Trees, Woodlands, and Archaeology

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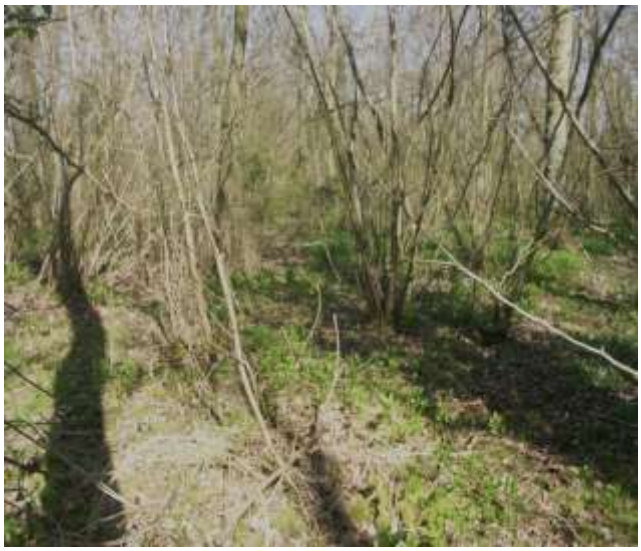
Trees and forests enter into archaeology in various ways.

1. Pollen analysis, which is largely based on trees, as a means of reconstructing past vegetation and land use.
2. Identification of charcoal and tree products, such as acorns, in archaeological contexts.
3. Trees and their products as part of the archaeology of standing buildings and of structures excavated from waterlogged sites.
4. Long-lived trees, often modified by cultural practices, as evidence for what has been going on around them.
5. Dendrochronology, the study of the annual rings of trees as affected by good and bad growing seasons, as a means of dating wooden structures, of identifying their provenance, and of determining past climate.
6. The study of wood-lots as features with archaeology either of their own or inherited from previous land-uses.

I refer to 'woodland' in its original English sense as land covered with natural trees, whether or not those trees are periodically felled or otherwise managed. The term excludes orchards, gardens, and (in my usage) areas of trees that have been planted. In England the term 'Forest', spelt with a capital F, historically is associated with deer rather than trees. In Australia and to some extent North America 'woodland' has been used for tree'd grassland, which I shall call *wood-pasture* or *savanna*. The American term 'wood-lot' means an area of woodland with a defined edge, usually surrounded by non-woodland. The English equivalent is 'wood', often as a place-name like Hayley Wood or Chalkney Wood — for each wood-lot has its individual name.



Woodland *(Buff Wood near Cambridge) and* wood-pasture *or* savanna *(middle Texas).*

