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A Publication of the Texas Water Resources Institute

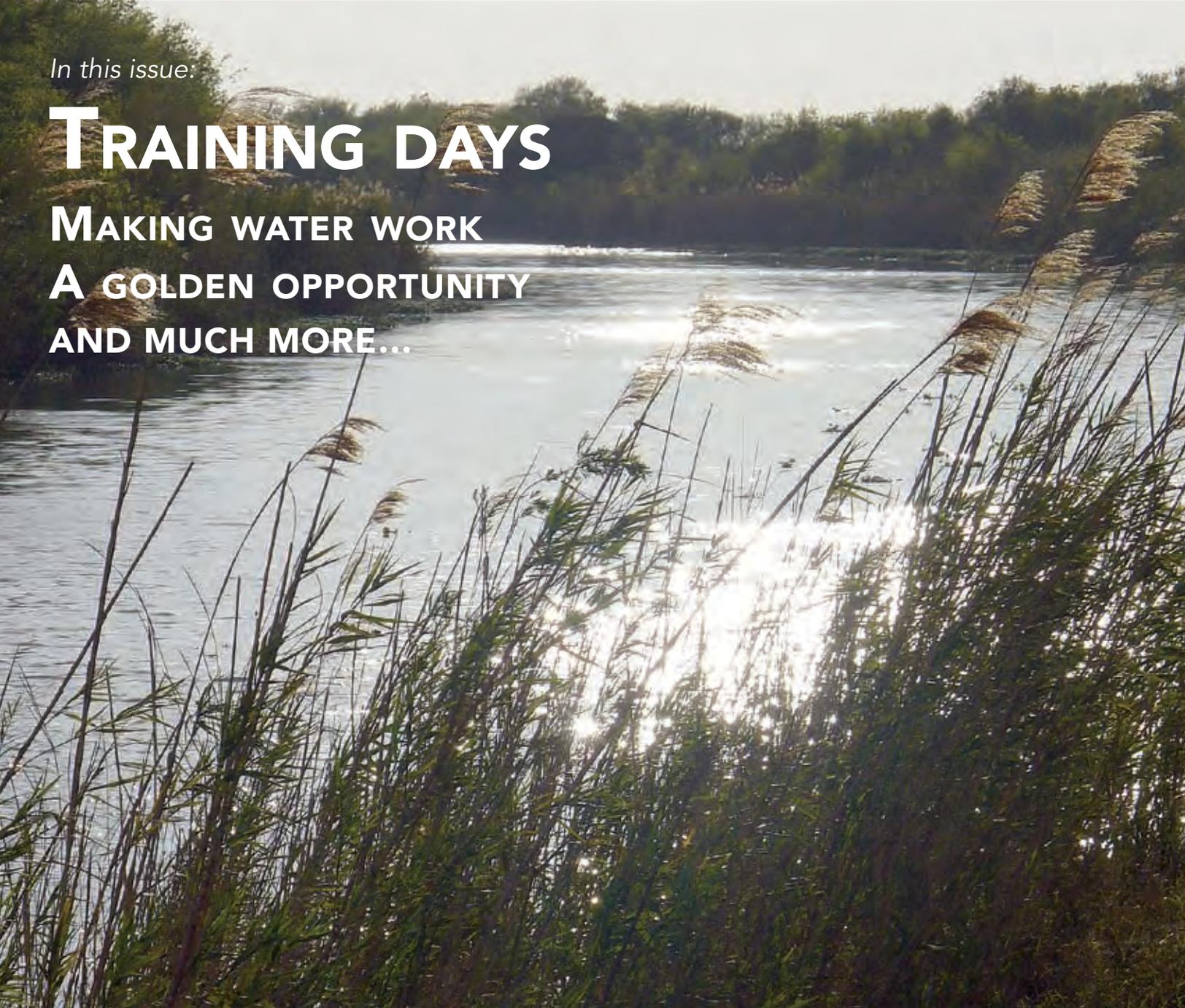
Summer 2008

In this issue:

TRAINING DAYS

MAKING WATER WORK

**A GOLDEN OPPORTUNITY
AND MUCH MORE...**



Dr. Ralph Wurbs

Message from
the Associate Director
for Engineering



Working to make every drop count

Through the outreach part of its mission, the Texas Water Resources Institute (TWRI) is launching a new program to coordinate training programs for water resources professionals.

Its purpose is to educate professionals on the latest techniques, innovations, and products of university research that can be translated into real-world application. As with many fields, water management is continually changing and becoming more sophisticated. It is imperative that practitioners in the field update their knowledge and proficiency in applying computer models and other assessment tools, and implementing new water management strategies and methods. With this new program, TWRI will be able to facilitate this process.

Currently, TWRI is working with Texas AgriLife Research, Texas AgriLife Extension Service, and Texas A&M University's Spatial Sciences Laboratory (SSL) and Zachry Department of Civil Engineering. Other universities and state and federal agencies are also partners in some of the scheduled courses. The institute will expand its program and offering of courses as needs and suggestions arise.

The institute recently hired Courtney Swyden as the program's coordinator with initial funding provided through SSL. Swyden will work with faculty to organize, administer, and market the courses and look for opportunities to work with new faculty to develop additional needed courses.

With this new continuing education program, TWRI hopes to give those involved in protecting and managing the state's water resources the information and training they need as they and the institute work together to make every drop count.

A handwritten signature in black ink that reads "Ralph Wurbs". The signature is written in a cursive, flowing style.

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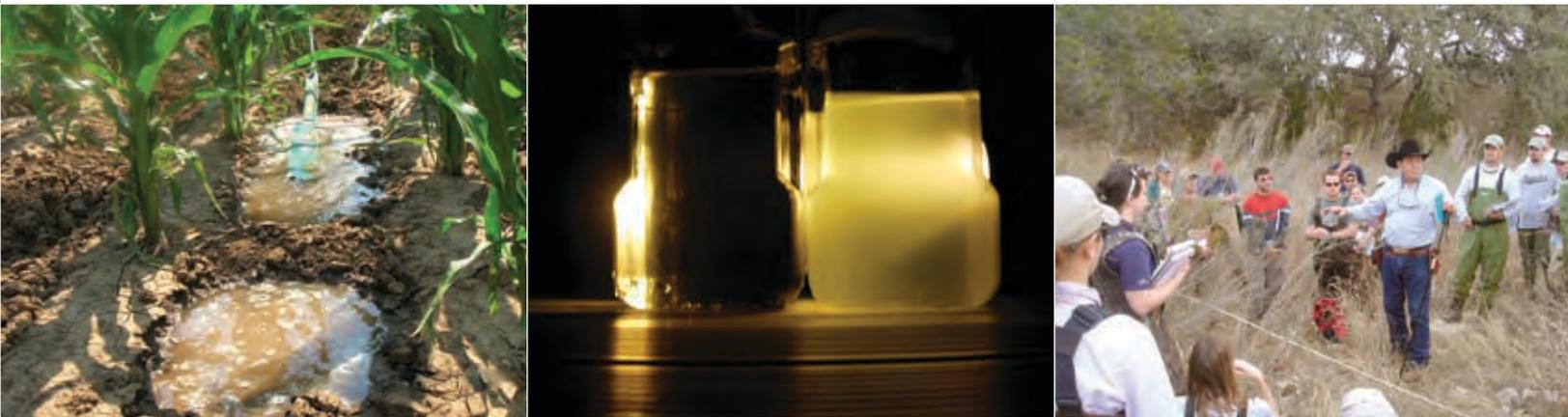
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<http://twri.tamu.edu>

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On the cover:
The Rio Grande one late
spring afternoon in 2008
near the river diversion point
for the Delta Lake Irrigation District,
based in Edcouch, Texas.
*Photo by Danielle Supercinski,
Texas Water Resources Institute*

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Story by Ric Jensen



Training days

TWRI coordinates water resources training programs



Photo by Danielle Supercinski, Texas Water Resources Institute

Helping water professionals learn how to manage water resources is the goal of new training programs coordinated by the Texas Water Resources Institute (TWRI).

