

# Optimizing river management: integrated assessment of floodplain interventions

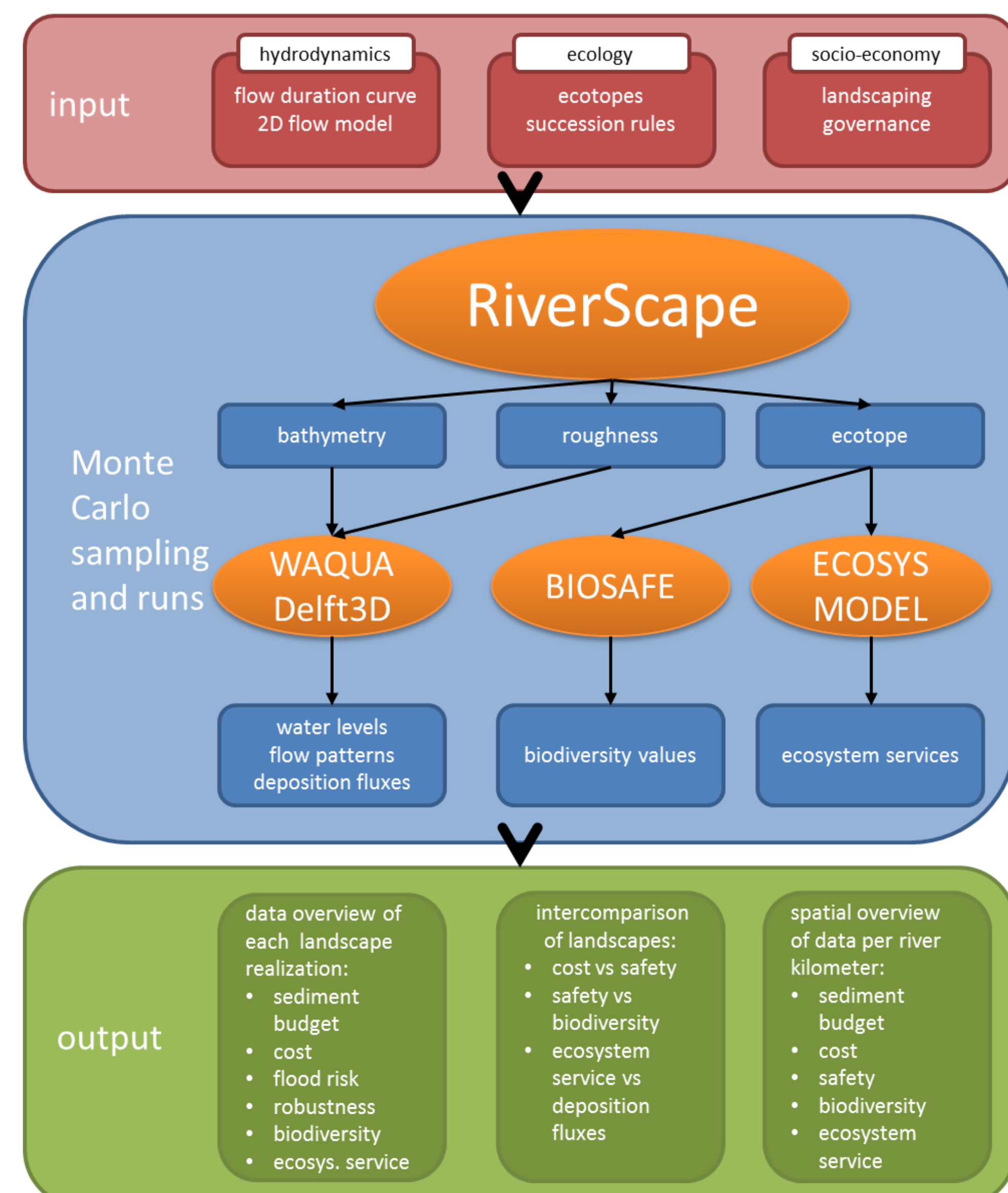
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## Introduction

There is a continuous need for evaluation of floodplain interventions with respect to hydro-morphodynamic as well as ecological processes. This requires a method that is fast, and inclusive to support discussions on future interventions.

