

# Rio Grande Basin Initiative

# OUTCOMES

## Water conservation above par

### Las Cruces golf course gets drought-tolerant makeover

It's a breezy afternoon and a few hardy hackers are out swinging iron on Sonoma Ranch's golf course. As nearby shots whistle through the air, Bernhard Leinauer treks through the rough, turning his head from side to side.

A turfgrass specialist with New Mexico State University's Cooperative Extension Service, Leinauer isn't venturing off the lush lawn of the fairway to find a lost ball; he's come to admire the new grass. Course managers removed more than 65 acres of water-loving rye grass from the rough and replaced it with a colorful mix of hardy range grasses.

"When they built the Sonoma Ranch course, they had wall-to-wall cool-season grasses, which required substantial amounts of water," Leinauer said. But a sustained drought and the availability of more water-wise grass varieties led administrators to look for a more sustainable alternative.

That search led them to seek Leinauer's advice. Leinauer is working to help New Mexicans conserve urban landscape water through the Rio Grande Basin Initiative. In particular, he is studying how different irrigation methods and root zone materials impact water use and turfgrass quality.

Sonoma Ranch is a 900-acre planned community on the eastern outskirts of Las Cruces, and the 7,000-yard golf venue, the first new course in Las Cruces in more than four decades, is the featured attraction. Sonoma Ranch buys water from the City of Las Cruces.

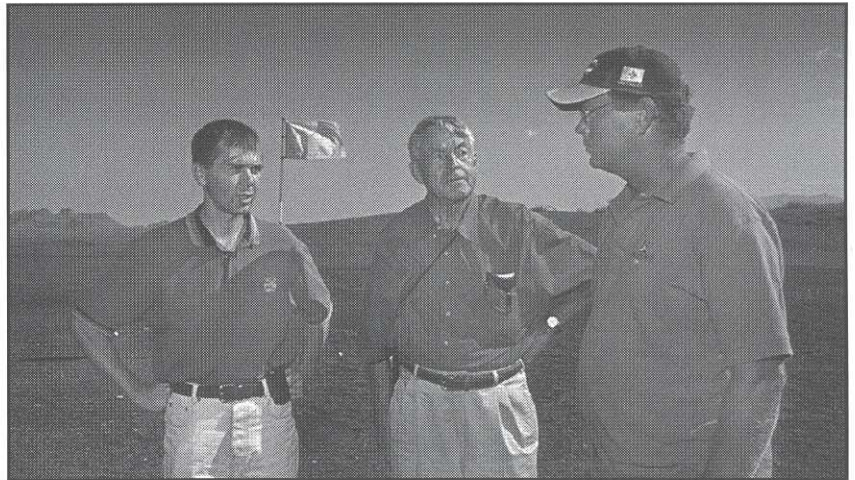


Photo by J. Victor Espinoza

Despite careful design and construction, Sonoma Ranch course officials were stunned by early water bills. So, Mike Kirkpatrick, golf course superintendent, and A.J. Crawford, the former superintendent, established native grasses on the rough areas. "In the first year after the new plantings, we reduced our water use by 30 percent," he said. "Even with the big drought in May and June this year, I'm on track to reduce my water use by 10 percent."

While water conservation is a priority, the golf course is still a business that needs to look good and play well to keep patrons coming back. Among the new range grasses going into the rough were buffalograss, blue grama, bluestem, sand dropseed, Indiangrass, Lehmann lovegrass and some wildflowers.

*New Mexico State University Extension Turfgrass Specialist Bernhard Leinauer (left) discusses use of range grasses with colleague Arden Baltensperger and Sonoma Ranch golf course superintendent Mike Kirkpatrick (right). Course managers removed more than 65 acres of water-thirsty rye grass from the rough and replaced it with a colorful mix of drought-tolerant native grasses.*

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# Scheduling efficient irrigation

## Growers look to Internet for crops' soil moisture requirements

Growers in the Lower Rio Grande Valley are looking to the Internet for tables and graphs that detail the soil moisture in their own fields. And, they're using this information to schedule irrigations.

Watermark sensors in growers' fields collect soil moisture data, which is used with rainfall and irrigation levels to calculate the optimum amount of water needed by a crop. These water requirements are then posted on a Web site developed by Texas Cooperative Extension.

