

Rio Grande Basin Initiative

OUTCOMES

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New Mexico State University
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Mapping the Rio Grande Basin

New management tool aids irrigation districts

by
Danielle Supercinski



GIS-based maps of 30 Rio Grande Basin irrigation districts in Texas completed during the spring 2005 will serve as an indispensable tool for planning future projects and managing districts' day-to-day operations.

Quality paper maps are just one of the byproducts of the GIS efforts.

"We began the (GIS-based) mapping effort as part of a regional water planning study to determine potential water savings that result from district modernization and rehabilitation," said Guy Fipps, Extension agricultural engineer and director of the Irrigation Technology Center. "These maps allowed us to extrapolate water savings test results from a small number of canals to the entire region, and to produce reasonable estimates of water savings."

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It took years to assemble the basic attribute data (canal sizes and conditions, for example) on the water distribution networks needed to produce these maps. This information is currently helping districts to decide which canal segments need rehabilitation or have high water loss, and which are suitable for replacement with a combination of synthetic liners and pipelines.

"These maps are indispensable for this purpose," Fipps said. "The districts estimate that to date these projects have saved about 50,000 acre-feet per year of water that otherwise would have been lost, with many more rehabilitation projects to be done."

Features displayed on these maps include: district boundaries, lined and unlined canals, pipelines, siphons, reservoirs, resacas, river pumping stations, district to district diversion points, roads, and aerial photographs. Some maps also include the Rio Grande River and Arroyo Colorado systems.

Irrigation districts also use these maps to determine exact "water account" of field boundaries and areas, and for the formal process of excluding land from the district as it urbanizes.

"The districts estimate that to date these projects have saved about 50,000 acre-feet per year of water that otherwise would have been lost."

"In recent years, more districts have been using the GIS and maps for day-to-day management decisions, maintenance scheduling, on-farm water delivery strategies and optimization, and for rehabilitation planning," Fipps said. "We have also implemented a technical training and assistance program for districts to develop their own 'in-house' capabilities to update the maps in the future."

The general public may even have an interest in these maps to determine exact locations of district facilities and to see how these facilities may impact their property. Many organizations, including environmental and wildlife interests, use these maps as part of their conservation and public education programs.

Many steps were involved in creating such useful maps.

The first step required assistance from the irrigation districts to locate old paper maps that could be used as a beginning guide. Aerial photographs of districts became the basis of all maps produced. These aerial

photographs were developed by the U.S. Geological Survey and have resolutions of about one meter and exact locations of canals and other features are clearly visible, Fipps said. Then, in many cases, field inspections and explorations were conducted using GPS surveying equipment to verify the locations.

“Since the GIS mapping began, it has allowed us to study districts in ways that would have been impossible without the GIS,” said Eric Leigh, Extension associate in biological and agricultural engineering. “The GIS maps are not only lines on a sheet of paper, but a wealth of information, storing any and all attributes for each section in a database.”

Two specific GIS components are useful for this purpose.

“One allows you to actually draw the map,” Fipps said. “The difference between GIS and other drawing software, such as AutoCAD, is that each point on the GIS corresponds to the exact location expressed in latitude and longitudinal coordinates. Thus, this map or ‘layer’ can be combined with any other layers.”

