Western Households'

Water Values, Knowledge and Preferences for

Meeting Future Scarcity

What is the public's view of western water issues?

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Western agriculture has blossomed with the development of water resources that are used in growing crops, which in turn spurs the growth of value-added industries like meat, sugar and dairy products. Economic activity is generated directly by these industries when inputs are purchased and wages are spent. Without other viable local base industries to generate revenues and provide employment, a reduction in agricultural revenue seriously impedes a rural regional economy.

Yet, population growth is driving a reallocation of agricultural water resources from rural areas to burgeoning municipalities. By 2030, an estimated 33 million additional people are projected to be living in the West, requiring approximately 30 billion more gallons of water for consumption (Western Governors' Association, 2006). Growth and subsequent water conflicts are often focused in agricultural areas where key water resources are fragile and scarce, as pointed out in the Bureau of Reclamation's Water 2025 Report.

In the face of increasing water scarcity, decisions must be made about how future demands for water resources will be met, the "acceptable" strategies for addressing scarcity in short term droughts and where public investment should be made in water development, infrastructure and mitigation. In particular, water providers seek costumer preferences for water initiatives because of an implicit notion that policy decisions should also be consistent with public attitudes and preferences. After all, households are the likely source of funds for water development, firming and relocation. Do western households want water to come from agriculture? Little has been researched or written on this question.

Western household perceptions, preferences and values for water are the subject of a Colorado Water Institute survey of households (Pritchett et al 2009) that was completed in 2009 . The purpose of the study is to benchmark the public's view of many western water issues, and particular attention is focused on households' perceptions of water scarcity, how municipal households view water in agriculture and trade-offs among alternatives for meeting future water demands. Survey responses from 6,250 individuals provide several water-related themes, and a subset of these themes is discussed in this article.

Respondents first addressed short-term scarcity. It's true that the West can experience temporary (less than 2 years) water shortages for a variety of reasons such as drought or over-allocation to certain uses. During these times, there may not be enough water to adequately provide for all water uses, and respondents were asked to prioritize water demands among the eight uses listed below:

1. For the natural environment (e.g., as part of fish and wildlife habitat, forest health and other natural uses.
2. For natural resource management (e.g., in-stream management, fire suppression, stream banks and wetland management)
3. For household use (e.g., drinking, cooking, showers, laundry, dishwashing, and toilets)
4. For private landscaping (e.g., lawns and gardens for private homes and businesses)
5. For industrial use (e.g., commercial manufacturing, mining and power plants)
6. For irrigated farmland (e.g., food or energy crop production, livestock)
7. For municipal landscaping (e.g., community parks, golf courses
8. For recreation (e.g., rafting, fishing, swimming, skiing, scenic viewing)

In this ranking question, if a respondent chose a category as the top priority, it is given a weight of 3, the second most water priority a 2, the third priority a 1 and if unranked the use category received a 0.

The weights given by all respondents to a particular category are summed. The sum is divided by the sum of total weights from all categories. The result is a percentage, and the percentage represents the proportion of total weights that a category has received. The percentage is called the relative importance statistic. Figure 1 summarizes these relative rankings.

Irrigated farmland was second only to household use (not including landscape watering) as a high priority among the eight categories. Note that the column bars sum to 100 percent, so the priority of one use may be measured relative to another. The lowest priorities are found for municipal landscaping and for recreation.

Respondents were then asked to choose among strategies to alleviate short-term scarcity. Options to rank 1st, 2nd , or 3rd included:

1. Restricting the amount of water that can be used on private lawns and landscapes.
2. Restricting the amount of water than can be used on public landscapes (e.g., parks and golf courses
3. Permanently transferring water from farms to the city.
4. Temporarily renting water from farms to the city.
5. Restricting the amount of water that can be used by industry (e.g., commercial manufacturing, mining or power plants).
6. Draining reservoirs and lakes.
7. Increasing water rates (bills) paid by private households.
8. Putting a limit on water projects that help protect wildlife and fish habitat.

These responses are summarized in Figure 2 using the relative importance statistic.

Consistent with the priorities of the previous question, respondents dislike transferring and leasing water from agriculture, but instead prefer restricting outdoor watering on public and private landscapes. Given the responses in Figures 1 and 2, it appears that households would prefer to meet short-term scarcity without impinging the performance of irrigated agriculture.

Respondents are also keenly aware of the potential for long-term water scarcity. In contrast to short-term water strategies, the opportunities to develop water for long-term use are more capital and construction intensive and require longer term planning. Opportunities include:

1. Reusing waste water on private lawns and landscapes (e.g., homes and private businesses)
2. Reusing waste water on public landscapes (e.g., parks and golf courses)
3. Building reservoirs and other storage projects
4. Limiting the growth of cities to a level that is supported by a sustainable water supply.
5. Requiring that households take steps to conserve water (e.g., use low-flow toilets)
6. Constructing pipelines
7. Reusing waste water, after it is treated, for use within the home.
8. Buying water from farmers

The first, second and third best option for meeting long-term water needs were ranked by survey respondents as indicated in Figure 3.

