The Ogallala Water Coordinated Agricultural Project

Lessons Learned Across State Lines

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Oklahoma Governor’s Water Conference
Roadmap

- The Ogallala Water Coordinated Agricultural Project
- What have we learned?
  - Part 1. Social values of water: Why conserve it?
  - Part 2. Practices and policies with potential improve conservation and profitability
  - Part 3. Sharing successful strategies across state lines
USDA-NIFA funded "Coordinated Agriculture Project" (2016-2020)
~70 people: faculty, post-docs, grad students, techs, staff
10 institutions - work is based in 6 of 8 Ogallala region states
Stakeholder Advisory Board grounds our science
Our approach

- Recognize that each state is different yet most are grappling with similar issues

Haacker et al. 2015
Our approach

- Recognize that each state is different yet most are grappling with similar issues
- Management is local: Work from the ground up with producers and groundwater management groups
- Foster partnerships for innovation around water tech for conservation
- Ask the difficult questions

L. Moore

OgallalaWater.org
OPTIMIZING WATER USE TO SUSTAIN FOOD SYSTEMS
Part 1. Why conserve groundwater? What is the value of the groundwater today and tomorrow? What are we conserving?

Matthew R. Sanderson
Randall C. Hill Distinguished Professor of Sociology
Kansas State University

Stephen Lauer
Doctoral student, Sociology
Kansas State University
Data and Methods

- Survey goal: representative sample of producers
- 227 counties in 6 states
- January – July, 2018
- 7,712 eligible
- 1,226 responses = 15.9% response rate

Qi, 2010
“How serious of a problem is groundwater decline?”

Generally not serious
Generally serious

Haacker et al. 2015
"How certain are you that you could reduce groundwater use beyond what you are using now?"

Probably cannot do

CO 72.8% / 14.6%

Probably can do

NE 65.5% / 15.5%

KS 70.0% / 18.4%

NM 79.3 / 6.9%

TX 78.1% 8.8%

OK 73.2%

1935
<table>
<thead>
<tr>
<th>Reason</th>
<th>Generally disagree</th>
<th>Generally agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>...it would decrease their production.</td>
<td>2.7%</td>
<td>85.6%</td>
</tr>
<tr>
<td>...they do not want to change their irrigation practices</td>
<td>12.9%</td>
<td>64.7%</td>
</tr>
<tr>
<td>...it takes too much effort to conserve groundwater.</td>
<td>48.7%</td>
<td>21.1%</td>
</tr>
<tr>
<td>...if they do not pump the water, someone else will.</td>
<td>21.9%</td>
<td>48.6%</td>
</tr>
</tbody>
</table>

Data: M. Sanderson (KSU)
“Most people do not save more groundwater because water use regulations are not strict enough.”

Generally disagree
Generally agree

CO 29.0% / 38.3%
KS 18.5% / 42.0%
NM 26.7% / 36.7%
TX 16.0%
OK 10.9% 41.3%

1935
<table>
<thead>
<tr>
<th>Groundwater should be conserved today so that...</th>
<th>Generally agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>...it is available to producers if <strong>drought</strong> becomes more frequent in the future.</td>
<td>73%</td>
</tr>
<tr>
<td>...<strong>jobs and business</strong> opportunities continue to be available in my <strong>community</strong> in the future.</td>
<td>66%</td>
</tr>
<tr>
<td>...<strong>my children and grandchildren</strong> can enjoy the benefits I have experienced.</td>
<td>86%</td>
</tr>
<tr>
<td>....<strong>future generations in my area</strong> can enjoy the benefits I have experienced.</td>
<td>85%</td>
</tr>
</tbody>
</table>

Data: M. Sanderson (KSU)
So, if there is a desire to extend the life of the aquifer, what can be done from a management perspective and a policy perspective?

Part 2. Evaluating policies and practice options
Innovations in irrigation, crop and soil management
Evaluating the relative impact of management and policy

- Climate (Historical & Future)
  - Surface water model (SWAT)
  - Groundwater model (MODFLOW)
  - Crop growth model (DSSAT)

- Economic models

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Optimizing Water Use to Sustain Food Systems
CO Republican River Study Area

Active irrigation wells (3808 Wells)

Aquifer Bedrock Depth

Water level changes from 1960s to 2018

- Declines: 20 - 32 meters
- Rises: 0 - 5 meters
- County Boundary
- State Boundary

Kilometers
0 5 10 20 30
Status quo, Finney County, KS

Rouhi Rad et al.
Evaluating the relative impact of management and policy

Climate
- Historical & Future

Surface water model (SWAT)

Crop growth model (DSSAT)

Groundwater model (MODFLOW)

Economic models

'What if' scenarios:
- Crop choice
- Improved crop genetics
- Irrigation management
- Water restrictions
- Incentives

OgallalaWater.org
Optimizing water use to sustain food systems
How do we get there faster?

Part 3. Sharing successful practices and policy strategies across state lines
Lessons learned from voluntary efforts

**Sheridan 6-Local Enhanced Management Area (LEMA) study**

- 23% decrease in total groundwater use
- 11% reduction in irrigated acres
- How? Irrigated acreage shifts: ↓ corn, ↑ grain sorghum, ↑ irrigated wheat
- Having a local feedlot = important buffer
- Minimal negative impact on cash flow

*Liebsch & Golden, 2018*
210 participants from all 8 Ogallala states
2018 Ogallala Summit key take home:

- Having data on water use and water levels is essential.
- Prioritize maximizing return on investment over maximizing yields.
- Peer-to-peer exchange among producers + industry engagement.
- Dynamic scheduling of irrigation can save time, water, money.
- Tech alone “will not save us”: improved ag water mgmt requires practice + policy.

2020 Ogallala Summit March 31-April 1, Amarillo, TX

“Science in Action”

“This idea that ‘conservation costs’ will never sell or lead to widespread adoption if it doesn’t help producers with their farming and the bottom line.”

Steve Walthour
Managing water requires bringing everyone to the table.

Management Practices:
- Dryland and Range
- Limited Irrigation
- Full Irrigation
- Irrigation Technologies
- Cropping Choices and Rotations
- Livestock Variety and Density
- Monitoring Data
- Cover Cropping
- Feed Production
- Enhanced Plant Genetics
- Irrigation Scheduling
- Tillage
- Rainfed
- LEPA
- LESA
- VRI
- SDI
- Weather
- Soil
- Moisture
- Aerial Imagery

Stakeholders:
- Agribusiness
- Agricultural Lenders
- Agricultural Technology Companies
- Consumers
- Crop Insurance Providers
- Distributors
- Futures Markets
- Energy Industry
- Groundwater Management Districts
- Importers and Exporters
- Landowners
- Local, State and Federal Elected Representatives
- Manufacturing Industries
- Municipalities
- Producers
- Public Land and Surface Water Managers
- Ranchers
- Recreational Users
- Universities
- Water Rights Holders
- Well Drillers
- Wildlife
- Seed
- Irrigation
- Fertilizer Companies
- Truckers
- Railways
- Oil
- Gas
Thank you!

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Quarterly newsletter sign-up:
OgallalaWater.org

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