



## **Potential reduction of hydrological extremes in headwaters: case study of upper Vltava River basin, Czechia**

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Increasing frequency of catastrophic “flash floods“ and extreme droughts in recent years results in an urgent need of solving of flood protection questions and measures leading to discharge increase in dry periods. Runoff flattening is related to a use of untraditional practices as a suitable complement to classical engineering methods. These measures should be represented by gradual increase of river catchment retention capacity in headstream areas.

Research carried out in the upper part of Vltava River basin (Šumava Mts., SW Czechia) on the base of a number of present automatic hydrological gauges and climatic stations consists in a runoff dynamics and rainfall-runoff conditions detailed analyses. Streamflow generation processes and present peat bog revitalization activities were studied using hydrological statistics and ion, carbon and oxygen isotopes balance analyses especially within periods of high or low discharge rates. Pedological survey of different soil types and textures was carried out to precise the determination of its water capacity. Practised detailed snow cover monitoring should markedly help with precisising of estimation of retained water storage and significantly improve a hydrological prognosis during snow melting process.

Detailed analyses of extreme runoff ascending and descending phases and minimum discharges in profiles closing several subcatchments with different physical-geographic conditions show higher peak flow frequency and their shorter reaction to causal amount of precipitation in the case of highly peaty areas, therefore more distinct runoff variability of streams draining peat land localities. These findings were affirmed by geochemical approach laboratory outcomes within the meaning of significant contribution of runoff from peat lands to the total runoff during extreme flood situations.

In order to achieve retention potential enhancement in the source areas of czech rivers a possible former accumulation reservoirs (used for wood floating in former times) restoration should be considered. The system of such small storage bins (similar to dry polders with temporary water impounding) could function as an alternative and supplement to greater dam reservoirs. Modern equipment and methods are able to evaluate its effectiveness. Implementation of these unforceable measures realized in river headstream areas could contribute to reduction of peak flows during flood situations and to retention of sufficient water resources for potential dry episodes in future.

**KEYWORDS:** retention potential, headstream area, flood protection, upper Otava River basin, runoff variability, drought, peat bogs hydrological function, isotope hydrology