

Project

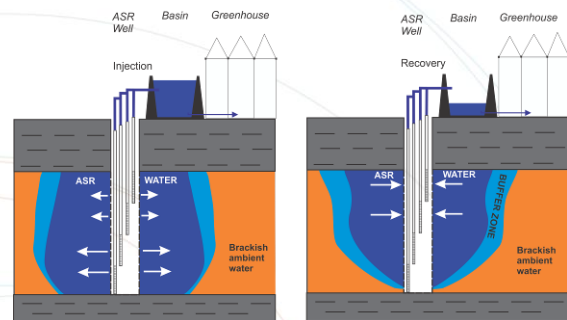
Theme 2 | Aquifer storage and recovery as a tool for self-sufficient fresh wa supply

Description of research

Aquifer storage and recovery (ASR) is defined as the 'storage of water in an aquifer through a well when water is available, and the recovery by the same well during water demand'. Using this technique on a small- to medium-scale, a robust and sustainable fresh irrigation water supply for the Dutch horticulture can be maintained.

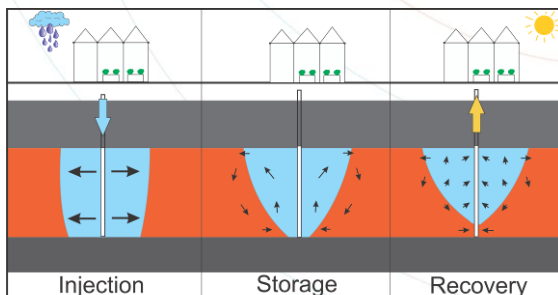
For ASR in coastal brackish aquifers, estimation of the maximal freshwater recovery is essential, since freshwater losses can occur due to buoyancy effects and lateral drift. However, even in areas less opportune for ASR, optimized injection and recovery using Multiple Partially Penetrating Wells (MPPW) or horizontal wells (Freshmaker) can still achieve satisfying ASR performance.

This study focuses first on the regional performance of conventional ASR. Secondly, the efficiency of two ASR optimization techniques and water quality changes due to interaction with aquifer sediments during storage are studied in field pilots. Finally, the risk of well clogging during ASR operation is evaluated. Altogether, this study thereby intends to design sustainable and robust configurations for efficient freshwater aquifer storage and recovery.



The most important conclusions

- Regional ASR performance estimation in the Haaglanden region highlights the large variety in aquifer suitability and the importance of site selection;
- Use of Multiple Partially Penetrating Wells (MPPW) can significantly improve freshwater recovery of small-scale ASR systems in areas less opportune, as shown by the Nootdorp ASR trial;
- In shallow brackish aquifers, the Freshmaker principle allows long-term storage of freshwater using horizontal wells;
- Especially release of trace metals from aquifer sediments is an important threat for ASR water quality.



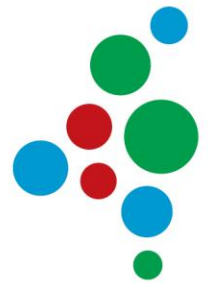
Research question

How can ASR systems be improved so as to prevent freshwater water losses caused by bubble drift, while maintaining favorable soil-water interactions and minimizing the negative interactions with the aquifer sediments?



Kennis voor Klimaat

Knowledge for Climate



Possible applications from the project

- MPPW for efficient freshwater aquifer storage and recovery in (semi-)confined aquifers, storing for instance precipitation surpluses in greenhouse areas (Hotspot Haaglanden);
- Freshmaker concept for storage and recovery of freshwater on creek ridges for irrigation by local fruit growers (Hotspot Zuidwestelijke Delta);
- In general: storage of the large winter freshwater surplus, without claiming large areas above-ground.

Opportunities for the project

- Continuation of the Nootdorp ASR trial in 2013 (small-scale ASR using MPPW in a brackish aquifer);
- 's Gravenzande ASR trial in 2012 and 2013 (large-scale ASR using MPPW in a saline aquifer);
- Freshmaker pilot at the Ovezande creek ridge in 2012 and 2013;
- Combination of freshwater storage with prevention of pluvial floodings.



Bottlenecks of the project

- Funding of field pilots for valorization of model-based techniques;
- Obtaining licenses for the injection of fresh surface- and rainwater (legislation).

More information

For more information about this project please contact

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