

Rio Grande Basin Initiative

OUTCOMES

ITC conducts first educational program

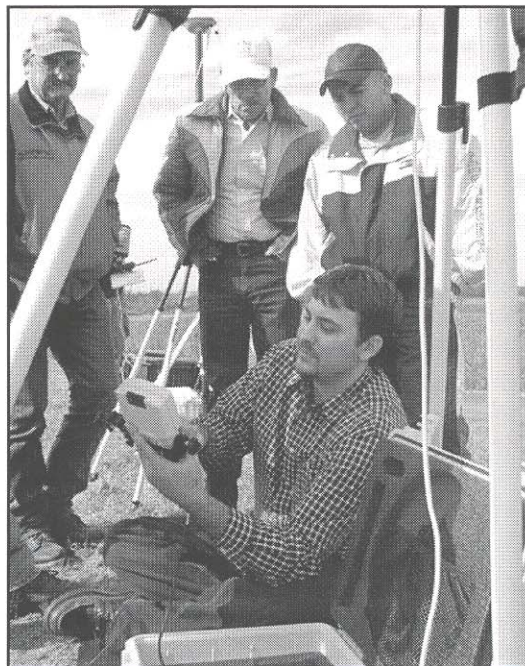
Irrigation districts in Lower Rio Grande Valley receive hands-on GPS training

Locating underground pipelines, measuring irrigated acreage, resolving boundary disputes and installing pipelines based on elevation mapping; this is how irrigation district employees in the Lower Rio Grande Valley intend to use what they learned at a Global Positioning System (GPS) short course offered through the recently established Irrigation Technology Center.

The Texas A&M University System established the Irrigation Technology Center to coordinate its water conservation programs throughout the state, said Guy Fipps, agricultural engineer with Texas Cooperative Extension. "The statewide network coupled with the proposed new facility in San Antonio gives the Rio Grande Basin and other regions the type of capability needed to improve irrigation technology, practices and innovation to help meet our future water demands," he said.

The GPS Short Course, the first educational program offered through the center, helped attendees learn the basics of mapping and surveying with GPS equipment. The advantage to these systems is quick and accurate mapping—the data obtained with GPS equipment can be used by computer-aided design (CAD) and geographic information system (GIS) software.

"Using GPS, the irrigation districts can do much of their surveying and engineering work without having to hire an outside firm," said Eric Leigh, course instructor and Extension associate.



Extension Associate Eric Leigh explains the use of global positioning system equipment to irrigation district employees at the GPS Short Course offered by the recently established Irrigation Technology Center.

In addition to two classroom sessions, the short course included a field training session. The cost of the course was underwritten by the Rio Grande Basin Initiative.

"We are interested in anything we can do to get the job done better, faster and more efficiently," said Bruce Thomas, short course attendee and residential water manager with La Feria Irrigation District. "The use of laptops in our trucks is one tool we have started using. GPS is another tool that will help us do our jobs better."

Learn more about the Irrigation Technology Center at <http://itc.tamu.edu>.

The ITC is offering a short course tailored for irrigation districts regarding the use of geographic information systems on Feb. 26 at the Texas A&M Agricultural Research and Extension Center in Weslaco, Texas.



Incentives for efficient water use

Outdated laws discourage growers from conserving water

Charles Tharp, a Las Cruces farmer who grows cotton, alfalfa, and pecans on 500 acres, said he could immediately cut his water use by 60 percent if he installed a drip system to irrigate his crops, but the costs would outweigh the benefits.

"I could irrigate my crops with 40 percent of the water I use now, but those drip systems cost between \$1,200 and \$1,800 per acre and I need to recoup the investment," Tharp said. "If I could sell the water I save on the open market, that would be a huge incentive. I think it would encourage a lot of farmers to make these investments if they knew they could sell the saved water to municipalities and not lose their water rights."

Like Tharp, thousands of southern New Mexico and West Texas farmers are discouraged from investing in water-efficient technology because of outdated laws and regulations, such as bans against selling water to municipal users, said Frank Ward, professor of natural resource economics in the New Mexico State University College of Agriculture and Home Economics. Ward is co-directing a joint study between New Mexico State University and Texas A&M University researchers as part of Rio Grande Basin Initiative efforts to identify "institutional barriers" that discourage water conservation and to analyze policy reforms.

