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## **Agricultural Water Management in a Changing Mid-Atlantic: Stakeholder Experiences and Attitudes Towards Alternative Water Sources, Weather Variability, and Related Factors**

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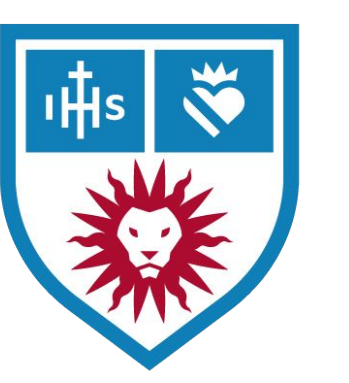
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# Agricultural Water Management in a Changing Mid-Atlantic: Stakeholder Experiences and Attitudes Towards Alternative Water Sources, Weather Variability, and Related Factors



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Center for Urban Resilience

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## Introduction

Water and agriculture are inextricably connected, and so are the impacts of climate change upon water supplies which will impact agriculture with greater intensity as the earth continues to warm. In the mid-Atlantic, climate change will intensify extremes such as flood and drought, resulting in greater water quantity variability (NIACS). Other consequences of climate change will include significant sea level rise and saltwater intrusion, as well as increased temperatures and decreased water quality (NIACS). In a region already experiencing significant but commonly overlooked impacts on water quality and quantity due to population and development increases, land use modifications, and agricultural runoff, understanding stakeholder perspectives on agricultural water management in the region is imperative. This study interviewed 17 mid-Atlantic stakeholders, largely based in Maryland, which included farmers, extension agents, engineers, academics, and state agency personnel. These semi-structured interviews examined stakeholders' perceptions and experiences with 1) water use and management in agriculture, including both freshwater and reusable resources; 2) past, existing and future weather variability; and 3) related factors impacting water use and management. Semi-structured interviews were completed to examine stakeholder perceptions towards nontraditional water sources and water conservation practices, with the intent of informing a future survey that would assess farmers' willingness to use treated recycled wastewater in agriculture in order to mitigate increasing water supply variability due to climate change.

## Methods

- Qualitative research methodology utilizing a protocol approved by LMU IRB
- Two researchers, both received human subjects training
- Potential interviewees obtained via referral; recruited via phone, according to script
- Semi-structured interviews via phone or Zoom, following receipt of signed informed consent
- Interviews lasted between 30 min-1 hour and were audio-recorded
- Interviewees received \$100 gift card as incentive
- 17 interviews conducted from June-December 2023
- Interviews transcribed, then inductively coded by both researchers to maintain objectivity
- Codes compiled into a matrix, then categorized according to larger themes
- Matrix findings quantified and visualized

### Qualitative Data Analysis

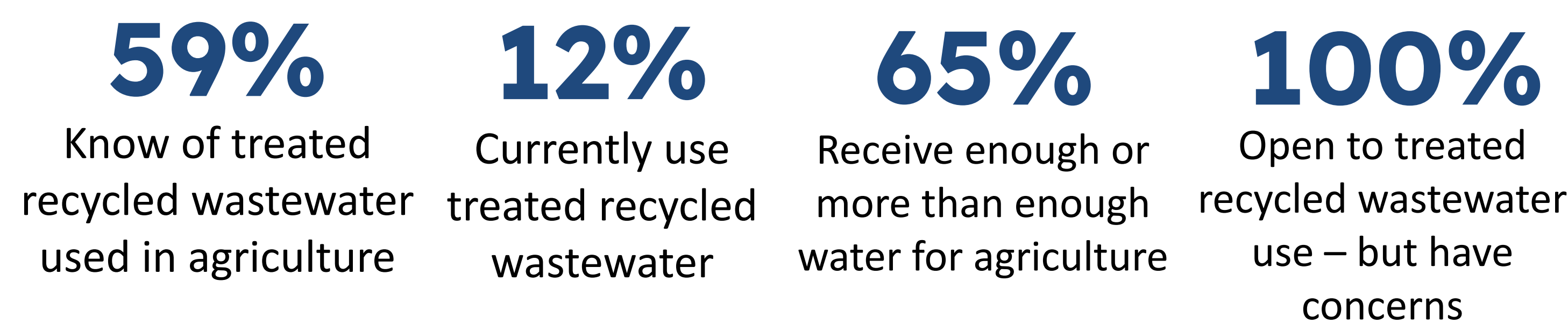


## Results

### Climate Change Effects on Agriculture

Most frequently mentioned: changes in blooming, planting, and harvesting times; saltwater intrusion; excessive rainfall being harmful to crops  
Other concerns: increases in weeds and invasives, increased runoff/erosion, inconsistent weather conditions impeding agricultural success

"The **extremes** of excessive moisture/precipitation, and then excessive drought, is increased from what it used to be. So how that's affected agriculture, is the stress, the **importance of irrigation.**"



