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# Willingness to Pay for Water Availability in Northwest Arkansas

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## Introduction

Urban systems are tightly linked to surrounding ecosystems, making such urban areas a major component of environmental change. Urbanization is now the dominant demographic trend globally (Vitousek, 1994) and it is thus important to understand the human attitudes and perceptions which shape the behaviors that directly influence environmental change (Pickett, et al. 2001).

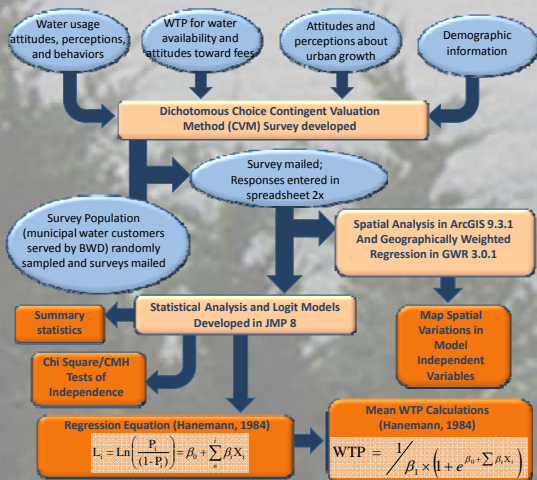
Two decades of rapid urban growth and a trend toward increasing per capita water consumption has left water providers in Northwest Arkansas concerned about their ability to meet future demand. Beaver Water District (BWD) is the largest of four regional water providers that draw from Beaver Lake, the only regional source of potable water. BWD supplies 62% of the population, but studies estimate that BWD will exhaust its allocation as early as 2031 based on growth projections (Carollo Engineers, 2006).

Growth and water consumption patterns are well understood, but we lack understanding of the priorities and attitudes that shape these patterns. Residential water use accounts for over half of demand, but there is little emphasis placed on conservation or water resource protection in the face of rapid urbanization. Further complicating the situation is the highly variable hydrologic regime of Beaver Lake's source, the White River (Cleveland and Stahle, 1989) and management of multiple competing uses for the water. Can we be assured of a stable, reliable water supply to meet future demand, or will water availability and deliverability prove to be the critical limiting factor in continued urbanization and population growth in the region?

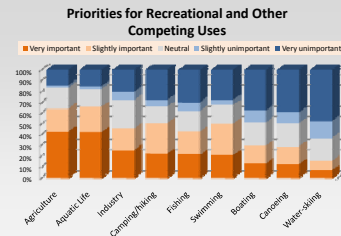
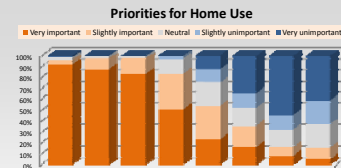
## Objectives

- Ascertain stated priorities for water use in the region
- Assess the attitudes and perceptions that influence willingness-to-pay and conservation behaviors
- Estimate mean willingness-to-pay for a reliable water supply at the regional and local scale
- Examine spatial variation in attitudes and perceptions

## Methods



## Priorities for Water Use



City	Surveys Mailed	Surveys Returned	Response Rate
Bentonville	286	51	17.8%
Fayetteville	552	122	22.1%
Rogers	441	84	19.0%
Springdale	636	112	17.6%
<b>Total</b>	<b>1,915</b>	<b>369</b>	<b>19.3%</b>

### Relationships to Demographic Measures

- Home owners more likely to rank water for drinking, cooking, outdoor watering, and washing cars at home "important"
- Women and respondents > 45 yrs of age more likely to rank water for housecleaning "important"
- Respondents with incomes >\$40,000 more likely to rank water for outdoor watering "important"
- Respondents < 45 yrs of age more likely to rank recreational uses (boating, fishing, hiking, camping, etc.) "important"
- Respondents > 45 yrs of age more likely to rank water for industrial uses "important"

## Logit Models & Mean Willingness to Pay

### Expected Independent Variables

- Bid Amount
- Education
- Income
- Attitudes towards Fees
  - I am happy to pay fees our water resource managers feel are appropriate
  - I can't afford to pay a higher fee
  - New residents should bear the cost of additional demands for water
- Attitudes toward Growth
  - I feel I have personally benefited from economic growth in the region

