

## **Economic Demand for Water in Selected Alabama Watersheds: An End-Use Approach to Modeling and Forecasting Water Demand**

Demand for water is influenced by population growth and economic activities as well as by price, income, and custom (tradition). When demand for water outstrips supply at a certain price, water shortage can occur. Adjusting the price of water could create incentives for water users to conserve water, and bring supply and demand back to equilibrium. The objective of this project was to estimate water demand by end-use sectors and to develop a methodology for predicting water use at the watershed level. Given forecast values of socio-economic and demographic variables, the methodology can be used to project annual water demand.

Water demand for 21 selected watersheds serving 60 counties in Alabama was estimated using an end-use factor model, with price of water as the main explanatory variable. The end-use sectors analyzed were residential, irrigated cropland, irrigated pastureland, commercial, industrial, mining, thermoelectric, and public use sectors. The summation of factor demands across all end-use sectors yields total water demand in the watershed.

The watershed was the unit of analysis for the water use factor demand equations. While the demand models were estimated at the watershed level, economic variables used to explain demand were available at the county level only. Water use data was obtained from the USGS while county economic and demographic data came from various sources whose census boundaries did not coincide with the watershed.

We found that demand for water responded significantly to changes in prices. Predicted values of water demand by the individual sectors were used to compute aggregate demand for each watershed. Total observed water use in the watershed was compared to the computed aggregate demand and statistical tests showed that their values were not significantly different. Thus, predicted values from our model closely approximate observed water use.

These results provide information that will assist in more efficient water management by understanding the economic dimensions associated with water allocation decisions. This study successfully combined water use data and county census data by identifying weight variables that define a county's influence on watershed water demand. Water use at the watershed level was satisfactorily predicted by the methodology used in this study. Finally, this methodology can be used to project future annual water demand using forecast values of socio-economic and demographic variables.

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