Water Rate Structure: A Tool for Water Conservation in Oklahoma

Damian C. Adams
Assistant Professor, Department of Agricultural Economics

Christopher N. Boyer
Graduate Student, Department of Agricultural Economics

Michael D. Smolen
Professor and Water Quality Coordinator,
Department of Biosystems and Agricultural Engineering

Introduction

The price you pay for drinking water and sewer access varies across the state. Whether you live in a city or a rural community, water pricing is an important component of your monthly utility costs. Not only do prices affect your household's budget, they also influence how efficiently you and your neighbors use water. When water is cheap, people do not worry much about waste; when water is expensive they might increase efficiency – repair water leaky faucets, install water-conserving appliances, and cut back on outdoor irrigation. The fact is, water rates (the prices the utility charges you for water) can be an effective conservation tool.

Conservation can help communities meet both long-run and short-run challenges. In some parts of the state, water infrastructure and supply are not keeping pace with population growth. From 1970 to 2000, the population of Oklahoma grew by 36 percent (OWRB, 2007). During the same period, the number of groundwater and surface water permits nearly tripled (OWRB, 2007). Periodic droughts and lifestyle changes have also led to frequent shortages of water supplies in Oklahoma. At the peak of the drought period ending in 2007, water supplies around the state were dangerously low. Water conservation pricing is one of many tools that communities can use to help manage water use. This Fact Sheet provides information on average water rates and rate structures, including conservation pricing, in Oklahoma and presents some pricing alternatives that might help manage water use.

Water Rate Structures: Block Pricing

Water pricing can have a significant impact on water use. In communities facing water shortages, one of the most effective ways to reduce water use (and waste) is by charging higher prices. A system of higher rates for higher-volume users is called conservation pricing. Conservation pricing provides an incentive for users to reduce non-essential water use like outdoor irrigation, to reduce water waste, and to adopt water-conserving technologies and behaviors. Based on the law of demand – as the price of water increases, water use decreases.

Increasing rates for all users, however, may have unacceptable consequences. There is a particular concern for low-income consumers whose utility bills can be a significant burden. A common solution is to use "block pricing," where different volume users are charged a different rate. This approach has been used to provide a low-cost resource to industries that need large volumes of water. When water conservation is the issue, block pricing maintains low cost for small-volume users but charges more for high-volume users.

There are a number of water rate structures possible with block pricing, but the most common ones are inclining block rates, declining block rates, and uniform rates. A "block" is a quantity of water for which the price per thousand gallons is set. In most Oklahoma water systems, a block is 5,000 gallons. Each 5,000-gallon block may have a different per unit rate. With a ***Declining Block Rate*** the price goes down as usage goes up because the utility charges a lower price per thousand gallons for higher-use blocks as shown in Figure 1.

The declining block rate structure provides cheaper water to high volume users with little incentive to conserve water. With ***Uniform Rates*** (not shown), the utility charges the same per thousand gallons for all levels of water use. With an ***Inclining Block Rate*** the price goes up with use because the utility charges a higher price per thousand gallons for higher

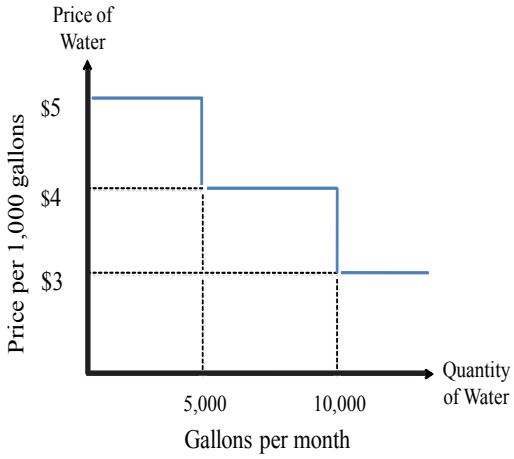

Figure 1. Example of Declining Block Rates.

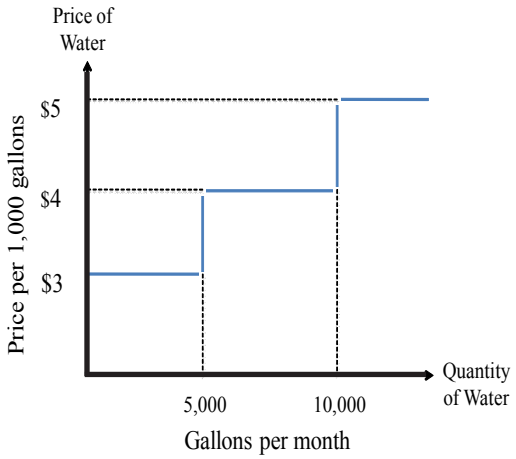

Figure 2. Example of Inclining Block Rates.

use blocks as shown in Figure 2. Inclining rates are known to reduce both average and peak water demand (Beecher et al. 1994).

