

Quantification of trade-offs for floodplain interventions as decision support

Menno Straatsma & Maarten Kleinhans

Challenge

Adapting densely populated deltas to the combined impacts of climate change and socioeconomic developments presents a major challenge for their sustainable development in the 21st century. Decisions for the adaptations require an overview of cost and benefits and the number of stakeholders involved, which can be used in stakeholder discussions.

Innovative components

We quantified the trade-offs of common measures for the River Waal with adaptation scenarios driven by:

1. the choice of seven measures,
2. the areas owned by the two largest stakeholders (LS) versus all stakeholders (AS)
3. the ecological or hydraulic design principle.

We evaluated measures automatically by their efficiency in flood hazard reduction, potential biodiversity, number of stakeholders and measure implementation cost.

For whom and where?

This method can be applied to any alluvial river where different stakeholders and river functions compete for space. It can be upscaled to the whole delta.

Application development and findings

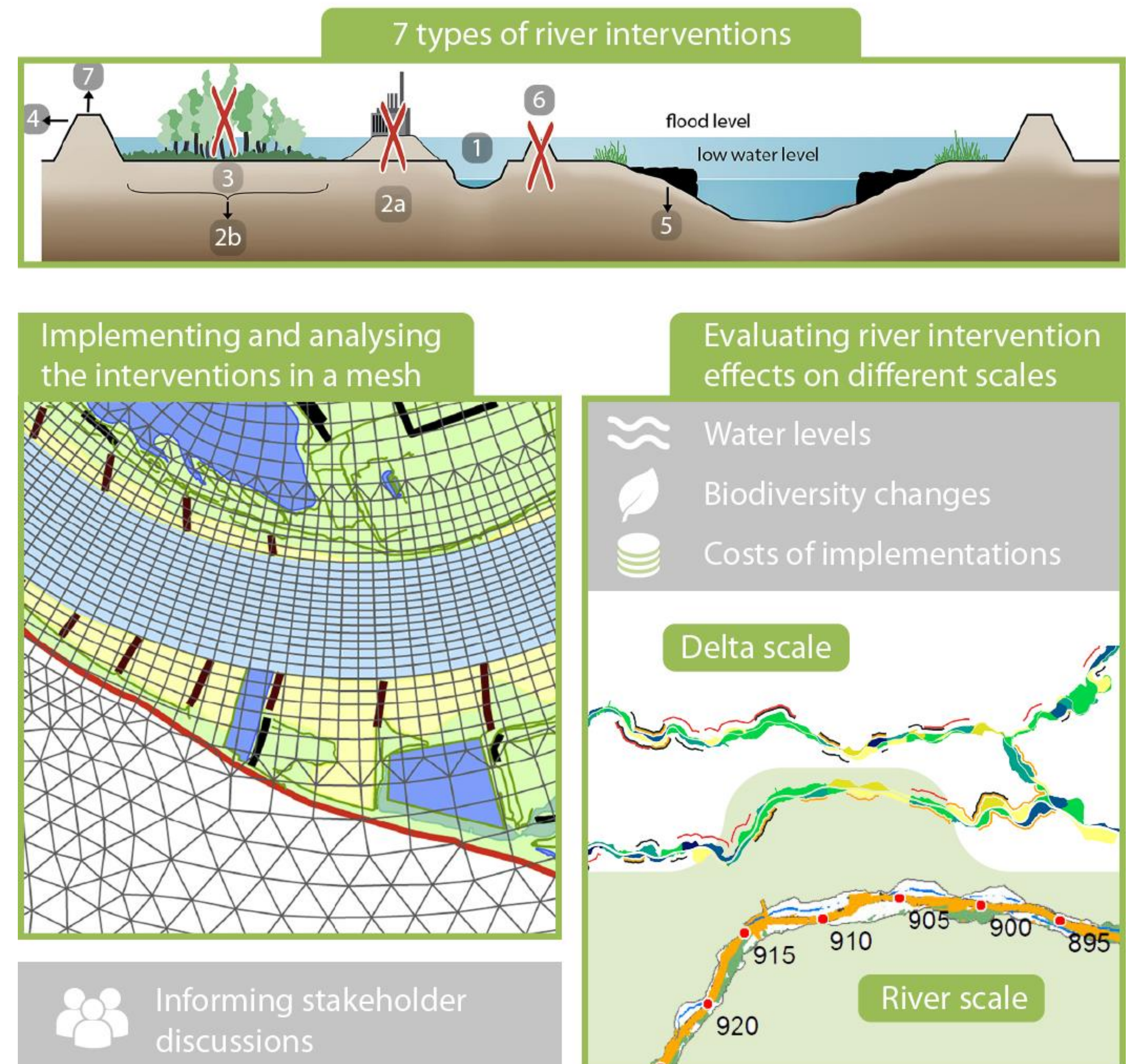
We found that only floodplain lowering over the whole study area can offset the altered hydrodynamic boundary conditions; for all other measures, additional dike raising is required. The areas owned by Staatsbosbeheer and Rijkswaterstaat comprise low hanging fruits for water level lowering due to the governance simplicity and hydraulic efficiency. Natural management of meadows (AS), after roughness smoothing and floodplain lowering, represents the optimum combination between potential biodiversity and flood hazard lowering, as it combines a high potential biodiversity with a relatively low hydrodynamic roughness.

