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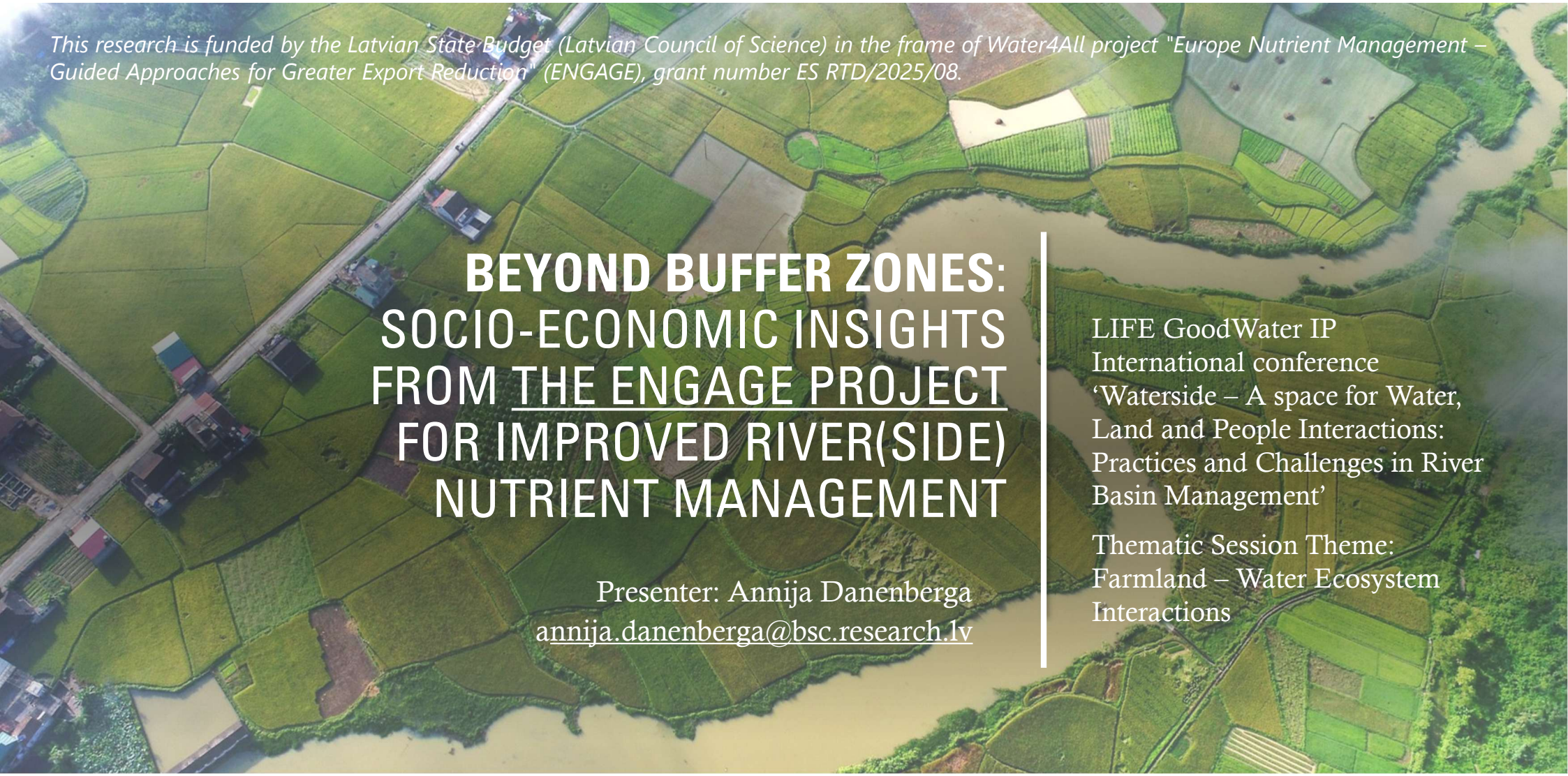

BEYOND BUFFER ZONES: SOCIO-ECONOMIC INSIGHTS FROM THE ENGAGE PROJECT FOR IMPROVED RIVER(SIDE) NUTRIENT MANAGEMENT

Presenter: Annija Danenberga
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LIFE GoodWater IP International conference 'Waterside – A space for Water, Land and People Interactions: Practices and Challenges in River Basin Management'

