was required for fencing, agricultural tools, household utensils, even shinty sticks. Bark was used locally for tanning and dyeing, while birch sap was used for winemaking, and if access to the resource was restricted, then it would be illegally procured.

Probably as important, at least to the tenantry, was the use of the woodland area. This was essentially a pastoralist society, heavily dependant on livestock, particularly black cattle, with Lowland breeds of sheep becoming more important towards the end of the 18th century. Winter grazing was crucial to this form of livestock husbandry. The potential for conflict with woodland

conservation and management was a critical factor, and compromises had to be made by the Earls and his tenants.

Inevitably, the hill woods were the first to suffer. Large populations of goats and semi-feral horses probably contributed to this, particularly prior to the 18th century. In addition, sheiling requirements for timber played a part in their decline. The lochside woods also suffered. The human population, which it must be remembered was considerably greater than today, risked potentially severe penalties to gain access to woodland grazing. Some areas of woodland, like those composed largely of alder, which once existed on the north shore between Lawers and Fearnan (in Gaelic = place of the alder), were seen as superfluous, and grubbed up. Together these uses had considerable significance in affecting the woodlands of Lochtayside, although the evidence does not allow for a full understanding of the importance of the individual factors, nor how they influenced each other.

For a relatively short period at least, commercial utilisation resulted in the adoption of those Lowland woodland management practises, which are now generally regarded as sustainable. In contrast to research into Breadalbane's Argyll woods, few wood contracts were discovered which related to commercial use of Lochtayside's woods. That is not to say there was no commercial activity, rather it is likely that the district had a distinct locational disadvantage, which resulted in greater costs in transportation to external markets for wood. Therefore, unlike Argyll, the production of charcoal was not nearly as profitable.

Oak coppice for tanbark provided the main commercial opportunity. Bark was easier to transport, and Lochtayside was close enough to regional markets (Crieff and Perth) to make it profitable. It appears that rising prices, towards the end of the 18th century, stimulated the introduction of a more rigorous coppice management regime. From around the 1780's, woods were cut during a 4-8 year period, in a 25 year rotation. The area of oak woodland taken into this rotation may not have been large enough to sustain the cutting of 25 annual hags. Enclosure followed cutting, and livestock were excluded for 7 years (this was the compromise reached with the tenantry). This system appears to have been in operation until the mid-19th century. Some woods were excluded from this system, mainly because they were not valuable enough. This also allowed some woods to be available for the tenantry (again part of the compromise). This period also heralded the adoption of more proactive and interventionist woodland management. Thus 'brush', 'black' or 'barren' wood (birch, hazel, alder and rowan) was less desirable and removed, and 'vacancies' were planted with oak, in a form of enrichment planting. This was probably the first sustained attempt at changing the composition of these woods in their history. The signs of this enrichment planting can still be seen today.

To what extent can the utilisation and management of these woods be regarded as sustainable? Certainly, it would appear that those woods which were under an oak coppice system, at least, maintained their extent, even after the coppice system was abandoned. Thus, the woods of the Crannich district of north Lochtayside were enclosed by a substantial stone dyke, as early as the 16th century. Meanwhile, those that remained unenclosed, or were less valued, can be demonstrated to have undergone a process of fragmentation and contraction.

Domestic, or non-commercial use is therefore now generally regarded as having been unsustainable, and would therefore have been a major cause for the decline of Lochtayside's woodlands. This conclusion is based largely on the fact that those woods which were apparently under no formal system of management, appeared to have deteriorated between 1750 and 1850. It may be suggested, however, that it was more complicated than that, and that more work is required to determine whether there were indigenous forms of management, which could be differentiated from the Lowland and English practises adopted for commercial utilisation. The second half of the 18th century saw unprecedented pressure being placed on the land and its natural resources. This was largely a consequence of a burgeoning population and a rapidly changing economic system. It is possible that indigenous forms of woodland conservation were unable to cope with such pressures, and therefore continue to be effective.

I want to finish with a note of caution! Not only do we sometimes tend to judge past management by our own standards, but all too often those judgements are made using incomplete and misinterpreted information. The Nature Conservancy Council's 'Ancient Woodland Inventory' used the Military Survey of Scotland (1747-55), or as it is more commonly known, the Roy Map, to identify 'ancient'

woodland sites. The results of my research now cast doubt on the reliability and accuracy of the Roy Map, and in particular in the reliance on it for determining the extent and distribution of woodlands in the mid 18th century, at more than a general level. Figures 1, 2 & 3 illustrate the extent of the discrepancy for Lochtayside.

