Sustainable Agricultural Water Conservation

Leadership, Database, and Clearinghouse

Year 6 Final Report

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Abstract/Executive Summary

Researchers at the Meadows Center for Water and the Environment (formerly River Systems Institute) of Texas State University-San Marcos were granted continued funding for data management and leadership for the Sustainable Agriculture Water Conservation (SAWC) projects in support of the Rio Grande Research Center at Sul Ross State University. The overarching goal of the SAWC is to develop and apply a holistic management approach for sustainable water uses within the basin. In order to achieve this goal, this project encourages communication, accessible data sharing, and acts as a central repository for a vast amount of information. This project has a basin-wide focus and addresses the SAWC's Diagnostic Study Objective 1.1.

During this project, the Executive and Assistant Directors of the Meadows Center supported the SAWC Director in management and strategic vision of the SAWC and oversaw all projects being performed by faculty and staff at Texas State University-San Marcos. In this project, the PI also conducted data and information management efforts to update and improve the SAWC databases and website.

This project has been a successfully collaborative effort with US and Mexican universities and federal agencies. During the sixth year the team will identify data gaps, duplicative efforts, and specify missing data throughout the basin. Identifying, analyzing, and articulating the root causes of the transboundary problems will be at the core of this project. The main outputs of this project were completed biogeographic, socio-economic, institutional, legal, and agricultural assessments and analyses. Despite the vast amount of work completed and funds expended, communication and information sharing among the players is still a huge barrier to the sustainable use of the Rio Grande. Thus, we also continued to maintain the databases and the project website and make SAWC researcher's data and outcomes more readily available on the site.

The River Systems Institute underwent a renaming due to an endowment and is now the Meadows Center for Water and the Environment. As this change happened in late 2012, the tasks preformed during this project span both names for the center.

Result of Tasks

Task 1: Database and Website

The proposed **Task 1** included the maintenance and update of the binational Rio Grande Institutional Database, the bilingual Rio Grande Publications Database, and the SAWC website.

Updates to the Institutional Database included additions which aimed to largely focus on government institutions. These institutions were found during the development of the Rapid Institutional Analysis to have important administrative duties over the waters of the Rio Grande and warranted inclusion in the online Institutional Database. It was a goal to create a new data standard to store the records; to will allow keener understanding of the structure of government bureaucracies, and the relationships between agencies that fall under the same parent organization. The additions, improvements and maintenance of the Institutional Database were part of a 5 year deliverable. This is a ongoing process in which some of the elements were successfully implemented. This is a deliverable that will never be complete, however, as the institutions are constantly updating their contact information, and new institutions are being created or discovered. This task could use future funding to continue to expand and improve this comprehensive Institutional Database.

The Publications Database faced challenges during this year of funding. In the previous years, the process to update the database satisfied our need. But in 2012, that process became obsolete and we had to rebuild the system. Our project's data records are housed and managed on the back end through Refworks.com. During the years of 2005-2011, after any changes, additions or updates to the database, the database manager would export an XML file from Refworks that could then be uploaded to a program developed in 2005 by an RSI programmer called Refworks Reader. On January 1st, 2012, the XML download capability was eliminated from Refworks.com due to a security issue, making RSI's Refworks Reader program obsolete. In anticipation of the change, during the fall of 2011, the River Systems Institute team started the process to create a new Advanced Processing and Imaging (API) solution that would allow any changes to the Refworks database to automatically reflect in the front end interface of the SAWC/Rio Grande website. As of December 2012, the solution works, but there are small glitches in the inner workings of the Texas State University server that prevent large volumes of traffic to the site. The site is currently functioning with a Fall, 2011 snapshot of the database, and once the glitches are dealt with, the new changes to the database will be live and reflected as they are made.

The Publications Database also increased its category functionality by introducing Stressors to the watershed as a feature of the database. The Publications Database team met with the technical group from the Geography Department and a methodology was outlined in order to update the database with Stressors. The method entails the following which is not in chronological order as multiple tasks may be carried out simultaneously.