"The good news is government policies during the past century have created an abundance of cheap, easily accessible water for farmers along the southern Rio Grande, and that's made the desert bloom," Ward said. "The bad news is the government has unwittingly made water so cheap and abundant that it has discouraged farmers from investing in measures to conserve water, especially the folks downstream of big dams. There are many

ways to conserve water, but farmers will only get on board when the economic benefits outweigh the costs."

Ward said federal construction of Elephant Butte Dam and other reservoirs combined with interstate water pacts that assure adequate water distribution among lower Rio Grande irrigators have allowed agriculture to flourish. But burgeoning urban populations in Las Cruces, El Paso and Juarez are straining water resources. In addition, demands to divert water for endangered species and dwindling water supplies from drought make conservation urgent.

"There's much more demand for water at a time when supplies are scarce," Ward said. "We need incentives to help farmers free up irrigation water for cities and other uses."

Researchers have already identified nearly a dozen adverse policies. One major disincentive in New Mexico is the use-it-or-lose-it policy, whereby irrigators must demonstrate that they are using their water to retain their rights, Ward said.

"Use it or lose it helps protect against speculative buying and selling of water, but it also encourages growers to consume more than they need to show they are really using it," Ward said. "Farmers need guarantees that they won't lose their rights if they conserve water."

Growers also need to be able to sell saved water at competitive prices to recoup investments in conservation technology. Elephant Butte Irrigation District (EBID) and El Paso County Water Improvement District No. 1 farmers are only permitted to transfer water to fellow district farmers at official prices. This year, the rate was \$20 per acre-foot at EBID and \$15 in El Paso. But if the markets were open, municipalities might pay \$200 or more per

New Mexico State University and Texas A&M University researchers are studying policy changes that could provide economic incentives for growers to switch to water-efficient irrigation systems and to adopt water conservation techniques.

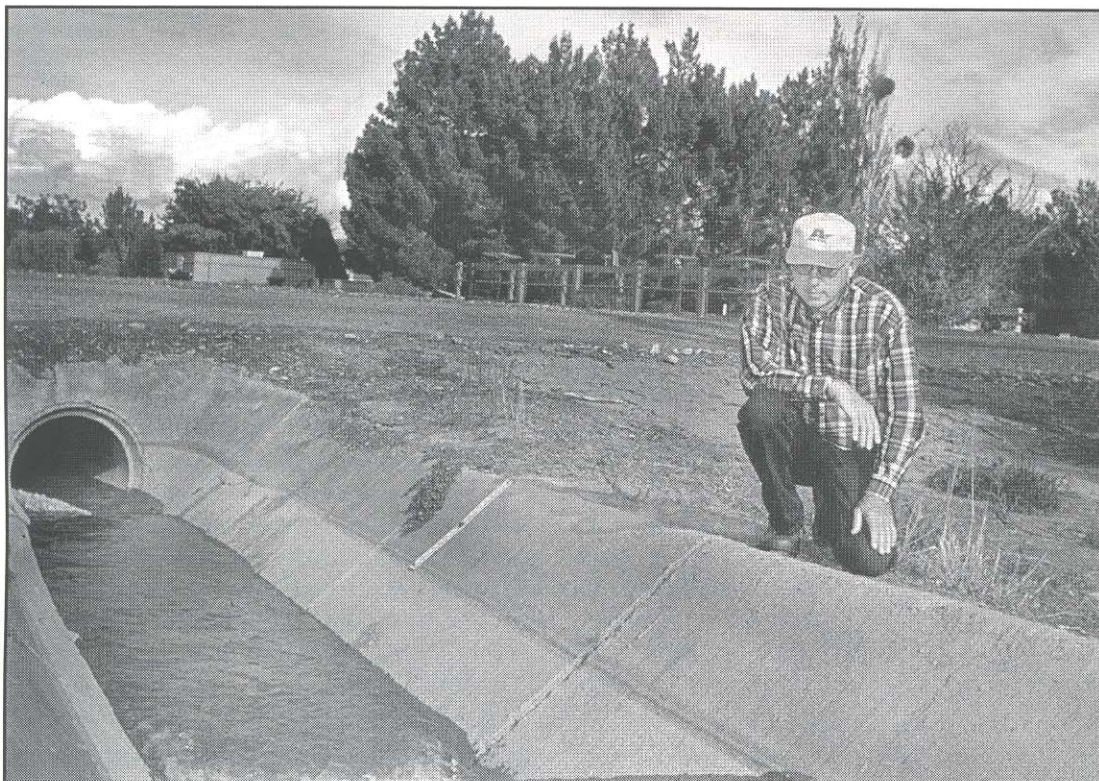
acre-foot for that water, said Ari Michelsen, director of the Texas A&M Agricultural Research and Extension Center in El Paso and project co-coordinator. Michelsen said carryover regulations governing distribution of water conserved by irrigators in a given season is another major impediment. New Mexico irrigators receive 57 percent of Elephant Butte Dam water annually and Texans 43 percent. If an irrigator from either district uses less water one year, the saved water is stored at the dam and then reallocated the following year under the 57-percent to 43-percent division.

