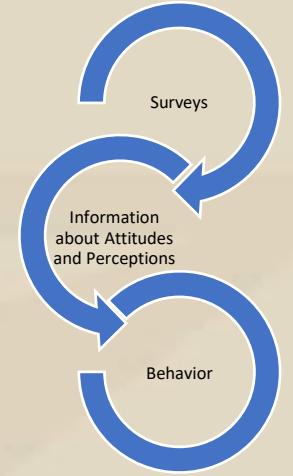


Perceptions of Groundwater and Attitudes Toward its Management

Closing the Communications Gap

Motivation and Problem

- Survey done in partnership with the Meadows Center
 - People know what groundwater is
 - People know where it comes from
- Surveys
 - Good for information
 - Descriptive form
- Can they guide the efforts of groundwater professionals and practitioners?
- What do we know about...
 - Respondents' perceptions?
 - Respondents' attitudes?
- These are important when understanding user behavior



Questions

- Are educational resources and outreach provided to groundwater users and stakeholders by groundwater professionals and educators enough to result in responsible and sustainable use of groundwater?
- Are educational resources and outreach enough to result in responsible and sustainable use of groundwater?
- What are the key variables influencing perceptions of groundwater availability and attitudes toward groundwater regulatory oversight?
- The 'communications gap' – Might there be mediating factors that affect what groundwater users and stakeholders know and how they behave?

Executive Summary

- Place, attitudes, and trust matter on groundwater issues and conflicts.
- The primary place difference occurs in the ‘versus’ divide
 - rural and urban residents, but other divisions matter, too.
- There are feeling of disempowerment when decisions are made regarding
 - growth and development,
 - lay and scientific/professional expertise,
 - being on the winner’s or loser’s side when state and local actors and interests conflict with each other.
- These underlying issues can cause or enhance conflicts based on place and space.
- Attitudes toward strengthening property rights and being in favor of regulation
 - are not necessarily antithetical to each other, although they can be distinctly different approaches to groundwater management.
 - limited regulatory oversight can help to strengthen and protect property rights
 - property rights holders can live with oversight if they see equity and independence in its governance
- Education and outreach need to be differentiated between urban and rural residents separately, and to different age groups.
- Entities created to manage, regulate, or monitor groundwater quality and quantity may need to be more visible and/or more proactive in the information and knowledge they provide to users and what they provide about groundwater uses, since
 - this influences perceptions about groundwater availability, pollutants, land uses, and attitudes toward regulation and property rights.
- These same attitudes should be considered when suggesting alternative ways to augment groundwater supplies when these supplies are threatened.
- “All politics is local”. Groundwater knowledge, issues and conflicts are also usually local, and personal.
- The local nature of groundwater use, and availability is nested in perceptions of, not just where a person lives geographically, but
 - also, how and where that person perceives their social, economic, or political place, and
 - this is projected onto their interaction with the resource itself.

Research Questions

- So, I wanted to investigate....
 - How social and demographic profiles affected
 - Perceptions of groundwater availability? (**intertemporally** and quality)
 - Attitudes toward groundwater management? (**property rights, regulatory oversight**)
 - The mediating variables that became evident from open-ended comments
 - The personal values held by a citizen.
 - Social support for the behavior.
 - A user's identity with the place
 - Personal obligation and freedom to act on information received.

The Surveys

- Online participants recruited using email contact lists
- Mail participants
 - A random sample of Texans were recruited by mail.
- Feedback on question order, validity and composition
- Open-ended and closed-ended questions comprised the total of 26 questions.
- There were 341 who started the Internet survey. 265 respondents completed the survey resulting in a 78% completion rate.
- 47 out of 500 surveys mailed were completed resulting in a response rate of 9.4%. Eight surveys were returned unopened.

