

A physical assessment of the opportunities for improved management of the water resources of the bi-national Rio Grande/Rio Bravo basin Una evaluación de las oportunidades para mejorar la administración física de los recursos hidráulicos bi-nacionales de las cuencas del Río Grande/Río Bravo



IMPROVED SOCIAL BENEFITS FROM THE SHARED TEXAS-MEXICO WATER SYSTEM

Steering Committee



University of Texas at Austin



Natural Heritage Institute



Instituto Tecnológico y de Estudios Superiores de Monterrey



Instituto Mexicano de Tecnología del Agua



Universidad Autónoma de Juárez, Chihuahua



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The objective of this project is to examine physical opportunities for expanding the beneficial uses of water in the Rio Grande/Bravo Basin to better satisfy an array of water management goals. These include making agriculture more resilient to periodic and persistent conditions of drought, improving the reliability of supplies to cities and towns, and restoring lost environmental functions in the river system. This is a comprehensive, win-win, model-based planning exercise that will illuminate strategies that can help to reduce future conflicts over water throughout the entire basin. This project is a “whole system” planning effort by some 20 technical institutions, which are primarily non-governmental, located on both sides of the U.S. – Mexico border.

The conventional segment-specific approaches to water management planning are no longer adequate to meet the challenges of a large transboundary basin such as the Rio Bravo Basin. This project is a technically ambitious gathering of hydrologic modeling and institutional expertise from Mexico and the United States that seeks to demonstrate how a system-wide analytical capability can be elaborated to produce greater benefits in the basin.

The Physical Assessment Project consists of two parallel, interacting and converging tracks. On one track, we have built a water resources database and an associated advanced hydrologic planning model that represents the entire basin from Elephant Butte reservoir to the Gulf of Mexico. We are using this model to evaluate the hydrologic feasibility of a suite of scenarios for improving the management of the limited water available in this system, particularly those opportunities that bridge across management units and jurisdictional boundaries. By hydrologic feasibility, we mean both physical viability and the ability to provide mutual benefits to stakeholders throughout the system. This is enabling us to elaborate and understand the hydrologic dynamics in the basin such that the tradeoffs associated with a wide range of proposed management strategies can be clearly illuminated.

On the second track, simultaneous with the development of a basin-wide model, the project has generated an initial set of future water management scenarios that respond to the needs and objectives of the basin stakeholders in each segment and each country. In consultation with the various stakeholder communities in the basin, including water users, planning agencies, environmental organizations, universities and research institutes, and local, state and national government officials, the project has constructed a rich suite of more than thirty realistic scenarios for improving the benefits that can be derived from a fixed water endowment in the basin. The management scenarios, we intend to address a planning horizon that encompasses the next 30 to 50 years. As such, the issue of climate variability and climate change cannot be overlooked.

Currently, these scenarios are being evaluated for hydrologic feasibility using the basin-wide model. In the future, gaming exercises will be performed with the models of these scenarios and the basin stakeholders. Modeling is necessary to understand how the various options affect the entire system and how they can be crafted to maximize the benefits and avoid unintended or uncompensated effects. The definition and refining of scenarios will continue throughout the project.

In developing and screening scenarios, the project is interested in those that have the potential to provide mutual benefits to all stakeholders in the basin. Those that can only be achieved at the expense of current water beneficiaries will be excluded from consideration. We are particularly interested in those broad-scale opportunities that have the potential to produce the largest benefits, but which have escaped the more regionalized water planning that has characterized the basin because they would require cooperation across jurisdictional or water management boundaries. We are interested in the scenarios that could be achieved without changes in the current water allocation structure in the basin, including treaties, compacts and water rights.

The “winning scenarios” will then be subjected to an economic feasibility analysis, and, finally, a legal and political feasibility analysis. The scenario development, hydrologic modeling, economic and institutional analysis will culminate in the presentation of technical recommendations to policy-makers on both sides of the border on the potential for improved water management in the basin.

The first phase of project activity is focusing on the system from Elephant Butte on the U.S. side and the Rio Conchos headwaters on the Mexican side to the Gulf of Mexico, including all tributary watersheds. In a second phase of activity, we expect to expand the program upstream to include the portion of the system from the San Luis Valley in Colorado to the Elephant Butte Reservoir.

This project was launched in 2001 by a consortium of U.S. and Mexican non-governmental organizations and government agencies to explore water management options for the bi-national Rio Grande/Bravo system that respond to the growing pressure on this important resource. Initial funding was from private foundations followed by funding from the U.S. Congress disbursed through the U.S. Environmental Protection Agency (FY05) and the U.S. Department of Agriculture (FY06). Recently, the scenario analysis work of the project has been supported by funds from the Instituto Mexicano de Tecnología del Agua (IMTA). The Project Steering Committee is comprised of the University of Texas at Austin, the Natural Heritage Institute, the Instituto Mexicano de Tecnología del Agua, the Universidad Autónoma de Ciudad Juárez, the Instituto Tecnológico de Estudios Superiores de Monterrey, the World Wildlife Fund-Mexico, and the U.S. Geological Survey.