We present the preliminary results of RiverScape, an automated method that can:

- position and parameterize interventions with respect to terrain height and land cover,
- compute potential biodiversity in a spatially explicit manner,
- automate the quantification of fluvial ecosystem services.



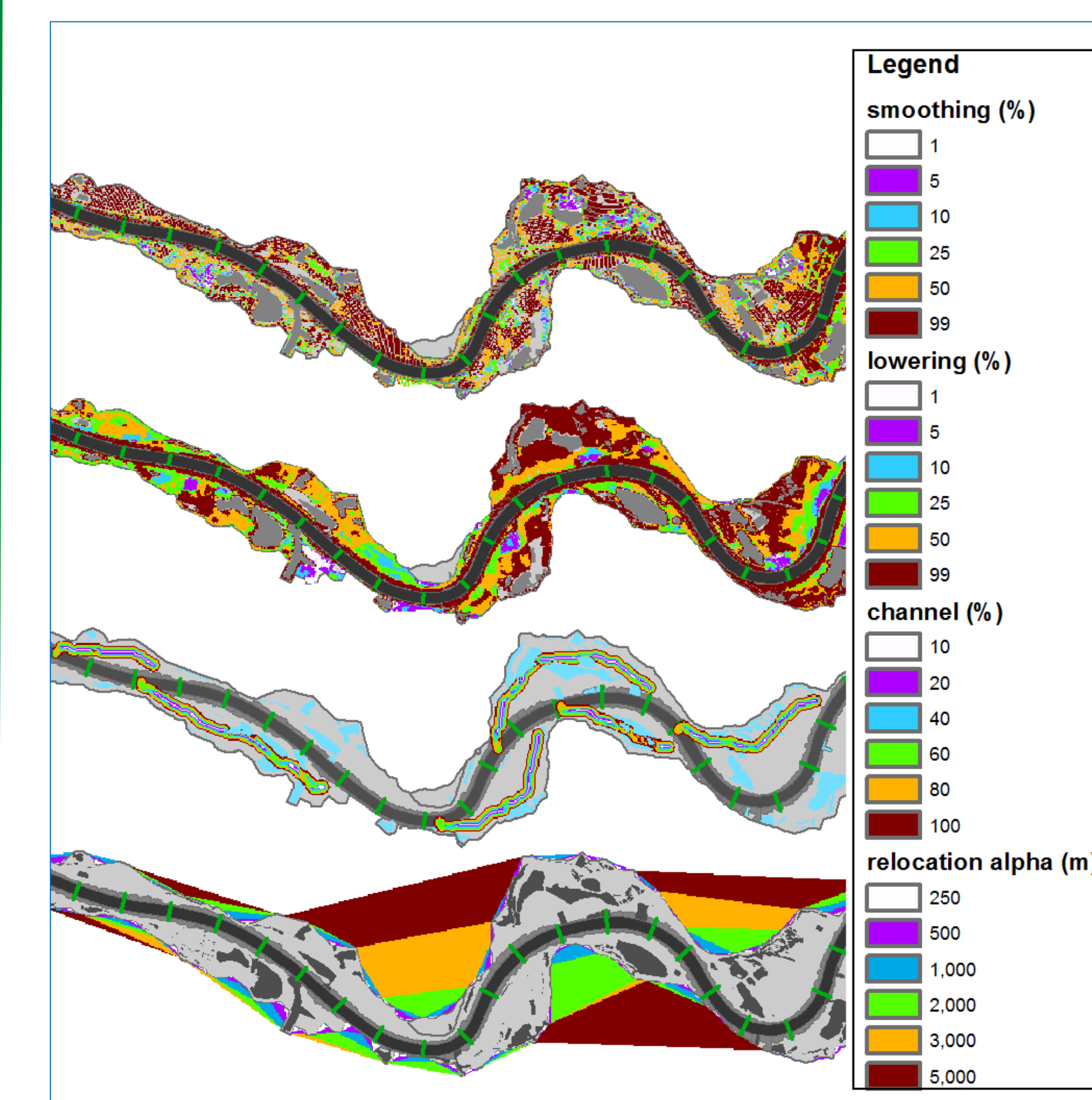
Flowchart of the RiverScape methodology

## Planning and parameterization

Interventions can be planned for single floodplain sections, or over the full study area. Four types of measures were implemented. Each intervention is parameterized in terms of land cover, roughness, and terrain height.