"That's a disincentive to conservation because only a portion of the saved water is returned," Michelsen said. Researchers are now surveying 400 farmers—200 from each irrigation district—to determine irrigated acreage, types of crops, irrigation methods, seasonal water use and economic incentives needed to adopt more efficient irrigation technologies and practices, said

Leeann Demouche, New Mexico State University research specialist with the project. The survey will be compiled into a report this spring.

"The study will give us the concrete data needed for future policy recommendations," Demouche said.

Meanwhile, researchers are working with the irrigation districts to encourage farmers to use conservation technologies that will help them save money even without policy changes, such as installing water meters on farms, Demouche said. EBID growers currently receive up to 3 acre-feet of water in a normal season, but many farmers don't need that much water. By installing meters, they can precisely measure water flow and close irrigation canals when their crops are wet enough. EBID simply credits the savings to their accounts. So far, only nine EBID growers are using the meters, including Charles Tharp, who installed two data loggers at \$600 each.



Charles Tharp is one of nine Elephant Butte Irrigation District members who have invested in meters that measure water flow and close irrigation canals when crops are wet enough. The irrigation district simply credits the savings to their accounts.

Photo by J. Victor Espinoza



Evaluating infrastructure needs

Economists analyze irrigation district renovation projects

Technical reports evaluating the proposed renovation projects for two irrigation districts in the Rio Grande Basin are now available from the Texas Water Resources Institute.

Economists with the Texas Agricultural Experiment Station and Texas Cooperative Extension collaborated with irrigation districts, their consulting engineers, the Bureau of Reclamation and the Texas Water Development Board to complete economic and engineering evaluations of proposed renovation projects in Edinburg Irrigation District Hidalgo County No. 1 and Harlingen Irrigation District Cameron County No. 1. The evaluations include the expected water and energy savings from the renovations, and the annual cost of the savings.

"We're supporting irrigation districts and their engineers in identifying these water and energy savings," said Ed Rister, co-author of the evaluations, and professor and associate head in the Texas A&M University Department of Agricultural Economics and the Texas Agricultural Experiment Station. "The evaluations allow them to compare projects of different economic lives, and, in the event of limited funding, prioritize projects based on the cost of these savings," he said.

The proposed project for Edinburg Irrigation District Hidalgo County No. 1 is the replacement of two concrete-lined delivery canals with reinforced-concrete pipelines. Concrete pipelines reduce seepage losses, improve flow rates and allow for greater use of high-tech irrigation systems.

Proposed projects for Harlingen Irrigation District Cameron County No. 1 are canal meters and telemetry equipment, impervious lining of delivery canals, pipelines replacing open-delivery canals and on-farm delivery-site meters. Both canal meters and delivery-site meters will

Aggregate Cost of Water and Energy Savings for Proposed Renovation Projects per Year

	Water per acre foot	Energy per kilowatt hour
Harlingen Irrigation District Cameron County No. 1	\$31.37	\$0.769
Edinburg Irrigation District Hidalgo County No. 1	\$28.97	\$0.203

improve the management of water-delivery system operations. Lining of canals and installation of pipelines reduce seepage losses, improve flow rates and reduce relift requirements.

Projects in both irrigation districts are among the four authorized by Congress in Public Law 106-576, the *Lower Rio Grande Valley Water Resources Conservation and Improvement Act of 2000*. However, project authorization does not guarantee federal funding, Rister said. Several phases of planning, development and evaluation—including the economists' evaluations—are required before the projects may be approved for financing and construction. Completion of economic analyses of water and energy savings for six or more districts is planned for 2003, he said.

