Environmental change at Sydlings Copse, Oxfordshire, *c*. 8500 BC to the Present

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Summary

Sydlings (or Sidlings) Copse is a small (*c*. 3 ha) area of woodland occupying a valley 4 km north-east of Oxford, in the parish of Stowood (NGR SP 556096). The site forms part of a Berkshire, Buckinghamshire and Oxfordshire Wildlife Trust nature reserve, and has been actively managed to encourage species diversity. The woodland consists predominantly of ash (*Fraxinus excelsior*), field maple (*Acer campestre*), hazel (*Corylus avellana*) and oak (*Quercus robur*). It has a rich ground flora with many species designated as 'ancient woodland indicators', including wood anemone (*Anemone nemorosa*), herb Paris (*Paris quadrifolia*) and toothwort (*Lathraea squamaria*) (Day 1993).

Introduction

There are abundant textual sources relating to the history of the site. It formed part of the medieval Royal Forest of Shotover and Stowood, mentioned in Domesday Book, and woodland on the site is first specifically mentioned in a boundary description (perambulation) of the Forest made in 1298, contained in the Boarstall Cartulary (Salter 1930). It should be noted that a medieval Royal Forest did not necessarily consist of a large expanse of woodland, as the term meant an area reserved for hunting by the king (Rackham 1980), although most Forests did contain some woodland. A description of the Stowood portion of the Forest from 1660 indicates that its boundaries then corresponded approximately to those of the early nineteenth-century parish of Stowood. Virtually the whole of this area (*c*. 240 ha) consisted of woodland, divided into nine coppices. Sydlings Copse is a remnant of one of these coppices. The area was disafforested (removed from jurisdiction of Forest Law) at this time, and land given to villages that had held rights of common in the Forest. Parish and estate maps from the eighteenth and nineteenth centuries show the progressive clearance of much of the medieval woodland, resulting in the narrow strip remaining at Sydlings Copse today, and other scattered patches of woodland (as at Wick Copse) (figure 1).

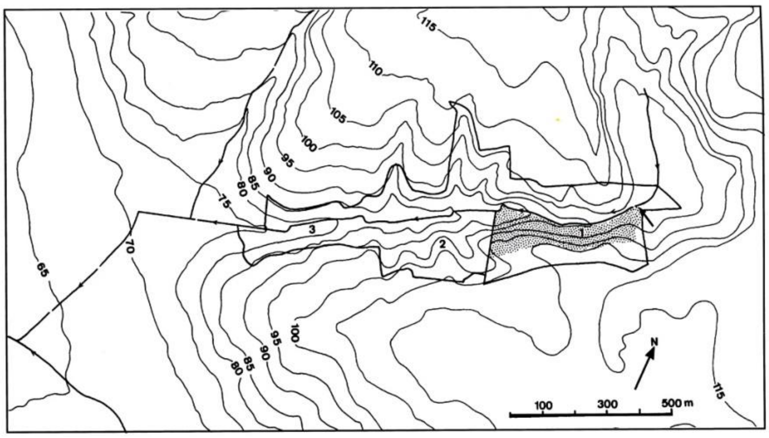

Figure 1. Map showing the location of Sydlings Copse and the coring site.

Textual sources thus indicate that Sydlings Copse is a remnant of a larger expanse of woodland present since at least the thirteenth century, but for the earlier history of the site we must turn to pollen analysis. Fortunately there are suitable organic deposits in the valley bottom, where fen communities have developed along the stream. Coring in these fenland areas by the present author in 1987 revealed up to 3 m of waterlogged deposits, found to cover almost the whole of the period from the end of the last glacial to the present day (the postglacial or Holocene). These deposits represent the most complete postglacial sequence from Oxfordshire, and analysis of the biological remains contained within them enables reconstruction of the process of environmental change and woodland development (complementing that from Cothill Fen), as well as the later history of human impacts connected with local agricultural activity. This paper presents a summary of the investigations at Sydlings Copse. For full results see Day (1991, 1993) and Preece & Day (1994).