Thematic Session Theme: Farmland – Water Ecosystem Interactions

BSC BALTIC STUDIES CENTRE

ENGAGE Europe Nutrient Management Guided Approaches for Greater Export reduction

Water4All Water security for the planet

Latvian Council of Science

STRUCTURE

I. Problem-scoping: Why farmland-water ecosystem interactions matter?

II. ENGAGE project outline

III. Beyond the physical: Socio-economic drivers

IV. Nutrient management perspective comparison (Biophysical data vs. Integrating socio-economic parameters)

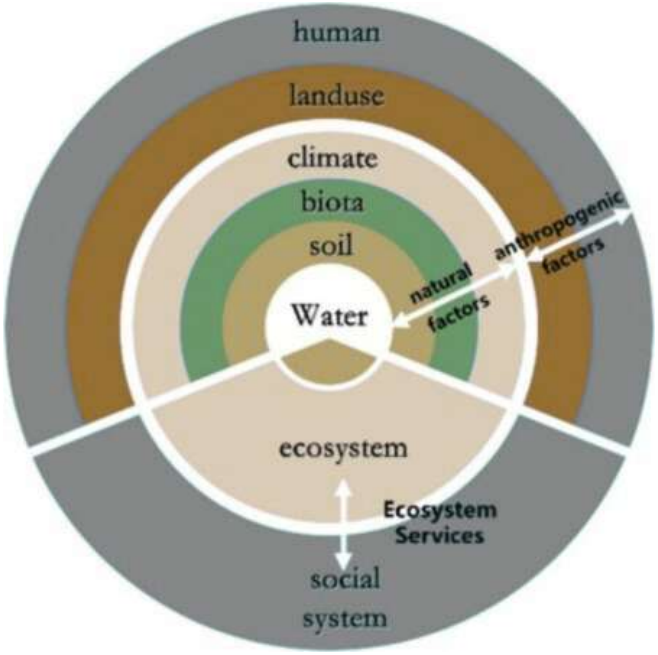
V. River basin governance through stakeholder co-design

'Buffers work – but not alone. It is socio-economic and governance factors that determine whether the ecological solution succeeds.'

- 60% of EU surface waters not in good ecological status (EEA, 2023)
- Nutrient runoff --> eutrophication acceleration -->

decrease of aquatic quality

- Climate and land use change amplifies nutrient fluxes
- **EU nutrient reduction targets illustrate the need for transboundary cooperation** – among farmers, industries and policy-makers, as well as academia, NGOs and the public
- Managing these interfaces determines both ecosystem integrity and social wellbeing




