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Prospects for Landscape History and Historical Ecology

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Abstract

Landscape is an objective reality that can be studied scientifically. The discipline of landscape history seeks to examine the influence of human and non-human agents on this reality. Historical ecology, a closely related field, investigates ecology (the relations of plants and animals to each other and to the environment) over time.

Landscape history began with seventeenth-century disputes over former open-field arable. Since 1960 it has grown into an identifiable academic discipline. Historical ecology remains a less organised and more dispersed activity. Both disciplines have been associated with England, but there is no reason why this should be so: research can be carried out anywhere, and has been done in North America, Scandinavia, Italy, Crete, Japan, and Australia, among other countries.

Landscape history and historical ecology are multi-disciplinary, and need to pay equal attention to history, archaeology and ecology. Amateurs often do this with more success than professionals. Landscape historians need to be wary of grand theories and of extrapolating ideas developed in one country to another where the environment and the human, plant and animal inhabitants are all different. However, some wide-ranging processes call out for explanation, such as the spread of open-field agriculture across Europe at a particular period.

Both disciplines have tasks in setting the agenda for conservation: in recognising abnormalities and distinguishing them from extreme but normal events; in identifying what is conservable and what is not: and in identifying what is special and worthy of conservation in the landscape of any particular country.

Predicting the future of any discipline is foolish. Like all long-term human activities, fields of study go in and out of fashion, and most predictions carry the unspoken condition 'provided the wheel of fashion remains stuck in the year 2000'.

An example of academic fashion is the study of succession: the natural processes that are set in motion when a field, village, railway, or peat-cutting is abandoned, and (in Britain) usually end by converting it into a wood. From

1910 onwards this was the dominant theme of ecological science: research was done, articles published, lectures given, and examinations set on how this happened (Tansley, 1939). After World War II interest declined, but not because the findings were unsound nor because there was nothing left to study. By the 1980s books about land management and conservation were being written as if there was no such thing as succession: as if a new wood could be created only by planting trees.

My object in this paper is not to make predictions, but to point out areas in which development is active and likely to continue in the next few years, and also gaps in which new work is needed.

What are landscape history and historical ecology?

I am writing of landscape in the conventional sense:

> a tract of land with its distinguishing characteristics and features, especially considered as a product of modifying or shaping processes and agents (usually natural).
>
> *Oxford English Dictionary*, second edition

Most landscape scholars since W. G. Hoskins, author of the classic book *The Making of the English Landscape* (1955), would omit the last two words.

Landscape in this sense is an objective reality, amenable to scientific investigation: gorges, terraces, hedges, pollard trees came into existence and have developed at times and by processes which can (in principle) be ascertained by observation and analysis. But landscape history is a fashionable subject around which jobs and research grants cluster, and there is a tendency to expand the scope of 'landscape' away from its proper rigour. It comes to include what scholars, writers, or the public have *said* about landscape, their perceptions and misperceptions. This is an important and interesting field of study; but it is not the history of landscape itself, and makes little sense without that history. Before analysing people's attitudes to landscape one must establish what it was they were attitudinising about.

Landscape history is only partly a humanistic study. Historical narratives are not necessarily about people. The object may be to add a little more to what is known about how ancient people earned their livings, but is not necessarily so. There are other actors in the theatre besides Man, and it would be possible to write a landscape history of an island that had never had human inhabitants. The landscape history of Mars is an active field of study.

Historical ecology is closely related. Ecology is the study of plants and animals in relation to each other and to the environment (including human activities); historical ecology is the study of those relationships over time. The historical study of individual woods, hedges, fens etc. is historical ecology; landscape history is the study of a collection of woods, hedges, and fens and the relations between them.

The history of landscape history and historical ecology

Landscape history goes back to Jacobean times, when purchasers of an estate often found themselves disputing with holders of common-rights, and ridge-and-furrow was cited as evidence of former open-field arable. Norden, the cartographer, wrote:

> and this field … may be an instance; for you see by the ancient ridges of lands, though now ouergrowne with bushes, it hath been arable land, and now become fit for no vse, unless it be reformed.
>
> *The Svrveiors Dialogue* (1610)

In one such disputed area, around Hayley Wood in Cambridgeshire, an archaeologist, Christopher Mead, … testified in 1607 that a certain field 'lyeth flatt' with 'neither ridge nor furrowe'. (This field, now part of the wood, does have ridge-and-furrow now (Plate 1).) Appeal was made to an 'antient bank' and in 1649 to 'auncient quick [live] hedges and ditches' (Rackham, 1975, 13, 10).

