Geophysical Research Abstracts
Vol. 14, EGU2012-789, 2012
EGU General Assembly 2012

Effects of peatland drainage on water quality: a case study of the shallow blanket bogs of Exmoor, UK

E. Grand-Clement (1,2), D. Luscombe (1), N. Le Feuvre (1), D. Smith (2), K. Anderson (1), and R.E. Brazier (1)

(1) School of Geography, CLES, University of Exeter, Amory Building, Rennes Drive, Exeter, Devon EX4 4RG, United Kingdom, (2) South West Water, Peninsula House, Rydon Lane, Exeter, Devon, EX2 7HR, United Kingdom

Peatlands are widely represented in the South West of England (i.e. Exmoor, Dartmoor and Bodmin moors), but their existence is currently under threat due to both climate change and the impact of historical human activities. Peat cutting and intensive drainage for agricultural reclamation in the 19th and 20th century, have modified the hydrological behaviour of these shallow peats and dried out the upper layers, causing oxidation, erosion and vegetation change. Such anthropogenic impacts directly affect the storage of carbon, but also the provision of other ecosystem services, such as the supply of drinking water, and the support of specific and rare habitats.

Blocking drainage ditches to restore the hydrological behaviour of peatlands has mostly been undertaken in the North of England, but to date, little is still known about the consequences of such management approaches on the overall Carbon stocks. The need to monitor restoration of peatlands in the South West of England arises due to the specific characteristics of the peat – it is often shallower than more northerly peat and dominated by Purple Moor Grass. In addition, and in part because of the shallowness of the resource, the peat has been damaged differently, often with very dense networks of hand-cut ditches which behave as highly efficient drainage networks. Most importantly, their location at the southernmost margin of the UK peatlands' geographical extent makes them extremely vulnerable to climate change, and so it is hypothesised that monitoring of these peatlands may provide an 'early warning system' for climatic impacts that affect more northerly sites in years to come.

This study focuses upon the current impact of peatland degradation on water quality on Exmoor. Our experimental approach employs detailed, high resolution monitoring of selected ditches that are representative of damaged conditions on Exmoor, from small- (30 x 30cm ditches) through medium- (50x50cm), large- (1-2m ditches) and finally headwater catchment-scales. Flow monitoring has been in place at all scales since November 2010. Flow proportional water samples were collected during a range of events throughout winter 2011-2012 and analysed for Dissolved Organic Carbon (DOC), Particulate Organic Carbon (POC), pH and colour. These variables were identified as critical, both in terms of carbon cycling and for costly water treatment that currently takes place downstream. Results were examined spatially in relation to drain sizes and magnitude/frequency of event, to improve our understanding of carbon losses in streams from damaged peatlands and further estimate the potential for improvement that can be expected after restoration. Data presented here focus on the DOC and colour and demonstrate the importance of understanding across different scales of ditch and understanding the effects of the magnitude/frequency of events that are observed prior to restoration of the system.