TWRI is working with Texas A&M University's Spatial Sciences Laboratory (SSL), Zachry Department of Civil Engineering, and the Texas AgriLife Blackland Research and Extension Center at Temple to market and administer short courses on water-related geographic information systems, remote sensing technology, and computer simulation models. Planned or anticipated topics include

the Soil and Water Assessment Tool (SWAT), Agricultural Policy Economic Extender (APEX), Water Rights Analysis Package (WRAP), and EPANET.

In other training programs, the institute is working with Texas AgriLife Research, Texas AgriLife Extension Service, state and federal agencies, and various universities to conduct training programs in watershed protection planning (see separate story on page 6) and irrigation training (see separate story on page 10). ⇨

“We want to provide water resources professionals with the latest technologies and products of university research,” TWRI Director Dr. Allan Jones said. “Training courses are one of the most effective methods of transforming scientific knowledge from the universities so it can be used by the public.”

Dr. Ralph Wurbs, associate director of engineering for the institute and a professor of water resources engineering in Zachry Department of Civil Engineering, agreed.



Wurbs

“Continuing education is essential to professional practice,” said Wurbs, who will teach the WRAP courses. “Training courses allow practitioners to efficiently gain proficiency in applying new innovations in technology, computer modeling, and water management strategies.”

Dr. Raghavan Srinivasan, SSL director and instructor for the SWAT model courses, emphasized that newly developed models give professionals expanded capabilities to better manage water resources.

“We are developing several state-of-the-art water resources models and management tools that professionals throughout the world are using to increase their capability to make more informed decisions about issues related to water quality, land management, water use, and other critically important topics,” Srinivasan said. “Training courses create an excellent learning opportunity that brings together the scientists who are creating modeling tools and the experts who use them. Feedback from the users can help to improve the models.”

The training courses are designed to provide intensive hands-on instruction, walk users through model fundamentals, and answer questions.

Dr. Kelly Brumbelow, an assistant professor of water resources engineering, plans on teaching courses on models to manage water distribution systems, such as EPANET.

“Because of the rapid pace of changes in technology, the ‘shelf-life’ of an engineering



Photo by Jerrold Summerlin, AgriLife Communications and Marketing

Dr. Raghavan Srinivasan, director of Texas A&M University’s Spatial Science Laboratory and professor in the Department of Ecosystem Science and Management, teaches an advanced Soil and Water Assessment Tool (SWAT) course to students. Srinivasan travels worldwide to conduct SWAT courses.

degree is just a few years now,” Brumbelow said. “Because of our role in developing and evaluating new technology, Texas A&M faculty are especially suited to deliver the latest knowledge to practicing professionals.

“I’m excited about the chance to offer courses in water distribution modeling because of the great need we have in Texas to build new distribution infrastructure as well as maintain and rehabilitate our older systems.”

TWRI will support participating faculty by developing curriculum materials, handling logistics, and administering continuing education credits. Courtney Snyder was hired to help administer and market the courses. Faculty and staff will focus on model development and training as TWRI assumes a greater role in administering these courses, Jones said.

Efforts are also under way to create web-based training modules to prepare students to take the advanced training courses. Modules currently being developed will provide an overview of natural resources and agricultural processes that are simulated by SWAT and APEX and will describe how to reclaim damaged soils.

For more information, go to:
<http://twri-training-courses.tamu.edu>. 

'Training courses are one of the most effective methods of transforming scientific knowledge from the universities so it can be used by the public.'

—Dr. Allan Jones, TWRI Director



Story by Ric Jensen

Course helps professionals develop watershed protection plans



Water resources professionals wanting training on watershed protection plan development are benefiting from a course organized by the Texas Water Resources Institute (TWRI) and collaborators.

TWRI is working with the Texas Commission on Environmental Quality (TCEQ), Texas State Soil and Water Conservation Board (TSSWCB), the Texas AgriLife Extension Service, Texas AgriLife Research, the River Systems Institute at Texas State University, Texas Institute for Applied Environmental Research at Tarleton State University, and the U.S. Environmental Protection Agency (EPA) to create the Texas Watershed Planning Short Course.

The first of three currently scheduled week-long courses was June 2-6, 2008, at the Mayan Dude Ranch near Bandera. Forty-three people attended.

Holistic watershed protection plans that actively involve stakeholders to preserve and restore watersheds are the accepted approach to managing Texas surface waters, said Kevin Wagner, TWRI project manager and leader for the short course.

“Proper training is needed to ensure that watershed protection efforts are adequately



Photo by Ellen Weichert, Texas Water Resources Institute

Pamela Casebolt of Texas State Soil and Water Conservation Board, Lucas Gregory of Texas Water Resources Institute, Vanessa Escobar of the Texas Water Development Board, and Ernest Moran of the San Antonio River Authority calculate load duration curves as part of a hands-on assignment during the Texas Watershed Planning Short Course.



Photo by Megan Meier, Texas Water Resources Institute

During the Applied Fluvial Geomorphology course, Dave Rosgen, a nationally known hydrologist, gives an overview of the field methods the participants will be using to analyze stream channels.

planned, coordinated, and implemented, and results from the efforts properly assessed and reported,” he said.

“This course is important,” Wagner said, “because it is one of only a few courses that builds upon the nine essential elements for watershed planning identified by EPA. As a result, people who have gone through this training program will be well prepared to develop plans according to EPA guidelines.”

Wagner said the course provides people with a thorough background into issues related to watershed protection planning, including how to deal with stakeholders and how to collect and analyze watershed data to determine loadings and identify pollutant ⇒



Photo by Ellen Weichert, Texas Water Resources Institute

Participants in the Texas Watershed Planning Short Course listen to a presentation by one of 16 speakers during the weeklong course at the Mayan Dude Ranch in Bandera. The next short course is set for Jan. 12-16, 2009.

sources. The course also teaches participants how to develop education and outreach efforts that will promote the use of sustainable best management practices to protect water quality. Participants are given an overview of EPA web-based tools, including the EPA Watershed Plan Builder.

National water resources experts—including Charlie MacPherson with Tetra Tech, Stuart Lehman with EPA headquarters, Bill Jarocki with the Northwestern Environmental Finance Center, Tom Davenport with EPA Region 5, and Jeff Thornton with the Southeastern Wisconsin Regional Planning Commission—were instructors at the June course. They provided a broad perspective on watershed-based planning. Instructors also included staff from EPA, TSSWCB, TCEQ, and faculty and staff from Texas A&M, Tarleton State, and Texas State universities.

Wagner said the Plum Creek Watershed Protection Plan, recently published as a draft, is used as a case study. “A case study allows course participants to see how others are developing their plans,” he said.

“This program brings watershed coordinators from across the state together in a setting where we can hear from experts, get to know each other, and discuss the common challenges we all face,” said Nikki Dictson. She is an Extension program specialist in water quality who works on the Plum Creek Watershed Protection Plan and is one of the instructors.

“As we bring watershed coordinators together at the training, it provides a forum to look at success stories that can be applied to develop and implement successful plans at the local level,” Dictson said. “As a result, we will help watershed coordinators develop watershed plans that have a better chance of being successfully implemented.”

Throughout Texas, TSSWCB and TCEQ are financing the development of over a dozen watershed protection plans.