The science of historical ecology began, as far as I know, with a controversy in 1769 between Daines Barrington and Edward Hasted over whether chestnut (*Castanea sativa*) was native to England. The same methods were appealed to as are in use today: historical records, ancient trees, place-names, the natural ecology of the tree, and supposed identifications of its timber in medieval buildings (Barrington, 1769; Ducarel *et al.*, 1772). As often happens in the progress of science, the controversy was won, not by the more cogent argument, but by the more eminent man. Barrington's view, that chestnut was a modern introduction, prevailed in the teeth of evidence to the contrary. The question of whether it was native or an ancient introduction could not be settled until the coming of pollen analysis nearly 200 year later: even this is not straightforward, and the limits of native chestnut in southern Europe are still vague and controversial.

The classic work of landscape history was *The Making of the Broads* (Lambert *et al.*, 1960) a collaborative study involving experts in stratigraphy and pollen analysis, historic cartography, economic history, archaeology, and changes in land and sea level. It disproved the popular and learned view that the Norfolk Broads were natural lakes or the remains of a silted-up estuary, and established that they were formed by an immense medieval industry digging peat for fuel.

More recently landscape history has grown into a coherent field of research with its own specialists and journals. Historical ecology has not become so organized: its findings tend to be scattered through journals of ecology, biological conservation, etc. I still hope that the journal *Environment and History* will fill this gap, but it seems to be difficult to get enough articles on environment, even extending this term to include plants and animals. Many issues have been eked out with articles on what people have *said* about 'environment', or even with articles of general history with only passing references to environment.

The future of landscape history and historical ecology

Geographical scope

When Jennifer Moody and I published *The Making of the Cretan Landscape* (1996), it was reviewed by Andrew Fleming and Yannis Hamilakis (1997). Among the claims they made was that there was 'something quintessentially British – or even just English' about the study of landscape archaeology: 'identifying and dating "archaeological features" and using the relationships between them to establish sequence, in the manner so lucidly expounded by Aston, Taylor, Bowen and Fowler' [and, I would add, by Fleming himself (1998)]. This was presented as a criticism: for reasons not fully explained, they doubted whether 'English-style landscape archaeology' would 'travel' to countries like Crete.

There is some substance in the claim that landscape history or archaeology has hitherto been studied mainly in England. Of articles published in the journal *Landscape History*, the geographical spread is as follows:

	per cent
England	75½
Wales	6½
Scotland	6
Ireland	2
France	2
Denmark	1
Sweden	1
Europe	1
India	2
South Africa	1
General	1

The overwhelming predominance of England is obvious; moreover the non-British articles tend to be rather vague and generalized and not to involve much fieldwork.

With the exception of Michael Williams' volume on South Australia (Williams, 1974), ours is the first book outside Britain to be published with the title *The Making of the . . . Landscape*. But there is no reason why it should be the last. It would be absurd if a discipline were to be peculiar to one country. Can botany be confined to Sweden, or climatology to Italy?

Historical ecology and landscape history indeed flourish in other countries. In Scotland there has been a gratifying body of recent work on woodland history (Smout, 1997); the present Historiographer Royal of Scotland, Professor Christopher Smout, writes on landscape history. In Italy I would mention, among others, the work or Diego Moreno in Genoa (Moreno, 1990). That great Belgian work, *Bossen van Vlaanderen*, by Guido Tack and colleagues

(1993), would be the envy of any English woodland historian. There is similar work in France, Germany and especially Scandinavia (Berglund, 1991; Birks *et al.*, 1992). In Japan I have spent some time under the guidance of Professor Jun-ichi Ogura, Professor Toru Nakashizuka, and others, discovering unexpected parallels and resonances with England, and reflecting that both are lands of ancient but independent civilization.

In North America the study of the history of Euro-colonial landscapes developed in parallel to that of England but largely independently, comparing written evidence with field evidence of land boundaries and relict woodland (Raup and Carlson, 1941). I have myself worked on this with Dr Moody in Texas (Plate 2). The Australian Forest History Society is active in the study of colonial landscape history, making use especially of the archaeology of railways and other machinery (Dargavel, 1997). There is also the historical ecology of Native American and Aboriginal land management, and the extent to which the resulting ecosystems survived through the colonial period.

