



## **Hydrological impact of mature coniferous plantation at two spatial scales in an upland peat catchment, Irthing headwaters, northern England**

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Coniferous forest plantation is widespread in the upland UK and a number of studies have been carried out to investigate the hydrological implications of this land use. Such studies also now form the basis for research into the way in which response to forestry activities may alter with climate change. The UK's longest running forest catchment experiment is at Coalburn in the headwaters of the River Irthing in the northern Pennine hills of England. Since 1966 this has monitored the hydrological effect of afforestation from planting to maturity. However, as a single catchment experiment it has studied the effect of changes only in a before and after context. Within the EC funded ForeStClim project, the Coalburn microcatchment (1.5 km<sup>2</sup>) has therefore been paired with a neighbouring grassland microcatchment (The Flothers, 1.4 km<sup>2</sup>), both being nested within a minicatchment (Throssburn, 7.1 km<sup>2</sup>) which discharges to the Irthing. Elevations are around 300 m in a generally muted relief and soils are peaty, typical of the Pennine hills. The aim of the project is to investigate a) the hydrological impact of a mature plantation cover relative to open grassland at the microcatchment scale, and b) the hydrological response of the combined land covers at the minicatchment scale. As well as advancing our understanding of plantation impact for upland peat catchments, the project will investigate how these impacts may alter with climate change.

Discharge and precipitation records for the Flothers and Throssburn begin only in 2003. Catchment comparison is thus possible from 2004, albeit with some gaps in the data record. Current analysis is aimed at the following:

- Comparison of the Coalburn and Flothers microcatchments annual runoff. The aim is to quantify variations in the extent to which the forest yields a lower runoff than the grassland, arising from the greater interception and transpiration losses of the trees;
- Comparison at the event level. The hypothesis will be tested that, as the size of the flood peak increases, the effect of the forest cover decreases. More specifically, the winters of 2009/10 and 2010/11 have provided an opportunity to contrast the responses for rainfall and snowmelt events;
- Identification of any spatial scale effect. The way in which the forest and grassland responses combine at the minicatchment scale and differences between the response at this scale and at the microscale will be investigated;
- Variations in the comparative responses of the two land covers for periods of distinct weather conditions will be examined for indications as to how the comparative responses may alter with climate change.

The presentation will provide the initial results from this analysis.