

Potable Water Reuse to Augment Drinking Water Supplies via Groundwater Recharge (TrinkWave)

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Transfer-Forum
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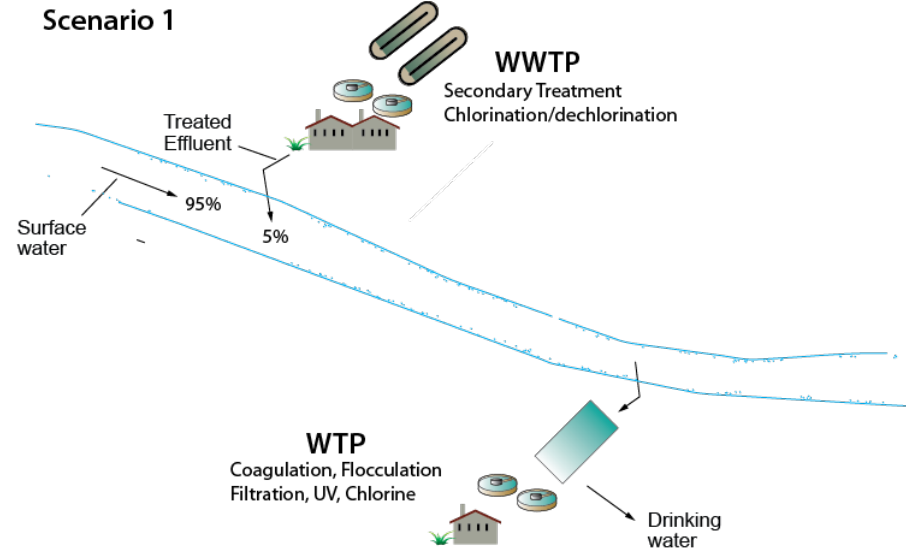
The Practice of Groundwater Recharge

Riverbank filtration (Managed aquifer recharge)