Historical ecology in other countries uses similar sources of evidence to those in England. Each country has particular strengths and weaknesses, and sometimes the features of the landscape itself are different. England has perambulations (written descriptions of boundaries) from the Anglo-Saxon period; Crete has perambulations of the Hellenistic, Venetian, and Turkish periods. Crete lacks the distinction between what is or is not woodland, so the scholar has to do without the fixed woodland boundaries which are so significant for England (Rackham and Moody, 1996). Japan, like England, has timber-framed buildings at all levels from the majestic temple to the humble farmhouse, from whose materials much can be learnt of the environments in which trees formerly grew. The estate archives of temples and shrines, like those of English monasteries and colleges, are potentially a valuable source. The United States has very detailed accounts of vegetation in land-grant surveys made just in advance of settlement. Japan, England, Crete, and to some extent Australia – but not the United States – have many pollards and other ancient trees from which past woodland and wood-pasture management can be inferred (Plate 3).

Another complication is that we are dealing with living things. One cannot draw general conclusions about 'forests' in one country and apply them to another country where the trees are different. The first action of the historical ecologist, on going to an unfamiliar country, must be to learn the properties of the principal trees and other plants, especially how they react to browsing and woodcutting. The English historical ecologist going to Spain or America or Australia (or even Scotland) encounters the unfamiliar influence of fire, and has to understand why certain trees and plants are combustible and how they react to burning. Rates of change are also very different. The comparatively short time-scale in America is balanced by very rapid changes: for example Connecticut and Massachusetts have changed from mainly forest to mainly farmland and back to mainly forest in a mere 350 years.

This list, which is not meant to be exhaustive, should establish that there is nothing specially English about historical ecology or landscape history, except

that (on present evidence) Mead, Norden, Barrington and Hasted happened to be first in the field. However, these studies have developed largely independently in the different countries. There is a pressing need for an international journal of historical ecology, which I hope LANDSCAPES will fill.

Climate and catastrophism

Landscape historians have traditionally regarded climate as more or less constant: Europe settled down to roughly its present climate at the beginning of the Holocene. Changes since then have not been sufficient to have much effect on landscape, except in very marginal countries like Iceland and in the immediate neighbourhood of glaciers.

The best-known counter-example is the 'Little Ice Age': that series of cold periods in Northern Europe with peaks in the 1320s AD, the 1590s, 1690s and 1810s. This was severe enough to be an important factor in the desertion of settlements, at least on the fringes of settlement (Grove, 1988). In southern Europe, and perhaps in Japan, these were also periods of deluges, which affected the landscape directly by shifting sediment. Their causes are controversial, but probably lie in some combination of reduced solar activity and clusters of volcanic eruptions (Grove and Rackham, 2001).

Now that new methods, such as the study of Greenland ice-cores and of oxygen isotope ratios in ocean sediments, have made it possible to study aspects of past climate directly, it becomes likely that earlier Little-Ice-Age-like events will emerge scattered through the Holocene.

Landscape historians usually make another unspoken assumption, that climate exerts its effects through gradual changes year by year. Erosion and deposition, for example, are the effects of a thousand years of ordinary rains, rather than of the single greatest rain in a thousand years. Any change is automatically ascribed to human activity. The favourite is, of course, tree-felling, but almost any activity, even the decline of human activity, has been cited as a cause of increased erosion, seldom with any evidence that the particular activity causes erosion in the ecosystem in question. It has now become very likely that the gradualist assumption is wrong: much erosion results from catastrophic falls of rain, sufficient to overwhelm the resistance of any ecosystem; and these deluges may be clustered in particular periods of history, such as the 1590s and 1690s in Crete (Grove and Conterio, 1995).

Catastrophes certainly affect whole landscapes. On the plain of Khaniá, Crete, air photographs reveal a planned grid of fields and hedges, probably of Byzantine date, laid out over a series of mud-flows which buried the Minoan, Greek, and Roman antiquities. Similar deposits are known from many Mediterranean countries under the name of Younger Fill (Vita-Finzi, 1969). Investigators traditionally ascribe them to human activities, but all too often this involves correlating a poorly dated deposit with an ill-defined and vaguely-dated activity in the hinterland.

