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Impact of peatland restoration on water treatability

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The design of catchment management practices for upland peat to optimise runoff quantity and quality has been a focus of research for many years. This has been necessary because these catchments are often used for drinking water collection. However, because of more recent concerns about the greenhouse gas (GHG) potential of CO_2 and CH_4 emissions peat management practices may also be required to maintain or enhance immobilisation of organic carbon (OC).

With respect to both GHG emissions and drinking water quality the most significant component of runoff is OC and research has, therefore, focussed on understanding what controls variability in its mass flux. However, in both cases the size and chemical composition of the OC may be as, or more, important than the amount. These characteristics will control the lability of the OC – the rate at which solid OC is converted to GHG – and also the ease with which the treatment process can make runoff potable.

Pristine sphagnum covered peat and eroded bare peat are end members of catchment cover resulting from historic changes in air quality – pollutant inputs – and land management practices. They are also the likely end members under future environmental changes such as climatic warming, alterations in rainfall regime and the land management practices selected to minimise GHG emissions.

This work compares the particle size distribution and chemical composition of OC in runoff from simulations of sphagnum covered and bare peat. Furthermore, the influence of the OC, and of $< \mu$m size fractions of the OC, on a critical part of the water treatment process; the flocculation of $Fe(OH)_3$ are assessed.

The PSD of OC from sphagnum was much smaller than that from bare peat. The former was predominantly carbohydrate whilst the latter was phenolic suggesting the former would be more labile. For sphagnum covered peat runoff flocculation of $Fe(OH)_3$ was prevented at concentrations from 20 to as low as 5 mg/l (OC). However, the runoff from areas of bare peat was able to prevent flocculation at concentrations as low as 1 mg/l (OC). (Investigations at lower concentrations are ongoing).