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# DEMAND SIDE MANAGEMENT: THE IMPACT OF INCENTIVES UNDER INCREASING SCARCITY

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**ABSTRACT:** Demand for water in the arid southwest continues to grow. Nowhere is this more evident than in Albuquerque, New Mexico, located along the Middle Rio Grande. While diversions from the Rio Grande and groundwater are now used to provide water to the city, resources remain scarce. With environmental constraints, traditional agricultural uses, and population growth, coupled with the potential of reduced water resources due to climatic changes, the water budget may become ever more tight. Efficient management programs may become increasingly necessary. Ascertaining the impact of policies and programs is difficult because of the complex nature of the hydrologic system and the impacts of the human behavioral system. Utilizing a Systems Dynamics model that simultaneously considers the physical and behavioral aspects of water management, we analyze the efficacy of alternative residential Demand Side Management (DSM) plans on the Albuquerque Basin aquifer and on the Rio Grande Compact, under difference future climate scenarios. Utilizing a model of the physical hydrology in the Middle Rio Grande with an engineered water management system (Roach 2008), integrated with an econometrically estimated residential demand function specific to the Albuquerque area, and a cohort population growth model, we are able to consider price and non-price incentives on the aquifer and the compact. Specifically we consider alternate population growth scenarios (low to high growth) and different climate patterns (magnitude and timing of drought). We couple these with alternative residential price paths, educational campaigns to inform consumers about water availability, as well as rebate programs for the installation of low-flow devices. Preliminary results indicate that an aggressive price path over our 45-year time horizon can result in an overall decrease in water demand, even with population growth. Educational and rebate campaigns, while effective in slowing demand in the early years is not as effective over the time horizon, as population growth out-paces conservation. We also find that the timing of drought impacts our results. When severe droughts occur later in our time horizon, when there is already a stress on the system due to population growth, making compact deliveries is more difficult. Finally, the level of economic growh can also substantially sress the system.

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