

What's bubbling up in water management (in States other than Nebraska)?

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Overview

1. State of water management in California
2. Idaho surface water-groundwater conflict
3. Mississippi-Tennessee groundwater litigation
4. Monitoring and enforcement stories
5. High Plains Aquifer tax credit

The global context for irrigation

Irrigated acres (millions)

World	684
India	141
China	133
USA	54
Pakistan	47
Nebraska	8.5
Egypt	8.4
California	8.0
Australia	6.4
Texas	4.5

California overview



- Mismatch between water supply and demand
- Federal, state, local, and private infrastructure
- 8 million acres in agriculture, both low and high value
- Endangered species, large urban areas, complex water rights. . .

The policy problem in California

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California water rights

- In the US, States generally own water and use rights are granted to individuals for beneficial uses
- In California, surface water rights include appropriative, riparian, adjudicated, and tribal
- Groundwater rights include correlative and adjudicated
- In general, surface water rights are quantified and reported; groundwater rights are not

Context – Physical water risk

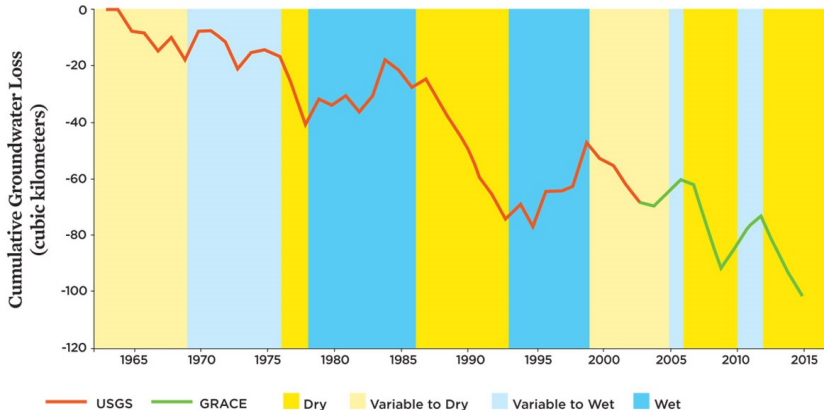
- Snowpack is a key component of surface water supply
- California's climate has multiyear dry and wet periods
- Water needs are highest when there is least water
- The impacts of recent droughts vary with seniority of water rights and physical availability of groundwater
- Much of agriculture's current resilience is attributable to (i) groundwater pumping and (ii) reallocation mechanisms

What have drought impacts been?

R. Howitt, estimates for 2015

Description	Impact	Percent
Surface water shortage	8.7 million AF	-48%
Groundwater replacement	6.0 million AF	72%
Cost of added pumping	\$590 million	75.5%
Farm seasonal jobs lost	10,100	5.1%
Crop revenue lost	\$900 million	2.6%

Groundwater and drought resilience



Context – Regulatory water risk

Issues

- In general, surface water rights are quantified and reported; groundwater rights are not
- The degree of monitoring and enforcement of rights, both in law and in implementation, is very variable

Policy

- California water bond (2014)
- Water Infrastructure Improvements for the Nation Act (2016)
- Sustainable Groundwater Management Act (2014)

Sustainable Groundwater Management Act (2014)

Overview

- A statewide mandate to move towards sustainable water management
- Targets “undesirable” impacts
 1. Lowering of groundwater levels
 2. Degraded water quality
 3. Seawater intrusion
 4. Land subsidence
 5. Reduction of groundwater storage
 6. Adverse surface water-groundwater interaction

Sustainable Groundwater Management Act (2014)

- Management process intended to bring relevant stakeholders together – agricultural, environmental, urban (including disadvantaged communities)
- Locally-driven formation of *Groundwater Sustainability Agencies* (GSAs), which do not need to follow hydrologic boundaries
- Agricultural groups are very wary of the SGMA process and its implications

Sustainable Groundwater Management Act (2014)

Regulatory risks

- SGMA is *not* intended to provide immediate mitigation of current impacts
- It's not clear how SGMA will be implemented or enforced, and there will be much local variation
- Effective groundwater governance is very hard, and California is starting from a low level with high stakes

Context – Reputational water risk

- Agriculture is the largest consumptive user of water
- Agricultural water values are the highest in the world, and can exceed urban values on the margin
- Locally, groundwater pumping has the potential to create reputational risk for agriculture
- Though overall land area in agriculture *decreased* during the drought, high value crop acreage is *increasing*

