

FUNCTIONAL VEGETATION PALEOECOLOGY

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MITIGATE THE IMPACT OF CLIMATE CHANGE WITH DATA-DRIVEN INSIGHT FROM PAST VEGETATION



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MAIN GOALS:

AIM:

This PhD project will integrate contemporary **plant functional traits** with global palaeoecological **pollen data** to reconstruct **long-term changes** in functional **vegetation patterns** and **ecosystem properties**. Through this synthesis, the research will advance our understanding of how ecosystems vary over space and time, providing new insights into the resilience and vulnerability of ecological communities in the face of **environmental change**.

1

Move beyond species-based reconstructions by connecting global fossil pollen assemblages with key contemporary plant traits related to **growth, survival, and reproduction**.

2

Quantify ecosystem dynamics at multiple spatial scales, **from local biomes to the global level**.

3

Estimate global functional ecosystem properties since the **Last Glacial Maximum**.

4

Explore links between community-level trait composition and both climatic variability and **anthropogenic impact**.

METHODOLOGY & INNOVATIONS



Extraction and curation of large-scale palaeoecological and macroecological datasets will be carried out from global databases, including **Neotoma** and **TRY**.



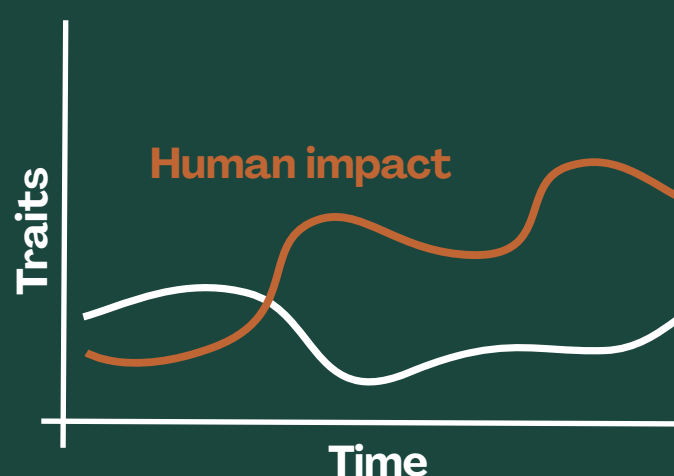
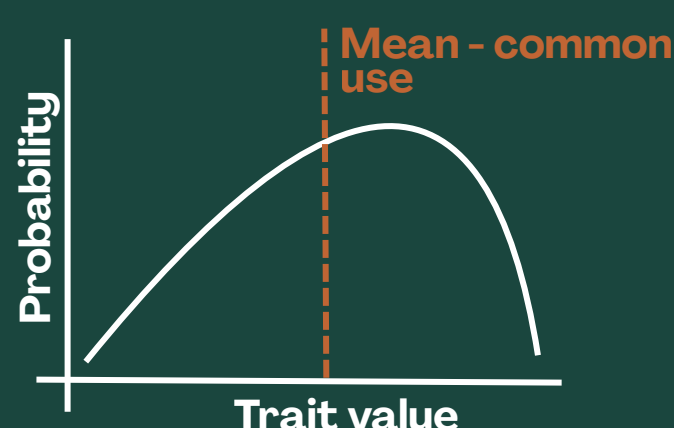
Use a **Bayesian probabilistic framework** that incorporates available trait data while propagating taxonomic uncertainty in a transparent and statistically robust manner to prevent taxonomic mismatches resulting in substantial information loss.



To provide a more holistic view of the structure and function of the ecosystem over time, analysis will be conducted at the level of individual traits (e.g. specific leaf area) and functional trait combinations.

EXPECTED OUTCOMES:

A) Bayesian Pollen–Plant Linkage for Functional Reconstruction



B) Anthropogenic Contraction of Vegetation Functional Space Since the Holocene

C) Forecasting Functional Diversity Loss: Paleo-Analogues to Prioritize At-Risk Ecosystems