“Up to now, the watershed coordinators we’ve sponsored have only had limited training opportunities,” said Aaron Wendt, TSSWCB’s state watershed coordinator. “Over the past couple of years, there have been several national courses, but we do things a little differently here in Texas.

“This course will help watershed coordinators build sustainable partnerships committed to implementing well-crafted watershed protection plans and will help TSSWCB and TCEQ direct limited grant funds to watershed restoration and protection projects that improve the water quality of rivers, streams, and estuaries in the state,” Wendt said.

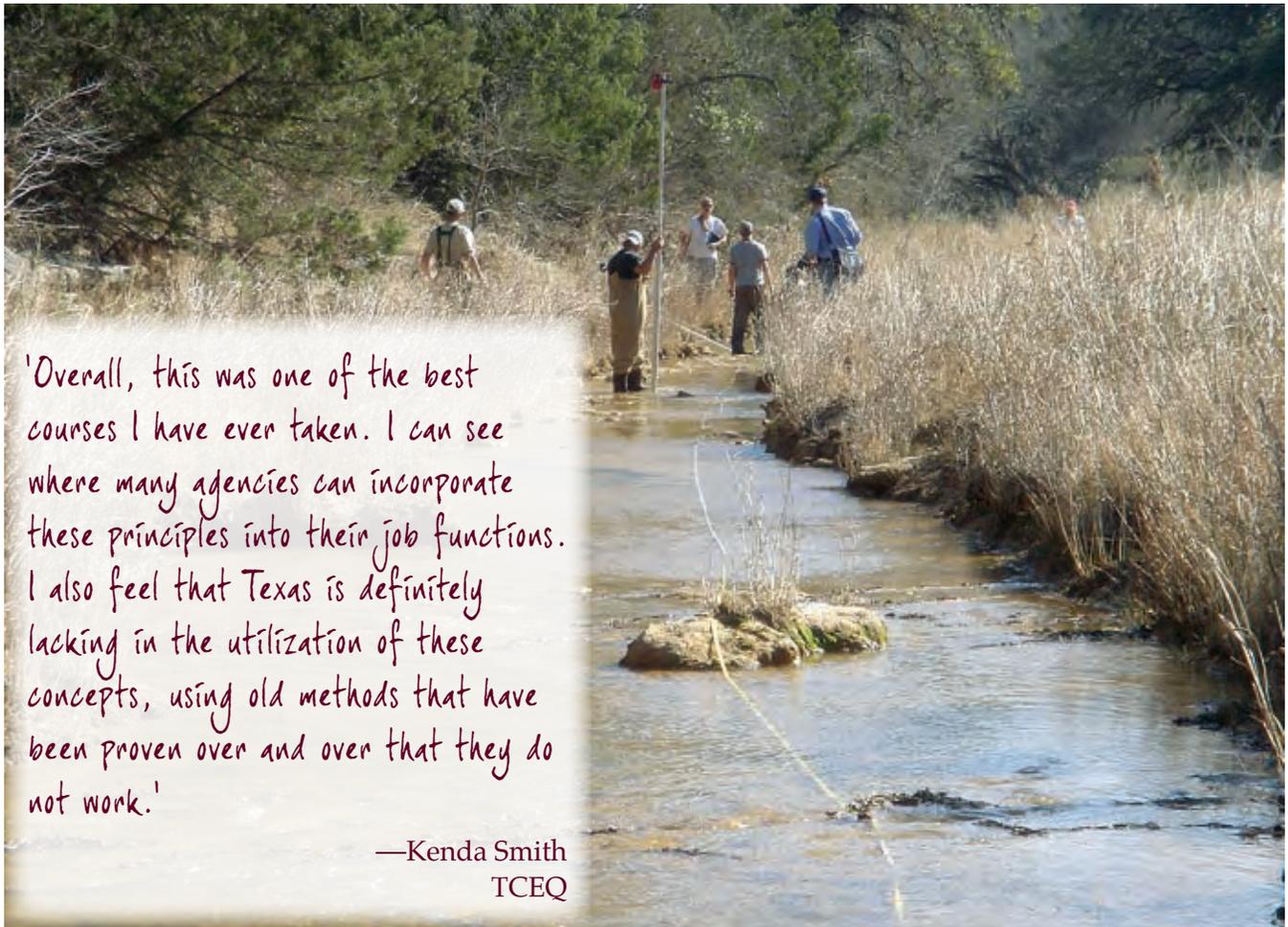
Other courses are scheduled for Jan. 12-16, 2009 and August 2009. TCEQ and EPA provided funding for the courses through a Clean Water Act Nonpoint Source Grant. For more information, visit the project’s Web site at <http://watershedplanning.tamu.edu/>. 

National expert in river restoration teaches course

Forty-four Texas water resources professionals met at the Mayan Dude Ranch outside of Bandera, Texas, on Jan. 28-Feb. 1 to learn about river restoration from a nationally recognized expert.

Dr. Dave Rosgen, a registered professional hydrologist with more than 40 years of experience,

taught the weeklong Applied Fluvial Geomorphology Course. The course was coordinated by the Texas Water Resources Institute (TWRI) and was part of the Texas Watershed Planning Short Course project, funded by the Texas Commission on Environmental Quality (TCEQ). ➔



'Overall, this was one of the best courses I have ever taken. I can see where many agencies can incorporate these principles into their job functions. I also feel that Texas is definitely lacking in the utilization of these concepts, using old methods that have been proven over and over that they do not work.'

—Kenda Smith
TCEQ

Photo by Megan Meier, Texas Water Resources Institute

Participants in the Applied Fluvial Geomorphology course, coordinated by the Texas Water Resources Institute, measure the stream variables of the West Verde Creek.

Rosgen, the principal hydrologist of Wildland Hydrology Consultants, gave the participants in-depth knowledge of natural processes in river basins, including fluvial geomorphology, sedimentation, hydraulics, and streambank erosion. He also taught participants about best management practices to restore impaired stream segments and improve fish habitat. Rosgen conducted field exercises with the group in West Verde Creek, located in the Hill Country State Natural Area.

Participants were from TCEQ, Texas Parks and Wildlife Department, Texas Department

of Transportation, Texas Forest Service, Texas AgriLife Extension Service, and TWRI.

Kevin Wagner, TWRI project manager, said the course was very successful. "Based on our evaluations, participants' overall satisfaction with the course was excellent," Wagner said. "Much time and effort went into coordinating this, but it was well worth it."

Wagner said he is keeping a waiting list for possible future offerings of the course. "With additional funding, we may offer the same course again or Dr. Rosgen's second course, River Morphology and Applications Short Course," he said. 💧



Making water work

**Program trains farmers
on latest irrigation tools' techniques**



Photo by Danielle Supercinski, Texas Water Resources Institute

Program trains farmers on latest irrigation tools' techniques

Every year farmers on the Texas High Plains hear how the Ogallala Aquifer underneath their cultivated acres is slowly being depleted. They know that to continue farming they must use the best, most efficient irrigation methods to make this water last.

That is why earlier this year, 40 of these farmers, Texas AgriLife Extension Service specialists, crop consultants and irrigation industry professionals attended the "Making the Most of Irrigation" event in Lubbock. This one-day training, part of the Irrigation Training Program, was the first of six that will be held in different regions of the state during the next two years to help farmers and others learn about efficient tools and techniques of irrigation management.

The program is a collaboration with the Texas Water Resources Institute (TWRI), AgriLife Extension, Texas State Soil and Water Conservation Board and its network of local soil and water conservation districts, and the U.S. Department of Agriculture's Natural Resources Conservation Service (NRCS). The Texas Water Development Board (TWDB) funds the project through its Agricultural Water Conservation Grant program.