Although this study has uncovered a wealth of information about woodland utilisation and management on Lochtayside during the early modern period, nevertheless further woodland history research of the Breadalbane estates is bound to be fruitful. In fact, there is a great need for both documentary and field based research into the history of woodlands in Scotland as a whole. I would suggest that before we judge our forefathers, perhaps we need to be considerably better informed. By achieving a greater understanding of the history of our woodlands, future management decisions will also be better informed, and sympathetic to their historical status.

PALAEOENVIRONMENTAL PERSPECTIVES ON WOODLAND SUSTAINABILITY

Althea Davies, Richard Tipping and Eileean Tisdall

Much of the discussion on woodland sustainability has dealt with historical and economic perspectives associated with human exploitation and management. A prerequisite for economic concerns must be that the woodlands were ecologically sustainable prior to exploitation. To consider this aspect of woodland sustainability it is necessary to view them on a longer time-scale and introduce a palaeoenvironmental perspective.

Glen Affric, in the northern Highlands of Scotland, contains an area of important native pinewood, one of thirty-five sites identified in Scotland which are thought to represent relicts of ancient, formerly more extensive native pinewoods (Steven and Carlisle, 1959). In Glen Affric, the woodland consists predominantly of pine-birch woodland which is located in the eastern part of the glen around the two lochs. This contrasts with the west of Glen Affric, where blanket bog and mire communities dominate the landscape. The National Trust for Scotland propose to restore ecologically sustainable woodland to their property at West Affric. This will be a test site for future woodland restoration schemes.

The definition of ecologically sustainable woodland for West Affric is of stable woodland communities over a long time-scale, since the NTS own West Affric in perpetuity. This does not imply static, unchanging communities, but a system in which the proportions of species present will alter according to environmentally-determined competitive interactions, with nutrient cycles able to ensure the perpetuation of woodland community as a whole. The woodland restoration project therefore implies sustainability over generations, which must be considered on the time-scale of tree generations, not human generations, covering periods of hundreds of years.

To achieve these goals, there is a need to maintain stability in the face of a changing environment. There are two major factors to consider in this respect; firstly increasing human demands in the form of leisure activities, and secondly climatic change, if we perceive future global warming to be a reality.

There are two key questions concerning woodland sustainability. Are woodlands ever stable systems, able to sustain themselves? If so, how can this be measured? Pollen analysis can provide data to answer both of these questions because the pollen record covers the long time-scales needed to assess long-term stability and thus the existence of a sustainable ecosystem. By using integrated palaeoenvironmental techniques, the record of past climatic conditions can be correlated with the vegetation record derived from pollen. We can therefore correlate periods when the climate was warmer than present with records of contemporary woodland composition and stability. This is important in terms of the threat of global warming. Pollen data also provide evidence of which forms of disturbance may disrupt stable woodland communities. This encompasses many different scales, from large-scale events such as climatic change, to geomorphic events, human impact and fires, which can have much more localised impacts.

A few examples from the Scottish Highlands and from America can be used to demonstrate the value of palaeoenvironmental techniques in answering the questions posed above. Pollen data from research on woodlands in northern Scotland over the last 10000 years since deglaciation (the Holocene) can be used to make an assessment of woodland stability and also gives some indication of the length of cycles involved. In America methods have been developed to measure woodland stability. These quantification techniques provide a statistical measure of community change which is necessary to identify periods of sustainable woodland and the contemporaneous environmental conditions.

On Eilean Mor, an island in Loch Sionascaig in the north-west of the Highlands, analysis of sediments from a small hollow demonstrated that, at the stand scale, local vegetational changes can occur rapidly, influenced by ecological processes such as tree-death, gap creation and gap-filling

(Kerslake, 1982). The data indicate that cyclic regeneration has occurred in native birchwoods over several thousand years. In the Cairngorms, pollen analysis of mor humus layers in native Scots pine woodland, combined with historical documentation, suggested that in the Dark Ages and later, there has been a dynamic relationship between pine woodland and moorland communities, with perhaps several vegetation changes occurring in any one part of the forest over the last 1500 years (O'Sullivan, 1973).

