Managed Aquifer Recharge Policy Recommendations

This document does not reflect official positions or regulatory standards applied or used by the Department when administering its functions under SGMA.

Background

Groundwater overextraction is threatening water security for thousands of families, with 12,000 domestic wells in the San Joaquin Valley at risk of going dry by 2040 under current groundwater sustainability plans in this region.[1] Agriculture is responsible for about 90% of the Valley's water use, and many small and mid-sized farmers are also at risk of losing access to water. At the same time, local ecosystems are among the most degraded in California, and 95% of the region's original wetlands are already lost.[2]

To replenish groundwater levels, state and local agencies are funding and implementing managed aquifer recharge (MAR) projects. While MAR projects can help communities by improving groundwater levels and quality, and by reducing flood risks, local and state agencies must implement them responsibly to prevent negative impacts, especially to drinking water. In this policy brief, we highlight key drinking water concerns and provide best practices to ensure state and local agencies prioritize communities and comply with state law, such as the Sustainable Groundwater Management Act (SGMA), Human Right to Water, Senate Bill (SB) 659, and SB 170.

1. Agencies must prioritize demand management.

Paul Gosselin, Department of Water Resources' Deputy Director for Sustainable Water Management, often says, "We can't recharge our way out of overdraft." While MAR projects can augment water supplies, agencies cannot substitute MAR projects for comprehensive demand management strategies. State agencies must incentivize local agencies to set pumping limits and tiered water pricing, reduce agricultural acreage, repurpose cropland, implement efficient irrigation techniques, adopt drought-resistant crops, practice deficit irrigation, and enforce water use restrictions. These measures are crucial to adapt to climate change and increasing water scarcity in California.

2. Agencies must conduct mapping and monitoring to ensure recharge projects do not further degrade groundwater quality.

Groundwater recharge can provide benefits to disadvantaged communities by restoring groundwater quality. However, recharge projects have the potential to further exacerbate groundwater quality issues because the groundwater and soil in the San Joaquin Valley and the Central Coast are loaded with nitrate and other contaminants. Recharge projects can push contaminants found in the soil into the groundwater and mobilize contaminant plumes towards sources of drinking water. Agencies implementing recharge projects must use best practices to improve communities' access to safe and clean drinking water.

Under SB 659, the State is required to establish standards for how recharge should be conducted in order to protect drinking water. SB 659 directs the State to conduct mapping to determine where recharge can benefit and protect drinking water. Specifically, the State is required to identify areas "where recharge is unlikely to degrade groundwater quality based on consideration of the quality and composition of the source water, the qualities of the soil upon which recharge will occur, and the proximity to drinking water wells."[3]

Adequate planning before the implementation of recharge projects is crucial, especially as climate change makes weather patterns more unpredictable. State agencies should map out where water should be redirected for safe groundwater recharge before rainfall events occur to allow more water to be captured — decreasing overall runoff. To accomplish this, state agencies should collaborate with local agencies to conduct mapping which determines where recharge projects should be located to provide benefits to nearby communities and prevent groundwater quality degradation.

"The water lands in the hills and goes out to sea because it's not being captured. In a drought, the best thing is to open up the land and then plant cover crops. Capture the water that comes from the sky and slow it down before it goes out to sea."

— Horacio Amezquita, Salinas Valley

In addition to the mapping requirements outlined in SB 659, state agencies should ensure that local agencies implement water quality monitoring to understand how MAR projects may impact water quality. Local agencies should install monitoring wells in between MAR sites and communities to successfully identify if recharge projects may degrade communities' drinking water.

Local agencies must also understand the history of crops grown and nutrient management practices used on the land. Some crops and agricultural practices, such as dairies, present a high risk of loading nitrate in the soil which can then be flushed into the groundwater. Because of the presence of this risk, local agencies should prohibit recharge on these parcels of land, especially near communities.

If local agencies conduct on-farm recharge, agencies must use sustainable nutrient management and restorative agricultural practices to prevent further introduction of nitrate into the groundwater. For example, local agencies can improve soil conditions by utilizing techniques, such as cover cropping, to promote groundwater recharge and minimize the amount of nitrate leached into groundwater.

3. Agencies must prioritize recharge projects that benefit communities.

Agencies must develop community-driven MAR projects to protect and restore drinking water access for frontline communities. Recharge projects should be designed to address the specific needs of disadvantaged communities, including preferred locations and long-term water access and should be developed with community input through a robust outreach process. Community-driven MAR projects can help ensure that recharge efforts improve drinking water supplies locally.

4. Agencies must ensure recharge projects feature drinking water mitigation strategies.

Under SGMA, groundwater sustainability agencies must consider all beneficial uses and users of groundwater, including drinking water users and disadvantaged communities.[4] State agencies must ensure that groundwater sustainability agencies (GSAs) outline mitigation measures to address potential degradation of community drinking water quality caused by managed aquifer recharge projects. While recharge typically uses clean water, it may mobilize existing soil pollutants such as chemicals and fertilizers, potentially impacting nearby drinking water wells. Recharge projects will impact GSAs' groundwater budgets, water quality, and drinking water users. Because of the direct impacts recharge projects will have on beneficial users, GSAs are responsible to implement drinking water mitigation strategies.

