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## Impact of land drainage and its remediation on hydrological and water quality processes in upland peatlands

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Peat covers many headwater catchments throughout the world. Peat is very sensitive to changes in hydrology that may be brought about by environmental change. Peatlands have been subject to artificial drainage for centuries. However, several problems have been associated with such drainage including increased flooding and erosion and deterioration in water quality and biodiversity. This paper examines the progress made in understanding hydrological and hydrochemical processes associated with drainage of peats. It will also provide evidence on processes associated with practices that attempt to remediate land drainage. There are a range of feedback mechanisms that occur following drainage, some of which are irreversible and which have long-term water quality implications. This provides major challenges for peatland restoration practice and sustainable catchment management. A case study using high-resolution topographic data and hydrological modelling tools to aid peatland management decision-making will be presented. This case study demonstrates that the same management practice can have very different impacts depending on its location in the catchment. Therefore any land management practice which attempts to reverse the negative environmental effects of drainage should also not be uniform across a catchment. Instead land management practice should be spatially distributed and a model is presented that allows spatially distributed decisions to be made. However, the paper will conclude by showing that we are still a long way off coupling the landscape-scale modelling with processes incorporating irreversible peat physiochemical change that occur at the plot scale.