Agricultural Runoff in the San Joaquin Valley Creates Drinking Water Crisis for Socially Vulnerable Communities

Evelyn La • Department of Applied Environmental Science • California State University Monterey Bay

California State University MONTEREY BAY

Questions

How does agricultural runoff affect the San Joaquin Valley?

Who is being impacted by agricultural runoff in the San Joaquin Valley?

What could be done to help mitigate these effects?

Important Abbreviations

SJV: San Joaquin Valley
LIC: Low Income Community
DAC: Disadvantaged Community
MCL: Maximum Contaminant Level

Background Info

- Agricultural runoff is the process by which water runs over fertilized farmland, enabling contaminants to enter the groundwater and waterways
- The SJV accounts for over 50% of California's agricultural output
- The Central Valley relies on the pumping of groundwater to provide water for crops and residential drinking water
- The over pumping of water in the SJV is causing higher concentrations of contaminants in groundwater
- Consumption of contaminated water can lead to a variety of human health issues
  - Methemoglobinemia
  - Linked to colorectal cancer, reproductive harm, neural tube birth defects, and thyroid disease[1]
- The MCL for nitrates in drinking water is 10 mg/L, but levels as low as 5 mg/L have been shown to be detrimental to health

Findings

- The San Joaquin Valley has some of the highest concentrations of nitrogen in groundwater, highest rates of poverty and largest Hispanic populations in California
- Tests done in the SJV found elevated levels of nitrates in the water in hundreds of towns where the population was 50 percent Hispanic or higher[2]
- The average income across all majority-Hispanic communities in the SJV with elevated nitrate was $49,367, less than half of the state's average of $101,493[2]
- In 2007, 74% of California's nitrate MCL violations occurred in the SJV which impacted 275,000 people and continues to rise yearly[3]
- The SJV has high rates of heart disease, cancer, spontaneous preterm birth, and infant mortality--all of which have been linked to the consumption of nitrates
- SJV Residents who are affected by nitrate contamination must rely on alternative water sources, which can be costly and add on to financial burden

Figure 1

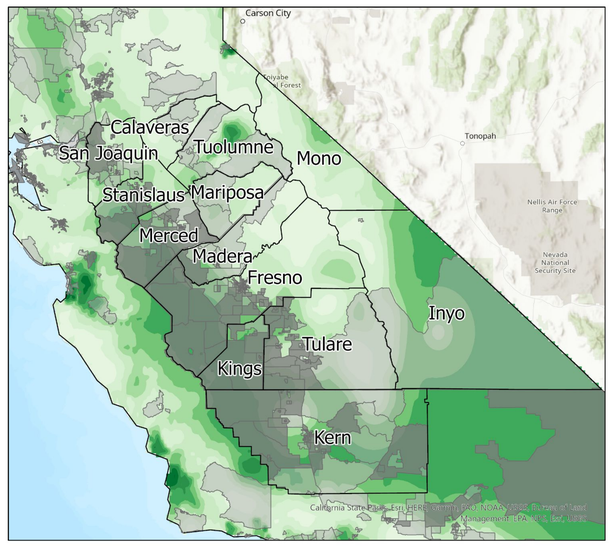

Figure 1: Map depicting the correlation between low income/disadvantaged communities and elevated amounts of nitrogen in the groundwater. Created by interpolating well data from California Environmental Data Exchange Network (CEDEN)

Figure 2

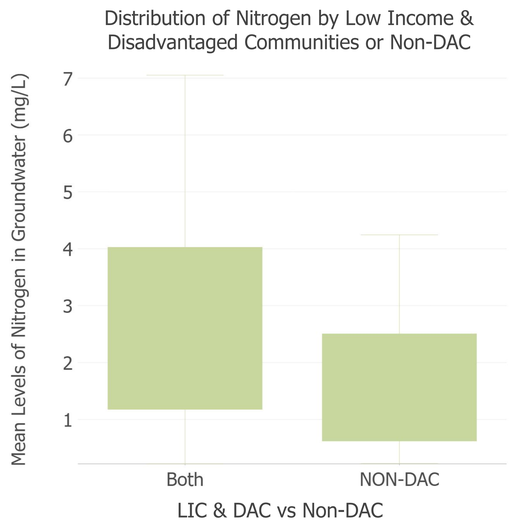

Figure 2: Chart comparing the distribution of nitrogen in groundwater between low income/disadvantaged communities and non-DAC

Possible Solutions

- ★ Stricter laws and tighter regulations under the Porter-Cologne Water Quality Control Act and related laws/programs
- Enforcement of sustainable fertilizer application practices
- More accurate pollution readings on a farm to farm basis for tax purposes
- Incentive based policy that doesn't allow pay to pollute (water quality trading)
  - farmers will be rewarded if they produce below a certain amount of pollutants
- Implementation of a fine if pollution levels are above a certain number
- Reuse nitrate rich water for irrigation

Conclusions

- Agricultural runoff disproportionately affects low income and disadvantaged communities, many of which are rural and comprised of racial-ethnic minorities
- These communities are small and economically disadvantaged, making it nearly impossible for them to get the help that they need
- They lack a voice to be heard, the funds necessary to afford nitrate mitigation and healthcare, and proper education about agricultural runoff to make informed decisions with fertilizer application
- The SJV faces a drinking water crisis with both the nitrate contamination and depletion of groundwater

References

1. Ward, et al., (2018). Drinking Water Nitrate and Human Health: An Updated Review. *International Journal of Environmental Research and Public Health*, *15*(7).
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3. Moore, E., & Matalon, E. (n.d.). *The Human Costs of Nitrate-Contaminated - Pacific Institute.* Retrieved April 8, 2023, from https://pacinst.org/wp-content/uploads/2011/03/nitrate_contamination3.pdf

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