WATER PRICING IN GEORGIA

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INTRODUCTION

Throughout the U.S., rates charged to public water users are generally based only on the costs of producing and distributing water and not on the resource itself. Thus, water is treated as an economically "free" commodity. Consequently, water is underpriced to the user since the value of the commodity is not considered. Since water is viewed as a free good, local water suppliers often price water using a descending rate structure. Results from the American Water Works Association's Water Industry Data Base indicates that 40% of the utilities surveyed nationwide have declining block rates and 44% use a uniform rate structure. Charging declining rates encourages high water consumption. Charging uniform rates neither encourages high water consumption nor water conservation. In the face of long term water supply problems and insufficient financing to improve the situation, water rates should better reflect true costs.

The objective of this study was to investigate the pricing strategies used by Georgia's community water systems. The goal was to determine the effects of pricing methods employed in the water supply industry on water use and system revenues.

Water, and its delivery, constitute a major industry in the state of Georgia. Consequently, utilities' pricing policies require analysis. Preliminary estimates indicate that gross revenues from all public water and sewer systems in the state were $2.2 billion in 1990 --- an average of $375 per person. These municipal, county, or authority water systems employ an estimated 131,000 persons with a capital investment in facilities of $4.6 billion and replacement costs of $5.6 billion. Expenditures for water related programs by state agencies in 1990 was $217 million with nearly 1,500 people employed in budgeted water related positions.

SURVEY METHOD

This paper presents the results of a survey of Georgia's community water systems. The survey was conducted jointly by the Georgia Experiment Stations' Department of Agricultural and Applied Economics and the Institute of Natural Resources, University of Georgia, Athens. A mail questionnaire was sent to all community water systems in Georgia in October of 1991 with a follow-up letter in November and a second reminder with another survey in December, 1991. In January 1992, all systems with incomplete surveys or unclear answers were contacted by telephone. The survey was designed in cooperation with the Association County Commissioners of Georgia, the Georgia Municipal Association, the Georgia Water and Pollution Control Association, the Georgia Environmental Protection Division, the Georgia Environmental Facilities Authority, the Georgia Rural Water Association and the Georgia Water Wise Council.

The population of this study was taken from the Georgia Environmental Protection Division's list of community water systems in the state. A survey was sent to all 535 systems and 316 were returned, accounting for 59% of the public water systems in Georgia.

CHARACTERISTICS OF GEORGIA WATER SYSTEMS

Table 1 shows that 57% of the water systems responding to our survey served less than 1,000 customers in 1990. Those systems serving from 1,000 to 10,000 customers made up 35% of the sample and only 8% had more than 10,000 service connections.

Of the 316 respondents, 233 provided useful rate information with response rate increasing with system size (Table 1). The survey showed (Table 2) 118 of the 233 respondents (51%) using a uniform rate structure, where customers were charged the same per unit cost regardless of quantity. In Georgia, 14 systems (6%) used a flat payment method, where customers paid a constant dollar amount regardless of use. Of the rest, 77 systems (33%) used a decreasing rate structure, 7 systems were unmetered and 17 (7%) used a increasing rate system.

Looking at rate type by system size, the above breakdown holds across all size categories. About 50% of the systems in each size category use a uniform rate structure, one-third use a decreasing structure and the rest

are spread across the other three rate types. Although the sample is small, more of the very large systems use a decreasing rate structure than the other types.

CHARACTERISTICS OF SYSTEM BY RATE TYPE

The results of our survey show that the respondents supply water to over 4.3 million people in Georgia -- over two-thirds of the state. These 316 systems have nearly 1.5 million service connections with a total capacity of about 1.4 billion gallons of water per day. The total daily use of these 1.5 million customers is over 671 million gallons per day resulting in $476 million in 1990 revenues.

Table 1. Size of Georgia Water Systems - 1990

Water Customers (connections)	Number and % in Sample		Number and % of Respondents sending rate information	
1- 999	180	57%	122	68%
1,000 -9,999	111	35%	87	78%
10,000 - 49,999	19	6%	18	95%
50,000 and above	6	2%	6	100%
Total Responding	316	100%	233	
Total Surveyed	535			

Table 2. Number Observations by Rate Type & Size 1990

Rate Type	Number of Customers 1-999	1,000-9,000	10,000-49,000	50,000- & Above	Total	and %
Uniform	61	45	10	2	118	51
Decreasing	35	33	6	3	77	33
Increasing	7	7	2	1	17	7
Flat	12	2	0	0	14	6
Unmetered	7	0	0	0	7	3
TOTAL	122	87	18	6	233	100

Figure 1 shows that those systems using a decreasing rate structure are the largest in the state, serving an average of 8,821 customers. These systems have an average capacity of over 10 million gallons per day (Figure 2), and use an average 5.2 million gallons of water per day, more than double those using a uniform rate (Figure 3). However, the average revenue (Table 3) for those systems is only $110,000 per year above the uniform systems. As expected, those systems using a flat or unmetered rate structure are the smallest systems with lowest water use and revenues.

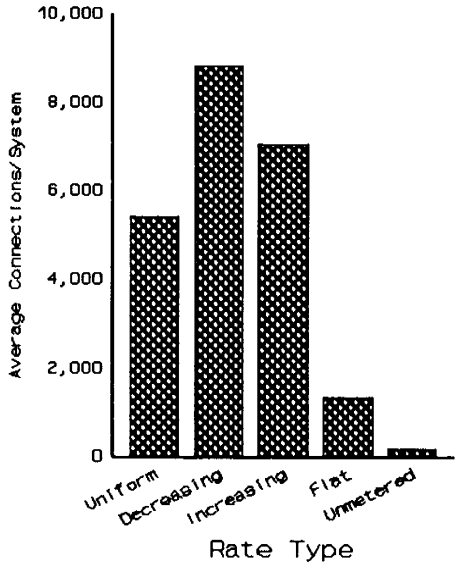

Figure 1. System size (as average number of connections) versus rate type.