To put these two examples in a landscape perspective, it is necessary to note that there has been no broad synchronicity in woodland loss or onset of mire or heathland expansion at sites within similar areas, even though climatic change is at present thought to be the major cause, as for example, at Loch Sionascaig, Eilean Mor, and nearby Lochan Dubh (Kerslake, 1982) or between soil profiles from the Cairngorms (O'Sullivan, 1973). This may be the result of variation in individual catchments and the inertia of woodlands on better-drained soils. In other words, there are thresholds related to the individual site situation which may make some woods more stable or buffered against change than others. It is important to notice that not all sites have shown the same patterns in the past, which will be true in terms of present and future woodland sustainability plans.

To analyse rates of vegetational change at Billy's Lake in Minnesota, Jacobson and Grimm (1986) used Detrended Correspondence Analysis, an ecological ordination technique used to determine the degree of dissimilarity between fossil pollen assemblages. They used percentage pollen data averaged in consecutive 100-year intervals (Figure 1). On this scale, the results demonstrated nearly continuous changes in the composition of communities over the last 10000 years, with only one interval of relative stability during the mid-Holocene, from 7000 to 6000 years ago. The periods of least stability were during the transition between prairie and forest at around 8000 years ago and 1200 years ago. The most rapid period of change occurred during the last 100 years of EuroAmerican settlement and the conversion of natural vegetation to cropland.

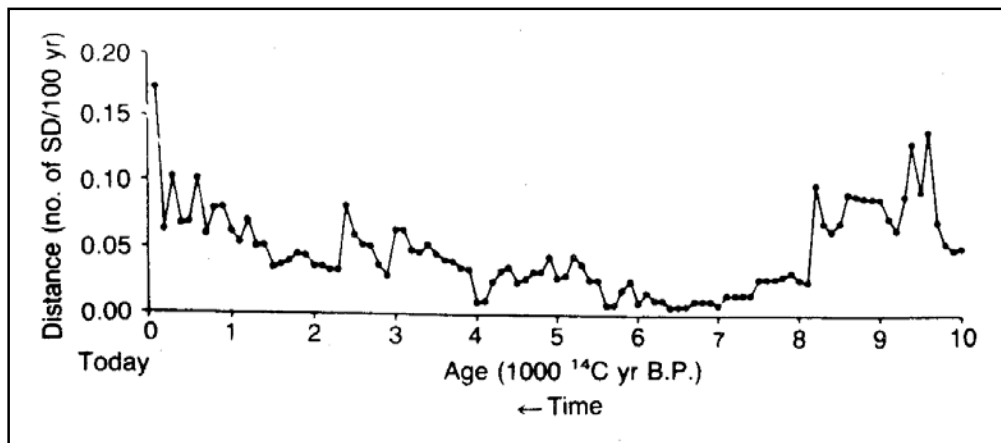


Figure 1

Rates of vegetational change in central Minnesota through the past 10000 years based on ordination of fossil pollen spectra from Billy's Lake. On the y-axis, relatively large values of ordination distance indicate times of relatively greater magnitude of change in pollen spectra per 110-year interval, and, therefore, the times of substantial vegetational change in the uplands surrounding Billy's Lake. Data from Jacobson and Grimm (1986); modified from Delcourt and Delcourt (1991).

These data provide information on the major causes of vegetation instability on different time-scales. Firstly, over the interglacial time span, the rate of change has been determined by changes in climate mediated by its effect on natural disturbance regimes such as fire. Secondly, historical anthropogenic intervention has caused rapid change.

In his analysis of Mackenzie River in north-western Canada Ritchie (1985) used changes in pollen accumulation rates as a proxy for estimating trends in their population abundance. The 14000 year history is characterised by two intervals of relative stability in vegetation composition (Figure 2):

- (i) Tundra community of herbs with dwarf birch, between about 14000 to 11000 years ago,
- (ii) Boreal woodland with alder, birch, spruce and willow, from about 5500 years ago until the present.