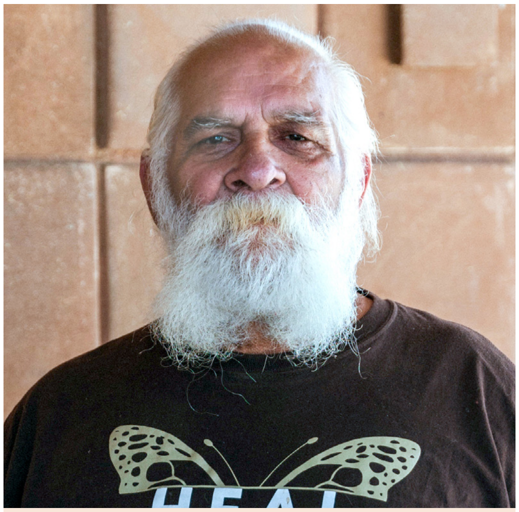
5. Coupling cropland repurposing and recharge projects can maximize community benefits.

As local agencies begin repurposing cropland through programs such as the Multibenefit Land Repurposing Program (MLRP), local agencies should consider how recharge can be integrated within land repurposing projects.[5] While repurposing cropland into other uses such as green space, habitat, and garden can already bring benefits to nearby communities who are surrounded by agriculture, local agencies should couple land repurposing with recharge to further improve communities' drinking water. For example, local agencies can repurpose individual fields which are close in proximity to create buffer zones around communities to mitigate negative impacts caused by extractive agriculture. Such buffer zones, created by repurposing interconnected fallowed lands, can also feature recharge from utilizing natural infrastructure.[6] Buffer zones intended to provide recharge benefits are most effective when they utilize co-concurrence of surface water supply (rivers or canals) and soil that can retain water. Together, these buffer zones coupled with recharge would protect communities from impacts from agriculture, improve community drinking water, and provide habitat, recreation, or other community benefits.

6. Recharge projects can double as nature based solutions.

MAR can be used to fulfill the State's goals under SB 170 — a law that directs the State to invest in climate resilient, green infrastructure by revitalizing creeks, streams, and other natural infrastructure.[7] Local agencies should prioritize MAR projects that capitalize on natural infrastructure to support both climate mitigation and stabilization of water supplies by leaning on the environment's natural resilience.

MAR can also play an important role in restoring wetlands, which are among nature's most effective groundwater recharge systems. By revitalizing degraded wetlands and floodplains, local agencies can enhance groundwater recharge naturally while providing community benefits such as green spaces, biodiversity support, and flood protection. For example, Dos Rios State Park is a repurposed dairy in the historical floodplain at the confluence of the



"If they did repurpose it into parks and planted trees, that could be good but would it be limited to just a tiny parcel? Would it be scattered closer to the rivers instead of something connected?"

— Tutuy Montes, Visalia

San Joaquin and the Tuolumne rivers that has been restored to protect downstream communities from flooding and to enhance the sensitive riparian ecosystems of the region, while also providing climate resilience and new socioeconomic opportunities to the nearby disadvantaged community of Grayson. This example underscores how well-planned MAR projects can simultaneously support environmental, social, and climate resilience, repurposing unsustainable cropland into multibenefit projects for the surrounding communities, sustainable agriculture, and California's environmental health.

Agencies must protect communities' drinking water when implementing MAR projects. We recommend including these best practices as part of the evaluation for MAR projects:

1. Set Clear Criteria for Groundwater Quality Protection

a. **Pre-Implementation Requirements:** Ensure that any water used for Subbasin recharge projects (e.g., stormwater, treated wastewater) meet state MCLs for all Title 22 contaminants to prevent introducing contaminants into the aquifer.

b. **Natural Filtration Considerations:** Prioritize sites where natural filtration can purify the water before it reaches the aquifer. Some examples include climate resilient riparian zones, wetlands, creeks, and streams that naturally filter and treat water before it enters the groundwater system.[8]

c. **Contaminant Monitoring and Mitigation Plans:** Require projects to have built-in monitoring systems for potential contaminants (e.g., nitrates and heavy metals). If elevated levels are detected, recharge should be halted immediately and the mitigation program should be utilized to address adverse impacts to drinking water users.

d. **Compliance with Local, State, and Federal Regulations:** Ensure that recharge projects meet or exceed all legal standards for groundwater protection, including but not limited to the Reasonable and Beneficial Use Doctrine, the Porter-Cologne Water Quality Control Act, the state and federal Antidegradation Policy, the Nonpoint Source Policy, Clean Water Act, and the Public Trust Doctrine.

e. **Prioritize subbasin areas** where groundwater flow is well understood and there are minimal existing data gaps, reducing the risk of contaminants spreading unpredictably.