ENGAGE
EUROPE NUTRIENT MANAGEMENT
GUIDED APPROACHES FOR GREATER EXPORT REDUCTION
UNIVERSIDADE DE ÉVORA
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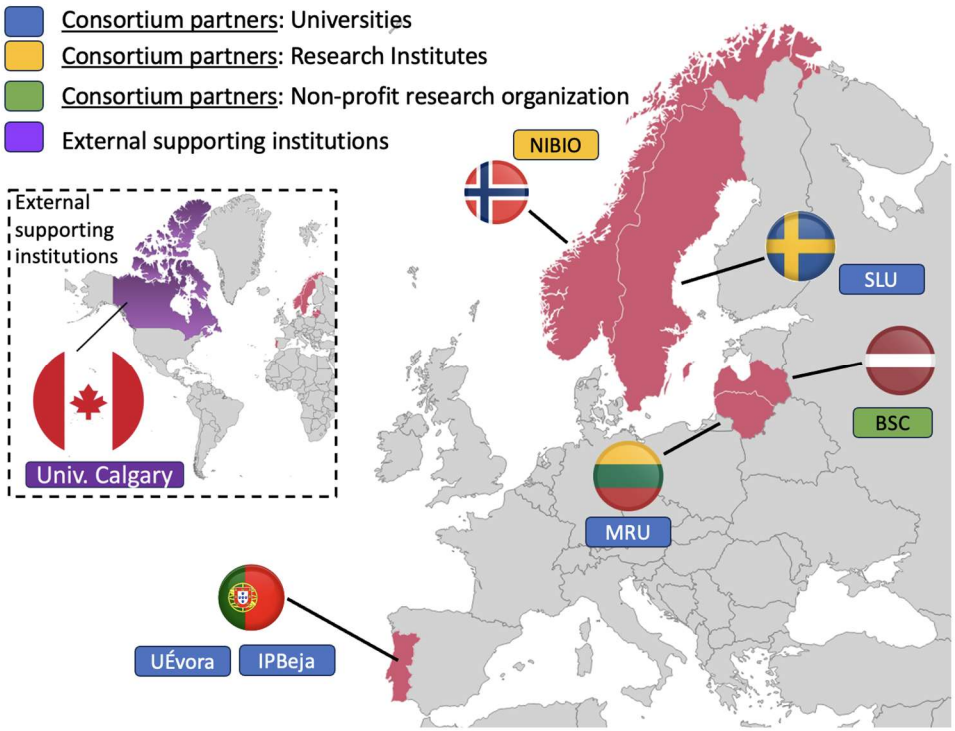
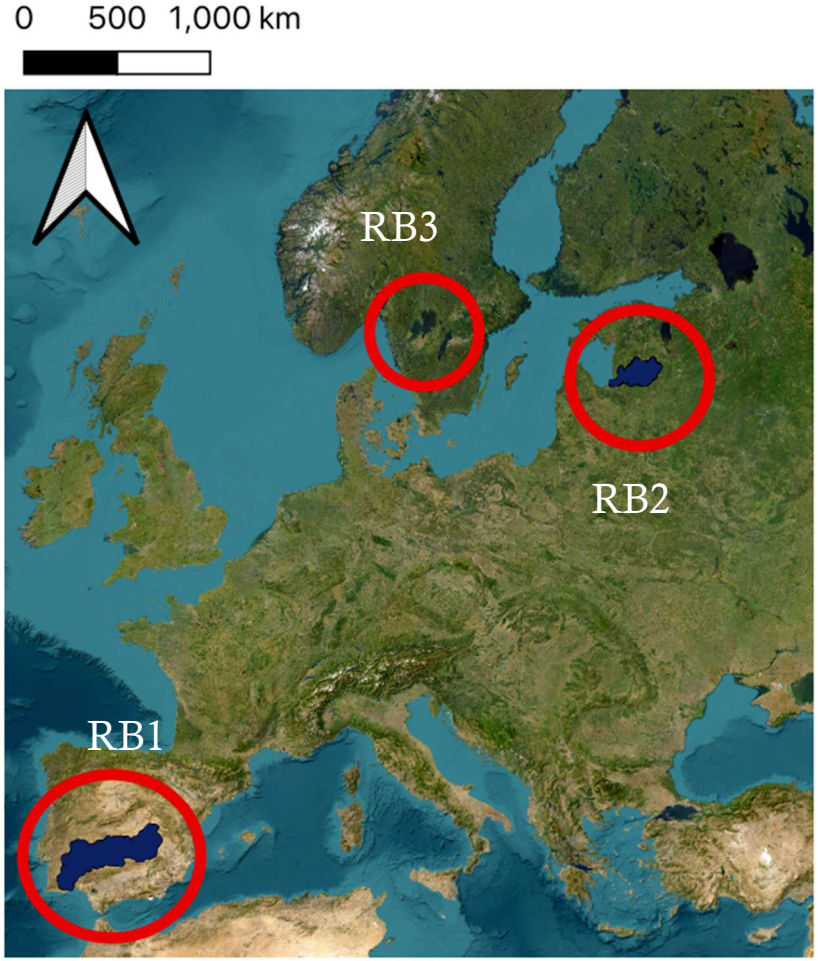
ENGAGE's goal: Operationalise a novel approach for multi-scale nutrient management in European river basins, co-designing strategies with stakeholders to maximise diversity of ecosystem services.

