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Effects of rewetting actions on stormflow runoff in drained headwater wetlands in SW-Germany

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This study investigates possible benefits of rewetting actions in headwater wetlands in the national park Hunsrück-Hochwald. Waterlogged areas are being drained by a dense trench network built in the 19th and early 20th century to facilitate forestry operations. One goal of the newly established national park is the renaturation of these waterlogged sites. Thus, trenches are being sealed to initiate the replenishment of soil water leading to growth conditions allowing a reestablishment of peat mosses. A desired side-effect may be stormflow hydrograph damping, for example during summerly heavy rainfall events.

The presented results are part of the long-term hydrological monitoring in the national park, measuring discharges in trenches, ditches and natural streams in order to assess changes induced by renaturation measurements. It investigates the effects and possible benefits of trench sealings concerning storm flow retention by comparing runoff patterns during singular storm events over a timespan of three years, both before and after sealing actions. Additionally, a comparison of two different sealing methods was conducted, discussing whether there is a superior technique.

A detailed hydrograph separation analysis revealed that especially rather simple mineral soil fillings using machinery provided a distinct decline of quickflow volume during heavy rainfall events while the more sophisticated approach of damming and replanting trenches by hand showed less measurable quickflow decrease. However, both approaches more or less revealed benefits concerning water retention during heavy rainfalls. Speaking of ecological benefits and impacts, damming and replanting provided a much more preserving method as there is less disturbance of surrounding peatland. Therefore, it has to be evaluated if the ecological benefits outweigh less runoff retention. Additionally, trenches with mineral soil fillings tended to feature more quickflow in the second year after establishment, that is why future research has to clarify, if damming and replanting ensures overall better results in the long term.