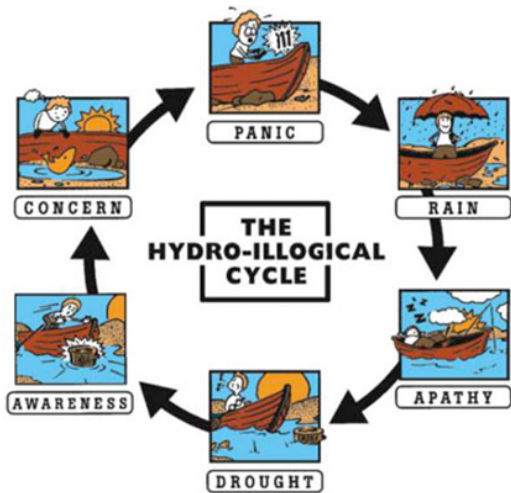
Current and potential responses to water risk

- Can increase available **supply**
 - Infrastructure construction, well deepening, managed aquifer recharge, wastewater reuse
- . . . or decrease or reallocate **demand**
 - Incentive-based, regulatory, and voluntary approaches
 - Relocation is also a response
- Significant amounts of money are being allocated for both supply side and demand side projects
- Involved stakeholders include public-private partnerships, nonprofits, and for profits

Case Study: Managed Aquifer Recharge

- Several California groups are testing aquifer recharge programs on agricultural land
- The basic idea is to spread floodwater on agricultural land for recharge, allowing continued pumping at current levels
- By design, producers will be paid for recharging aquifers
- Pilot payments are in the range \$95-\$118/acre-foot

Challenges to groundwater management



California Summary

Physical risk

- Groundwater provides enormous buffer value but drawdown creates long-term sustainability issue
- Cropping changes are currently reducing system resilience

Regulatory risk

- Regulatory uncertainty, particularly with groundwater
- Unresolved monitoring and enforcement issues

Reputational risk

- Multiple dimensions; water cycle is poorly understood
- Recent flooding makes groundwater management harder
- Public and private sector innovation opportunities exist

Groundwater Management in other states – Idaho

- Eastern Snake Plain Aquifer is connected to Snake River
- Tributary springs supply surface water for uses including 1 million acres of irrigation
- Conflict between surface water and groundwater users as aquifer depleted and irrigation becomes more efficient

Current situation

- Reduction in groundwater pumping with metering
- Conversion of groundwater-irrigated acres to surface water
- State-funded aquifer recharge program (\$5 million/year)

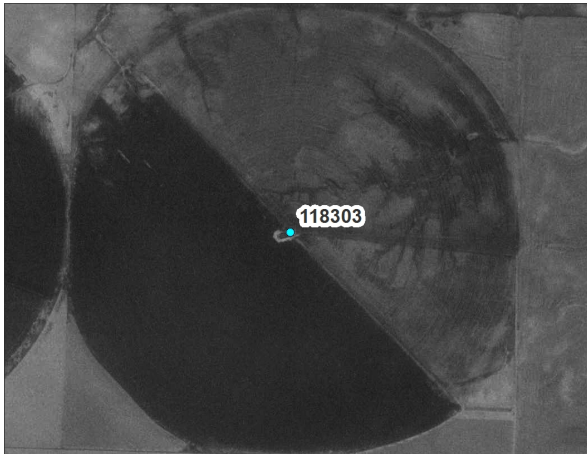
Groundwater Management in other states – MS/TN

- The deep Memphis Sand Aquifer is shared between Mississippi and Tennessee
- The city of Memphis pumps from the aquifer, MS irrigators from shallower aquifers
- Mississippi has sued multiple times (asking up to \$615 million in compensation) and lost repeatedly in court

Current situation

- MS has added the state of Tennessee to its litigation
- The Supreme Court has agreed to take the case
- Memphis municipal use is around 200,000 AF/year
- Mississippi irrigator use is around 1.5 million AF/year

Monitoring and Enforcement



Case Study: Well drilling moratoria

- Enforcing moratoria is hard!

Cases

- The Colorado County Groundwater Conservation District (TX) does not allow new wells to be drilled (from the CO County Citizen):

CCGCD holds monthly meetings. At the March 2016 meeting, CCGCD discussed people who were in violation of the permits. No action was taken on this discussion.

During the April 27 meeting, Manager Jim Brasher said, “When we had the drought in 2014 farmers were drilling wells that weren’t permitted. We could have fined them.”

Current status of well metering

Area	Proportion of metered wells
United States	0.28
California	0.26
Kansas	0.89
Nebraska	0.39
Texas	0.24