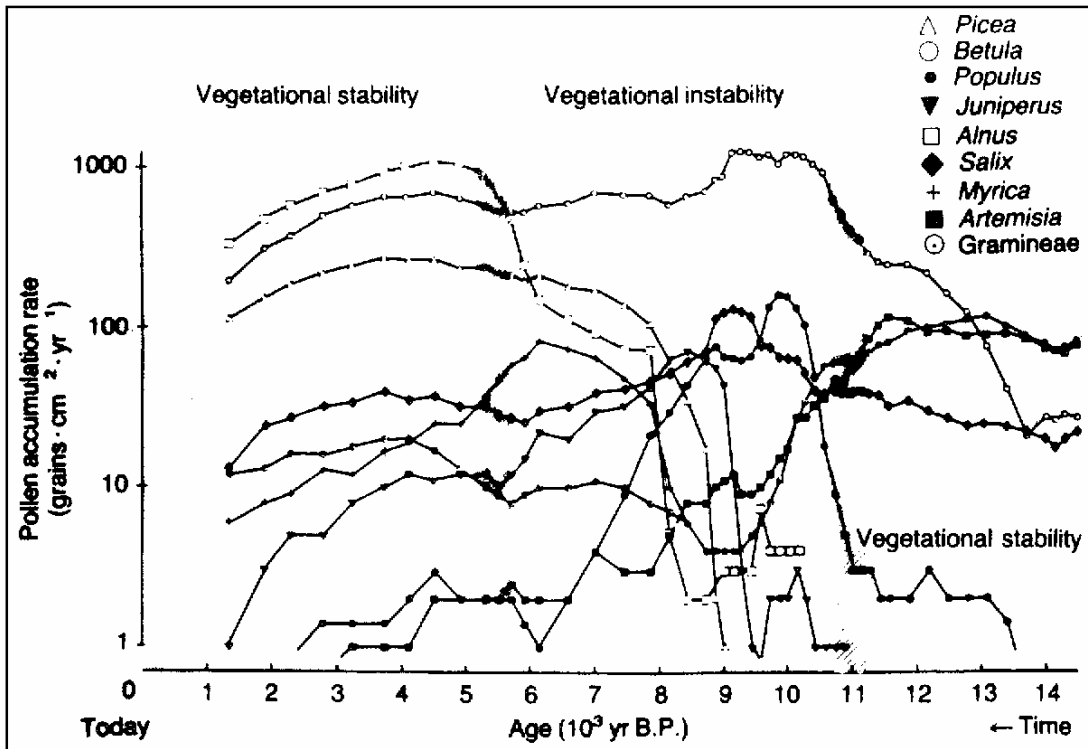


Figure 2

Five-sample running means for pollen accumulation rates of plant taxa over the past 14000 years as recorded in the palaeoecological record from Twin Tamarack Lake, Lower Mackenzie Basin, north-west Canada. The vertical bars separate late Pleistocene and late Holocene times of relative vegetational stability from the early-to-mid-Holocene time of vegetational instability. Data from Ritchie (1985); graph modified from Delcourt and Delcourt (1991).

The intervening period of instability was characterised by rapid changes in the abundance of taxa. Climatic change, with a seasonal maximum in summer warmth, was reached at 10000 years ago. This was suggested to have initiated the sequence of relatively rapid vegetational change. However, during this period of instability, species interactions were probably more important than climate in determining further changes in community composition. Competitive interactions, with variations in catchment topography and soils, may have influenced the variation between sites seen in Scotland.

Both of these American examples show how events happening on different spatial and time scales influence the stability of the vegetation; climatic influence over the long timescale, and more localised species interactions and human activities over shorter periods.

The research in Glen Affric aims to produce vegetation and climate records for the last 10000 years. The record of woodland history can then be analysed to indicate when stable conditions existed, for what duration, and why the stability may have been disturbed. The pollen and climatic data can be

integrated to indicate the role of climatic change or other factors, such as human intervention and burning, in maintaining or causing change in the communities which existed within the glen. This data will provide the NTS with information needed to make informed decisions about restoring ecologically sustainable woodland to West Affric.

In conclusion, the techniques are available for assessing woodland sustainability. Pollen data and statistics can be successfully combined to:

- (i) examine the degree of similarity/variability in past vegetation composition, and to
- (ii) define periods of stable (*i.e.* self-sustaining) woodland and the environmental conditions which prevailed during those periods.

This can provide necessary information for management plans aimed at sustainability, since inferences about woodland stability need to be viewed in the context of a longer-term trajectory of change (Delcourt and Delcourt, 1991). So a palaeoecological perspective can determine the possibility of true woodland sustainability for the future.

Authors

Althea Davies is a PhD student researching the Holocene woodland history of Glen Affric, with emphasis on human impact.

Eileen Tisdall is a PhD student investigating the Holocene climatic record for Glen Affric.

