



Land use management and extreme weather events affecting drinking water supply

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In the 1980s well field Brest was built for the purpose of additional drinking water supply for Ljubljana (the capital of Slovenia) and its surroundings. In the beginning groundwater was abstracted from shallow wells in Iška river alluvial fan, later also deeper wells were drilled into deeper parts of the porous aquifer. The porous aquifer is recharged from the rainfall and the Iška river. Due to the karst characteristics of the hinterland, the Iška River has a torrential character, which is reflected in the large discharge fluctuations affecting recharge of alluvial aquifers. In addition, the karst hinterland also has a direct impact, since the alluvial aquifer is also recharged directly from groundwater inflows from dolomite and limestone aquifers in bed rocks. Recently, deep wells were drilled to reach dolomite aquifer in bed rock.

For more than 20 years there was no problem with quantity of groundwater, so the abstraction was mainly from shallow wells. But in the last ten years problems of groundwater quantity arises; especially the shallow wells have been very often dry, which also affect the safety of drinking water supply. The sensitivity of the Iška fan aquifers is evident from groundwater level fluctuation analysis. After the events in September 2010 (floods, disappearance of river Iška, earthquake) we observe higher amplitudes in groundwater level fluctuation.

The groundwater quantity is sensitive to human interventions into the recharge area as well as on extreme weather conditions. For this hydrologic, hydraulic and groundwater flow model were set up considering changes in the recharge area and climate change, which was done in the frame of the CAMARO-D project (Cooperating towards Advanced Management Routines for land use impacts on the water regime in the Danube river basin). Different scenarios were studied, such as scenarios of land use changes in the recharge area and scenarios of different pumping regimes of groundwater.

Main land use problems in the recharge area are forest management and urban sprawl to Iška river flooding area. In the Iška river basin protected forest is present, within no interventions are allowed (including sanitation cutting and dead wood removal), which is causing threats in case of high waters due to flushing of dead wood downstream and causing erosion and damming. Moreover, in 2014 Slovenia was faced with sleet, which damaged 65 % of the Slovenian forest. Due to development of settlements in the 80s along the river Iška flood protection measures were implemented (mostly building of dams), which on the other hand threaten old settlers, living in this area, and their farms and fields.

Results of models will be used to set up measures and management plan for sustainable water management including flood protection measures and groundwater management with optimal operation of wells in well field Brest.

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