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DANUBIUS-PP

MODELLING THE IMPACT OF INCREASED LATERAL CONNECTIVITY ON NUTRIENT RETENTION IN AUSTRIAN DANUBE FLOODPLAINS

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Introduction

- Hydro-morphological alterations and excessive nutrient inputs into Central European rivers
- Floodplains are sinks for inorganic nutrients but often decoupled from rivers
- Danube Floodplain National Park (DFNP): proposed reconnection of 7 side arms in accordance with navigation purposes

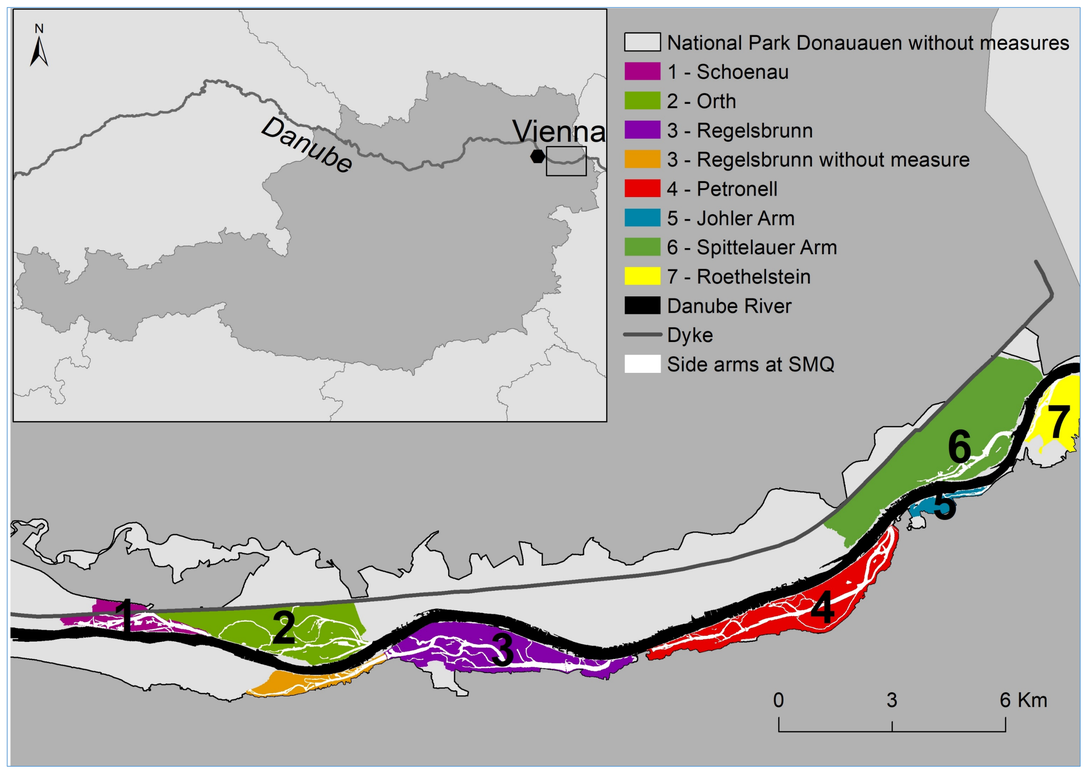
Methods

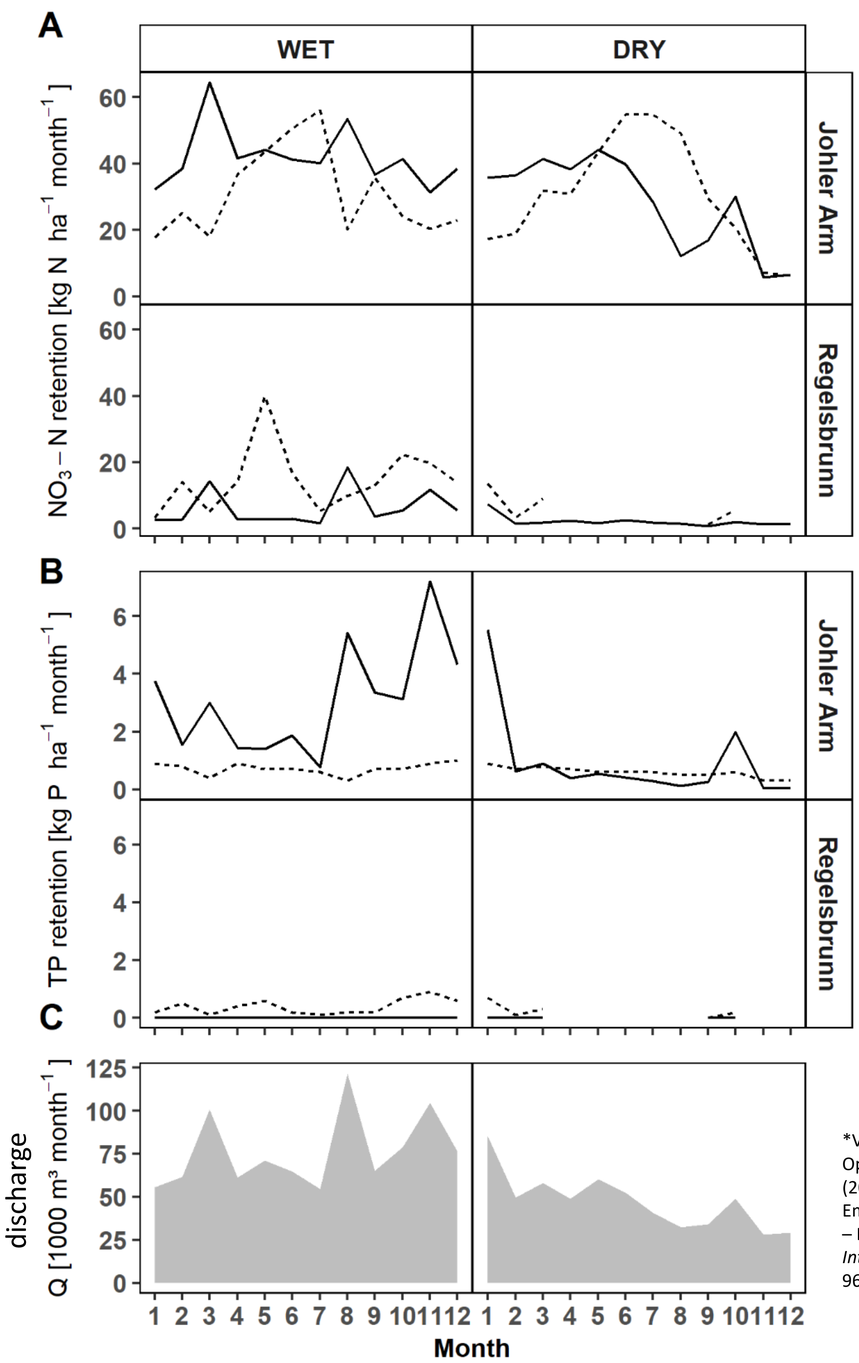
Application of 2 models simulating impact of reconnection measures on NO_3-N and total P retention in a wet (2002) and a dry year (2003):

