KWB

Interreg
Baltic Sea Region

Co-funded by
the European Union

SUSTAINABLE WATERS
WaterMan

WaterMan – 1st method & tool workshop

Water reuse with focus on risk & life cycle assessment

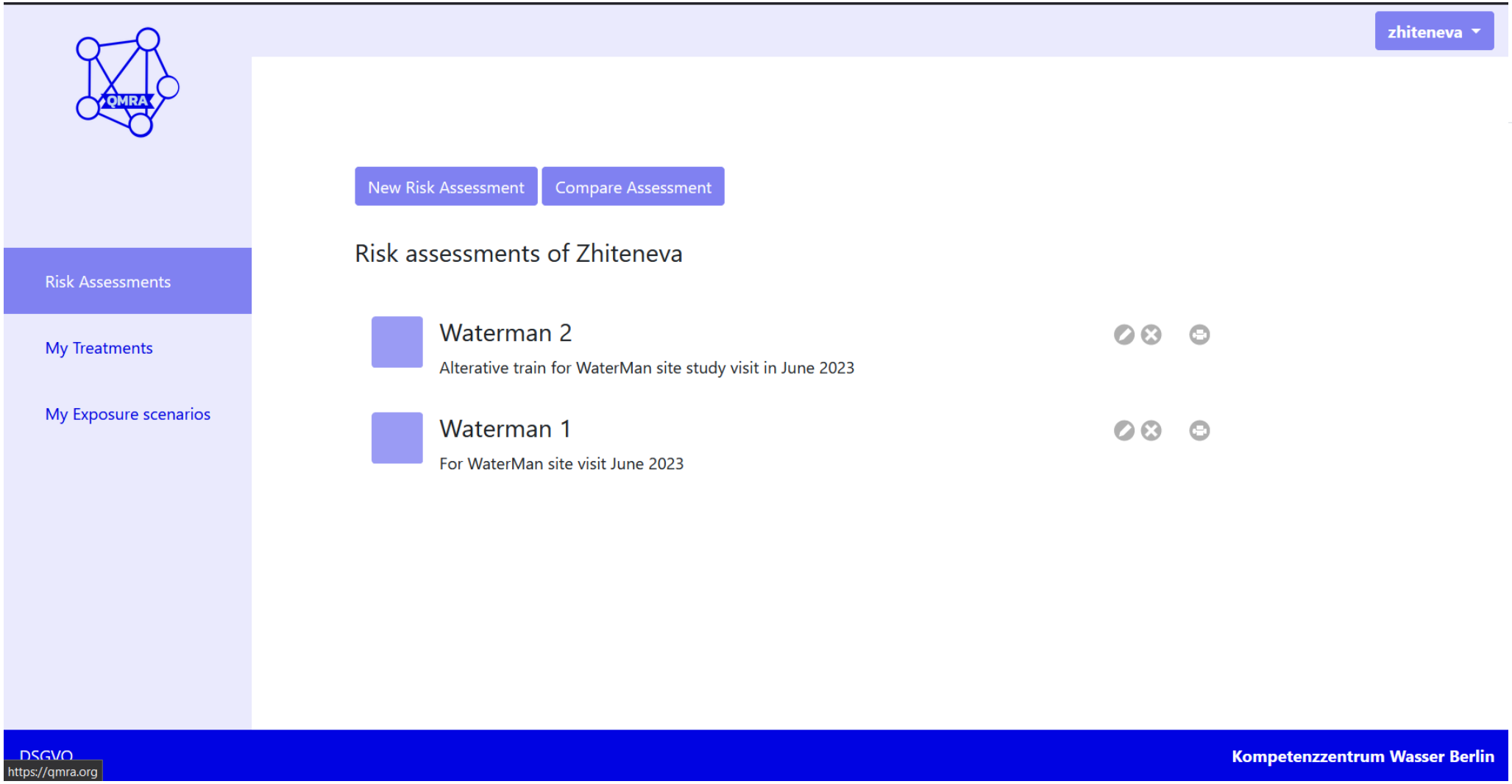
12.06.2023

QMRA & QCRA tools at KWB

KWB QMRA tool: QMRA.org

- **Who**: KWB developed the tool
- **What**: Probabilistic risk assessment tool developed in the EU project DEMOWARE (in which Water Reuse Europe was created) & refined in AquaNES
- Based on log removal values (LRV) published by the World Health Organization
- Has built in treatments, exposures, and pathogens (reference pathogens)
    + User can additionally define exposures, pathogen removal, treatment
    + Reference pathogens: rotavirus, *Cryptosporidium*, *Campylobacter*
    + User can compare multiple assessments / treatment trains
    + Results are downloadable as a .csv or .jpeg
    - Cannot add any new source water types
- **Where/When**: Applied at beginning and during monitoring phases of water reuse projects
- **Why**: For quantitative risk assessment
- **How**: By following the steps on the next slides