"Prior to our use of the Internet, we analyzed soil moisture data at the end of the growing season," said Extension Agricultural Engineer Guy Fipps, who oversees the project. "Growers could see what they did right or wrong only after it was too late to make any changes. Now the data is available on the Internet as it is collected."

Soil moisture for 250 acres of irrigated cotton, sugarcane and citrus at Rio Farms

in Monte Alto, Texas, is being monitored. Dale Murden, general manager of Rio Farms, said the benefit is irrigation that is timely and efficient.

"A tool like this offers more bang for the buck," he said. "It ensures that irrigation water is used efficiently to maximize yields while conserving water."

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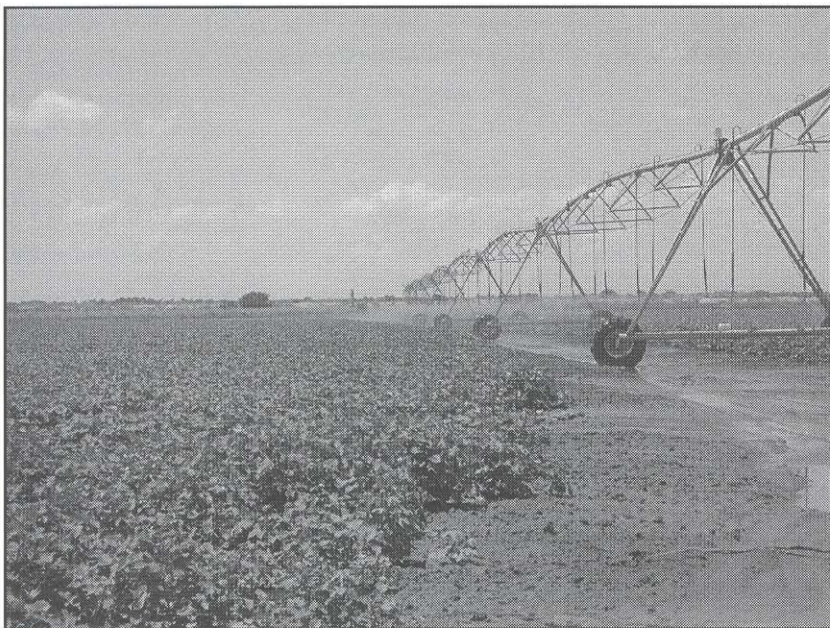
*"Prior to our use of the Internet, we analyzed soil moisture data at the end of the growing season. Growers could see what they did right or wrong only after it was too late to make any changes. Now the data is available on the Internet as it is collected."*

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*Soil moisture data collected with watermark sensors in this cotton field at Rio Farms in Monte Alto, Texas, is posted on the Internet with irrigation and rainfall levels—enabling growers to make irrigation decisions based on the crop's current soil moisture requirements.*

The crop water requirements are online at <http://texaset.tamu.edu>. The TexasET (evapotranspiration) Network Web site, which was launched in 1995, provides weather conditions and water requirements for plants and crops throughout the state. Funds from the federally funded Rio Grande Basin Initiative help to extend its reach in the Lower Rio Grande Valley.

"With the water issues in agriculture making a giant leap to the front of the stage, emphasis has been placed on irrigation scheduling and increasing yields while still trying to conserve water," said Gabriel Ortega, Extension assistant in Weslaco, Texas. "We're certain that the use of this Web site will be important in making that change to more efficient irrigation."





# Protecting native species

## Irrigation ditches could be perfect niche for silvery minnow

Hundreds of miles of twisting agricultural irrigation drains and ditches snake their way across the fertile Rio Grande valley in a cascade of links from the 1,900-mile-long waterway. Now, in a project of the Rio Grande Basin Initiative to monitor New Mexico's native fish, scientists have begun sampling these river offshoots to determine if they can be used to foster conservation of native species.

"I know the idea is a little bit counter to what some people would propose," said David Cowley, project leader and endangered species expert with New Mexico State University's department of fishery and wildlife sciences. "Some just want to keep the water out of the irrigation system and in a river, but our research is looking at ways to use water for both purposes: agriculture and conservation."

Using the Middle Rio Grande Conservancy District as its testing ground, the team has established a series of monitoring stations in the Socorro division where they intend to sample not only the fish, but also aquatic insects, plants and algae. Insect and algae samples are already being taken, while fish collection permits are forthcoming from state and federal agencies. A critical question the researchers are attempting to answer is whether irrigation systems can provide enough food to support native fish.

