STORMONT LOCH

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Highlights

The sediments which infill the floor ofStormont Loch provide an important pollen record, supported by radiocarbon dating, of the vegetational history and environmental changes in eastern Scotland during the Lateglacial.

Introduction

Stormont Loch (NO 190423) is a partially infilled, shallow (less than 3 m) lake which occupies part of a large kettle hole complex in the outwash fan which spreads across Strathmore from the Ericht Valley, draining both Glenshee and Strathardle (Paterson, 1974; Insch, 1976). The site lies at an altitude of 61 m O.D. within freely drained iron podsols (Corby Association; Laing, 1976) where they closely abut brown earths (Balrownie Association) which comprise the fertile, till-derived soils of much of Strathmore.Stormont Loch is one of the few lowland sites in Strathmore which retains a complete Lateglacial and Holocene sedimentary sequence, having escaped drainage and marl extraction during the 18th and 19th centuries, which either removed or disturbed deposits on a wide scale throughout the agricultural lowlands of eastern Scotland. Limited stratigraphical investigations and detailed pollen analysis of one part of the loch basin have been undertaken by Caseldine (1980a, 1980b).

Description

Borings in the western fringe of the basin have shown relatively rapid thickening of the sediment infill to over 6 m within 50 m of the edge; beyond this, surface water conditions prevented further boring. The Lateglacial sediments comprise a straightforward sequence of a basal, dark grey clay which becomes increasingly coarse with depth, followed by a brown organic mud incorporating occasional lenses of both gyttja and sedge peat, overlain in turn by a very fine grey clay (Figure 14.9). Overlying the Lateglacial deposits there are over 4 m of Holocene sediments, largely telmatic peats and dystrophic gel muds.

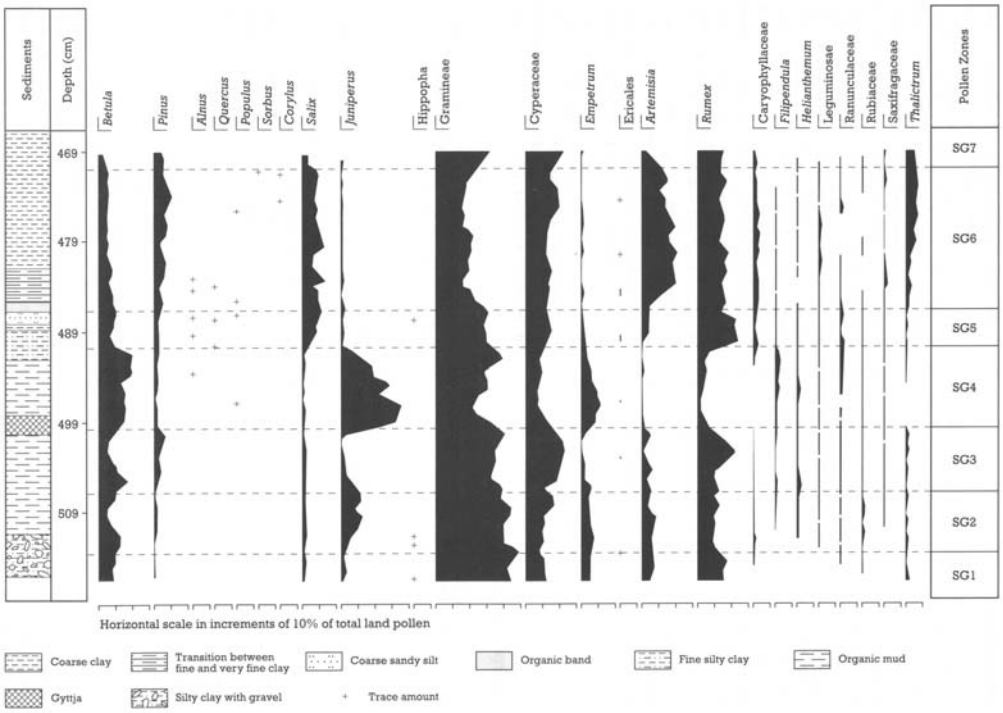

Figure 14.9: Stormont Loch: relative pollen diagram for core SGI showing selected taxa as percentages of total land pollen (from Caseldine, 1980a).

Pollen diagrams have been prepared for the Lateglacial and Holocene sediments from the basin by Caseldine (1980a, 1980b). Of particular interest is the record for the Lateglacial derived from two parallel cores and comprising both relative pollen (Figure14.9) and pollen concentration diagrams supplemented by four radiocarbon dates (SRR–1732 to SRR–1735).

