



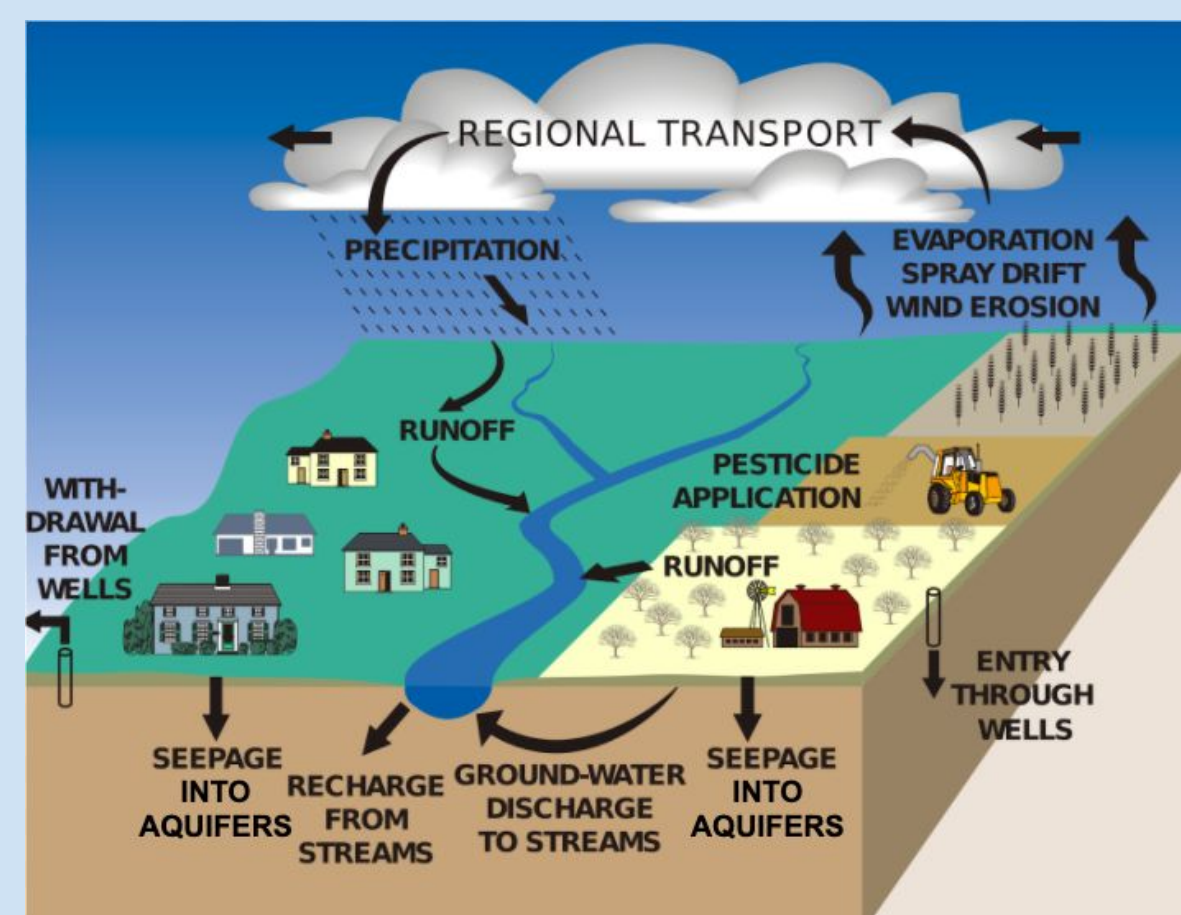
Causes, Effects, and Solutions to Groundwater Depletion in California



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BACKGROUND

- Groundwater depletion has been occurring in California for the past few decades
- 85% of Californians depend on groundwater (PPIC)
- Groundwater has a negative environmental effects, as it plays an important role in the hydrologic (water) cycle (Donev)
 - Can lead to saltwater intrusion which is dangerous for agriculture and organisms dependent on groundwater (USGS)
- Much of California's economy is supported by agriculture (heavy use of groundwater)
- Groundwater has numerous uses critical uses in California (USGS)
 - Agricultural
 - Municipal

