



Divining Rod

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Measuring Water Use from the Sky

by Will Keener, WRR

A team of researchers at New Mexico State University has developed a process to estimate water use in pecan orchards based on the interpretation of satellite data. The team believes this remote sensing method – which is now being applied to other crops – will help farmers and land owners better manage their water use.

“The ideal situation is to use the least amount of water to get the largest yields. Our researchers believe optimization of irrigation schedules can be used to maximize the return,” says Max Bleiweiss, remote sensing specialist and an adjunct professor in the university’s Entomology, Plant Pathology, and Weed Science Department. “This has really been a team effort.”

The effort was funded by the Rio Grande Basin Initiative – a joint Texas and New Mexico effort, the New Mexico Governor’s Water Innovation Fund, and the Water Resources Research Institute.

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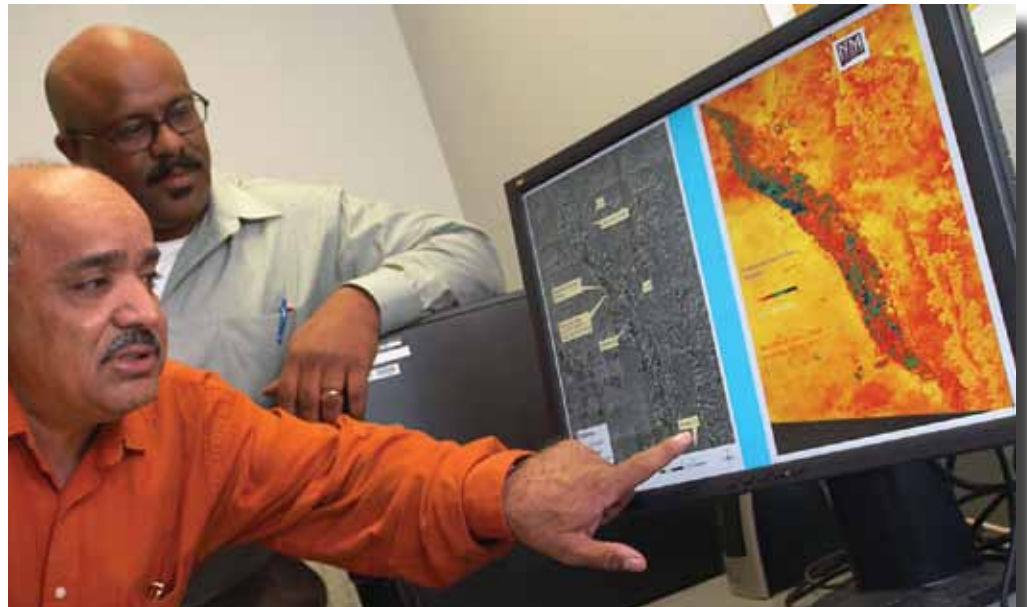
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Professor Zohrab A. Samani (left) discusses a computer-generated water-use map with A. Salim Bawazir, a co-investigator on the remote-sensing water-use project. Daily maps like this could be useful to farmers in determining irrigation needs in real-time.

NMSU Photo by Darren Phillips



Divining Rod

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WRRI Welcomes Will Keener

Will joined WRRI this year as a volunteer writer. His articles appear in the *Divining Rod* newsletter. Will earned a bachelor's degree in Journalism at the University of Colorado and a bachelor's degree in Earth Sciences at Metropolitan State University in Denver. He earned his Master's degree in communication from the University of New Mexico. During his career he has worked for a variety of newspapers and magazines, as an adjunct professor in the South Pacific, and in public relations for the energy industry. He was a science writer at Sandia National Laboratories in Albuquerque until his retirement in 2007. Will and his wife Linda moved to Las Cruces in 2008.



The WRRI is delighted to have Will contributing his writing talents to the institute. ♦

Now We Know

'Groundwater' is One Word. Dr. William Alley, the chief of the USGS Office of Groundwater, sent out a missive reporting that as of August 1, 2009, the USGS will spell 'groundwater' as a single word. Many may greet this directive with a big yawn. But for many in the groundwater profession, the debate over "one word vs. two" has been a big deal. Over the years, the controversy has resulted in acrimonious debates, shouting matches, editorials, and letters to the editor. At the New Mexico WRRI, we've been spelling groundwater as one word for nearly 25 years so I suppose we now feel validated!