Site description and stratigraphy

At Sydlings Copse organic deposits have accumulated along the entire length of the valley, as a result of a high water table maintained both by the stream and by seepage of water along the valley sides where the Corallian limestone and sands overlie Oxford Clay. At the eastern end of the site the organic deposits reach a maximum of *c*. 1.3 m in depth, and are underlain by a similar depth of tufa, a calcium carbonate deposit formed as a result of spring activity. One of two large medieval dams spans the stream in this part of the site, but most of the organic deposits accumulated long before the dams were constructed.

A core for pollen analysis was removed from the deepest part of the deposits using a 5 cm-diameter Livingstone piston corer. The sequence consisted of a basal layer *c*. 15 cm thick of calcareous silt and clay with fragments of plant material, overlain by 130 cm of tufa, overlain in turn by 132 cm of mud and peat (figure 2).

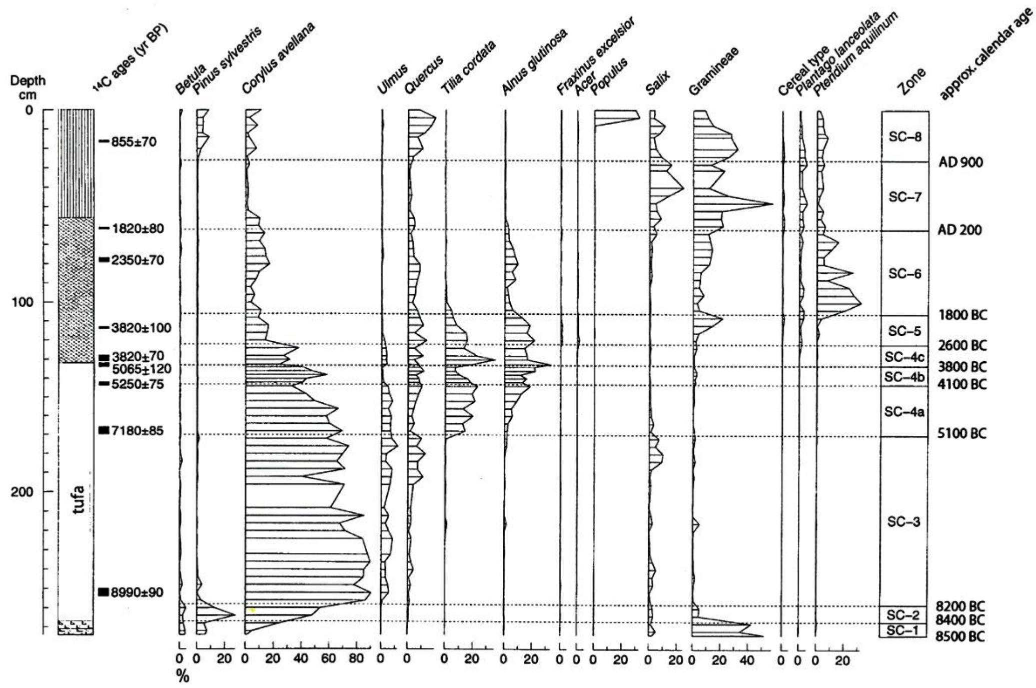

Figure 2. Summary pollen percentage diagram from Sydlings Copse, showing selected taxa only.

These deposits accumulated as a result of spring activity, which supported growth of fen vegetation along the valley bottom. The tufa would have formed in a shady spring, surrounded by trees, while the switch to mud formation may reflect changes in the rate of water flow due to disturbance in the catchment by human activity. The tufa deposits are of particular importance for environmental reconstruction because, in addition to pollen grains, they contain molluscs and ostracods (which are well preserved in the carbonate-rich deposits). A full account of molluscan analyses from the site is given in Preece & Day (1994).

Pollen analysis and radiocarbon dating

Pollen analytical methods are the same as applied to the Cothill Fen sequence (Dark, this volume). The timescale shown on the pollen diagram is based on a set of eight radiocarbon dates on plant remains or fragments of land snail shell. The dates were produced by the Oxford Radiocarbon Accelerator Unit and the results converted to calendar age ranges using the program OxCal (Bronk Ramsey 1995), indicated by cal BC or AD.