Experiments

Historical ecology should be, at least partly, a science. It is mainly an observational science like astronomy, rather than an experimental science like chemistry. However, all scientists like to experiment where they possibly can. Quasi-experiments, inadvertently set up by people in the past, can be instructive for the modern investigator. In Hatfield Forest, for example, one can compare coppice compartments and plains, with their different histories of grazing and woodcutting: these amount to a replicated experiment which has run for some 600 years, even if the randomisation of the plots leaves something to be desired (Rackham, 1990).

I hope that in time to come there will be actual experiments in historical ecology. Here we encounter the problem of the short time-scale. Almost the whole of science is geared on research grants and research studentships, which limits its scope to those phenomena in which useful data can be gathered within three years at most. Scientists move from job to job and get little chance to pursue observations even for a human lifetime. Research sites are littered with debris of abandoned experiments.

There is a more fundamental problem still. Experiments tend to be set up to answer specific questions to which the answers are already approximately known. If the question cannot be settled within a few years it tends to go out of fashion. What is needed is simple, cheap experiments and observations – fencing an exclosure, or taking photographs from a fixed point – which can be continued year by year without being at the mercy of grants or changes of fashion or personnel.

Multi-disciplinary studies

Landscape history involves history, archaeology, and ecology. Few studies pay equal attention to all three. All too often historians try to write the history of a landscape without doing any fieldwork. This very morning I found yet another author citing felling trees for shipbuilding as the cause of forest turning into non-forest, without any evidence of the quantities involved, still less of whether the particular forests were the sort of forest that is destroyed merely by cutting down the useful trees. Historians who rely solely on written records cut themselves off from ever knowing what was going on at times when people were not writing: for example, archaeology reveals that the late Roman was the second most prosperous period in the landscape of Crete, yet all the surviving records for Crete at this period could be written on a postcard.

Conversely, ecologists fail to understand or evaluate historical data. All too often an article states baldly 'Ancient writers say that . . .' without stating which ancient writers, what exactly they say, and what are the reasons for believing them. Linguistic skill is also needed, since much may turn on the precise meaning of a technical word which the ordinary translator may get wrong.

Even without the historical dimension, ecology is difficult to teach because of its complexity. Schools assign it a minor place in the curriculum, without

realizing that ecology is the most complex subject that they teach: far more complex than physics. The task of informing the public is far from complete. I find in a new book on the politics of landscape, in a preface by an eminent writer and lover of the countryside, the following claim:

> . . . we know that the countryside is an artefact, as man-made as a suburban garden. What has been made can be re-made to suit us.

It is dispiriting to find this still being repeated after twenty years of demonstration to the contrary. The writer seems not to know the fundamental difference between woodland and plantation, between those hedges, grasslands, etc. that are the result of people planting and sowing things and those that have sprung up of themselves; of how attempts to re-create old grassland often produce a startlingly different result from what was intended (Akeroyd, 1992); let alone of the complicated ways in which plantations, sown grasslands, and even suburban gardens lose their character as mere human creations and slowly acquire natural features that they were not meant to have.

The growth of survey archaeology has added another dimension to landscape history, but not everywhere. In Hoskins' time it was possible to assume that much of England was 'virgin forest' down to Anglo-Saxon times or even later. We now know better: many of the bigger wooded areas of medieval England, such as the site of Stansted Airport, have revealed abundant evidence of Roman and prehistoric settlement (Rackham, 1990). But in other countries, especially in eastern Europe, the old interpretation prevails: areas are assumed to have been wildwood down to a late period, or even today, apparently only on the basis that they contain no conspicuous monuments. What a rigorous archaeological survey would produce is unknown. Archaeologists dislike surveying in forest or other dense vegetation, because poor visibility makes the terrain unrewarding in terms of artefacts found; such areas (for example the phyllite country of west Crete) tend to remain blank on the archaeological map, whether or not they were so in reality.

The future of landscape history, and especially of historical ecology, depends on having people trained in more than one discipline. They do not flourish in universities, especially at undergraduate level. The historical ecologist is called upon to be a general practitioner of science, which is an unfashionable thing to be in an age of specialization.

They do, however, flourish among amateurs. As in some other branches of science, enthusiastic amateurs are good at gathering the essential field data. They may not all have the breadth of interest needed to synthesize different aspects of data, but by forming groups they can make use of each other's specialist abilities. They should be welcomed and given help in publishing their findings. There is a danger that a professional class will arise who will marginalize the contribution of amateurs. This has already happened in the field of biological conservation, in which the amateurs who used to dominate it have now largely been replaced by professional conservationists. This might be to the good, at least if professional training was less subject to fashion; but in

practice any advantage is outweighed by the tendency of conservationists to move on every few years, abandoning their existing work to pursue their professional careers.