The Quaternary Period Wins Out in the End. According to *Science* magazine, geoscientists have cut the Gordian knot of geologic timekeeping. Ever since 19th century geologists divided the history of Earth into four periods – the Primary, Secondary, Tertiary, and Quaternary, oldest to most recent – their intellectual descendants have been dismantling that time scale. But the geologists, anthropologists, glaciologists, and paleoecologists studying the last couple of million years became quite attached to the Quaternary. However, strict constructionists have been insisting for decades that the modern rules for dividing up geologic time permitted neither the Quaternary nor quaternarists (*Science*, Jan. 2008, p. 402). On May 21, the final committee vote on the question was announced: The quaternarists will endure. Pending an almost certain ratification by the ultimate authority – the International Commission on Stratigraphy – the Quaternary will officially take over the past 2.6 million years of the geologic time scale, when humans took up tools and the world began slipping in and out of the ice ages. (Excerpted from Richard Kerr's article in *Science*, 5, June 2009, p. 1249; www.sciencemag.org).

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The team remotely gauged evapotranspiration, or ET, as a measure of water use. ET measures water that evaporates from the soil or is lost from a plant as water vapor. Knowing the daily ET volume for a particular field or farm can help determine irrigation amounts. It can also be important in water accountability: the prickly questions of who gets precious irrigation water and how much. Quantifying amounts of water needed for various crops is a key to this allocation process.

The Mesilla Valley is a major producer of pecans in the Southwestern U.S., with more than 30,000 acres under cultivation. The large acreage and the fact that pecans consume a relatively high amount of water compared to other crops made pecans a good first target.

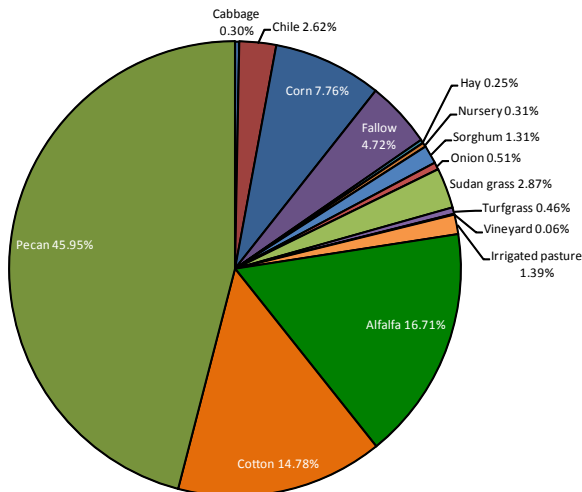


Max Bleiweiss surveys part of the archive at the Center for Applied Remote Sensing for Agriculture, Meteorology, and Environment at New Mexico State University. The goal for the center is real-time remote sensing applications. Photo by Will Keener

The project’s goal was a cost-effective method using remote sensing to estimate water use on both a farm- or field-specific basis and across a region, such as the Mesilla Valley. To reach this goal, the team:

- organized and processed a diverse and sometimes difficult body of data from satellites orbiting 400 miles above the Mesilla Valley and from ground stations,
- carefully delineated pecan growing sites including the region’s many smaller pecan farms,
- developed a model to integrate the satellite data and ground-based information,
- processed the image data with the model, and
- created water-use maps on a daily use basis.

Distribution of Water Use by Crops in Mesilla Valley, NM



This chart of water use for 2008 in the Mesilla Valley was compiled from remote sensing data using a model adapted by the research team. The model calculates water use on a daily basis for each pixel on the ground. Water consumption in each field is calculated by adding up the water consumption for each pixel in that field for that day. These numbers are compiled to calculate water consumption for each field for the year. The team used about 6,000 fields in the survey for the crops listed. About 1,500 of the fields were in pecans.

