

Balancing agricultural and environmental water demand to address the sensitivity of socio-ecological systems

Motivation & Innovation

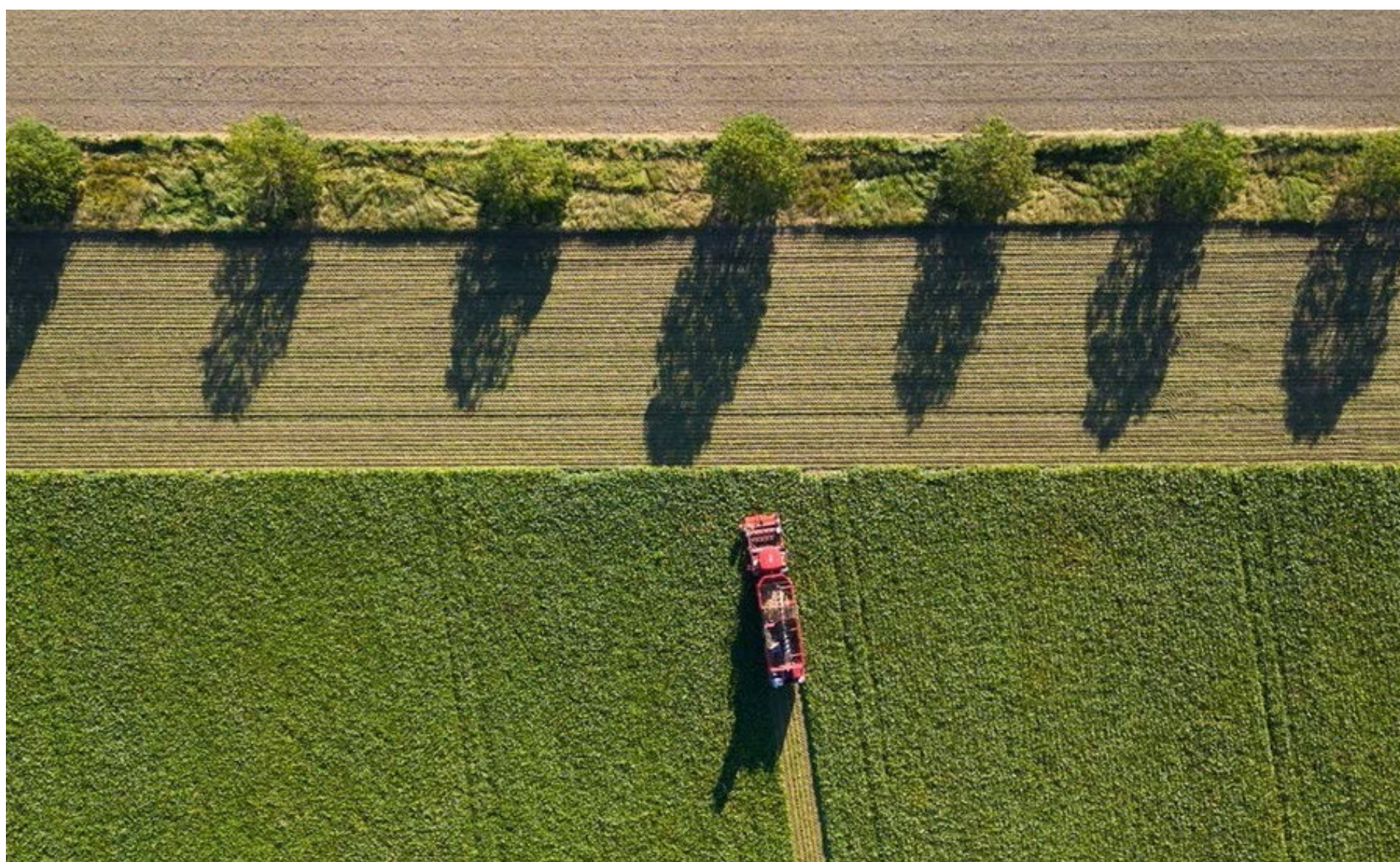
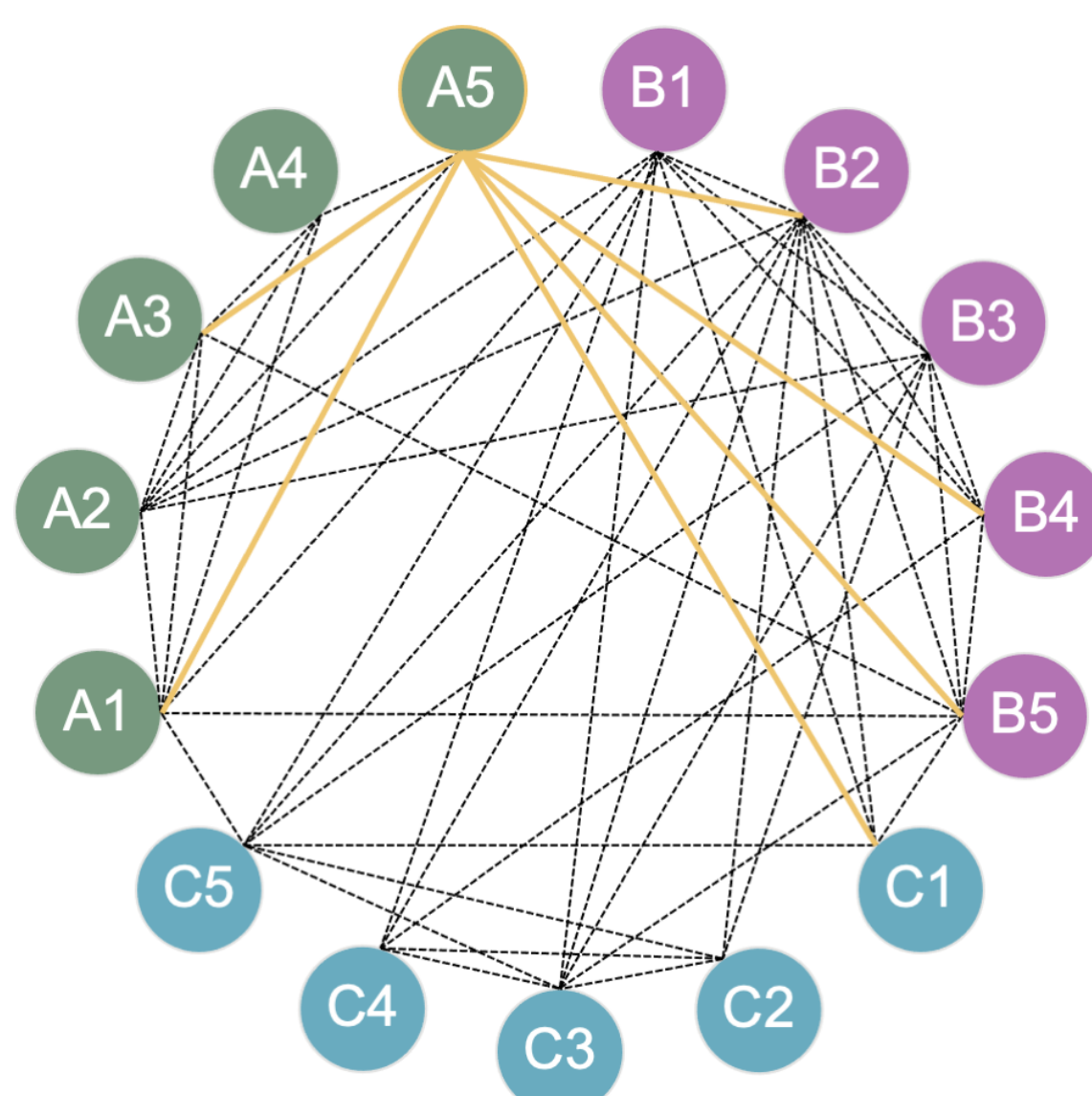