Landscape history in theory

The Enlightenment of the last four hundred years sought to explain the world in terms of a small number of natural laws. People who devised theories, or made fresh data fit existing theories, were held in more esteem than those who gathered or checked the information. This was not new: the Aristotelian Greeks were incorrigible theorizers from small amounts of unverified data, which explains why they were successful astronomers but got nowhere in ecology (Rackham, 1996). It was given a fresh stimulus by Newton's theory of gravitation, which explained to a high degree of accuracy the motion of anything from roughly the size of an apple to that of a galaxy. This is characteristic of 'hard' sciences, like physics or astronomy, and some people still expect the 'soft' sciences like biology to have the same basis of rigid, relatively simple laws.

An obvious characteristic of biology is that biological laws have exceptions. Trained scientists do not like this. Now that evolution has come back into fashion, much scholarly effort is put into contriving elaborate demonstrations of how anomalous features of the structure, and even behaviour, of plants and animals may, after all, be reconciled with the laws of Darwinian evolution. Insistence that all species originated in the same way does a disservice to reality. Some plants, such as white clover, cord-grass, and one of the two British birches are known to have been created instead by polyploidization, and there may well be other mechanisms inaccessible in the depth of geological time. In terms of ecological history, evolution is not all-important. In the Quaternary period in which we live, plants and animals – at least in temperate regions – are found, not so much in habitats to which evolution has adapted them, as in those into which accidents of history have thrust them. During the glaciations, climatic change overtook evolution as the dominating force of ecological history; in the Holocene, it in turn has been overtaken by the growing scope of human influence.

Before long, somebody will complain that landscape history lacks a unifying theory. To some extent this is fortunate. Landscape history is a very soft science, combining ecology with behavioural anthropology; if it has laws they will be full of holes. It will be very unfortunate if it develops a rigid theory to which anomalous data have to be made to conform, as seems to have happened with evolution.

Half-baked theory can have disastrous effects. An example is the so-called 'Tragedy of the Commons': the notion that a common cannot be sustainable because each participant will over-exploit his own share to the detriment of the participants as a whole. It is surprising that this should ever have been believed: anyone who has studied the history of real commons, such as Hatfield Forest, knows that they are remarkably stable and if they break down usually do so for other reasons. It is, however, a fashionable theory, to which landscape

history can be made to fit. In southern Europe and the Third World governments make it the pretext for abolishing commons, often precipitating the very disaster they expect to avert (Hardin, 1968; Monbiot, 1994).

As soon as a theory is developed there is a risk that people will try to alter the landscape physically to fit the theory, however weak its foundation. This may be to the good: the theory that forests attract rainfall caused many a tropical administrator to preserve small areas of forest (Grove, 1995). But often it is harmful. The Enlightenment encouraged the theory that the natural and proper state of trees was growing close together in forests of tall trees, suitable for European ideas of good timber quality. This led to a separation of forestry from farmland and the loss of intermediate categories. Long-standing savanna or wood-pasture (that is, trees plus grass) were destroyed to form farmland or infilled to form forest. Wood-pasture was largely exterminated in countries receptive to Enlightenment theory, such as Germany and Italy; some of it survived in backward countries like England and Greece (Grove and Rackham, 2001). Even after pollen analysis was invented, scientists were conditioned to think that tree pollen implied trees in the form of forests; other forms of tree-land, such as savanna, were not considered.

This notion exerts its baleful influence to this day. Conservationists devote their efforts to preserving dense forests of tall trees; sparse or short forests, however great their merit, get little attention.[1] An urgent task for pollen analysts is to develop criteria for recognising when trees imply forests, and for distinguishing forests from savanna, maquis, coppice-woods, and hedgerow trees.

This said, there are areas of landscape history that cry out for unifying explanations. For example, open-field: why did strip-cultivation spread rapidly across Europe at a particular period? Why is it unknown in the Roman period or earlier? Why was it much more successful in some areas than others? What do Cambridgeshire, north-east Normandy, Germany, or Sardinia (lands of well-developed open-field) have in common against Essex, Devon, south-west Normandy, the south of France, or Corsica (Rackham, 1986)?