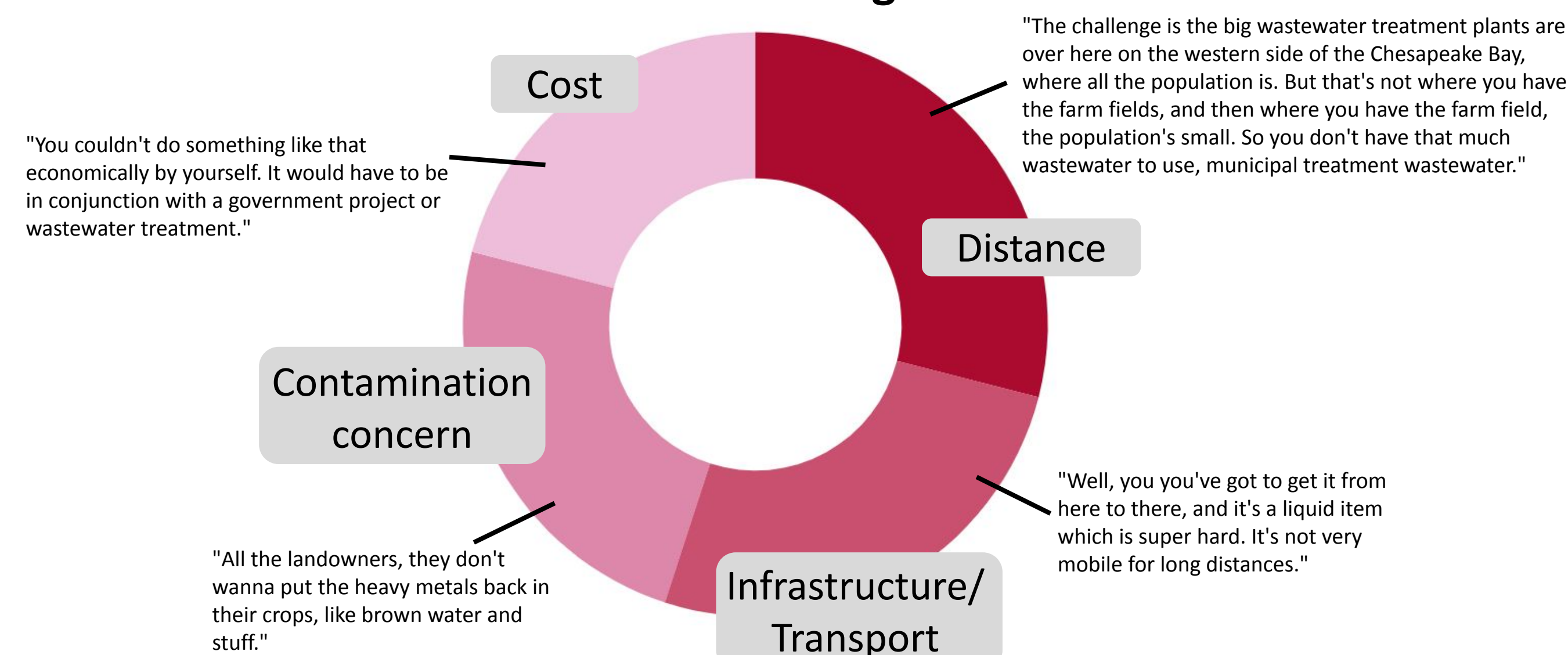
### Irrigation Methods

Most frequently mentioned: drip or subsurface drip irrigation, center pivots  
Other methods: sprinkler irrigation, hard hose, various technologies such as automated pump controls, fertigation, and micro-irrigation

### Water Sources in Agriculture

Most frequently mentioned: groundwater, surface water, rainfall

### Barriers to Treated Recycled Wastewater Use in Agriculture



### Water Quality

Concerns: PFAS levels, pharmaceutical contamination, excess salinity, microplastic contamination, nutrient runoff from poultry

## Discussion

The mid-Atlantic is agriculturally diverse, with different regions possessing different climate concerns, water sources for agriculture, and irrigation methods. Thus, answers to related questions varied between interviewees. Although climate change poses a risk for greater extremes of high rainfall and drought, many farmers seem to currently receive enough or more than enough water for use in agriculture. Some interviewees also seemed more concerned with water quality rather than quantity. No interviewees opposed the use of treated recycled wastewater in agriculture, and many were welcome to the idea, but all posited many justifiable concerns and questions. Aside from the major barriers, farm ownership versus rental as well as responsibility for cost were frequently raised issues. This study has provided valuable information for understanding current stakeholder attitudes towards water and the potential for treated recycled wastewater use in mid-Atlantic agriculture. Helpful insights were also gained as to the structure and content of the future survey that this study will inform, which looks to better understand agricultural water management and treated recycled wastewater as a mitigation for climate-induced water concerns.

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