

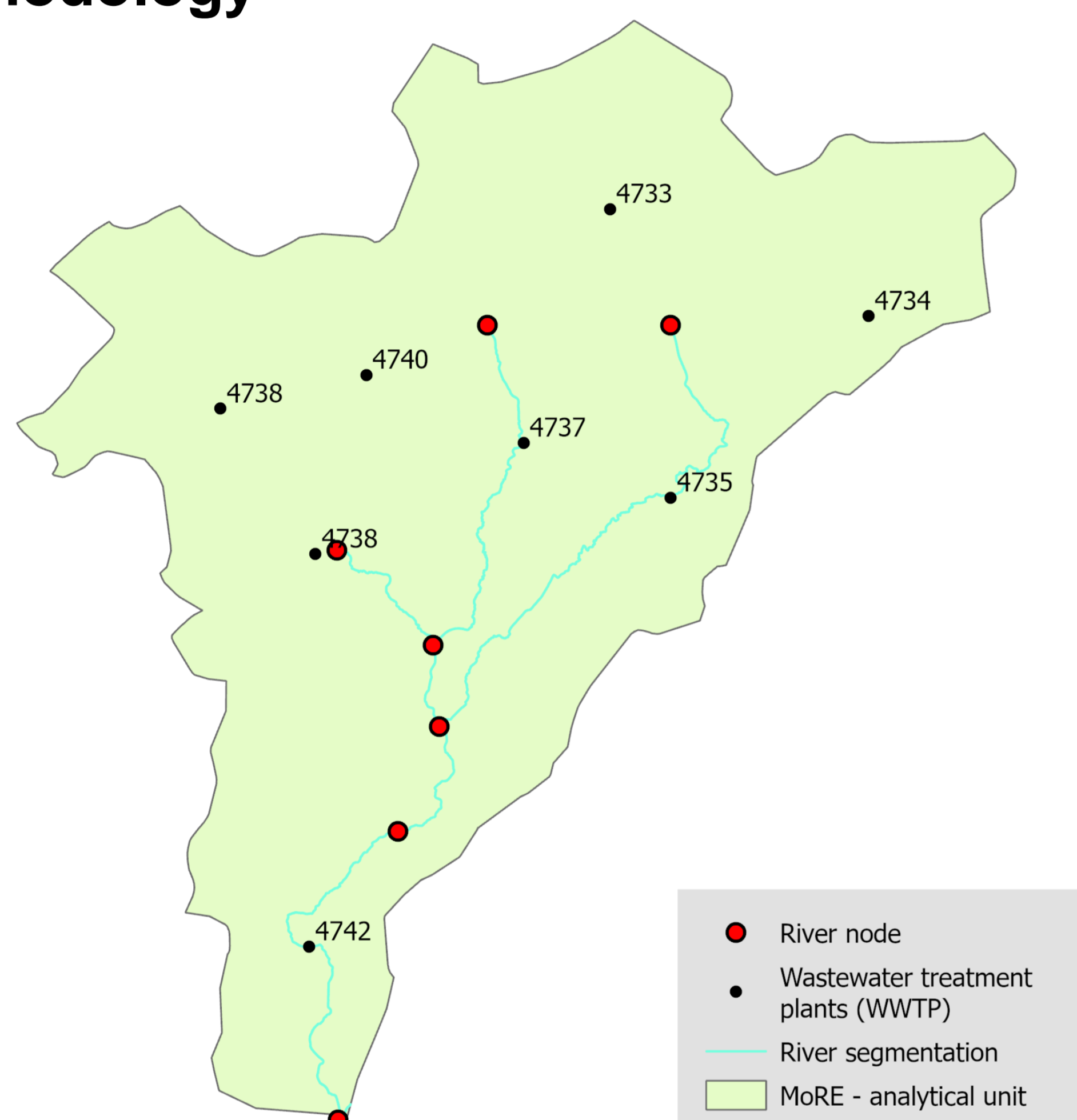
A Modelling Framework for Pollutant Transport and Retention Processes in River Networks — Concept and First Simulation Results