Oklahoma Water and Sewer Rates

In 2002 and 2008, the Oklahoma Municipal League surveyed water supply managers across Oklahoma for information on drinking water and sewer rates (OML, 2008). The surveys asked the price charged to water users for 5,000 gallons per month and 10,000 gallons per month. We calculated the cost per 1,000 gallons at each level, and classified municipalities as having inclining (conservation) rates if the rate was higher at 10,000 gallons, declining block if the rate was lower at 10,000 gallons, and uniform if both rates were approximately the same. We also examined how average prices and rate structures changed from 2002 to 2008.

Rate Structures

Most Oklahoma communities used declining block rates (DBR) in both 2002 and 2008 (Table 1), but since 2002, the use of DBR fell overall. Notably, there was a 50 percent decrease in the use of DBR by communities more than 100,000 by 2008. However, communities with 10,000 to 20,000 and 20,000 to 50,000 people increased their use of DBR.

Although most communities use DBR, smaller communities are moving toward inclining block rates (IBR). In 2002, no communities with populations less than 20,000 reported using IBR. By 2008, however, only smaller communities (less than 50,000) were using IBR, and all communities more than 50,000 that had been using IBR in 2002 switched to uniform or declining block rates. There was no change in the percent of communities using IBR for those sized 20,000 to 50,000 (8 percent) or more than 100,000 (0 percent). Only larger cities (more than 50,000) saw a growth in the use of uniform rates.

Average Rates

Rate structures only paint half the picture. Conservation can also be affected by average water rates. We calculated the average rates charged per 1,000 gallons, reported in Table 2. In 2002, the *first* 5,000 gallons cost an average of $4.28 to $5.59, and the *next* 5,000 gallons cost $3.76 to 4.82 on average. Communities in the 50,000 to 100,000 population range charged the lowest average price for the *first* 5,000, but there was not a clear pattern between community size and price for the *next* 5,000 gallons. In 2008, the *first* 5,000 gallons cost an average of $5.62 to $6.82, and the *next* 5,000 gallons cost $5.22 to $6.37 on average. Generally, smaller communities charge more for the *first* 5,000 gallons (except for communities ranging in populations of 20,000 to 50,000), but the results for the *next* 5,000 gallons are mixed.

Drinking water rates have generally increased from 2002 to 2008. During this period, the overall average prices charged for drinking water and sewer rose 26 percent for the first 5,000 gallons (from $5.34 to $6.71), and 29 percent for the next 5,000 gallons (from $4.33 to $5.57). Communities in the 50,000 to 100,000 range saw the biggest increase, with a 42 percent jump in price for the first 5,000 gallons, and a 39 percent rise in the cost of the next 5,000 gallons. Higher rates may not necessarily reflect conservation efforts. There are many factors influencing water prices in your community, including the age and condition of infrastructure, and water quality and treatment requirements. In many cases, communities may have raised rates to address new infrastructure needs or water quality regulations.

Why is this important?

Many Oklahoma communities will need to address water shortages at some point in time. Water rates can be effective

Table 1. Oklahoma Water Rate Structures (including sewer) by Population.

Community Size (Population)	*Inclining Block Rate*		*Uniform Rate*		*Declining Block Rate*	
	2002	*2008*	*2002*	*2008*	*2002*	*2008*
Less than 1,000	0%	11%	0%	0%	100%	89%
1,000 to 10,000	0%	8%	8%	4%	92%	88%
10,000 to 20,000	0%	6%	12%	0%	88%	94%
20,000 to 50,000	8%	8%	15%	0%	77%	92%
50,000 to 100,000	20%	0%	0%	20%	80%	80%
More than 100,000	0%	0%	0%	50%	100%	50%
Total Population	2%	9%	8%	3%	90%	88%

Table 2. Summary of 2002 and 2008 Rates (including sewer, $ per 1,000 gallons).