In 1994, when the district's irrigation system was last surveyed, scientists found 20 fish species, eight of which were native to New Mexico. The tally included such native fish as the gizzard shad and the high-profile Rio Grande silvery minnow.

The silvery minnow, endangered for 8 years, is found only in the middle Rio Grande from Cochiti to Elephant Butte, a stretch of river that has gone dry in recent years due to drought.

There are far more miles of irrigation ditches

than river within the valley, Cowley said, making irrigation canals a potential alternative.

The system is divided into two parts that deliver and drain water. Delivery drains, which originate at major river diversion sites, branch off into smaller and smaller



Photo by Clifford Hohman

so-called laterals, ultimately ending up in fields. Most of the laterals also have an ending point at an interior drain or riverside drain where irrigation water is returned to the river after it percolates through soil.

Cowley said that prior research in the Las Cruces region indicated that even during the off-year irrigation season, many delivery ditches stayed wet. These wet spots can be found underneath another ditch pipeline or highway and appear to offer very good conditions for supporting fish.

"We're expecting to find similar sorts of things in the Middle Rio Grande Conservancy District," Cowley said. The size of native fish in the irrigation system is expected to vary. The largest will likely be the river

*New Mexico State University scientists have begun a three year study of New Mexico's agricultural irrigation drains and ditches to determine if these Rio Grande offshoots can be used to foster conservation of native fish species.*

*Continued on page 7*



# Improving irrigation systems

## GIS used to map water accounts, plan rehabilitation projects

Experts with Texas Cooperative Extension are working at both ends to decrease water demanded by agriculture in the Lower Rio Grande Valley—reducing water losses in the canal system and providing methods for using less water on croplands.

Research indicates that 68 billion gallons of water could be saved by advanced management and rehabilitation of irrigation canal systems. A technical assistance program coordinated by Extension and funded through the Rio Grande Basin Initiative is helping irrigation districts use a geographic information system (GIS) to manage water accounts and plan rehabilitation projects.

The GIS uses mapping software to assemble, organize and display geographically referenced information, such as the size of irrigated acreage or the capacity of pipelines.

Extension Agricultural Engineer Guy Fipps said that prior to the technical assistance program, many irrigation districts in the Valley relied on outdated maps and maintained few records about their distribution networks. Now, he said, eight districts, including those in San Juan, Mercedes, San Benito and Brownsville, have integrated the GIS into daily operations.

In San Juan, fields and their account numbers link the GIS to databases which provide automatic updates as changes occur. As a result, Fipps said, irrigation district employees have immediate access to the latest information and can better interact with customers.

Maintenance crews and canal riders also obtain maps of specific areas related to their work. Irrigation district employees in Brownsville are using the GIS to create

customized notebooks with maps of field boundaries and valves.

“Photographs, diagrams and other records of facilities and legal descriptions have been linked to the GIS for quick display and use,” Fipps said. “With a click

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*Eight districts, including those in San Juan, Mercedes, San Benito and Brownsville, have integrated the GIS into their daily operations.*

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of the mouse, maintenance records and photos of work orders are documented.”

Extension Associate Eric Leigh said that in Brownsville and other irrigation districts, where rehabilitation projects are under way to replace canals with pipelines and to reline canals, the GIS has reduced the size and cost of these projects.

“Prior to the use of the GIS, capacity requirements for new pipelines were based on total land area, which included non-farmed land,” he said. “Maps created with the GIS enable the irrigation districts to determine capacity requirements based on actual field size and soil type, which optimizes pipeline sizes and reduces the cost.”

Irrigation districts also rely on the GIS for resolving boundary disputes, predicting water use patterns and conducting other analyses. In addition to the technical assistance program, Extension is working with the districts through demonstration projects to improve water accounting and evaluate needs for rehabilitation. Through these demonstrations, Extension introduced modern flow meters and water measurement structures for on-farm water accounting.

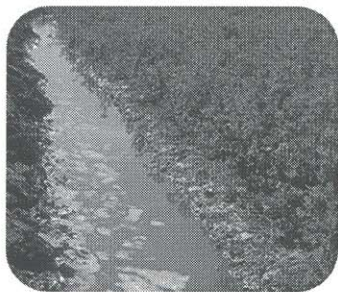
*In irrigation districts where rehabilitation projects are under way to replace canals with pipelines and to reline canals, the GIS has reduced the size and cost of these projects.*



# Every drop counts

## New technical report available from TWRI

A report titled *Alternative Approaches to Estimate the Impact of Irrigation Water Shortages on Rio Grande Valley Agriculture* is now available through the Texas Water Resources Institute. The report, written by Texas Cooperative Extension Economist John R. C. Robinson, compares alternate approaches to valuing the economic impact of irrigation water shortages from Mexican noncompliance with the 1994 treaty.