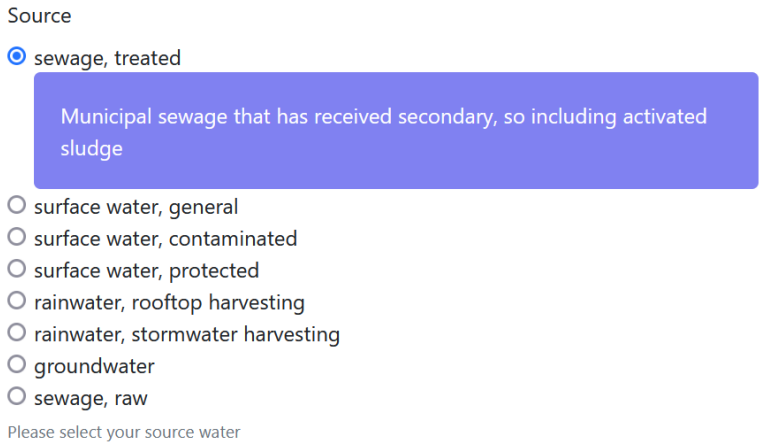
QMRA tool: Risk assessments



QMRA tool

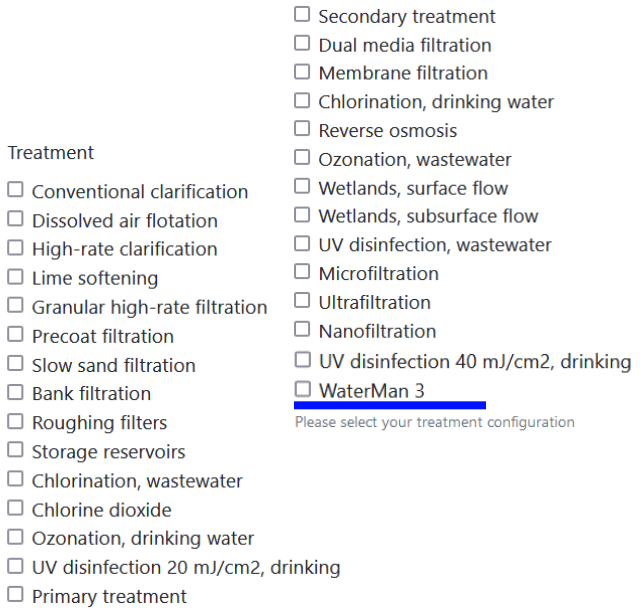
Source

Choose what type of water quality your assessment will begin with → **only 1 possible**



