



# Water Resource Management

## Current Practices and Challenges

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**With Focus on:**

- 1) Agricultural**
  - 2) Municipal**
  - 3) Oil & Gas**
- 



Computer Science Department  
Texas Tech University  
July 2018



# Objectives of the Study

- Learn about
  - Current practice
  - Technology use
  - Existing problems
  - Future challenges

Focusing on:

## Water Resource Management



# Approach

- Identified three major consumers/stakeholders of water:
  1. Agricultural and farming
  2. Municipal and residential
  3. Oil & Gas industry





# Approach

- Organized, recruited, and conducted three focus groups:
  1. Agricultural and farming
  2. Municipal and residential
  3. Oil & Gas industry
- Each focus group included:
  - A set of survey questions
  - Discussions on selected problems
  - Recording and taking notes



# 1) Agricultural and Farming



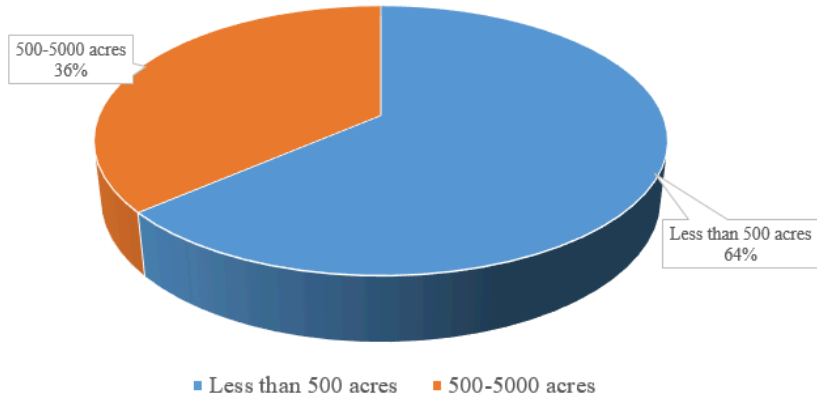
- Recruited 8 participants from Lubbock and surrounding counties
- The survey & discussion parts consisted of 15 questions



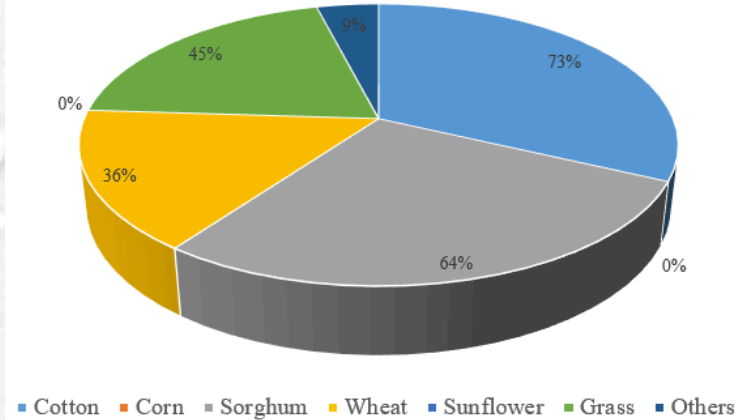
# Agricultural focus group discussion on water resource Manager



