

# REGIONAL FORUM

## Sustainable Groundwater Management in the Northern Sacramento Valley

### Update on the Sustainable Groundwater Management Act

Thomas Harter

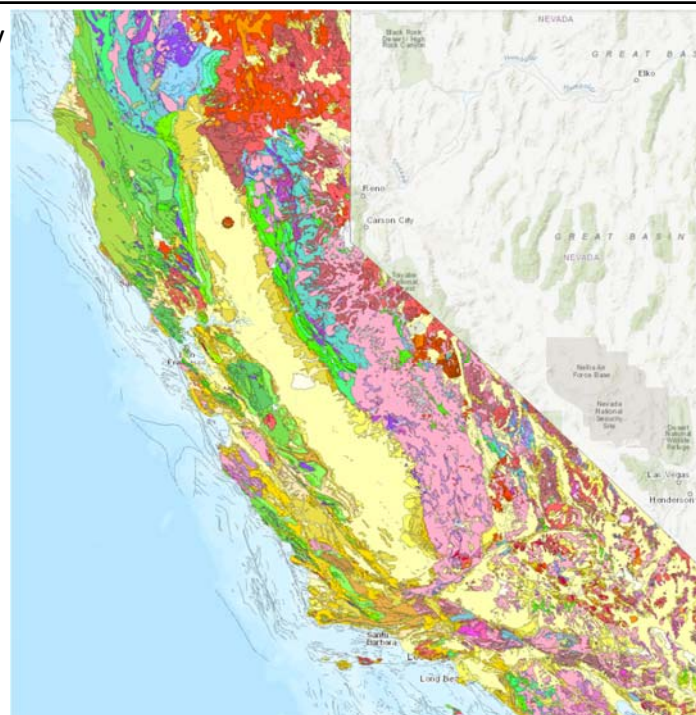
University of California Davis  
[ThHarter@ucdavis.edu](mailto:ThHarter@ucdavis.edu)

<http://groundwater.ucdavis.edu>

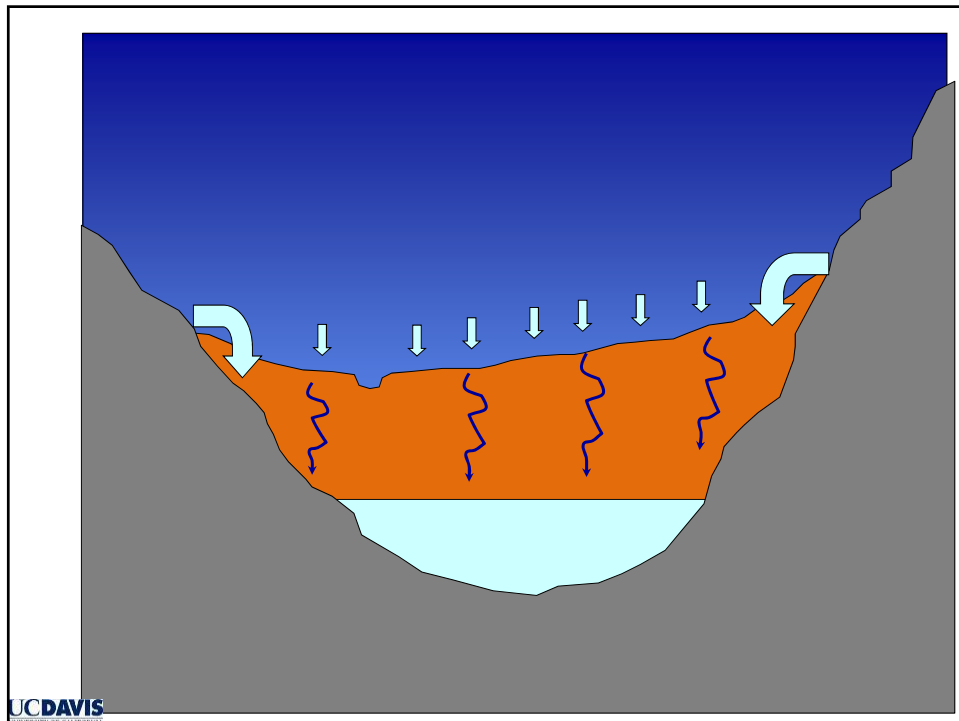
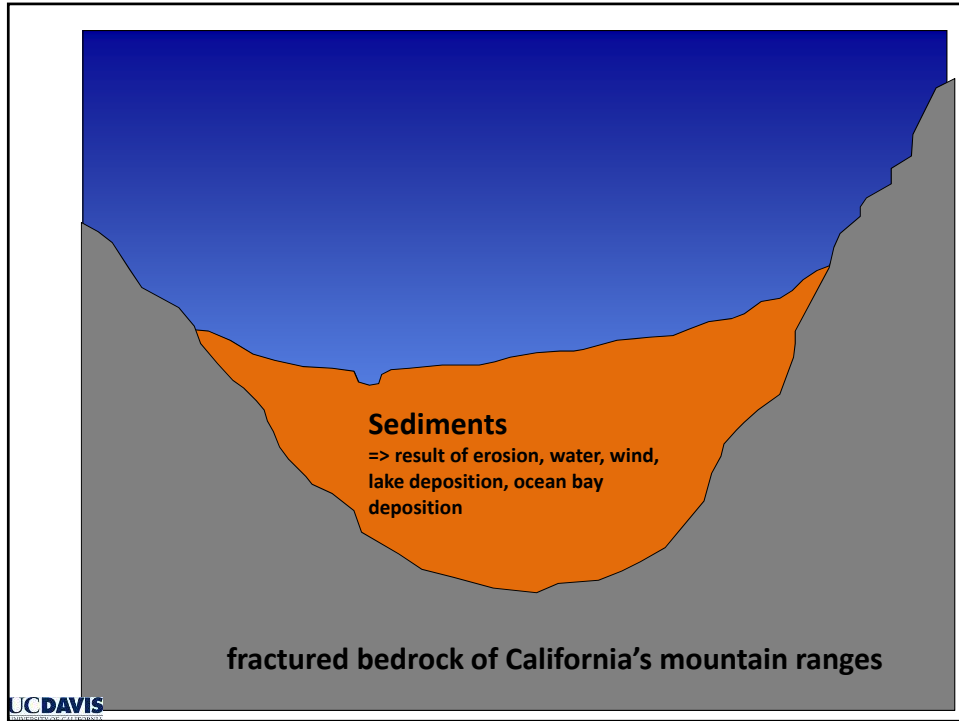
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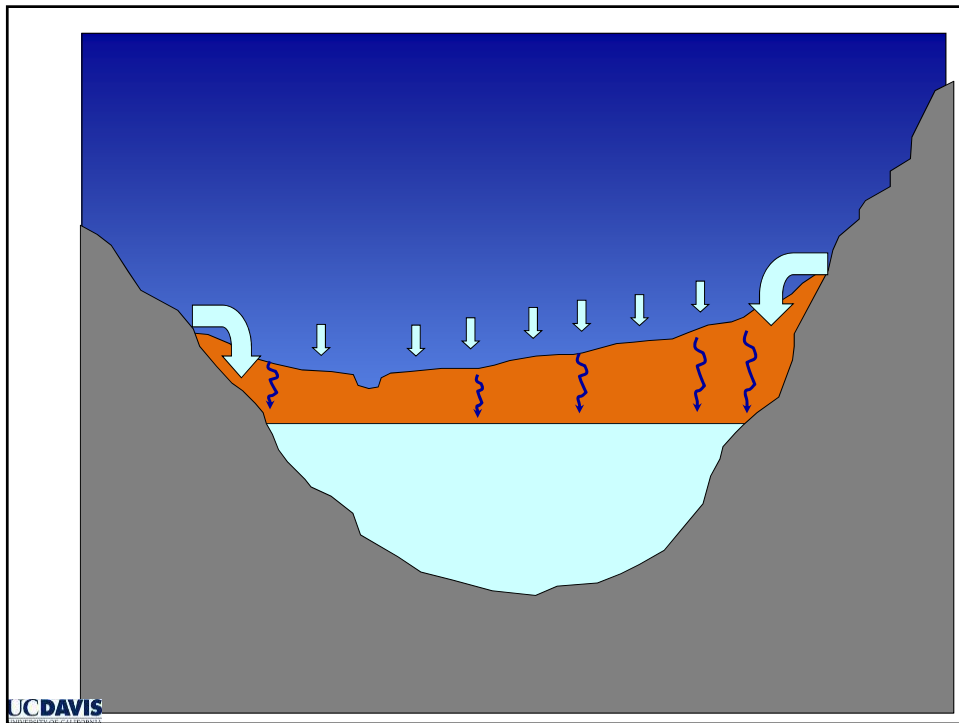
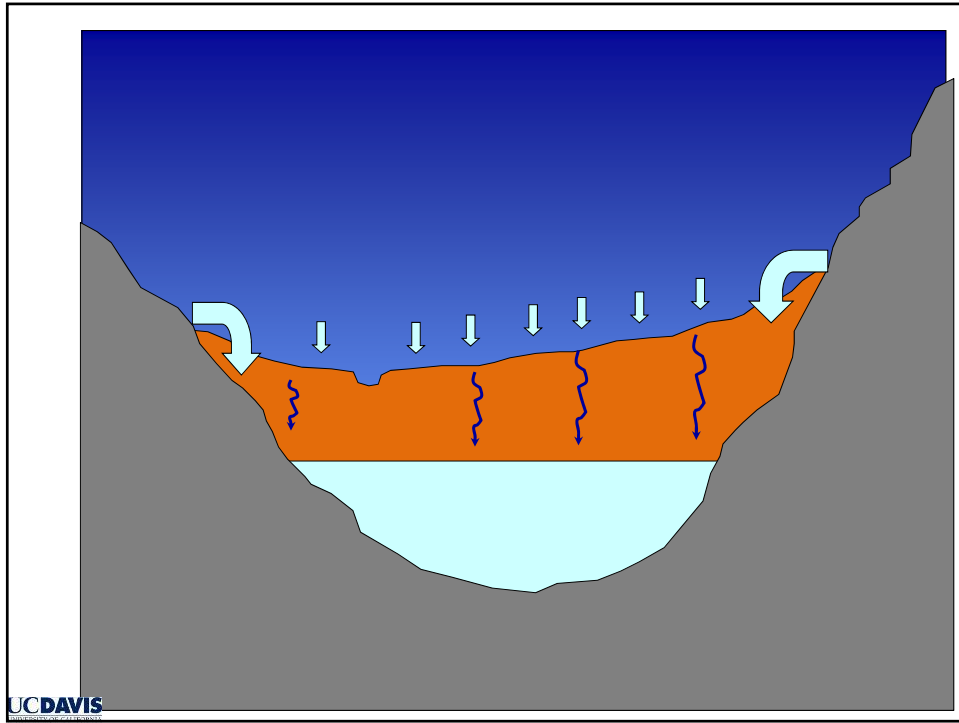
University of California  
Agriculture and Natural Resources