Richard Tipping is a lecturer in Environmental Science and is supervising both PhD projects.

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SUSTAINABLE MANAGEMENT OF HAZELWOODS: PAST AND FUTURE

Peter Quelch

1. Two contrasting aspects of hazelwoods fascinate me:
 - (a) **Traditional Woodmanship** in western hazel woods — what exactly was it? Who was involved and what did they do, both in terms of woodland crafts utilising the material, and the husbandry which sustained the resource.
 - (b) **The Naturalness** of these woodlands as a habitat, their botanical richness and their value for biodiversity.
2. The first aspect looks at the woodlands as part of a cultural landscape, worked by man for centuries. Perhaps even for millennia, since it is known from pollen records that hazel was one of the very early colonising species after the ice age. Archaeological excavations show that hazel nuts have always been a prime food source, while hazel rods have been woven into wattle and baskets from the earliest times.
3. The second aspect, the habitat value, is a late 20th century way of looking at hazel or any other semi natural woodlands. Certain oceanic hazelwoods have had a long period of neglect this century, which paradoxically has allowed a blossoming of rare epiphytic ‘lower plants’ — lichens, mosses and liverworts, in an extraordinary display of natural diversity. These plants are known to require long site continuity in ancient woodland, and yet we also know that the resource was managed until quite recently. Normally, it seems that the degree of intervention by man is diametrically opposed to the quality of naturalness in the woodland, but is this always true?
4. I am often asked to help identify natural woodland as potential seed collection areas. This can be surprisingly difficult in broadleaved woodlands — many have had a history of partial planting, and they almost all seem to have been managed in some way. This history of intervention is recognised by the term ‘semi-natural’ while the degree of intervention varies greatly in nature, extent and timing.
5. The search for natural stands makes one look beyond the ‘industrial coppices’ of the 18th and 19th centuries. These woodlands are typically enclosed by dykes, are fairly pure in species composition, and in some cases were actually planted by landowners eager to cash in on the commercial value of oak coppice in the late 18th century. At that time of course, many of the woods which are now regarded as semi-natural were under intensive and regular management for tanbark, charcoal for iron smelting, wood for fuelling lime kilns, or wood distillation plant such as the pyroligneous acid works at Crinan or Balmaha.
6. What especially interests me are the unenclosed woods of a wider range of species, particularly those woods on soils of higher nutrient status. This paper is mainly concerned with the oak/elm/hazel woods, but another woodland type, the slope alderwoods are equally intriguing ancient woodland remnants, often very visible in the landscape.

The ancient alder trees, usually in the form of short stubby stools from repeated cutting, and grazing, seem to persist in the landscape long after the associated oak, ash, birch and hazel have been felled or have reached the end of their lifespan. Outstanding examples of ancient slope alder can be seen in the Woodland Trust’s new Glenfinglas acquisition in the Trossachs.

7. I will describe four examples of western hazelwoods which illustrate the interface between past use by man and present naturalness. The question arising from this review is of course — what is the best way to manage these woodlands in the future?

8. **BARRANDAIMH**

This relatively small semi-natural hazelwood lies within the larger Barnluasgan Caledonian Forest Reserve, Crinan. In partnership with Forest Enterprise a local woodland crafts group, Argyll Green Woodworkers Association (AGWA), identified a patch of hazelwood that might be suitable to demonstrate 'traditional' coppicing techniques. However, survey showed this wood to be exceptionally rich in epiphytic lichens and bryophytes, species which depend not only upon long site continuity but also 'old growth' hazel stems. They are also present on old ash and elm within the woodland, and due to the extreme oceanicity of the site some species even flourish on the boulder scree and rocks.

Very old stools of ash and elm, oak, alder and hazel show that the site has been regularly cut over in the past, yet 50 years of lack of disturbance have allowed development of one of the most profuse examples of the Lobarion lichen community I have yet seen. Needless to say, simple short rotation coppicing (5-10 years) would effectively destroy that interest, or at least force the epiphytic into obscure refugia for many years to come.

AGWA is looking at compromise management, whereby hazel stands with particularly rich epiphytic growth are retained undisturbed, while other patches are recoppiced or regenerated to rejuvenate and expand the hazel resource. We are calling this 'coppice with retentions'. Once the silvicultural details are worked out, it would be a simple matter to issue guidance to others contemplating hazel coppicing.