- Düsseldorf, Germany since 1870

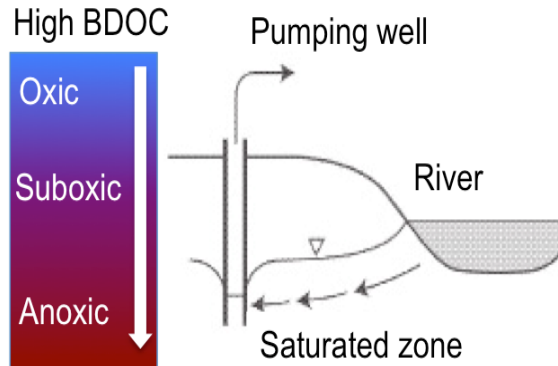


De facto potable reuse is common worldwide

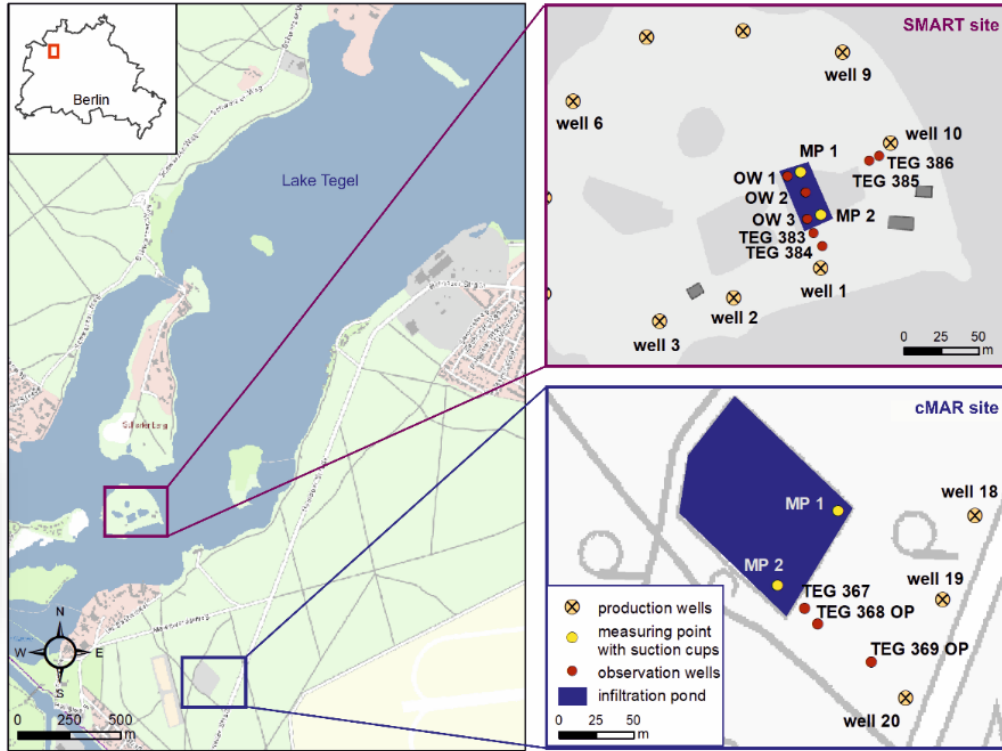


Translating a conceptual idea into Engineering Practice

Riverbank filtration → Re-aeration → Aquifer recharge and recovery



Sequential Managed Aquifer Recharge Technology: **SMART**



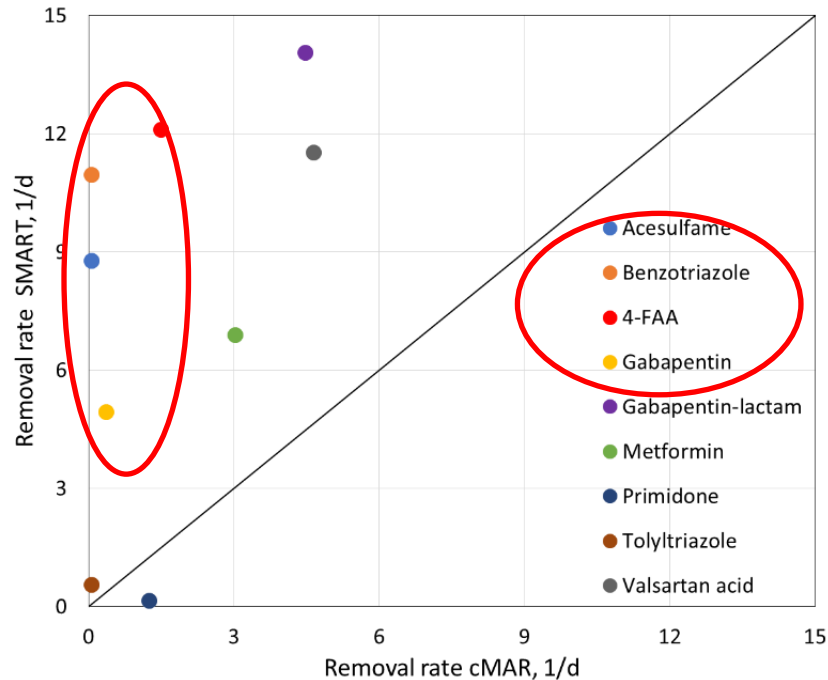
SMART

vs.