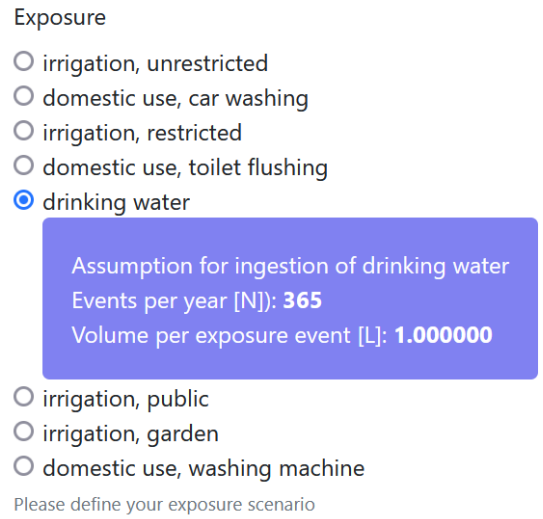
Treatments

Choose which types of treatments should be evaluated→ **many possible**

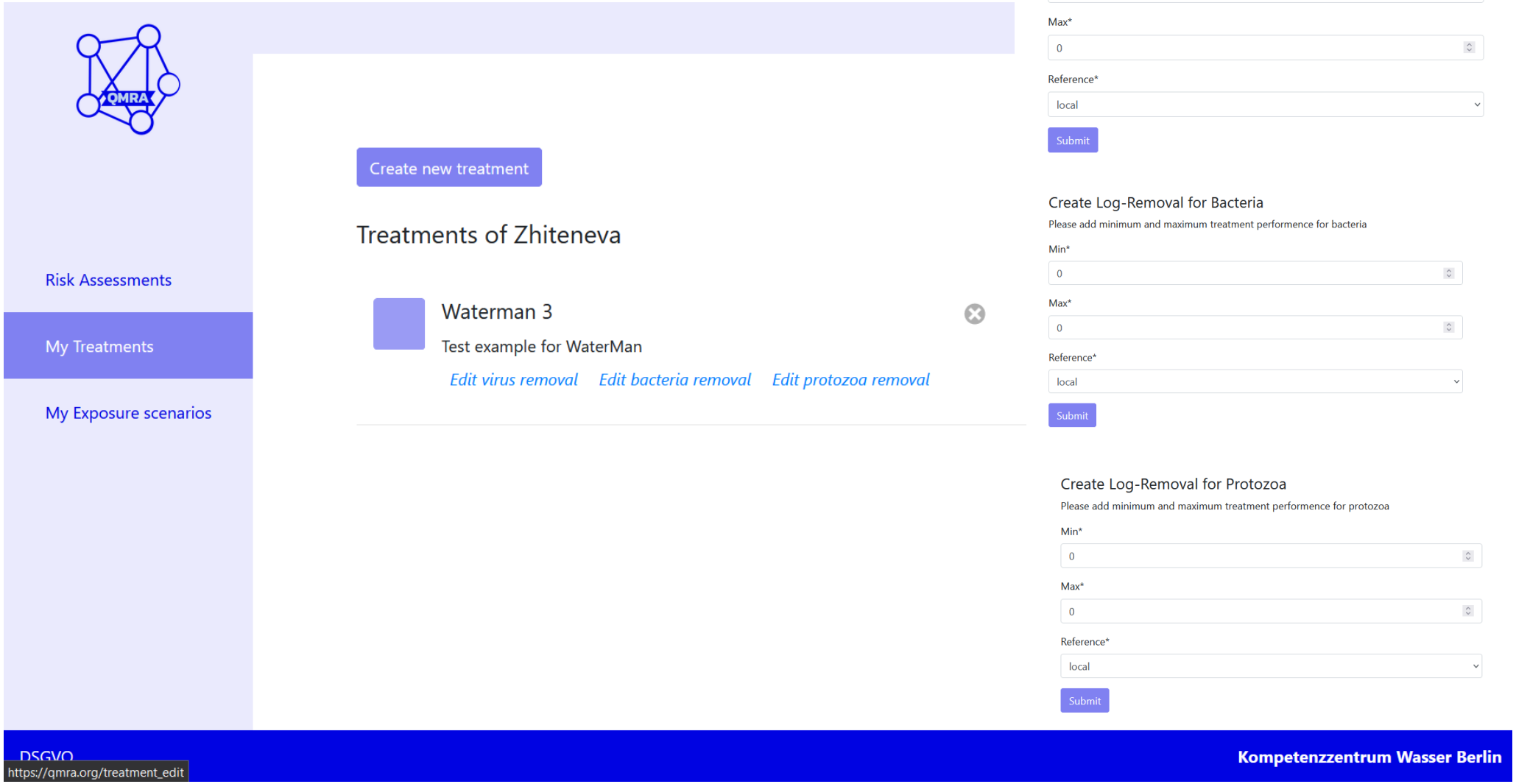