9. **BALLACHUAN**

Ballachuan hazelwood, an SWT Reserve on Seil, near Oban, is an extensive area of coastal hazel scrub which also has an exceptionally rich lichen flora. What interests me is exactly why this should be so. It is known that coastal hazelwood were cut over for creel making by fishermen, but did they select suitable stems, leaving the rest, thus giving habitat continuity for the epiphytes? This would contrast with 'clear coppicing' practiced in southern woodlands which over centuries removes the diversity of ancient indicator species of lichens (Rose 1993).

Also relevant is the ecological knowledge on how long it takes Lobarion lichens to recolonise, either from refugia on the site, or from adjacent areas. Many studies have been in drier areas like the New Forest, but obviously climatic conditions are far more favourable for lower plant reproduction and colonisation in Western Scotland.

10. **GLEN FYNE**

This apparently very natural and unenclosed wood of hazel with alder and some ash and oak is situated on a steep sided glen at the head of Loch Fyne on Ardkinglas estate. Surprisingly the main area of hazel is very poor for lichens, not in any way comparable to the two previous sites, or even to exceptional areas in nearby Glen Shira, which has lichen communities of European importance. It looks as though the Glen Fyne hazel was cut over, perhaps earlier this century and has not yet recolonised by the Lobaria. Old growth lichens do indeed survive on relict hazel high up in the crags above this wood. Climate conditions are obviously not limiting, though air pollution is known to affect lichens south of Loch Fyne.

11. **LEITER FURA**

The fourth example is part of a now extensive area of afforestation at Kinloch on Skye, where the native woodland is being restored by removal of young conifers. In this case ancient stools of hazel are growing adjacent to and even within the ancient settlement of Leiter Fura. Much of the hazel is recent, having regenerated since grazing ceased after enclosure for forestry in 1976. However the ancient stools are not obviously enclosed by protective dykes, leading one to presume a type of husbandry where farmstock and hazel actually existed.

12. COPPICE AND POLLARD MEADOWS

Examples of that now long dead form of 'agroforestry' are still found in remote sectors of Europe in the form of coppice and pollard meadows. Dr Haeggstrom of Helsinki University has made a study of this form of land use in the Aland islands and elsewhere in Europe. Traditional management provided hay, leaf fodder and hazel nuts, as well as wooden material. Fascinating relicts of pollard meadows survive in another Norse influenced part of Britain, Borrowdale and Langdale in Cumbria. The Scandinavian examples are mainly in nature reserves, as again it is perhaps no coincidence that these ancient forms of husbandry also developed a very rich associated botanical community.

13. SUMMARY

To summarise, more work is suggested in the following three areas of research:

- (a) Ways in which upland ash/elm/hazel woods were used and managed.
- (b) How grazing and stock management interacted with the hazel woods — were there in fact coppice meadows in Scotland?
- (c) How to use epiphytic lichens as indicators of site continuity, to help explain the history of intervention in oceanic hazelwoods.

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THE ORIGIN OF SCOTS PINE IN SCOTLAND

Mike Phillips

As a generalisation, there is comparatively little variation in growth, form or survival between Scottish sources of Scots Pine (native or planted) irrespective of their Continental origin, following the post-glacial migration of the species from the continent into Scotland. However, quoting from Forrest (1982):

“It is postulated that the Scottish north-western relicts were derived from middle or southern European sources and the south-western relicts primarily from Scandinavia, while the remaining bulk of the Scottish population shows similarities with middle European sources.”

It is of considerable interest to note that:

“The large differences to all other Scottish sources in the monoterpene biochemical analysis in the extreme north western relicts suggests that they may be of long standing undisturbed origin.”

However, if we make direct comparisons between Scottish and Continental sources through provenance trials in Scotland we see very large differences in rates of growth, form and survival. This is not at all surprising when we consider the vast natural range of Scots Pine which runs from the Atlantic seaboard in the West, across Europe and Asia, to the vicinity of the Pacific Ocean in the East, and from beyond the Arctic Circle in Scandinavia to the Mediterranean.

It is postulated, therefore, that Scottish Scots Pine which constitute the westernmost sources of the natural range have become ‘adapted’ to the point where they now bear little resemblance to the Continental origin.