Dr. Bill Harris, TWRI's associate director and developer of the project, said this program is important because the amount of water used for irrigating crops is more than the amount of all other uses combined. According to the TWDB's state water plan, 60 percent of water used in Texas goes to irrigating crops and this percent will decline to 42 percent by 2050.

"Conservation-based water management practices are essential to meet that decline," Harris said. "Efficient use of irrigation water through the training of agricultural irrigators has the potential to yield large dividends in water savings."

Although numerous irrigation programs are scattered across the state, "this course



Photo by Danielle Supercinski, Texas Water Resources Institute

One of the practices taught in the Irrigation Training Program is the use of Evapotranspiration (ET) networks. Researchers at the Texas AgriLife Research and Extension Center at Uvalde have installed field lysimeters like the one shown to quantify crop water use for further development of ET networks.

Planned Irrigation Training Programs

Central Great Plains (Chillicothe)	August 19, 2008
Rio Grande Valley (Mercedes)	October 27-28, 2008
Coastal Bend (San Patricio County)	November 2008
Wintergarden (Uvalde)	TBD (Fall 2008)
Panhandle (Amarillo)	January 14, 2009

creates a cohesive program of information so that agents and specialists can use a common program," said Cecilia Wagner, TWRI project manager.

The course uses a manual of Extension and related agencies educational materials, presenting information about such principles as determining crop water needs, using climate data for irrigation scheduling, improving on-farm water management, increasing application efficiency, economic comparisons for different systems and application techniques, and reducing losses in water conveyance systems.

At each training location, the instructors will tailor the curriculum specifically to that

'... this course creates a cohesive program of information so that agents and specialists can use a common program.'

—Cecilia Wagner, TWRI project manager



Photo by Shelby Axtell, Texas Tech University

region, including region-specific irrigation practices, cropping systems, and climates, Wagner said. The next one-day program is scheduled for August 19, 2008 at Chillicothe with Drs. John Sij and Dana Porter serving as coordinators.

At the Lubbock program, held in conjunction with the Southwest Farm and Ranch Classic Trade Show, the attendees learned

about optimizing irrigation scheduling using evapotranspiration networks and soil moisture management from Porter, an AgriLife Extension specialist at Texas AgriLife Research and Extension Center at Lubbock.

“We’re really promoting optimizing management of advanced irrigation technology,” Porter said. “We have some really neat technological tools and are trying to increase ↪



people's familiarity with these tools and improve the proficiency with which they are used to improve water management."

Porter added that there has been training for High Plains irrigators in the past, but the Irrigation Training Program is more comprehensive. "We have done commodity specific programs, but this is putting it all in one place," she said.

Jay Yates, Extension risk management specialist, presented information about the economics of rotation strategies for water conser-

vation; Randy Underwood of NRCS gave an update on NRCS's cost-share programs; and Jim Conkwright, High Plains Underground Water Conservation District general manager, gave a legislative update on water issues.

Edwin Smith, Farris Hightower, and Jerry Funck from the Texas Agricultural Irrigation Association discussed specific irrigation technologies, including center pivot irrigation and subsurface drip irrigation. Extension agronomists Drs. Calvin Trostle and Randy Boman spoke about management of forage and grain crops and cotton, respectively.



Photo by Shelby Axtell, Texas Tech University

Certified crop consultants and certified irrigation designers who attended received continuing education credits.

These individuals are targeted, Porter said, because “they work with key growers, so they can really have an impact.”

Wagner said the hands-on training program is targeted toward producers who are already practicing efficient irrigation but want to refine their systems. “The instructors are teaching them the tools and techniques that allow them to be more efficient irrigators,”

she said. The project team plans to train more than 200 people over the next two years.

Although predicted water savings from the program are difficult to measure at this point, Harris said, measured and demonstrated water savings from implementation of precision irrigation technologies have shown up to 30 percent savings in total water use in the Uvalde area and savings of 1 million acre-feet of water per year in the Amarillo area.

“We believe conservative estimates of water savings possible with well-trained irrigators are 10 percent to 25 percent,” Harris added. 💧

Linking Texas irrigation

Consortium communicates research, education projects

Irrigation research and education professionals have had a tremendous impact on the development and implementation of irrigation systems and practices in Texas, yet few efforts have been made to coordinate ongoing programs and results. With the formation of the Consortium for Irrigation Research and Education (CIRE) in 2007, these professionals have formed a forum to discuss and share projects and results and are working to better communicate irrigation information throughout the state and beyond.

“CIRE will facilitate communication and cooperation among irrigation scientists and engineers as well as with producer organizations and federal and state action agencies interested in improving irrigation management and technology,” said Dr. Allan Jones, Texas Water Resources Institute (TWRI) director.

CIRE members decided a Web site would be one way to collect and publicize the past, ongoing, and planned irrigation projects across Texas. TWRI was selected to facilitate this process.

“TWRI does a great job at administering its current projects and related Web sites and has a complete communications team in place, making it a natural fit,” said Dr. Giovanni Piccinni, Texas AgriLife Research associate professor, plant stress physiologist and CIRE vice chair.



CIRE meeting attendees viewed lysimeters, various crop research plots, and center pivot and drip irrigation systems at the Texas AgriLife Research and Extension Center at Uvalde. These plots are part of the Precision Irrigators Network project funded by Texas Water Development Board and the Rio Grande Basin Initiative project funded by the U.S. Department of Agriculture's Cooperative State Research, Education and Extension Service.

The CIRE Web site is located at <http://cire.tamu.edu> and includes links to CIRE-related materials, grant opportunities, progress and outcomes, photos, and links to CIRE members' Web sites.

“The most notable feature of the Web site is the progress and outcomes sections,” said Dr. B.L. Harris, TWRI associate director and former CIRE chair. “This allows any irrigation scientist or Extension professional to sign up and enter their ongoing project efforts and accomplishments into a database that will be accessible to anyone across Texas.

“It is our hope that the CIRE Web site will be a common place for irrigators across Texas to come for information on irrigation studies, past and present, as well as to input their own information to be shared throughout the state.”

'It is our hope that the CIRE Web site will be a common place for irrigators across Texas to come for information on irrigation studies, past and present....'

— Dr. B.L. Harris, TWRI associate director and former CIRE chair



The Web site is still being fine-tuned, and suggestions on how to better collect and facilitate this information are welcome, Harris said.

In addition, a CIRE listserv has been setup to encourage more internal communication between project investigators, researchers, and specialists. Individuals can subscribe to the listserv through the Web site or by e-mailing Danielle Supercinski, CIRE secretary, at dmsupercinski@ag.tamu.edu.

The initial CIRE meeting was held Oct. 29-30, 2007, in College Station with 30 attendees. The next CIRE annual meeting was held May 21-22, 2008, at the Texas AgriLife Research and Extension Center in Uvalde. There were 31 attendees, including representatives from AgriLife Research, Texas AgriLife Extension Service, U.S. Department of Agriculture's Agricultural Research Service, Texas Tech University, Texas A&M University-Kingsville, TWRI, and Harlingen Irrigation

District. Current project updates and results were presented, and discussions on future project collaboration opportunities were highlighted.

"These efforts contribute to optimizing programs to improve irrigation management and provide for broad-based water use education and irrigation training throughout the state," Jones said.

The next annual meeting will be in the Texas High Plains in 2009.

"These meetings give us all a chance to assemble at one location, discuss our ongoing efforts, new technologies and future project ideas, and consider ways we can work together toward the common goal of saving water," Piccinni said. "We look forward to future meetings where we can continue to exchange ideas and collaborate on more projects." 💧

Teaching internationally



Dr. Francisco Olivera, associate professor in the Zachry Department of Civil Engineering, travels to different countries, including his native country of Peru, to teach water resources management.

