

MAR State Survey

Managed Aquifer Recharge Team (MAR) State Survey

Survey Purpose:

ITRC's Managed Aquifer Recharge Team is developing guidance and training on the range of innovative aquifer recharge options. The guidance will define the appropriate geologic settings and tools needed for characterization and design. We will use the results of this survey to identify and guide the development of the Team products, including the technical and regulatory guidance document.

Project Introduction:

Managed Aquifer Recharge (MAR) is a form of aquifer management that focuses on groundwater availability and quality. MAR includes Aquifer Recharge used to replenish aquifers and Aquifer Storage and Recovery to store water for beneficial purposes in the future. Augmenting groundwater storage through MAR represents a cost-effective way to:

- Increase the availability of groundwater for potable, non-potable, irrigation, or fishery uses.
- Improve groundwater sustainability by acting as a barrier to saltwater intrusion or aquifer subsidence.
- Improve water quality through aquifer filtration.
- Address groundwater dependent eco-systems (wetlands).
- Provide enhanced baseflow for downstream users and minimal instream flows

To help support the growing practice of MAR, ITRC is working to produce a technical guidance document and training that will evaluate:

- The potential uses of MAR,
- Innovative characterization approaches, and
- Modeling tools (GIS, groundwater modeling, water balance) that:
 - Support development and placement of MAR infrastructure and
 - Evaluate the factors for safe and successful implementation.

In this survey, the first set of questions (4 to 8) are not specific to MAR but are more general to aquifer management activities. The Team expects that most states have some aquifer management activities (such as UIC programs) and have a general understanding of aquifer management issues and input about states' approaches would be important to focusing our products. Questions 10 to 15 are specific to MAR projects and may be skipped if the state does not have such projects.

Your input on the application of MAR in your state will help the Team address areas that will be most beneficial to states.

* 1. Name

* 2. Division

* 3. Email Address

4. What are your state's primary areas of experience in aquifer management (Check all that apply)?

- Drinking water storage
- Storm water management
- Base flow enhancement
- Saltwater intrusion control
- Flood control
- Disposal
- Drought mitigation
- Our state does not have aquifer management experience

Other (please specify)

5. To better manage surface water and groundwater resources, how is your state addressing fluctuating or increases in demand (Check all that apply)?

- Aquifer storage and recovery projects involving wells and/or spreading basins
- Dams and reservoirs
- Aquifer recharge to replenish water in aquifers and prevent subsidence
- Restricted or limited use
- Alternate source of water
- Reclaimed Water (for example, treated municipal, agricultural, or industrial wastewater)

Other (please specify)

6. If your state has considered or implemented aquifer management projects, which of the following regulatory or technological barriers were present (Check all that apply)?

- Water rights issues
- Statutory or regulatory restrictions
- Lack of guidance
- Lack of technical expertise
- Water quality concerns including industrial, remediation, and stormwater impacts
- Technology needs
- Cost or time prohibitive
- Stakeholder acceptance
- Communications
- Water Resources Allocation/Protection
- Drought mitigation
- Aquifer management projects have NOT been considered or implemented in our state
- Regulatory or technological barriers have NOT been encountered for aquifer management projects considered or implemented in our state

Other (please specify)

7. Are there specific well construction requirements or guidance in place for the design of MAR or other injection/extraction wells?

- Yes
- No
- I don't know

If yes, please provide a link to the guidance, if available

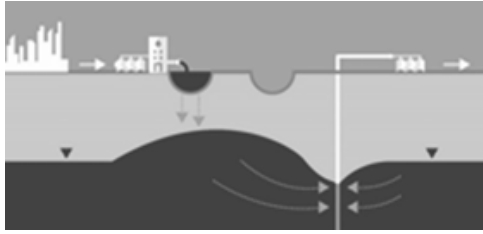
8. Does your state have active permitted aquifer management projects?

- Yes
- No
- I don't know

If so, how many permitted aquifer management projects are active in your state (Enter a whole number)?

9. Does your state have knowledge or experience with MAR projects?

- Yes
- No



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MAR Specific Questions

If you or your state has knowledge or experience with MAR projects, please respond to questions 10 through 15; otherwise, scroll to bottom and go to question 16 on the next page.

10. What concerns do you have for groundwater quality with the use of MAR (Check all that apply)?

- Water chemistry
- Pathogens
- Disinfection byproducts
- Metals in injected water
- Mobilization of aquifer matrix metals
- Trace contaminants (for example, hydrocarbons, chlorinated solvents)
- None

Other (please specify)

11. Modeling can be used as a tool for the design and implementation of MAR projects. Does your state currently employ any of the following models (numerical, analytical, spreadsheets) to understand and allocate resources (Check all that apply)?

- Groundwater modeling
- Unsaturated flow models (for example, infiltration)
- Solute transport models
- Reactive geochemical models
- Surface water modeling
- Watershed models
- Water balance models
- Ground water/surface water interaction models (for example, baseflow enhancement)
- None of the above

12. How do your programs complete modeling activities?

- In-house staff
- Contractors
- Both
- Not applicable

Other (please specify)

13. Does your state have existing guidance documents to support MAR projects (Check all that apply)?

- Groundwater modeling
- Surface water modeling
- Water infiltration (for example, wells, infiltration galleries, spreading basins, bank infiltration)
- Water harvesting (for example, rainwater, stormwater, diverting floodwater)
- Water allocation decision-making framework
- Risk management
- Construction or the design of enhanced recharge structures OTHER THAN injection wells such as infiltration basins, diversions, low-water dams
- We do not have guidance

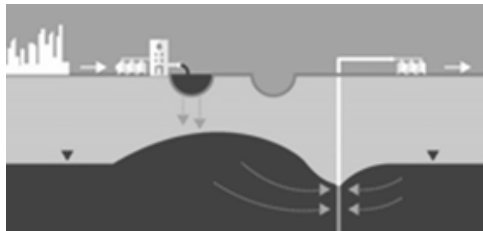
Other (please specify)

14. If you identified existing guidance in response to Question 13, please provide a link(s) to the guidance, if available.

15. Do you have a MAR case study you would like to share with the ITRC MAR team?

- Yes - I have an existing case study that I can share with the Team
- Yes - I have a MAR project that I am willing to create a case study for the Team
- No
- I don't know

If you have an existing case study, please provide a link to the paper, if applicable



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Other Topics or Issues

16. Thank-you for taking the time to complete this survey. If there are any other topics or issues you feel the Team should consider, please describe.