1. A schema of stressors and associated keywords was to be developed, as exhaustive and inclusive as possible
2. The current RefWorks database of 4,000+ References was to be updated with the Stressor keywords
3. The Refworks Reader program that uploads the references from RefWorks to the web server was modified. Once the local server glitches are worked out the changes will be live.
4. The web server database structure was modified to support the new Stressor field

5. Search capability against Stressors was to be added to the website.

The addition of Stressor search functionality was Dr. Petersen's initiative. His group is housed in the Geography department at Texas State University-San Marcos. This specific task was a joint effort of the Department of Geography and the Meadows Center for Water and the Environment.

The website was reconfigured to have an updated look and reorganization. Language functionality was added with switching from English to Spanish. It was unveiled in early 2012 under the URL www.rsiriogrande.org. This website is a central location for Rio Grande related projects at the Meadows Center for Water and the Environment. This site houses information about initiatives through the Sul Ross projects, the USDA projects and the United Nations Global Environment Fund Projects. This site is the portal to the Institutional Database, the Publications Database, the Watershed Characterization Tool, and more. Enter Screen shot of Website HERE. The URL was changed after the Center was renamed in late 2012 from www.rsiriogrande.org to www.meadowscenter-riogrande.org.

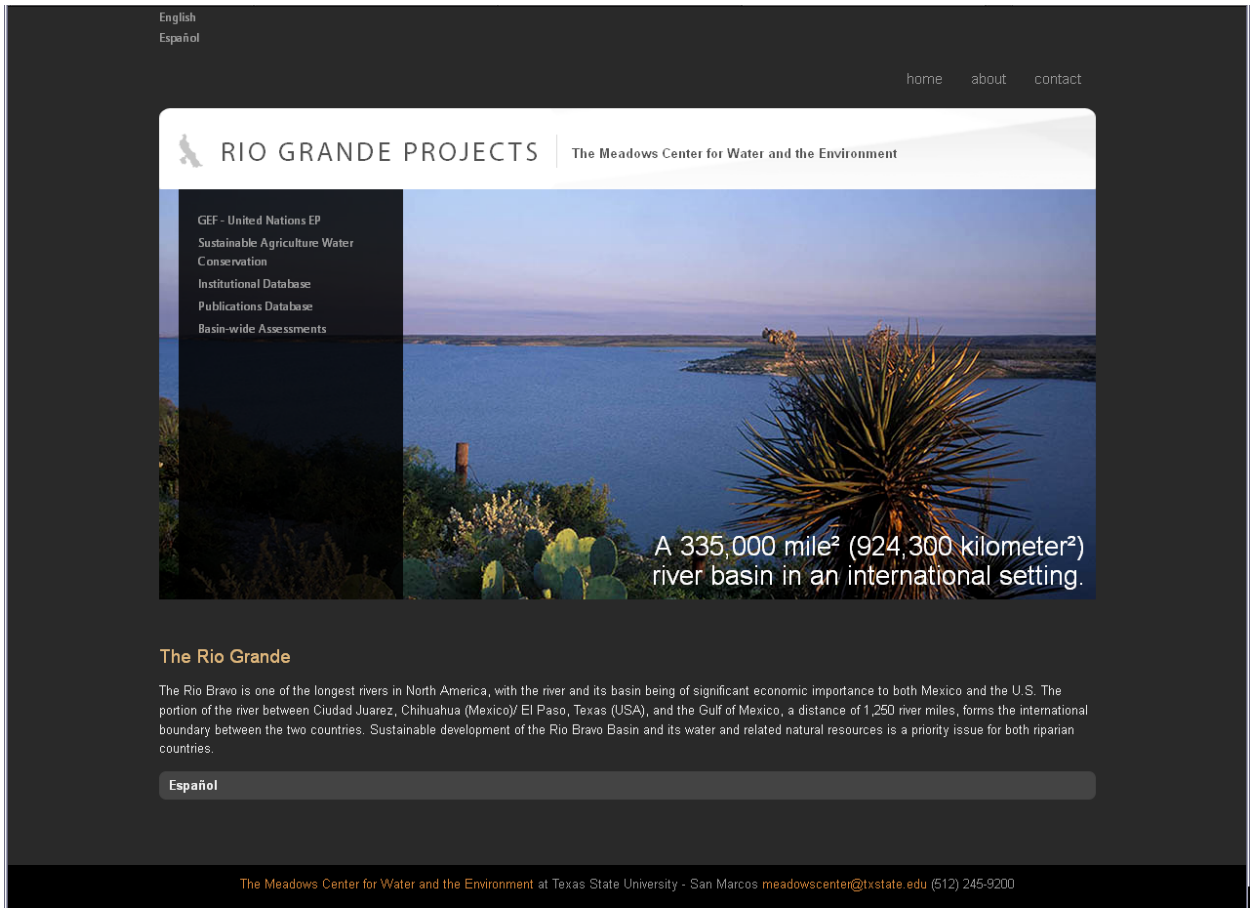


Figure 1. Screen shot of meadowscenter-riogrande.org

Task 2: Brochure

The proposal stated that the goal of **Task 2** was to finalize the SAWC pamphlet and brochure for dissemination. A tri-fold brochure was created in English and Spanish versions. It was never disseminated as no event or opportunity arose.

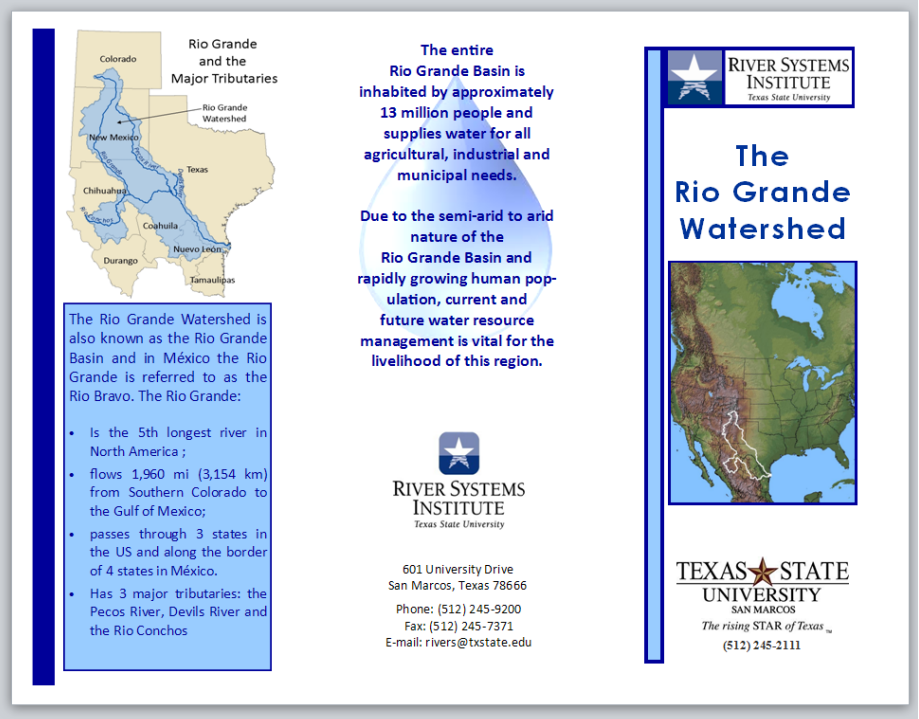


Figure 2.A. Trifold brochure front.