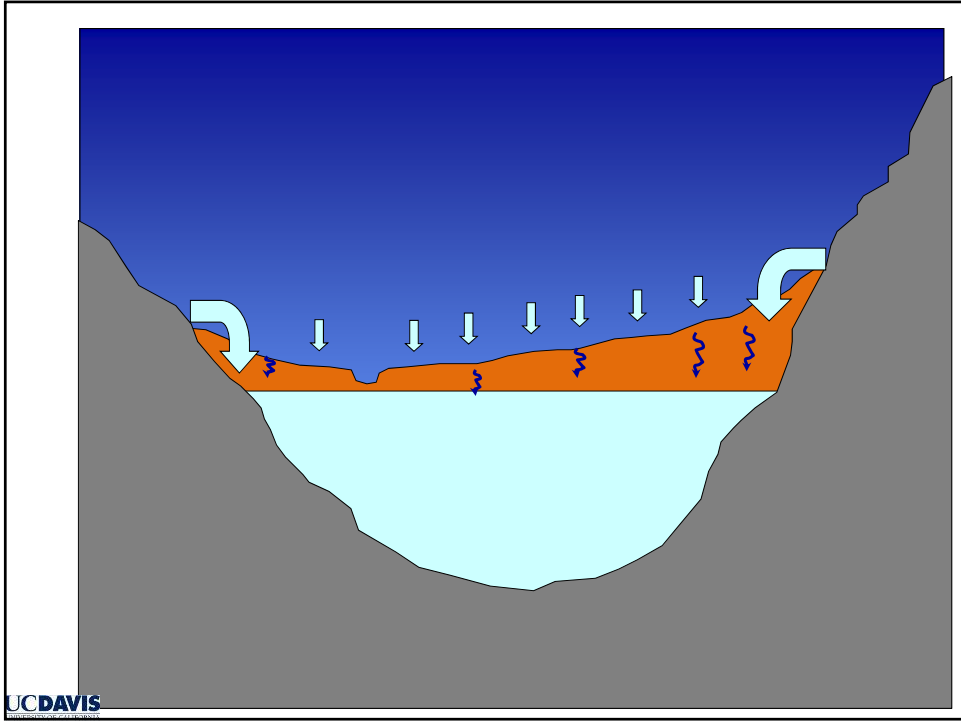
California Geology

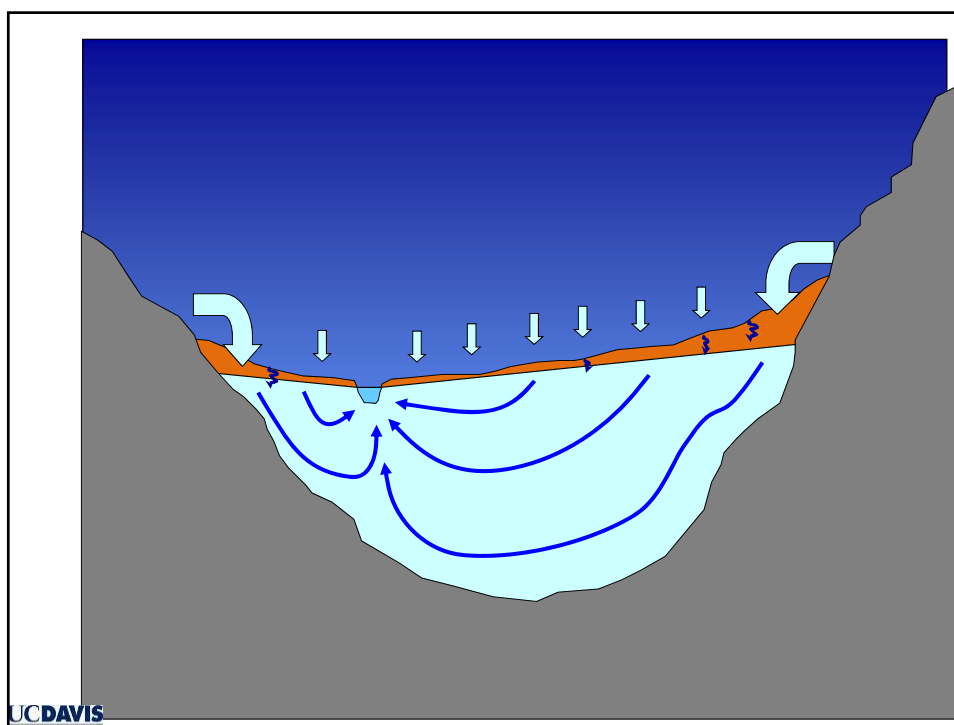
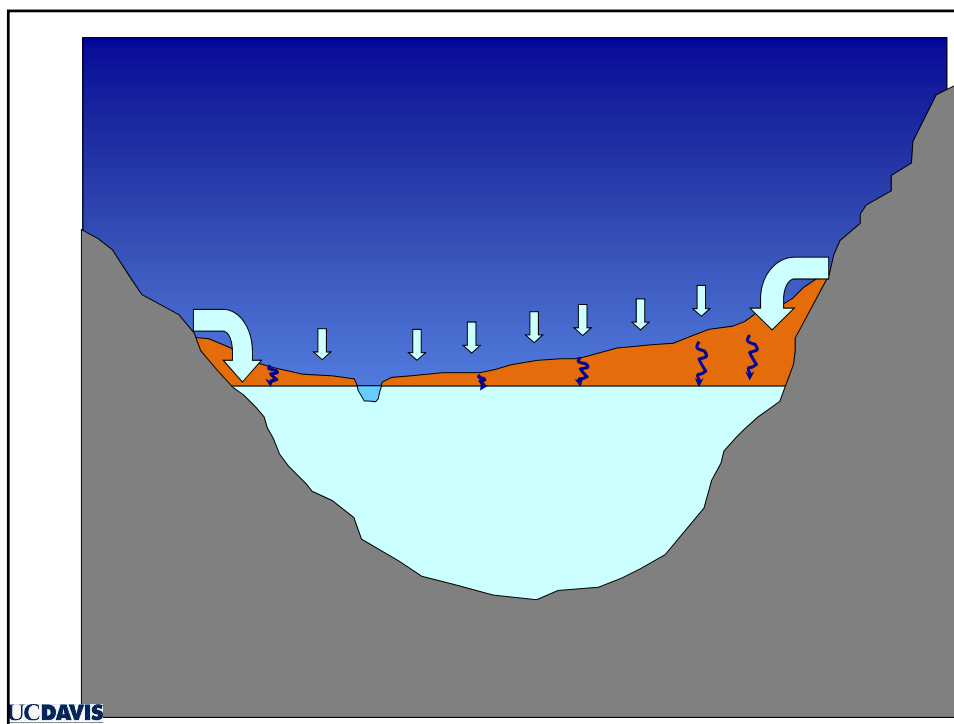


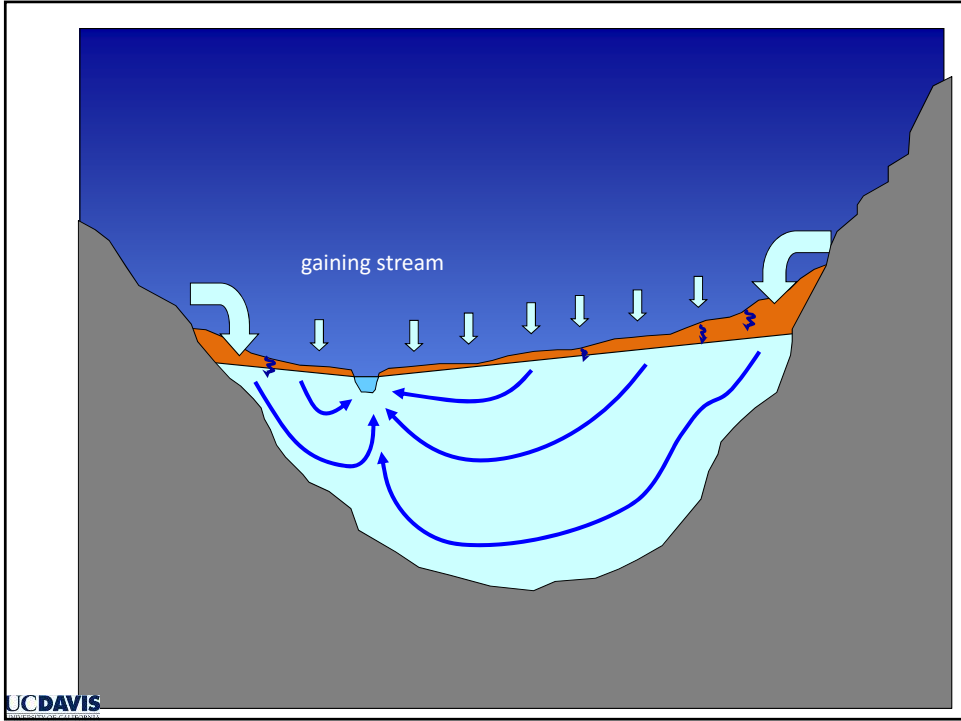
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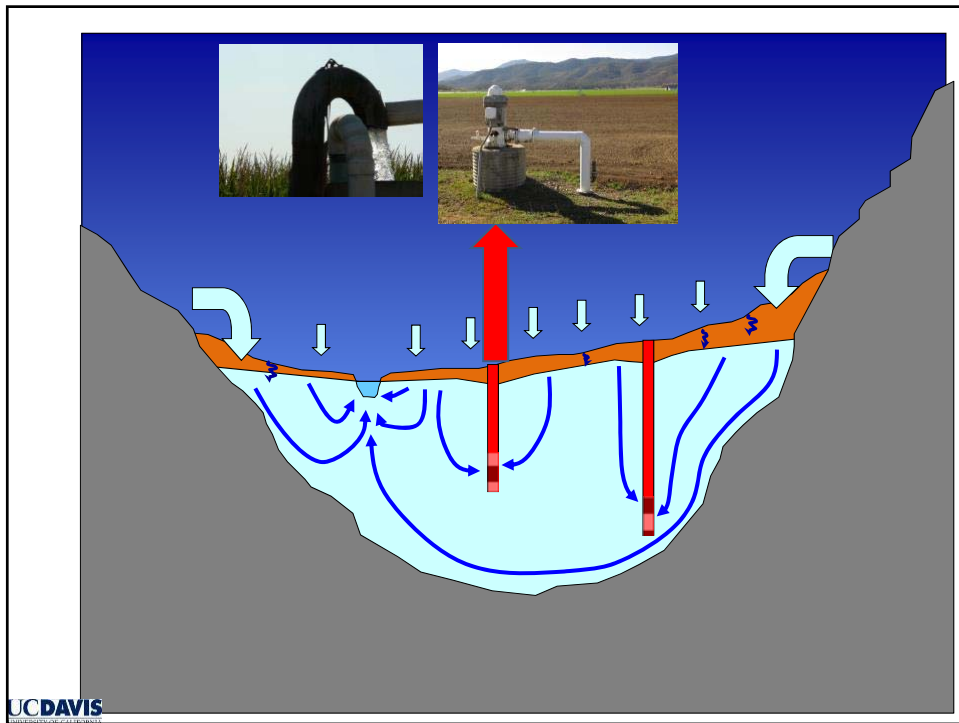
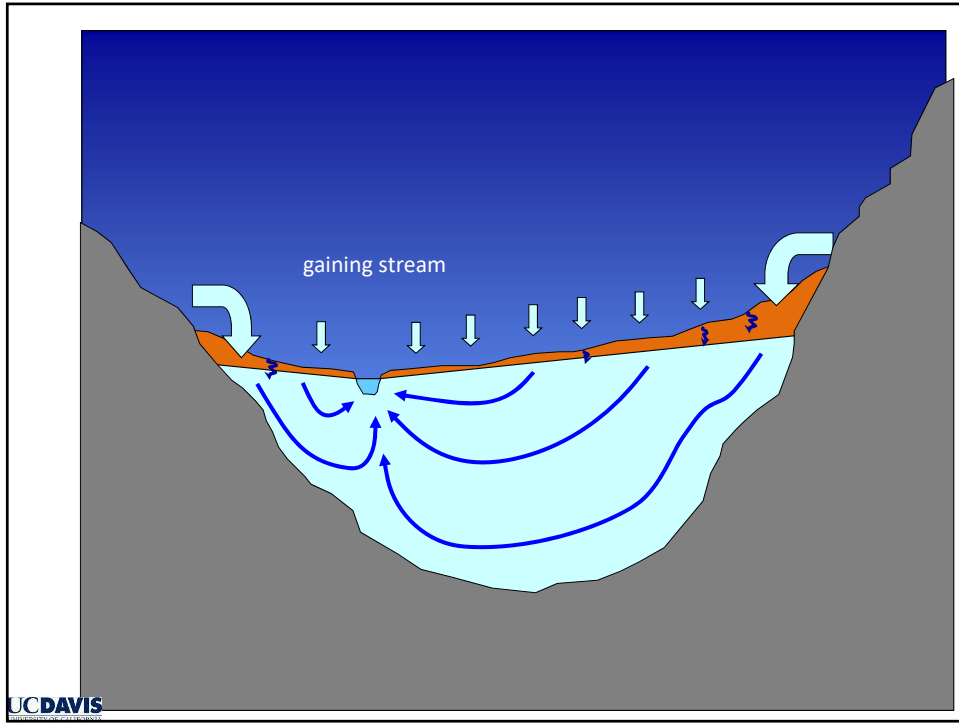