Further to this question of origin and the resultant diversity under Scottish conditions, it is of interest that about 1860 there were large imports of Scots Pine seed from the Continent due to the succession of unfavourable seasons which occasioned a great scarcity of Scots Pine in Scotland. According to Gregor (1868), the resultant plants were utterly worthless except in the most favourable situations, and though height growth was rapid the girth was less than our native species and the trees had a tall slender appearance even with ample space. Nursery growth and survival was poor and browning was much in evidence.

Matthews (1949) quotes from a meeting with Mr. Feaks, a forester at Darnaway, that the trees of German origin brought in to satisfy the huge demands of planting schedules were of rough, dark bark the whole way up the stem, and the timber was knotty and of poor quality. Stevens in 1920, compares the native Scots Pine to those generally found in England and Scotland and wrote “it is fairly certain that many of the latter have been grown from foreign seed of not too good a type”. Murray in 1920 writes that the variation in Scots Pine, regarding variants, may be of great value under our conditions, while others are likely to be practically useless”. Hobart Hampden in 1914 stressed the importance of using the most suitable provenance of Scots Pine and says “beyond doubt the results of using foreign seed have been disastrous”. From the records available, it appears most probably that Continental Scots Pine seed came from the forests of Haguenau, in the Bass Rhin region (*Pinus S. Haguenensis* Louden) and from South Karlsruhe according to Gregor, Hutchison and Kienitz.

In more recent times, between 1920 and 1956, the Forestry Commission imported 223 lbs. of Scots Pine seed from 12 different countries, compared to 70,000 lbs. collected in Britain, of which 28,000 lbs. came from Thetford in Norfolk, the bulk of which, if not all, was collected from the famous “Breckland Hedges” and which has a similarity to Speyside in origin according to terpene analysis.

Both Gregor and Anderson commented that a factor in the influx of seed referred to may have been cost, as it was reported that Scots Pine seed was imported from the Continent at less than half the price of native seed at that time.

As regards the mixing of genes, once the flowering commenced there may have been an effect upon the genetic composition of native stock by gene flow into adjacent woodlands through pollen dispersal under favourable conditions.

We see then that the results indicated by the provenance trials strongly suggest that, due to the poor performance of Continental Scots Pine in Scotland, many, if not most plantings of the 1860 era, are likely to have failed completely, or have been slow grown (var. *Scotica*) evolved from the poor quality Continental Scots Pine exhibited in progeny trials gives food for thought.

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REFLECTIONS TWENTY YEARS ON

Jim Lindsay

When I completed my thesis in the 1970s the few of us working in this field were trying to revise a history fogged by myth. It was a history in which weary unconvincing old interpretations of woodland development were still regurgitated, often by ecologists and others for whom woodland history was a side-show, and who would not have tolerated the same kind of laxness in their own specialist areas. This interpretation inevitably found its way onto a wider stage. Readers of the kind of popularised history for which publications like the Scots Magazine provided a platform received a simplified picture dominated by the tragic loss of forests so dense that, to use a favoured image, a squirrel could have travelled for many miles without having to descend to the ground. This loss resulting largely from the misbehaviour of rascally timber merchants and rapacious ironmasters, most of them happily English. There was a supporting cast of military men dedicated to cutting every tree great enough in girth to hide a murderous rebel, and sturdy Highlanders ready when summoned by the Fieri Cross to spend their afternoons felling and clearing hundreds of hectares of woodland as breaks in the face of advancing forest fires.

Into this world of big simple explanations and colourful incidents came the revisionists. We had perhaps three main messages to convey. One was that most of the woodland had gone well before the modern historic period. In most parts of Scotland travelling squirrels had lost their high roads long ago. A second was that the important processes tended to be sustained and undramatic. Unskilful felling and clumsy timber work about the farm coupled with sustained grazing pressure created a long-term hazard much greater than that posed by occasional flurries of commercial greed. Finally, we tried to stress that woodland was a recognised resource, the use of which was governed by legal and customary conditions. Some kind of management, no matter how casual and haphazard in modern eyes, had been the norm.

That was then, and this of course is now. A lot can happen in twenty years. When I was invited to take part in this meeting, I was a little apprehensive that the wheel of revisionism might turn out to have revolved again.

On the evidence of the meeting, I am glad to see that this is not the case. The meeting offered welcome evidence that the community of workers is now much larger and more diverse, but researchers in this field are still wrestling with some of the same problems I had to face in the 1970s. A handful of key themes came out of the day, and I will try to identify them now.

