



Is the blocking of drainage channels in upland peats an effective means of reducing water colour at catchment scales?

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Catchments with extensive peat coverage commonly have high fluvial dissolved organic carbon (DOC) concentrations. Long term water colour (a proxy for DOC) records from the River Tees, UK, indicate an increasing water colour trend, a trend that has been recognised in series of UK streams. It is considered that the release of carbon from these areas can be related to changes in water table depth in the soil profile with DOC being produced within the aerobic layer of the peat. The drainage of upland peatlands, by the cutting of open drainage channels was common practice in Northern England. The practice succeeded in lowering the water table but led to an increase in recorded DOC concentration leaving the catchment. The blocking of these channels has thus been proposed as a means of peat restoration. The reduction in drainage capacity will cause increases in the water table, rewetting the peat and reducing losses in carbon.

This study aims to assess the effectiveness of drain blocking as a method of reducing DOC levels at the catchment scale. Also the effects of blocking on the water balance and any changes in the flow pathways of water through the catchments post blocking will be determined via fingerprinting studies. A series of nested blocked and unblocked catchments were studied in Upper Teesdale, Northern England. Drain water samples at nine localities were taken at least daily. These sites were located such that individual drains could be monitored in the context of a larger catchment. Water table depth, flow and weather parameters were recorded along with the collection of run off and soil water samples. A detailed sampling programme was undertaken in which a series of drains were studied in the 12 months prior to blocking and the 12 months after.

Results indicate that the blocking of zero order drainage channels leads to a decrease in DOC export on an individual drain scale. However, this is due to a reduction in water yield rather than concentration. Concentrations are seen to rise by a small yet statistically significant amount in blocked zero order streams. The effect at a larger scale is more complex. Annual export values in the unblocked control catchment show a rise from zero to first order streams indicating that water is being added to the system at this scale from external spatially variable sources. This pattern is also recognised in the blocked catchment. The DOC concentration record in blocked drains at this larger scale however indicated a reduction relative to the unblocked catchment. This reduction points to a change in flow pathways post blocking as highly coloured water re-navigates its way downstream.