

## **Abstract**

During the very dry period of 2015–2019, several problems with groundwater scarcity emerged, including the drying up of smaller streams in the Czech Republic during dry summer periods. With the intensifying climate change, it is crucial to understand the causes of stream drying. The aim of this thesis is to verify the hypothesis that the drying of smaller streams in the Czech Republic during the summer months is caused by secondary evapotranspiration, i.e., the evapotranspiration of groundwater from forested floodplains and water bodies in the basin. The literature review part of the thesis summarizes the results of studies dealing with water loss in the basin due to climate change and its effect on runoff conditions in Europe and worldwide. Several studies have demonstrated that the impact of floodplain forests on the hydrological balance of the basin is significant, and their influence is markedly higher than would correspond to their usually small representation in the basin area. Calculations of potential evapotranspiration in selected 30 basins in the Czech Republic, where flow rates in dry years fall below 0,1 l/s/km<sup>2</sup>, showed that the secondary evapotranspiration from floodplain forests along with evaporation from water bodies in the basin can adequately explain the declines in flow rates during summer periods. The average deficit of specific total runoff from the areas of interest between 2018–2019 caused by evapotranspiration reached up to 1,13 l/s/km<sup>2</sup> (for the catchment area as a whole) in the summer months. Monitoring of groundwater levels and derived flow rates at 12 piezometers in the Brzina basin in the summer of 2023 showed that stream drying is highly variable in time and space. Specific runoff in the upper part of the basin, which is composed of weathered granitoids, in the summer of 2023 reached values only in the order of hundredths or tenths of l/s per km<sup>2</sup>, while flows in the middle and lower parts of the basin were higher. Secondary evapotranspiration in the peak summer months of 2023 reached values of up to 52 l/s/km<sup>2</sup> (for floodplain forest area). The reduction of flow rates up to the autumn period is caused by the need to replenish pore water in the vicinity of the streambed, under which the water table can drop even more than 1 meter. The average volume of water needed to replenish the surroundings of the monitored profiles in the upper part of the Brzina basin in the driest periods of 2023 was about 7 000 m<sup>3</sup> per km of stream length.

**Keywords:** Evapotranspiration, runoff, hydrological drought, floodplain forests, floodplain, causes of drought