Buying water from farms is the least desirable alternative among the long-term strategies that include reusing water in various forms, limiting growth and building storage projects. Notably, the question does not include a location for alternatives; thus survey respondents might not support reservoir construction near their home or in an ecologically sensitive area.

The previous discussion suggests that households value water in agriculture, but are these households willing to pay a fee to this end? To gain insight, respondents were asked whether they were willing to pay a fee—which varied randomly across respondents from $5 to $25 in five-dollar increments—on their water bill during the

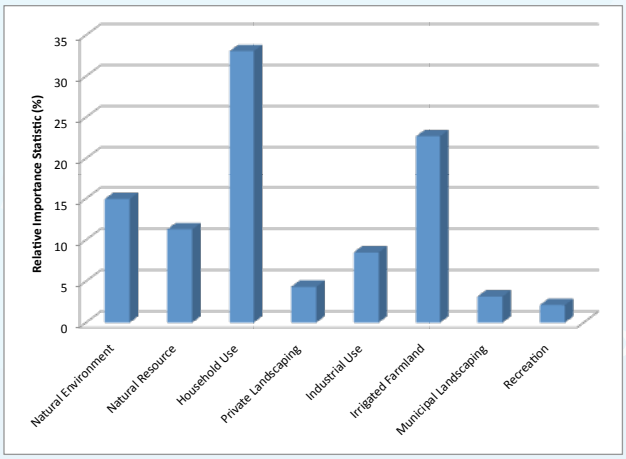

Figure 1. Relative priority rankings for water use in short-term scarcity.

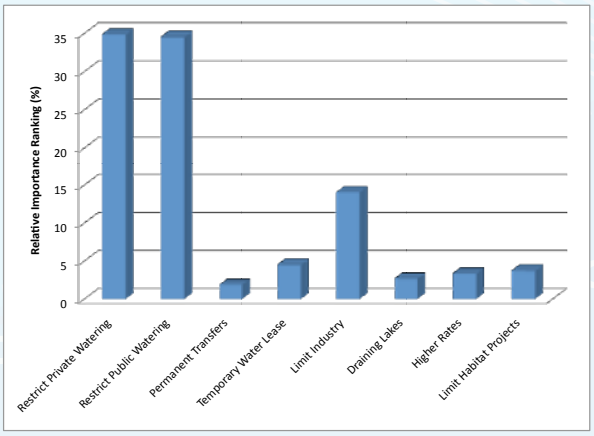

Figure 2. Relative rankings of strategies for meeting demand during short-term scarcity.

By 2030, an estimated 33 million additional people are projected to be living in the West, requiring approximately 30 billion more gallons of water for consumption (Western Governors' Association, 2006).

summer months to fund programs designed to increase the supply of water and reduce the demand for water. Respondents were told this fee would be used to support eight such water initiatives, but the cost of the eight initiatives and how the fee might be divided among these initiatives was not specified. Mores specifically the question asked:

> "Water providers might consider increasing water rates in order to find new sources of water, to pay for water conservation programs, or to help with problems that may arise as water is shifted to cities from other areas. Would you pay an additional $___ per month on your water bill during the summer months if the fee was divided among the following programs?"

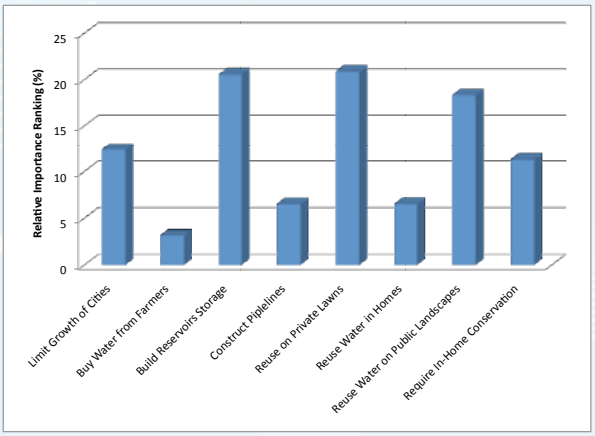

Figure 3. Relative ranking of long-term water strategies by survey respondents.

1. To implement programs and technology to reduce household water consumption.
2. To construct a reservoir for water storage.
3. To create a system to reuse household waste water for watering public landscapes.
4. To set aside water for wildlife habitat in and around nearby streams.
5. To help keep irrigated farms in production.
6. To make infrastructure improvements in rural communities as compensation for water being transferred to cities.
7. To set aside water for public water-based recreation.
8. To provide subsidies on water-efficient appliances.

