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About

Dr Nick Kettridge specializes in characterizing the ecohydrological resilience of ecosystems to both natural and anthropogenic disturbance. Much of his research focuses on peatlands; understanding the processes that control the provision of key ecosystem services within these environments, and quantifying their response to changing climatic conditions and extreme events such as fire and drought.

Qualifications

2005 – PhD Geography – University of Sheffield

2002 – BSC Geography – University of Sheffield

Biography

- Lecturer in Water Sciences, University of Birmingham (2012-)
- Post doctoral research fellow, McMaster University (2010-2011)
- Post doctoral research fellow, Lancaster University (2006-2010)
- PhD. 'The thermal behavior of northern peatlands', University of Sheffield (2002-2005)
- BSC (Hons) in Geography, University of Sheffield (1999-2002)

Teaching

Undergraduate Modules:

- Earth and Ecological Systems (Module convener; Year 1, GGM102)
- Global Environmental Issues (Year 1, GGM103)
- Snowdonia Field Course and Tutorials (Year 1, GGM105)
- Research Methods for Dissertations (Year 2, GGM201)
- Geography and Geography/Geology dissertation supervision (Year 3, GGM301)
- Wetland Environments (Module convener; Year 3, GGM308)

Masters Modules:

- Environmental Analysis and Modelling (GGM506)
- Advances in Water Sciences
- Project/dissertation supervision

Postgraduate supervision

- **Rhoswen Leonard** (2013-present) The ecohydrological functioning of the Canadian Western Boreal Plain and its response to wildfire
- **Isaac Aidoo** (2013-present) Suspended Sediment Dynamics/Turbidity during storm events in an Urban River Catchment: River Tame
- **Michael Grocott** (2012-present) The hydrology of biological hotspots in a glacierized catchment: an integrated tracing and modeling study

Research

The resilience of ecosystems to both natural and anthropogenic disturbance is controlled by a complex array of interconnected feedback mechanisms that transcend the traditional disciplines of ecology, hydrology, terrestrial and aquatic biogeochemistry and micro-meteorology and propagate across both spatial and temporal scales. Nick's research breaks down these boundaries and investigates the essential system interactions that control the response of ecosystems to changing environmental pressures.

From left to right: a) Männikjärve Bog, Estonia, b) GPR measurements at

Caribou Bog, Maine, USA, c) automated evaporation chamber measurements, Dinner bog, Ontario, Canada, d) Sphagnum desiccation, Cors Fochno, Wales, d) methane ebullition from a harvested poor fen, Quebec, Canada.

Much of Nick's research focuses on peatlands; understanding the processes that control the provision of key ecosystem services within these environments, and quantifying their response to changing climatic conditions and extreme events such as fire and drought. Peatlands are an essential hydrological resource and an important carbon store and climate regulator, containing approximately 10% of the global liquid surface fresh water supply and representing one third of the global soil carbon pool. Managing the competing demands of water security and carbon mitigation within these sensitive ecosystems, whilst preserving their unique biodiversity, is one of the key challenges facing current environmental policies. Nick's research investigates the interconnected feedback mechanisms that control the response of these ecosystem services to key pressures, working at spatial scales ranging from individual biogenic gas bubbles to the continental scale, at timescales ranging from hours to millennia. This research brings together field scale monitoring, field and laboratory manipulations and computer simulations to unravel these complex interactions, providing a process-based understanding of ecosystem function. Only through this improved process understanding can we predict future ecohydrological and biogeochemical responses of these environments to changing climatic conditions, characterize the resilience of current ecosystem services and develop informed, relevant management and restoration strategies.

Left, Burnt Crow, a bog within central Alberta, Canada, burnt during a wildfire in 2006. Right, Salteaux, a fen drained within the 1980's and subsequently burnt in 2003, also within central Alberta.