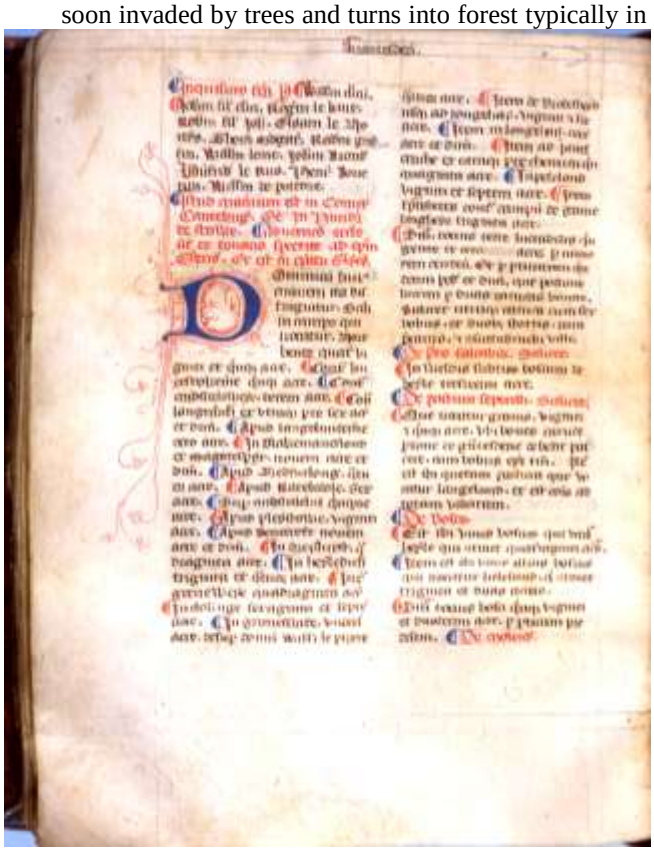
The idea of Ancient Woodland

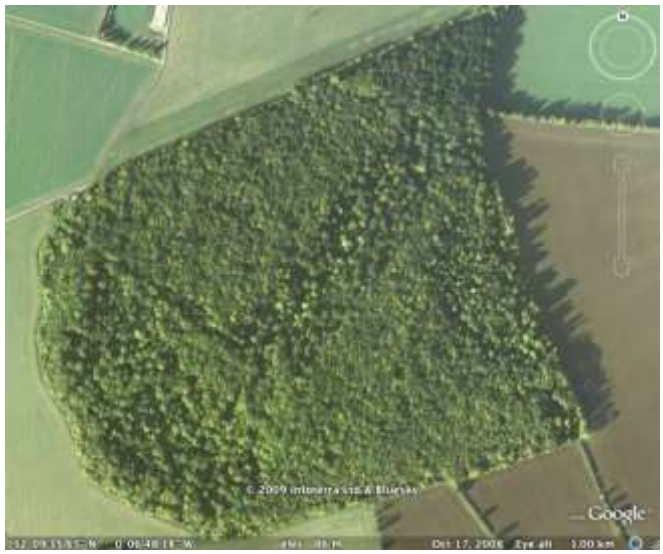
'Virgin Forest', like 'Primitive Man', is one of those phantoms that haunt the imagination of scholars. In practice nearly all the world's forests have been used by people and altered in some way, usually since prehistoric times. *Homo sapiens* has the unique power to act at a distance, if only by exterminating significant animals, such as the super-elephants of previous interglacials, and by altering the natural frequency of fire where fire is possible.

There is an important distinction between Ancient Woodland, wood-lots that have been in existence for several centuries, and those that have sprung up on land that used to be used for something else. For example Hayley Wood near Cambridge is first documented in AD 1251 and still exists. This is not by an oversight: it has been intensively used for most of the last 750 years and has been cut down many times, but it has remained as a wood and has not been made into fields. The wood has expanded on to a field abandoned in the 1920s, but the recent wood, though attached to an Ancient Wood, is very different in structure and vegetation.

As North Americans know well, the easiest way to create a new woodland is to stop cultivating a field. This has happened many times in the historic

and indeed the prehistoric past. An abandoned field is soon invaded by trees and turns into forest typically in 50 years or less; but it may be centuries before it acquires the characteristics of ancient woodland.





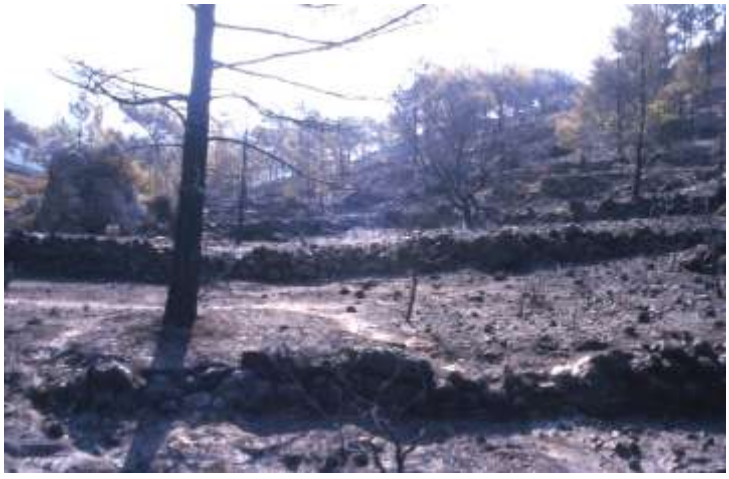
Hayley Wood as documented in 1251 (bottom right corner) and in Google Earth. The north corner of the wood has grown up since 1920.

Archaeology of features in woodland inherited from previous land-uses

Woods have been increasing not only in eastern North America but in many parts of the world, and have overrun a great variety of archaeological features. In Estonia the agricultural island of Saaremaa was ruined by both Hitler and Stalin and is now more than half forest, in which are embedded mysterious abandoned factories and collective farms.

In the European Mediterranean, forests often contain remains of terrace cultivation, abandoned when mechanized agriculture came. The equivalent in England is *ridge-and-furrow*, the very distinctive pattern left by medieval open-field agriculture in which fields were divided into strips typically 660 x 31 feet. In the Amazon rain-forest archaeologists have found large areas of special soil, *terra preta* ('black earth') containing charcoal and potsherds, artificially formed in pre-Columbian times. The present solitudes of the Amazon are not primæval but result from depopulation.

Forests have a reputation for containing little archaeology, but this seems to be based on a belief that they are 'primæval', have always been there, and have had little human activity; and on the practical consideration that dense vegetation interferes with archaeological survey.