Exposure

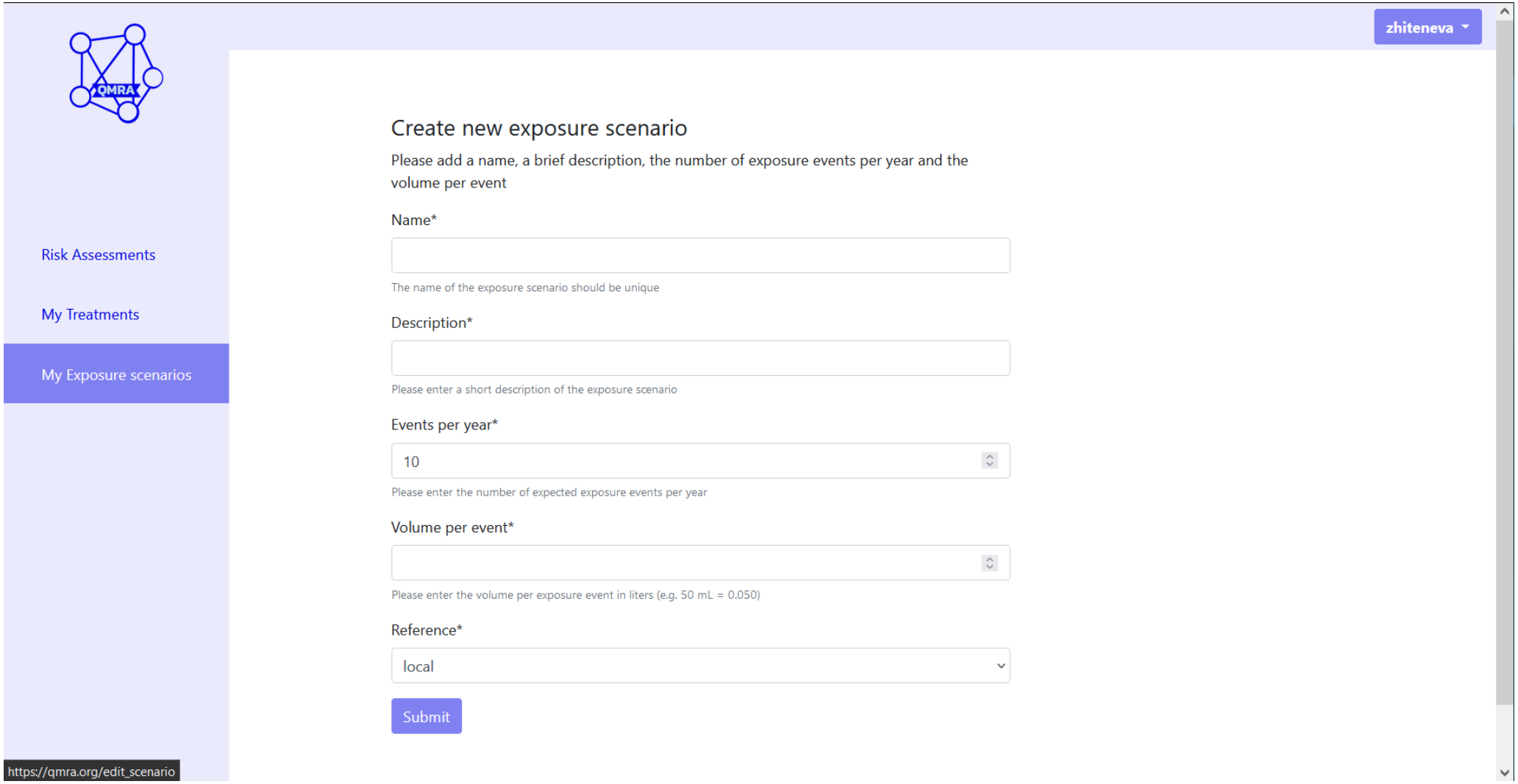
Choose what type of exposure your assessment will evaluate → **only 1 possible**