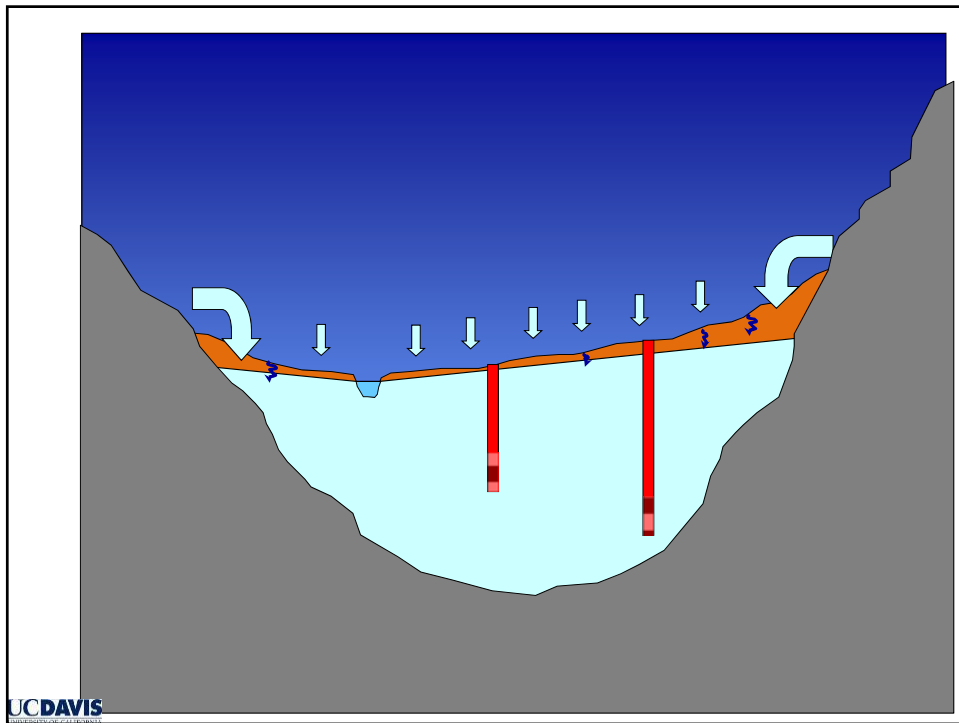
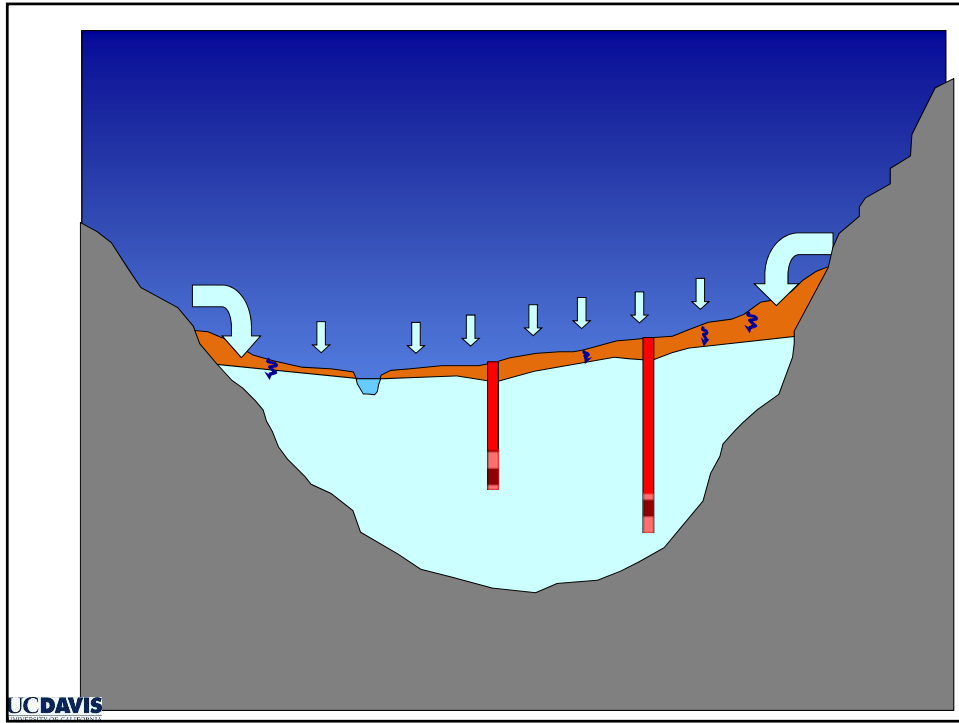


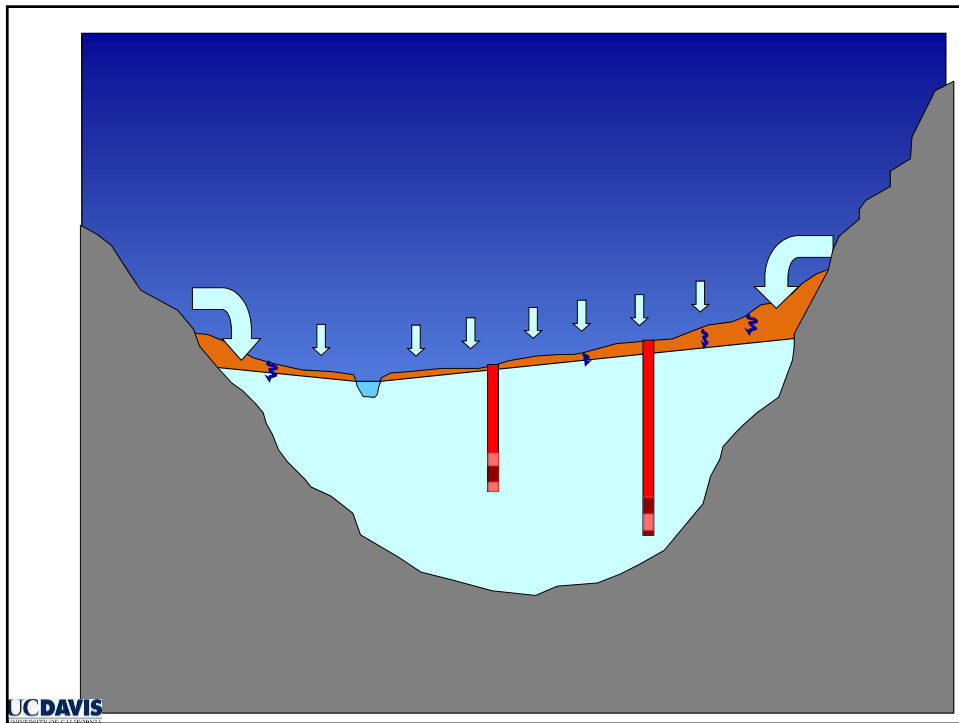
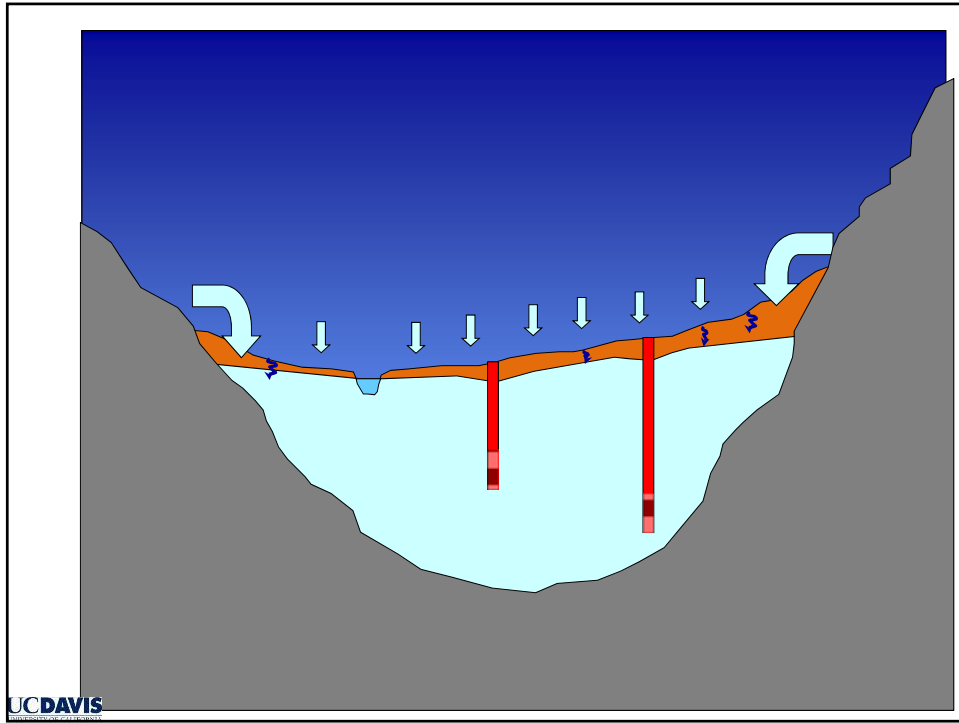


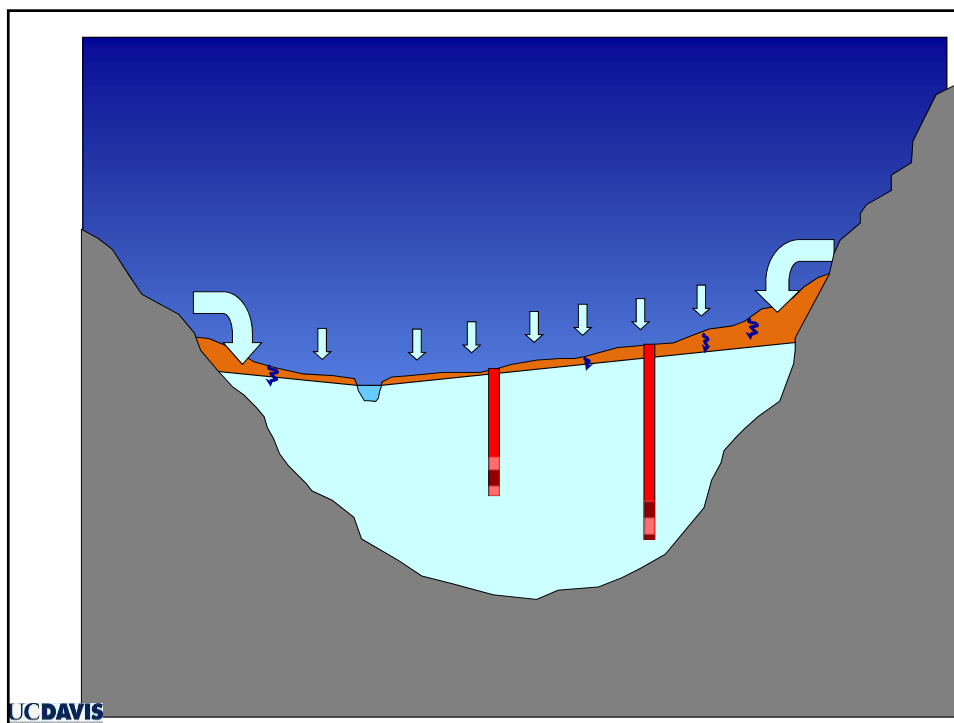
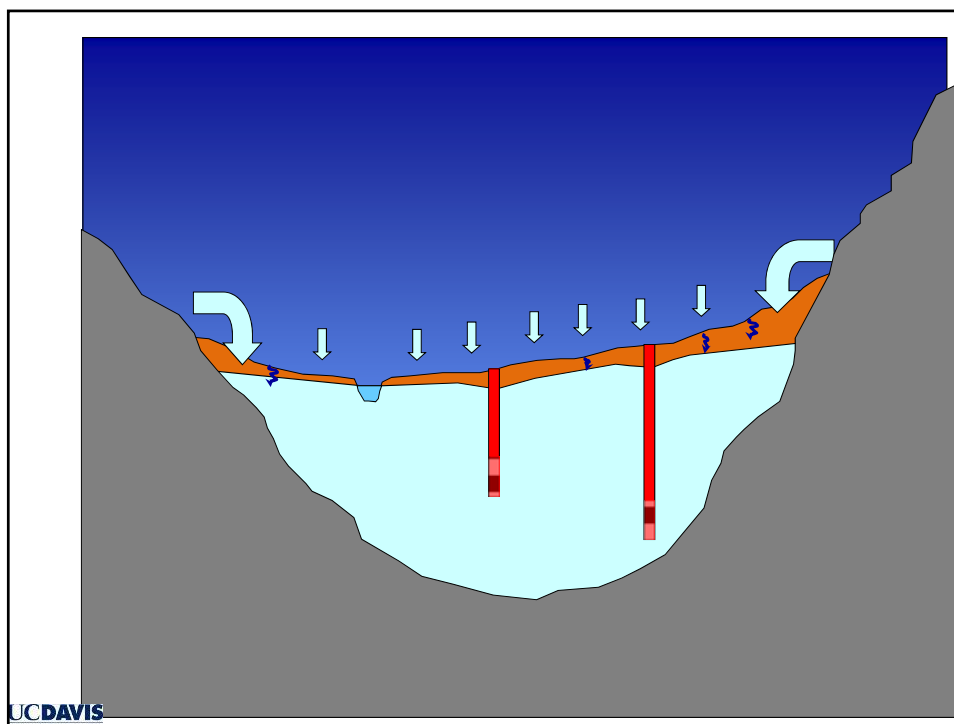