A forest fire in Crete reveals underlying terraces from former cultivation. Much of the apparent increase in fires in Mediterranean countries results from abandoned fields being invaded by pines and other fire-promoting vegetation.

In reality almost any kind of archaeological feature can be found in present forest, ranging from the deserted cities and monuments of Cambodia and Yucatán to the hillforts, coal-mines, and burial mounds of western Europe. Some of these definitely indicate that the forest was not there when they were in use. Prehistoric barrows (burial mounds) in Europe are usually located where they can be seen from a distance; so when they are embedded in forest they indicate that the forest was not there in the Neolithic (4000—2000 BC) or Bronze Age (2000—750 BC). Medieval England (1100 AD) was only about 15% woodland, and most of the then big wooded areas contain evidence of non-woodland activity in prehistoric or Roman times. Even an ancient wood-lot like Hayley Wood, though it has been woodland for at least a thousand years, is underlain by faint earthworks of two prehistoric phases.

A wood one-and-a-half years after being felled. Note the distinction between the timber *trees (mostly oaks) that have been left standing and the* underwood *trees (here mostly ash) that are now sprouting from the stumps.*

Woodbank made, probably in the middle ages, to demarcate and protect the ancient wood to the right from what was then common pasture to the left. The latter has grown up to woodland within the last 120 years.

Archaeological features of woodland as such

Especially in countries where woodland is valuable property, wood-lots are defined by boundaries: typically a *woodbank* with an external ditch, or sometimes a dry-stone wall. Woodland conservation consisted in keeping out domestic (and often wild) animals that would eat the regrowth shoots of newly-felled areas. In England woodbanks were constructed from Anglo-Saxon times (7th to 11th centuries AD) until the 19th century. They are a valuable record of changes in woodland area. They appear to be uncommon in America, where woodland was abundant and labour scarce (except in slave States).

In the Old World, woods have been historically sources of energy more than timber. Woodland management typically relies on the fact that most of the world's trees, when felled, sprout either from the stump or the roots, yielding a renewable supply of *underwood* poles and rods used for many more or less specialized purposes, but especially for fuel. Woods were felled every so many years and allowed to regenerate.

The distinction between *timber* (tree-trunks big enough to make beams and planks) and *wood* (underwood poles and branches of trees felled for timber) has existed in Europe from prehistoric times and is maintained in most European languages, but was not taken up in America.

One of the most important woodland and wood-pasture products was charcoal, mainly an industrial and an urban fuel. Charcoal is made by igniting a stack of wood in an insufficient supply of air, and letting exothermic decomposition turn the wood slowly into charcoal. Many European woods on slopes are full of charcoal-hearths, platforms on which small logs were stacked, covered with straw and earth, and ignited from within. These appear in sloping woods as circular platforms, scooped into the hillside, and covered (under the leaf-litter) with a thin layer of residual charcoal, from which the species of wood can be identified and a radiocarbon date sought. Because charcoal is difficult to transport far, remains of fuel-using industries, especially making iron and glass, tend to be not far from woodland that produced charcoal.

Trees as archaeological features

Trees are long-lived objects that often (but not always) can be dated by their annual rings. Even a partial ring-count, such as a core taken from a hollow tree, gives an estimate of the rate of growth in diameter and can thus be used to estimate the age of the tree.

Trees are used in many ways that leave a permanent mark on the tree even if it outlives the use. The most common methods are *coppicing* and *pollarding.* Coppicing is the practice of felling a tree expecting it to sprout either from the stump or the roots. This was the normal method of managing woodlands as a self-renewing resource in many Old World cultures. Coppice stools produce a characteristic multi-stem tree that gets bigger at each felling cycle. Pollarding is a similar practice where the tree is cut 8 to 12 feet above ground. Pollarding is more labour-intensive; the usual reasons for it are either to ensure that grazing animals cannot reach the young shoots or to create a distinctive boundary marker. Typically a coppiced or pollarded tree lives longer than one that is not felled; its annual rings contain a record of the cycles of felling and regrowth.

Coppiced and pollarded trees are found in many Old World cultures, from Portugal to Japan. Coppicing spread to North American colonies, but apparently not pollarding (though it is known in Tasmania). Another practice that leaves a permanent mark on the tree is the harvesting of pieces of bark for various purposes, whether by Australian Aborigines or by beekeepers in Crete. Occupational burning of grassland, by Italian chestnut-growers, Tasmanian Aborigines, and many others, leaves either charred bark or a definite fire scar at the bases of any trees in the grassland.