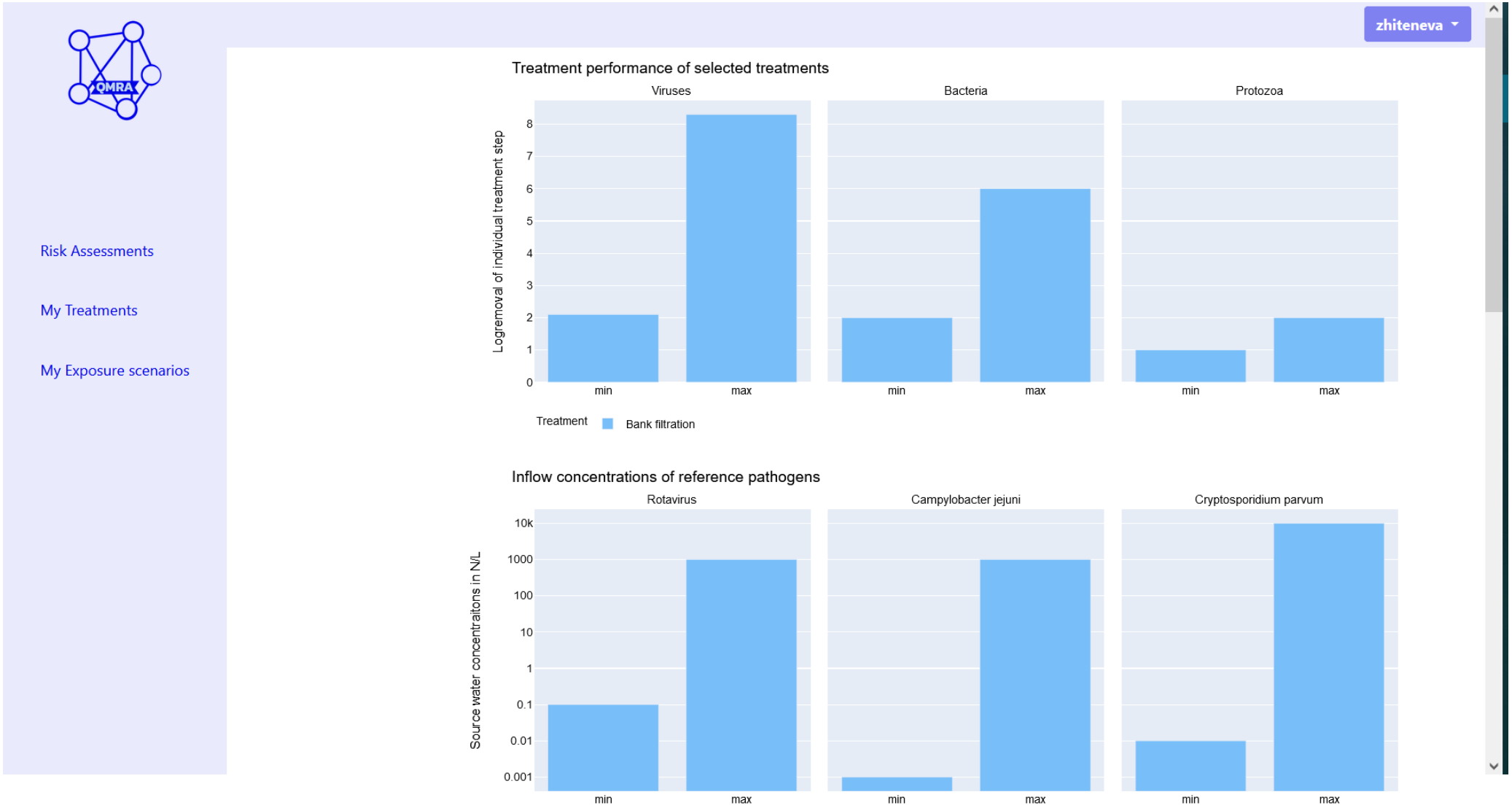
QMRA tool: Treatments



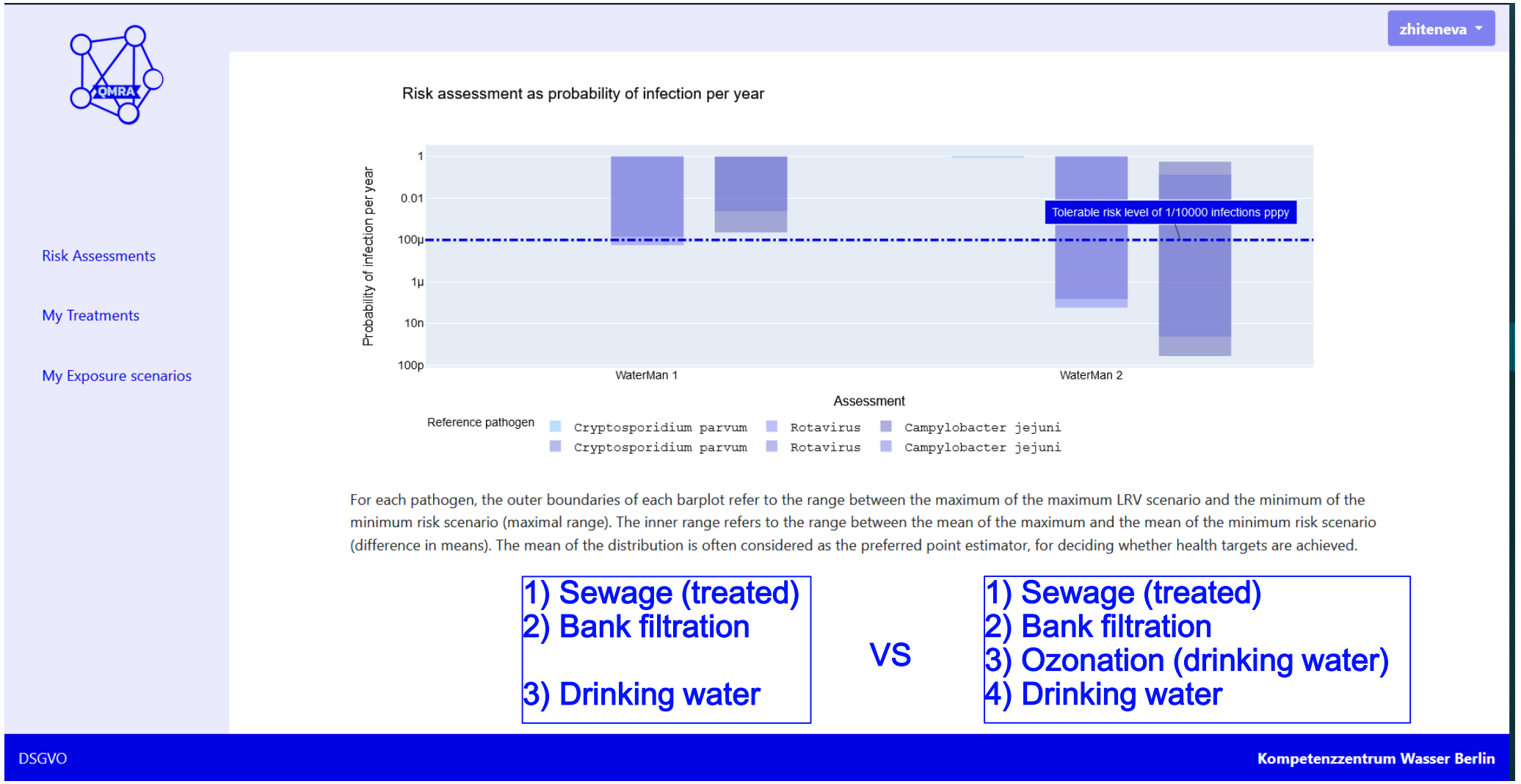
QMRA tool: Exposure scenarios



QMRA tool: Exposure scenarios



QMRA tool: Comparing assessments



KWB LRV tool

- Another microbial removal assessment tool developed by KWB
- Focus is on microbial log removal values (LRVs) for Class A agricultural irrigation
- Simplified tool where user can upload influent and effluent pathogen concentrations → tool will show the likelihood of reaching the LRVs using the best available statistical method