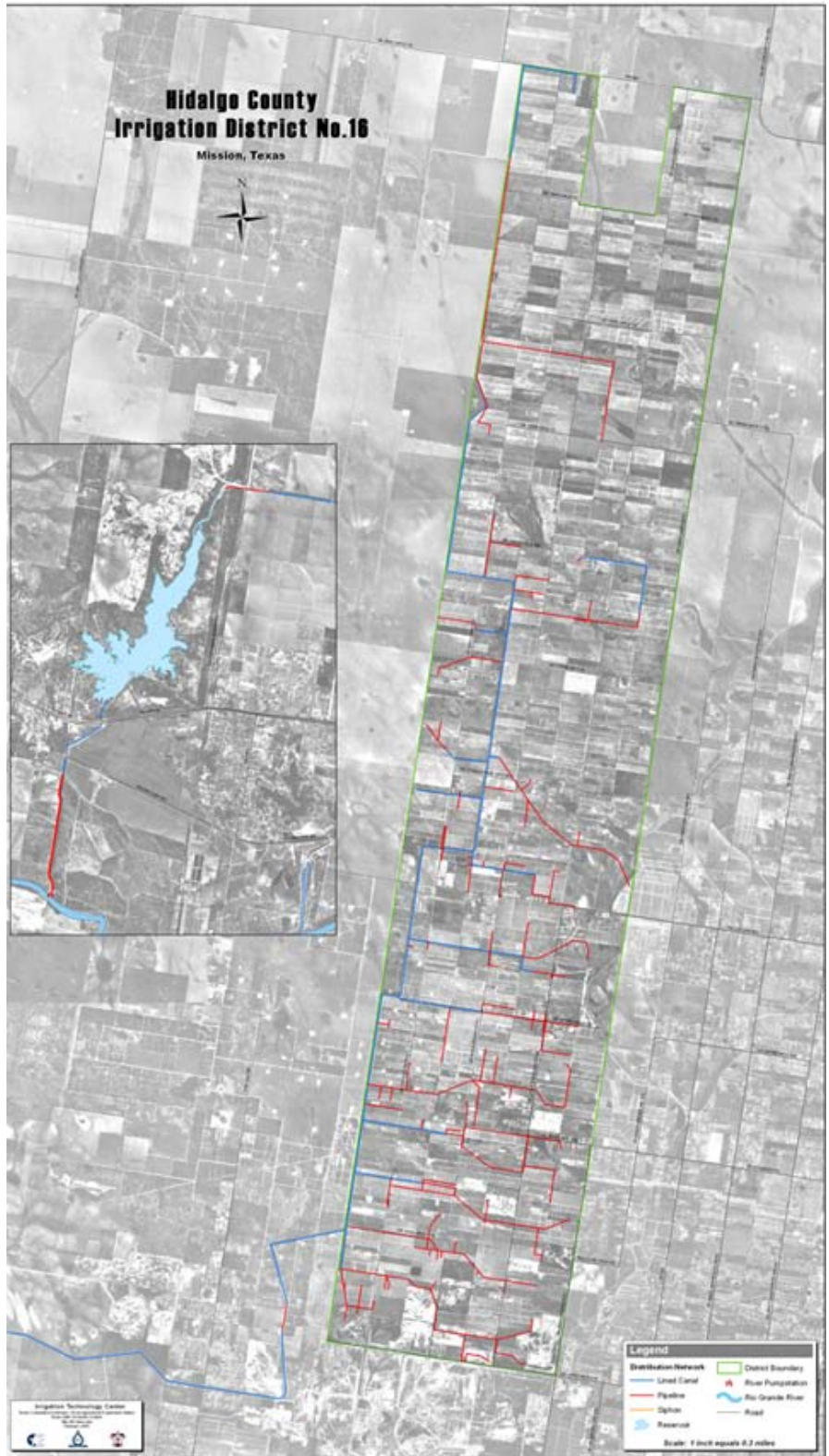
For example, roads in Texas are available in GIS, which can then be combined with these district maps.

“The second feature of GIS that is useful is being able to link ‘attribute’ data with other map features and display these when printing out the map or making a map image,” Fipps said.

The mapping of irrigation districts began in 1996 as part of the GIS development program. This is the fourth major map release completed since 1998.

These irrigation district maps can be ordered online using the order form posted on the IDEA Web site at <http://idea.tamu.edu/gismaps.php>.

There are several options to choose from, including the district, type of paper and



Irrigation district maps, such as this Hidalgo County map, can be obtained for 30 Rio Grande counties displaying district boundaries, lined and unlined canals, pipelines, reservoirs, and resacas, to name a few.

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NMSU Specialist Saves Water

Dickerson teaches gardeners to harvest rainfall

by
Kevin Robinson-Avila

Horticulture specialist George Dickerson practices what he preaches when it comes to water conservation.

In his home garden in Albuquerque's Southeast Heights, Dickerson has arranged his landscape entirely around the concept of harvesting rainwater for irrigation.

"Water is precious in New Mexico, so when it rains, we want to get as much use from it as possible," said Dickerson, a veteran horticulturist with New Mexico State University's Cooperative Extension Service. "In my garden, I use about 90 percent of rainwater for irrigation through simple techniques that allow me to capture rain for future use or direct it to trees and shrubs in my landscape."

In August, Dickerson shared his personal and professional experience in water harvesting with

gardeners during a series of free workshops, sponsored by the Rio Grande Basin Initiative, in Albuquerque, Santa Fe, Los Alamos, Taos and Las Cruces.

"Most rainfall is lost to runoff," Dickerson said. "But by harvesting rainwater, gardeners can reduce the amount of tap water needed to irrigate gardens and landscapes. It's also better for plant health because rainwater is salt-free."