RiverScape settings for intervention planning

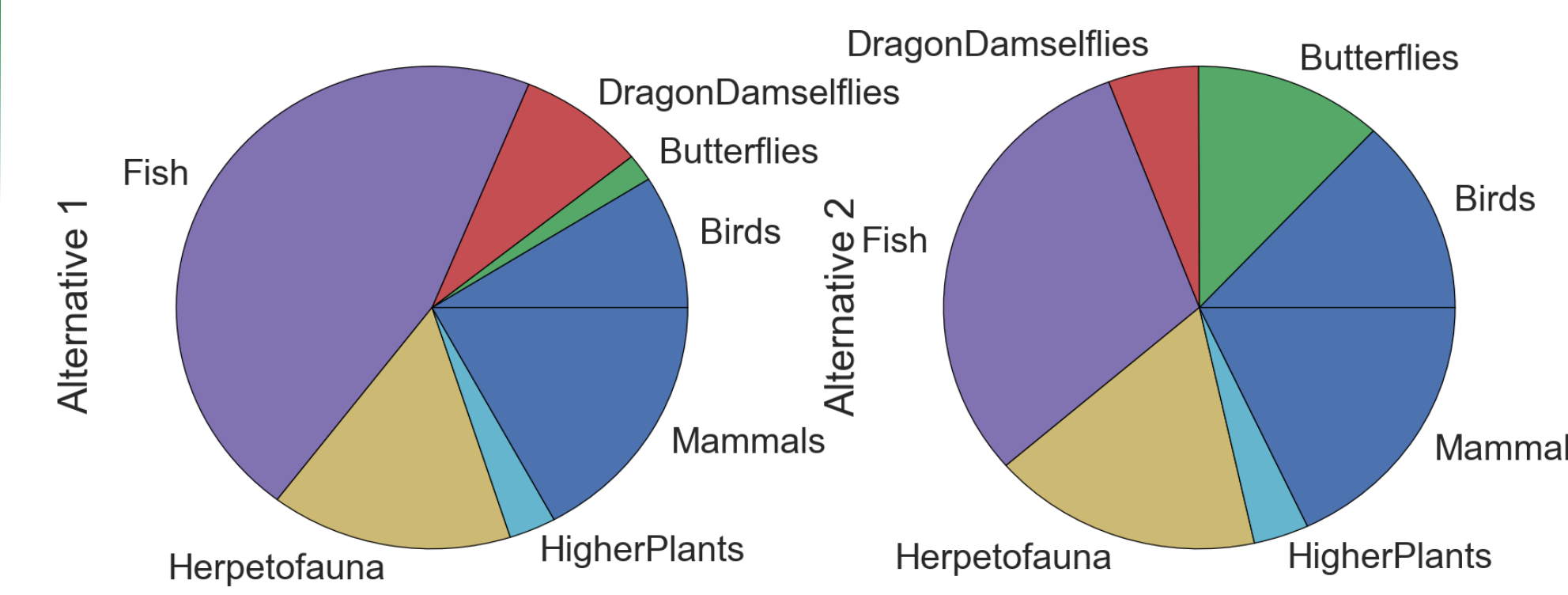
floodplain smoothing	floodplain lowering	side channel creation	embankment relocation
<ul style="list-style-type: none"> <li>• floodplain percentage</li> <li>• new ecotope</li> <li>• new roughness code</li> </ul>	<ul style="list-style-type: none"> <li>• floodplain percentage</li> <li>• depth relative to mean river water level</li> <li>• new ecotope</li> <li>• new roughness code</li> </ul>	<ul style="list-style-type: none"> <li>• channel width relative to mean river water level</li> <li>• channel depth relative to mean river water level</li> <li>• cross sectional slope</li> <li>• new ecotope</li> <li>• new roughness code</li> </ul>	<ul style="list-style-type: none"> <li>• alpha shape for winterbed</li> <li>• floodplain height relative to mean river water level</li> <li>• new ecotope</li> <li>• new roughness code</li> </ul>



Intervention planning and spatial parameterization: six options for four intervention types