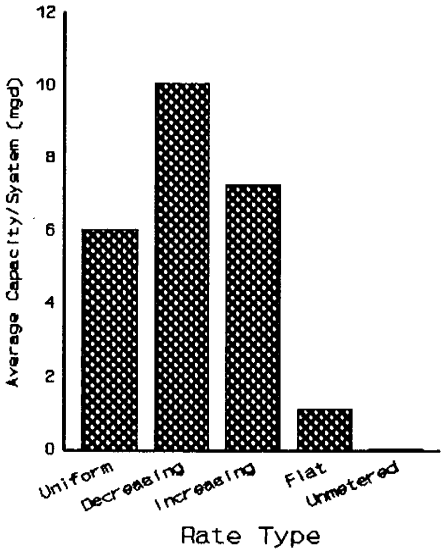

Figure 2. System size (as average capacity in mgd) versus rate type.

Table 4 shows the per capita water demand for systems in each of the rate types. Customers facing water conserving rate types use the least amount of water, per capita. The per capita (connection) daily water demand was 352 gallons for customers facing increased rate, followed by uniform rate customers, decreasing rates and flat rate systems. Thus, the pricing mechanism, as hypothesized in theory, works as expected in providing signals regarding water conservation. However, the average yearly revenues of the systems using an increasing structure was less than both the uniform and decreasing systems (Table 3). This is despite the fact that the average bill for 10,000 gallons was $20.37 for customers facing an increasing structure, the highest in the survey. Finally, the annual revenue per customer was $214.11 for the increasing rate systems, just above the systems using a flat rate and only about half that of the uniform rate systems.

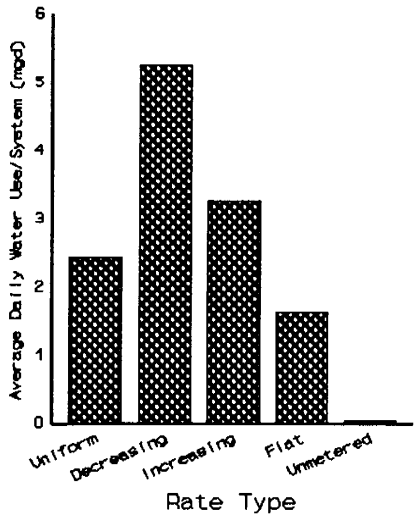

Figure 3. System size (as average daily water usage in mgd) versus rate type.

Table 3. Revenue Characteristics of Systems by Rate Type - 1990

Rate	Total 1990 revenue (million dollars)	Average revenue system (thousand dollars)	Revenue/ connection $	Average bill for 10,000 gallons $
Uniform	258	2340	409.95	18.15
Decreasing	186	2450	270.57	17.78
Increasing	26	1606	214.11	20.37
Flat	4	279	209.11	12.80
Unmetered	.20	33	150.85	

Table 4. Per Capita Daily Water Use by Rate Type

Rate type	Per capita daily water use (gallons/connection)
Uniform	428
Decreasing	503
Increasing	352
Flat	654
Unmetered	---

In order to further explore the relationships between rate type and system water use and revenues, Fisher's least significant differences test was conducted. The hypothesis tested was:

Ho: $\mu_1 = \mu_2 = \mu_3 = \mu_4 = \mu_5$

where $\mu_1 \ldots \mu_5$ were the mean revenues, per capita, of the systems in the five different rate type categories. The same test was also used where $\mu_1 \ldots \mu_5$ was the per capita means of daily water demand, by rate type.

Regarding system revenues for 1990, the test failed to reject the hypothesis that there was no significant difference in mean revenues due to rate type at the 10% and 5% levels. We also conducted a simple regression where revenue was a function of rate type. The F-value (.21) and R^2 (.004) indicated very little correlation between the two.

For per capita water demand, the Fisher test showed no significant differences across rate types except for those few systems using an unmetered rate structure at the 10% level. When conducted at the 5% level, there were no significant differences in mean water use due to rate type. A regression of water use by rate type also showed little correlation.

CONCLUSION

Over the past two years, an increasing number of water systems in Georgia have begun to examine their rate structures. For example, in the Atlanta area, 26% of the utilities used decreasing block rates in 1990 (Atlanta Regional Commission, 1990). In 1992, that percent had fallen to 19 (Atlanta Regional Commission, 1992). As systems examine various water structures, research will be required to judge the impact of these changes on revenues and water use.

The results of this survey show that customers facing prices for water that increase as water use increases do indeed use less water than those facing other pricing structures. Further, those facing uniform rates use less

water than those paying decreasing rates and flat rates. While the statistical results do not distinguish between rate structures, further examination of the data is required.

The results also indicate that concerns about the impact of an increasing rate structure on system revenues may be legitimate. However, given the fact that water is considered an inelastic good, revenues can remain neutral or increase if the rate structure is properly designed. Of course, rate makers must also consider the objectives of any pricing structure. Are prices to be used to maximize only revenue? For profit making? For cost recovery and bond payments? For water conservation? Whatever policy objective is to be considered, rate making requires more and better information on a systems customer base than was evident in the survey responses.

This study was based on a limited data set. Follow-up research suggested by this survey will examine more closely, using time series information, the relationships between rates, revenues and water demand in Georgia.

LITERATURE CITED

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