

Assessing the impact of peatland restoration on freshwater ecosystems

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Application deadline: 16th December

Start date: October 2020

Project Background

Decades of degradation have turned the UK's peatlands from sinks to sources of organic carbon, with adverse consequences for adjacent freshwater ecosystems. However, restoration efforts which broadly aim to raise the water table and re-establish vegetation are accelerating. Restoration not only slows erosion and thus particle export to rivers and streams, it also fundamentally alters the soil processes which dictate chemical composition of the waters exported. Outflow water composition is governed by a dynamic array of biological, hydrological and geochemical processes occurring in the peat itself, thus the results can be highly site dependent and difficult to predict. Such unforeseen interactions could limit the success of these measures in safe-guarding nearby freshwater ecosystems. Thus it is of critical importance to quantify the effect restoration has on the biogeochemistry of the peatland itself in order to predict its effect on surrounding freshwater ecosystems.



(Left) Peatland restoration in action at Waun Fignen Felin, Brecon Beacons National Park. (Middle) Sampling of organic matter-rich fluids from peat. (Right) Peat core sampling following coring.

Project Aims and Methods

We are seeking a highly motivated PhD student to join our multi-disciplinary team and work alongside the Brecon Beacons National Park Authority to:

- 1) Determine how soil biogeochemistry changes during peatland restoration
- 2) Identify how these changes impact water quality in surrounding rivers and streams

The student will conduct studies at two peatlands in the Brecon Beacons, Waun Fach and Waun Fignen Felin, which have differing lithology, restoration degree and specific water quality issues. Porewater depth profiles will be collected across areas of undisturbed, degraded and restored peat throughout the year, tracing the flow of water into surrounding rivers and streams. Porewater will be geochemically characterized (pH, nutrient fractions including the dissolved and particulate organic fractions, DOC, trace elements, iron redox state) and compared to solid phase analyses of peat cores collected in the same area (geochemistry, mineralogy and microbial community structure). Stream water samples will also be analysed at increasing distances from the source to determine the extent to which processes in the streams themselves influence nutrient fractionation and organic matter content. Organic matter processing within the streams and the

impact of these fluxes on freshwater microbiota will be further simulated in the lab using incubations of outflow water, incorporating both microbial and abiotic processes.

Training

The student will be part of the GW4 FRESH Centre for Doctoral Training where they will develop core technical skills in freshwater bioscience as well as personal skills essential for a scientific career. The project will be based in the University of Bristol School of Earth Science and take advantage of Bristol's Biogeochemistry research platform across the schools of Earth Science, Geography and Chemistry. The research project will provide training in cutting-edge laboratory methods required for geochemical monitoring, microbial cultivation and community analysis, as well as characterization of minerals and organic matter. The opportunity is also available for the student to conduct specific analyses at the University of Exeter and the Centre for Ecology and Hydrology. The student will also be provided with extensive training in field skills, with the opportunity to regularly conduct field work in the Brecon Beacons. By collaborating with the Brecon Beacons National Park Authority, the student will also gain first-hand experience in the sustainable development of natural resources.

Candidate Requirements

The ideal candidate will have a strong background (preferably MSc-level) in a related discipline e.g. Earth Science, Physical Geography, Microbiology, Molecular Biology or Environmental Chemistry as well as a strong interest in Environmental Microbiology and Geochemistry. A desire to conduct field work is essential. Experience with wet chemical laboratory methods, microbial cultivation or molecular ecology would be highly beneficial. Good written and oral communication skills are required, as is the ability to work independently and in a team.

How to apply

Applications should be made directly to the GW4 FRESH CDT via the link below by 16th December. It is highly encouraged to contact the lead supervisor by email for more details on the project beforehand.

Eligibility

Studentships will last for 3.5 years full-time or the equivalent period part-time. Applicants must demonstrate an outstanding academic record: at least a 2:1 undergraduate degree or equivalent, or relevant masters degree. NERC-funded studentships are subject to UKRI eligibility requirements. In short, you should be a citizen of the UK or other EU country and have been residing in the UK for the last 3 years (apart from temporary or occasional absences).

Useful links

NERC GW4 FRESH CDT Website with information on how to apply

<https://www.gw4fresh.co.uk/how-to-apply/doctoral-students/>

NERC GW4 FRESH CDT Training opportunities

<https://www.gw4fresh.co.uk/our-training/>

Postgraduate study at Bristol

<http://www.bristol.ac.uk/earthsciences/courses/postgraduate/>