

A Spatial Analysis of the Distributional Effects of Water Quantity Management

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ABSTRACT: This paper investigates the relationships among the spatial distribution of a region's residential population, water deficits, and the response of residential water demand to three institutional environments. Specifically, the distributional effects of water-scarcity pricing, water rationing, and mandatory water restrictions are compared using spatial data from New Castle County, Delaware. The application demonstrated that a 591 percent increase in the marginal price of water in times of deficit would achieve the same aggregate conservation goals as rationing and mandatory restrictions—a 25 percent reduction in consumption. The distributional effects of these policies are quite distinct. Rationing forced households with lower consumption to forgo essential uses, while households with high consumption were able to conserve at the nonessential margin. The mandatory restriction was more equitable in the treatment of low consumptive households, but provided a rather blunt incentive for efficient consumption among high consumptive households. Only pricing water above a threshold to reflect its scarcity allows consumers to decide efficiently how to conserve by eliminating the less-valued uses.