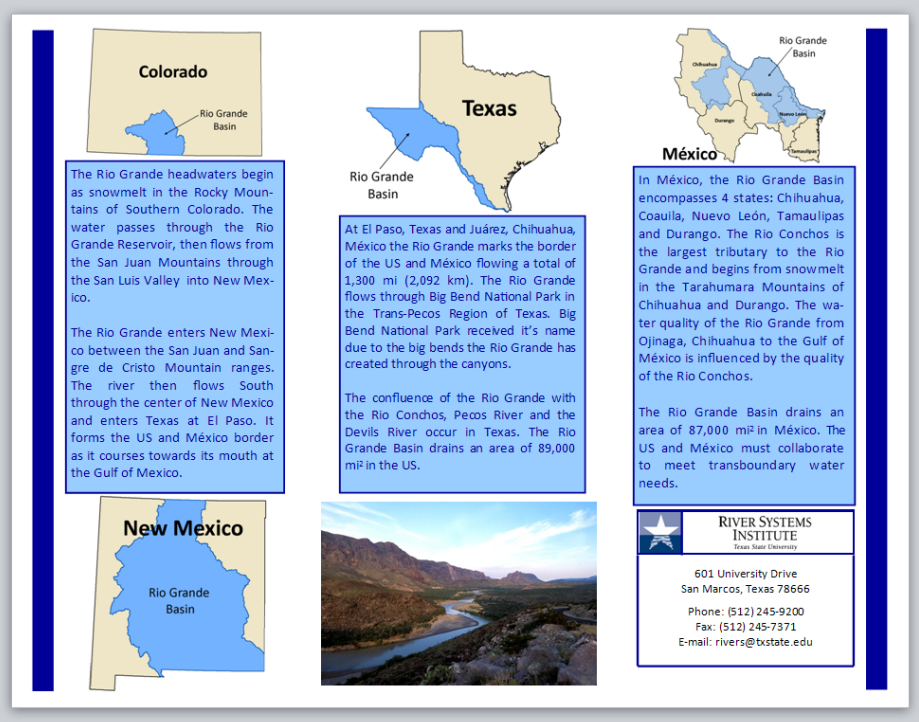
