



Variability of Soil Water Storage in the Danube Floodplain Forest

I. Meszaros, Miklanek P., **Mitkova V.**

Institute of Hydrology SAS, Bratislava, Slovakia, meszaros@uh.savba.sk

Soil moisture and groundwater table monitoring is one of the key parameters for detection of the man management implications on environment. The complex monitoring system of Gabčíkovo water structure is operated because of its potential environmental impacts. It includes all possible impacts - climate, water, forests, agriculture, health aspects, etc.

The soil moisture in floodplain forests along the Danube river is studied in this contribution. Soil moisture is the main water source for vegetation and its insufficiency or abundance may significantly influence the forest. The essential change in moisture conditions may force vegetation cover changes.

The soil moisture is monitored at 23 sites within the floodplain forests since 1996. The soil moisture is measured by the Neutron Probe System IH-II produced by Didcot Instruments. One group of the sites is situated along Danube river between the old river channel and the new inlet channel for the water power plant, and the other one on the left bank of the Gabčíkovo water structure. During the vegetation season selected sites are monitored weekly, other ones each two weeks or monthly. During winter all the sites are monitored monthly.

The soil water content in this paper is calculated from the volumetric soil moisture data by standard technique in 10 cm layers and integrated for the upper 30, 80 and 150 cm soil layers. This data is important for evaluation of the disposable water for plants and their growing.

The mean annual regime of the soil moisture content is important parameter for the water availability for plants. This is particularly important in floodplain forest. The water stress in longer periods can damage the plants and ecosystems and influence the

forest management. Nine years of data collection (1996-2004) allowed to derive the mean annual regime of the soil moisture content in studied area. This knowledge is used for artificial summer flooding of floodplain forest.

The first group of the localities is typical by higher soil water content and the annual regime is not very marked. It is related to the ground water levels, which are also relatively high. The area is in good hydraulic connection with the water levels in the old river channel and also in the inundation area side arms, which are supplied by surface water from the water power plant intake channel.

The second group of the localities is typical by lower soil water content and the annual regime is in most of the sites very marked with maximum values in March-May and minimum values in September-November. It is also related with the ground water levels, which are relatively deep under the soil surface. The relatively stable water level in the neighbouring water reservoir increased also the ground water levels in the area by up to 2 m after construction of the dam.

Considerable decrease of ground water level, which occurred in the last 30 years before putting the project into operation, is evident mainly in the upper part of the area. The changes in the ground water levels in the flood-plain area, and generally in the whole region, confirm the positive impact of the project, in particular on the upper part of Zitny ostrov, and an important positive role of the water supply system for the left side Slovak flood-plain area since 1993.

References:

Kostka, Z.: Soil moisture spatial variability in mountain catchment and role of forest as hydrological factor. *J. Hydrol. Hydromech.*, Vol.43, 1995, 4-5, 301-318.

Kostka, Z., Holko, L.: Soil moisture and runoff generation in small mountain basin. *Publikácia SVH 2* (ISBN 80-967808-1-6), ÚH SAV a SVH Bratislava, 1997, 90 pp.