Old, culturally modified trees, known in Britain as *veteran trees*, are often of special value as habitats for other wildlife. They are also witnesses to past land-use. A common finding, all over the world, is *infilled savanna*: scattered, often pollarded, old trees embedded in a forest of younger trees. The old trees originally were in grassland or heathland, usually maintained by some human land-use. When that land-use ceased, young trees sprang up and replaced the grassland. Examples include the ancient pollard oaks in some English royal Forests, the oak and elm motts (clonal patches) in the juniper woods of middle Texas, and the big eucalypts with fire-backened bases (relicts of Aboriginal land management) in young rain-forest in Australia. Fairhead & Leach, in *Reframing Deforestation*, show that much of what was thought to be 'primæval forest' in West Africa is the successor to a cultural landscape of farmland and savanna, the result of slave-traders who murdered or carried off the people maintaining the savanna.

In much the same way the forests that cover most of New England are often no more than a century or so old. They contain, as well as the field-walls and cellar-holes of the people who lived and farmed the land, the distinctively spreading hedgerow hedgerow and field trees of the farmland, now embedded in younger forest.

In the Mediterranean region old trees can be used to date other features. The key to landscape archaeology lies in dating the agricultural terraces; but we do not have that key. Terraces are strangely lacking in historical documentation, and are notoriously difficult to date on strictly archaeological grounds. Yet ancient trees, especially olives, usually sit on terrace walls or their degraded remains in such a way that the wall must be no older than the tree. It thus becomes possible to identify Byzantine, or less often Roman or Hellenistic, terraces.

Ancient coppice stool of ash in an Essex (England) wood. The multiple stems tell of centuries of felling and regrowth.

Ancient pollard oaks in an English medieval deer-park. Like most Veteran Trees these are in wood-pasture rather than woodland.

Plants indicative of woodland history

When a new wood is formed, whether by a change in land management (such as abandoning a field or ceasing to graze a savanna) it does not suddenly acquire all the characteristic plants and animals. The process of *succession,* whereby a field turns into a wood, was one of the main themes of early 20th-century ecological science: it may not be completed for centuries.

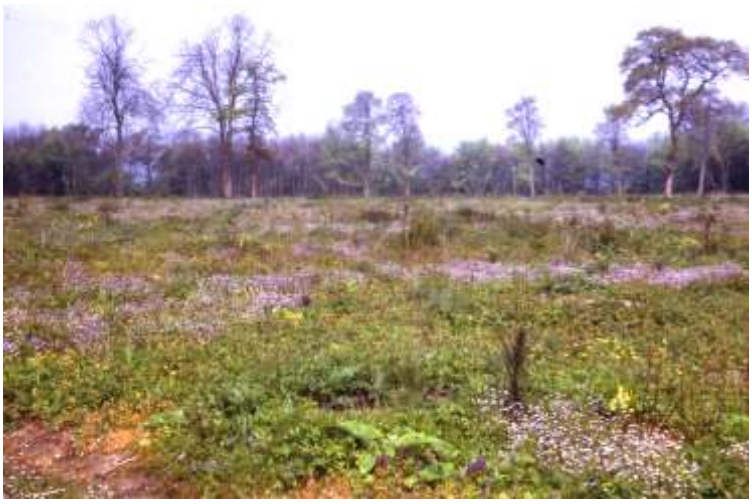
Two factors are involved. The soil of the previous land-use may be inhospitable to woodland plants. In particular, farmland which has been fertilized may be too fertile to be ideal for trees and woodland plants, which tend to be adapted to relatively nutrient-poor environments. The limitation may be not from the plants themselves but from the mycorrhizal fungi which all trees, and many herbaceous plants, have attached to their roots and which are essential to the well-being of the host.

The other constraint is from lack of dispersal. Seeds of many woodland plants do not easily reach newly-available ground, even if adjacent to an existing wood, much less if the new wood is isolated by fields. Hence there are *ancient-woodland indicator plants,* both trees (such as lime (basswood) in Europe) and herbs. Studies in Europe show that many of these belong to one or both of two categories. They may be clonal — spreading by underground stems or roots to form circular patches — and thus not often or easily establishing from seed. Or their seeds may be dispersed by ants; the ants (if they still exist at all) will be confined to woodland, not easily travelling across non-woodland to reach a new outlying wood.