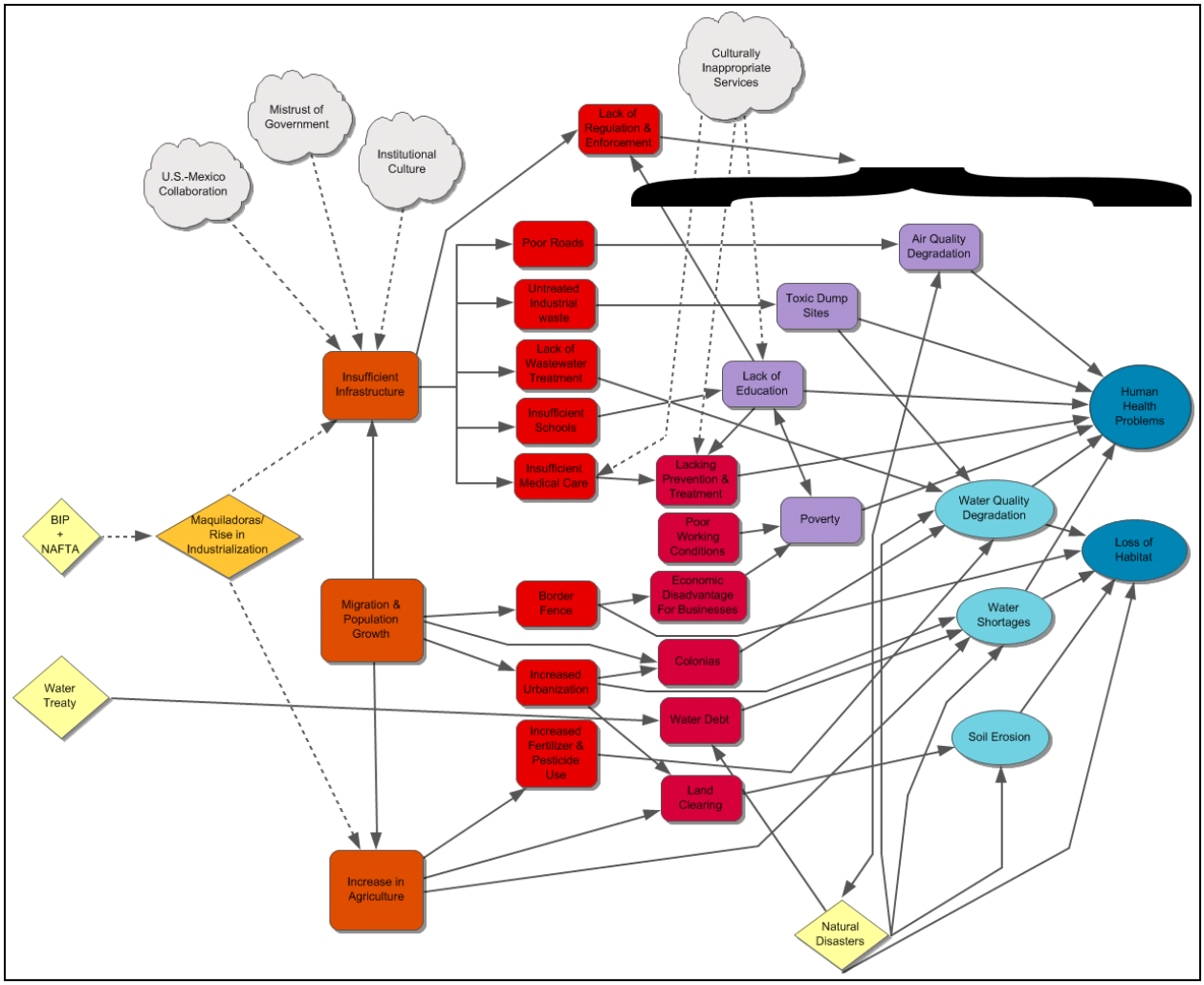


