



MSc project: Evaluating the efficiency of peatland restoration

Context: Peatlands provide many ecosystemic services, including carbon (C) storage, water retention and biodiversity housing. In Switzerland 90% of peatlands have been destroyed in the past 200 years and 90% of the remaining surfaces are damaged but many of these could be restored for biodiversity conservation and C fixation. The peatland of Étang de la Gruère (JU & BE), one of the largest in Switzerland, has been renatured in 2018-20. Drainage ditches were blocked, some forest was cleared and ponds were dug to create a variety of habitats. Only minimal monitoring is in place to assess the effect of this restoration and especially the effect on C fixation is not measured as there is currently no cheap and easy way to measure this accurately.

Testate amoebae (TA) are microscopic eukaryotes that produce a decay-resistant shell. They are well-established bioindicators of water table depth (WTD) and pH in peatland ecology and palaeoecology (Mitchell *et al.*, 2008, Swindles *et al.*, 2019). As WTD and pH are key factors controlling greenhouse gas (GHG: CO₂ & CH₄) fluxes, on-going research is aiming to develop transfer functions to infer C fluxes from TA (Frésard *et al.*, 2023) and potentially reconstruct past GHG fluxes including pre-disturbance ecosystem functioning and the impacts of disturbance and ecological restoration.

Goals of the study: The aim of this study is to assess the impact and efficiency of restoration work at Étang de la Gruère, focusing on 1) soil properties, 2) vegetation, 3) testate amoeba communities, and 4) greenhouse gas (GHG: CO₂ & CH₄) fluxes. This study will contribute to developing testate amoebae-based transfer functions to infer GHG fluxes. This will allow us to evaluate the impact of restoration work conducted at the site.

Requirements: Interest in natural history, vegetation, microbial ecology, soil science, ecological modelling, applied ecology and microscopy. Basic proficiency in R coding for statistics and simple functions will be needed.

Collaboration: Nature conservation of Canton du Jura

Keywords: Ecosystem restoration, Peatlands, Testate amoebae, Vegetation, Gaz fluxes

Workplace: Laboratory of Soil Biodiversity, UniNE

References :

Frésard, A., et al. (2023) Relationships between northern peatland testate amoebae and methane emissions – building a transfer function for inferring present and past methane emissions for peatland monitoring. *Mires & Peat*, 29, Article 20, 18 pp.

Mitchell, E.A.D., et al. (2008) Testate amoebae analysis in ecological and paleoecological studies of wetlands: Past, present and future. *Biodiversity and Conservation*, 17, 2115-2137.

Swindles, G.T., et al. (2019) Widespread drying of European peatlands in recent centuries. *Nature Geoscience*, 12, 922-928.

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