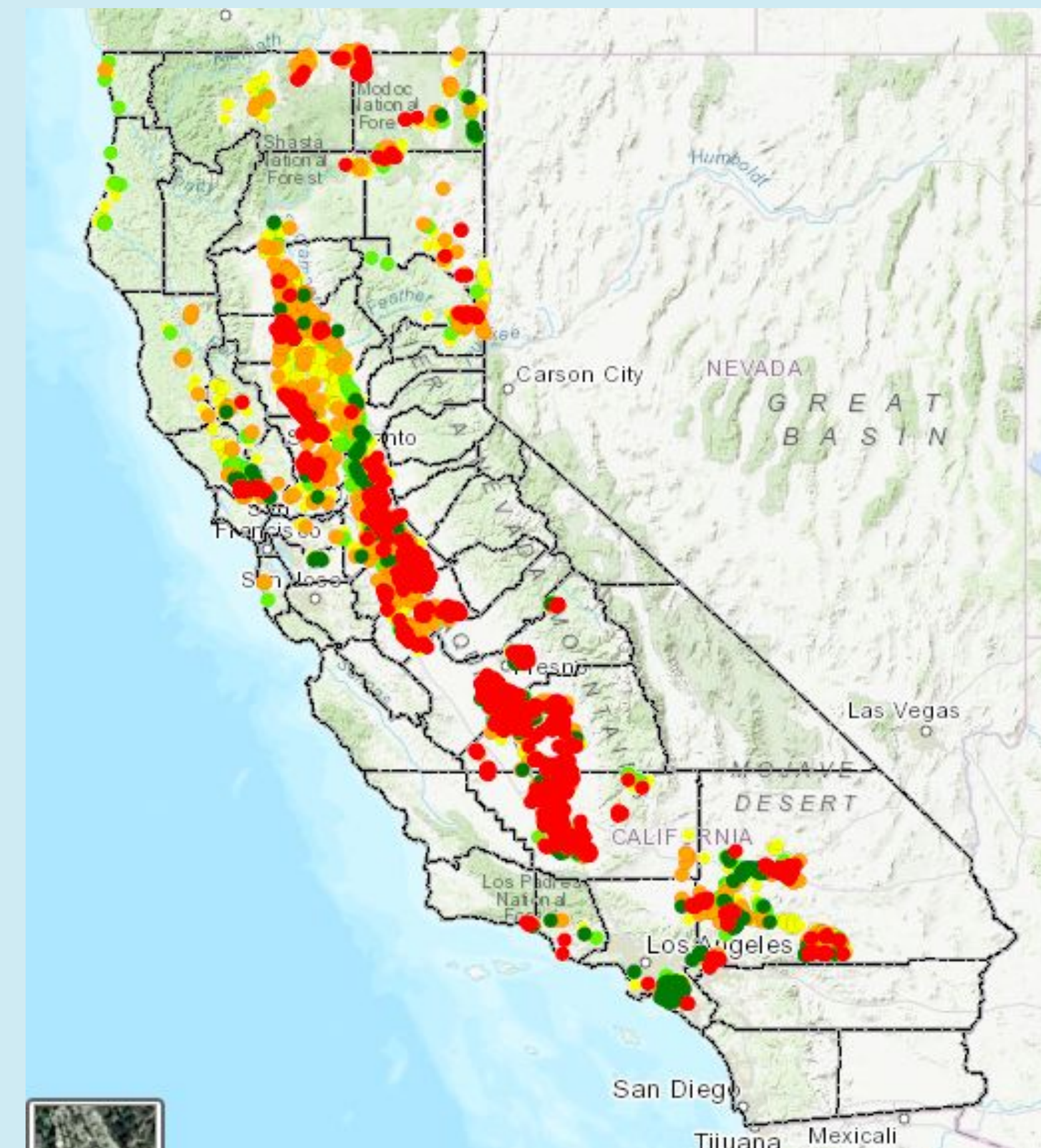


The Hydrologic Cycle

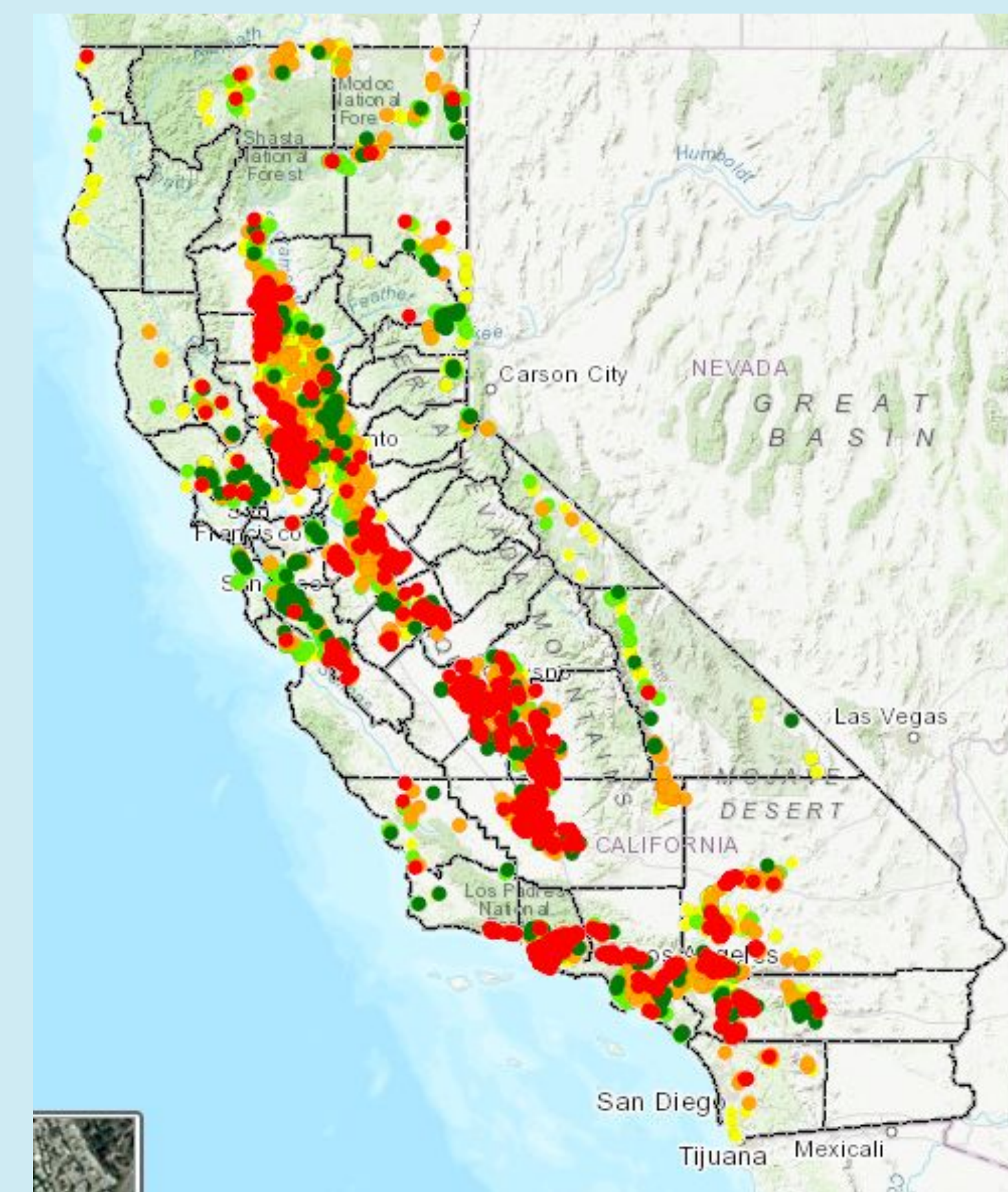
RESEARCH METHODOLOGIES

- Online databases
- News articles
 - understand how groundwater depletion has affected counties/ towns that are heavily agricultural or rely on groundwater in some way
- Academic papers for background information on the topic
- Interactive maps and databases with information on groundwater depletion trends by county and aquifer

DATA AND FINDINGS



Change in groundwater levels from 2002 to 2012 (AGI)



Change in groundwater levels from 2013 to 2018 (AGI)

Key:
Red: decrease in water level greater than 10ft
Orange: decrease in water level between 2.5ft and 10ft
Yellow: increase or decrease in water level of 2.5ft or less
Light Green: Increase in water level between 2.5ft and 10ft
Dark Green: Increase in water level greater than 10ft

What is Being Done?

- California Statewide Groundwater Elevation Monitoring program (CASGEM) → data, starting in 2009, depicting groundwater depletion was an issue that needed resolution (California Department of Water Resources)
- Sustainable Groundwater Management Act (SMGA) → Bill passed in 2014 that mandates farmers across the state, who use groundwater, draw up a plan to use water resources more sustainably (California Department of Water Resources)
 - Plans must be drawn by January of 2022

CONCLUSIONS AND ANALYSIS

Conclusion:

- Groundwater depletion has been occurring for the past few decades, where a majority of depletions from 2002 to 2018 are greater than 10 feet (AGI)
- Most changes are made through public policies and have greatly impacted the agricultural industry and their groundwater usage

Analysis:

- Public Policies are beneficial in forcing change
- Awareness brings about change and is needed for people to take action
- Some counties rely on groundwater because it is affordable and efficient
 - As such, using groundwater may be necessary, as all other means of obtaining freshwater are expensive and inefficient

NEXT STEPS

- Research more environmental effects of groundwater depletion
 - Focusing on environmental implications of such issues rather than the effect they have on human populations
- Expand groundwater depletion research to whole country
- Research other topics pertaining to water usage, quality, and effects on the environment
 - Research human activities and how they affect and impact the environment

POSSIBLE SOLUTIONS

- Most groundwater goes to agriculture and municipal use
 - Water recycling plants would help reduce continual mining of groundwater for municipal use
 - Farming techniques and other methods of irrigation can help reduce the heavy reliance on groundwater

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