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INDUCED RIVERBANK FILTRATION FOR MANAGED ARTIFICIAL GROUNDWATER RECHARGE AT APAČE FIELD

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Objectives

Shallow aquifer of Apače field

Efficiency analysis of a MAR system at Apače field

- Steady-state GW flow model FREEWAT
- GW recharge assessment SWAT
- Transient GW flow model using SWAT output data
- Transport model with simulated nitrate leaching



Aquifer of Apače field





Aquifer of Apače field

- Shallow aquifer
- Exposed to intensive agriculture
- Main drinking water supply for the Pomurje region (26.000 inhabitants)
- Constructed MAR system with IRBF in 2016



Intensive agriculture





Shallow aquifer





Water protection areas





Impermeable layer





Groundwater flow





MAR system with IRBF

- Pumping riverbank filtrate of river Mura
- Active protection against nitrate polluted hinterland waters
- Prevention of water scarcity in the summer period
- Deferrization and demanganization



MAR system with IRBF





MAR system with IRBF - Segovci





MAR system with IRBF - Podgrad









Groundwater model - FREEWAT

- Establishment of a steady-state GW model in FREEWAT
- Implementing MODFLOW boundary conditions to simulate:
 - River/aquifer seepage RIV package
 - GW recharge RCH package
 - MAR system WEL package
 - Hinterland water inflow GHB package
 - Lake/aquifer seepage LAK package





Scenarios

- Rise of the groundwater level after the construction of the MAR system
- Protection of the MAR system against polluted hinterland waters
 - o 1. scenario: high water level
 - 2. scenario: low water level





Rise of GW level after MAR construction





MODPATH particle-tracking



Impact of lakes in Zgornje Konjišče on groundwater of Apaško polje (Kolar, 2018)



GW recharge assessment - SWAT

- Impact of farm management on surface waters and ground water
- Hydrological response units HRUs
 - o landuse, soil, slope, climate





GW recharge assessment - SWAT







Annual GW recharge (2012-2017)





Future goals and aims

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Steady-state GW flow model – FREEWAT

GW recharge assessment - SWAT

• Transient GW flow model using SWAT output data

• Transport model simulating nitrate leaching



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Thank you for your attention!

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