Extending the ancient in our understanding of ancient woodlands: time and ecological dynamics Helen Shaw, helen.shaw@mu.ie





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Adding a longer time dimension to AWI



Palaeo – means "old" older or ancient, especially relating to the geological past
Palaeolithic – Old Stone Age, Palaeontology – Study of fossils – bones etc.

Palaeoecologist - studies ecology through time. Palaeoenvironmental scientist - studies environment through time.

Holocene and recent palaeoecology – since last ice retreat.

We have c. 100 years of use of palaeoecology. Mainly using pollen and spores extracted from sediment to understand vegetation cover through time.



Palaeoecological methods





Data display



Percentage of pollen counted



0

Percentage of various different pollen taxa/ micromorphs each level is a sample of all species at a point in time.

The current palaeoecological sites resource in Ireland

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A CATALOGUE OF IRISH POLLEN DIAGRAMS.





Mitchell, F.J., Stefanini, B.S. and Marchant, R., 2013. A catalogue of Irish pollen diagrams. In *Biology and Environment: Proceedings of the Royal Irish Academy* (Vol. 113, No. 1, pp. 103-133). Royal Irish Academy.

Are all sites measuring the same thing? Pollen deposition via the air into a sediment basin

Younger sediment at top

Older sediment at the base

Small basins under canopy - local pollen rain dominates therefore local stand scale histories can be gained.

Palaeoecology: spatial potential



Palaeoecological sites filtered for stand-scale woodland studies



Figure 27. Distribution of the 41 sites containing pollen data that may depict local-scale woodland histories, including ALEW, other woodland sites and shadow woodlands. Red indicates local sites, and green indicates extralocal sites. (Devaney, J., Shaw, H et al 2023)

Under 20 sites have chronological records

Devaney, J., Shaw, H., Mitchell, F.J.G., Darcy., E., Leniston, T. & Roche, J. (2023). Mapping, monitoring, and protecting ancient and long-established woodland in Ireland. Irish Wildlife Manuals, No. XXX. National Parks and Wildlife Service, Department of Housing, Local Government and Heritage, Ireland. **Publication in prep.**

Mapping, monitoring, and protecting ancient and long-established woodland in Ireland – **clearly room for more palaeoecology**



Figure 5. Distribution of ALEWs (after Perrin & Daly, 2010) with Annex I woodland monitoring data (red; 91A0 Old sessile oak woodland, green; 91E0 Alluvial woodland, purple; 91J0 Yew woodland). Triangles indicate ancient or **possible** ancient woodlands and squares indicate longestablished woodland.

Devaney, J., Shaw, H., Mitchell, F.J.G., Darcy., E., Leniston, T. & Roche, J. (2023). Mapping, monitoring, and protecting ancient and long-established woodland in Ireland. Irish Wildlife Manuals, No. XXX. National Parks and Wildlife Service, Department of Housing, Local Government and Heritage, Ireland. Publication in prep.

Great previous work – but gaps... Issues for palaeoecology



Figure 1. Percentage pollers diagram of the major taxa from Reenadiana Word, Killarney. The 'total herbs' curve includes all herbaceous pollers uses in the pollers sam (plotted and unplotted).

> Interesting shifts to *Taxus baccata* in Reenadinna wood. Clearance phases.

> Difficult to assess timing due to the short core covering several thousand years.

Few local-scale Irish sites have detailed chronologies...

Mitchell, F.J.G., 1990. The history and vegetation dynamics of a yew wood (Taxus baccata L.) in SW Ireland. *New Phytologist*, *115*(3), pp.573-577.

Examples: Glen Affric Should we restore this forest?



Shaw (2006); Shaw and Tipping (2006); Shaw and Whyte (2013)

A long-term ecotone rather than a degraded forest Mixed woodland with continuity to the east...

Skelghyll and Common woods Cumbria



Small woodlands... Not designated But insignificant?



http://www.scottishforestrytrust.org.uk/projects/a-palaeoecological-investigation-of-tilia-cordata-in-skelghyll-and-com-2011-2012.asp



Image: http://www.one-foot.com/Wansfell%20Pike%20via%20Jenkin%20Crag%20and%20Troutbeck%202010.html



http://www.euforgen.org/species/tilia-cordata/ http://botany-collection.bio.msu.ru/plant/view?id=400

Skelghyll Woods Summary pollen diagram (c.1800 years) and *Tilia cordata* pollen curve



Skelghyll Woods summary pollen diagram (percentage of pollen in key taxon groups)

Tilia pollen as a percentage of total land pollen from samples in the Skelghyll peat core

Small fragmented and planted woodlands can be important.

AWI Task 4: Add palaeoecology to our inventory toolbox



Use **proxy** evidence to extend our ecological investigations of the past.

What species were present in the past?

Was continuity or change the norm?

How did species presence/abundance change through time?

What were the **drivers of that change**?







There are a whole range of other things that can be interpreted to provide palaeo<u>environmental</u> signals from bogs.

Microfossils

Fungal spores, testate amoebae, nematode eggs, chironomid midge larvae.

Macrofossils Beetles, plant parts (leaves, seeds, stems, wood).

Chemical markers Chemical pollutants in sediments. Chemical constituents of sediments. Carbon – contained in the plant matter. DNA, lipids and proteins.

What gaps can we fill?

Time – extend the ancient presence and cover of woodland continuity **Space** – where trees were



Also...composition of woodland, processes of change, and environmental drivers

AWI Methods – standard palaeoecology +





Task 4.1 of AWI project...the most important!

A simple process

- 1. Site selection
- 2. Coring, Describing the core, radiocarbon and dating
- 3. Pollen counting
- 4. Analysis

However, making it a success...

- We will use mapping, developed in previous presented stages of project, to identify sites of ancient woodlands of interest.
- Whilst NPWS can give us access to some sites, others may be privately owned...
- Not all woodlands will have suitable sites.
- Finding suitable sites is not easy!
- Do you know of any small wet hollows in interesting fragments of possibly ancient woodlands?
- Please do speak to me about them: helen.shaw@mu.ie

Thank you!

Questions? Suggestions? Helen.shaw@mu.ie



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