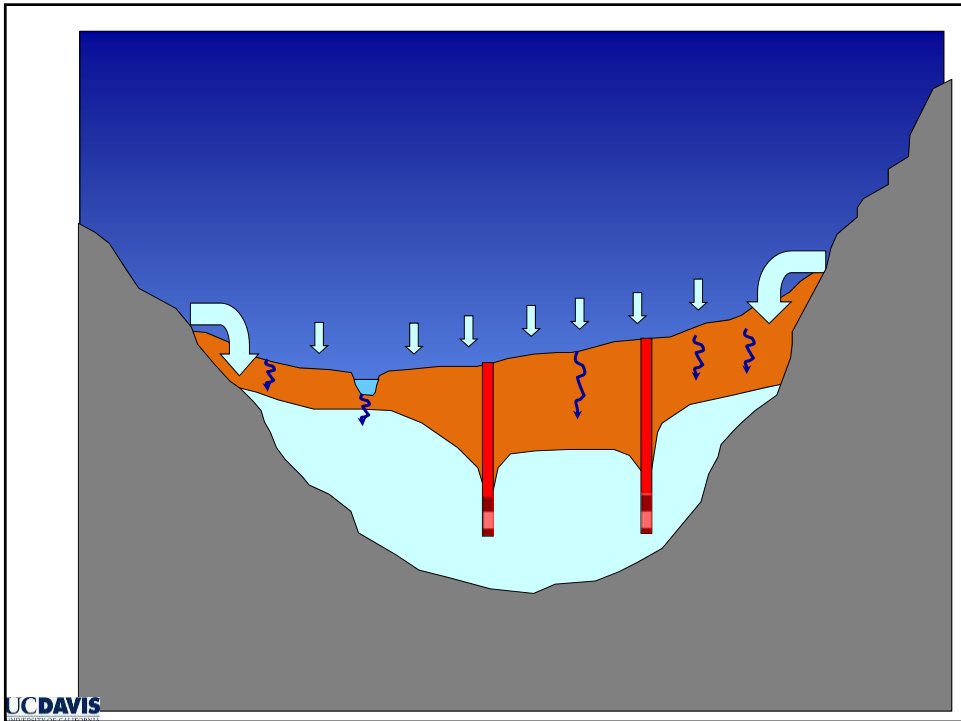
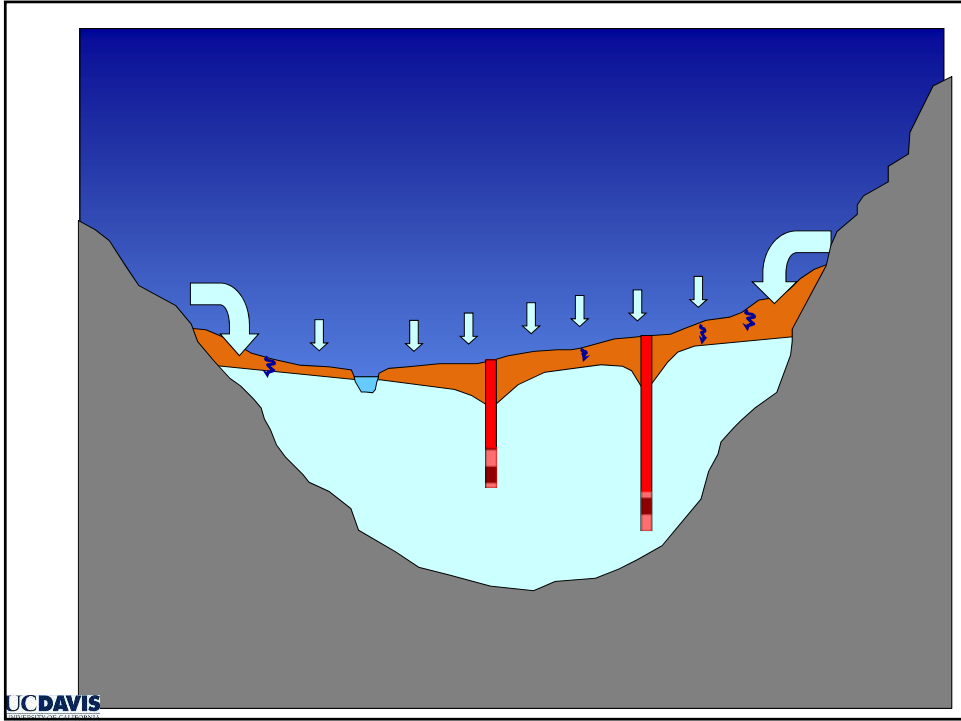


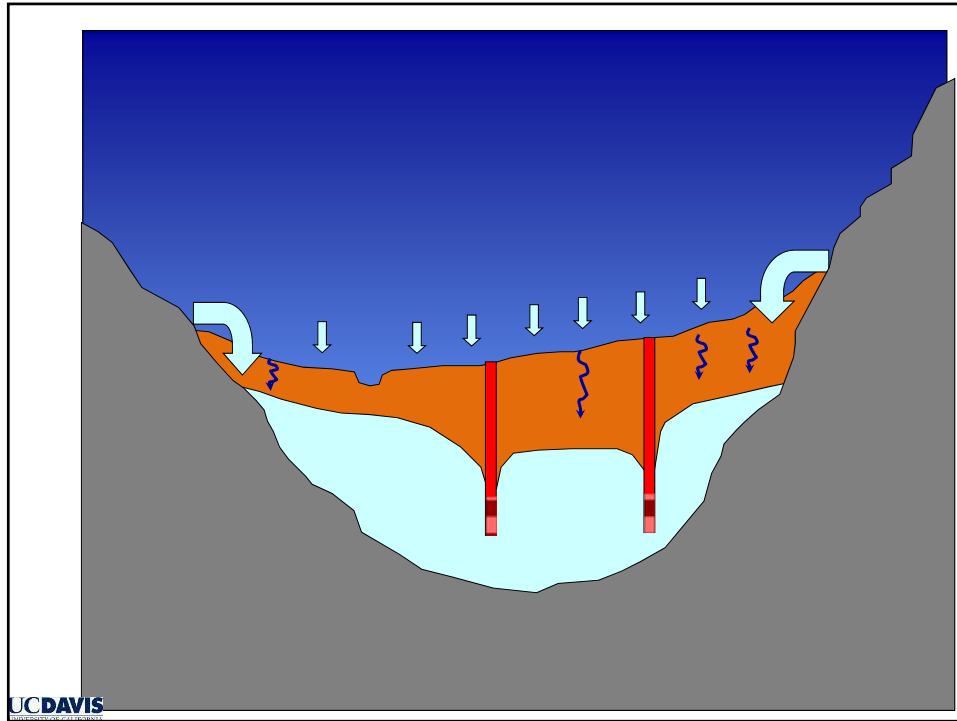






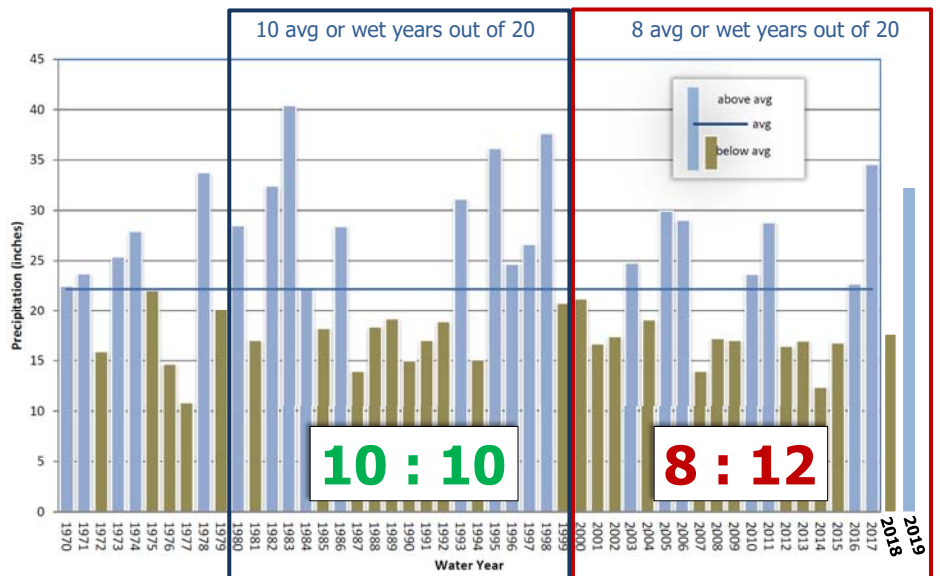






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### An inofficial “Groundwater Drought Score”



Harter and Brewster, California Water Blog, April 9, 2018; Data from DWR, 2017

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<https://californiawaterblog.com/2018/04/08/groundwater-recovery-in-california-still-behind-the-curve/>

## Sustainable Groundwater Management Act of 2014 (SGMA)



### SUSTAINABILITY


 Lowering GW Levels
  Reduction of Storage
  Seawater Intrusion
  Degraded Quality
  Land Subsidence
  Surface Water Depletion



Groundwater Sustainability Plans (GSPs) required for **medium** and **high** priority basins by 2020/2022