The two methods compared are an average value-of-water approach and an *ex post*, historical crop damages approach. The availability of historical and average water shortage amounts highlights the usefulness of the former method. Crop data limitations do not allow for a comprehensive treatment of the issue using the historical damages approach.

<http://twri.tamu.edu>

## NMSU and Texas Extension teamed for workshop

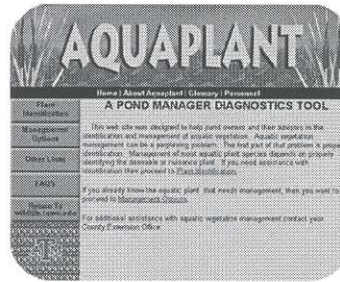
More than one hundred producers from West Texas and Southern New Mexico strengthened their understanding of water and its relationship to salinity, soil properties and plant growth in El Paso, Texas, at a half-day workshop. Specialists with New Mexico State University's Cooperative Extension Service and Texas Cooperative Extension led sessions on soil testing, selecting fertilizers for soil with a high salt content, alleviating salinity problems on irrigated land, and managing irrigation to minimize salt effects on crops. Presentations from the workshop are available online.

<http://riogrande.tamu.edu>

## Tool online for diagnosis and management of aquatic weeds

Irrigation district managers can find online help in identifying and managing aquatic vegetation at <http://wildlife.tamu.edu/aquaplant>. Users sort through photos, drawings and descriptions to identify aquatic plants, and then find specific directions for managing desirable or nuisance plants.

Mechanical, chemical and biological control methods



are described, as well as guidelines for cultivation. Control options are linked to herbicide labels and permits so that managers can make informed decisions.

Control options are included for water hyacinth and hydrilla, which have infested and reduced flow in the Rio Grande River and the valley's irrigation mains and canals.

## Drought management workshop archives available in NM

Archives of three drought management workshops for agricultural producers are available at Cooperative Extension offices in New Mexico.

The workshops, originally conducted online, cover efficient irrigation, financial management strategies and in-home water conservation.

"This online presentation is a valuable opportunity for producers, because they only have to travel as far as their county Extension office to participate," said Craig Runyan, project

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director for the Rio Grande Basin Initiative in New Mexico.



“Drought management is a timely topic,” Runyan said. “Although New Mexico has been getting rain recently with this monsoon season, it’s premature to think that we’re out of the drought.”

<http://weather.nmsu.edu>

### Video describes use of poly pipe to replace earthen ditches

A new video describing the use of polyethylene pipe, known as poly pipe, to conserve irrigation water is available through Texas Cooperative Extension offices in the Rio Grande Valley. The video, produced by Extension Agronomist Charles Stichler, describes the irrigation challenges faced by growers and the use of poly pipe to replace earthen canals and ditches. Benefits of using poly pipe, as well as selection, use and maintenance are explained in the video. For more information, contact a county Extension office.

### New participants bring additional projects to Rio Grande Basin Initiative

Three New Mexico State University faculty members joined the Rio Grande Basin Initiative with new projects in wastewater reuse and domestic water use:

- Brian Hurd, assistant professor of agricultural economics and agricultural business, is measuring the resulting savings from Xeriscaping in New Mexico communities and identifying barriers to further Xeriscape adoption. Herd will identify residential landscaping trends that can assist municipal water managers in assessing local program impacts, and he will inform water policy makers on the effectiveness of residential water conservation programs.

- April Ulery, assistant professor of agronomy and horticulture, is joining a project already under way to identify noxious weeds in the Elephant Butte irrigation canals.

- Geno Picchioni, assistant professor of agronomy and horticulture, is identifying the best management practices for application of wastewater. He will estimate the capacity of plots along the Rio Grande to accept application of wastewater and will then construct a wastewater management model with the collected data. Workshops, classroom instruction and

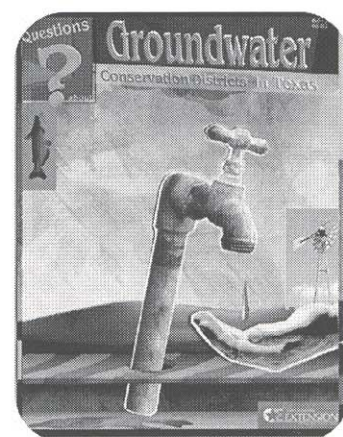
publications are planned.