Category	Online Survey (%)	Mail Survey (%)
Household Income	(n = 314)	(n = 39)
<\$10,000	1.3	2.6
\$10,000 - \$39,999	6.7	2.6
\$40,000 - \$69,999	15.6	12.8
\$70,000 - \$99,999	19.8	15.4
\$100,000 - \$149,999	21	23
\$150,000 and over	16.2	17.9
Prefer not to answer	19.4	25.6
Race/Ethnic Origin	(n = 315)	(n = 40)
White/Anglo	85.7	80
Hispanic	5.4	2.5
Prefer not to answer	6.7	15
Age	(n = 315)	(n = 41)
<25 years of age	4.4	0
25-44 years of age	23.8	10
45-64 years of age	41	32
65 years and older	30.8	54
Home Type	(n = 320)	(n = 41)
Single-family home	90	94.9
Condo or Townhome	2.8	0
Second home	0.3	0
Apartment	5.3	0
Multiple-family home	1.6	5.1
Property Owner	(n = 320)	(n = 41)
Yes	86	88
No	14	12
Regions by Zip Code	(n = 87)	(n = 36)
Central	18	17
South	17	12 (South/South Central)
Gulf	5	1
East	18	2
West	13	4
North	15	0
Panhandle	1	0

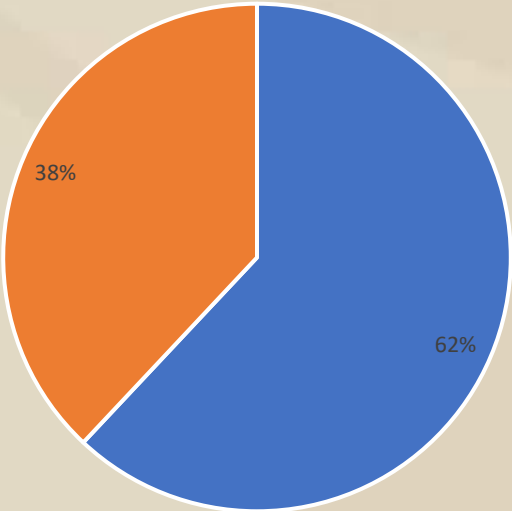
Summary of Demographic Profile

- Income
 - >40,000
- Race
 - White/Anglo
- Age
 - > 25 years of age
- Home type
 - Single-family residence
- Property owner
- Zip codes
 - All but Gulf and Panhandle

Results

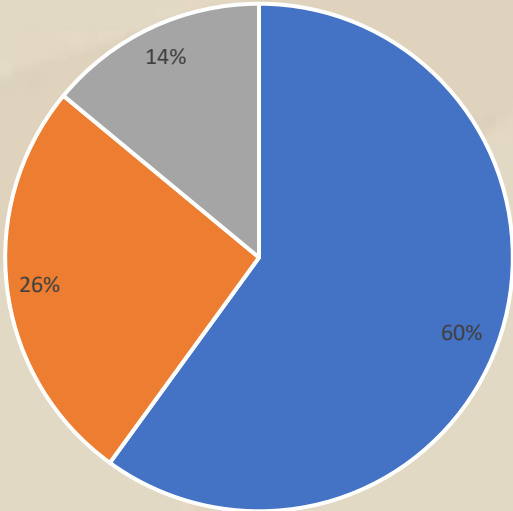
Perceptions of Groundwater Availability - County

