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ANALYSIS OF THE SUCCESSIONAL TRAJECTORIES OF ALLUVIAL WETLANDS UNDER ANTHROPOGENIC STRESS

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Context

Freshwater ecosystems, as social-ecological systems, provide crucial biodiversity and vital ecosystem services to billions of people. They face **extensive** human-driven **threats**, risking both ecosystems and human well-being.

Alluvial wetlands, this thesis' study sites, are mainly cut-off channels. These wetlands harbor the majority of river biodiversity.

Study object

Aquatic vegetation



- High cost-effectiveness
- Records environmental changes
- Shapes biological structure

1850

1962

2003



Institut National de l'Information Géographique et Forestière

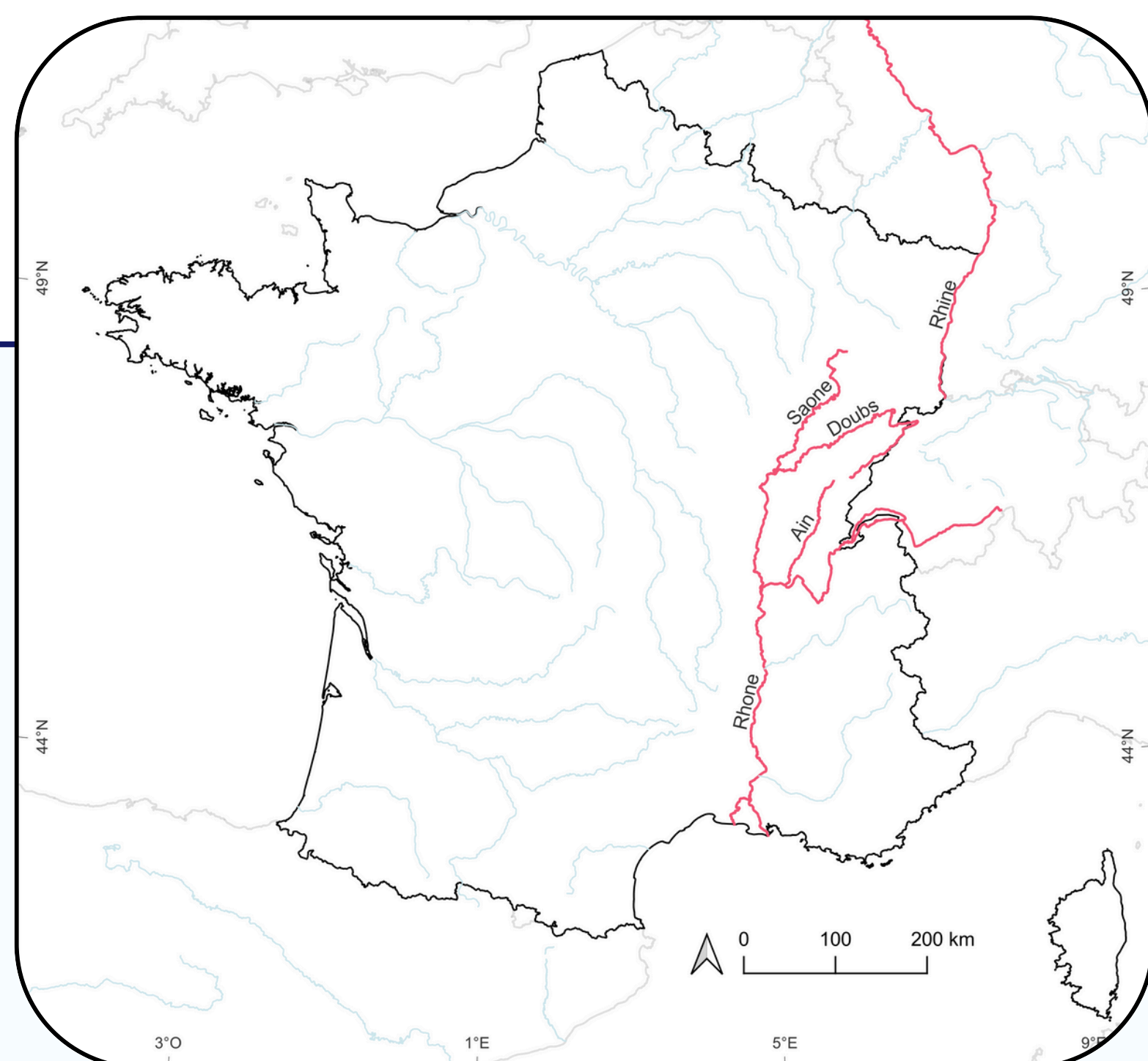
Formation of a cut-off channel of the Doubs River (France), formed when the river changes course. These alluvial wetlands stay connected to the river during floods and to the groundwater table.

Line of research

1

Latitudinal gradient

Analysis of **aquatic plant biodiversity** along a North-South gradient. Latitudinal gradient will serve as a proxy for temperature variations, placing the analysis within the broader context of **climate change**.