Chart courtesy: Z. A. Samani, NMSU

In his office, Bleiweiss taps on his computer keyboard and satellite images from the U.S. Geological Survey appear on the screen. Bleiweiss processed, calibrated, and corrected similar 2002 and 2003 images from two different satellites, each detecting slightly different bands with different thermal detectors. The two satellites also offered different fields of view, calling for the stitching of images to get comparable areas of coverage. Based on orbits and weather issues, Landsat scenes are typically available 12 or 13 times a year, Bleiweiss says. The second satellite turned up even fewer scenes.

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54th Annual New Mexico Water Conference

October 14-16, 2009

Preliminary Program

Wednesday, October 14

1:00 – 5:00 Tour of the Los Lunas Silvery Minnow Refugium and Isleta Pueblo's Hazardous Fuels Reduction Project

Thursday, October 15

8:30 Welcome by WRRRI Director **Karl Wood** and Isleta Pueblo Governor **Robert Benavides**

9:00 New Mexico's 16 Regional Water Plans: One Size Does Not Fit All
Angela Bordegaray and **Gretel Follingstad**, ISC

9:30 Updating New Mexico's State Water Plan
Estevan Lopez, ISC

10:00 Break

10:30 The Legislative Perspective on Funding the State Water Plan
Representative **Andy Nuñez**, Chair, Water & Natural Resources Committee

11:00 New Mexico Planning Areas Versus Management Areas: Is There a Difference?
Blane Sanchez, ISC Commissioner

11:30 The Texas Water Planning Process
Carolyn Brittin, Texas Water Development Board

12:00 Luncheon
Utton Memorial Water Lecture: A Kaleidoscope of Water Issues
Representative **Joe Stell**, retired NM legislator

1:30 New Mexico's Water and Wastewater Infrastructure Development: Implementation of the American Recovery and Reinvestment Act and into the Future
Karen Gallegos, NM Environment Department

2:00 The Hidden Value of Science in Planning
Wes Danskin, USGS, San Diego

2:30 The Land and Water Supply Connection: Does Water Limit Growth?
Susan Kelly, Utton Transboundary Center, UNM

3:00 Scenario Planning: Making Strategic Decisions in Uncertain Times
Timothy Thomure, HDR Engineering, Tucson

3:30 Break

4:00 Panel Discussion: Regional Water Planners San Juan Basin – **Randy Kirkpatrick**, San Juan Water Commission
Southwest Region – **Tom Bates**, City of Deming
Middle Rio Grande – **Joe Quintana**, Mid Region Council of Government

5:00 **Daniel B. Stephens and Associates** will host a reception as soon as we adjourn for the day. Please join your colleagues for good food and more great conversations. Cash bar available.

Friday, October 16

8:00 Flood Control in an Urban Area: Challenges for AMAFCA
John Kelly, Albuquerque Metro Area Flood Control Authority

8:30 NMED's Approach to Aquifer Storage and Recovery Water Quality Issues
Robert George, NM Environment Department

8:45 The Future of New Mexico's Deep Water
John D'Antonio, Office of the State Engineer
Michelle Henrie, MHenrie | Land | Water | Law
Ann Rodgers, Chestnut Law Office
Guy Bralley, Sandoval County

10:15 Break

10:45 Using New Mexico's AIS Management Plan and Legislation to Protect Our Aquatic Resources
Brian Lang, NM Department of Game and Fish

11:15 Water and Energy: Energy Growth in the Southwest and Its Implications for Water Use
Jared Ciferro, National Energy Technology Lab

11:45 They Are Going to Miss Me When I'm Gone: The Loss of Knowledge and Institutional Memory Due to Retirement
Karl Wood, WRRRI

12:00 Water conference drawing – must be present to win (one-night stay at Isleta Resort and Casino)
Adjourn

Water Planning in a Time of Uncertainty

Isleta Casino and Resort

Hotel Information

The conference will be held at the Isleta Casino and Resort south of Albuquerque. A block of rooms has been reserved at the Resort for conference participants. The rate for a single or double room per night is \$119 plus taxes. The cut-off date for the block of rooms is Tuesday, September 29, 2009. Individual reservations can be made by calling the Resort at 1-877-747-5382 or 505-848-1999. To receive the conference rate, identify yourself as a participant of the New Mexico Water Conference.

