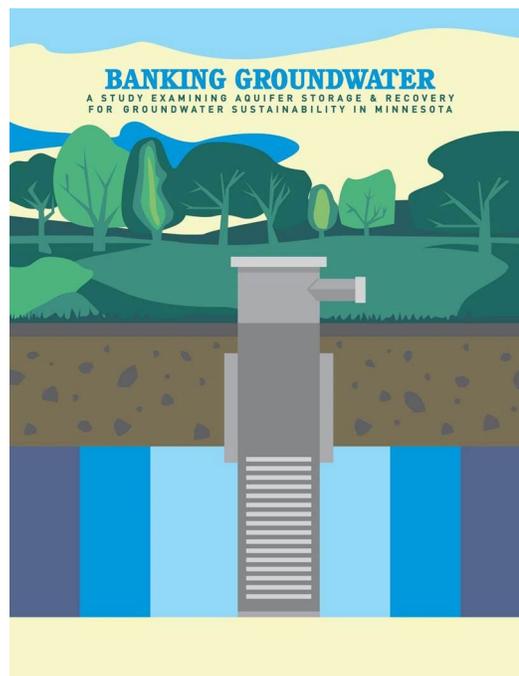


Abstract

Some of the more than 75% of Minnesotans who rely on groundwater may find it in short supply in the face of population, land-use and climate change. Aquifer storage and recovery (ASR) is a technological approach to treat and inject clean water into an aquifer for temporary storage. The hydrogeological characteristics and the chemistry of the source water and aquifer impact treatment needs prior to injection and after extraction. Aquifer properties that control how water moves determine the volume and rate of water injected. This study examined four different kinds of aquifers across Minnesota with unique pressures to determine their suitability for ASR. The study findings suggest three may be suitable for ASR.

The Buffalo aquifer in Moorhead has variable injection capacity and multiple sources of water for injection. Water quality issues of arsenic, sulfate, manganese, and hardness would require treatment after extraction. The Jordan aquifer in Rochester faces increased pressure from growth and nitrate contamination in the surrounding agricultural areas. The wastewater treatment plant could provide adequate source water if treated. Woodbury faces pressure from increasing population and PFAS contamination of the Jordan aquifer. ASR could recharge groundwater from wastewater treatment plants and also be integrated with PFAS remediation scenarios by reinjection of treated groundwater. ASR is not recommended for the surficial sand aquifer in the Straight River Groundwater Management area in north central Minnesota because there is no source of water to make it a feasible option at this time. Cost-benefit analysis combined with a sensitivity analysis of economic factors should be a component of ASR project feasibility. Modified state well code and a streamlined permitting path would allow more successful development and deployment of ASR. State adoption of control over Class V injection wells from the USEPA is also necessary.



The full report is available at www.wrc.umn.edu/banking-groundwater-managed-aquifer-recharge

Acknowledgements

Funding for this project was provided by the Minnesota Environment and Natural Resources Trust Fund as recommended by the Legislative-Citizen Commission on Minnesota Resources (LCCMR).



Water Resources Center

UNIVERSITY OF MINNESOTA
Driven to DiscoverSM