Conservation, restoration, and recognising the abnormal

The connexion between landscape history and conservation should be obvious, although surprisingly little has been published about it, except in the context of ancient woodland. Many sites of archaeological interest are also of ecological importance: for instance, in England prehistoric earthworks are often the last refuge of chalk grassland species, elsewhere destroyed either by ploughing or by succession of woodland.

Historical ecology is important in distinguishing what is conservable from temporary habitats which it would be unreasonable to expect to conserve.

1. The Council of the European Communities included only 'forests of tall trees' in its list of 'natural habitat types' requiring 'special areas of conservation' – excluding, for example, the wonderful high-altitude cypresses of Crete, among the oldest trees in Europe.

Conservationists used to be told not to try to conserve hedges, on the grounds that all hedges were later than 1750 and could easily be re-made. This, it need hardly be said, is nonsense – it is one of the *factoids* which are prevalent in this discipline – but if it were true it would be a valid argument against conserving them.

Restoration ecology is an industry in the United States, and is beginning to spread in Europe. It presupposes historical knowledge. A recent well-publicized objective (political reputations depend on it) is the restoration of the 'Great Caledonian Wood', traditionally supposed to have covered much of the south and middle Scottish Highlands until well within the last thousand years. The popularity of this scheme is not diminished by the insistence of Scottish historical ecologists – Professor Smout, Dr Jim Dickson (1992), and others – that the Great Caledonian Wood is a myth: the bog trees supposed to be remains of it are thousands, not hundreds, of years old, and the Highlands in Roman times were not very different from what they are now. Can something be restored that did not exist?

Another field in which I expect historical ecology and landscape history to be much invoked in the next hundred years is in recognizing the abnormal. In Australia it was pointed out to me that eucalyptuses respond to periods of drought by their branches dying back and growing again when the rains return. In England, when oaks behave in the same way, the condition is called 'stag-head' and is thought of as an abnormality, for which explanations such as acid rain are devised. Historic records of oaks 'dead in the top' indicate that this is a normal part of the behaviour of oak, calling for no special remedy.

Much of the uncertainty about global warming arises from not knowing whether the period of instrumental records of temperature is typical of the Holocene. In reality, it may turn out that the last 170 years have been a time of unusually stable climate against which to compare the changes of the last few decades.

A definitely abnormal feature of the late twentieth century is the presence of artificially large numbers of deer. This I have seen in Texas, Pennsylvania, England, Sweden, and Japan. In England the two native species of deer and the anciently-introduced fallow deer are augmented by at least four modern introductions; deer are now more numerous and widespread than at any time in the historic period. This has a disastrous effect on ecosystems, especially woodland, not adapted to such large numbers of herbivores.

One of the most urgent problems in historical ecology is to estimate the numbers and effects of browsing animals in prehistory. Human influence here may go back well beyond the Holocene, at least concerning the extermination of elephants and other tree-breaking beasts. Conservationists, faced with more deer than ever before, tend to say 'Bring back the wolf'; but nobody knows what effect carnivores had on herbivores in wildwood times. Whether wolves did indeed keep browsing within bounds cannot be verified. The problem takes a different turn in remote islands, such as Crete, which had a prehistory of herbivores (small elephants, terrestrial hippopotamuses, slow deer) but never

had a carnivore fiercer than a badger. Should over-grazing be regarded as their normal state?

Conservation, like forestry and other long-term human activities, runs in fashions. Historical ecology might have helped to prevent some of the more bizarre fashions, such as suppressing fires in American National Parks in the belief that all fires were unnatural.

One now encounters the claim that the only proper objective of conservation is preserving wildwood. In countries such as England, where no wildwood is left, conservationists are summoned to drop whatever else they are doing and to devote all their energies to *restoring* wildwood (Hambler and Speight, 1995). One of the problems here is defining the object of restoration: is it to be wildwood as it was before settled (Neolithic?) human activity? Or as it would be now if that activity had never occurred? Even the first is not straightforward. Pollen analysis reveals something of what tree species there were in wildwood, but very little is known of its structure, sizes and ages of trees, or whether there was a natural equivalent of coppicing (as there is, for example, with American and Japanese species of lime), or even to what extent it was forest-like or savanna-like. A realistic object of conservation would be to maintain whatever aspects of landscape are special to each particular country. This could well be wildwood in Borneo (provided that the claim of wildwood is based on historical and archaeological evidence rather than ignorance). In England it will be types of vegetation that result from long-continued interaction between plants and animals and land management.