First of all I was impressed to find that I was attending a genuinely interdisciplinary meeting at which foresters, ecologists, practical conservationists and historians could share a discussion with a remarkable lack of antagonism. In my experience of twenty years ago specialists maintained better fences around their expertise than Scottish foresters had once erected around their coppices. If the fences have not yet been totally removed, the evidence now is that people are willing to lean on them and talk to each other, and gates have been provided. Although presentations ranged from specialised themes such as the exploitation of hazel and the performance of pines of different provenance, through to big issues like the nature of sustainability itself, there was a welcome range of contributions from the floor.

The theme of sustainability provided a powerful focus both for examining rationale and motivation in the past and steering development for the future. It is a natural link between the two in a way which the concept of conservation could not be. Retrospectively I could see how useful an articulating concept it would have been when I was doing my own work. The term has of course been applied in all sorts of contexts in the last few years, and like all buzz-words is in danger of devaluation. However Sandy Mather's discussion cleared away a lot of the confusion and prompted what I regarded as the best debate of the day, one in which we returned to the persistent problem of what we are trying to achieve and for whom.

The roles of ownership and the allocation of resources were also vital in providing a link between the study of the past and the management of the future. Like sustainability, they were on the scene throughout the day and had their place centre-stage in Chris Smout's international comparison in the afternoon. Historically the attitudes of landowners in the past are not easy to elucidate. This is inevitable since we cannot evaluate them without a good working knowledge of the mental frameworks of the past, and these notoriously do not travel well through time. The relationship between legal right and customary access to resources is difficult for similar reasons, and because the whole unrecorded web of customary expectations and duties may be illuminated only by occasional shafts of light in baron court records. These are fields that still need development.

Internationality is another area that deserves far more attention than it has received so far. Chris Smout's review of woodland history in Scandinavia, Scotland, and Ireland pointed out the range of variation to be found even within the geographically limited area of oceanic north-west Europe. The contrast between Scotland and Ireland in particular provided an instructional view of the divergence that can develop as a result of different political, military, economic, and demographic circumstances in neighbouring countries that otherwise have much in common environmentally and culturally. On a more local scale Fiona Watson's contribution emphasised the impact of Irish entrepreneurs in the west Highlands in the first half of the eighteenth century, another field that certainly deserves more attention.

It was illuminating to see that many of the problems of quantification continued to bother researchers. This came out of the papers by Alan MacDonald and Mairi Stewart in particular. We are still at the stage (perhaps it will be a permanent state) where our best guess about the effectiveness of woodland management is a comparison of 'before' and 'after' measurements of woodland extent, but problems with this came up in discussion. Using the Roy Map (the Military Survey) means confronting the relationship between the field and fair versions. Plotting patterns from historic maps onto modern bases for comparison creates all sorts of problems, some of which I made a first attack on in a paper published some years ago¹. Even when we have done our best to establish quantitative change, we may still not be in a position to know whether the actual quality of the woodland had improved or declined! The techniques discussed by Althea Davies might offer some help, although by their nature they will inevitably tend to improve our knowledge of qualitative change rather than allow us to put boundaries more precisely on the map.

When I contributed a chapter to a collection on Scottish landscape development in 1980², one reviewer airily dismissed in a few lines a whole group of specialised chapters including mine, because they were marginal to the key themes of rural development. This meeting has demonstrated to my satisfaction at least that the study of woodland history has matured to the point at which such a position is no longer tenable. However there is still educational work to be done as long as the myths about woodland history have not been laid to rest. Their sheer persistence shows that they must be attractive. People enjoy anecdotal and episodic history, and clean simple explanations are always most pleasing. We all also like someone to blame, and in the Scottish case England is always on hand to provide a convenient scapegoat. For all these reasons the popular falsehoods about woodland history have all the vigour of garden weeds. This group may not be able to address the public at large about the folly of its ways, but it is within its power to help with the enlightenment of those who speak to the public through the media, and thus contribute to a long overdue awakening of a better public awareness of our woodland and its history.

¹ Lindsay, J.M. (1980) *The Assessment of Transient Patterns on Historic Maps — a Case Study*, Cartographic Journal 17 16-20.

² Lindsay, J.M. (1980) *The Commercial Use of Woodland and Coppice Management*, Chapter 12 in *The Making of the Scottish Countryside*, edited by Parry, M.L. & Slater, T.R., London:Croom Helm.