## Cropland Acres of Participants



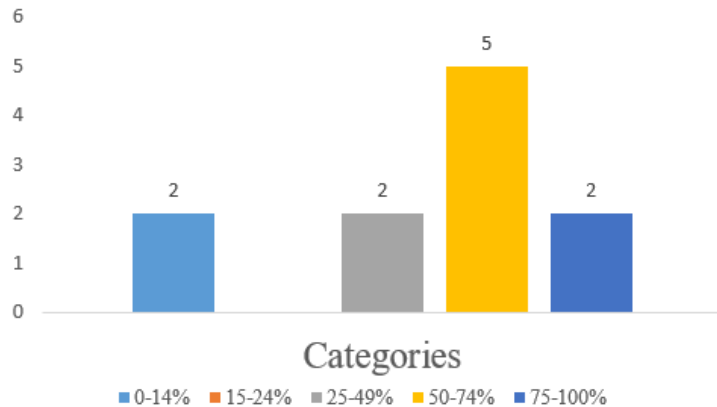
## Crops Produced by Participants



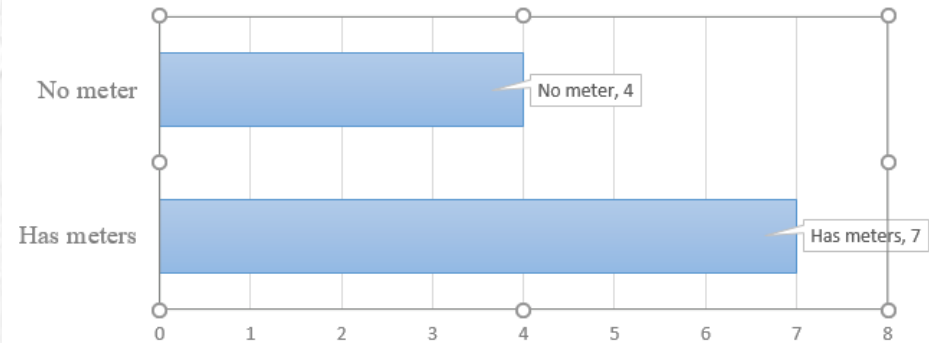
# Agricultural focus group discussion on water resource Management



## Percentage of Cropland Irrigated



## Irrigation Wells with Meters

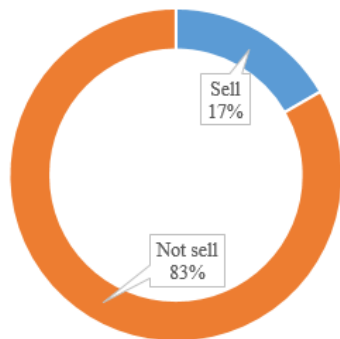




# Agricultural focus group discussion on water resource Management



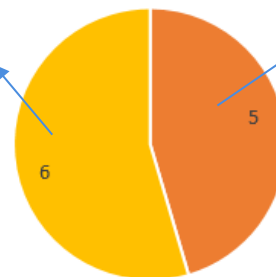
## Sell Part of the Groundwater



■ Sell ■ Not sell

## Technology for Precision Agriculture

Need:  
(1). Probes for  
checking soil  
moisture;



