Groundwater Recharge & Drinking Water

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Human Right to Water

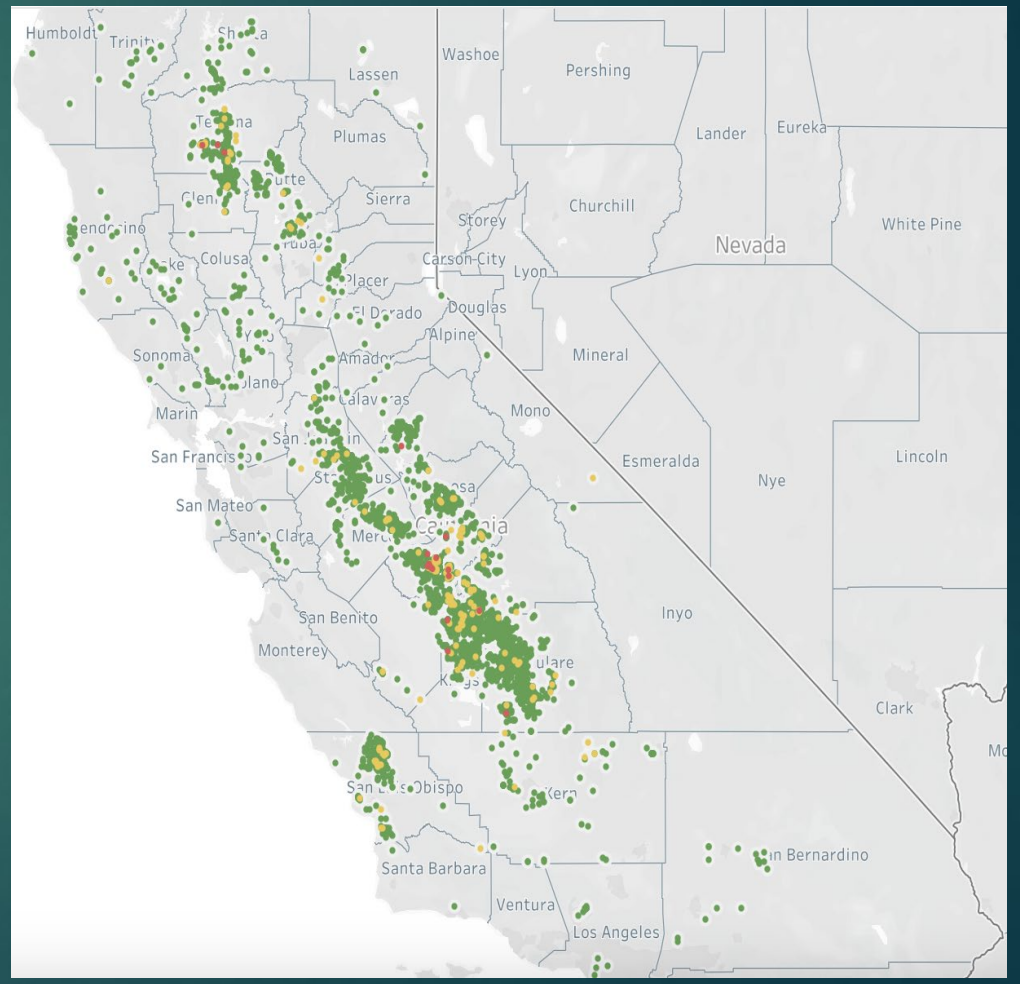
"It is hereby declared to be the established policy of the state that every human being has the right to safe, clean, affordable, and accessible water adequate for human consumption, cooking, and sanitary purposes." (Water Code, § 106.3 (AB 685, 2012).)

Existing Conditions & Context

- ~1 million Californians still lack access to safe and affordable drinking water.
- Contamination can be naturally occurring, caused by human activity, or both.
- Groundwater quality regulations are commonly inadequate and/or inadequately enforced.
- Programs to support private well households have begun in recent years (SAFER, CV SALTS), but private wells are not well regulated and testing is not typically required.
- There is still no statewide household water affordability program.