Community Size (Population)	*Price per 1,000 gallons, 2002*		*Price per 1,000 gallons, 2008*		*Change in price, 2002 to 2008*		*Percent change, 2002 to 2008*	
	Up to 5,000 gallons	*More than 5,000 gallons*	*Up to 5,000 gallons*	*More than 5,000 gallons*	*Up to 5,000 gallons*	*More than 5,000 gallons*	*Up to 5,000 gallons*	*More than 5,000 gallons*
Less than 1,000	5.59	4.29	6.82	5.53	1.23	1.24	22%	29%
1,000 to 10,000	5.54	4.40	6.80	5.61	1.26	1.21	23%	28%
10,000 to 20,000	5.00	4.35	6.04	5.30	1.04	0.95	21%	22%
20,000 to 50,000	4.99	4.39	6.47	5.59	1.48	1.20	30%	27%
50,000 to 100,000	4.28	3.76	6.09	5.22	1.81	1.46	42%	39%
More than 100,000	5.53	4.82	5.62	6.37	0.09	1.55	2%	32%
Total Average Price	5.34	4.33	6.71	5.57	1.37	1.24	26%	29%

Table 3. Summary of Alternative Conservation Rate Structures.

Rate Structure	Description.
Drought Demand	Rates are higher during drought periods.
Excess-Use	Prices are much higher for above-average water use.
Inclining Block	Price per block increases as water use increases.
Indoor/Outdoor	Prices for indoor use are lower than prices for outdoor use. This requires separate meters.
Penalties	Charges customers for exceeding allowable limits of water use.
Scarcity Pricing	Cost to develop new supplies is added to the bills of all users.
Seasonal Pricing	Water rates are higher during the season of higher demand (usually summer).
Sliding-Scale	The unit price increases based on average consumption.
Spatial Pricing	Users pay for the actual cost of supplying water to their location. Those farther from the central water source pay more.
Time-of-Use	Water rates are higher during peak hours or peak days of the week.
Water Budget	Block rates are defined uniquely for each customer, based on an efficient level of water use for that customer.

Source: Vickers (2001), Beecher et al. (1994), Mayer et al. (1998).

conservation tools for managing shortages in both the short-term (e.g., from droughts) and long-term (e.g., from climate change or population growth). Inclining block rate pricing is just one of numerous conservation rate structures that could be used to help keep water demand in line with available supply. See Table 3 for examples of alternative water rate structures.

Conclusion

Most municipal water systems in Oklahoma use water rate structures that generally do not encourage conservation, preferring declining block or uniform rates. However, some smaller communities have moved toward an inclining block structure that rewards conservation. Average rates for drinking water and sewer increased by more than 26 percent from 2002 to 2008, and rate increases were generally higher in the larger communities. A notable exception is the 0 to 5,000 gallon block for cities with more than 100,000 people. Other rate structures were shown that communities could consider when deciding how to manage their water resources. Rate structures and average rates may have a strong impact on how efficiently you and your neighbors use water, and may affect water system revenue, water consumption, and other factors important for water systems.

For more information

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The Oklahoma Cooperative Extension Service
Bringing the University to You!

The Cooperative Extension Service is the largest, most successful informal educational organization in the world. It is a nationwide system funded and guided by a partnership of federal, state, and local governments that delivers information to help people help themselves through the land-grant university system.

Extension carries out programs in the broad categories of agriculture, natural resources and environment; family and consumer sciences; 4-H and other youth; and community resource development. Extension staff members live and work among the people they serve to help stimulate and educate Americans to plan ahead and cope with their problems.

Some characteristics of the Cooperative Extension system are:

- The federal, state, and local governments cooperatively share in its financial support and program direction.
- It is administered by the land-grant university as designated by the state legislature through an Extension director.
- Extension programs are nonpolitical, objective, and research-based information.
- It provides practical, problem-oriented education for people of all ages. It is designated to take the knowledge of the university to those persons who do not or cannot participate in the formal classroom instruction of the university.
- It utilizes research from university, government, and other sources to help people make their own decisions.
- More than a million volunteers help multiply the impact of the Extension professional staff.
- It dispenses no funds to the public.
- It is not a regulatory agency, but it does inform people of regulations and of their options in meeting them.
- Local programs are developed and carried out in full recognition of national problems and goals.
- The Extension staff educates people through personal contacts, meetings, demonstrations, and the mass media.
- Extension has the built-in flexibility to adjust its programs and subject matter to meet new needs. Activities shift from year to year as citizen groups and Extension workers close to the problems advise changes.

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