Impacts of climate and regulation on groundwater and surface water interactions with floodplain ecosystem

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The groundwater and surface water interactions are extremely important to sustain flood forest and ecosystems in side channels and oxbows. The interactions are impacted by climate variability, river regulations and land use changes. There is a need to model those interactions and calibrate parameters in existing water flow models.

We have studied and modelled the surface water – groundwater interactions on the Mura river aquifer in Slovenia and investigated impacts of river regulations to groundwater level dynamics. We present findings and analyse the relevance of climate variability. We also identify knowledge gap and recommend further research to understand dynamic of groundwater-stream interactions of the Mura River in Slovenia.

The river Mura in Slovenia (1400km\textsuperscript{2} large catchment) is a bed-load dominated river. Its aquifer in Slovenia is 520 km\textsuperscript{2} large. The groundwater moves gravitationally into well-permeable sediments in parallel to the Mura River. The recharge dynamics of groundwater has been changed due to large regulation works before 1980, reduced sediment supply from the upstream and disconnection of side channels. There is a statistically significant decrease of groundwater levels in the middle of aquifer. Close to a water reservoir the opposite is true. During the low and average river flows, the direction of water flow is from groundwater into channels. Water from the main channel of the Mura fills the soil and recharges the groundwater only at high waters. Flood forest, backwaters and oxbows, once typical for the floodplain areas along the Mura River are loosing the contact with the groundwater.