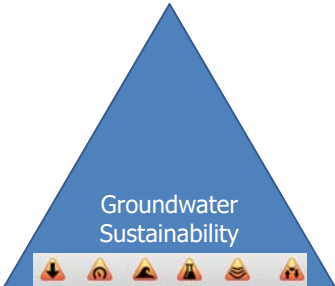
### LOCAL CONTROL







## Developing a GSP – An Optimization Problem

Healthy People

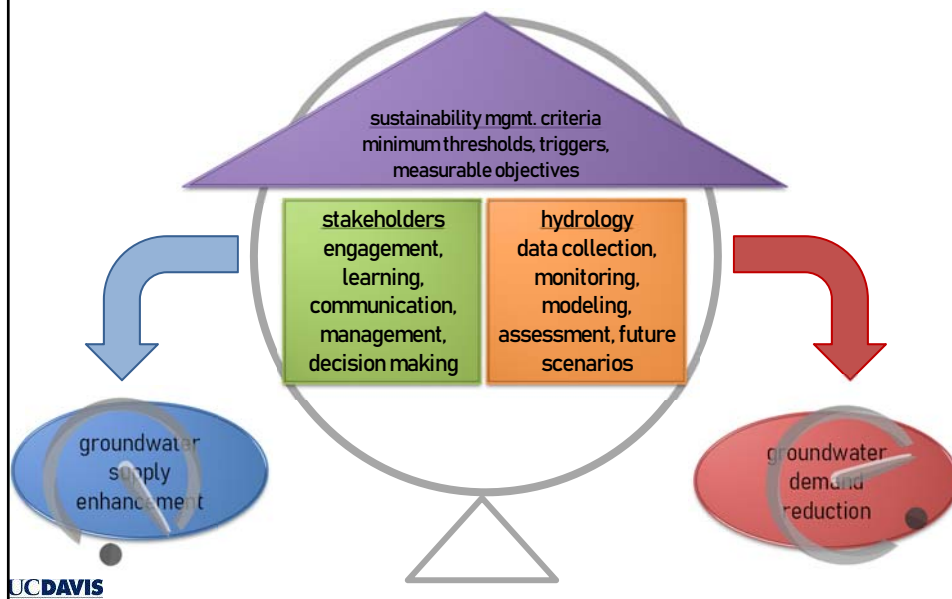


Healthy Economy      Healthy Environment

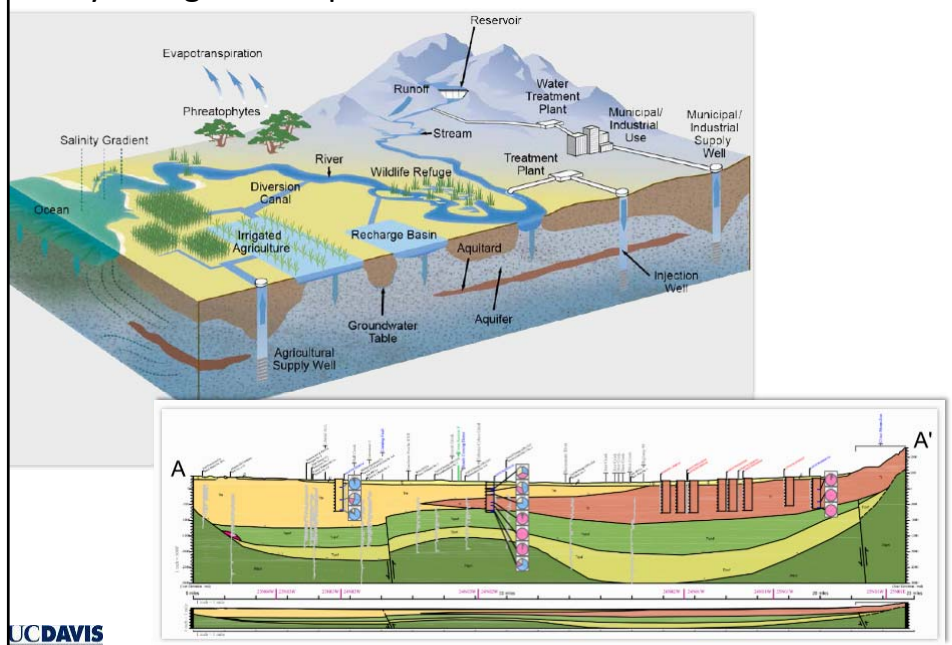


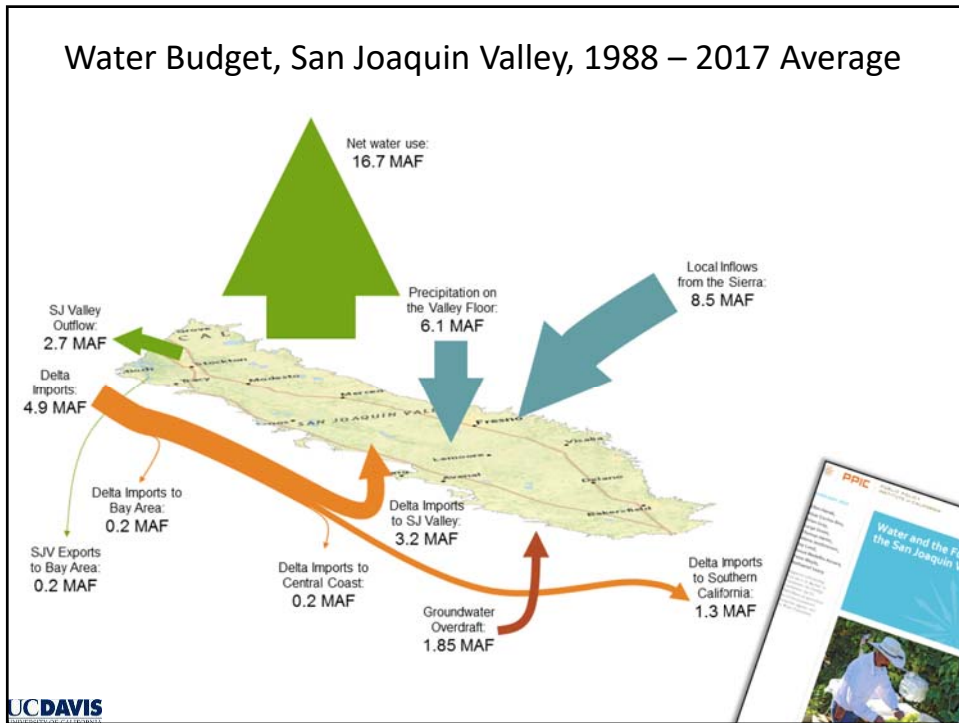
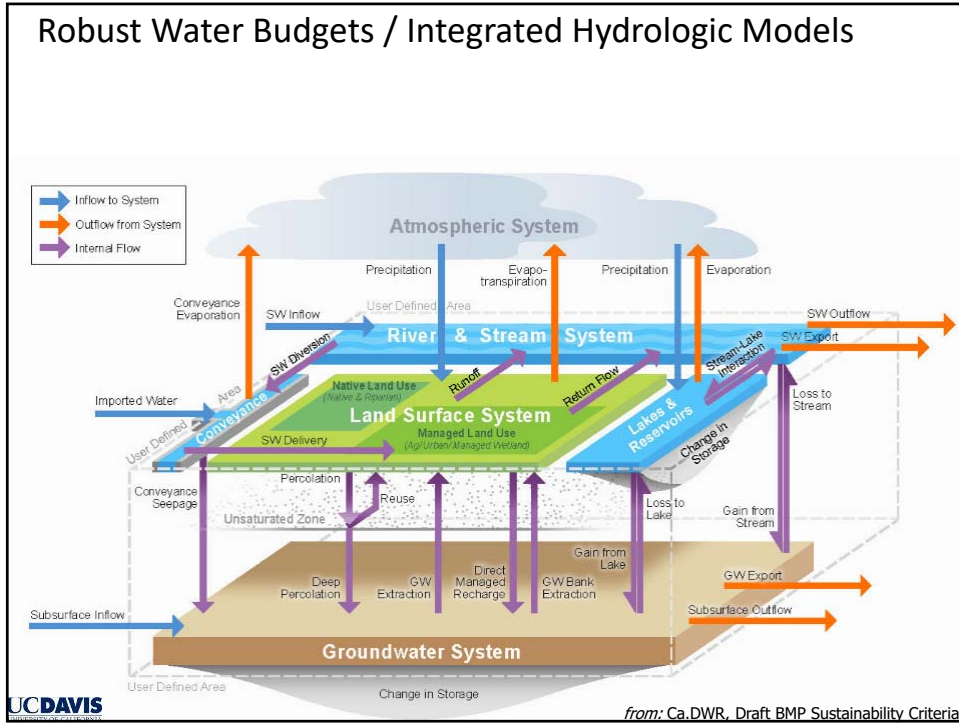
Adopted from: Marylou Shockley, CSU Monterey Bay

## The Key Elements of Groundwater Sustainability Plans

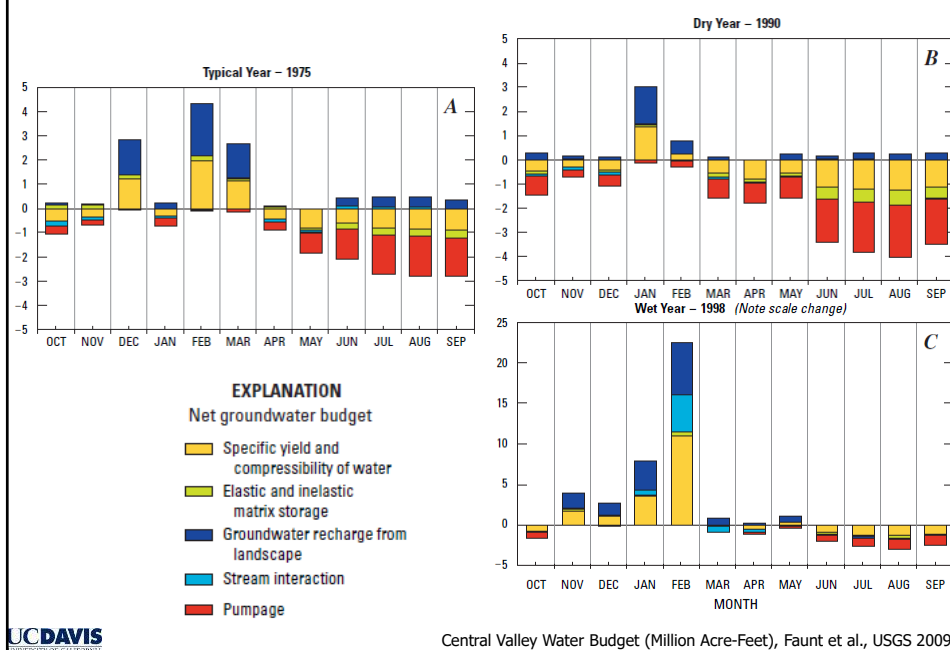


## Hydrologic Conceptual Models





## Groundwater Budgets: By Water Year Type, Seasonal Changes



## GSP: Monitoring and Managing Sustainability

Groundwater Sustainability Agencies have *discretionary* authority to:

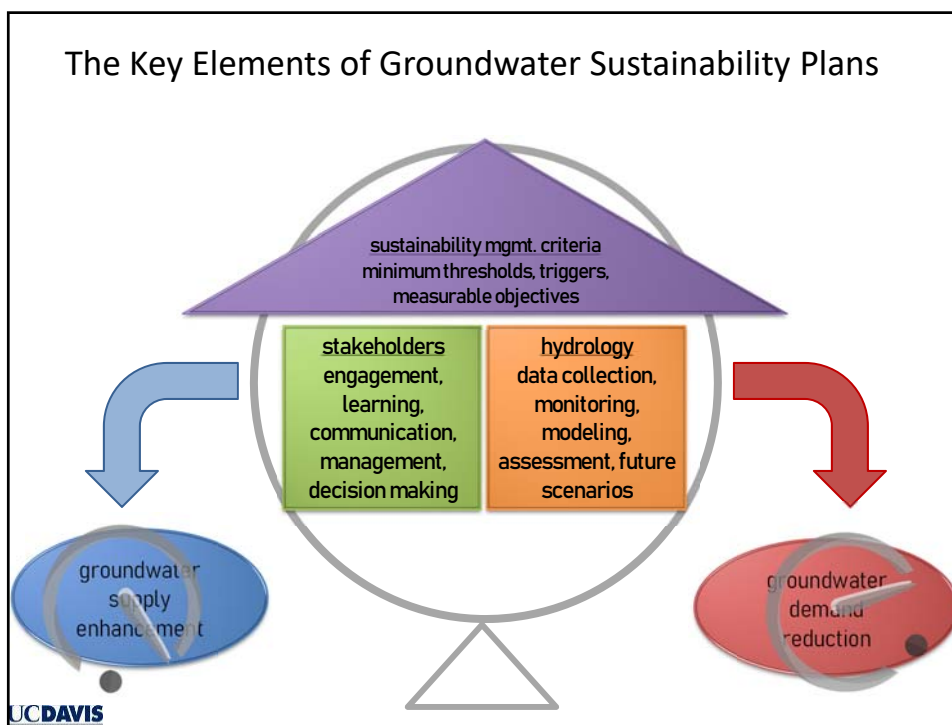
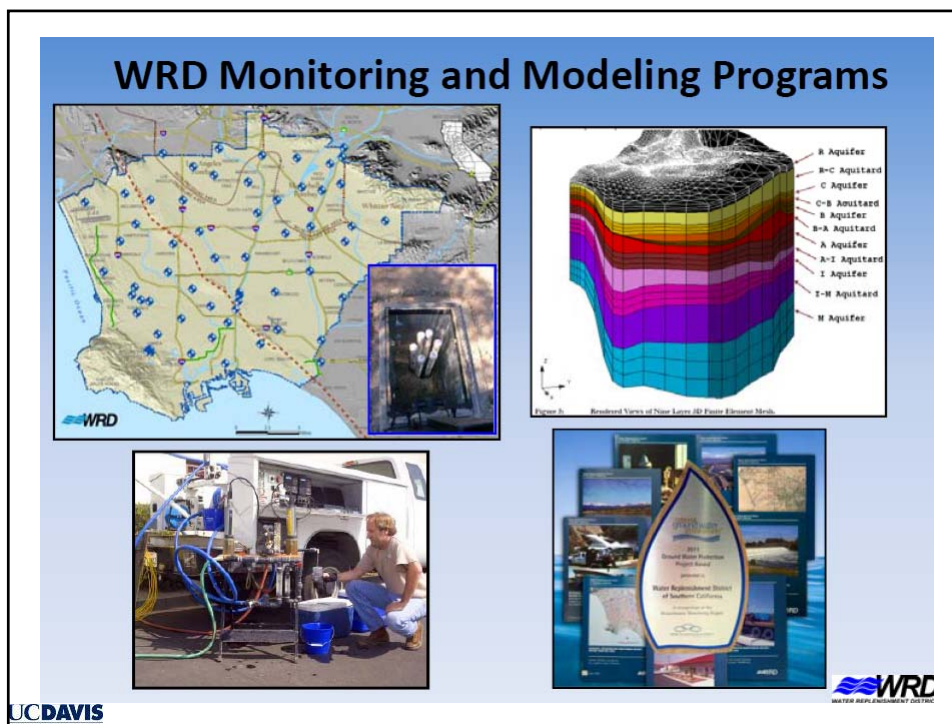
- Conduct studies
- Register & monitor wells
- Set well spacing requirements
- Require extraction reporting
- Regulate extractions
- Implement capital projects
- Assess fees to cover costs

Some exemptions for smaller private well owners



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COURTESY - Marcus Trotta, Sonoma County Water Agency, 2015