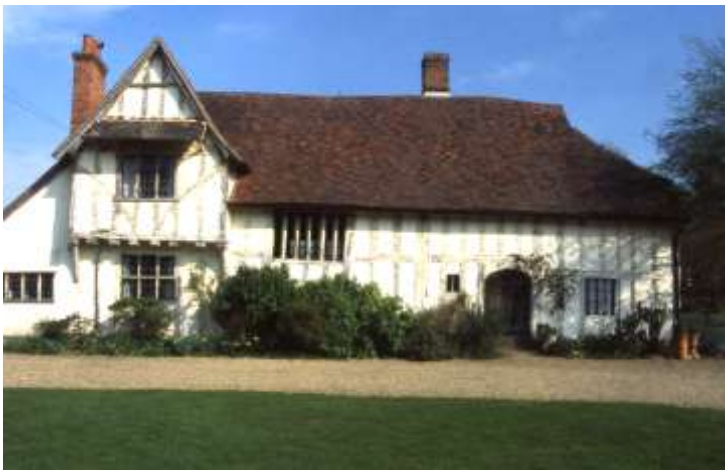
Some plants specialize in recent woodland: for example birches in the northern hemisphere, and many early-successional tropical trees. Plants specializing in recent woodland include the nettles and umbellifers of northern Europe, and the poison ivy that infests the stone walls of abandoned farmland in New England.

Another (overlapping) group of plants related to the cultural history of a wood-lot are the coppicing plants. Every time a wood is felled, some plant species react negatively, and many more react positively, to the removal of the canopy and temporary increase in light. Many perennial woodland plants, although present all the time, are stimulated to extra growth and flowering. Others are not visible at all in the wood before felling, and germinate from buried seeds.

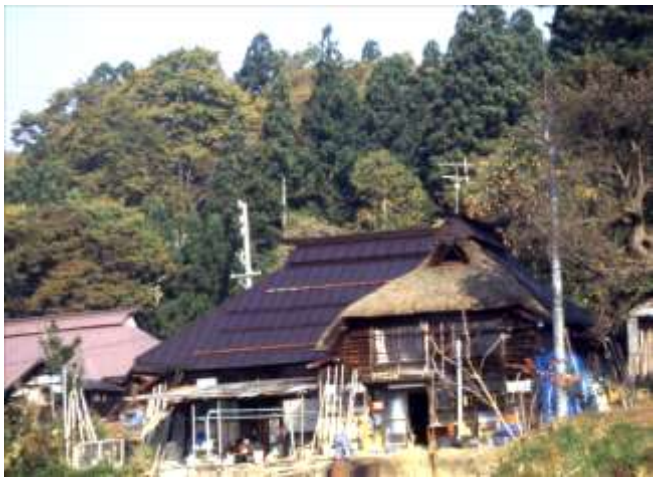
In most European woods the majority of plant species are not adapted to continuous shade, but require either permanent open areas (glades) or regular temporary open areas (coppicing) — both of which are distinct from small, temporary, irregular treefall gaps. As experience in Australia shows, the beginnings of a coppicing flora may appear in only three successive fellings of the same area. However, considering that many ordinary English wood-lots have been felled a hundred times in their history, there has been scope for coppicing responses to have been intensified by evolutionary change, especially among the *guild* (as American ecologists would say) of buried-seed plants.



Many of the flowering-plants of English (and European) woods do not withstand continuous shade: they flourish — if they appear at all — only after each time the wood is felled.



An English medieval farmhouse, made from small oak-trees, carpenter's oddments, reused oak timbers, elm and ash, and coppice poles.



A comparable Japanese vernacular house.

Off-site archaeology: timbers of buildings and structures

In countries like Japan and England, that have large numbers of ancient timber structures like timber-framed houses, cathedral roofs, and timber temples, these provide evidence of past woodland management. This can be extended back into prehistory by using excavated wooden artefacts preserved in waterlogged sites.

It is rarely possible to study an existing structure and know which wood-lot the timbers came from: in many cultures they could have been transported hundreds of miles.

There is often a preference for particular species: thus in early Japan palaces and temples are built mainly from the very durable conifer *hinoki* (*Chamæcyparis obtusa*), but from the 15th century onwards they are often of the elm-like *keyaki* (*Zelkova serrata*). English medieval ecclesiastical and upper-class carpentry is almost always oak, but lower-class buildings include elm, ash, aspen, and poplar. In Japan, however, oaks are a lower-class carpentry tree.

A common feature in most human cultures is the use of relatively small trees. So a great medieval barn — in its time the largest and most imposing structure for miles around — will be built of hundreds of components, made mostly of logs less than a foot in diameter. Components calling for trees more than two feet in diameter are few, and there is often evidence that these were difficult to find. The timbers evidently came from sources managed to yield a continuous supply of logs small enough for two men to lift. Forest giants were left until power tools had been invented. (Sawmills, although a medieval European invention, were taken up in New England earlier than in Old England.)

Exceptions are to be found in cultures, like Japan, where giant conifers existed that could be split accurately, thus avoiding the trouble and expense of lengthwise sawing: although even in Japan vernacular houses tend to use small trees.