

PEATBOG

Pollution, Precipitation and Temperature Impacts on Peatland Biodiversity and Biogeochemistry

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Peatlands are Threatened by Climate Change and Nitrogen Pollution

Peatlands are the world's largest soil carbon pool, support a unique biological community, and provide important ecological, economic and protective functions. But peatlands are highly vulnerable to changes in precipitation, temperature, and nutrient inputs. Evidence suggests, for instance, that the species richness of bryophytes in heathlands is inversely related to the amount of reactive nitrogen falling in deposition (Figure 1). As in the rest of the world, peatlands in Europe are impacted by elevated N deposition (Figure 2).

PEATBOG aims to understand how nitrogen pollution and changing climate, individually and combined, will affect the biodiversity and ecosystem properties of peatlands. We also aim to develop meaningful indicators of risk to these impacts that are of use to conservation managers and policymakers.

The project began in spring 2009 and will run for three years.

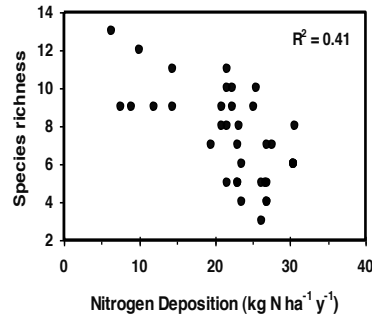


Figure 1. Relationship between bryophyte species richness and N deposition at 36 *Calluna* moorland sites in northern Britain, 2005-6. From (1).

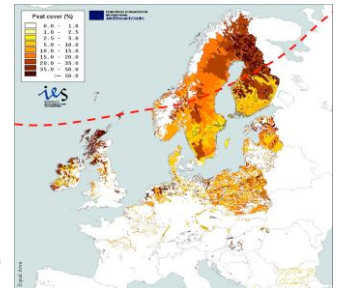


Figure 2. Distribution of peatlands in Europe. Dashed line shows the approximate location of the 5 kg N ha⁻¹ y⁻¹ isocline. From (2,3).

Objectives of PEATBOG

1. Through surveys across northern Europe, determine the relationships between peatland vegetation diversity and the deposition of reactive nitrogen, considering all other major drivers on biodiversity.
2. Conduct field manipulation experiments to quantify the nature of interactions between nitrogen pollution, soil hydrology and temperature on peatland biodiversity and biogeochemistry.
3. Using isotopic tracer techniques and controlled mesocosm experiments, investigate the mechanisms that link peatland biodiversity to nitrogen cycling, carbon sequestration, and C and N exchange with the atmosphere, and how these are impacted by chronic N deposition.
4. Determine how the composition and function of the microbial community reacts to enhanced atmospheric nitrogen deposition, warming and drought, and relate these responses to above-ground vegetation diversity.
5. Develop meaningful indicators, at scales appropriate to the user, of the risk to peatland ecological and functional integrity of elevated nitrogen deposition and climate change.

Progress So Far...

- The ecology and biogeochemistry of three Scandinavian peatlands across contrasting levels of nitrogen deposition were intensively studied in relation to local variations in moisture and temperature in the summer of 2009. Planning is under way for a large cross-European survey of peatlands to take place in summer 2010.
- Two field sites, Cors Fochno in Wales and Whixall Moss on the English-Welsh border have been selected for manipulation of hydrology and temperature. The sites are similar in peatland type and climate, but receive contrasting levels of nitrogen deposition.
- Cores have been collected from the above five study sites and experimental manipulations are now underway. Work on a process-based model has begun with the initial structure now determined.
- Initial microbial sampling of the main study sites has begun.
- Technique development for indicators and regional risk assessments are underway.



References:

- (1) Caporn et al. (2007) Report to Defra, London
- (2) Montanarella et al. (2006) Mires and Peat 1: 1-10.
- (3) www.emep.int

Interested in being involved?

To join a group of stakeholders and scientists that will interact with the project and receive regular updates, email Richard Payne at r.payne@mmu.ac.uk.

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