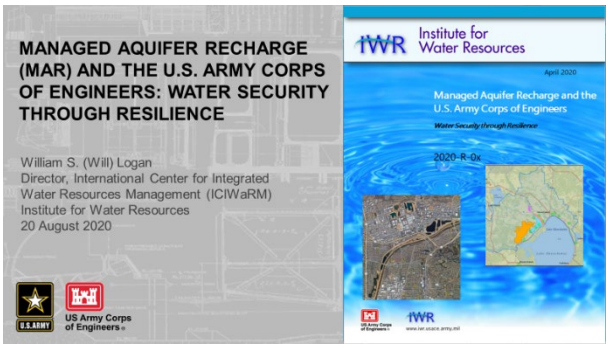
Managed Aquifer Recharge (MAR) and USACE: Water Security through Resilience
August 20, 2020
Q&A Session



This webinar, presented by Dr. Will Logan (Director, International Center for Integrated Water Resources Management), provided an overview of Managed Aquifer Recharge (MAR). MAR includes both artificial recharge basins and aquifer storage and recovery wells, and is being used to address many water management challenges around the globe. The USACE Institute for Water Resources (IWR) recently published a report on how the Corps and its partners have been, or have considered, using MAR in civil works projects. In addition to applications in flood risk management and aquatic ecosystem restoration, MAR can be used for drought management, water supply, seawater intrusion prevention, and other water resources management objectives. This presentation discussed how MAR may be further integrated into the USACE civil works planning process and new initiatives to deliver more sustainable and resilient water management solutions.

For more information or assistance, planners should reach out to Will or visit the May 2020 USACE IWR report on Managed Aquifer Recharge.

This summary of the Question / Answer session of the webinar is not a transcription; questions and responses have been edited and reordered for clarity.

Costs, Benefits, and Perception around MAR

What is the general public perception of MAR?
There is sometimes a stigma related to recycled wastewater, but it often depends how a project is communicated to the public. For example, asking water supply representatives to specifically explain the process (i.e., water is treated and injected back into the ground, allowing it to be treated by nature before reuse) is often a better public communication approach than having the waste water representatives serve as the communication leads.

In what scenario would MAR not be an appropriate measure to consider for a project? What are the potential second and third order impacts of the MAR approach?
There are many cases where storing water below ground rather than above ground may not be an appropriate measure. In the West, where reservoirs are losing a meter or more of water a year from evaporation, you might save a lot of water by storing it underground. However, in regions that do typically not lose a significant amount of water above ground, and therefore probably do not have large aquifers, it may not make sense to use MAR. In addition, the shallower and more porous, permeable, homogeneous, and extensive the aquifer, the better the chances of successfully and appropriately using MAR.

Further, when using MAR, there are complex and developing groundwater laws to consider. The chemical environment of the aquifer—will interactions with the aquifer materials release arsenic or heavy metals, for example—and land costs are other factors. When considering MAR, the project designer must take into account numerous factors that are specific to the region and aquifer location.

How are the benefits of MAR captured in a benefit-cost ratio (BCR)?
A recent, comprehensive paper on this topic from Andrew Ross and Sunail Hasnain is available in Managed Aquifer Recharge: Local solutions to the global water crisis. Proceedings of the International Symposium on Managed Aquifer Recharge (ISMAR 10) (pages 256-267, "The costs and benefits of managed aquifer recharge"). Another example comparing groundwater vs. surface water storage in California is summarized in a research brief for the Stanford Woods Institute for the Environment. One of the first BCR analyses for groundwater recharge, conducted for USACE's Salado Creek project in central Texas in 1970, focused on the value of the recharge to the Edwards Aquifer that had occurred due to the leaking of the first dams built in the area. The benefit-cost analysis for this accidental recharge was used to justify building the next dam.

Collaboration, Best Practices, and More Information on MAR

Which other federal agencies are involved in MAR? Does USACE actively work with and/or learn from them?
USACE has much to learn from other federal agencies about MAR. The IWR report on MAR recommended that USACE use current interagency agreements, interagency committees, and other mechanisms to conduct seminars, webinars, meetings, and to potentially engage in cooperative research with other agencies to exchange knowledge, experience, and lessons learned related to MAR. As an example, the Bureau of Reclamation's WaterSMART program includes a Drought Response Program, for which five of the program's 18 grants in 2019 were for MAR projects. There are several current examples where USACE and another agency are both involved in the same dam, such as the Twitchell Dam in California where USACE coordinates with the Bureau of Reclamation, and could cooperate on MAR. This cooperation could be in the form of formal agreements between agencies, but it can also be done by fostering relationships in the field.

What kind of information is available related to MAR best practices?
IWR's MAR report focuses specifically on USACE's MAR engagement. Within the U.S., the American Society of Civil Engineers has recently released Standard Guidelines for MAR. Elsewhere, the International Association of Hydrogeologists has a Commission on Managing Aquifer Recharge with a wealth of resources.

Who should District planners talk to about potentially incorporating MAR into a project?
There is not currently a list of "go-to" contacts within USACE. One of the purposes of the MAR report and this webinar was to identify potential mechanisms to assist in such intra-Corps communications. For the moment, planners may consider contacting USACE Districts whose projects are described in thes MAR report, local partners who may have experience, USACE's Water Management and Reallocation Studies Planning Center of Expertise, and the Bureau of Reclamation Division of Planning,

Miscellaneous

Are there any examples of MAR engagement in Alaska and/or Hawaii?
Alaska does have several ongoing projects related to groundwater seepage, but none are examples of explicit or purposeful recharge projects. Hawaii has fractured aquifers, meaning that MAR should be a viable option in the area, but there are no specific known examples. MAR engagement in Hawaii is likely

affected by the current Supreme Court case involving injection well effluent discharging into the coastal zone (County of Maui, Hawaii v. Hawaii Wildlife Fund Et Al.)

Anyone interested in Alaska MAR issues should reach out to Jan Deick.