



Future dissolved organic carbon export dynamics in peatland-derived potable water supply catchments in the UK

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Peatlands are important global terrestrial carbon stores as well as sources of regional potable water supply. Concentrations of dissolved organic carbon (DOC) in surface waters have increased across Europe and parts of North America in the past decades, resulting in increased water treatment problems and cost. However, it is unclear how climate change may impact DOC in peatland-derived potable water. Here we use a physically based hydrological model (PERSiST) and a biogeochemical organic carbon model (INCA-C) to predict discharge and DOC concentration in nine hotspots of peatland-derived potable water use in the UK under a range of 21st-Century climate and sulphate-deposition scenarios. These catchments supply 72 % of all peat-derived water consumed in the UK, and 57 % of the global total. The annual average and seasonal variability of DOC concentrations are likely to increase while the mean discharges are likely to decrease under all future scenarios. The large increases (by as much as a factor of 1.6) in DOC concentration in the 2090s over the baseline period are projected in the autumn and winter, a time when DOC concentrations are already high in the baseline datasets. However, the total DOC flux is largely insensitive to future climate change because the projected increase in DOC concentration is mostly counterbalanced by the projected decrease in discharge. To fulfil regulations on DOC concentrations in water supplies for all nine study catchments in the 2090s, at least £.5 billion of the capital investment for new treatment plants will be required. Thus, more efficient water treatment technology and responsible stewardship of peatlands will be necessary.