Texas A&M professor travels the world teaching water resources engineering

Dr. Francisco Olivera says he was born to teach.

“That’s what I have done all my life,” said Olivera, an associate professor in Texas A&M University’s Zachry Department of Civil Engineering.

A native of Peru, Olivera graduated as a civil engineer from the Catholic University in Lima, Peru, and received a master’s degree in hydraulic engineering from the International Institute for Hydraulic and Environmental Engineering in Delft, The Netherlands. In Peru he was a professor of engineering at the Catholic University for 12 years before coming to the United States in 1992 to obtain his doctorate degree from The University of Texas at

Austin. He then worked as a researcher for UT for five years.

In 2001 he joined Texas A&M as an assistant professor in the environmental and water resources engineering area of civil engineering. Olivera is also a faculty member of Texas A&M's intercollegiate water management and hydrological science degree program. He teaches and conducts research on urban stormwater management and the use of geographic information systems (GIS) in water resources engineering.

In addition to his teaching, Olivera travels to different countries to teach young professionals and university students. Since 1995 he has conducted 14 training seminars and continuing education courses sponsored by universities or international and government agencies in Spain, Portugal, Finland, Morocco, Brazil, and Peru.

Although he tailors each course to the needs of the audience, Olivera said all the courses involve his research of using GIS to study such topics as quantifying the effects of land use changes on runoff, understanding the spatial distribution of precipitation using radar precipitation data, floodplain mapping, water flow routing, and analyzing and modeling nonpoint source pollution.

Every summer since 2005, Olivera has taught "Methods for the Sustainable Management of Water Resources: The Use of Geographic Information Systems." It is a two-week course at the Complutense University of Madrid in Madrid, Spain, that country's largest university with around 90,000 students.

For the last three years, he has also taught a two-day class, "Spatially-Distributed Hydrologic Modeling," in Madrid. The class is for students in the master's of general and

applied hydrology program at the Center for Hydrographic Studies of the Center for Studies and Experimentation of Public Works (CEDEX).

Olivera said he first became acquainted with the Madrid center in the early 1980s when he applied to the master's program. Although he was unable to attend because of insufficient funds, 25 years later the school invited him to teach there.

"Teaching at CEDEX was a very rewarding experience," he said.

In fall 2007, he traveled to South America to teach courses in Brazil and Peru. The course in Piura, Peru, was a one-day, 9-hour course, "Use of Geographic Information Systems in Water Resources Engineering," at the University of Piura.

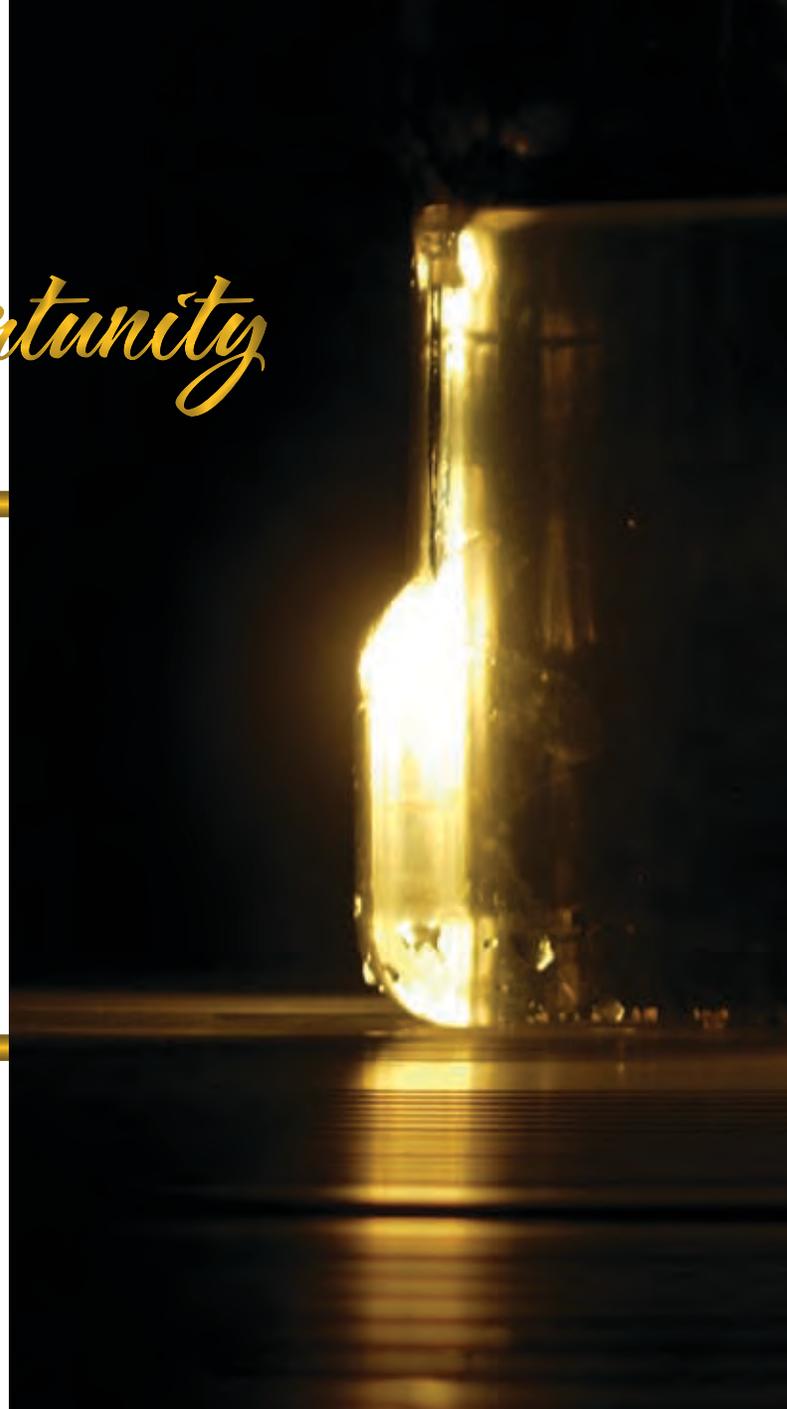
Students for that course came from all parts of northern Peru and had to travel overnight by bus. "The distance is short, but the roads are very bad," he said. "They arrived there in the early morning and went directly to class."

Teaching that course was especially gratifying, Olivera said, because the students were very motivated. "They don't take education for granted," he said. "They have to do something to get a good education, and they are doing that."

Although he enjoyed teaching in Peru, Olivera said he is most proud of what he is doing in Spain. "In Spain they have all the resources," he said. "It is one of the leading countries in the world and they are looking at our program at Texas A&M" for someone to teach their professionals.

For now, Olivera is talking with yet another university in another country—National University of the Litoral in Santa Fe, Argentina—about teaching yet another course. 💧

A golden opportunity



Researchers making progress in understanding toxic algae

Scientists at three Texas universities investigating golden algae, its explosive growth, and its deadly toxins have discovered an apparent competition between golden algae and blue green algae in certain Texas lakes. Understanding this competition could lead them closer to controlling this harmful algae, the researchers said.

“Our biggest finding so far,” said Dr. Daniel Roelke of Texas AgriLife Research and one of the investigators, “is that there appears to be a chemical warfare between golden algae and blue green algae. Only when golden algae wins this chemical warfare is it able to bloom.”

Roelke, along with Dr. Bryan Brooks of Baylor University and Dr. James Grover of the University of Texas at Arlington, have studied golden algae for four years. Funding comes from the Texas Parks and Wildlife Department, AgriLife Research, Baylor, and UTA. Support also includes U.S. Department of Energy funds secured by Rep. Chet Edwards in fiscal years 2006 and 2008. The Texas Water Resources Institute manages the congressionally funded portion of the research.

