Improving Water Delivery Efficiency in the Middle Rio Grande using a Decision Support System

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Abstract. Water is the lifeblood of the American West and the foundation of its economy, but it remains its scarcest resource. The explosive population growth in Western United States, the emerging additional need for water for environmental uses, and the national importance of the domestic food production are driving major conflicts between these competing water uses. Irrigated agriculture in particular is by far the largest water user – 80% country wide and 90% in the Western U.S – and since it is perceived to be comparatively inefficient user, it is frequently asked to decrease its water consumption.

The case of the Middle Rio Grande illustrates the problem very well. The river is the ecological backbone of the Chihuahuan Desert region in the western United States, and supports it's dynamic and diverse ecology, including fish and wildlife habitat. The Rio Grande Silvery Minnow is federally listed as an endangered species, and irrigated agriculture in the Middle Rio Grande has come under increasing pressure to reduce water consumption while maintaining the desired level of service to water users. This presentation will address our on-going research to make irrigation system operations more efficient in the Middle Rio Grande Conservancy District (MRGCD). Specifically, it will describe formulation and implementation of a Decision-Support System (DSS) that can assist MRGCD managers to more efficiently plan and implement their water delivery operations, thereby reducing river diversions. Since year 2000, the MRGCD has been modernizing their physical water delivery network, and the DSS will be used with SCADA software in making water delivery decisions based on real-time knowledge of available water supplies and crop water requirements.

In irrigation systems, the conceptual problem addressed by the DSS is how best to route water supply in a main canal to its laterals so that the required water diversion is minimized. The MRGCD DSS uses linear programming to find an optimum water delivery schedule for canal service areas in the MRGCD irrigation system. For the past two years, the model has been validated in the field and the evaluation indicates that model recommendations are realistic and represent ditch-rider rotational practices.