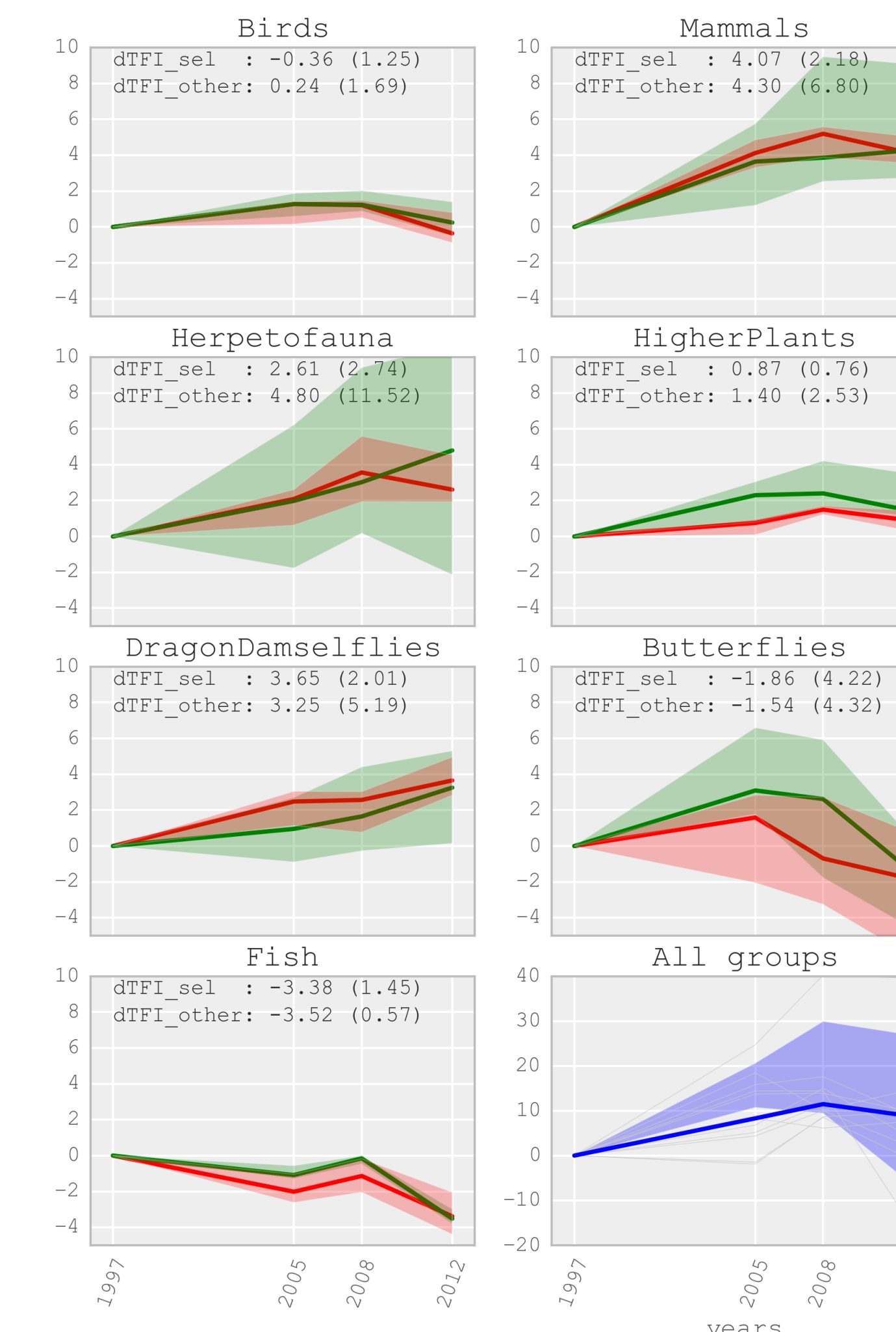
## Biodiversity development

The development of biodiversity as a result of the intervention was evaluated using the re-implemented spatially explicit version of BIOSAFE (Lenders et al. 2001).



Evaluation of the biodiversity value of seven taxonomic groups for two different intervention alternatives

Temporal development of biodiversity value can be evaluated to demonstrate the effect of succession and rejuvenation.

