Efficient Irrigation Water Management in the Middle Rio Grande using Decision-support Models and Infrastructure Modernization

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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. 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 its dynamic and diverse ecology, including the fish and wildlife habitat. The Rio Grande Silvery Minnow *(Hybognathus amarus*) is federally listed as endangered species, and the irrigated agriculture in the Middle Rio Grande has come under increasing pressure to reduce its water consumption while maintaining the desired level of service to its water users. This presentation will present our on-going research on options 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 the MRGCD managers to more efficiently plan and implement their water delivery operations, thereby reducing river diversions. The MRGCD DSS uses linear programming to find an optimum water delivery schedule for canal service areas in the MRGCD irrigation system. The computer model is presently formulated along with the related datasets for three of the four divisions in the MRGCD. For the past three years, the model has been validated in the field and the evaluation indicates that the model recommendations are realistic and represent ditch-rider practices. The future plans are to complete the data files for the irrigation networks in the remaining division and concurrently help the MRGCD implement the DSS to guide water delivery operation. Additionally, the presentation will address the MRGCD program of irrigation system modernization with SCADA incorporation. Over the past few years, the MRGCD has developed a SCADA system with the focus being to improve water use efficiency throughout the Middle Rio Grande Valley. This presentation examines the five components of the system and how each component was developed and incorporated in the overall SCADA system. The SCADA system and related improvements in operational practices have reduced MRGCD river diversions from 740,000,000 m^3/year a decade ago to an average of 431,720,000 m^3/year over the last three years.

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