- Not yet available → projected for 2024/2025

QCRA tool

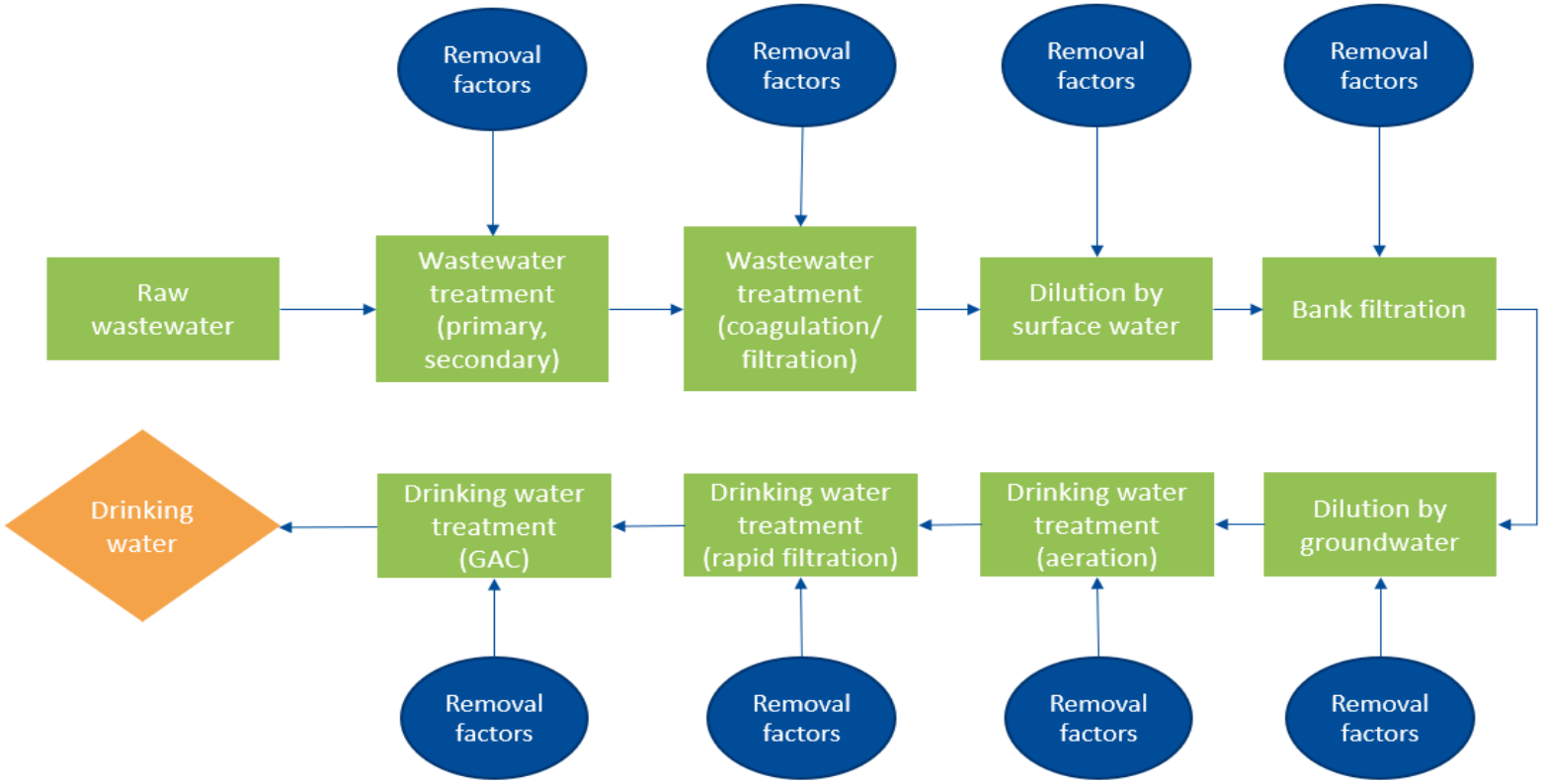
- Currently being developed within the EU Green Deal project PROMISCES

- Will be an open source application ready for download by mid 2025
  - Target group: water researchers/engineers (with programming knowledge)

- Tool for performing a probabilistic quantitative risk-based human health exposure assessment for PFAS and other industrial chemicals which are persistent, mobile, and potentially toxic
  - Could be extended to other chemicals based on the user‘s interest and availability of concentrations/information in treatments

- Exposure routes included (which are relevant for WaterMan):
  - Municipal wastewater reuse via agricultural irrigation
  - Semi-closed drinking water cycle

QCRA tool



- The goal of the risk-based HHEA is:

