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Groundwater uptake dynamics of a lowland oak forest in the Great Hungarian Plain

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The groundwater uptake of forest stands often generates disputes, especially in today's drying climate. Forestry in Hungary does not take into account groundwater as a surplus water resource under 2 meters, while other sources show forest groundwater uptake in case of much deeper water table. White method is the most appropriate way to quantify water consumption. It is based on the transpiration-caused diurnal fluctuation of groundwater.

Once in the Great Hungarian Plain, hardwood forests stood along the River Tisza. These riparian ecosystems were supplied significantly by river floods, directly or indirectly. These forests mostly disappeared because of land use changes and water regulation works. One of the relics is the Ohat Forest, a salt steppic oak forest on the edge of the Hungarian Puszta (Hortobágy). Historical maps prove that this area was continuously forested, even before the water regulations.

Because of its dryness, the 2020/21 hydrological year is especially suitable for water uptake analysis. Its yearly rainfall sum was 469.8 mm, compared to the long-term average (more than 500 mm). A groundwater well was settled in the forest on 28th of May 2021, and on 22nd of June 2021 a vented pressure transducer was installed to monitor the water table. Logged time series show diurnal groundwater fluctuation, by which we can estimate the environment-dependent groundwater uptake of the oak forest.

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