Publications

Kettridge, N., R.E. Humphrey, J.E. Smith, M.C. Lukenbach, K.J. Devito, R.M. Petrone, J.M. Waddington (2014) Burned and unburned peat water repellency: implications for peatland evaporation following wildfire, Journal of Hydrology

Comas, X., **Kettridge, N.**, Binley, A., Slater, L., Parsekian, A., Baird, A.J., Strack, M., Waddington, J.M. (2013) The effect of peat structure on the spatial distribution of biogenic gases within bogs, Hydrological Processes

Kettridge, N. and Waddington, J.M. (2013) Negative feedback regulation of undisturbed and burnt peat evaporation during drought*, Hydrological Processes*

Kettridge,N., Thompson D.K, Bombonato L.,Turetsky M.R., Benscoter, J.M. WaddingtonB.W (2013) The ecohydrology of forested peatlands: simulating the effects of tree shading on moss evaporation and species composition *Journal of Geophysical Research-Biogeoscience*, G03030

Sherwood, J.H., **Kettridge, N.**, Thompson, D.K., Morris, P.J., Silins, U., Waddington, J.M (2013) Effect of drainage and wildfire on peat hydrophysical properties, Hydrological Processes.

Kettridge, N., Binley, A., Comas, X., Cassidy, N. J., Baird, A. J., Harris, A., van der Kruk, J., Strack, M., Milner, A. M., Waddington, J. M. (2012) Do peatland microforms move through time? Examining the developmental history of a patterned peatland using ground penetrating radar, *Journal of Geophysical Research-Biogeoscience*, G03030

Kettridge, N., Thomposon, D. K., Waddington, J. M. (2012) Impact of wildfire on the thermal behavior of northern peatlands: Observations and model simulations, *Journal of Geophysical Research-Biogeoscience*, 117, G02014

Kettridge, N., Kellner, E., Price, J. S. And Waddington, J. M. (2012) Peat deformation and biogenic gas bubbles control seasonal variations in peat hydraulic conductivity, *Hydrological Processes.*

Kettridge, N., Green, S, Baird, A. J. and Binley, A. (2011) Ebullition events monitored from northern peatlands using electrical imaging, Journal of Geophysical Research-Biogeoscience, 116, G04004.

Kettridge, N. and Binley, A. (2011) Characterisation of peat structure using X-ray computed tomography, Journal of Geophysical Research-Biogeosciences, 116, G01024. (Manuscript selected by editors as an AGU Research Spotlight with a summary printed within Eos, the AGU's weekly newspaper).

Binley, A, Kruschwitz, S, Lesmes, D. and **Kettridge, N.** (2010) Exploiting the temperature effects of low frequency electrical spectra of sandstone: determination of effective diffusion path lengths, Geophysics, 75, A43-A46.

Kettridge, N. and Baird, A. J. (2010) The development and application of a 3D soil temperature model of hummock hollow complexes in northern peatlands, Journal of Geophysical Research-Biogeosciences, 115, G03009.

Kettridge, N. and Binley, A. (2010) Evaluating the effect of pore dilation on the quality of laboratory measurements of peat hydraulic conductivity, Hydrological Processes, 24, 2629-2640.

Kettridge, N., Comas, X., Baird, A. J, Slater, L., Strack, M., Thompson, D. Jol, H. and Binley, A. J. (2008) Ecohydrologically important subsurface structures in peatlands revealed by ground-penetrating radar and complex conductivity surveys, Journal of Geophysical Research-Biogeoscience. G04030

Kettridge, N. and Binley, A. J. (2008) X-ray computed tomography of peat soils: measuring gas content and peat structure, Hydrological Processes, 22, 4827-4837.

Kettridge, N. and Baird, A. J. (2008) Modelling soil temperatures in northern peatlands. European Journal of Soil Science, 59, 327-338.

Kettridge, N. and Baird, A. J. (2007) In situ measurements of the thermal properties of a northern peatland: Implications for peatland temperature models. Journal of Geophysical Research –Earth Surface, 112, F02019.

Kettridge, N. and Baird, A. J. (2006) A new approach to measuring the aerodynamic resistance to evaporation within a northern peatland using a modified Bellani plate atmometer. Hydrological Processes, 20, 4249-4258

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