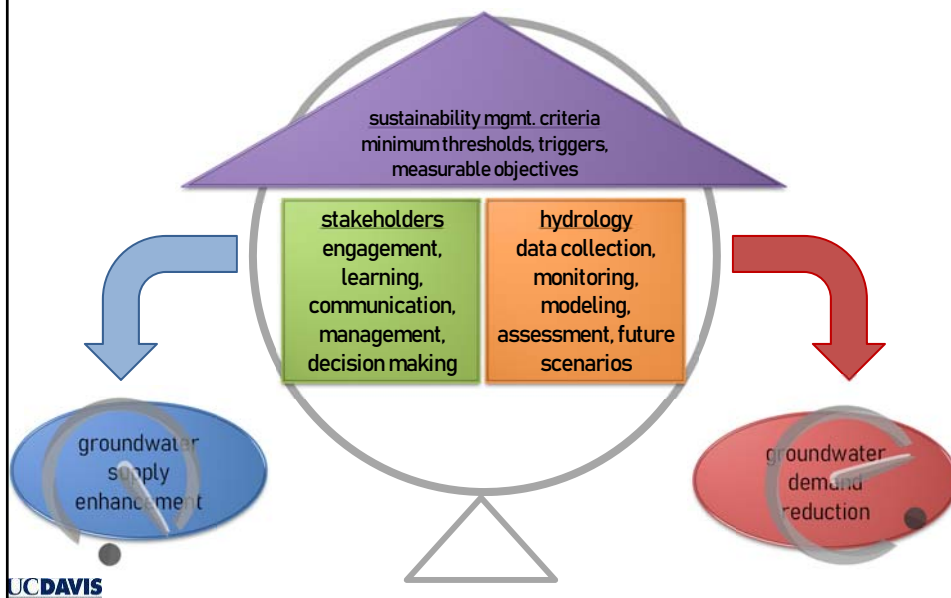


## Stakeholder Engagement

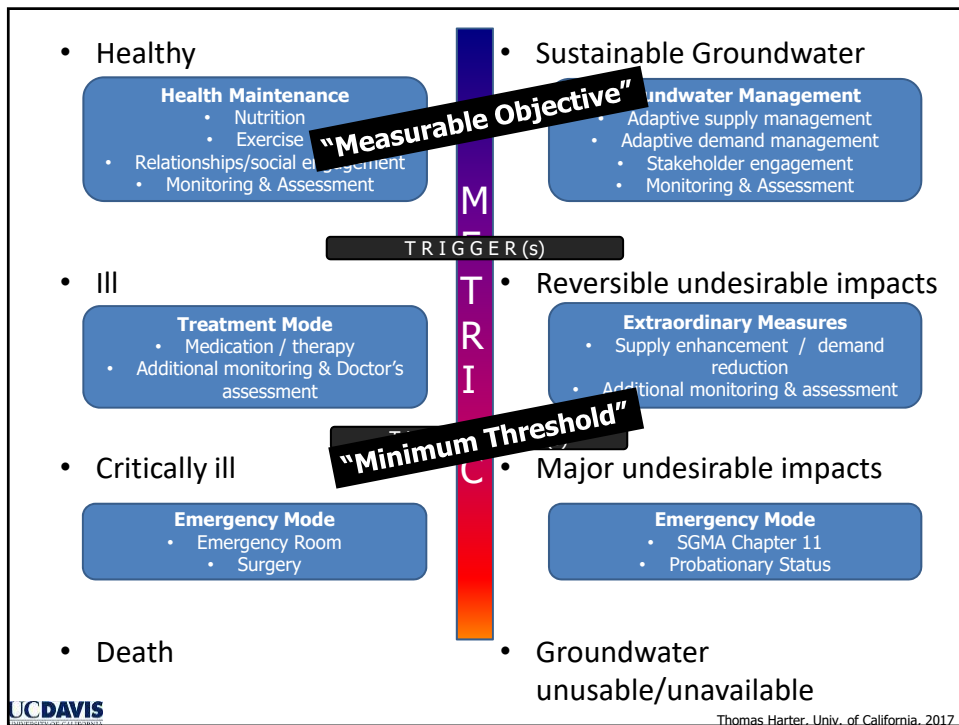
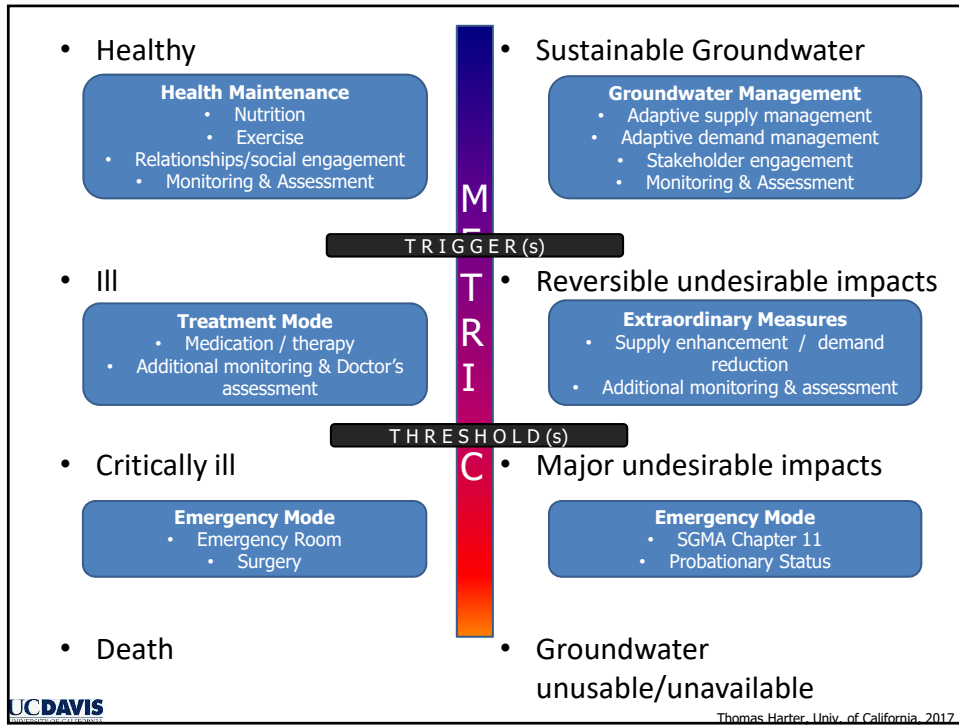


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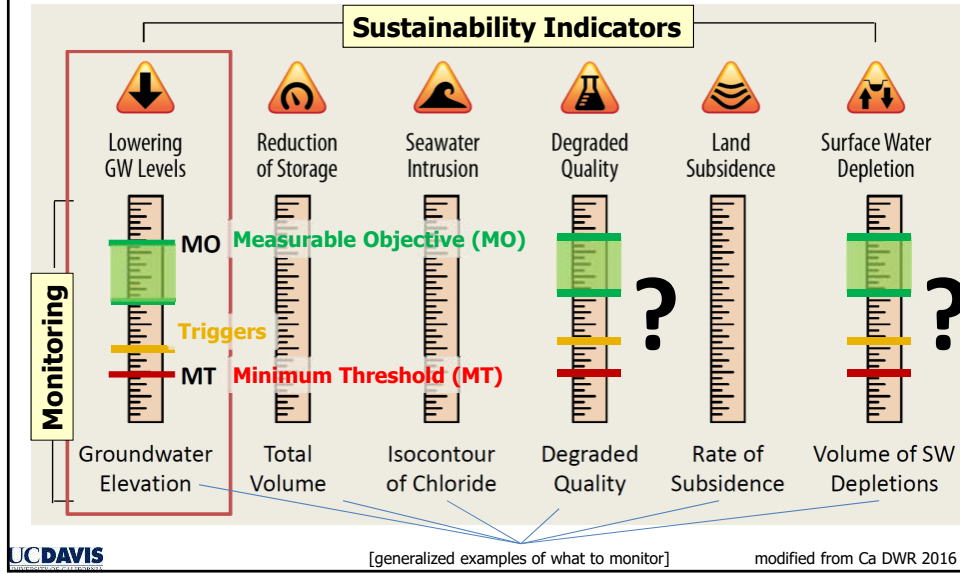
## The Key Elements of Groundwater Sustainability Plans



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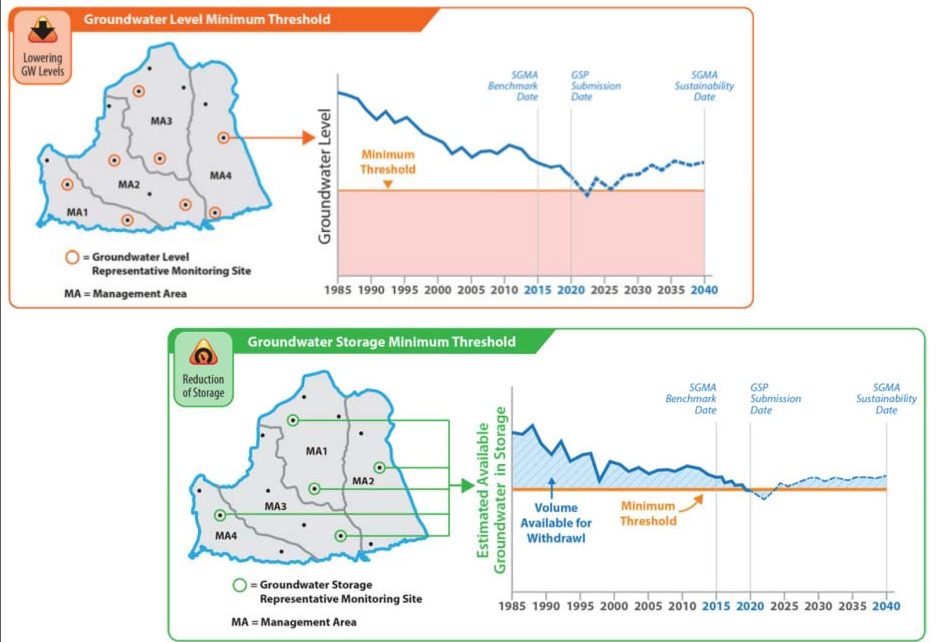
### GSP: Monitoring and Managing Sustainability



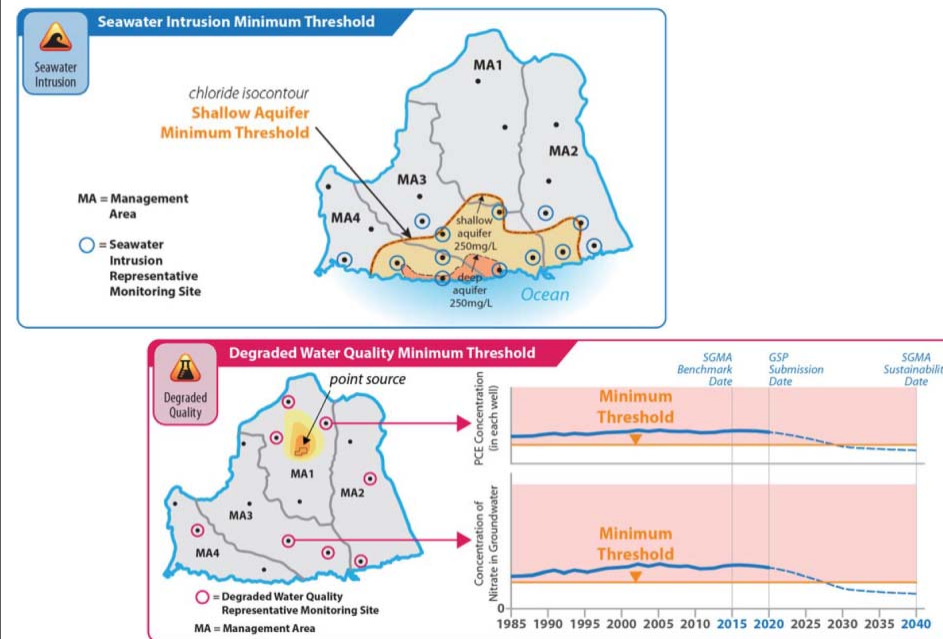
### DWR Suggested Metrics – by Minimum Thresholds

Sustainability Indicators	Lowering GW Levels	Reduction of Storage	Seawater Intrusion	Degraded Quality	Land Subsidence	Surface Water Depletion
Metric(s) Defined in GSP Regulations	<ul style="list-style-type: none"> <li>Groundwater Elevation</li> </ul>	<ul style="list-style-type: none"> <li>Total Volume</li> </ul>	<ul style="list-style-type: none"> <li>Chloride concentration isocontour</li> </ul>	<ul style="list-style-type: none"> <li>Migration of Plumes</li> <li>Number of supply wells</li> <li>Volume</li> <li>Location of isocontour</li> </ul>	<ul style="list-style-type: none"> <li>Rate and Extent of Land Subsidence</li> </ul>	<ul style="list-style-type: none"> <li>Volume or rate of surface water depletion</li> </ul>

