# A Socio-Environmental Geodatabase for Integrative Research in the Transboundary Rio Grande-Río Bravo Basin

OU

The UNIVERSITY *of* OKLAHOMA

To effectively understand human-water interactions and inform decision making on the shared and scarce water resources in the transboundary Rio Grande/Río Bravo Basin (the Basin), state and Federal entities in the United States and Mexico utilize a wide range of integrated cross-disciplinary and international data. However, data disparities and inconsistencies are challenges to effective transboundary collaboration. The University of Oklahoma developed a socio-environmental geodatabase to inform researchers and practitioners about the spatial heterogeneity of human and natural dimensions in the Basin and help foster transboundary collaboration for sustainable resource management.

Project Location
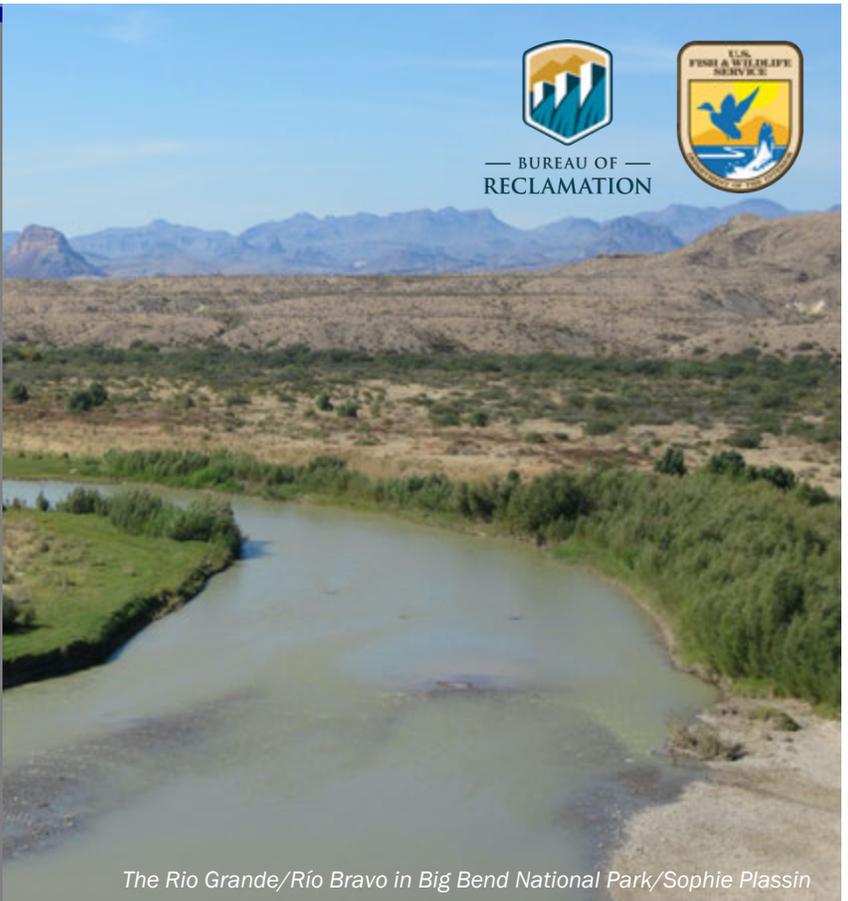
The Rio Grande/Río Bravo in Big Bend National Park/Sophie Plassin

KEY ISSUES ADDRESSED

Researchers in collaboration with Rio Grande Basin stakeholders identified the need for a comprehensive understanding of water and other resources managed across the Basin. Data for the Basin are scattered across multiple institutions and generally focused on limited geographic areas. Furthermore, data on infrastructure, stream networks, water use, and land cover are commonly available, but basin-wide data on the diversity types of decision-making institutions are missing. An integrated data management domain, such as an open-access database to facilitate the sharing of spatial biophysical and social data, will improve understanding of how the Basin functions and will support improved water management decision-making.