Enough groundwater to meet CURRENT NEEDS of MY COUNTY



■ Online Agree ■ Online Disagree

Enough groundwater to meet CURRENT NEEDS of MY COUNTY

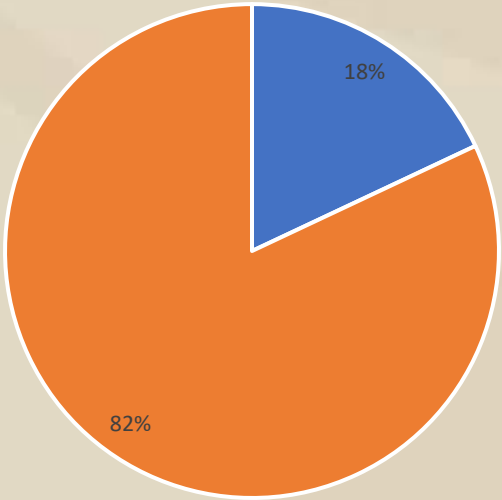


■ Mail Agree ■ Mail Disagree ■ Mail Don't Know

Enough groundwater to meet CURRENT NEEDS of COUNTY

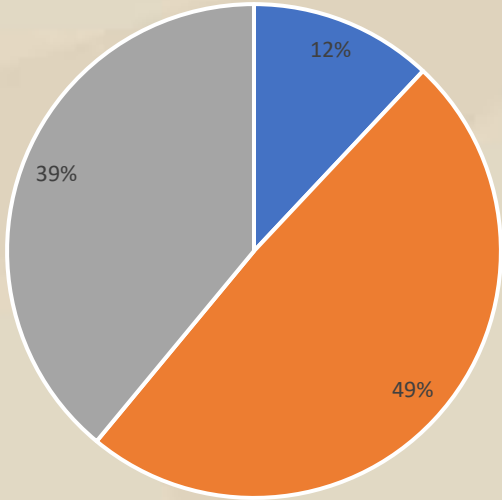
Perceptions of Groundwater Availability - County

Enough groundwater to meet **FUTURE NEEDS** of my COUNTY for the next 25 years



■ Online Agree ■ Online Disagree

Enough groundwater to meet **FUTURE NEEDS** of my COUNTY for the next 25 years

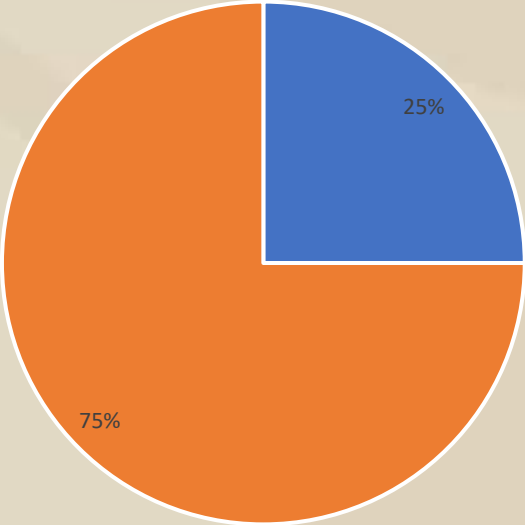


■ Mail Agree ■ Mail Disagree ■ Mail Don't Know

Enough groundwater to meet CURRENT NEEDS of COUNTY

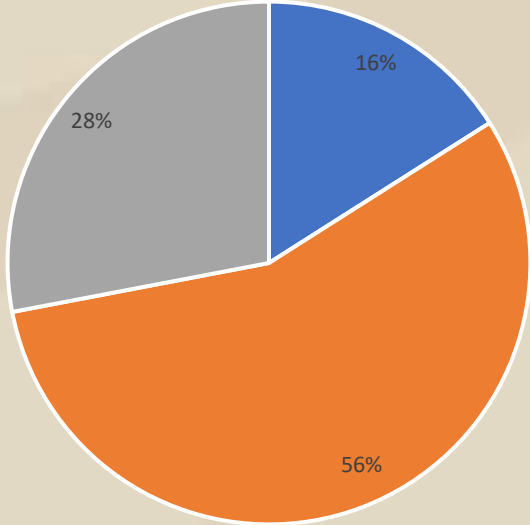
Perceptions of Groundwater Availability - State

