THE FUTURE OF WATER IN THE DESERT: CONVERGENCE AND DIVERGENCE BETWEEN DECISION MAKERS AND STUDENTS

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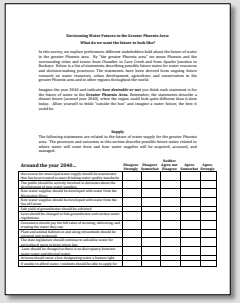
Do decision maker values about water in the greater Phoenix area reflect stakeholder values?

In 2012 the Decision Center for a Desert City at Arizona State University conducted a survey of decision makers who impact water resources in the metropolitan Phoenix area. The goal of the survey was to better understand what decision makers want from the future of water resources in the region.



- N≈106
- Survey conducted online
- 68 Statements ranked on 5 point scale from very desirable to very undesirable
- Length≈30 min

Water Management	Urban Interests
Agricultural Interests	Environmental Interests

This survey measures convergence and divergence in water-related values between decision makers and the public.

In preparation for a broad public survey, this pilot survey gathers data on the water-related values of ASU undergraduate and graduate students and compares them to the results of the decision-maker survey.

Domains of the Water System

Supply

Water sources and how water will be acquired, accessed, and managed

Delivery

Delivery infrastructure management and delivery methods

Demand

Consumption, conservation, and use

Outflows

Sewage and effluent

Cross-Cutting

Water governance and research

Variable Consolidation

A factor analysis was conducted on the original survey results to reduce the number of items and identify underlying variables. For each domain [Supply, Delivery, Demand, Outflows, & Cross-cutting] 2-3 factors emerged. The top two items in each factor were selected for use in the stakeholder survey. These were substantiated with additional survey items critical for inclusion in the scenario analysis (next phase of research. A principal components analysis and Varimax rotation were used. The total number of survey items was reduced from 68 to 21. (White et al. in prep)

	Collaborate and Conserve	Develop New Supplies Under Technical Management
(k) Safe yield (the long-term balance of groundwater withdrawals with recharged water) should be the central principle of water managers.	**0.766**	0.009
(i) Groundwater should be replaced where it was originally removed.	**0.68**	-0.272
(f) The greater Phoenix area should use only as much groundwater as is replaced every year, except in years of extreme drought.	**0.677**	-0.114
(h) Natural areas along streams should be restored and protected for fish and wildlife.	**0.655**	-0.286
(l) All contaminated groundwater (e.g., Superfund sites) should be completely cleaned up.	**0.58**	-0.139
(j) New housing developments should have to prove a 100-year supply of physically available water.	**0.554**	0.046
(m) Residents and businesses should gather and store rainwater in barrels to irrigate their landscaping.	**0.553**	-0.408
(a) Primarily water managers should make decisions about the development of new water supplies.	0.382	**0.553**
(d) De-salted water should be a source of water for the greater Phoenix area to meet growing demands.	-0.045	**0.752**
(n) New water supplies should be sought to allow continued growth and development.	-0.096	**0.776**
(e) Water supplies should be developed to meet all demands regardless of impacts.	-0.1	**0.558**
(c) Water should be brought to the greater Phoenix area from rivers and lakes in the Midwest to meet growing demands.	-0.119	**0.589**
Number of items	7	5
Variance explained (%)	23.003	17.773
Alpha	.793	.670

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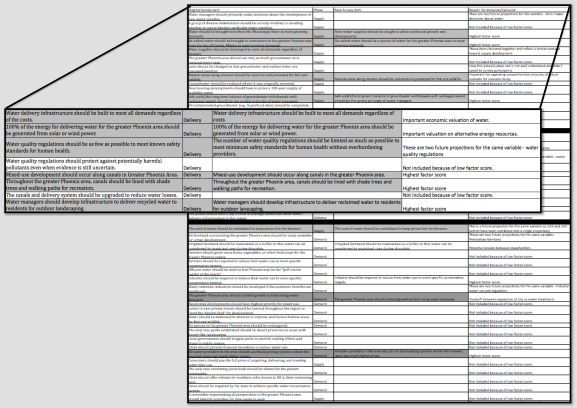
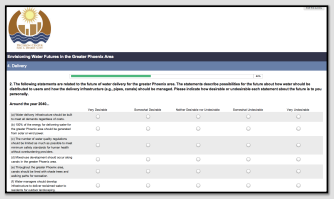
Item Reduction Process



