



Decrease of the flood conveying capacity of the Middle Tisza River, Hungary, due to the regional surface deformation

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In the last years of the 20th century, consequent flood waves drawn the attention to the water conductivity of the middle section on the Tisza River, around the city of Szolnok, Hungary. In this region, the flood-channel of the river could discharge, in the year 2000, 200 m³/s less flow than what was conveyed at the same water level in 1970. As a result of the analysis of the vegetation in the floodway, the water conveying capacity was reduced by cca. 100 m³/s. The rest of the capacity loss is partially because of the uneven subsidence in the area.

According to repeated precise levellings, taken around 1950 and 1980, the area of the city of Szolnok subsides about 4.3 mm/year, while 50 km downstream to this site this value is only 1.5 mm/year. This subsidence rate is a result of the quickened sediment compaction, induced by the water and hydrocarbon exploitation in the region. Due to this uneven subsidence, the slope of the flood-channel upstream of the most subsiding zone (the city of Szolnok itself) was increased, while it was decreased downstream of the city. This results in a backwater effect in that river section, endangering the city. The deformation of the longitudinal profile of the river can be computed from the geodetic measurements. The decrease of the flood conveying capacity can be estimated using the basic formula of Chezy, explaining more than 30 m³/s reduction of the conductivity.

This example shows that a man-induced process, as here the quickened subsidence is, can seriously modify the effectiveness of a river regulation system, which was not planned to handle these processes, occurring afterwards.

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