Although scientists have studied golden algae, or *Prymnesium parvum*, around the world for six decades, most of the studies

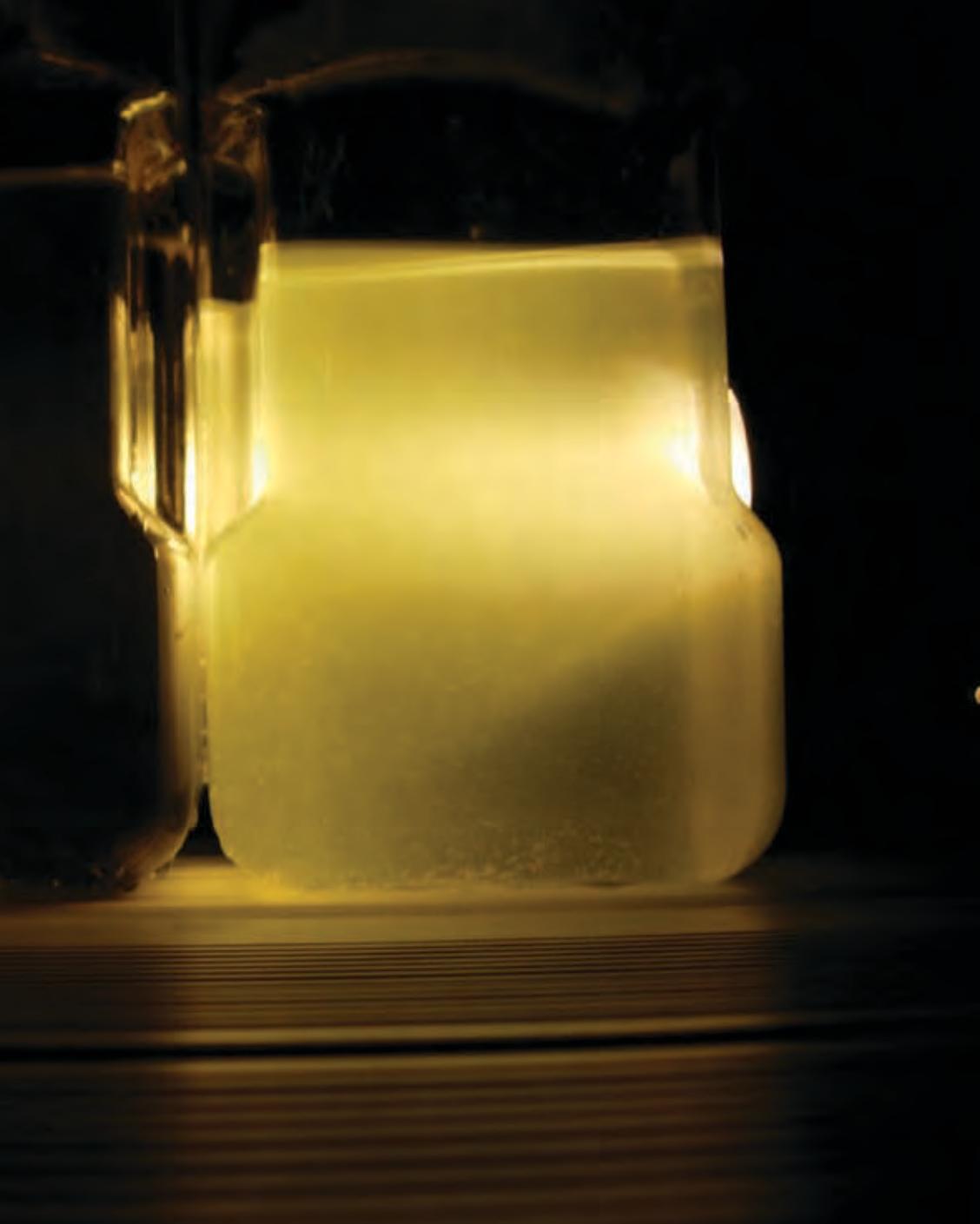


Photo courtesy of the Texas Parks and Wildlife Department

(photo left) Toxic golden algae have killed fish and other gill-breathing animals in Lake Granbury as well as other lakes in five of the state's river systems.

(photo right) Scientists researching golden algae, its explosive growth, and possible management strategies have studied the affects of nutrients such as nitrate and phosphate have on controlling the organism.

have examined the organism in coastal, saline environments. "Our research team represents one of the few in the world that is focused on the dynamics of the organism in inland waters," said Brooks, an associate professor of environmental science and biomedical studies at Baylor.

First appearing in Texas in 1985 in the Pecos River, golden algae has since surfaced in most of the 25 major river systems throughout Texas. Although it can exist in waters without being harmful, the algae has caused major fish kills in five of the state's river systems. When this algae has explosive increases in its

population, called "blooms," it secretes toxic chemicals into the water. These toxins kill fish and other gill-breathing animals. According to the Texas Parks and Wildlife Department, golden algal blooms have killed more than 25 million fish valued at \$10 million since 1985 and caused major negative impacts on lake ecosystems and recreational opportunities.

In research started at Lake Possum Kingdom and continuing at Lakes Whitney, Granbury, and Waco, the scientists have identified certain environmental and chemical factors, including low temperatures, low nutri- ➔

(photo left) Dr. Daniel Roelke, Texas A&M associate professor, works with other team members to investigate golden algae and its relationship to other algae and bacteria in Lakes Granbury, Whitney, and Waco.

(photo right) Dr. Bryan Brooks, Baylor University associate professor, finishes taking a water sample from Lake Whitney as part of the golden algae research.

Photo by Matthew Minard, Baylor Photography



ents, and low salinity that stress the organism, causing it to become more toxic.

However, even when the same conditions exist in different lakes, blooms don't always occur, said Roelke, an associate professor of wildlife and fisheries sciences at Texas A&M.

The researchers have compared water taken from Lake Whitney that has golden algal blooms to water from Lake Waco that has golden algae which doesn't bloom.

"When we mixed the waters, the water from Lake Waco suppressed the blooms in Lake Whitney," he said.

Roelke said at the time they took the water samples, Lake Waco had a high population of blue green algae. "The chemicals produced by blue green algae may have suppressed the growth of golden algae," he said.

The researchers are now examining what environmental conditions allow blue green algae to win the chemical warfare over golden algae in Lake Waco and what conditions allow golden algae to win in Lakes Granbury and Whitney.

"That is what we want to discover," Roelke said. "What are those conditions and more importantly are those conditions something we can control from a management perspective?"

In lab experiments, Grover's lab is further investigating the toxins produced by the algae.

"We are looking at the potential for toxins produced by the golden algae to impact the other kinds of algae (such as blue green algae) that compete with it and the reciprocal effect of those other algae on golden algae," he said.

In the modeling portion of the research, Grover, a UTA biology professor, and his laboratory are testing a suite of models that will simulate the population dynamics of golden algae. Their research is based on the factors in the environment that are important to its growth: the nutrients, nitrate and phosphate; water temperature; salinity; light; water flow; and other factors.

Grover said they are now verifying the models against one year of field observation data for Lake Granbury. Once a model is selected and verified, Grover said they will use the model to understand the population dynamics of golden algae in different environments and then evaluate different management options.

"The model would be a test bed where you could manipulate things and see what happens," he said. "For example, we could simulate the effects of adding or decreasing nutrients going into the lake and see if that has an influence (on the algae)."

Brooks said that in the previous lab studies, they have found that adding nutrients has decreased the toxicity of golden algae. He sug-



(photo left) TWRI Director Dr. Allan Jones talks with Rep. Chet Edwards and Hood County Judge Andy Rush (back to camera) about the research that was accomplished using the custom-designed data flow unit purchased by federal funds.