Water delivery infrastructure should be built to meet all demands regardless of the costs.	Delivery	Water delivery infrastructure should be built to meet all demands regardless of costs.
100% of the energy for delivering water for the greater Phoenix area should be generated from solar or wind power.	Delivery	100% of the energy for delivering water for the greater Phoenix area should be generated from solar or wind power.
Water quality regulations should be as few as possible to meet known safety standards for human health.	Delivery	The number of water quality regulations should be limited as much as possible to meet minimum safety standards for human health without overburdening providers.
Water quality regulations should protect against potentially harmful pollutants even when evidence is still uncertain.	Delivery	
Mixed-use development should occur along canals in the greater Phoenix area.	Delivery	Mixed-use development should occur along canals in the greater Phoenix area.
Throughout the greater Phoenix area, canals should be lined with shade trees and walking paths for recreation.	Delivery	Throughout the greater Phoenix area, canals should be lined with shade trees and walking paths for recreation.
The canals and delivery system should be upgraded to reduce water losses.	Delivery	
Water managers should develop infrastructure to deliver recycled water to residents for outdoor landscaping.	Delivery	Water managers should develop infrastructure to deliver reclaimed water to residents for outdoor landscaping.

Important economic valuation of water.		
Important valuation on alternative energy resources.		
These are two future projections for the same variable - water quality regulations		
Not included because of low factor score.		
Highest factor score		
Highest factor score		
Not included because of low factor score.		
Highest factor score		

Pretesting on ASU Students



- N≈77
- Survey conducted online
- 21 Statements ranked on 5 point scale from very desirable to very undesirable
- Length≈15 min

Undergraduate & Graduate	Interdisciplinary

Convergence and Divergence in Values

Supply

•***For students, an equitable future includes protected natural areas for other species.*** Students were significantly more likely than decision makers to say that "Natural areas along streams should be restored and protected for fish and wildlife" (Student M=1.38, Decision Maker M=1.76, F=8.69, p<.001)

Delivery

•***For students, a sustainable future is powered by renewable energy.*** Students were significantly more likely than decision makers to say that a desirable water future included "100% of the energy for delivering water for the greater Phoenix area should be generated from solar or wind power" (Student M=1.62, Decision Maker M=2.86, F=48.58, p<.001)

Demand

•***For students, mandatory conservation targets for business is a desirable part of the future.*** Students were significantly more likely than decision makers to say that "Industry should be required to reduce their water use to meet specific conservation targets" (Student M=1.63, Decision Maker M=2.26, F=13.18, p<.001)

Outflows

•***For students, future drinking should not come from treated municipal wastewater.*** Students were significantly less likely than decision makers to say that "Municipal wastewater should be treated for direct reuse as drinking water" (Student M=3.18, Decision Maker M=2.80, F=4.01, p=.05)

Cross-Cutting

•***For students, water resource decisions are participatory processes in the future greater Phoenix area.*** Students were significantly more likely than decision makers to say that "Local stakeholders and residents should be actively engaged in water resource decisions in the greater Phoenix area. (Student M=1.74, Decision Maker M=2.04, F=3.91, p=.05)

Conclusion

Water governance in the greater Phoenix area is a complex and contested topic. Decision Makers from Water Management, Urban Interests, Agricultural Interests, and Environmental Interests, are tasked with developing the water system in the best interests of their constituencies. The comparative results from this pilot survey of Arizona State University students shows potential conflict with multiple areas of divergence between Decision Makers and Students. Future research will expand to the broader public of the greater Phoenix area in order to measure the Decision Makers' representation of the public's interests.

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