Enough groundwater to meet CURRENT NEEDS of STATE



■ Online Agree ■ Online Disagree

Enough groundwater to meet CURRENT NEEDS of STATE

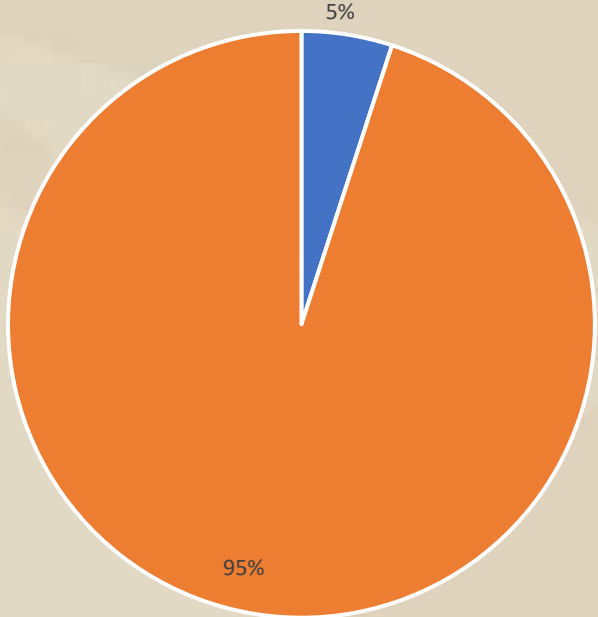


■ Mail Agree ■ Mail Disagree ■ Mail Don't Know

Enough groundwater to meet FUTURE NEEDS of my STATE for the next 25 years

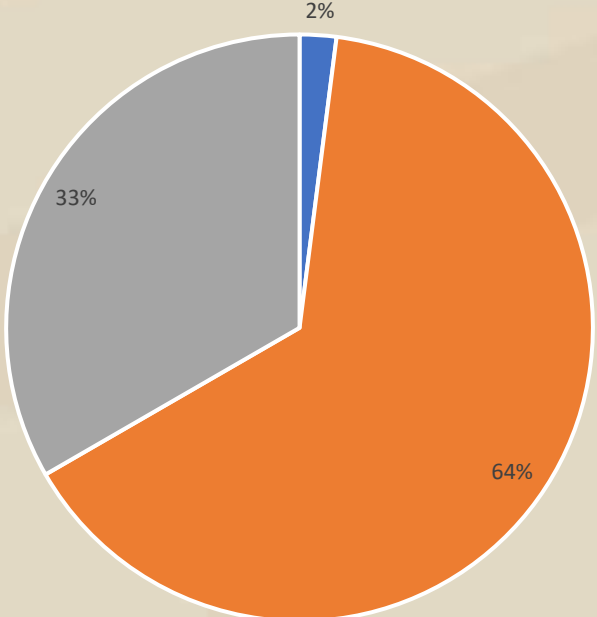
Perceptions of Groundwater Availability - State

Enough groundwater to meet FUTURE NEEDS of my STATE for the next 25 years



■ Online Agree ■ Online Disagree

Enough groundwater to meet FUTURE NEEDS of my STATE for the next 25 years



■ Mail Agree ■ Mail Disagree ■ Mail Don't Know

Enough groundwater to meet FUTURE NEEDS of my STATE for the next 25 years



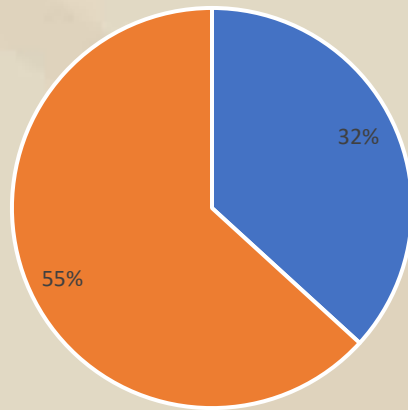
In summary

Respondents were:

1. More pessimistic about the availability of groundwater to meet current needs at the state level than at the county level.
2. More pessimistic about the availability of groundwater to meet the future needs at the state level than at the county level.
3. High uncertainty (Don't Know responses) about availability about future availability at the county and state levels
4. High uncertainty (Don't Know responses) about availability about current availability at the county and state levels, but more so at the state level.