Techs used: Aqua Spy,  
Soil Moisture Probe,  
Phantom 4 Pro Drone

■ With sensor or drone ■ Without sensor or drone



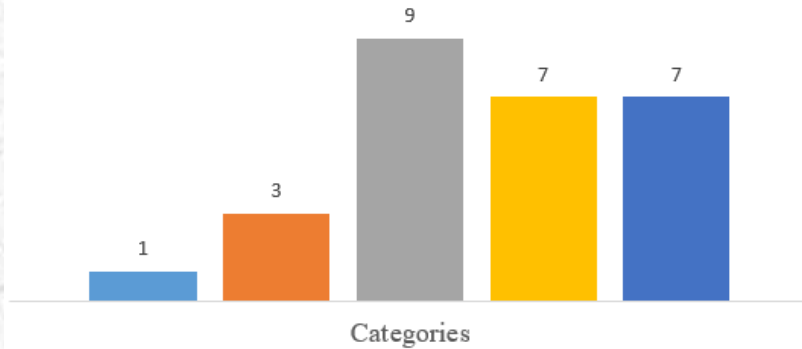


# Agricultural focus group discussion on water resource Management



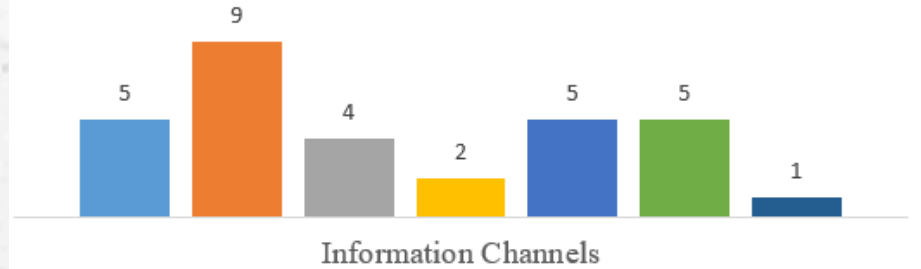
## Risks for Crop Producers

■ Lack of tech support ■ Expensive new techs ■ Weather risk  
■ Irrigation supply risk ■ Market risk

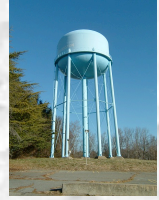


## Information Channels to Access

■ Agriculture radio program ■ Field days of TTU  
■ USDA NRCS ■ Agriculture magazines  
■ Collaborator companies ■ Mobile app  
■ Others



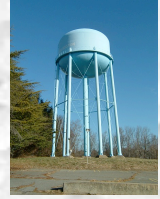
## 2) Municipal & Residential



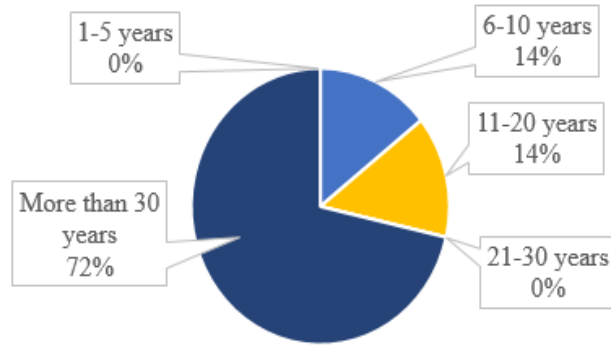
- Recruited 7 participants from Lubbock and surrounding counties
- The survey and discussion parts consisted of 28 questions:



- Municipal focus group discussion on water resource Management

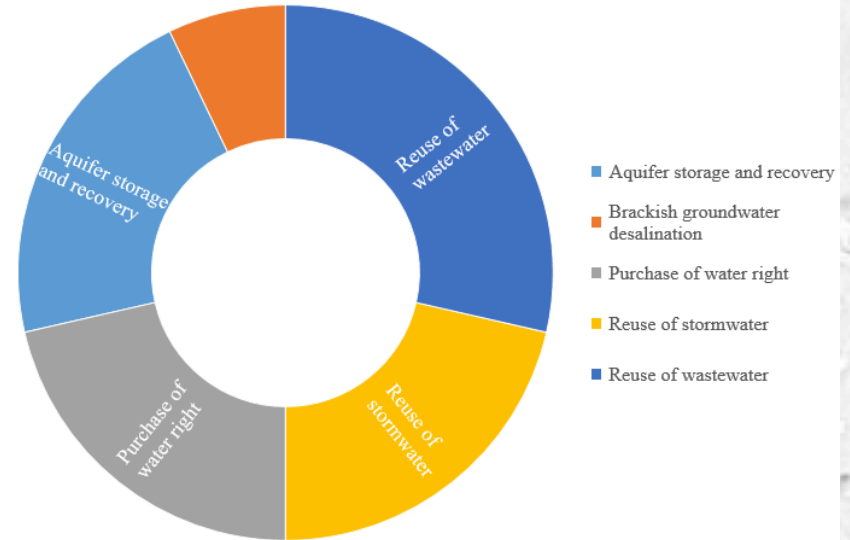


## The age of water supply infrastructure



■ 1-5 years ■ 6-10 years ■ 11-20 years ■ 21-30 years ■ More than 30 years

## New techs may use

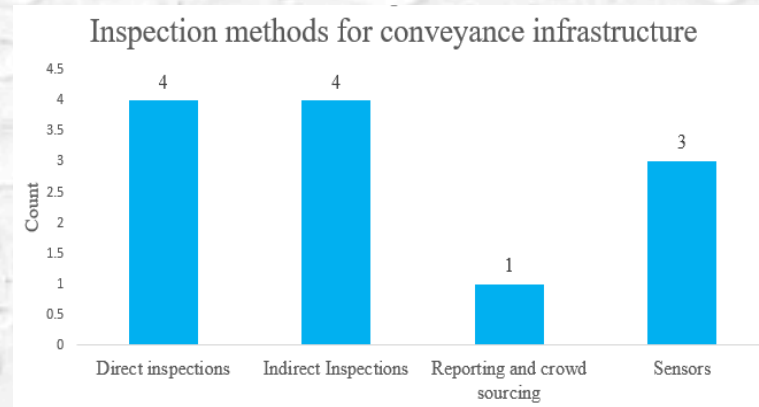
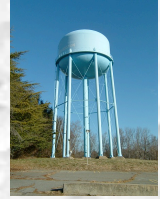


■ Aquifer storage and recovery  
■ Brackish groundwater desalination  
■ Purchase of water right  
■ Reuse of stormwater  
■ Reuse of wastewater

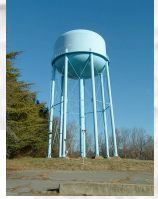




- Municipal focus group discussion on water resource Management



- Municipal focus group discussion on water resource Management

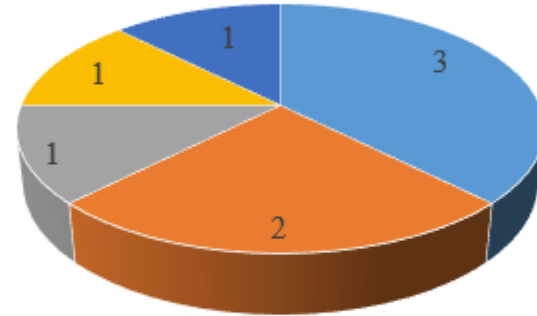


## Applications of smart meters

### Smart meter deployment



■ No smart meters    ■ Has smart meters



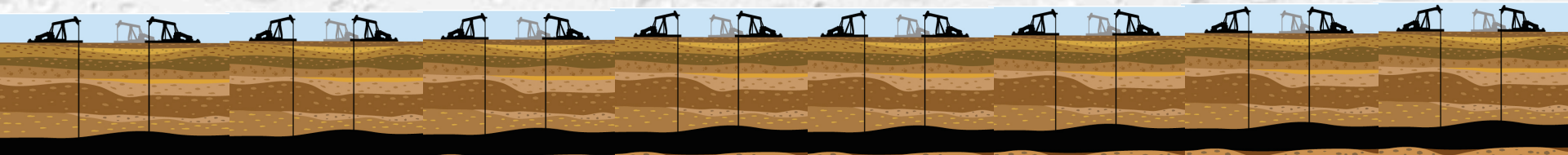
■ Billing process                      ■ Analyzing water use  
■ Promotion water conservation   ■ Management of demands  
■ Others



### 3) Oil & Gas



- Recruited 11 participants from Midland and surrounding counties
- The survey part included 24 questions:

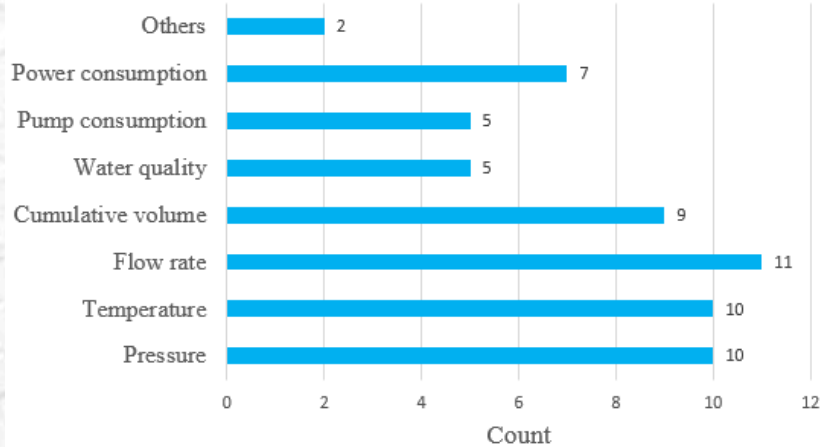




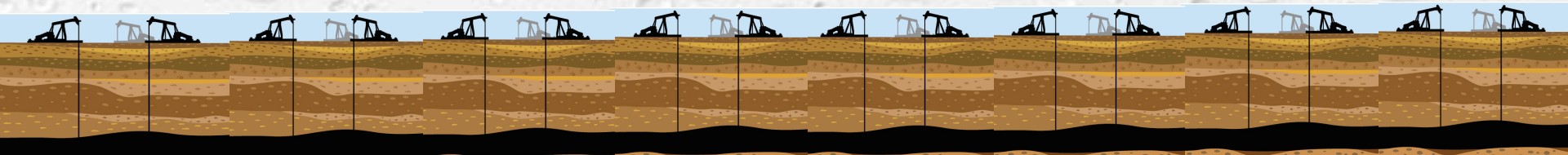
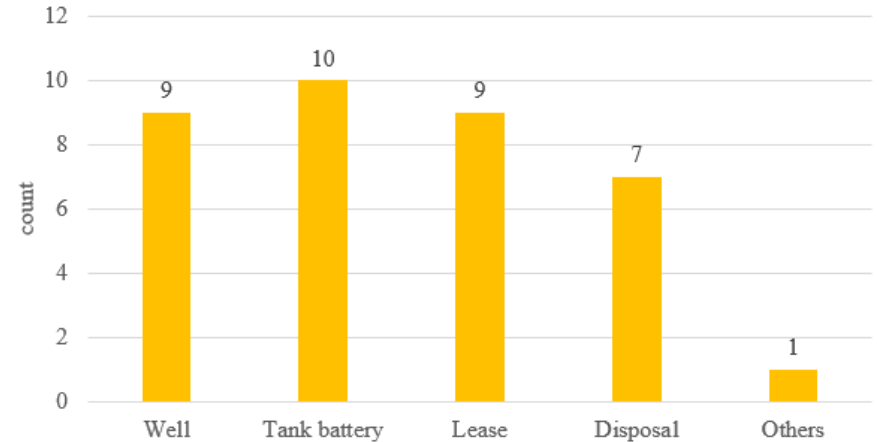
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Sensors used in oil & gas industry



