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Options and Consequences: Water Banking/ Leasing Explored for the Rio Grande in Southern New Mexico

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Options and Consequences: Water Banking/Leasing Explored for the Rio Grande in Southern New Mexico

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Since 1950, the demand for water has more than doubled in the United States. Historically, growing demands have been met by increasing reservoir capacity and through groundwater mining, often at the expense of environmental and cultural concerns. The future is expected to hold much the same. Demand for water will continue to increase particularly in response to the expanding urban sector, while growing concerns over the environment are prompting interest in allocating more water for in-stream uses. So, where will this water come from? Virtually all water supplies are allocated. Providing for new uses requires a reduction in the amount of water dedicated to existing uses.

The concept of water banking, or leasing, (defined as a temporary transfer of use across time or space) has gained considerable attention as a volunteer, market-mediated system for transferring water between competing uses. Although water banking/leasing has a number of advantages, there are potential drawbacks as well. Water transfers could increase water depletions by converting paper water rights to new wet water uses. Also, ecosystem and cultural values are not well represented in the marketplace. Finally, the institutional arrangements and third-party effects must be carefully considered in the development of an efficient, fair, and open market system

Here, we explore the role of water banking/leasing in allocating resources among competing demands. In particular, we develop a framework for quantifying the broad consequences of water banking/leasing on water supply, agricultural production, the economy, the environment, water quality, and society. The resulting model allows one to explore different market systems and legal institutions, subject to a range of third-party effects, to aid in the design of an efficient, fair, and open water banking/leasing system.

The water banking/leasing model is formulated within a system dynamics context using the object oriented commercial software package, Powersim™ Studio 2003. System dynamics provides a unique mathematical framework for integrating the natural and social processes important to managing natural resources and can provide an interactive interface for engaging the public in the decision process. These system level models focus on capturing the broad structure of the system, specifically the feedback and time delays between interacting subsystems. The spatially aggregated models are computationally efficient allowing simulations to be conducted on a PC in a matter of

seconds to minutes. By employing interactive interfaces, these models can be taken directly to the public or decision maker.

To demonstrate the water banking/leasing model, application has been made to potential markets on the Rio Grande. Specifically, the model spans the reach between Elephant Butte Reservoir (central New Mexico) and the New Mexico/Texas state line. Primary sectors in the model include climate, surface and groundwater, riparian and aquatic habitat, watershed processes, water quality, water demand (residential, commercial, industrial, institution, and agricultural), economics, policy, and legal institutions. Within the model the basin is divided into four distinct but interacting reaches and a monthly time-step is employed. River operations and water demand trends have been calibrated to historical data.

The proposed presentation will provide a detailed description of the model as well as the process by which the model was created and calibrated. Additionally, demonstration of the operational model will be made.

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