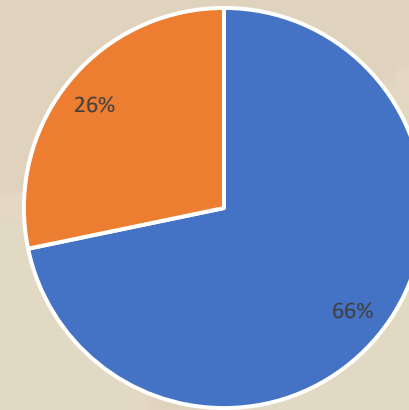
Attitudes Toward Property Rights

The best way to make sure that there is enough water for the future is through protecting, defending, and strengthening private property rights over groundwater



■ Online Agree ■ Online Disagree

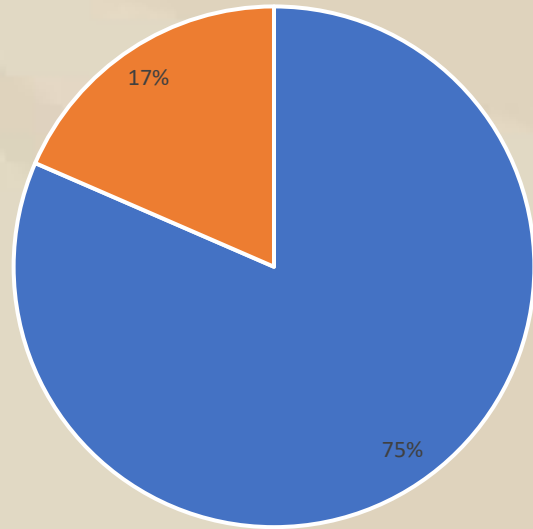
The best way to make sure that there is enough water for the future is through protecting, defending, and strengthening private property rights over groundwater



■ Mail Agree ■ Mail Disagree

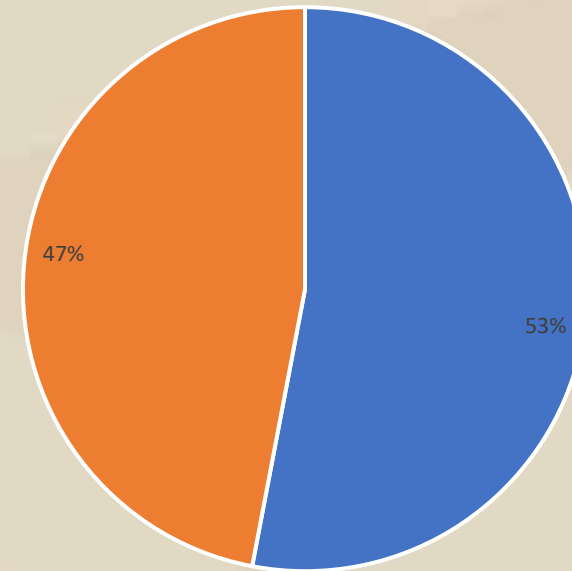
Attitudes Toward Regulation (Oversight)

The best way to make sure that there is enough water for the future is through government regulation