Figure 1. Sugar beet harvest, Hannover region (© dpa)

- Water scarcity challenges agriculture and the environment with **heightening uncertainty** (Höllermann & Evers 2019) and conservation needs (Heinzel et al. 2022). In NW Germany, this requires a **shift** from traditional drainage **to water conservation systems** which address imminent drought risks.
- **SES sensitivity** with scenario analysis identifies ecological regime shifts under varied hydro-climatic and agricultural scenarios. This guides water allocation **within ecological limits** and **reduces systemic risk**.

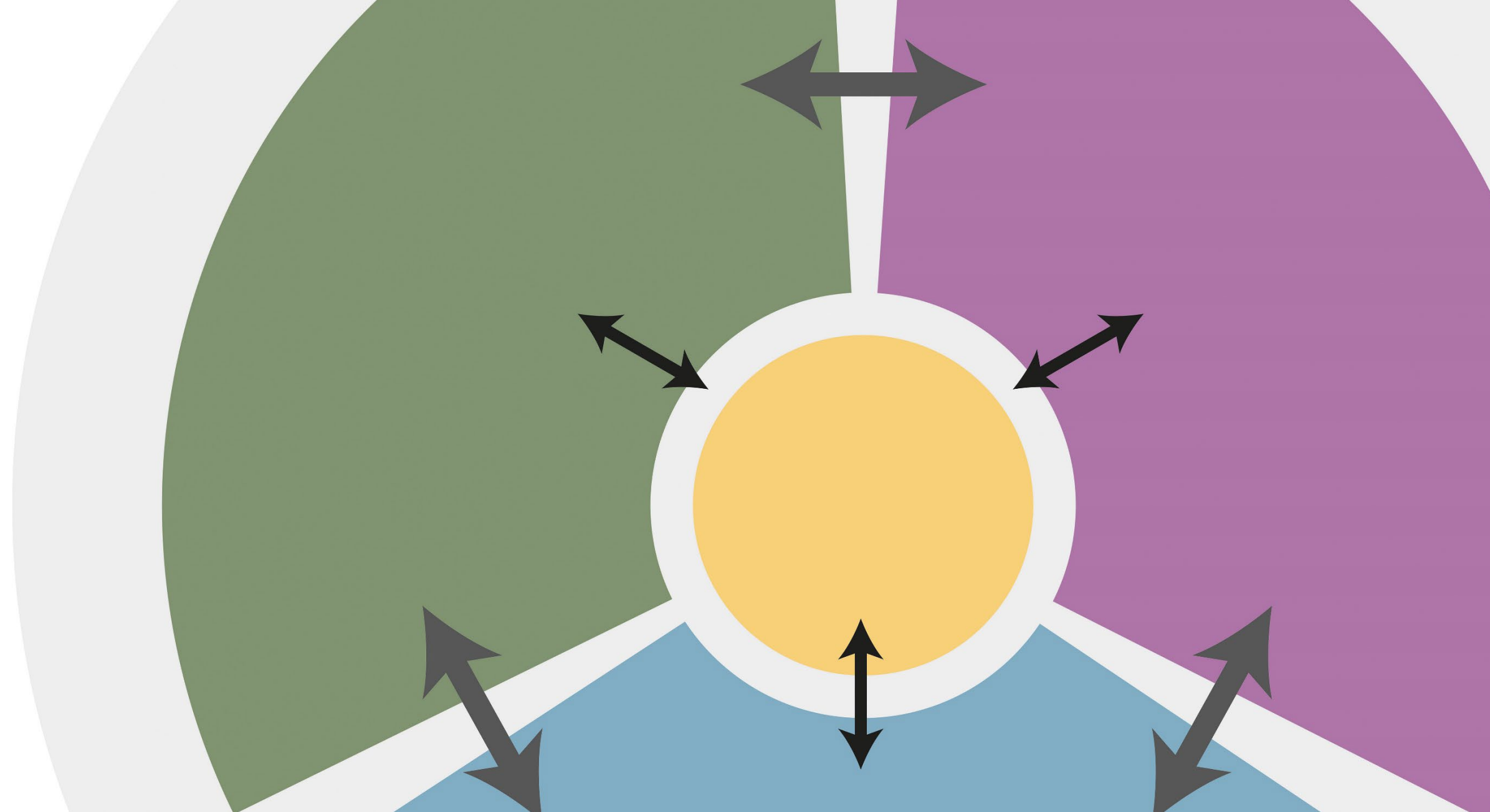
Linkages



- Builds on land use archetypes developed in A1
- Provides preliminary scenario results for discussion (B5, C1)
- Integrates findings on human behavior (B2, B3, B4) for further scenario development

References

Heinzel, C., Fink, M., & Höllermann, B. (2022). The potential of unused small-scale water reservoirs for climate change adaptation: A model- and scenario based analysis of a local water reservoir system in Thuringia, Germany. *Frontiers in Water* 4.
 Höllermann, B., & Evers, M. (2019). Coping with uncertainty in water management: Qualitative system analysis as a vehicle to visualize the plurality of practitioners' uncertainty handling routines. *Journal of Environmental Management* 235, 213-223.