(photo right) Dr. James Grover, UTA professor, and his laboratory staff are investigating the toxins produced by golden algae when it blooms.

Photo by Robert Crosby, UTA University Publications

gested nutrient amendment is “a way forward” in determining management options.

In its first year of monitoring Lake Granbury, the team employed a new technology—a custom-designed, boat-mounted data flow unit that enabled system-wide characterization of the lake. The unit continuously samples water as the boat moves along the lake. This sampling allowed the team to document details of a bloom’s formation, how extensive it was, and where and when it occurred.

Through this monitoring, the scientists found that golden algal blooms do not occur simultaneously throughout the lakes. Roelke said they are trying to determine if there are “hot spots” where blooms begin within the lakes.

“If blooms initiate in the coves, we might be able to manipulate nutrients to create conditions that promote blue green algae; and that might circumvent golden algae blooms altogether,” Roelke said.

At Lake Granbury, the scientists are also investigating a linkage between golden algae and bacteria found in the lake, possibly from leaking septic systems.

Roelke said sampling in open waters of Lake Granbury revealed a weak correlation between golden algae, bacteria, and dissolved organic matter.

“However, we have not ruled out yet that leaky septic systems might play a role in golden algal bloom development,” he said.

In their second year of research at Lake Granbury, they are extending the monitoring into the lake’s coves to see if the longer hydraulic residence time (where water stays in one place longer) of the coves might enable the bacteria to grow and in some way stimulate the golden algae.

In another area of research, the scientists are trying to understand bloom termination by looking at past occurrences of golden algal blooms.

“If we are unable to stop the blooms from occurring, we might be able to cause the blooms to terminate,” Roelke said.

In the four years they have studied golden algae, the researchers say they have learned much about this particular organism and give credit to the multi-institutional financial and research support.

“What has made the team very effective is that we all bring different skill sets to the table,” Brooks said. “It’s really incredible over the last three to four years how much progress our research team has made—from not having much of an understanding at all about the dynamics of this organism in inland waters to now being very close to making some very viable management recommendations.” 💧

Youth Water Camp



A plant chemist directs Water Camp youth in basic water analysis at a local power plant during a tour.

Ward County 4-H program educates students about water conservation, quality

In January 1991, a committee of the Texas Agricultural Extension Service (now Texas AgriLife Extension Service) and Upper Pecos Soil and Water Conservation District personnel met on the development of a 4-H water camp educating youth on water issues to be held at the George and Opal Bentley 4-H Center in Ward County.

The center in Monahans, Texas, was deeded to Ward County in 1989 by the Bentleys with the stipulation that the facility be used for 4-H projects and activities. Ward County had the facility, transportation, and paperwork; the committee needed to find the technical information and suggestions for projects. Thus, planning for the first State Youth Water Camp began.

“Those of us in Ward County were excited that we had Extension specialists and folks

from other agencies who thought this was a worthy project that we could bring to fruition,” said Abigail Pritchard, Ward County Extension agent—family & consumer sciences.

During the ensuing discussions, several suggestions were made concerning what might be done at that year’s camp and what subject areas should be included.

“The number of ideas listed was astounding,” Pritchard said. Topics ranged from water laws, water supply, and water use for irrigation to effluent water, drinking water quality, and more.

“Many of the suggestions from that original meeting are part of the camp today,” she said.

When the committee had lined out the basic agenda and several activities to include during the week-long camp, a task force committee was appointed to work out the myriad of details still left. Weldon Floyd and Nancy Rhodes, then Ward County Extension agents, were co-chairs. Committee members were Joe Henggeler, Extension engineer-irrigation; Marsha Stabel, 4-H and youth development specialist; and Abigail Pritchard, Upper Pecos Soil and Water Conservation District technician at that time. Dr. John Sweeten, then an Extension program leader for agricultural engineering, also assisted with the curriculum.

“That first committee group really saw what water camp could be even in Far West Texas,” Pritchard said.

This committee turned the State Youth Water Camp into the program it is today—a



Members of the Rangeland Watershed Management project group simulate the splash effect of rainfall on partial vegetation as part of their project work.

five-day educational camp featuring hands-on experiences, guest speakers, and field trips. It teaches high school youth the importance of water stewardship and trains youth in water conservation and preservation. The camp also illustrates how water resources are being used by industry, agriculture, and municipalities.

The first State Youth Water Camp was held July 21-26, 1991 at the center. Twenty-five high school 4-H members and 27 adult leaders from across Texas participated.

“We knew as soon as the first camp was over we wanted to do another one and immediately began preparations,” Pritchard said.

Since 1991, the camp has been held annually the last week in July. The camp is limited to 15 boys and 15 girls from across the state who are high-school age, have an interest in water quality and conservation, and are willing to participate as a team member.

Information about the camp can be found through the Ward County Web site at <http://ward-co.tamu.edu/>.

The camp is staffed by professionals from several state, federal and private agencies under the leadership of AgriLife Extension and the U.S. Department of Agriculture’s Natural Resources Conservation Service. Other partners include the Pecos Valley Resource Conservation & Development Area, Texas Water Resources Institute, Texas Water Development Board, Texas Natural Resources Conservation Commission, state soil and

water conservation districts, underground water conservation districts, the City of Odessa, and Coyanosa Field Crops Committee.

In addition, the Rio Grande Basin Initiative (RGI) funds materials and project work. Pritchard said this enables the cost for the camper to be kept relatively low at \$150 while still providing a quality experience. The projects and work of RGI participants are also referenced because that effort often ties to other topics being discussed with the campers, she said.

“Most of our partners have been with the camp since its inception,” Pritchard said. “They continue to provide quality tours and speakers for youth to learn about water use and conservation as well as today’s water issues.”

State Youth Water Camp objectives

Youth will learn:

- Needs and opportunities for water conservation, economic benefits of reduced water use, technologies for improving efficiencies, proper irrigation management, and improved use of precipitation on crops and forages.
- Individual conservation practices and methods for efficient use in the home and in landscapes.
- Methods of reducing nonpoint source pollution (in support of the USDA Water Quality Initiatives).
- Methods of water management and possible alternate water supplies.
- Skills in evaluating water quality/conservation problems and the ability to develop solutions to problems.
- Career opportunities in water quality and conservation.
- Leadership skills which enable them to be leaders seeking solutions to local, state, and national water concerns. 💧

Cultivating corn in clumps increases water efficiency, yield



Cornfields in the Texas High Plains may look a little different in the future if research findings by a group of scientists are adopted by farmers.

This group is discovering that planting corn in clumps instead of the traditional rows increases water use efficiency and corn yield.

Researchers are Dr. B.A. Stewart and graduate student Mohankumar Kapanigowda of West Texas A&M University in Canyon, and Drs. Terry Howell, Louis Baumhardt, and Paul Colaizzi of the Conservation and Production Research Laboratory (CPRL) in Bushland, which is a unit of U.S. Department of Agriculture's Agricultural Research Service.



Researchers have discovered that corn grown in clumps (left) rather than in traditional rows (right) increases water use efficiency and corn yield.

Saving agricultural water in the Texas High Plains is a high priority, as the main source for its water is the Ogallala Aquifer. The portion of the aquifer that extends from Texas up to western Kansas is declining at a relatively rapid rate with depletion of 1- to 3-feet per year with very little recharge.

The group has previously determined that planting grain sorghum in clumps produces significantly more grain because less water is used to produce vegetative growth during the early growing season. This leaves more soil water available for the reproductive and grain filling periods.

Now, they are studying corn.