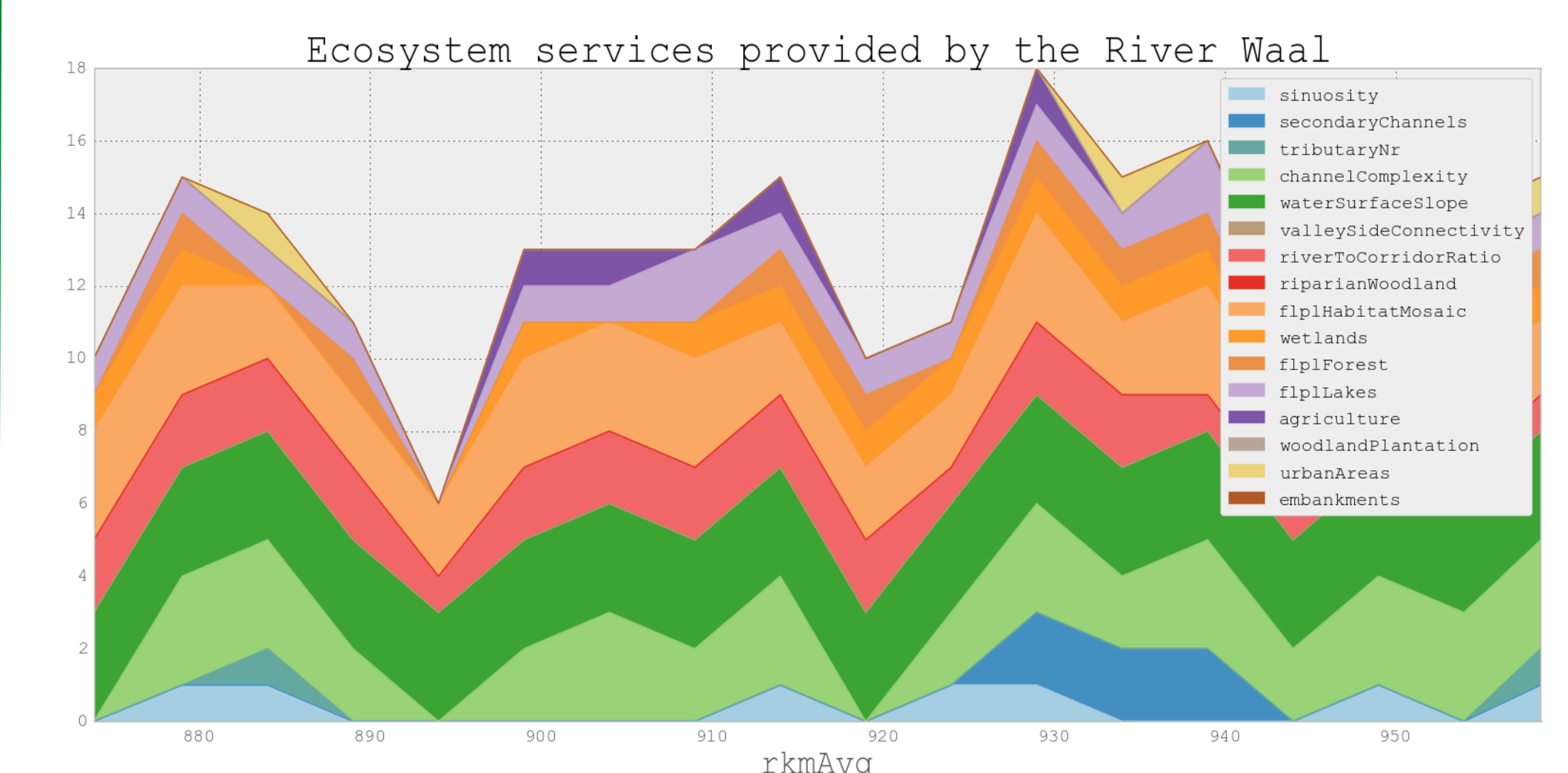


Temporal development of biodiversity value for rejuvenated floodplains (red), and the others (green)

## BIOSAFE

## Ecosystem services development

Evaluation of ecosystem services, *sensu* Large and Gilvear (2014), was automated using the RiverScape geodatabase. This gives an overview of 16 services per 5-km long river sections. No monetary values are assigned yet.