■ Online Agree ■ Online Disagree

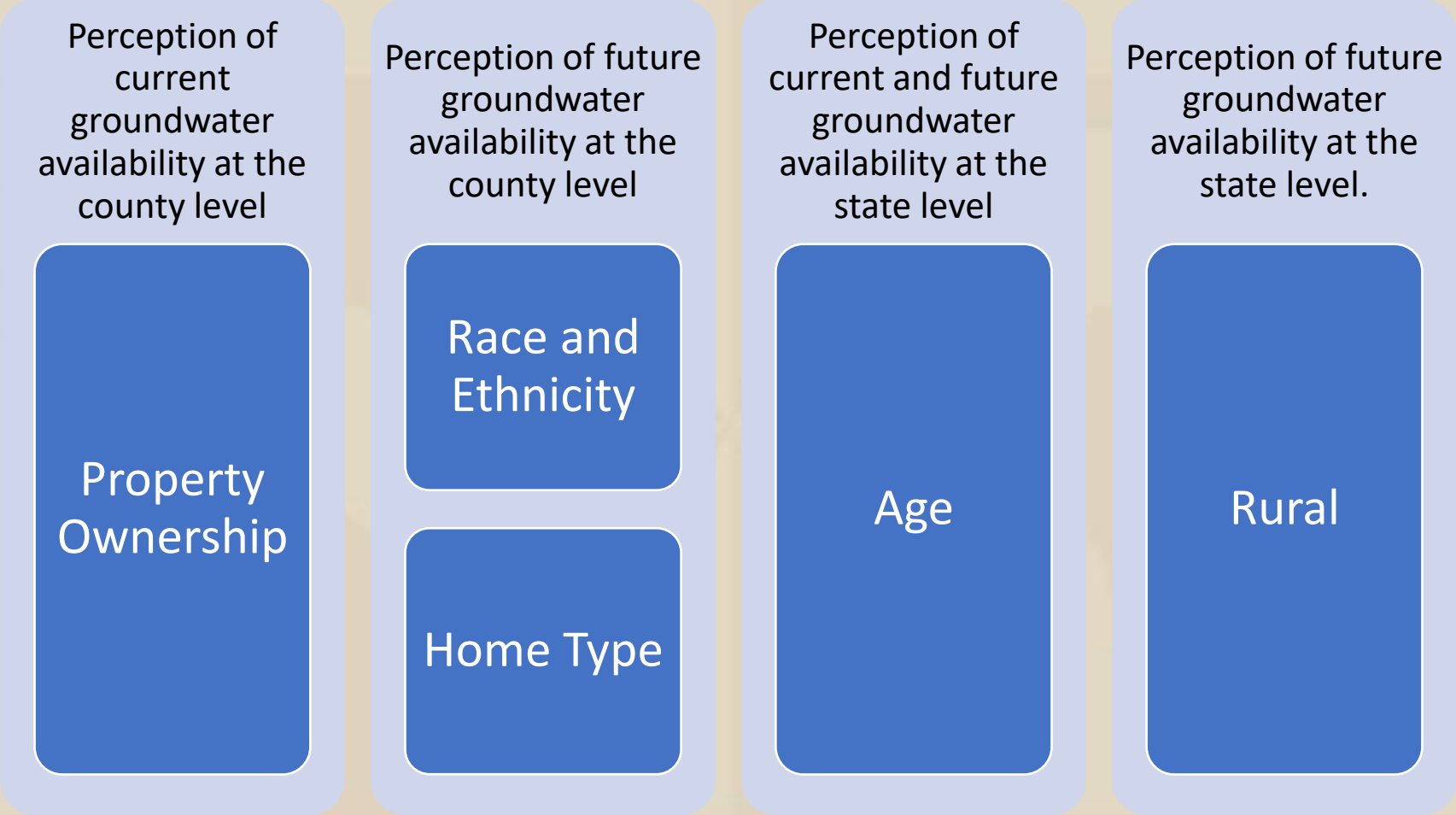
The best way to make sure that there is enough water for the future is through government regulation



■ Mail Agree ■ Mail Disagree

The best way to make sure that there is enough water for the future is through government regulation

Perceptions



Attitudes Toward Groundwater Management

Property Rights Management

Property Ownership

Race and Ethnicity

Regulatory Oversight

Urban

End-of-Survey Comments

End-of-Survey Comments

- Comments were collected concurrently at the conclusion of the survey and then coded.
- The codes were then applied to the comments to understand the beliefs, values, attitudes, and perceptions underlying matters of groundwater availability and management.
- The three major codes were beliefs, values, and attitudes.
- The affective and belief components of perceptions and attitudes are complex.

