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Divining the pattern: integrating dendrochonrology and paleolimnolgical records from Central Scotland.

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Multiproxy approaches can provide a more comprehensive and detailed interpretation of the past environment than would be possible using a single proxy, however, the integration of multiple data sources requires careful consideration. Within this study, we integrate diatom, pollen, dendrochronology and geochemistry (XRD, C/N ratios and isotopes) records to infer past environmental and climatic changes around Loch an Eilein in the central Cairngorms, Scotland. This region has experienced significant variations in pine forest extent over the last 8000 years. To our knowledge, this project is the first to employ both lake sediment and tree-ring sequences from the one location to reconstruct past environmental and vegetational change.

A 2.5 m sediment core recovered from Loch an Eilein forms the basis of the results and is augmented by sub-fossil pine material (trunks and branches) recovered from this and an adjacent lake. The lower section of the Loch an Eileen core spans the transition into the Holocene period, with minerogenic sediments and the diatom species *Fragilaria* and *Aulocosira* initially dominant. By ∼8,700 cal yr BP *Cyclotela* had become the dominant species, potentially indicating a warming climate. The pollen record also shows a marked transition from an early *Betula*-dominated woodland community to a *Pinus*-dominated one, further reflecting inferred warming. Additionally, sub-fossil pine material clearly shows extensive mature *Pinus* woodland by ∼7850 cal. yr BP at several sites within the Cairngorms.

From ∼6100 cal. yr BP there is a transition to mixed pine-birch woodland with a decline in *Pinus*, while the diatom communities reveal compositional shifts potentially linked to changes in stratification and mixing regimes. The pollen record indicates a continued pine decrease until ∼2500 cal. yr BP, which is consistent with the lack of radiocarbon dated sub-fossil material dating from ∼5900-3200 cal. yr BP.

Increasing anthropogenic indicators within the pollen record, combined with an increase in sub-fossil material post ∼3000 years BP may indicate the beginning of long term human impact on woodland ecosystem. This appears to have had maximum impact by the early 19^{th} century and the current woodland ecosystem represents a recovery from the final major forest clearances of these times.

This record provides a long-term context against which more recent changes can be compared and highlights the value of multiproxy reconstructions.