Impacts on Domestic Wells & Small Community Water Systems

- According to DWR's Dry Well Reporting Tool, nearly 3,000 drinking water wells have gone dry since 2013 due to over pumping of groundwater.
- A 2012 report to the legislature concluded that:
  - About ⅓ of domestic wells in the Southern San Joaquin Valley were impacted by nitrate contamination.
  - 96% of nitrate contamination in groundwater is caused by overapplication of fertilizer and dairy manure to cropland.
  - Harter et al., "Addressing Nitrate in California's Drinking Water."
- This is consistent with more recent water quality testing demonstrating that 30-40% of domestic wells in at-risk areas have nitrate concentrations above drinking water standards.



Drinking Water Considerations Related to Recharge

1. Water Supply
2. Water Quality

Recharge and Water Supply

- Recharge using flood flows is not a silver bullet, and GSAs are not planning for enough demand reduction.

Plans present solutions that would more than address the anticipated level of overdraft…

Most plans follow these SGMA requirements (exceptions include the Merced basin, where the plan does not estimate the yield of supply projects; and Tule, where several plans are vague on how they will fill the gap between projected supplies and overdraft). In aggregate, the plans present over 2.2 maf/year of supply and demand solutions—more than enough to address the level of overdraft they are anticipating.

… but they emphasize solutions on the supply side, and relatively little on the demand side…

The plans assume that new supplies will fill more than three-quarters of the total overdraft gap in their jurisdictions, while demand management will save less than one-quarter. This is the inverse of our estimates, which considered both the costs and the amount of water that might be physically available from a wide range of sources. We found that it would be difficult to increase supplies by more than half a million acre-feet (See Chapter 2 in *Water and the Future of the San Joaquin Valley*).

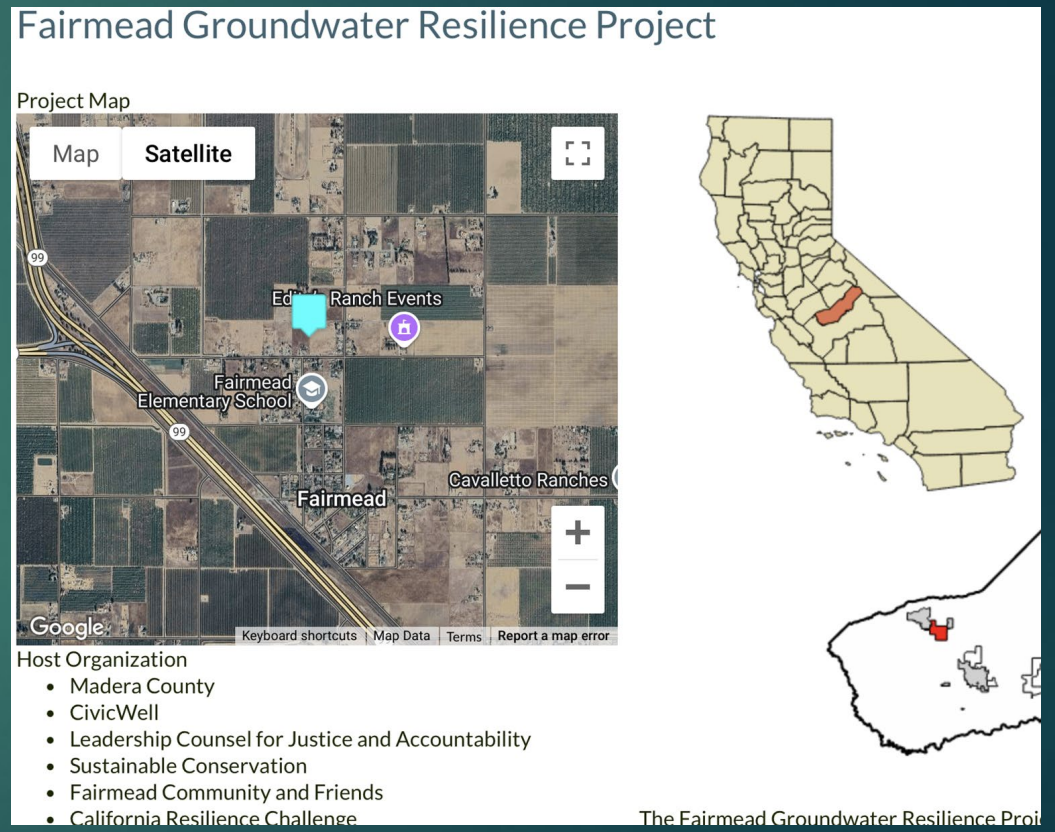
…and the supply numbers do not add up

The supply solutions can be broken into two groups—projects that would augment overall supplies available in the region, and projects that would shift surface water supplies from one water user to another (Figure 4). Most basins look to both kinds of solutions (Figure 5). At the regional scale, neither category reflects a realistic assessment of the potential for these solutions to end overdraft.