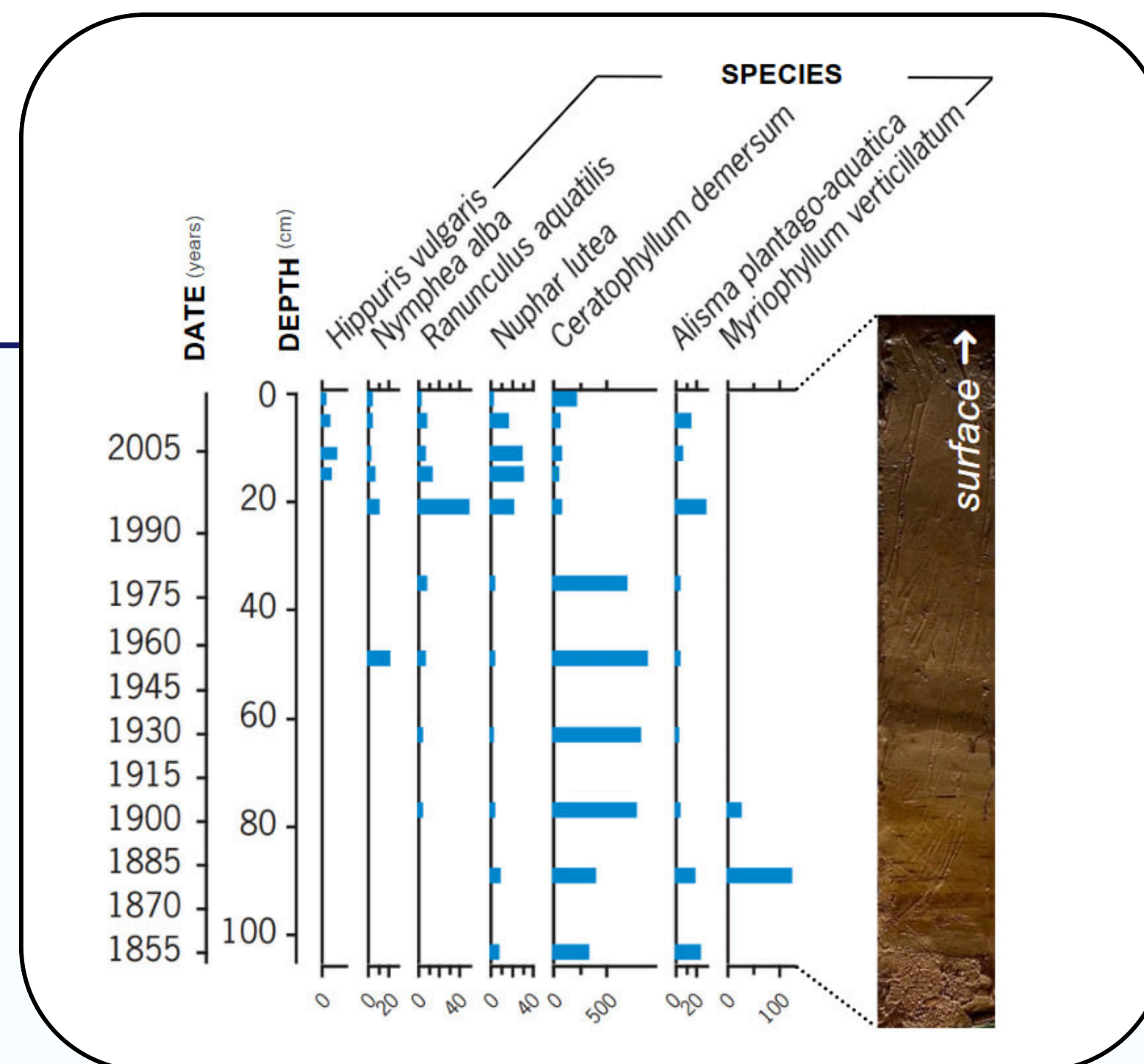


Rivers studied along the latitudinal gradient in France.

2

Diachronic studies

Reconstruction of **wetlands' history** (80 to 200 years) from 15 sediment cores sampled in 3 rivers (Ain, Doubs, Loue) to investigate the anthropogenic influence on aquatic plant diversity and abiotic conditions.