Trust in Regulatory Oversight

- Trust, or the lack thereof, is reflected in attitudes toward regulatory oversight.
- It is important that residents feel that they trust the institutions responsible for regulatory oversight and that they have the necessary expertise and are not acting simply out of political expediency or political pressures.
- Some respondents feel that oversight is subject to special interests.
- *“There is widespread discontinuity in district rules and management plans across the state, which sets the stage for unfair application of regulation of personal property rights.” “Rule of capture needs to go away”*
- *“(The Legislature) often make things worse because the Legislature does not individually have enough expertise and knowledge in groundwater science to make well thought out decisions. Everything is so rushed during the legislative session that the legislators do not have sufficient time to adequately research groundwater issues, groundwater science, local hydrogeology, and this often results in poorly crafted language in House and Senate bills with built-in unintended consequences.” “Science, not the sanctification of private property rights, should govern groundwater management.”*

Perceptions that Property Rights are Under Threat

- Some respondents feel that oversight is subject to special interests.
- There is a difference in attitudes toward regulation between urban and rural residents. A higher percentage of respondents to both types of surveys reported living in urban zip codes. However, the following comments suggest that some respondents regard state or local legislation to protect their groundwater with distrust.
- *“There is too much interference in local management by State Legislature (VS) who are overly influenced and driven by special interests.”*
“Government regulation usually creates more problems than it solves.”
- *“...another crook has figured away (sic) thru legislation to thief groundwater from its owners and blame it on the owners.”* *“A particular set of groundwater marketers has attempted to pressure the district into approving a permit that includes a stipulation that is not legal.”* *“There is widespread discontinuity in district rules and management plans across the state, which sets the stage for unfair application of regulation of personal property rights. “Cities must not ‘rob’ rural neighbors of their water.”* *“I disagree with my water district I voted against it and I do not like paying taxes to the district and get nothing.”*

Perceptions that Property Rights are Under Threat

- When a respondent perceives that there will be groundwater availability in the future at the county level, s/he may be less likely to agree with the statement that there needs to be strengthening of property rights than when there is not a perception of this availability.
- Several comments reflected attitudes in favor of property rights. These comments do not directly tie perceptions of future availability of groundwater at the county level to property rights.
- It may be that these residents feel no need to strengthen property rights attached to their land ownership.
- *“Local management is working just fine and needs to be left alone to do its job over the long term.”*
“GCDs expedite the depletion of rural Texas groundwater resources to support greedy economic developers.”
- *“Ten years ago, I would have said a GCD in Kendall County would negatively affect my property rights, specifically groundwater rights. After attending district monthly meetings and periodic workshops, I learned that given the Rule of Capture in Texas (in groundwater law, the GCD actually protects property rights when they effectively exercise the powers granted by the state through the Water Code. Today, I am staunch advocate of the state's preferred method of groundwater management—groundwater conservation districts, especially the Cow Creek GCD.”*

GCDs can serve a useful function

- GCDs are seen as preventing harm by the actions of one landowner on neighboring landowners.

- *“It is a hard job to correctly apply the rules and regulations, but the board has gotten it right.”*
“Groundwater district does an excellent job managing water and looking out for the citizens of the district.”
“Private markets cannot adequately protect or allocate groundwater. The current “highest and best use” would be the most profitable: bottled water.”
“Regulation is good because it protects.” *“Standing up for what is legal, and right fulfilling the duty to carry out the views of the constituents that elected them.”* *“...the GCD actually protects property rights when they effectively exercise the powers granted by the state through the Water Code.”* *“Thank god we were placed in (named) district to afford us some oversight and protection from ___ and _____, based on science, not just who can buy the biggest “straw”.*
“Groundwater district does an excellent job managing water and looking out for the citizens of the district.”

What are the true divides over groundwater?

- The main divide explored by closed-ended questions of the survey results reported here, and of the groundwater surveys cited earlier was that between urban and rural residence.
- Many comments revealed other divides. One respondent classified the divide as that between winners and losers.
- Another divide is the outnumbered and powerless rural Texans against urban dwellers, developers, or economic growth advocates, my interests against their interests, or my way of life vs. their way of life.
- *“The overwhelming majority of GCD's are self-serving politically correct position protecting dictators of the winners and losers of rural Texas groundwater resources.”*
- *“(few) Rural Texans have been sold out... economic growth”, “Cities must not 'rob' rural neighbors of their water”, “The water company is simply in the business of drilling deeper wells to supply more water for the urbanites to waste and squander”, “The worst abusers of ground water are the developers that are in the business fragmenting the rural areas...”, “...but why worry about a few rural Texans when you position is 1st down 1 yard to goal and your opponents are of no significance”. “In the urban area ground water is used and abused whereas in our rural areas we are much more sensitive to ground water from weeps and springs as well as the water levels in our well.”*
“Enforcement of groundwater rules is difficult due to the rural setting and also resistance from citizens.”