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PLATE 1. Hayley Wood, Cambridgeshire, England. The ridge-and-furrow (emphasised by floodwater) proves that this part of the wood has not always been woodland. The ridges were not there in 1607.

PLATE 2. A property boundary laid out bt the great surveyor G.B. Erath on 22 July 1845 in what was then a prairie near Valley Mills, middle Texas. After 150 years it has spontaneously turned into a hedge.

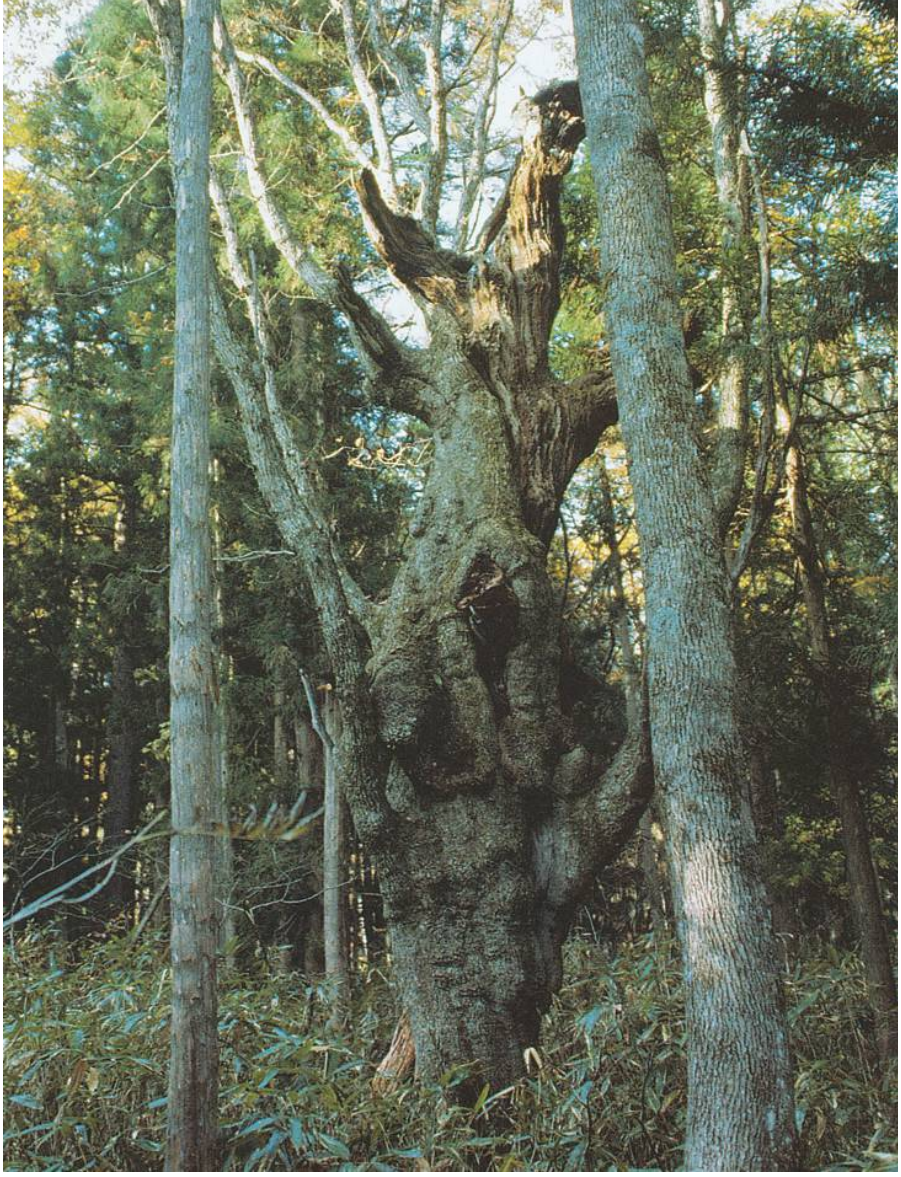

PLATE 3. *(left).* Old pollard oak *Quercus mongolica* on land belonging to the shrine of Togakushi, Japan. Such ancient trees, discordant with the younger trees around them, are characteristic of 'infilled savanna' and prove that the land has not always been woodland.