

Managed Aquifer Recharge for Water Reclamation, Recycling, and Reuse

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Managed Aquifer Recharge (MAR) operations have been designed to purposely inject or infiltrate rainwater, stormwater, reclaimed water, or water from other aquifers into a selected aquifer for storage, in situ treatment, and later recovery. Two challenges to successful MAR operation include clogging of the infiltration surface and the presence of microbial pathogens in recovered drinking water. This presentation summarizes ongoing field, laboratory, and numerical modeling experiments that were designed to better assess, understand, and overcome these MAR challenges. In particular, we have studied the pros and cons of various MAR operations, developed modeling tools to simulate infiltration from modern drywells and to inversely determine in situ soil hydraulic properties, and examined the influence of subsurface heterogeneity on drywell performance. Conditions that pose greater risks for clogging were identified, and approaches to mitigate clogging were investigated. Factors and mechanisms that alter the risk of pathogen transport during MAR were also systematically examined, including: field-scale variations in water velocity, solution and solid phase chemistry, residence time, and temperature. Optimization of these MAR conditions can be used to improve the microbial quality of recovered water and minimize the risks to human health.