

## **Abstract**

The hydrological conditions of the riparian forests near Litovel, which are part of the Litovelské Pomoraví Protected Landscape Area, are significantly influenced by both the Morava River and groundwater abstraction in the Čerlinka intake area. The sequence of hydrologically dry years from 2015 to 2019 in this region has intensified the debate regarding dynamic sources of groundwater and the effects of groundwater abstraction on riparian forests. The aim of this thesis was to quantify the factors controlling the groundwater level in the Quaternary fluvial deposits within the riparian forest and to estimate the parameters controlling flow in these deposits. Addressing these questions is complex, as groundwater flow is concentrated not only in the fluvial deposits but mainly in the underlying karstified Devonian limestones, which are locally in hydraulic contact with the fluvial deposits to an unknown extent. Archival materials indicate that efforts to determine dynamic groundwater sources, the impact of groundwater abstraction in the riparian forest, and its spatial extent have been ongoing since the 1970s. Analysis of monitoring data from 43 wells and piezometers during the pumping test in 2022 revealed that the effects of abstraction, due to the rapid spread of hydraulic pulses in the confined limestone aquifer, are clearly observable up to 1.5 kilometers away from the intake area, including in the riparian forest in the NPR Vrapač area, where changes in water levels can exceed 20% of those observed in the extraction wells. Both the analysis of recorded water table levels and hydraulic modeling suggest that the river and fluvial aquifer are in hydraulic contact with the confined limestone aquifer beneath the NPR Vrapač area. However, this contact likely does not extend to the more distant parts of the forest from the intake area, where changes in water levels due to groundwater abstraction are significantly less pronounced or not observed at all. Evapotranspiration can significantly contribute to groundwater level declines in the riparian forest during low water levels in the Morava River in the dry summer months, when it exceeds the average current abstraction amounts in the intake area (according to the years 2020-2023) by up to 1.5 times. The hydraulic model of the study area and groundwater oscillation during the 2022 pumping test suggest that dynamic groundwater resources in the limestone aquifer oscillate around 180 l/s. The results indicate that the riparian forest is primarily influenced by the nearby Morava River and, to a lesser extent, by current abstraction in the Čerlinka intake area, which does not exceed 190 l/s. However, during low water conditions, the impact of abstraction in the NPR Vrapač area, which is in close hydraulic contact with the rapidly responding confined aquifer in the karstified limestones, can become more pronounced at the expense of the river's influence, leading to more significant groundwater level declines in this area.