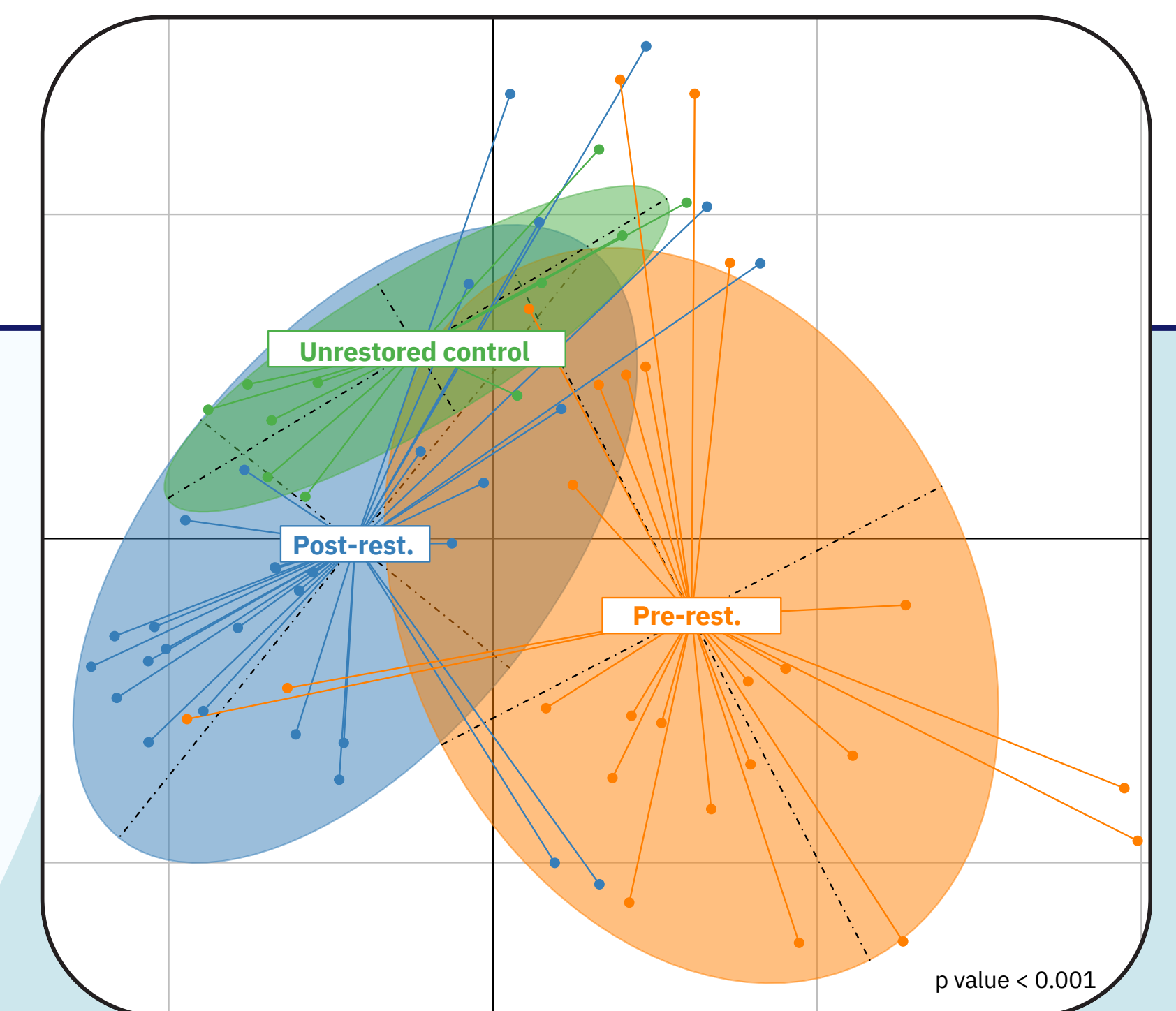


Vegetation diagram from a cut-off river channel (extracted from a sediment core).

3

Restorations

Diversity analyses (richness, functional, etc) of **alluvial wetland biodiversity** across temporal gradients relative to ecological restoration dates (pre- and post-restoration).



Principal Coordinate Analysis (PCoA) plot illustrating the composition of aquatic plant communities categorized by the restoration status, using the Canberra index. p value < 0.001

Scientific contributions

A better understanding of the hierarchical factors controlling aquatic plant diversity.

- Produce a functional typology of alluvial wetlands.
- Hierarchize, at different spatial scales, the factors controlling wetlands biodiversity.
- Study functional trajectories of alluvial wetlands under anthropogenic and natural constraints.
- Hierarchize the factors controlling functional trajectories.
- Define reference conditions for ecological restoration projects.
- Assess the cost-benefit of restorations, including carbon costs (not been conducted to date).



References

Fluet-Chouinard, E., et al. (2023). Extensive global wetland loss over the past three centuries. *Nature*, 614(7947), 281-286.
 United Nations, The United Nations World Water Development Report 2024: Water for Prosperity and Peace. UNESCO, Paris.
 Schaal, C., Oudot-Canauff, J., Cuenot, Q., Bégeot, C., Valot, B., Gauthier, E., & Bornette, G. (2018). Reconstruction de la végétation actuelle et passée d'un méandre du Doubs à l'aide de marqueurs carpologiques, palynologiques et génétiques. In 13èmes rencontres d'archéobotanique.