PROJECT GOALS

- Combine existing biophysical datasets with Basin social information in an open-access geodatabase to foster transboundary research and cooperation for sustainable resource management between the U.S. and Mexico
- Classify and spatially enable a dataset of institution types making water and land management decisions
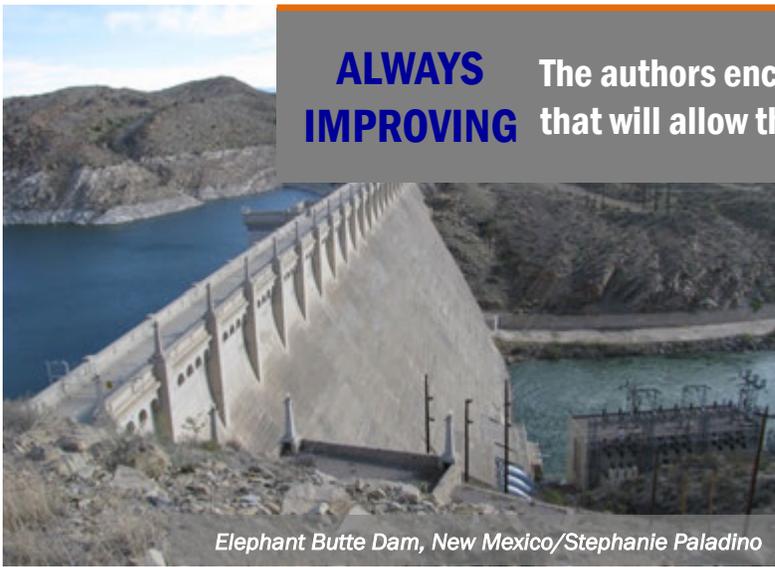
Elephant Butte Dam, New Mexico/Stephanie Paladino

PROJECT HIGHLIGHTS

Compiling Existing Data: Existing spatial and tabular datasets were standardized into 145 data layers. The datasets are organized into five themes: *Water & Land Governance, Hydrology, Water Use & Hydraulic Infrastructures, Socio-Economics, and Biophysical Environment.* Outcomes include a dataset of land use and land cover that can be used to provide a more accurate estimation of evapotranspiration for the entire Basin and datasets on water rights and permits.

Describing Decision-Making Structures: The geodatabase was designed to capture the social heterogeneity and complexity of water and land governance. This approach provides a multi-scale view of how river segments are connected across the Basin. The *Water & Land Governance* data layer includes political jurisdictions, surface-water management agencies (state, Federal, and binational), state and interstate stakeholder platforms, groundwater-focused institutions, irrigation distribution organizations, land management, and protected areas.

A Living Database: The open-access geodatabase can be updated with new data from the United States and Mexico as they become available.

Collaborators

- Department of Geography and Environmental Sustainability, University of Oklahoma
- Center for Applied Social Research, University of Oklahoma

Lead Author: Jennifer Villa, USGS OK-TX Water Science Center, December 2020. Photos courtesy of University of Oklahoma For more information on CCAST, contact Genevieve Johnson (gjohnson@usbr.gov) or Matt Grabau (matthew_grabau@fws.gov).

Visit CCAST:

LESSONS LEARNED

With 145 layers of information classified in five themes and 35 sub-themes, the geodatabase is a rich source of information for scientists and practitioners interested in the Basin. Despite addressing many challenges related to dataset inconsistencies, the geodatabase still contains important gaps. Spatial datasets for wells and delineations of most public lands were not located for Mexico. Spatial datasets delineating boundaries of community ditch organizations and acequia associations in New Mexico were not available, and some binational infrastructure information is missing.

The process of integrating bi-national datasets; harmonizing its variables, values, and units; translating between Spanish and English; and geoprocessing information requires the investment of considerable time and effort. Engaging in collaboration with an interdisciplinary team and with the help of stakeholders provides broader interpretations of the components that contribute to the geodatabase. This comprehensive approach is effective in bringing together the multiple types of data required to obtain a robust analysis and understanding of land and water management decisions in the Basin.

NEXT STEPS

- Update geodatabase as more data are available
- Incorporate more datasets describing social, cultural, and political components of the Basin
- Use the geodatabase to support the development of an integrated socio-environmental water resource management model for the Basin

For more information on this project, contact Jennifer Koch: jakoch@ou.edu

Gate controlling water distribution along canals/Stephanie Paladino