Environmental change at Sydlings Copse

Before describing the sequence of environmental change represented in the deposits from Sydlings Copse it is worth mentioning that, as described in relation to the pollen sequence from Cothill Fen, numerous factors are involved in interpretation of the pollen diagram. We may note particularly that several potential indicators of human activity are under-represented in the pollen record. This is especially the case for cereals, which release very little pollen. A similar situation applies to herbs forming the woodland ground vegetation. It would be useful to use the pollen record to trace the history of the 'ancient woodland indicators' species present in the woodland today, but only a few produce distinctive pollen – e.g. wood anemone (*Anemone nemorosa*) and dog's mercury (*Mercurialis perennis*) - and their pollen production is low. For a detailed discussion of the pollen record for these plants see Day (1993).

For the sake of description the pollen diagram has been divided into zones of similar pollen composition. The sequence illustrates the following main stages:

Woodland development in the Mesolithic period, c. 8500-4100 cal BC (zones 1 - 4a)

The lower part of the sequence corresponds approximately to the period covered by the deposits at Cothill Fen, and illustrates the development of woodland after the end of the last glaciation. From c. 8500-8400 cal BC the environment was predominantly open, with scattered birch (*Betula*), pine (*Pinus sylvestris*) and willow (*Salix*). After a brief flourishing of pine, hazel came to dominate the landscape, with some areas of elm (*Ulmus*) and oak (Quercus) woodland. At c. 5100 cal BC there was a major change as small-leaved lime (*Tilia cordata*) arrived and rapidly became the dominant component of woodland on well-drained soils, although areas of hazel, elm and oak continued to occur. Alder (*Alnus glutinosa*) spread more slowly to a position of dominance on soils prone to water-logging, apparently replacing local stands of willow.

Neolithic woodland disturbance, c. 4100-2600 cal BC (zones 4b-4c)

At *c*. 4100 cal BC there was a sharp decline of elm and lime, accompanied by a major increase of hazel and minor increase of grasses. This represents the Neolithic 'elm decline', an event widely recognised in other pollen sequences from Britain and north-west Europe. Various hypotheses have been proposed to explain it, including the spread of agriculture (with elm woodland on fertile soils being cleared to create areas for cereal cultivation), use of leaf fodder to feed cattle, and the spread of a disease similar to Dutch elm disease. At Sydlings Copse there is no evidence for cereal cultivation at this time and no signs of significant woodland clearance. The fact that lime declines at the same time as elm suggests that the decline may at least partially be explained by gathering of elm and lime leaves for fodder – as both are palatable to cattle, but research at other sites suggests that the elm decline was too rapid and universal an event to be explained entirely by human action (Rackham 1980). Pollen analysis of annually-laminated sediments from Diss Mere, Norfolk, indicates that the decline occurred over a period of just six years (Peglar 1993). This suggests that the most likely cause is a disease of elm, but this does not explain why lime should also decline at some sites, such as Sydlings Copse.

It is probable that the general explanation for the elm decline in north-west Europe is the spread of a disease, but that the characteristics of the event at individual sites may reflect an interaction with the effects of human activity, whether this involved agriculture (where cereal pollen is present at the time of the elm decline) or harvesting of leaves to feed cattle (as at Sydlings Copse). Human activity may have encouraged the spread of disease by damaging trees, and so increasing their susceptibility to infection. At Sydlings Copse the decline of lime and elm resulted in reduced shade, encouraging the flowering of hazel and allowing a modest increase in abundance of grasses. The molluscan assemblages also attest to a reduction in shade. The outbreak of disease and apparently use of leaf fodder, eventually ceased, after which elm and lime populations recovered.

Woodland clearance from the late Neolithic/early Bronze Age, c. 2600-800 cal BC (zone 5-base of 6)

At *c*. 2600 cal BC there is a marked decline of hazel, followed by the virtual disappearance of elm and a decline of lime, suggesting the onset of significant woodland clearance. This clearance was probably undertaken to create both arable and pasture land in the late Neolithic-early Bronze Age period, as suggested by the increase of grasses and presence of cereals and ribwort plantain (*Plantago lanceolata*), a plant commonly associated with pasture or fallow land. The abundance of ferns suggests that the remaining woodland was more open than previously, and this open woodland structure seems to have encouraged other species of the ground flora to flower, as pollen of dog's mercury (*Mercurialis perennis*) appears for the first time.