Figure 2.B. Trifold brochure back.

Task 3: Rapid Assessments

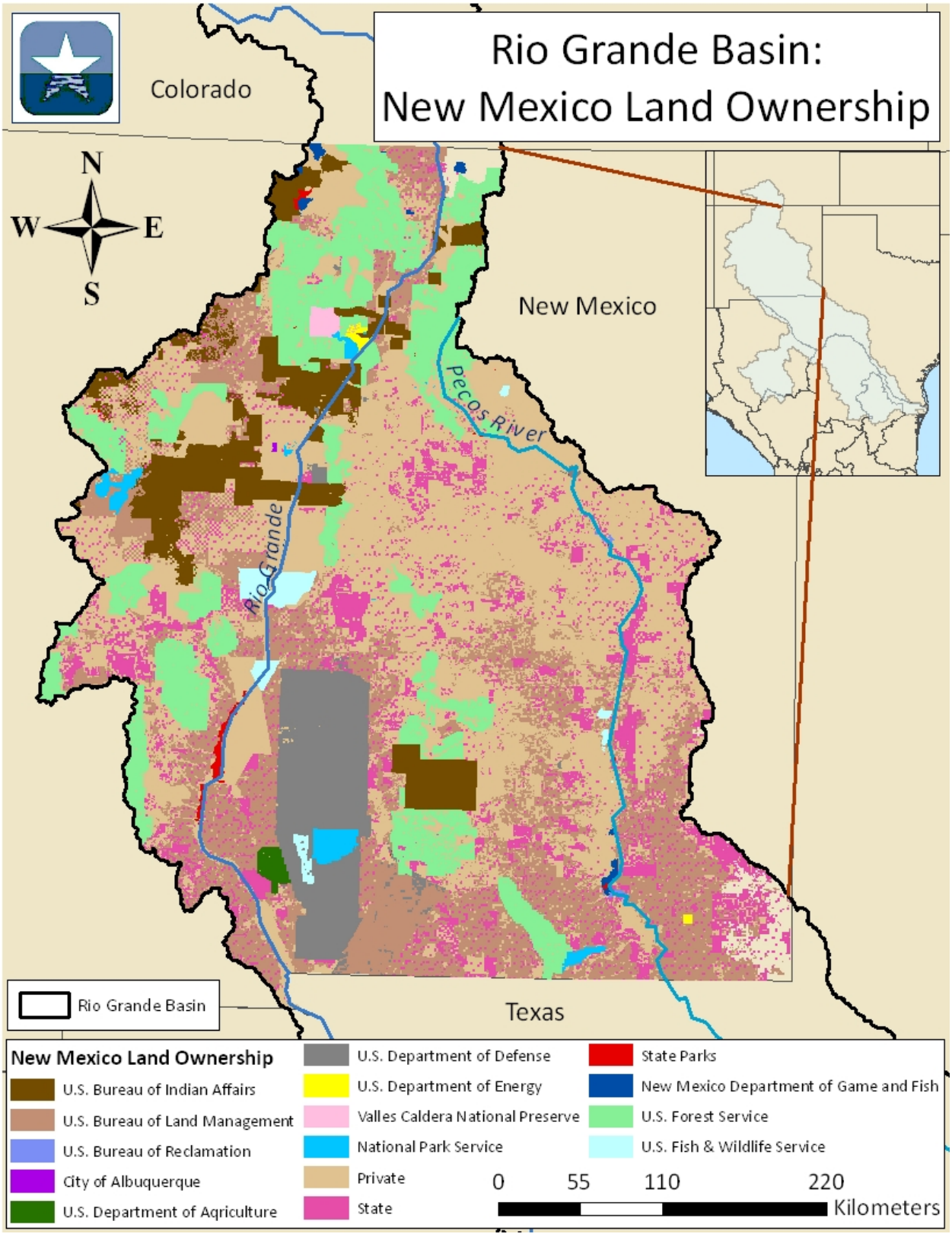
The proposed goals of **Task 3** were to finalize biogeographic, socio-economic, institutional, legal, and agriculture rapid assessment and publish, where possible, into monographs or peer reviewed journals, as well as analyze available data to identify root causes of transboundary problems. These subtasks were accomplished in several ways, and resulted in several separate documents.