Stewart, director of West Texas A&M's Dryland Agriculture Institute, said that under very limited water conditions, plant populations of corn must be low.

"At low populations, tillers, or plant side shoots, often form at the beginning of corn's growing season," Stewart said. "When harsh summer conditions arrive, these tillers are often aborted but the moisture and nutrients they used are lost. We have found in our research, as yet unpublished, that clump planting reduces the number of tillers. This

reduction means more moisture and nutrients are available late in the season to serve the main ear."

In one study conducted during 2007 at the Bushland research lab, Kapanigowda planted corn in clumps spaced 40 inches apart and in traditional rows spaced equidistant. He used two irrigation methods: low-energy precision applicator (LEPA) and low-elevation spray applicator (LESA). The three irrigation rates he used were dryland, 2 inches, and 4 inches.

The results showed that clump planting in groups of three reduced the tillers, which conserved more soil water until it was needed for producing grain.

"With clump planting, there was an 11 percent increase in grain yield compared to equidistant plants under dryland conditions," Stewart said, "but no benefit with 2 and 4 inches of irrigation."

This research is part of the federally funded Ogallala Aquifer project, a joint project of U.S. Department of Agriculture's Agricultural Research Service, Texas AgriLife Research, Texas AgriLife Extension Service, West Texas A&M, Texas Tech University, and Kansas State University. 💧

Multi-department seminar series brings leading scientists to A&M

A successful lecture series brought leading scientists from across the country to Texas A&M University during the Fall 2007 and Spring 2008 semesters to discuss multi-scale processes in earth systems, said Dr. Binayak Mohanty, professor in Texas A&M's Department of Biological and Agricultural Engineering and organizer of the series.

Fifteen well-known researchers were featured as part of this Distinguished Lecture Series, "Multi Scale Processes in Earth Systems." They represented such institutions as Massachusetts Institute of Technology, Princeton University, Cornell University, Duke University, National Center for Atmospheric Research, University of Texas at Austin, British Petroleum, and Oak Ridge National Laboratory,

Texas A&M's Departments of Biological and Agricultural Engineering, Atmospheric Sciences, Civil Engineering, Ecosystem Science and Management, Geology and Geophysics, Mathematics, Petroleum Engineering, and Water Management and Hydrologic Sciences hosted the lectures.

Mohanty said more than 100 people attended each lecture, including students and faculty from Texas A&M as well as other A&M campuses and Texas AgriLife Research and Extension Centers.

Mohanty explained that much of the natural processes occurring in earth and environmental systems are inherently multi-scale, meaning that they occur in and evolve over space and time. Current understanding of these multi-scale processes and the transfer of their characteristics features across space and time scales are rather limited, he said.

In multi-scale research, scientists from different earth science disciplines gather different information, such as scale-based process characterization, remote sensing observations, and advanced modeling and scaling techniques by incorporating different data that has been generated at different spatial

and temporal scales. With novel multi-scale mathematical algorithms and measurement tools, researchers try to scale the information up and down appropriately to infer larger scale events from small scale features and vice versa.

Mohanty said the seminar series was multidisciplinary because multi-scale processing occurs in many different research areas, including hydrology, ecology, petroleum engineering, geosciences, and atmospheric sciences.

"The most significant accomplishment of the seminar series is that people are not just from one discipline but from different departments," he said. "They are in the same room talking and learning new techniques from other disciplines and generating new ideas for innovative interdisciplinary research proposals."

Mohanty organized another Distinguished Lecture Series in Spring 2003, "Water, Chemical, and Heat Transport in the Environmental Systems Across Different Space-Time Scales," in which other prominent scientists from Harvard University, MIT, Princeton University and other national and international institutions spoke.

He envisions applying for a multiyear grant from the National Science Foundation to establish a Science and Technology Center at Texas A&M on multi-scale processes. These centers are designed to develop multi-disciplinary projects with people with a common theme and produce major research products.

WRAP short course set

Texas Water Resource Institute will host the Water Rights Analysis Package (WRAP) Short Course on Aug. 6-8 at the Centeq Research Plaza on the Texas A&M University campus.

The two and a half-day course will focus on the fundamentals of WRAP, a generalized modeling system for simulating the development, management, allocation, and use of the water resources of a river basin. It will also include computer modeling exercises.

The course is designed for engineers and scientists employed by water agencies and consulting firms. "Participants will gain a thorough understanding of the modeling system and proficiency in its application," said Dr. Ralph Wurbs. He is associate director for engineering for the institute and a professor of water resources engineering in Zachry Department of Civil Engineering.

Instructors include Wurbs, and Richard Hoffpauir, a consultant with several years experience in the application of WRAP.

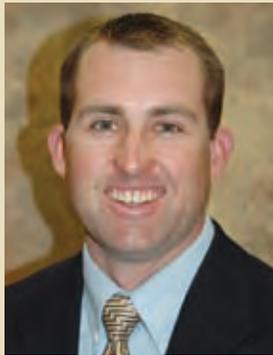
For more information or to register, go to: <http://twri-training-courses.tamu.edu> or contact Courtney Swyden, cmswyden@ag.tamu.edu, or (979) 862-2299.

New faculty

Nich Kenny

Texas AgriLife Research and Extension Center at Amarillo

Nich Kenny recently joined the Texas AgriLife Research and Extension Center at Amarillo as a Texas AgriLife Extension Service agriculture engineer. He is working with Leon New, AgriLife Extension irrigation specialist, on irrigation systems and crop production practices.



Kenny, a native of Yuma, Ariz., earned his bachelor's degree from the University of Arizona in Tucson, and most recently served as president and owner of NPK Inc., an engineering and agricultural applications consulting company.

In that position, he said he oversaw projects in Arizona concerning effluent reuse facilities, landfill and waste handling operations, wildlife habitats, and a variety of irrigation methods, including flood, drip, and sprinkler.

TWRI welcomes new faces

Megan Meier was recently selected as a project manager for the Texas Water Resources Institute. She provides leadership for projects funded by state and federal agencies. Meier also works as a team member for directing Clean Water Act 319 projects funded by the Environmental Protection Agency through the Texas State Soil and Water Conservation Board and Texas Commission on Environmental Quality.



She joined the institute as a student technician in June 2007. A graduate of Texas A&M University, Meier earned her bachelor's of science degree in wildlife and fisheries sciences and a master's of science degree in water management and hydrological sciences.

Courtney Swyden recently joined the Texas Water Resources Institute as program coordinator of the institute's new training program. Swyden will work with faculty and others to develop, coordinate, and market water resources short courses.



Prior to joining the institute, Swyden worked as a tournament/special events coordinator for PGA TOUR Superstore in Dallas, Texas. As a student at Texas A&M University, she worked for the institute as a student writer. She earned her bachelor's of science degree in agricultural journalism and communications from Texas A&M in December 2006.

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Project wins environmental award



B.L. Harris, associate director of Texas Water Resources Institute and RGBI project director, (second from left) and Craig Runyon, of New Mexico State, (third from left) receive the award from TCEQ's Commissioners Bryan Shaw, Buddy Garcia, and Larry Soward.

The Rio Grande Basin Initiative (RGBI) project was recently selected as the first place winner of the Texas Commission on Environmental Quality's (TCEQ) 2008 Texas Environmental Excellence Award (TEEA) in the agriculture category.

The TEEA celebrates the efforts of citizens, communities, businesses, and organizations to preserve and protect the Texas environment. The awards spotlight the state's highest achievements in environmental preservation and protection.

"This is a very prestigious award, and we are all highly honored to have won," said B.L. Harris, Texas Water Resources Institute associate director and RGBI project director. "Both Texas and New Mexico participants have done a great job in earning this award."