"By harvesting rainwater, gardeners can reduce the amount of tap water needed to irrigate gardens and landscapes."

Dickerson's garden is an exemplary model of water-harvesting creativity.

The property slopes away from his house on all sides, allowing rainwater to drain toward trees and shrubs. Sloped brick walkways hug the home's perimeter, all of which are lined underneath with nonporous heavy plastic. That reduces evaporation, controls weeds and forces rainwater to flow toward the garden instead of seeping through cracks.

"The idea is to channel rainwater with slopes, canals and swales toward the vegetation," Dickerson said. "A tremendous amount of water rolls off roofs and down driveways and sidewalks when it rains, so the landscape design needs to capture and transport that water."

Dickerson grows water-thrifty plants like cactus and desert shrubs farthest from the house because less runoff



George Dickerson, horticulture specialist with NMSU's Cooperative Extension Service, demonstrates how roof water flows to rain barrels below to catch runoff for irrigation. The factory-made orange barrel cost Dickerson \$60, but the black barrel is a trash bin he converted to a rain barrel for less than \$20.

reaches them. Thirstier trees like aspens are located closer to the home to catch more rainwater from the roof and walkways.

“Rain barrels can cost \$50 to \$100 or more at stores, but I converted the plastic trash bins for less than \$20 each.”

Dickerson lives on hilly land. To avoid soil erosion and trap more water, the steepest slopes are terraced with railroad ties. He also laid woven plastic mulch and compost around most trees and shrubs.

“The plastic is porous to allow water through while controlling weeds,” Dickerson said. “The compost acts like a big sponge to grab and save water.”

Dickerson uses rain barrels to capture water from his roof. Wooden canals and aluminum drainpipes channel water to barrels, which have plastic spouts near the bottom and top. The lower spigot is to irrigate the garden between storms, while the upper spout allows overflowing rainwater to drain from the barrel when it gets full. Canals and plastic tubing guide water from barrels to the garden.

“With a 1,500 square-foot roof, a homeowner could potentially collect 930 gallons for every inch of rainfall.”

Factory-made rain barrels are often expensive, so Dickerson converted cheap plastic garbage bins into rain barrels by cutting holes at the bottom and top and gluing plastic spouts to them. He cut holes in the lids and placed netting on top to capture roof runoff and filter debris from water.

Maps

continued from page 3

size. Custom maps are another option. Districts with GIS capabilities can receive a copy of the shape files at no charge. A pdf version is also available.

Three sets of additional maps have been published and can be found on the IDEA Web site as well. These maps include U.S. Congressional District Maps, Municipal Water Supply Network of districts and regional scale maps.

Current project staff includes Guy Fipps, Eric Leigh,

“Rain barrels can cost \$50 to \$100 or more at stores, but I converted the plastic trash bins for less than \$20 each,” Dickerson said.

Dickerson’s roof is flat. To drain puddles, he places barrels on the ground beneath problem areas, runs a plastic hose from the barrel to the roof and sucks the water at the bottom end to create capillary action.

Under ideal circumstances, Dickerson said an inch of rainfall could produce about 0.62 gallons of water per square foot of roof. “With a 1,500 square-foot roof, a homeowner could potentially collect 930 gallons for every inch of rainfall,” he said.



Dickerson’s landscape is built to harvest rainwater for irrigation. The property slopes away from the house to direct runoff to the garden. Water-thrifty plants like cactus are planted farthest from the house where less water reaches and thirstier trees like aspens and pines are closer to the home to catch more water. An underground drain canal in the driveway directs runoff to more garden areas on the right side of the house.

Photos courtesy of J. Victor Espinoza

David Flahive and Askar Karimov. Funding for the mapping has been provided through the *Efficient Irrigation for Water Conservation in the Rio Grande Basin* project for the past 5 years.

Photos courtesy of Guy Fipps, Eric Leigh and Askar Karimov

NMSU Studies Cover Crops

Evaluating which crops are most appropriate for winter kill mulch

by
Jennifer Gipson

Dr. Erin Silva, assistant professor at New Mexico State University in the Agronomy and Horticulture Department, along with Co-PI, Dr. Constance Falk, professor in the Agricultural Business and Agricultural Economics Department, are currently working on the Rio Grande Basin Initiative project *Killed Mulch Cover Crop Systems and Water Management in Southern New Mexico*. The objective of their project is to determine which cover crops are most appropriate for use in a winter kill mulch system in both conventional and organic vegetable production.