ENGAGE's objectives:

- **Objective 1**: Stakeholder Engagement for Collaborative Nutrient Control
- **Objective** 2: Co-Design & Application of Decision Support Tool (DST)
- **Objective 3**: Knowledge Transfer & EU-Level Scaling



CASE STUDIES



RB1 - Guadiana River Basin (Portugal & Spain)

- 67,100 km²; Spain (83%), Portugal (17%)
- Alqueva Dam (4150 hm³) supports irrigation (100,000 ha) & hydropower
- Eutrophic reservoir due to nutrient loads

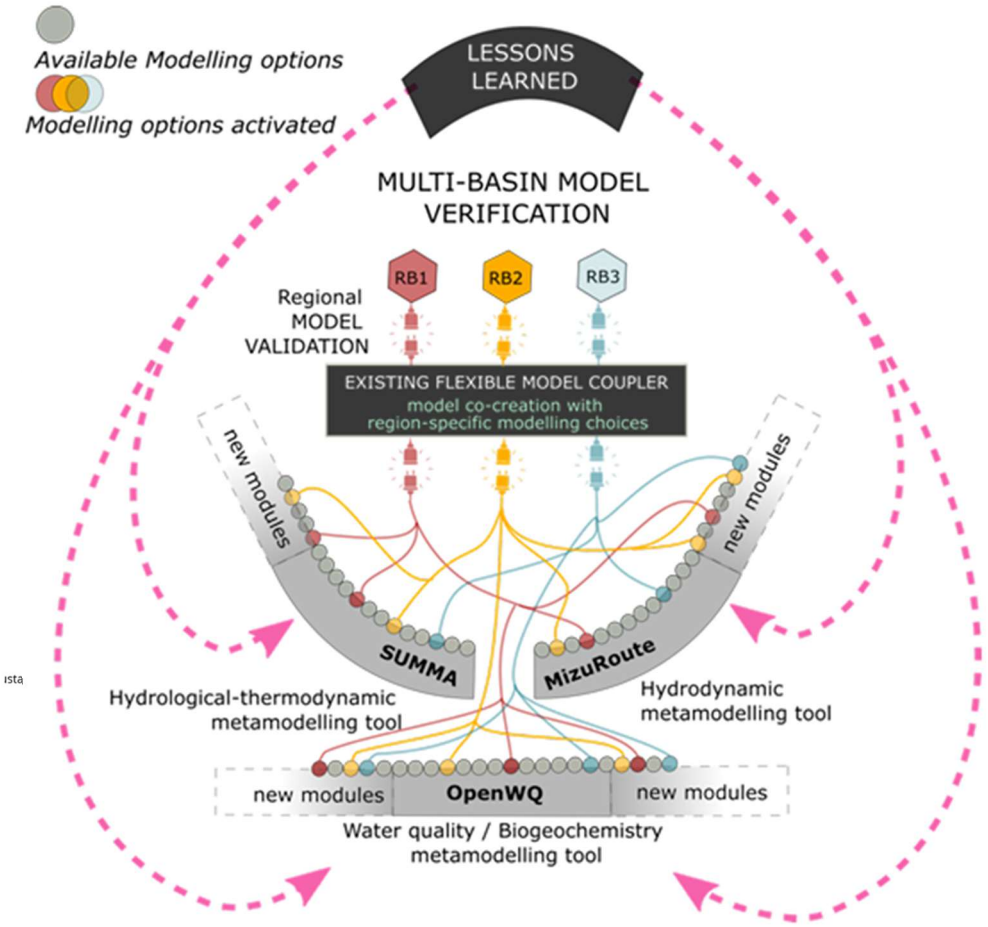
RB2 - Gauja-Koiva River Basin (Latvia & Estonia)