conventional
groundwater
recharge

Performance of SMART

CEC transformation: Field-scale experiment



$\Delta\text{DOC (SMART)}$

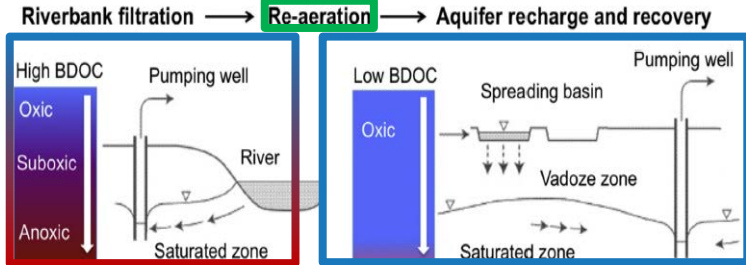
$= 0.2 \pm 0.2 \text{ mg/L}$

$\Delta\text{DOC (cMAR)}$

$= 2.1 \pm 0.5 \text{ mg/L}$

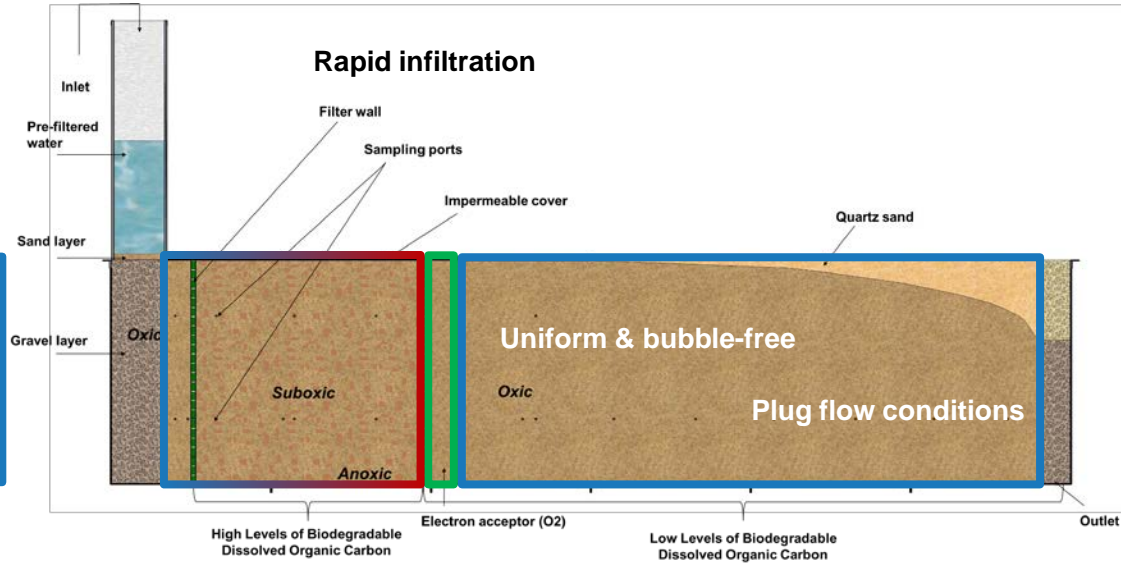
- Removal during SMART similar or better
- Stable redox conditions
- Little BDOC
- Short retention time sufficient

SMART



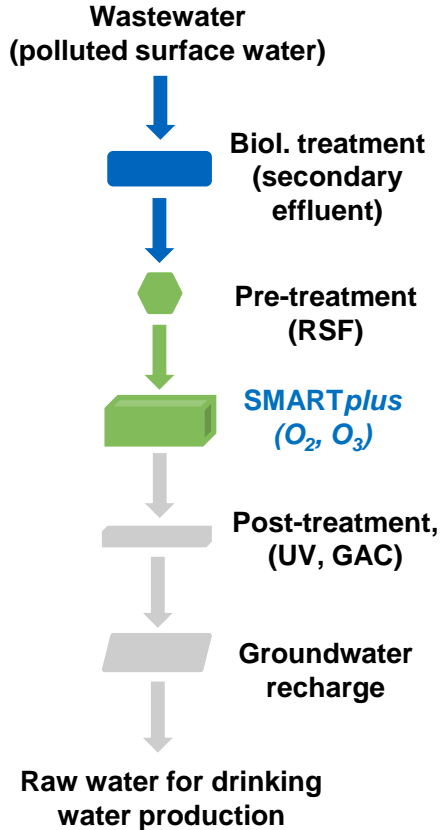
Regnery et al. 2016, Chemosphere.

SMART_{plus}



- High tech transfer potential due to independence from local hydrogeological conditions
- Increase in performance of conventional MAR systems with retention times of less than 13 hours