Proposals for all New Mexico projects are online.

<http://rio-grande.nmsu.edu>

### Publication answers groundwater conservation district questions

A new publication from the Texas Water Resources Institute and Texas Cooperative Extension describes Texas groundwater law and groundwater conservation districts. The publication, written by Texas Water Resources Institute Associates Bruce Lesikar, Ronald Kaiser and Valeen Silvy, answers common questions about the creation, administration



and management of groundwater conservation districts. It describes water marketing and water planning requirements, as well as alternatives to groundwater conservation districts.

<http://tcebookstore.org>

*Three New Mexico State University faculty members joined the Rio Grande Basin Initiative with new projects in wastewater reuse and domestic water use.*

## Las Cruces golf course gets drought-tolerant makeover

*Continued from page one*

In June, Sonoma Ranch took another big step toward water conservation, pulling another six acres of rye grass from the driving range and reseeding it with three drought-tolerant varieties of Bermudagrass: Princess, Sultan and Royal Blend.

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*In June, Sonoma Ranch took another big step toward conservation, pulling another six acres of rye grass from the driving range and reseeding it with three drought tolerant varieties of Bermudagrass.*

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"We're looking at different seeding rates and how different Bermudagrasses can be successfully established once the decision is made to go with a warm-season grass,"

Leinauer said. Leinauer expects the water saving on the new driving range will be substantial. "It depends on how and if you irrigate through the winter," he said. "Your water saving can be up to 50 percent if you completely turn off the irrigation when the warm-season grasses go dormant. If you don't, then you save maybe 30 percent."

Meanwhile, Leinauer said new research suggests that additional water savings can be found just by using some of the recently developed varieties of Bermudagrass. For instance, data from the University of Arizona indicates that the Princess variety of Bermudagrass, which came on the market three years ago, is 30 percent more efficient than other Bermudagrasses. "One of our objectives is to learn how to better establish those stands," he said.

## Irrigation ditches could be perfect niche for silvery minnow

*Continued from page three*

carp sucker at 10 inches in length, while the smallest would be the fertilized eggs of the Rio Grande silvery minnow. Many of the species in the ditches and drains will tend to be smaller specimens since the water level isn't enough to support large fish growth, Cowley explained.

"But that's not to say we couldn't make simple modifications to the drains that would make them friendlier to fish," he said. The researchers are particularly interested in determining whether once native species, especially those threatened or endangered, get in, can they find their way out of the irrigation system.

Alternatively, if the fish are found in the drains, "Can we make those conditions conducive for them to survive for a year or more at a time, especially during times of drought?" Cowley said.

### Call for Papers

In support of the Rio Grande Basin Initiative, the College of Agriculture and Home Economics at New Mexico State University will host the *Aquatic Resources in Arid Land Conference* March 31 through April 2.

The conference will explore water issues from social and ecological perspectives. Subject categories include:

- water and global human welfare
- climatic variation
- sustainable development for drought conditions
- water and endangered species
- aquatic biota of arid land
- sustainable populations
- riparian zones and stream limnology
- aquatic biota as indicators of habitat conditions

The submission deadline is March 7, 2003. For more information, visit <http://rio-grande.nmsu.edu>.



## **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.

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B.L. Harris, Project Director,  
Associate Director, Texas Water Resources Institute

Craig Runyan, Project Director,  
Water Quality Coordinator,  
New Mexico State University Plant Sciences

Rachel Alexander, Editor  
Contributors: LeeAnn DeMouche, Norman Martin

Send comments or subscription requests to  
*Outcomes* Editor, Texas Water Resources Institute,  
2118 TAMU, College Station, Texas, 77843-2118.  
Call (979) 845-1851 or e-mail [riogrande@tamu.edu](mailto:riogrande@tamu.edu).

<http://riogrande.tamu.edu>  
<http://rio-grande.nmsu.edu>

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 **Texas Water  
Resources Institute**  
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Texas Water Resources Institute  
1500 Research Parkway, Suite 240  
2118 TAMU  
College Station, Texas 77843-2118

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