Data application in production process

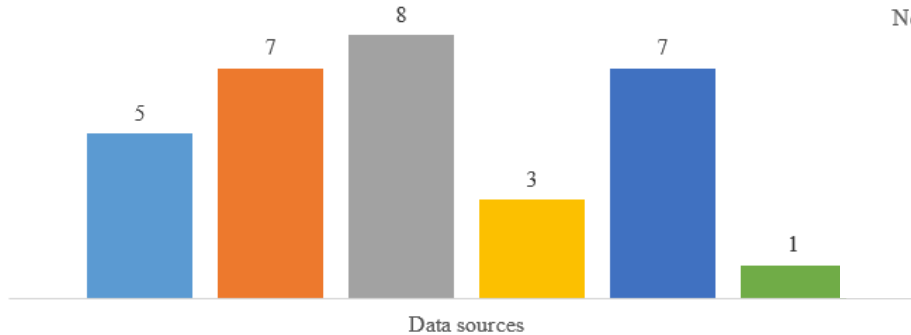


- Oil & gas focus group discussion on water resource Management

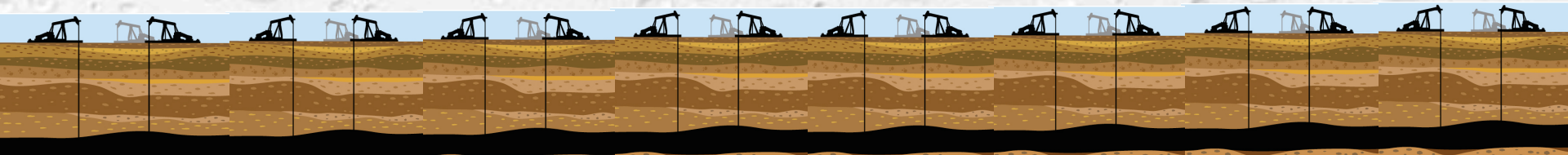
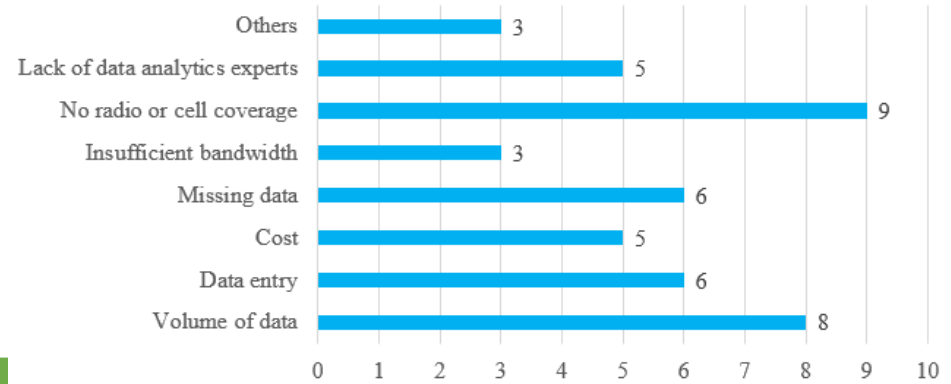


Data from third party for water management

Trucking companies  
Fresh water sources  
Mid-stream water companies  
Commercial disposal wells  
Municipal water treating plants  
Others



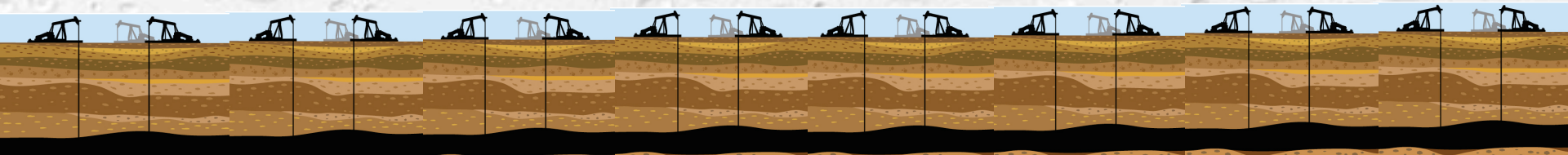
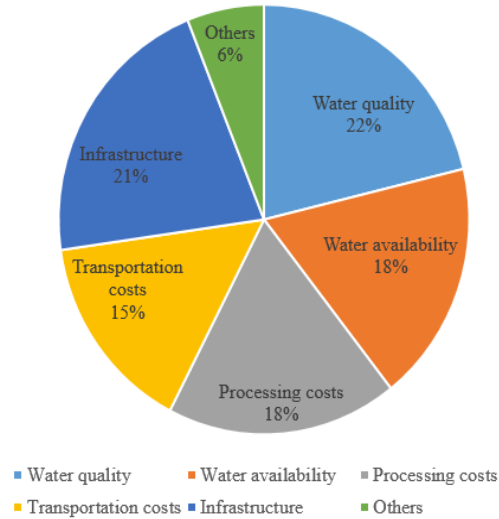
Challenges in data acquisition and handling



- Oil & gas focus group discussion on water resource Management



Challenges in reusing produced water





Thank You