Interpretation

Within the lowest clay there is a Gramineae-Rumex pollen assemblage typical of the earliest phase of the Lateglacial Interstadial throughout Scotland (Gray and Lowe, 1977b). The later interstadial record which occurs within the mud varies from the sequence more commonly found in eastern Scotland (Lowe and Walker, 1977), in that it has two clear peaks for *Juniperus* separated by an assemblage having increased *Rumex* and Cyperaceae. This pattern appears both in the relative and concentration diagrams and is interpreted as representing a brief climatic deterioration within the interstadial. This has been tentatively correlated with the Older Dryas climatic oscillation which is found in north-west Scotland (Pennington, 1977b) and in other parts of north-west Europe, but a radiocarbon date from this level of 13,820 +670/-580 BP (SRR–1735) is thought to be affected by older carbon and hence inaccurate. Sites demonstrating such an oscillation are rare in eastern Scotland; the only other clear sequence is found at Corrydon in Glenshee (Walker, 1977).

The change to the Loch Lomond Stadial is demonstrated by the lithological change from organic mud to grey clay and in the pollen record by the virtual disappearance of *Juniperus* and the presence of a range of herb taxa characteristic of the cold period. This occured after 11,510 + 140 BP (SRR–1734). At Stormont Loch there is a very full and detailed representation of the local stadial vegetation cover which suggests a delayed expansion of *Artemisia* after an initial phase in which *Rumex* and Gramineae were dominant. This is assumed to reflect an initial period of high precipitation followed by a very much drier, but still very cold phase, a pattern similar to that found further north in the Strathspey by Macpherson (1980) and which lends support to the stadial palaeoclimatic interpretations of Sissons (1979d). There is evidence for increasing warmth at 10,150 + 110 BP (SRR–1733) in an expansion of aquatic taxa and a decrease in *Artemisia*, but local development of *Juniperus* and *Empetrum* is dated rather late at 9700 + 90 BP (SRR–1732).

The Holocene sequence conforms with the expected pattern for eastern Scotland (Birks, 1977)

showing early dominance of *Betula* and *Corylus*, and the eventual development of *Quercus*, *Ulmus* and *Alnus*. Strathmore lies well to the south of the extensive pine-dominated woodland of northern Scotland and during the middle Holocene exhibited a mixed-oak woodland with enhanced frequences of birch, which itself was the major woodland element on the higher ground immediately north of the Highland Boundary Fault. An elm decline is sharply delimited in the pollen record and is associated with the first appearance of *Plantago lanceolata* and the expansion of other open ground indicators. The more recent record shows further woodland clearance and the eventual local expansion of *Calluna* as the soils immediately around the site became heavily podsolised.

Stormont Loch is of national importance in that it provides a complete picture of vegetation change over the last approximately 13,000 years from an inland lowland area close to the main centres of Lateglacial ice development, but located away from the direct influence of the ice (for example, compare with Tynaspirit and Loch Etteridge). It also allows potentially valuable comparisons with the many upland sites that have been studied, which may help clarify environmental (for instance, altitudinal) influences in the Lateglacial climatic record; as yet there is insufficient evidence to evaluate fully such influences (see, for example, Tipping, 1991b). In its detailed and generally atypical Lateglacial pollen record, Stormont Loch is of wider importance in contributing to a better understanding of the complexity and character of Lateglacial climatic change. By demonstrating consistent vegetation changes in duplicate cores, particularly within the interstadial part of the record, but also within the stadial, the results confirm Stormont Loch as an important reference site not only for eastern Scotland, but also for making the comparisons necessary to establish the wider patterns of Lateglacial climatic change (see Tipping, 1991b). Further, comparisons of the pollen record with the coleopteran record (Atkinson *et al.*, 1987) are also essential and in this respect Stormont Loch is significant in showing early climatic deterioration during the Lateglacial, a feature matched in the coleopteran record established at other sites (Atkinson *et al.*, 1987). Stormont Loch is also notable for its full and clear stadial record, showing increasing aridity as the stadial progressed, an aspect now attracting attention in explaining the pattern of glacier changes.

Further, Stormont Loch has great potential for the study of Holocene vegetation history in a dominantly agricultural landscape whose past land use history is but poorly understood. This potential lies in the probable thick depth of sediments in the main part of the loch, affording a high level of analytical resolution, and in the relatively long period of anthropogenic influences identified in the preliminary Holocene pollen diagram.

Conclusions

Stormont Loch is an important reference site for studies of the environmental history of eastern Scotland during the Late Devensian and Holocene (approximately the last 13,000 years). It is particularly notable for the detail of its Lateglacial pollen record which has allowed revealing insights into the environmental changes that occurred; for example, it is one of only a few sites in eastern Scotland to show that vegetation development was interrupted by a short, but separate climatic deterioration before the Loch Lomond Stadial (about 11,000–10,000 years ago). By virtue of its geographical location, Stormont Loch is also significant for the potential comparisons it allows between the different vegetation histories at sites in the uplands and lowlands.

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