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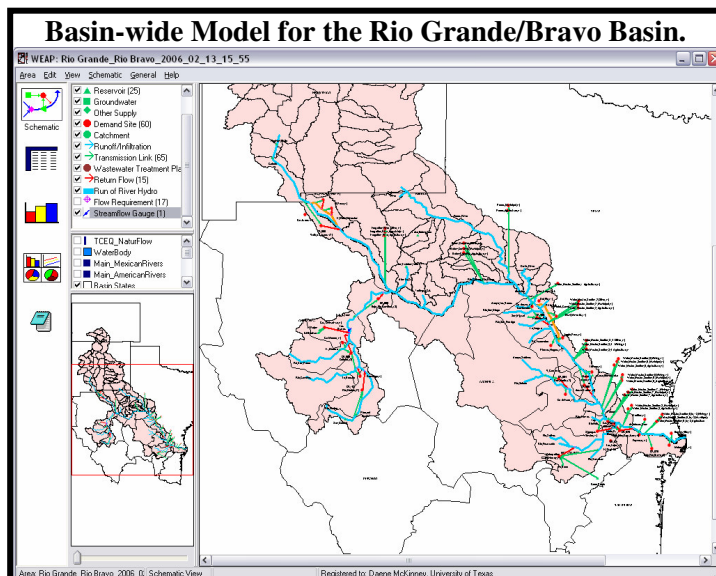
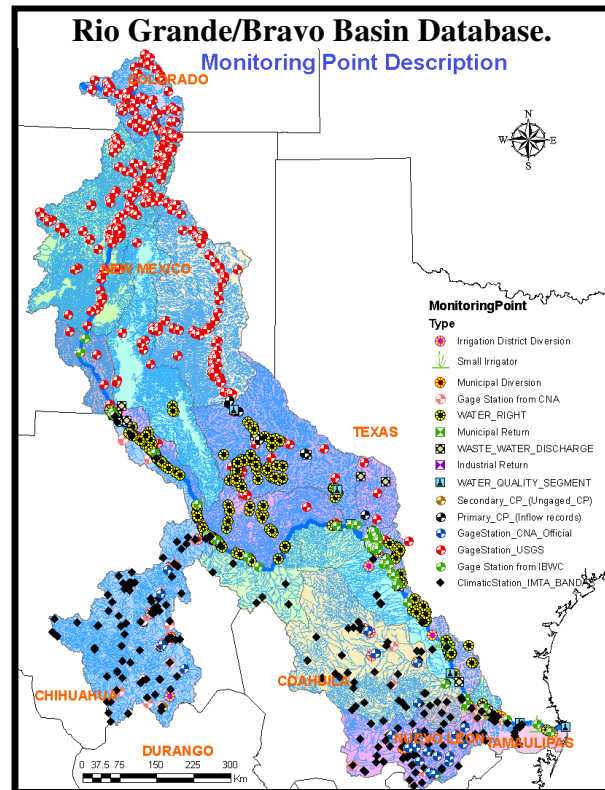
The Project coordinates closely with two other congressionally funded projects at US Universities in Texas and New Mexico: *Efficient Irrigation for Water Conservation in the Rio Grande Basin*, Texas and New Mexico Agricultural Experiment Stations and Cooperative Extension; and *Sustainable Agricultural Water Conservation in the Rio Grande Basin*, Texas State University System.

Recent Project Accomplishments

Data Development - Much of the data needed by the project existed in the CRWR ArcHydro database. Additional required data was collected during the past year and submitted by the project partners for inclusion in the database. This database is now the most comprehensive source of water resource information related to the basin. Database training workshops for project participants and some stakeholders were conducted in El Paso (July 2005) and Monterrey (August 2005) and included, among others, representatives from the IBWC, El Paso Water Utility District and Elephant Butte Irrigation District, Texas State officials, and the National Water Commission of Mexico.

Model Development – Meetings held in June 2002 and March 2005 developed guidelines and recommendations for basin-wide modeling in the Rio Grande basin. The Project partners have designed and implemented these concepts for the development of the basin-wide model. The project has selected a modeling platform (the Water Evaluation and Analysis Program, WEAP) that integrates both hydrology and water resources planning in Rio Grande Basin so that a variety of management options can be explored. Through a series of training session (October 2005) and intensive model development workshops (Cuernavaca, January 2006; and Juarez, February 2006) the model is nearly complete and extensive testing is underway.

Scenario Development - A rich array of scenarios for improved water management has been developed from the Rio Conchos to the lower Rio Grande/Rio Bravo basin in Texas and the Mexican state of Tamaulipas. The next set will focus on the El Paso/Juarez region of the basin. Eventually, we will generate scenarios that will include the entire basin on both sides of the border. These scenarios are the product of consultations with agricultural and urban water districts, the National Water Commission of Mexico, Texas State officials, the Rio Grande Water Master, environmental NGOs and scientists. These



scenarios involve management innovations that go well beyond any that have previously been evaluated or considered. It appears that they have large potential to substantially expand water user benefits in Texas and on both sides of the border without reallocating benefits among stakeholders. Potential benefits to Texas water users would include greater reliability of water supplies through a reduction of the physical losses of water in the system, conservation transfers, improvements in the operations of the Mexican and international reservoirs. In addition, the scenarios also aim for improvements in environmental flow conditions and drought coping strategies. These are now being evaluated for their hydrologic feasibility and efficacy in meeting the objectives of

the water user communities in the basin, using the planning model that has been developed for this purpose.

Scenario Analysis – The initial scenario development process resulted in an increased understanding of the basin stakeholders’ multiple objectives in managing this large bi-national basin: increase benefits to the whole system; improve agricultural water supply reliability; increase municipal water supply availability; and restore environmental flows in the river. Various methods of achieving these goals were also suggested, including (1) water right buybacks; (2) groundwater banking and conjunctive management of surface and ground water; (3) use of non-treaty tributary flows to partially satisfy treaty obligations; (4) water conservation and reuse; (5) infrastructure reconfiguration and reoperation; and brackish water desalination. So far, based on initial

scenario analysis results the programs to retire water rights and bank the saved water in aquifers for later delivery and the conjunctive management of reservoirs and aquifers seem to be physically feasible (although detailed analysis of individual aquifers to assess their suitability needs to be undertaken).