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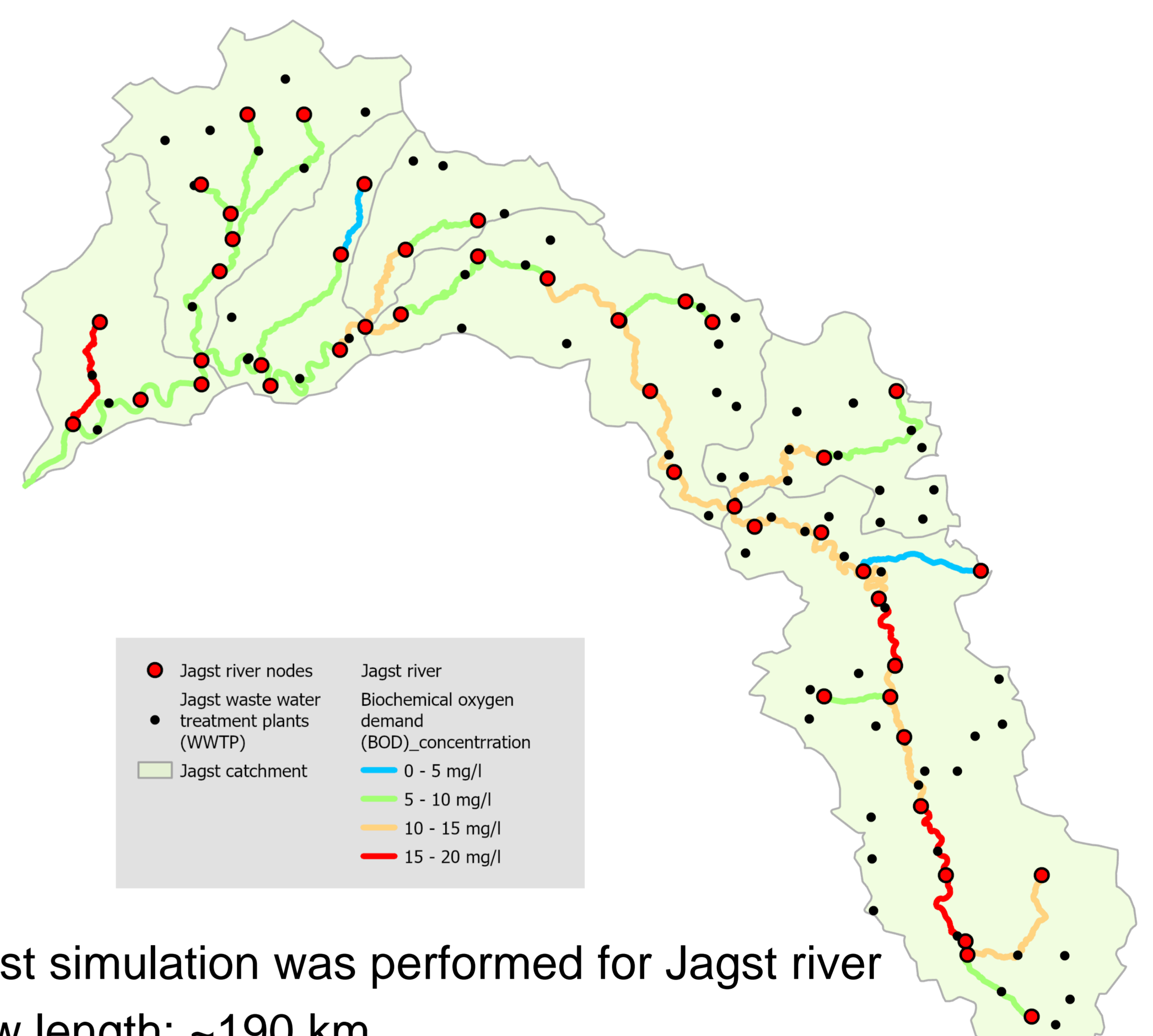
Background

MoRE (Modeling of Regionalized Emissions) models pathway-specific substance emissions into surface waters at catchment scale. In current MoRE applications, transport and retention processes in river networks are not yet adequately represented. This work develops a node–edge approach to enable Germany-wide modelling of transport and retention processes.

Methodology



Results



- MoRE analytical units as spatial base
- River network divided into edges (~7 km median length)
- River edge – WWTP pairing based on river segment IDs and network logic
- WWTP effluent assigned to nearest edge node (upstream/downstream)
- First-order degradation along each edge

The first simulation was performed for Jagst river

- Flow length: ~190 km
- Point sources: 77 WWTPs
- WWTP effluent concentration: 15 mg/L BOD
- Water temperature: 25 °C
- Discharge scenario: 30% of mean annual discharge (MQ)
- River edges are coloured according to simulated BOD concentrations

Conclusions & next phase

- The developed workflow enables automated assignment of WWTP emissions to the river network
- The framework supports simulations of transport and retention processes along river edges
- Germany-wide application for representative substance groups, including persistent, biologically degradable and photolytically degradable substances

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