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Impact of river regulation works on morphological processes of the Sava River and on the Ljubljansko Polje aquifer

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The gravel sandy aquifer of Ljubljansko Polje is the drinking water source for nearly 300.000 inhabitants of Ljubljana city and vicinity. The bedrock is the impermeable permocarbonic shaly mudstone and sandstone. In the last million years, the river Sava filled up the basis thus forming a field. The lower part of the aquifer is composed of Pleistocene gravel and sand whilst in the upper part there are Holocene sand and gravel sediments. Shallow soil layer consists from sandy loam and half of meter deep covered the aquifer. The hydraulic conductivity of Ljubljansko Polje sediments is very well, from 10-2 m/s in the central part to 3,7·10-3 m/s on the borders of the plain. A numerical groundwater flow model was established for the wider area of the Ljubljansko Polje aquifer. Groundwater discharge is about 4,5 m3/s in average, from which 2/3 recharge from the Sava River and 1/3 infiltrate from surface. Yearly 1000 mm of water infiltrate from precipitation.

First land use planning that includes public drinking water supply and draining and wastewater purification was re-established at the end of the 19th century. In the same time large river regulation works started on the Sava River which was destroyed in first half of twenty century. Later on a new river regulation works and hydropower scheme were developed. Falling groundwater levels have been observed in the Ljubljansko Polje aquifer, where the water levels to fall by nine meters and the volume of groundwater to decrease by 40 million m3.and some springs and creeks which drainage groundwater disappear. Process of changes is well documented by measurement