Status for day-to-day practice

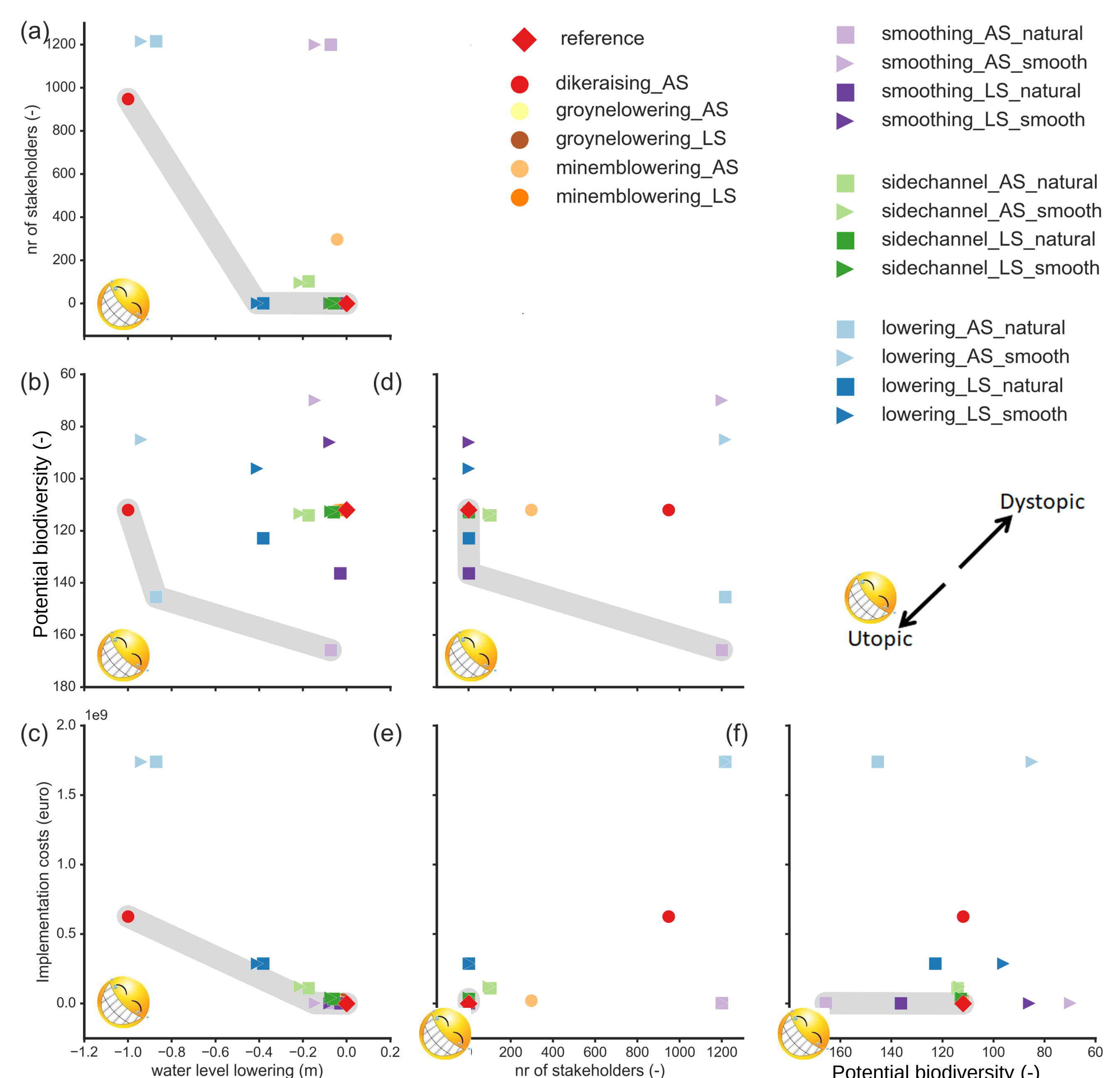
With this automatic multicriteria evaluation, we step up to a multi-disciplinary optimization. It supports the negotiations among stakeholders in the decision-making process.

Next steps

The concept will be tested in a sequence of Living Labs for the River Waal in 2019. Temporal evaluation, which includes floodplain maintenance, extends the current functionality.



Seven different interventions (top) that were positioned and parameterized automatically in the Waal River (detail left), and evaluated at the scale of the delta and river reach (right).



Trade-offs between water level lowering, implementation costs, number of stakeholders (AS = all stakeholders, LS = two large stakeholders) and potential biodiversity.

Interested?

Email to: m.w.straatsma@uu.nl
Explore more in the [project description](#) or the [story line](#) on biodiversity recovery