Following the authorization by Congress, the North American Development Bank (NADBank) announced the availability of an \$80-million water conservation fund for irrigation projects in the United States and Mexico. The economists are using the spreadsheet model developed for the legislation-authorized projects to develop materials documenting the sustainability of projects proposed to NADBank as well.

Collaborating economists include M. Edward Rister, Ronald D. Lacewell, Allen W. Sturdivant, John R.C. Robinson, Michael C. Popp and John R. Ellis.

The evaluations are available as technical reports through the Texas Water Resources Institute. <http://twri.tamu.edu>

Every drop counts

Valley farmers offered free soil tests

Growers in the four-county Lower Rio Grande Valley of Texas took advantage of a free soil-testing program designed to improve farm management practices and conserve water. The program was funded by the Rio Grande Basin Initiative.

"Soil testing is the cornerstone of an economically and environmentally sound nutrient management program," said Brad Cowan, an agricultural agent with Texas Cooperative Extension in Hidalgo County. "It involves the chemical analysis of soil to determine whether there is an adequate supply of the nutrients essential for plant growth."

Cowan said there are 12 essential elements that can become deficient in Texas soils. If one or more of these elements is not available in an adequate supply, plant health, crop quality and crop yield can suffer.

"Poor plant nutrition can also reduce water use efficiency and increase the amount of water required to produce a given yield," said Cowan. "But, by the same token, if nutrients are applied unnecessarily, production costs increase with no increase in returns. Soil testing can be critical to achieve maximum economic crop yields."

Farmers learn efficient practices at workshop

Farmers and small-tract water users in the Elephant Butte Irrigation District (EBID) learned how their water is delivered and how to make the most of it at an October workshop in Las Cruces, New Mexico. The Agricultural Water Management Practices workshop was hosted by the New Mexico State University (NMSU) Cooperative Extension Service.

Leeann DeMouche, a specialist with the NMSU Extension Plant Sciences department, and James Narvaez, EBID district hydrologist, opened with an explanation of the irrigation district's distribution system, which serves more than 8,000 users from Sierra County, New Mexico, to El Paso, Texas. Presenters also offered ideas on irrigation scheduling and management.

"If irrigators know exactly what it takes for EBID to get water onto their land, then hopefully that process can be faster, more efficient and more productive for them all around," DeMouche said. "This workshop comes out of the Rio Grande Basin Initiative and is connected to research on institutional barriers to water conservation in agriculture."



Poster describes non-native aquatic plants

A poster describing the impact of non-native aquatic plants in the Rio Grande Basin is available from Texas Cooperative Extension. The poster, *Invaders Attack Rio Grande Valley*, details the effects of hydrilla and water hyacinth.

"They crowd native species," according to the poster. "They increase water evaporation 4- to 5-fold."

Additional effects of non-native aquatic plants include lowering of property values, impairment of recreational access and harboring of insect pests. Non-native aquatic plants also clog canals and pumping stations, reduce water flow, increase sedimentation, slow navigation, reduce fish and wildlife habitation, and deplete oxygen in the water.

"If irrigators know exactly what it takes for EBID to get water onto their land, then hopefully that process can be faster, more efficient and more productive for them all around."

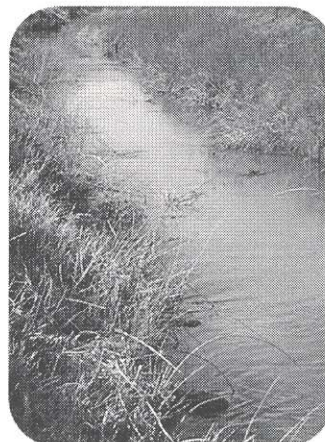
"[Non-native aquatic plants] crowd native species. They increase water evaporation 4- to 5- fold."

Distributed to irrigation districts and Extension offices in the Lower Rio Grande Valley, the poster was developed through the Rio Grande Basin Initiative in an effort to communicate methods for improved aquatic weed control that conserve water and protect water quality. Contact dlmitchell@tamu.edu to order copies of the poster.

Report describing economic methods available from TWRI

A report titled *Economic Methodology for South Texas Irrigation Projects—RGIDECON* is now available from the Texas Water Resources Institute. The report was written by M. Edward Rister, Ronald D. Lacewell, Allen W. Sturdivant, John R. C. Robinson and John R. Ellis. It provides a mathematical discourse documenting the economic and financial methods used in RGIDECON, a Microsoft Excel spreadsheet capital investment evaluation model focused on irrigation district-level pumping and delivery systems. These methods and the spreadsheet are the basis for identifying several measures of performance for the renovation projects proposed by irrigation districts relying on the Rio Grande River for their supplies of agricultural irrigation, municipal and industrial water.