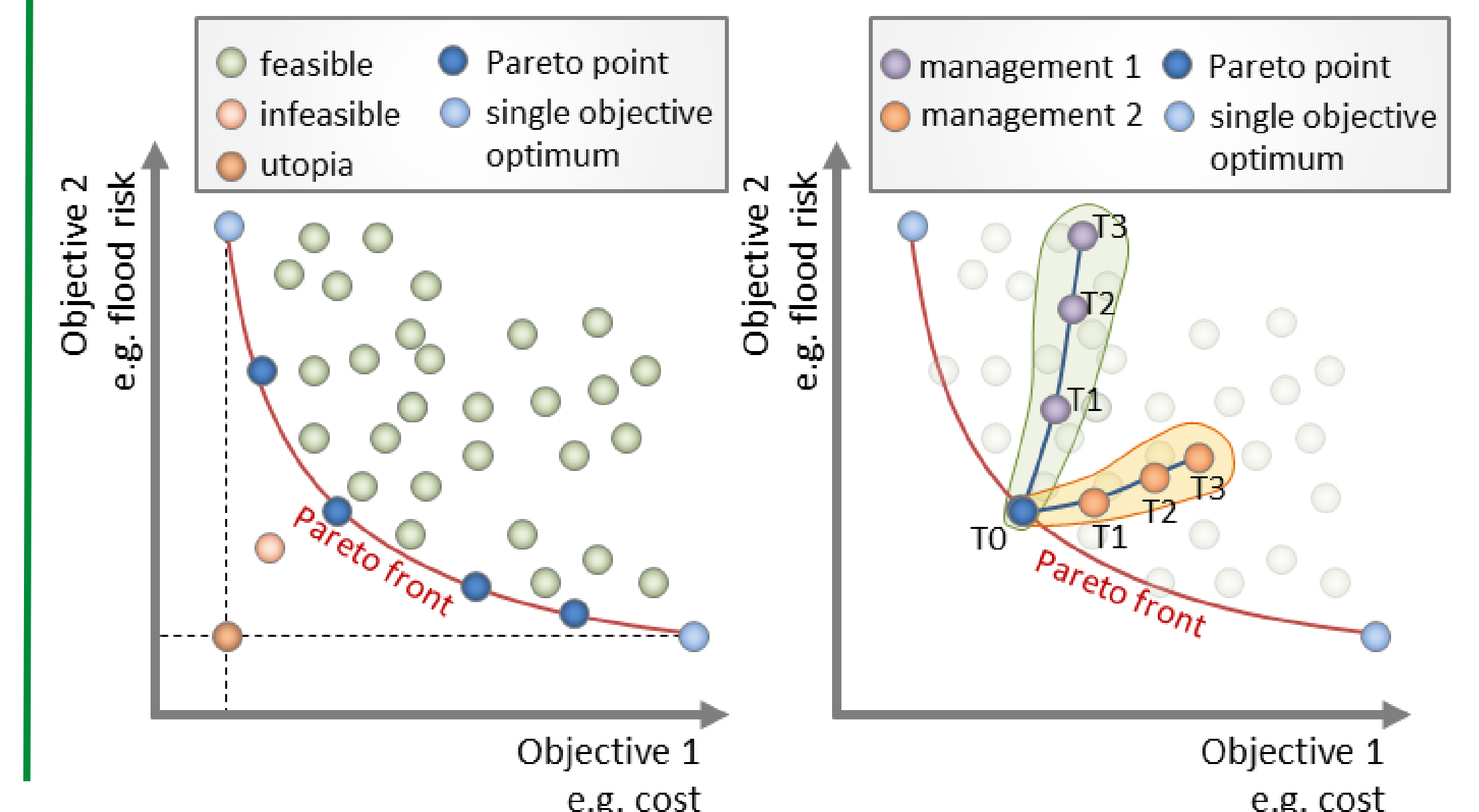


Intervention planning and spatial parameterization: 6 options for four intervention types

## Preliminary conclusions and outlook

The RiverScape modules on planning/parameterization, biodiversity, and ecosystem services provide fast access to a wide range of intervention options and ecological evaluation. The next steps will be to:

- add evaluations in terms of flood risk reduction, cost estimates, and uncertainty (Fig., left),
- consider evolution of the intervention over time,
- evaluate effects of land management (Fig., right).



Two dimensions for decision support visualisation: Cost and flood risk. Intervention selection, evolution over time, and uncertainty