From *c*. 1700 cal BC oak and alder also declined markedly, suggesting that clearance had become sufficiently extensive to spread even onto soils prone to water-logging. The extent of hazel woodland also continued to decline, while lime disappeared completely. There is little evidence for cereal cultivation, and it is possible that the further impetus to clearance was creation of pasture. Sedges became abundant on the local wetland area, while an increase of bracken may reflect colonisation of sandy soils previously occupied by lime woodland.

Late Bronze Age/early Iron Age woodland regeneration, c. 800-400 cal BC (mid zone 6)

From *c*. 800 cal BC there is some recovery of woodland of hazel, oak and alder. This parallels events at several other sites in England (Dark 2000), and may reflect a temporary reduction of agricultural activity in response to a period of climatic deterioration.

Renewed clearance from the Iron Age to Anglo-Saxon periods, c. 400 cal BC-cal AD 900 (upper zone 6-zone 7)

In the Iron Age and early Roman period some of this regenerated woodland was cleared once again, suggesting a renewed impetus to agriculture. By the middle of the Roman period virtually all local woodland on well-drained soils had been cleared, and the small amount of alder woodland on wetter soils replaced by willow. Cereals were grown locally, probably as part of a mixed agricultural economy.

The near-total removal of woodland is intriguing in view of the fact that the region to the north and east of Oxford was the focus of the Oxfordshire ware pottery industry, which would have required substantial fuel resources. Over thirty kiln sites are known (Young 1977), manufacturing white wares made from the iron-free clays found on Shotover Hill. The pollen record suggests that there would have been little woodland present locally to fuel the kilns, and it is likely that the small remaining areas of woodland were managed by coppicing to ensure a regular supply of fuel. The increase of willow during the Roman period may reflect deliberate encouragement or planting, as willow grows rapidly after cutting.

The pollen sequence suggests that the landscape remained very open well into the Anglo-Saxon period. It is often assumed that the end of Roman Britain was accompanied by collapse of the agricultural economy and widespread land abandonment, but there is no evidence from Sydlings Copse for any woodland regeneration that might result from such events. This accords with archaeological evidence for apparent continuity of occupation at sites in the Upper Thames region, as notably at Barton Court Farm, Abingdon (Miles 1986).

Woodland regeneration from the late Saxon/early medieval period, c. cal AD 900-present (zone 8)

From *c*. cal AD 900 increases of oak and hazel reflect woodland regeneration - the origin of the woodland currently on the site. It is notable that the secondary woodland differs markedly in composition from the original woodland, being dominated by hazel and oak, while lime and alder are absent. Pollen of wood anemone appears for the first time, having been absent during the earlier woodland phases. Although ash and maple are abundant in the woodland today, they barely register in the pollen record because they are low pollen producers.

The fact that woodland regeneration occurred suggests that the land around the site ceased to be cultivated or grazed, and one possible reason for this is a change in land use when the area was designated a Royal Forest. Creation of a hunting area reserved for the king’s use may have meant that some areas of land ceased to be farmed, and thus reverted to woodland.

There is no indication from the pollen sequence of the period of woodland clearance in the eighteenth and nineteenth centuries, attested by texts and maps. This is probably because woodland survived at Sydlings Copse itself, immediately surrounding the site where the pollen core was taken. Furthermore, the accumulation rate of the uppermost deposits is slow, and they may have been mixed due to recent trampling by animals (and humans!) on the fen.

Conclusions

The wetland deposits of Sydlings Copse have preserved a valuable record of environmental change spanning most of the postglacial period. The site is one of very few in Britain where the origins of an existing wood can be traced by pollen analysis. The pollen record, combined with textual records, indicates that Sydlings Copse is a remnant of a substantial area of secondary medieval woodland, resulting from regeneration over a thousand years ago. The present diverse flora of the site reflects this ancient origin, combined with the wide range of habitats presented by variations in geology, topography and drainage and, in particular, the cycle of light and shade produced by coppice management.

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