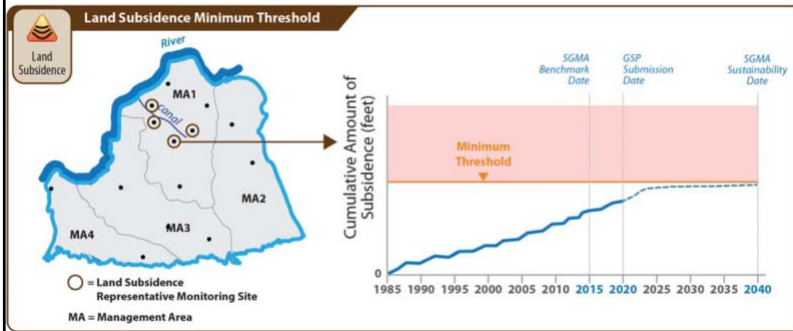
## Examples



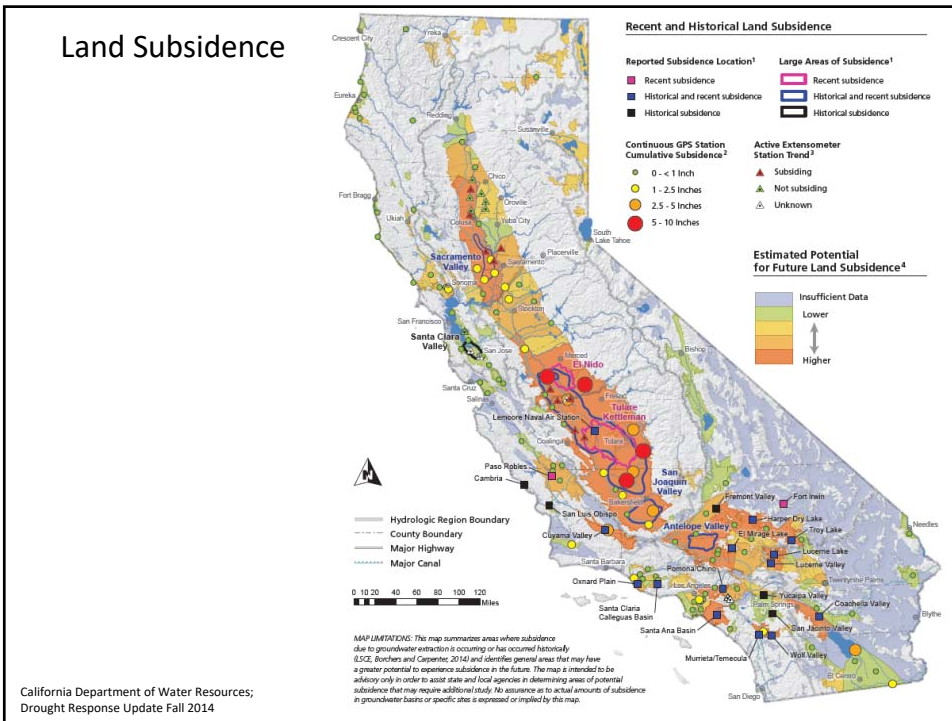
## Examples



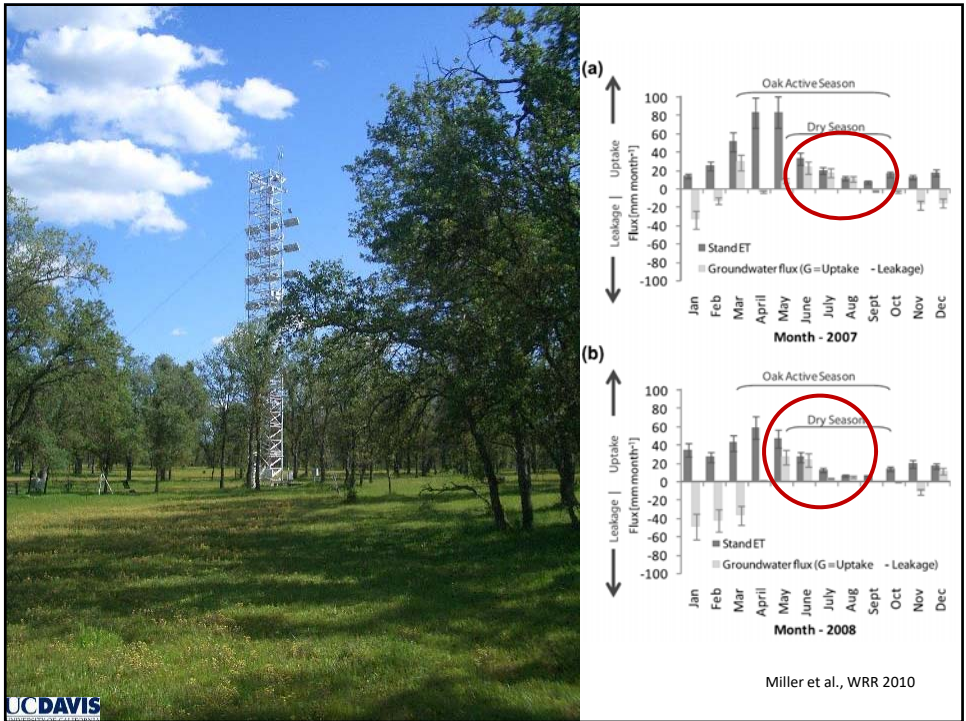
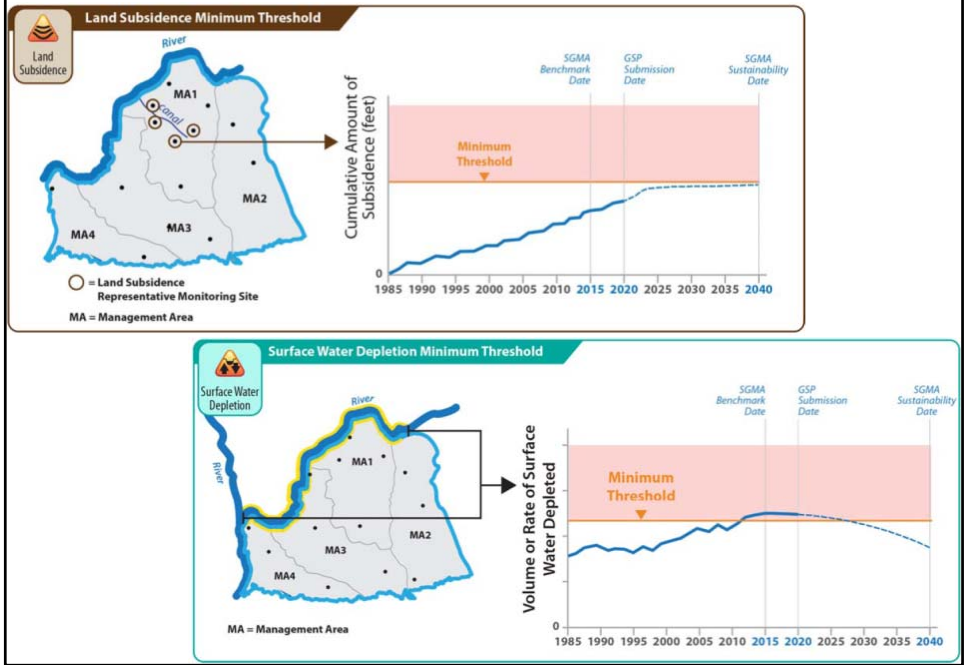
### Examples

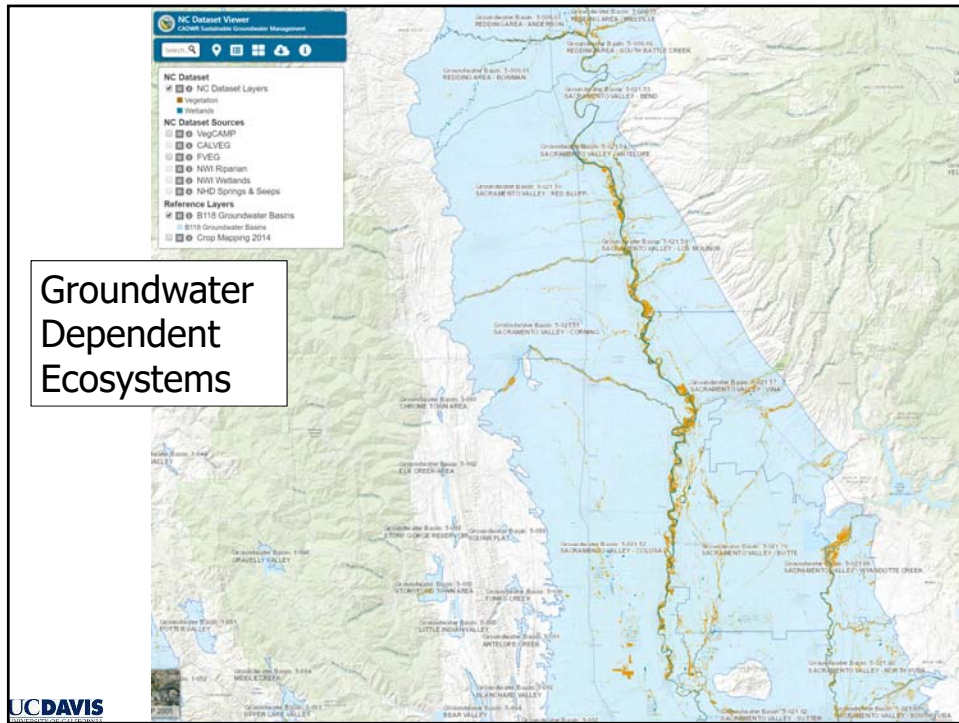


### Land Subsidence



### Examples

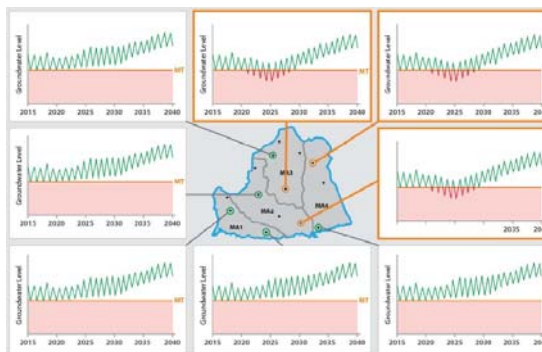




### Key Groundwater Mgmt Challenge in Central/NorCal: Surface Water and Ecosystem Impact

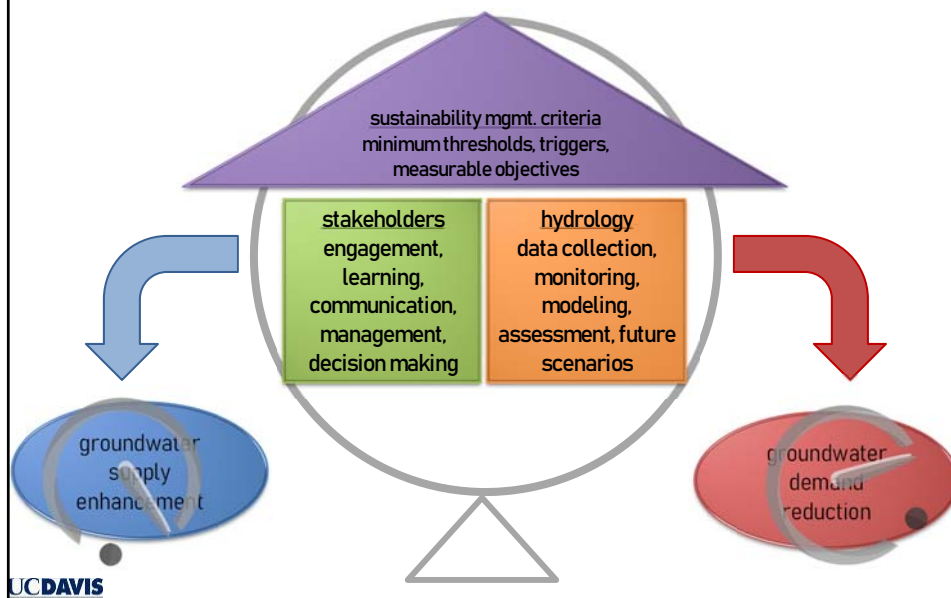
## Defining a Minimum Threshold

- Justification => in the context of the basin setting
- Relationship between thresholds
- Thresholds => no adverse affects on:
  - adjacent basins
  - on beneficial uses and users of groundwater, surface water
- Thresholds not to violate federal, state, local regulations
- How will each minimum threshold be measured?



**Undesirable results will be a function of minimum threshold exceedances.**

## The Key Elements of Groundwater Sustainability Plans

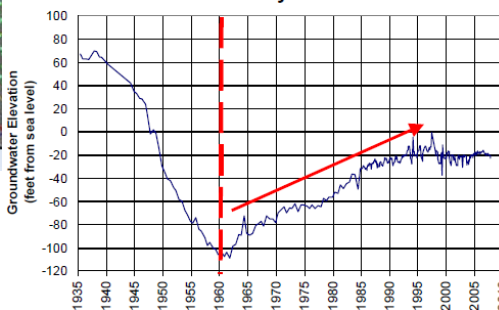


### Storage for Local Use: Water Replenishment District of So. Cal. (founded in 1959)

Over 400 Wells Pumping 240,000 acre feet per year  
(78 billion gallons/year) by Cities and Private Co.



Central Basin Key Well 2S/13W-10A01



=> also to prevent seawater intrusion!