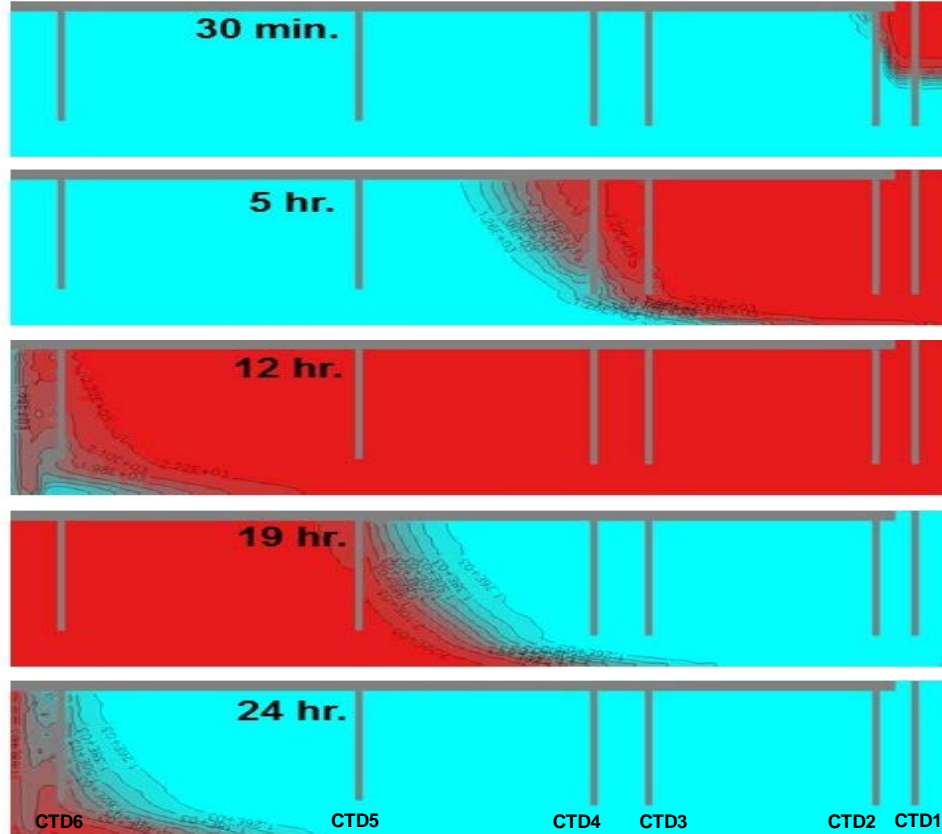
SMART_{plus} at pilot scale



Sampling ports
pH, turbidity, DOC, NH₄-N, NO₃-N, UV₂₅₄, TOxCs

Online monitoring
CTD, O₂ (DO), UV₂₅₄, flow rate

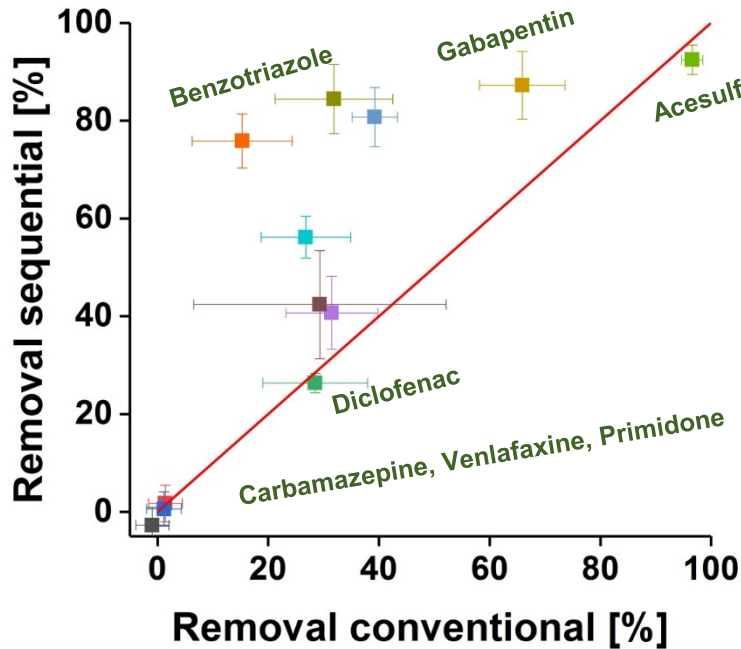




Hydraulic retention time:
approx. 12 hours

Performance of SMART_{plus}

Removal of selected CECs

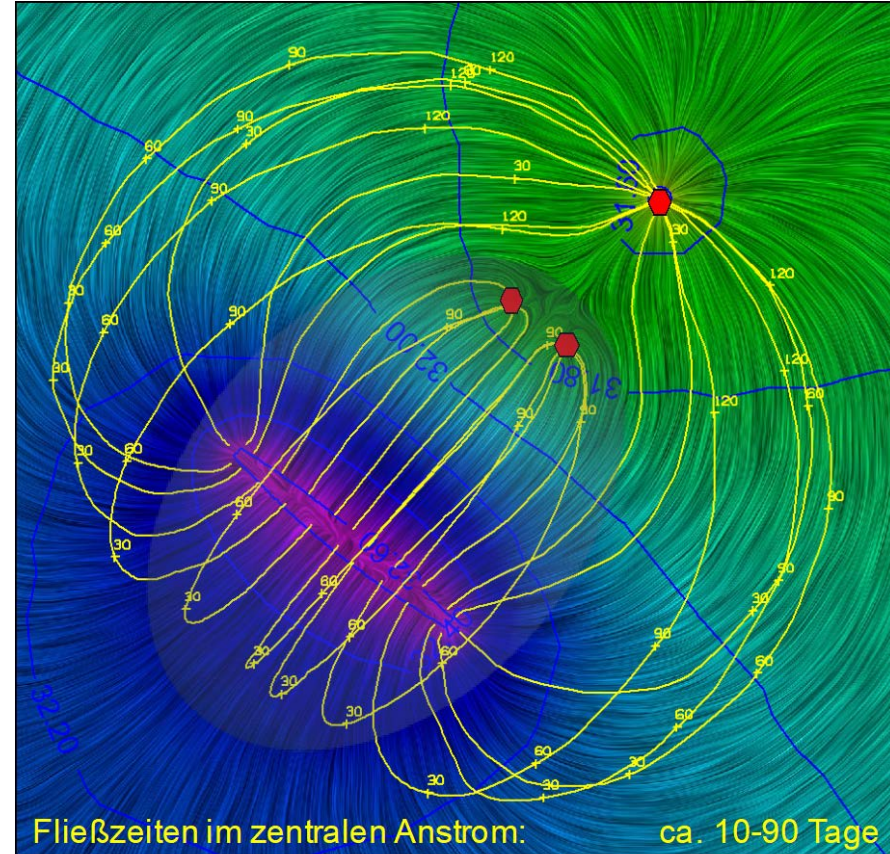
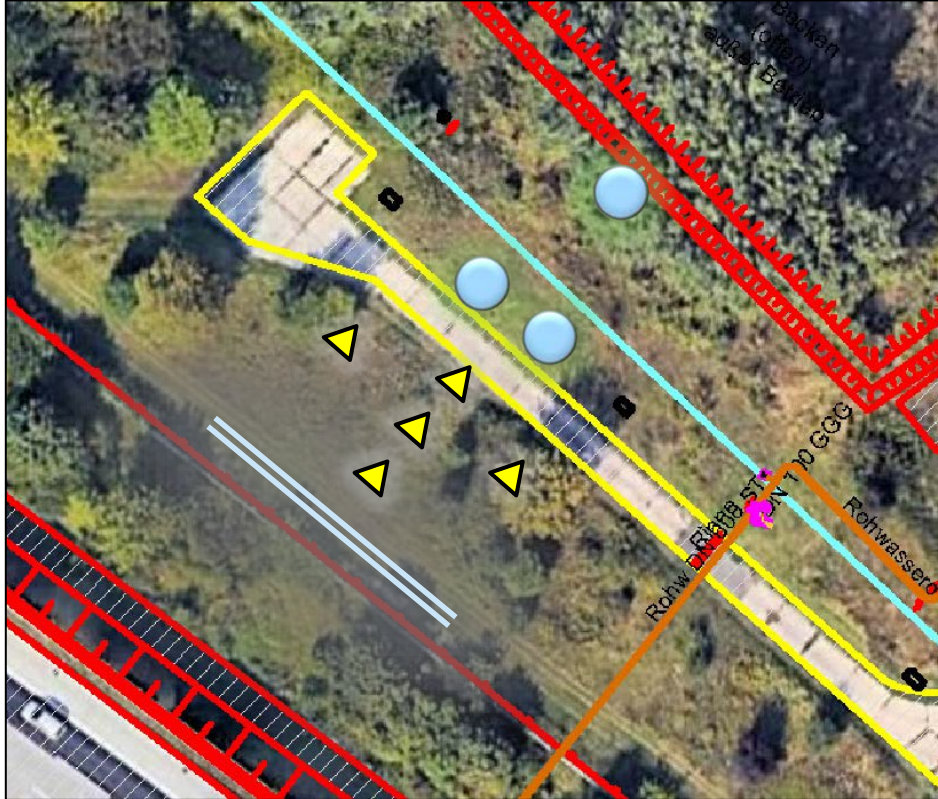


Improved removal of several CECs during sequential biofiltration

Some CECs require longer hydraulic retention times

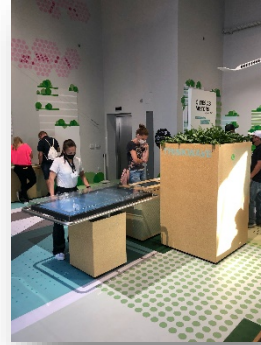
Some CECs persist biofiltration

Demonstration-scale Facility Johannisthal



Thank you!
www.trinkwave.de

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GEFÖRDERT VOM



Bundesministerium
 für Bildung
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