Perceptions of the detrimental impact of land use, pollutants, priority allocation

- Surprisingly, some comments reflected sentiments about the importance of:
 - Household responsibility
 - Commercial responsibility
 - The importance of education

- *“Private markets cannot adequately protect or allocate groundwater. The current “highest and best use” would be the most profitable: bottled water. We cannot irrigate crops with bottled water”, and augmentation of groundwater (“I am still incredibly concerned about (name of company) trying to pump water from our Aquifer to houses 13 or more miles away”*
- *“I’m sure there are many things I could do to improve my water usage, but I strive to have as minimal of an impact as I can. One thing I wish San Antonio (or really every city) would do, is to completely do away with irrigation and watering for decor. It seems to me that if every person and business is zero-scaping, that would make a significant positive impact. Why do we need lawns and plants in places they don’t belong?”*
- *“Water usage could easily be better managed”, “Households should take responsibility for landscape management and water usage”*),
- *“Limit growth to fit the amount of available groundwater is the only common-sense, sustainable approach”. “... to continue to permit growth which depletes the existing groundwater resources that property owners depend upon.”*
- *“Education is essential.” “We need to know more about proactive management strategies through newspaper, email, websites”*

Insights

- What is groundwater? It is a matter of:
 - Values,
 - Place (not just geographic location)
 - Attitudes.
- When do property rights and regulation matter?
 - Perceptions of groundwater availability at a local level
 - One's dependence on groundwater as a drinking water source
 - None of the demographic variables in the model captured this interdependence.
- When does an attitude toward regulation become most salient?
 - When an urban or rural area is the place of residence.
- Location-specificity may be a proxy for 'versus' controversies – us vs. them,
 - rural vs. urban,
 - state vs. local,
 - power vs. those with less power,
 - my way of life vs. their way of life.
- Values are less a cause of internal conflict for stakeholders in matters of groundwater use and availability, than external conflict.
- External conflict is more likely to arise when individuals or community residents feel a sense of disempowerment.
- Stakeholder comments reflect frustration about an ability to influence matters surrounding groundwater.
- Subsidiarity in oversight and governance is important to local residents, but
 - scientific knowledge or expertise is perceived to be a tool of manipulation by professionals, as is
 - political power wielded by developers is also of concern, and
 - both of these 'outsiders' can be distrusted depending on the interests of the respondent.
- Trust may be the preeminent theme underlying many of the responses.
- Decentralization and regulatory oversight are both valued and are not necessarily perceived to be in conflict with each other, but
 - both of these can only work if citizens perceive that, as individuals, they have an equal voice and an equally powerful voice in outcomes that affect the groundwater-based wealth of their property.
- Inter-community and intra-community conflicts arise when the disempowered look for solutions by bringing legal, political, and social pressures to bear on decisionmakers.

Limitations

- Several predictors were found to be statistically significant. This study incorporated six predictors.
- The limitations of funding allocated for the study did not allow for a random sample of respondents which would have yielded a better representation from each part of the state.
- The survey was based on a convenience sample of respondents limiting the generalizability of the study to a general population. However, the economic and socio-demographic characteristics of respondents are similar to those in representative samples used in other studies.

Conclusion

- Closing the communication gap between perceptions, knowledge, attitudes and behavior, and the governance gap that exists between policy priorities and implementation of policy depends on educators, practitioners, and policymakers looking at and then beyond the thumbprint of identity which users reveal in their responses to groundwater surveys.

Thank you!