WRD and Maven's Notebook, 2013

### Recycled Water Reuse - Pajaro Valley -

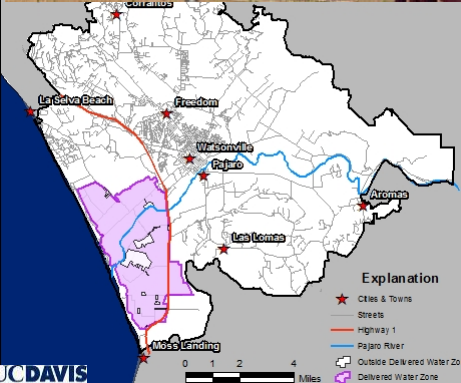


Photo: Californian Salinas



Photo: J.D. Hillard



## Expand Water Storage: Groundwater Banking

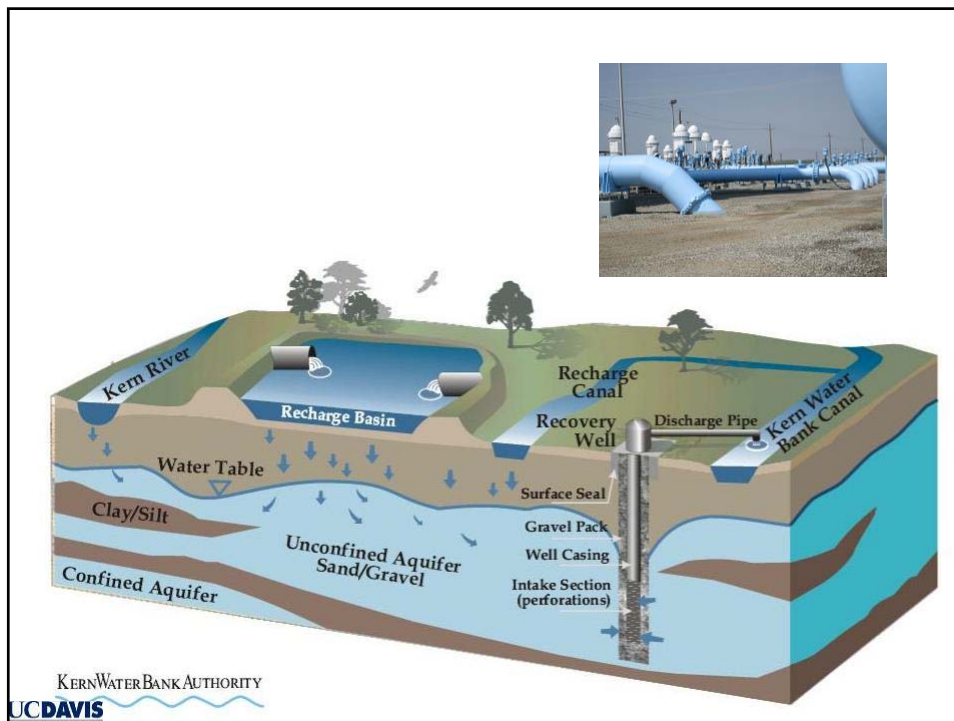


Delta River infrastructure, such as the water discharge pipe, allows water districts and agencies to manage surface water and groundwater within the same hydrologic area as a single resource. Using one source to balance the other when surface water or groundwater levels are low. This can reduce water treatment and groundwater pumping, enhance local supply, and increase the amount of water available for transfer.

From: Ted Johnson, WRD 2013

DWR, California Water Plan Update 2013

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### Local Recharge Basins/ Managed Aquifer Recharge

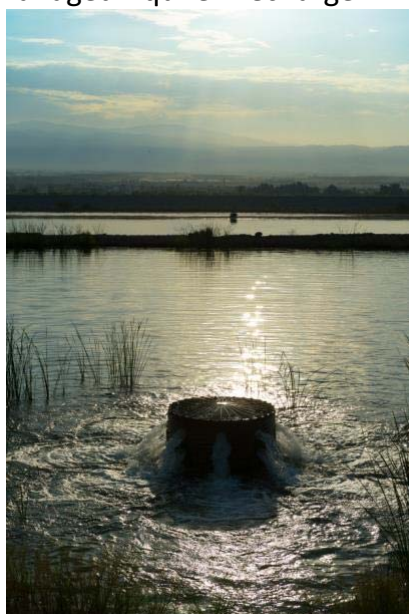


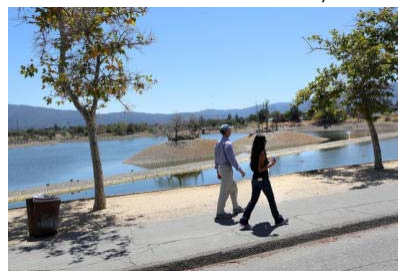
Photo: Kelly M. Grow, Dept Water Resources



Coachella Valley (Colorado River water)



Santa Clara County



Photos : George Sakkestad, Mercury News, 2015

### Intentional Winter Recharge in the Agricultural Landscape



## Managed Aquifer Recharge Near a Stream



## Managed Aquifer Recharge Near a Stream



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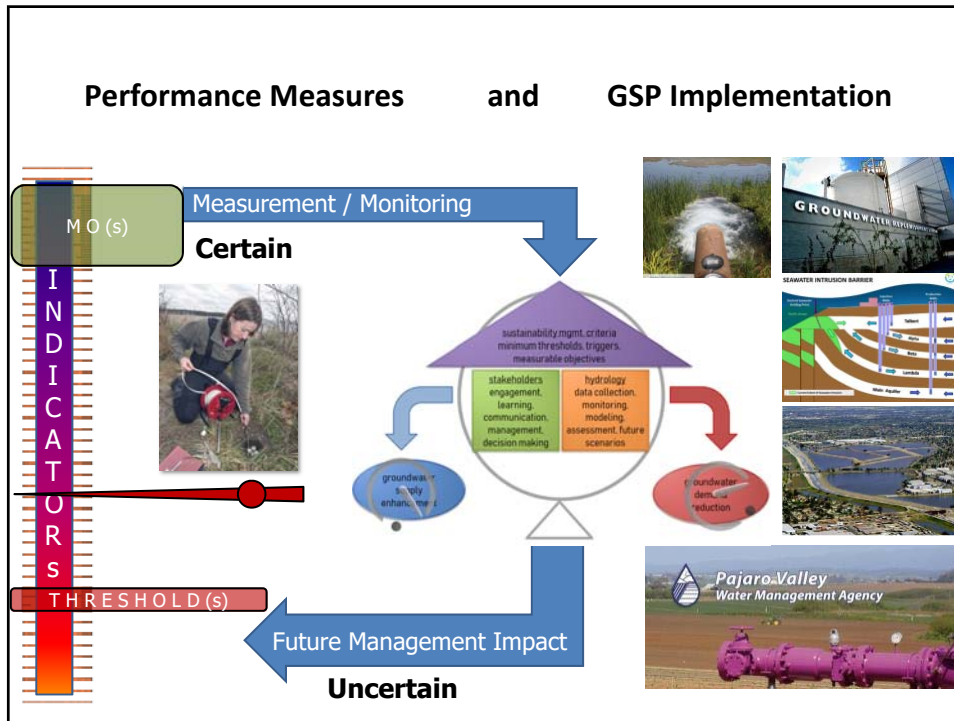
## Managed Aquifer Recharge Near a Stream

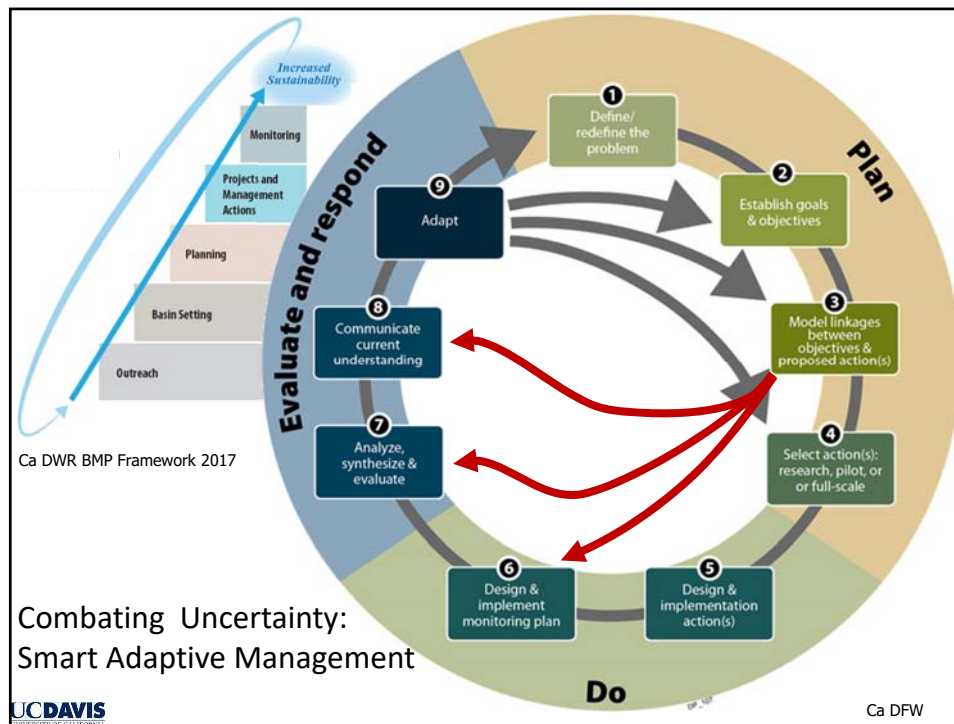


## Managed Aquifer Recharge Near a Stream



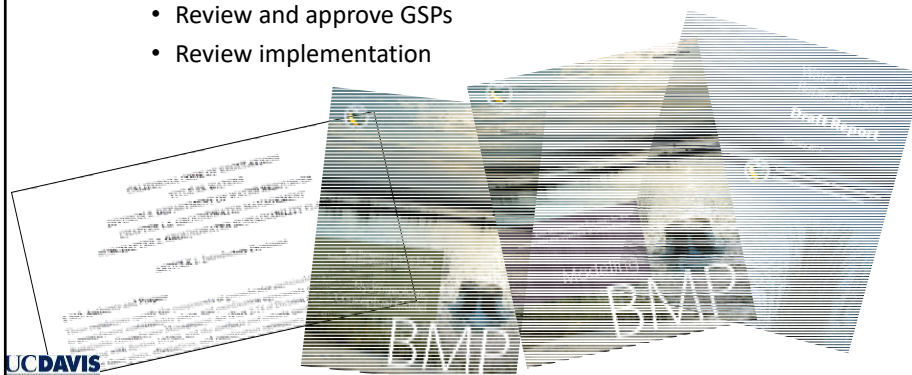
## Managed Aquifer Recharge Near a Stream





## Role of the State: Carrot

- Department of Water Resources has a key role:
  - Technical assistance and funding (Prop 1: \$100 million for SGMA) (ongoing)
  - Regulation
    - Groundwater basin boundary adjustments (2016)
    - Minimum regulations and guidelines for appropriate GSP (2016)
  - Control
    - Review and approve GSPs
    - Review implementation



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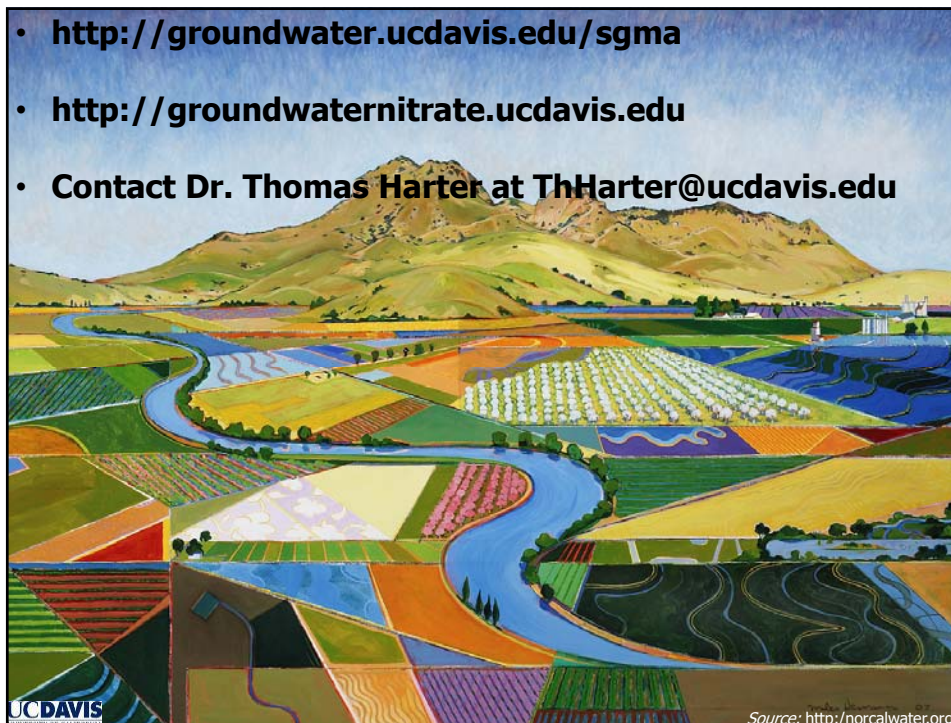


California DWR, 2016

- State Water Resources Control Board:
  - Enforcement where local control fails (after 2017)
    - “probationary status”
    - Public hearing and 180 days to fix the problem
  - After 180 days: SWRCB poses as interim GSA
    - Groundwater extraction reporting mandatory
    - Possibly temporary control of groundwater extraction
    - Development and implementation of interim GSP
  - When locals are ready: get authority back from state

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- <http://groundwater.ucdavis.edu/sgma>
- <http://groundwaternitrate.ucdavis.edu>
- **Contact Dr. Thomas Harter at [ThHarter@ucdavis.edu](mailto:ThHarter@ucdavis.edu)**



Source: <http://norcalwater.org>