Hanak et al., "A Review of Groundwater Sustainability Plans in the San Joaquin Valley" (May 14, 2020), https://www.ppic.org/wp-content/uploads/ppic-review-of-groundwater-sustainability-plans-in-the-san-joaquin-valley.pdf.

Recharge and Water Supply (Continued)

- Recharge will play a role and can have localized benefits.
- Recharge must be community-driven and maximize benefits to residents in disadvantaged communities.
- Communities must be front and center in guiding solutions.



Recharge and Water Quality

Recharge on agricultural lands has the potential to degrade groundwater quality by mobilizing nitrate and other contaminants. It could also improve water quality depending on site-specific conditions. Site-specific analysis, monitoring, and effective regulatory protections are critical.

Flooding of fields previously treated with manure is unlikely to cause widespread new groundwater contamination. Rather it may continue and perhaps accelerate groundwater contamination already moving through the subsurface due to historic and recent manure management. Nitrates and salts are of particular concern (VanderSchans et al., 2009; Harter et al., 2002, 2012, 2017). Under MAR conditions, the transport of legacy nitrate and salt in the vadose zone and in shallow groundwater – whether in dairy land application areas or other irrigated lands – may be accelerated. But at the same time it may also accelerate improvement of groundwater quality, as we illustrated recently in a modeling study (Bastani and Harter, 2019). We do not anticipate risk for microbial

Harter et al., "Perspectives on DairyMAR" (April 9, 2023), https://californiawaterblog.com/2023/04/09/perspectives-on-dairymar/

We lack site-specific research about the groundwater quality impact from incidental flooding of dairy land application areas or from intentional DairyMAR. But we offer some

Challenges Associated with Solutions Once Groundwater is Polluted.

- Effectively protecting sources of drinking water is the only way to reach universal access to safe drinking water for all Californians.
- Interim Solutions do not reach everyone:
  - CV SALTS Program in the Central Valley offers free well testing and interim drinking water solutions, including bottled water delivery.
  - Despite substantial outreach efforts for multiple years, the CV SALTS Management Zones have only tested only about 19% of at risk wells in their jurisdictions.
- Long-Term solutions are costly and slow:
  - Options: Consolidation, Well Replacement, Blending, Treatment, Extension of public service, etc.
  - Most of these options are costly and take years to implement. See, eg., Tombstone Territory.

Main Conclusions:

1. Recharge is not a silver bullet for water supply challenges. Sustainable groundwater management primarily requires a real commitment to demand reduction.
2. If done properly, recharge can help communities and households maintain (or regain) access to safe tap water. If done poorly, it could exacerbate nitrate and other pollution or fail to maximize drinking water benefits.
3. Once groundwater is polluted, solutions are difficult, costly, and slow. Sources of drinking water must be effectively protected from pollution and overuse.
4. Emergency flood policies should not discourage advance permitting. (See State Water Board's Streamlined Permitting Process.)

SB 122 (2023) Protections That Must Be Maintained:

- Definition of "floodflow" that excludes non-flood events.
- Early notice of diversion to both the State Water Board and the public.
- Prohibitions on floodflow recharge on dairy land and irrigated lands identified as outliers with respect to nitrate applications.
- Preliminary and final reports related to the diversion location and estimated water recharged.
- Public data posted to the State Water Board's website.

Unmet Policy Needs:

- Monitoring and data collection related to the water quality impacts of recharge.
- More analysis and mapping of the fields where it is likely safe, from a water quality perspective, to recharge groundwater.
- Emphasis on community-drive recharge projects that will help to stabilize groundwater levels and improve groundwater quality near disadvantaged communities.
- Incorporation of climate modeling in groundwater management, to better ensure that demand reduction and recharge efforts result in long-term sustainability.