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Increasing freshwater recovery upon aquifer storage

A field and modelling study of dedicated aquifer storage and recovery configurations in brackish-saline aquifers

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Propositions accompanying the dissertation: 'Increasing freshwater recovery upon aquifer storage' by Koen G. Zuurbier

1. The feasibility perspectives of ASR in coastal aquifers require revision as hydrogeological engineering has offered new possibilities in the last decades.
2. In unsuitable brackish-saline aquifers targeted for ASR, injecting a 'buffer zone' prior to the first ASR-cycle will not lead to a (long-term) improvement of the recovery efficiency.
3. Half of the ASR performance is determined by physical recoverability of injected water, but the other half by chemical alteration during aquifer residence (Chapter 4).
4. The 'bubble metaphor' for injected freshwater during ASR (Vacher et al., 2002) can be pretty realistic in brackish granular target aquifers: the freshwater body is discrete from its surroundings, can have a relatively simple geometry, and it rises (Chapter 3), while it can also burst (Chapter 6).
5. The potential of the subsurface to solve aboveground freshwater management issues is underestimated, which results in inefficient and expensive freshwater management.
6. Use of brackish water as a source for freshwater via desalination and ASR can enforce each other, and their integration may be one of the major solutions for a robust, sustainable freshwater supply.
7. Although increasingly unrecognized at universities, fieldwork is an indispensable part of a hydrogeologist's training and research.
8. Model early, measure frequently (contra and pro Stuyfzand, 1993).
9. The scientific cycle provides a survival strategy in science, climate adaptation, and daily life.

These propositions are regarded as opposable and defendable, and have been approved as such by the supervisors, prof dr. P.J. Stuyfzand and dr. N. Hartog.