Both the approach and the procedures used to



calculate the required indicators mandated in Public Law 106-576 developed by Texas Agricultural Experiment Station and Texas Cooperative Extension agricultural economists are presented. Attention is directed to the process of selecting the discount rate to be used in the analyses for individual irrigation districts' proposed projects.

Also available from the Texas Water Resources Institute are reports detailing the first two economic and conservation evaluations conducted using the model.

<http://twri.tamu.edu>

Report estimates canal's seepage losses

A report titled *Seepage Losses for the Rio Grande Project: Franklin Canal Case Study* is available from the Texas Water Resources Institute. It presents preliminary findings on estimated seepage losses from the

Franklin Canal in El Paso, Texas.

Seepage losses were estimated with ponding tests and current meter flow measurements. According to the report, seepage losses per irrigation season for the Franklin Canal range from 350 acre-feet per mile based on ponding tests to as high as 2000 acre-feet per mile based on the current meter measurement results. An acre-foot is 325,851 gallons, the amount necessary to cover one acre of land, one-foot deep with water.

"El Paso County Water Improvement District No. 1 and Elephant Butte Irrigation District operate more than 500 miles of canals and laterals, and deliver 870,000 acre-feet of water in a full allotment year to Texas and New Mexico," said Zhuping Sheng, assistant professor of biological and agricultural engineering at the Texas A&M Agricultural Research and Extension Center in El Paso. "Through canal lining, water losses in the conveyance system due to seepage losses will be minimized and delivery efficiency will be maximized. Because canal lining is a project that requires a significant investment of money, water losses need to be determined prior to the execution of the project." Authors include Zhuping Sheng, Yaqi Wanyan, Luis S. Aristizabal and Kadambari Reddy.

<http://twri.tamu.edu>

Project conference set for May

Presentations, break-out sessions will focus on collaboration

The Texas Water Resources Institute and the New Mexico State University College of Agriculture and Home Economics will hold the second annual Rio Grande Basin Initiative Conference May 20–22, 2003 at the Texas A&M Agricultural Research and Extension Center in Weslaco, Texas.

B.L. Harris, project director for the Rio Grande Basin Initiative and associate director of the Texas Water Resources Institute, said the purpose of the meeting is to promote communication among project participants in Texas and New Mexico and to promote collaborative linking with other agencies.

“Significant accomplishments to date will be highlighted, and interactive

Rio Grande Basin Initiative Conference

May 20-22 • Weslaco, Texas

For registration information, visit <http://riogrande.tamu.edu>

discussions for future plans will be a focus,” he said. “Better integration, project activity prioritization and expanded collaboration are goals of the meeting.”

Project participants, collaborating agencies and other interested groups are invited to attend. For registration information, visit <http://riogrande.tamu.edu>.

Managing aquatic resources

NMSU College of Ag and Home Economics calls for papers

In support of the Rio Grande Basin Initiative, The New Mexico State University College of Agriculture and Home Economics will host *Aquatic Resources in Arid Lands*, an international conference and workshop, April 20–May 2, 2003 in Las Cruces, New Mexico.

“The conference will explore water issues from social and ecological perspectives,” said David Cowley, symposium organizer and assistant professor in the department of fishery and wildlife sciences at New Mexico State University. “This conference will bring together experts in sustainable water use, aquatic habitat management and native species conservation.”

A workshop session on the final day will help participants create a science-based policy statement for managing aquatic resources. The deadline for early registration is April 1. Go to <http://leopold.nmsu.edu> for details.

Call for Papers

Subject categories for the conference and its proceedings publication 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://leopold.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.

Rio Grande Basin Initiative Outcomes
Winter 2003, Vol 2. No. 2

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: Kevin Robinson-Avila, Leeann DeMouche,
D'Lyn Ford and Rod Santa Ana.

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.

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

This material is based upon work supported by the Cooperative State Research, Education, and Extension Service, U.S. Department of Agriculture under Agreement No. 2001-34461-10405 and Agreement No. 2001-45049-01149.



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

Nonprofit Org.
U.S. Postage
PAID
College Station
Texas 77843
Permit No. 215