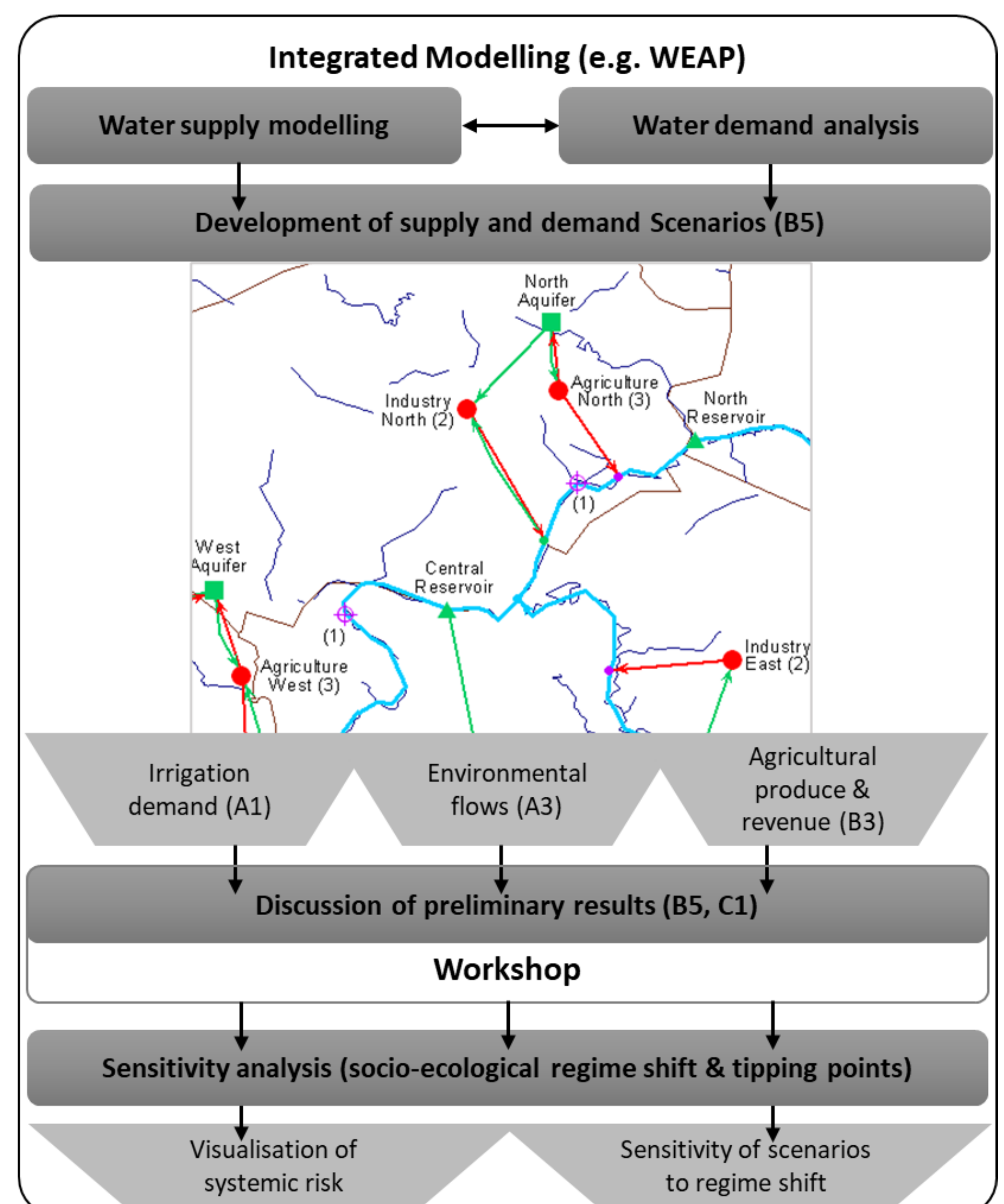


A5. Ecosystem dynamics

Objectives

- How do different agricultural practices and crop choices affect water demand and productivity in the context of climate variability and water scarcity? Are there any **tipping points**?
- What are potential **ecological regime shifts** under various hydro-climatic and agricultural **scenarios**? How sensitive are SES to change?

Scientific Design



Principal Investigator

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- Socio-hydrological interactions and dynamics (agriculture, floods)
- Perception and handling of uncertainties of hydro-climatic risk in water resources management and agriculture
- Participatory system and scenario analysis