They are evaluating the emergence and ground coverage of selected warm-season annual cover crops while also determining optimal planting dates for selected warm-season annual cover crops. The water usage, biomass production, soil water moisture retention and weed suppression of these crops are also assessed to determine the effect of cover crops on the subsequent yields of vegetable crops planted into mulch.

The study is evaluating the soil moisture conservation benefits of three different cover crops planted in late summer and early autumn. The cover crops that were chosen are lablab beans, cow peas and sudex. Currently, the crops are monitored for the amount of water they are using. Once they



Lablab beans, cow peas and sudex were chosen as cover crops to evaluate the soil moisture and conservation benefits.

die, the percentage of groundcover will be monitored, along with weed suppression capabilities.

The ultimate outcome will provide recommendations for potential cover crop varieties and planting dates for use in killed-mulch systems that would provide soil moisture conservation, weed suppression, and wind protection on the subsequent crops. At the conclusion of the project, actual amounts of water saved through the adoption of the system will be calculated. Economic analyses and cost and return estimates regarding the use of a killed-mulch system will be reported and made available to growers.

A presentation on this project is planned for the 2006 Southwest Vegetable Conference in Las Cruces, to describe the work to growers. In addition, a presentation of this experiment will be included at the 2006 Chili Field Day with the intention of distributing the information to growers who may be interested in this production technique. Results will also be presented at the Rio Grande Basin Initiative Annual Conference.

Photo courtesy of Erin Silva

Every Drop Counts...

2006 RGBI Conference Plans in the Works

The 5th Annual Rio Grande Basin Initiative Conference will be held March 27-30, 2006, in Ruidoso, NM at the Ruidoso Convention Center. Conference information can be found at <http://spectre.nmsu.edu/riogrande/welcome.html> and <http://riogrande.tamu.edu/conference2006>.

Registration and more information will be posted as it becomes available.

2006 USDA-CSREES National Water Conference

The 2006 USDA-CSREES National Water Conference will be held in San Antonio, Texas, Feb. 5-9, 2006, at the Marriott Rivercenter.

The conference will provide opportunities for water quality professionals engaged in research, extension and education to share

knowledge and ideas, to identify and update emerging issues, and to network with the CSREES National Water Quality Program and partner organizations. For more information go to <http://www.soil.ncsu.edu/swetc/waterconf/2006/main.htm>.

El Paso Ordinance Promotes Conservation

El Paso residents are doing their part to help conserve water, mostly due to a Water Conservation Ordinance in place by El Paso Water Utilities. The Ordinance applies to any person who uses water from the EPWU supply system. It contains mandatory, year-round restrictions on certain water use activities and prohibits water waste.

There is no residential watering allowed on Mondays; however customers of EPWU can water their landscapes three days a week, year-round.

Residential car washing is allowed only if a bucket and/or hand-held hose equipped with a positive shut-off nozzle is used. However, during times of a water emergency, drought restrictions or fundraising car wash events, washing is only permitted at a commercial car wash.

Rio Grande Basin Initiative personnel with Extension are providing educational programs in support of EPWU programs to help El Pasoans conserve water in their homes and landscapes. Experiment Station scientists are researching the use of wastewater for irrigation and more efficient systems for water usage.

Side Note from the Editor

In an attempt to update our newsletter mailing list, please report address changes or subscriber name changes to Danielle Supercinski at DMSupercinski@ag.tamu.edu.



Faces of RGBI

Administrative support for the project

by

Danielle Supercinski

Ellen Weichert has been a part of Texas Water Resources Institute since September 2001 and has worked with the Rio Grande Basin Initiative since the original proposal. She works with all the project personnel regarding budgeting, purchasing and staff issues. Ellen also helps coordinate meetings and conferences, and prepares related materials. In addition, she provides administrative support to Dr. B.L. Harris, Texas Water Resources Institute associate director and Rio Grande Basin Initiative project director, which may be the hardest part of all.

Ellen is definitely a benefit to the Rio Grande Basin Initiative and its participants. We thank Ellen for all of her work in keeping the Rio Grande Basin Initiative budgets flowing.

Increasing Irrigation Efficiency in the Rio Grande Basin through Research and Education

Through Extension and research efforts, the Texas A&M University System Agriculture Program and the New Mexico State University College of Agriculture and Home Economics are implementing strategies for meeting present and future water demand in the Rio Grande Basin. These strategies expand the efficient use of available water and create new water supplies. This federally funded initiative is administered by the Texas Water Resources Institute and the New Mexico State University Water Task Force with funds from the Cooperative State Research, Education, and Extension Service.

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