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Hydrological factors behind the water quality changes due to restoration in boreal peatlands

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Recovery of hydrological conditions after restoration in previously drained peatlands is typically faster process compared to changes in runoff water quality. Often nutrient load from restored sites increase remarkably during restoration operation and reduce over time when conditions stabilize. However, in some sites nutrient load can remain high for long periods of time which increase negative effects of restoration on downstream water bodies. The factors and challenges behind these processes are poorly understood in practical catchment restoration planning. This study aims to understand factors affecting water quality changes after peatland restoration. Totally 43 peatlands areas of which 24 sites were previously drained and restored during the study and 19 sites at their pristine stage (control sites) were included to the study. The control pristine sites had as little anthropogenic disturbances as possible and the sites were chosen so that the paired study sites closely share similar peatland type, nutrient status and weather conditions. Pore water quality (total phosphorus, total nitrogen, dissolved organic carbon, pH, electric conductivity and colour) was measured from all sites and runoff quality and amount from 7 sites in the years 2008-2014. Measured parameters, different peatland types and nutrient loads were studied together with numerous hydrological parameters (variation in water table fluctuations, peat pore water recharge coefficient, physical parameters of peat e.g. specific yield, degree of humification) by statistical methods. Differences in water table dependent hydrological conditions indicate e.g. flow paths and residence time of water that is known to have effect on runoff water quality. As a result, water table related hydrological changes following restoration are as well assumed to explain alterations in water quality in different peatland types. In addition, using water table related hydrological processes as a proxy for water quality analysis reduces cost as water quality analysis is more costly than continuous measurement of water table. This presentation gives preliminary results from this extensive dataset.