Source: USDA FRIS, 2013

Monitoring and Enforcement – Kansas

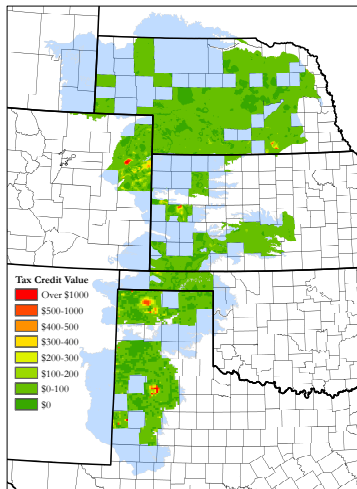
Violation	Quantity over/AF	Penalty assessed	Penalty Paid	Remarks
Meter tampering/violation of permit conditions		\$500	\$100	Suspension reduced to \$100/ NO REDUCTION
Overpumping 2014	21.214	\$5,000	\$5,000	CAFO 6/16/15 - suspension change back to base acres in 2016/ \$5,000 penalty / reduction to 437.572 AF FOR 2015
False 2005 through 2013 WUR/ meter tampering		\$10,000	\$10,000	Hearing 5/19/2015; no change to order; order final 9/22/2015; Water right not perfected and water right dismissed
Overpumping 2013	11.456	\$1,000	\$800	CAFO changed to \$800 penalty; apply for term;
Falsification of the 2008, 2009, 2012 and 2013 WUR		\$4,000	\$3,600	Suspension changed to \$3,600 penalty, \$400 for MF term ap; reduced 120 AF on 5 year QTY
Overpumping reduced QTY 2014	1.307	\$1,000	\$1,000	2015 QTY reduced to 37,386 AF
Overpumping 2014	36.7			2015 QTY reduced to 201,248 AF
Overpumping 2014; failure to maintain meter	32	\$1,100	\$1,100	2015 QTY reduced to 282,000 AF
Overpumping 2014	158,961	\$1,000	\$1,000	2015 QTY reduced to 901,039 AF - CAFO NO CHANGE FROM ORDER
Overpumping the reduced QTY 2014	11.854	\$6,000	5,600	CAFO 10/5/2015; Reduced penalty to \$5,600; \$400 MYFA reduced by 545 AF from 2015-19
Overpumping 2013	4.845	\$500	\$500	
Overpumping 2014	17.004	\$1,000	\$1,000	2015 QTY reduced by 34,008 AF to 229,992 AF
Overpumping 2014	9	\$1,000		- 2016 QTY Reduced to 5,000 AF - CAFO No Civil Penalty, no reduction
Overpumping 2014; false 2014 Water Use Report	5.62	\$2,000	\$2,000	2016 Suspension
Operating a meter out of compliance		\$500	\$100	CAFO 9/1/2015 Changed penalty to \$100; required meter seal and anti rev
False 2014 water use; meter tampering		\$2,000	\$2,000	2016 SUSPENSION - CAFO WAIVED overpump NONC NO OTHER CHANGES
overpumping 2014, false 2014 water use report		\$4,000	\$4,000	Changed to NO SUSPENSION W/ a 10 AF reduction in 2015 – 2015 reduced to 231.00 AF
Overpumping 2013	19.97			2015 QTY reduced to 126.06 AF
Overpumping 2014	6.00	\$2,000	\$2,000	2016 QTY reduced to 105,111 AF due to previous penalty
Overpumping 2014	94,947	\$10,000	\$9,600	2016 suspension - 9/24/2015 reduced civil penalty to \$9,600; MYFA app \$400; 260 AF reduction in MYFA
Overpumping 2014	17,688			2015 QTY Reduced to 277,582 AF - 9/24 - no change to order
Overpumping 2014	151	\$1,000	\$1,000	2015 QTY Reduced to 217.02 AF CAFO 9/10/2015 CHANGED REDUCTION TO AUTH 368.5 AF for 2015
False 2014 water use/Noncomp. For 2014 overpump		\$1,000	\$1,000	2016 SUSPENSION NONC for OP - SC on 8/18/2015 no change to order
Overpumping the reduced QTY 2014	56.235	\$10,000	\$2,000	2016 SUSPENSION REDUCED to CIVIL PENALTY TO \$2,000 and a reduction of 138,000 acre-feet to 2015-2019 MYFA
Violation of a cease and desist order		\$2,000	\$2,000	
Overpumping 2014	50.36	\$1,000	\$1,000	Waived anti-ervse meter

Case Study: Fox Canyon GMA, California

Overview

- Very high value agriculture (vegetables, citrus) and cities
- Seawater intrusion is a concern
- Metering with self-reporting is required
- There are pumping charges that are tiered:
 - Up to your allowance: \$6/acre-foot
 - 1-25AF over allowance: \$1,315/acre-foot
 - 25-100AF over allowance: \$1,565/acre-foot
 - >100AF over allowance: \$1,815/acre-foot
- Under the 2014 Sustainable Groundwater Management Act, it will be necessary to reduce everyone's pumping
- Historically reported amounts are the baseline

High Plains Aquifer depletion credit



- Following lawsuits in TX and KS, the IRS allows a tax credit for aquifer depletion
 - The value of the credit is based on purchase price, saturated thickness, and depletion
 - Represents a disincentive to conserve water
- ← Estimated values for 2009 land purchase in 2013 (Gibson, 2017)

Summary

- This is a period of major legal challenges and regulatory and technical change in groundwater management
- Major activity in the western and southern US
- Many local and state agencies are finding out – or are about to find out – how hard it is to build trust for groundwater management



Thank you!

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