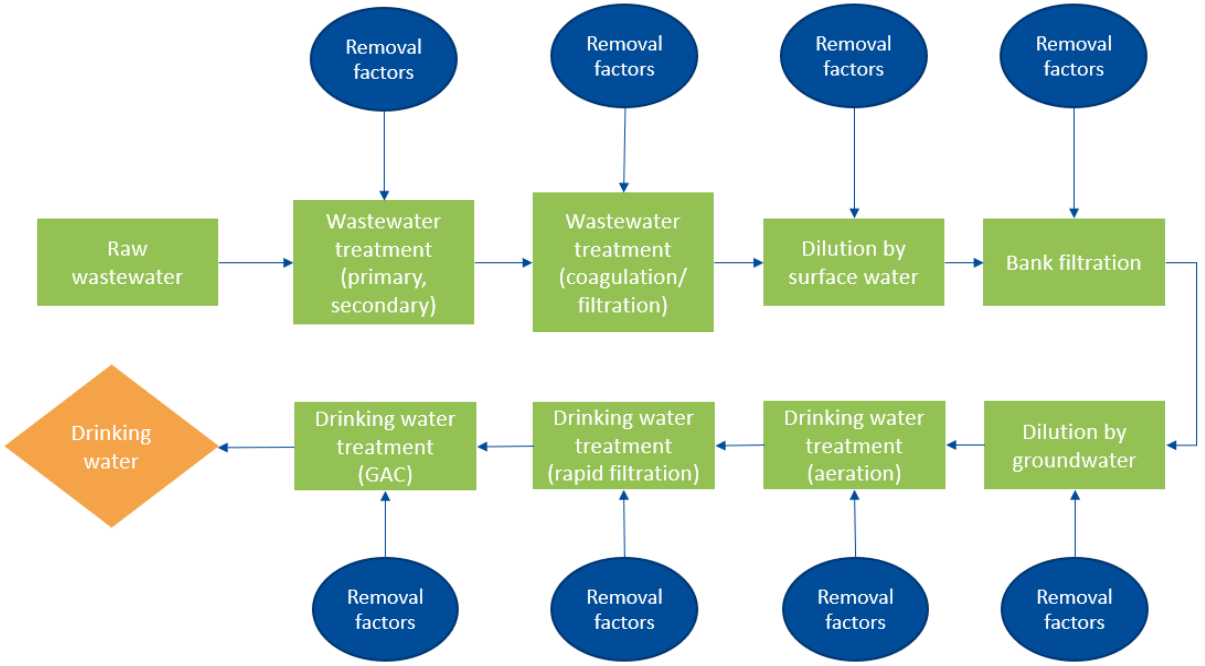
→ to estimate the most probable compound concentration along the exposure route? **No**

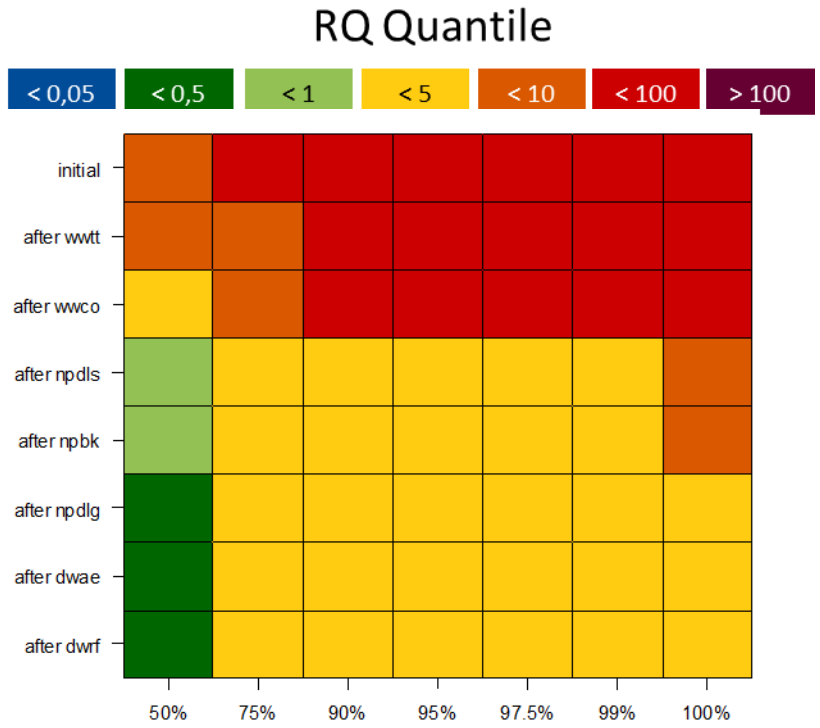
$$Risk = Likelihood\ x\ Impact$$

→ to describe final risk **Yes**

QCRA tool

$$RQ = \frac{\text{Predicted concentration}}{\text{Guideline value for drinking water}}$$





KWB

THANK YOU

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