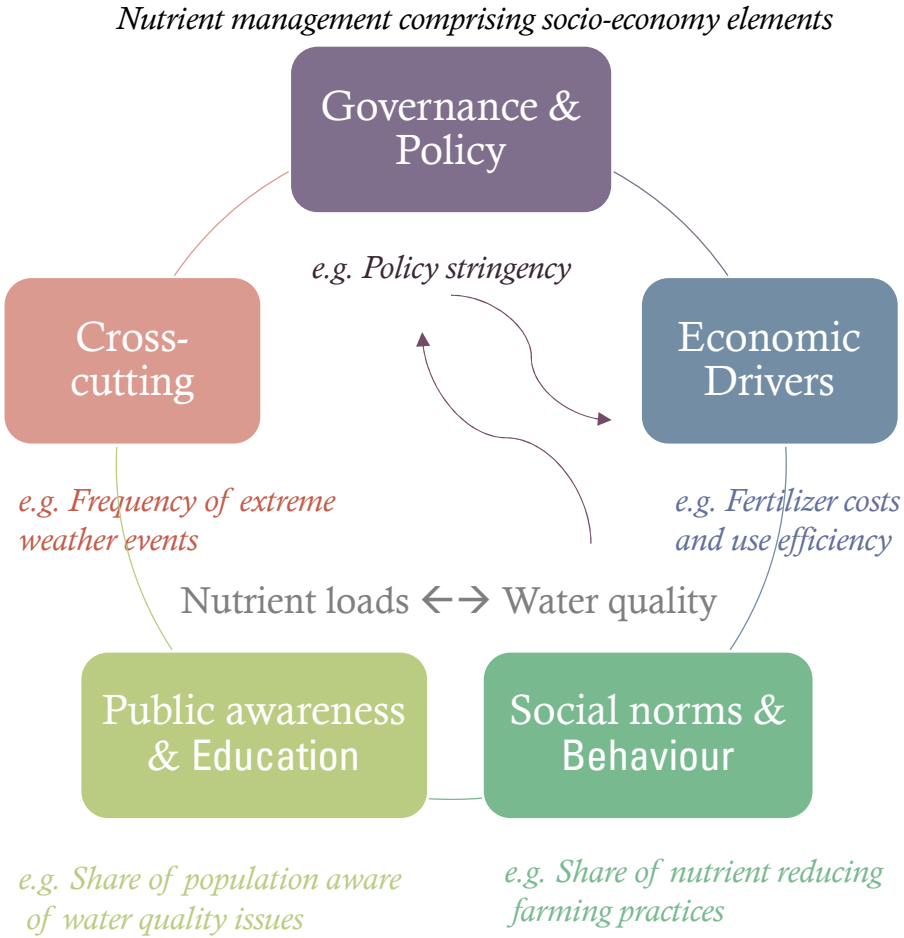
- 14,380 km²; Latvia (90.75%), Estonia (9.25%)
- Low anthropogenic pressure, 50% forest, protected areas
- Challenges: fertilizer legacy, water abstraction, nitrate-vulnerable zones

RB3 - Hobølelva River Basin (Norway)

- 335 km²; drains into Lake Vansjø & Oslo Fjord
- 20% agriculture, key for nutrient pollution mitigation
- Focus area in ENGAGE: Kråkstad subcatchment (40% agriculture)

BSC is responsible for Work Package 4 "Socio-economy and Societal Change". This means integrating socio-economic processes into the Decision Support Tool, complementing technical and biological data with a management and societal dimension. The task of the researchers is to identify indicators that reflect both environmental (for example, how much nitrate or phosphate is in the water), land-use indicators (fertiliser use intensity, irrigation area) and social indicators (how many people use a water body for recreation). By combining these data, it is possible to more fully analyse how river basin systems work and draw conclusions about the effectiveness of the measures put in place.





IV. Nutrient management perspective comparison (Biophysical data vs. Integrating socio-economic parameters)

Model Component / Impact Area	Biophysical–Hydrological Data-based	Integrated with Socio-Economic Parameters	Comparison evaluation (- / + / ++)
1. Inputs considered	Precipitation, soil type, nutrient loads, land cover, river flow, retention rates	Same biophysical data, and plus governance indices, farm practices, population density, subsidies, education/awareness data	++
2. Spatial focus	Catchment/sub-basin (biophysical layers)	Catchment, and administrative or social units (NUTS2, municipalities)	+
3. Temporal scale	Short- to medium-term (seasonal, annual)	Multi-year scenarios-based with policy cycles and behavioural response times	+
4. Key outputs	Nutrient load trends, retention coefficients, pollution hotspots	Plus: changes in farmer adoption rates, investment efficiency, social benefit metrics (jobs, recreation, awareness)	++
5. Scenario testing	Climate or land-use change only	Policy, subsidy, or behaviour-change scenarios combined with climate and land-use change	+
6. Decision support relevance	Mainly technical optimisation (e.g., best buffer strip size)	Strategic and cross-sectoral planning, balancing environmental and social–economic outcomes	++
7. Data sources, availability	EEA, Copernicus, river monitoring stations	Adds Eurostat, OECD, FAOSTAT, national statistics	+ / -
8. Communication value	Quantitative but less relatable to non-experts, various stakeholder groups	Easier to communicate – links water quality to livelihoods, tourism, equity	++
9. Policy linkage	Environmental directives only (WFD, Nitrates)	Integrates CAP, regional development, and social policy objectives	++
10. Outcomes & benefits	Improved nutrient load estimates	Better governance alignment, cost-effectiveness, social acceptance, ecosystem service gains	++