2. Conduct Comprehensive Hydrogeological Assessments

a. **Map out Subbasin** to understand different types of recharge possible (on-farm, natural, managed aquifer recharge, etc.), where it is most needed, and where it will have no impacts on groundwater quality. Conduct soil testing for the vadose zone.[9]

b. **Identify proximity to potential contamination sources.** Consider nearby agricultural land uses, industrial operations, and waste disposal sites that could pose a contamination risk.[10]

c. **Evaluate the vulnerability of the aquifer.** Some aquifers may be more vulnerable to contamination due to the type of soils or the rate at which water percolates through to the groundwater.[11]

d. **Understand recharge rates and potential impacts.** Assess how the recharge will affect groundwater levels and the movement of contaminants.

e. **Identify where the nearest monitoring well is located** and determine if the monitoring well will adequately detect changes in groundwater quality. Install new monitoring wells if existing monitoring wells are not in close proximity to the recharge site.

f. **Conduct soil testing** to understand what contaminants in the soil may be mobilized after recharge.

3. Incorporate Adaptive Management and Long-Term Monitoring

a. **Demand Management:** Until critical overdraft conditions have ceased, the primary goal of recharge should be to leave water in the aquifer. The Subbasin should not treat recharge as a new water supply. All recharge projects must be coupled with demand reduction.

b. **Continuous Water Quality Monitoring:** Implement real-time monitoring of groundwater quality at recharge sites to detect early signs of contamination

c. **Post-Recharge Assessments:** After the recharge project is operational, continue to assess the impacts on groundwater quality over time, allowing for adjustments if contaminants are detected.

d. **Feedback Loops:** Incorporate findings from ongoing monitoring into future project designs and the overall selection process to continuously improve groundwater quality protection.

e. **Drinking Water Mitigation:** Develop a plan to support drinking water needs in the case that water quality monitoring demonstrates that recharge projects have degraded communities' drinking water supply. The mitigation plan should consider both preventative measures, such as the development of a sustainable, community-driven long-term solution such as consolidation or treatment system, and emergency actions such as providing bottled water to impacted communities. Additional mitigation measures include:

- Developing proactive strategies inspired by dry well mitigation measures and drought response actions.
- Considering preventive measures like installing community-wide filtration systems or consolidating rural water systems.
- Creating a contingency fund for rapid response to any water quality issues that arise.
- Ensuring transparent communication with affected communities about potential risks and mitigation efforts.

4. Stakeholder and Public Involvement

a. **Engage with local communities, regulatory agencies, and other stakeholders throughout the project selection process to:**

- Address community concerns about groundwater safety and sustainability.
- Incorporate local knowledge about land use and groundwater issues.
- Build public trust through transparent decision-making and communication of the

Notes

1. Available at: https://waterfdn.org/wp-content/uploads/2020/05/Domestic-Well-Impacts_White-Paper_2020-04-09.pdf.
2. Fernandez-Bou, A. S., Ortiz-Partida, J. P., Pells, C., Classen Rodriguez, L. M., Espinoza, V., Rodríguez-Flores, J. M., et al. (2022). Regional Report for the San Joaquin Valley Region on Impacts of Climate Change. California Natural Resources Agency. Available at: https://www.energy.ca.gov/sites/default/files/2022-01/CA4_CCA_SJ_Region_Eng_ada.pdf
3. Senate Bill 659. Available at: https://legiscan.com/CA/text/SB659/id/2844602
4. Cal. Water Code § 10723.2.
5. Department of Conservation, Multi-Benefit Land Repurposing Program. Available at: https://www.conservation.ca.gov/dlrp/grant-programs/Pages/Multibenefit-Land-Repurposing-Program.aspx
6. Water, environment, and socioeconomic justice in California: A multi-benefit cropland repurposing framework: "Buffer zones are defined here as physical separation areas where the land use is aimed to provide environmental protection around and inside a specific location".
7. Senate Bill No. 170. Available at: https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=202120220SB170
8. Atkinson, S. F., & Lake, M. C. (2020). Prioritizing Riparian Corridors for Ecosystem Restoration in Urbanizing Watersheds. PeerJ, 8, e8174. Available at: https://doi.org/10.7717/peerj.8174
9. Soil Agricultural Groundwater Banking Index. Available at: https://casoilresource.lawr.ucdavis.edu/sagbi/
10. We are seeing a concerning growth in industrial operations such as warehouses and hydrogen projects in Tulare County. We want to ensure recharge projects are not sited near potential harmful land-use practices.
11. Larva, O., Brkić, Ž., & Marković, T. (2023). "Vulnerability and Risk of Contamination of the Varaždin Aquifer System, NW Croatia." Sustainability, 15(23), 16502.

Developed by:

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Community Water Center
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Union of Concerned Scientists

California Environmental Voters

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