Using the causal chain template developed in year 5 for the institutional analysis, issues were evaluated in order to identify the situation that caused them. A string of cause and effect resulted in a web of issues, their roots and the resulting issue that the Rio Grande faces. Understanding patterns in root causes can help with mitigation of the issues. The use of the template resulted in the following causal chain analysis.



The team proposed the collection of data in order to create GIS maps of political boundaries that govern the Rio Grande. This was to give a better understanding of the shared and overlapping government ownership of the Rio Grande within the United States. This effort resulted a series of maps,

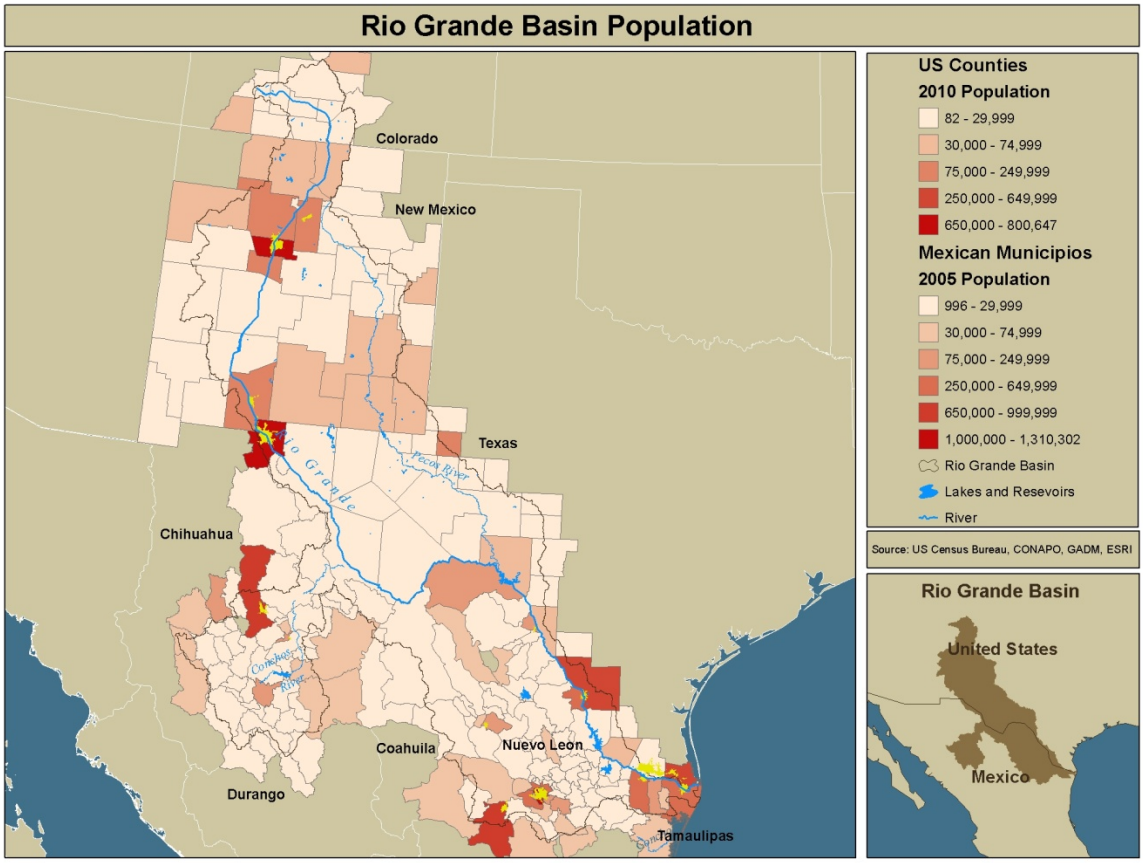
one for each US state in the basin. The following example is the New Mexico portion. Some data from Mexico was utilized, but Mexico was identified as a GIS data gap.



The team proposed to collect an inventory of waste water output from the maquiladora industry, as well as an evaluation of the environmental impact of the Border Industrialization Program and NAFTA. This information was compiled as best as possible into a document, complete with an analysis. Any data gaps and missing information were discussed as opportunities for further research.

The team proposed to research and compile information on existing water quality and storm-water runoff from colonias. This information was compiled as best as possible into a document, complete with an analysis. Any data gaps and missing information were discussed. This research helps to identify the stressors and threats to water quality on the Rio Bravo Basin.

Population data of the Rio Bravo Basin was to be gathered in order to locate high population areas. 2010 and 2035 populations were mapped as well as the percent increase in populations between those years. Although no data gaps were identified, different method of measuring population changes exists between the two countries, resulting in the possibility of inaccurate comparison across the border. The two data formats were integrated as well as was possible. This subtask resulted in a series including the following map.



The team proposed to compile regional better management practices taking into account existing climactic conditions for each area of the Rio Grande Basin, and to formulate techniques to conserve and protect existing natural resources. The climactic and agricultural profiles were characterized for the Basin portions of Colorado and New Mexico, to Texas and Mexico. Conservation techniques and better management practices were proposed relating to water use, agriculture, irrigation, livestock, building, and other activities involving the management of natural resources in the Basin.

Conclusion

During this year the PI and team of researchers at Meadows Center for Water and the Environment compiled, organized and analyzed a wide variety of data on the Rio Grande Basin. The work in Task 1 facilitated the information to reach audiences and have visibility. The work in Task 2 resulted in a brochure that can bring more people to the information and databases housed within the project website. Task 3 work resulted in in-depth analysis and compilations of information on detailed topics that had not been developed previously. This information will enable decision makers in the Rio Grande Basin to have informed assessments when considering the region's natural resources. Data gaps exist that prevented the team from finalizing these analyses. Further funding would enable the team to further explore information, steer future research, and continue progress towards informed management of the Rio Grande Basin and its natural resources.