Just over half (52.1%) of all respondents stated a willingness to pay a fee on their summer water bill in support of eight listed programs. What drives the decision to pay the water fee? Insight comes from a statistical procedure described in Thorvaldson, Pritchett and Goemans (2010). Simply put, the size of the fee tends to decrease the likelihood of a decision to pay. Homeowners are less supportive of the fee than renters, and households with higher incomes are more likely to support the fee. Attitudes of the respondents toward growth also make a difference. If respondents' agree that new growth and development should pay for its own water resources, they are less supportive of the fee. Nearly a quarter of respondents list either "Increase fees on new homes and new housing developments" or "Increase water rates for new housing developments" as their first choice for funding new water supplies. These respondents' couple land use planning and water resource planning. A pair of strategies might assist in confronting water scarcity—encouraging voluntary restrictions on water use, and the implementation of regional planning. Respondents that supported voluntary restrictions generally did not want to pay a fee in support of the eight initiatives. In contrast, respondents encouraging regional planning of water resources supported the administration of a fee. The opposing results might be grounded in perceptions of individual vs. collective responsibility. Households who feel that water restrictions should be voluntary rather than mandated by the government may not see water scarcity as a problem that will affect them, or if it does affect them, they desire independence in addressing the issue. In contrast, households who feel that regional

planning is needed to address water scarcity likely recognize that water scarcity is an issue that will affect everyone and that the best solutions will likely need to involve entire communities.

Simple demographics also play a role in support for the fee. The longer a resident has lived in the West, the less support exists for the fee. Although there is little correlation between the length of time a respondent lived in the West and an awareness of water scarcity, if newer residents to the West are perceived as having a diminished sense of water scarcity, this could further perpetuate the general view that newer residents to the West should bear a greater portion of the burden of securing water supplies for the future.

Homeowners were less likely to give a "yes" response to the fee, perhaps because homeowners are more likely than renters to have greater awareness of water use and costs, and may thus be more sensitive to increasing fees. Moreover, because some renters do not pay a separate water bill, they may not have to bear the burden of a water fee, at least in the short term. Thus, it may not be that renters are more supportive of the fee so much as they are less likely to have to pay the fee and are thus less opposed to it.

The age and income of respondents explains the willingness to support a fee to fund water initiatives. The youngest category of respondents and the oldest respondents tend to support the fee, a finding consistent with Deller et al (1997)—who found that younger individuals and retirees are more likely to support economic development efforts—which may be due in part to older individuals having higher discretionary income. Indeed, higher levels of household income increased the likelihood that a respondent would support the fee. Income also tended to influence the decision to support the fee more than other demographic and attitudinal variables, perhaps suggesting that higher income households can share a larger burden of supporting water initiatives, a revenue-generating model that is consistent with property tax collection to support public utility efforts and progressively-tiered water rates.

Respondents were then asked to allocate the fee across the eight programs in any way they wished, even if they did not support the fee. The average allocations are shown in Table 1. It is striking that, while much of the water policy literature emphasizes the need for demand management and a reallocation of some water from existing uses, respondents prefer to allocate the largest proportions of the fee toward reservoir construction and keeping irrigated farms in production. It may be that these two activities are perceived as benefitting a greater portion of the population.

Averages are just one of many ways to describe respondents' preferences for allocating the proposed water fee. Additional insight can be provided by determining the number of respondents that allocated the majority of the fee toward one particular program, and the number of respondents that allocated 100 percent of the fee toward one program. These data are also displayed in Table 1, and while largely in agreement with the average allocations, there are a few exceptions, namely among those respondents who seek to devote all of their fee to water efficient appliances. Once again, households seek to keep irrigated farms in production.

Conclusions

Water scarcity will increase in the West in no small part due to increasing demands for a resource that is already largely appropriated. Reallocation of water resources is likely, but these results suggest that municipal households would prefer that irrigated agriculture remain vibrant. This is of practical importance to water managers seeking to acquire resources and to the rural communities who find irrigated cropping is an important base industry. A logical next step is to develop innovative water sharing opportunities

Table 1. Average Fee Allocations among Eight Water Programs

Program	Average Allocation	# of Respondents Allocating Majority of Fee to Program	# of Respondents Allocating 100% of Fee to Program
Construct a reservoir for storage.	17.2%	902	82
Keep irrigated farms in production	16.2%	710	83
Create a system to reuse household water for public landscapes.	16.2%	638	70
Implement programs to reduce household water consumption.	13.9%	471	45
Set aside water for wildlife habitat in nearby streams.	12.1%	165	43
Provide subsidies for water-efficient appliances	10.9%	237	84
Make infrastructure improvements in rural communities	6.9%	59	22
Set aside water for public based recreation.	6.6%	37	17

between agricultural and urban interests. Examples of water sharing are limited in the West, but include the use of interruptible supply agreements, rotational fallowing that spreads lost economic activity over a greater geography and time, and innovative water exchanges.

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Additional Resources

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