- **Statistical model:** multiple adaptive regression spline model of concentration differences in differently connected side arms (connected/disconnected state)
- **Semi-empirical model:** larger scale causalities for denitrification and deposition of total P according to Venohr et al. (2011)*

Outcomes

- Similar total retention (t/a) according to both models; complementary: Semi-empirical model more reliable at high discharge, statistical model considers NO_3-N retention in disconnected state
- Higher nutrient retention in floodplains where reconnection allows more frequent inundations at lower discharges
- **Drivers for retention (positive)**: Discharge, nutrient input concentration/load, inundated area, duration of surface water connection, temperature, **(negative)** hydraulic load
- **Limitations**: high flows, overestimation of total P retention after reconnection (statistical model), validation
- After restoration, riverine NO_3-N and total P loads are reduced by **<0.1%** in the DFNP -> more frequently connected floodplain areas and less nutrient emissions into Danube River required



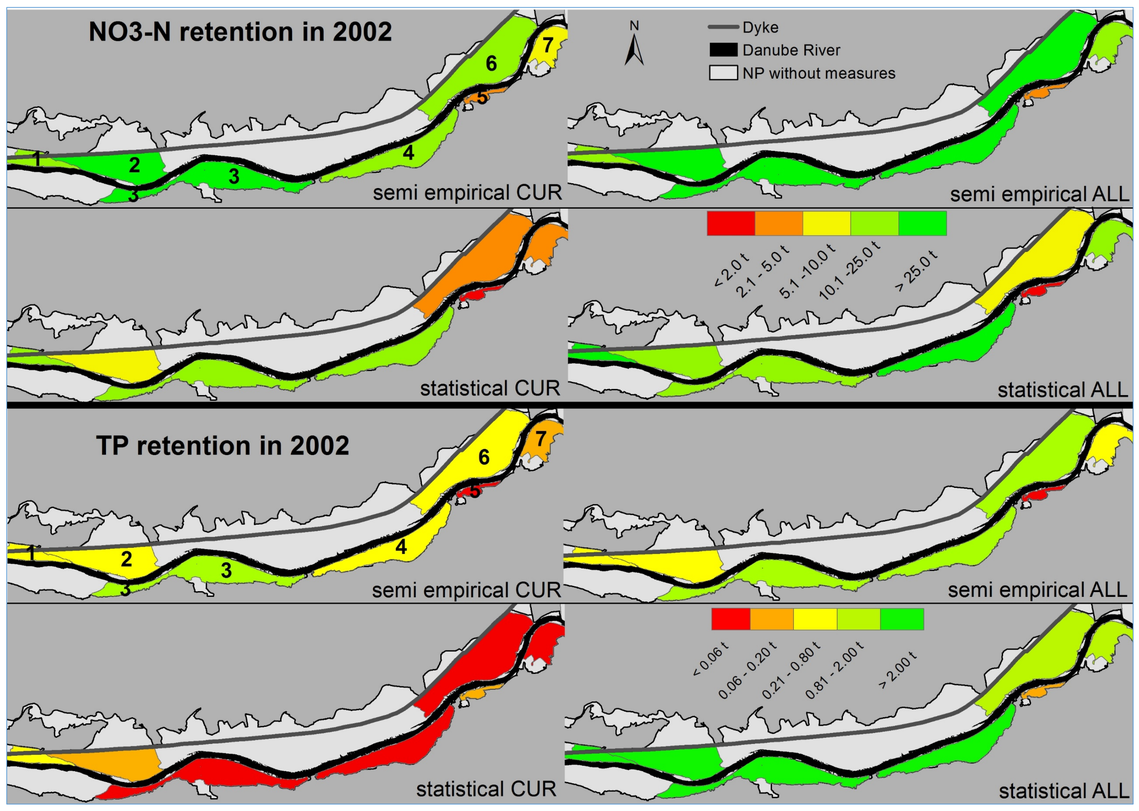


High connectivity

Low connectivity

Current state

After restoration



*Venohr, M., Hirt, U., Hofmann, J., Opitz, D., Gericke, A., Wetzig, A., et al. (2011). Modelling of Nutrient Emissions in River Systems – MONERIS – Methods and Background. *International Review of Hydrobiology* 96(5), 435-483.

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