		Regional Model				
Term	Estimate	Std Error	Chi Square	Prob > Chi Sq	Effect Likelihood Ratio	
Intercept	0.722294	0.534302	1.85	0.1764	N/A	
Bid Amount	0.044443	0.008058	30.42	< 0.0001	< 0.0001	
Happy to Pay Fees	1.442518	0.360137	16.04	< 0.0001	< 0.0001	
Can't Afford to Pay	-1.05856	0.428115	6.11	0.0134	0.0104	
Pleased with Growth	1.139184	0.477182	5.70	0.017	0.0115	
Support Land Use Reg.	1.123807	1.123807	4.88	0.0271	0.0179	

		Bentonville Model				
Term	Estimate	Std Error	Chi Square	Prob > Chi Sq	Effect Likelihood Ratio	
Intercept	1.419528	1.135743	1.56	0.2113	N/A	
Bid Amount	0.066114	0.027782	5.66	0.0173	0.0015	
Can't Afford to Pay	-2.806277	1.210857	5.37	0.0205	0.0041	

		Fayetteville Model				
Term	Estimate	Std Error	Chi Square	Prob > Chi Sq	Effect Likelihood Ratio	
Intercept	-0.885109	0.583934	2.30	0.1296	N/A	
Bid Amount	0.038146	0.012641	9.11	0.0025	0.0003	
Happy to Pay Fees	2.275119	0.580969	15.34	< 0.0001	< 0.0001	
Home Ownership	-0.747322	0.405752	3.39	0.0655	0.0450	

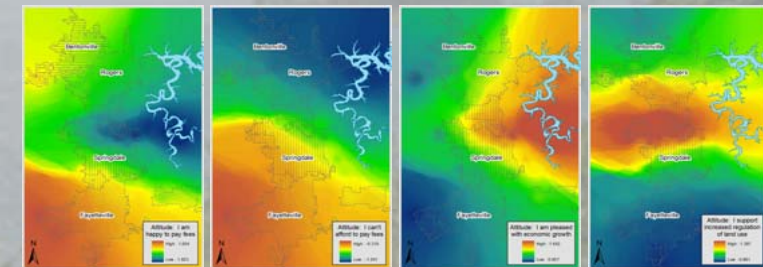
  

		Rogers Model				
Term	Estimate	Std Error	Chi Square	Prob > Chi Sq	Effect Likelihood Ratio	
Intercept	-1.597119	0.680564	5.51	0.0189	N/A	
Bid Amount	0.042793	0.016598	6.65	0.0099	0.0015	
Happy to Pay Fees	2.444345	0.711374	11.81	0.0006	0.0003	

		Springdale Model				
Term	Estimate	Std Error	Chi Square	Prob > Chi Sq	Effect Likelihood Ratio	
Intercept	-2.705021	0.679243	0.16	0.6905	N/A	
Bid Amount	0.0543421	0.0145	14.05	0.0002	< 0.0001	
Can't Afford to Pay	-1.76381	0.649179	7.38	0.0066	0.0033	
Pleased with Growth	2.0097102	0.86763	5.37	0.0205	0.0107	
Support Land Use Reg.	1.5330601	0.811278	3.57	0.0588	0.0420	

## Mapping Spatial Variability in Parameter Coefficients



## Conclusions

- Fit of the regional logit model is not constant spatially.
- Relative impact of the independent variables on the model varied spatially.
- In all models, attitudes were more important than traditional demographic measures in determining willingness to pay.
- Because water policy is often enacted at the local scale, it is essential to understand local variations in attitude in order to make sound policy decisions.

### References Cited

Carollo Engineers. 2006. Beaver Water District Regional Growth Study. Cleveland, M.K., and D.W. Stahle. 1989. Tree Ring Analysis of Surplus and Deficit Runoff in the White River, Arkansas. *Water Resources Research* 25:1391-1401.

Hanemann, W.M. 1984. Welfare Experiments in Contingent Valuation Experiments with Discrete Responses. *American Journal of Agricultural Economics* 63 (5):1255-1263.

Pickett, S.T.A., M.L. Cadenasso, J.M. Grove, C.H. Nilon, R.V. Pouyat, M.C. Zipperer, and R. Costanza. 2001. Urban Ecological Systems: Linking Terrestrial Ecological, Physical, and Socioeconomic Components of Metropolitan Areas. *Annual Review of Ecology and Systematics* 32:127-157.

Vitousek, P.M. 1994. Beyond Global Warming: ecology and global change. *Ecology* 75:1861-1876.