IV. Nutrient management example comparison (Biophysical data vs. Integrating socio-economic parameters)

Model Component / Impact Area	Biophysical–Hydrological Data-based	Integrated with Socio-Economic Parameters	Comparison evaluation (- / + / ++)
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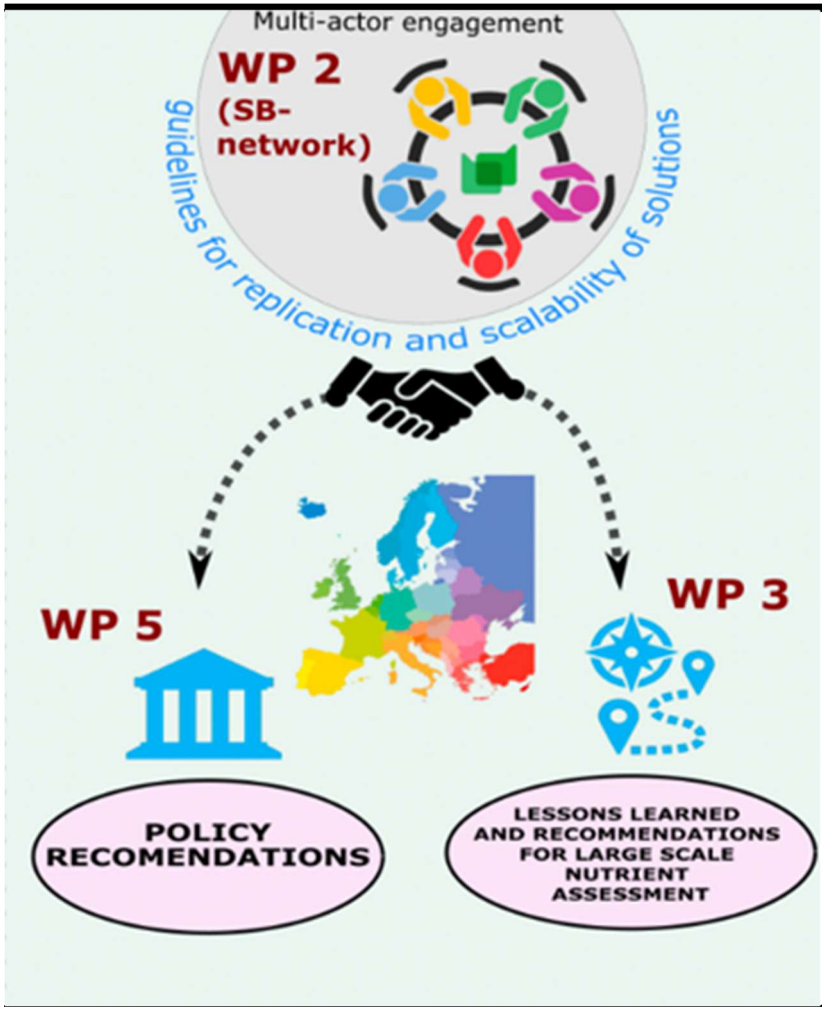

ENGAGE's mission:

- **to establish regional stakeholder networks** comprising local, regional, and national authorities and other societal representatives,
- **to co-identify nutrient pollution problems,** as to **co-design strategies** for nutrient export reduction,
- and **important elements** that should be included **in the DS tool** to ensure informed decisions.

EXPRESS WILLINGNESS TO BECOME **ENGAGE** STAKEHOLDERS/ FOLLOWERS OF THE PROJECT

https://forms.gle/HAnryhvX29reS8b3A

V. River basin governance through stakeholder co-design

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Baltic Studies Centre

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Water4All Project ENGAGE

https://www.engage.uevora.pt/en/

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