Registration Form

Name _____

Badge Name _____

Affiliation _____

Address _____

City, State, Zip _____

Phone _____

Fax _____

Email address _____

Please check all that apply:

Registration Fees

- Registration \$175 received by Sep. 4 (Early Bird)
- Registration \$225 from Sep. 5 through Oct. 2
- Registration \$250 after Oct. 2 and at the door
- Full-time student registration \$75
- Luncheon ticket(s) for guest(s) \$40/guest

Tour

- I will attend the Oct. 14th Wednesday afternoon tour
- I will not attend the tour

The registration fee includes all conference functions and a copy of the proceedings on CD to be published after the conference. The registration fee will be refunded if written notice of cancellation is received by September 30, 2009. A \$25 cancellation fee will be charged.

Amount Enclosed _____

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[Register Online](#) - Check WRRI's homepage for updated information about the conference. You can also register for the conference at <http://wrri.nmsu.edu>. Choose the Water Conference link and follow the instructions.

Water Conference to Host Tours on October 14, 2009

A tour of the Los Lunas Silvery Minnow Refugium and the Isleta Pueblo's Restoration Project (Hazardous Fuels Reduction Project) and Diversion Dam will take place Wednesday, October 14, 2009, from 1:00 – 5:00 pm. Tour participants should meet at the Isleta Resort lobby at 1:00. We will break into two groups with one group leaving for the Los Lunas Silvery Minnow Refugium while the other group tours the Isleta Pueblo restoration and diversion dam projects. At about 3:00, the groups will meet back at the Isleta Resort lobby and switch tours. Participants will return to the Isleta Resort around 5:00.

Isleta's Hazardous Fuels Reduction Project

In response to the devastating fires that occurred in the Albuquerque Bosque in 2004, Senator Domenici obtained Federal funding to reduce fuel loads and promote restoration of the Albuquerque Bosque and surrounding areas. For the past two years, the ACOE has assisted the Pueblo of Isleta with implementing a hazardous fuels reduction project on a 164-acre area near the Pueblo's north boundary. Treatment prescriptions range from mechanical only, mechanical and hand, and hand only, depending on the density and distribution of native flora. The project has included removal and chipping of salt cedar, russian olive, elm, tree of heaven, and locust. Post treatment prescriptions have included herbicide application to resprouts and native flora plantings.



The Isleta Diversion Dam was constructed in 1934 and is owned by the Pueblo of Isleta. The dam is operated by the Middle Rio Grande Conservancy District and diverts irrigation water from the Rio Grande to serve approximately 32,000 acres of farmland in the Belen Division. The dam is 647 feet wide and has thirty 20'x5' radial gates. The Belen Highline canal heading is on the westside of the river and the Peralta Main heading on the east. The diversion has the capacity to divert 1087 cfs.

Los Lunas Silvery Minnow Refugium

The Los Lunas Silvery Minnow Refugium (SRM) is unique. It is a cutting edge conservation hatchery. It also is a model for desert fish hatcheries. The SRM is only allowed to consume 2 ac-ft of water annually. The facility models the Rio Grande, including the hydrograph. Its uniqueness has garnered three major awards: "Best of New Mexico 2008" in the Small Projects Category, given by Southwest Contractor magazine; "Best of the Best in the US 2008" in the Small Projects Category given by McGraw-Hill, which publishes 11 regional contractor magazines; and, Engineering Award of Excellence in the Environmental Category given by ACEC.

Historically, the fish was found in 2,400 river miles of the Rio Grande and Pecos River. Today, it is restricted to 174 miles of the Rio Grande from Cochiti Reservoir to the headwaters of Elephant Butte Reservoir. It was listed as endangered in 1994.

History: The SRM was built by New Mexico Interstate Stream Commission (NMISC) to help the federal government comply with 2003 Biological Opinion as well as to provide non-federal cost share to the Middle Rio Grande

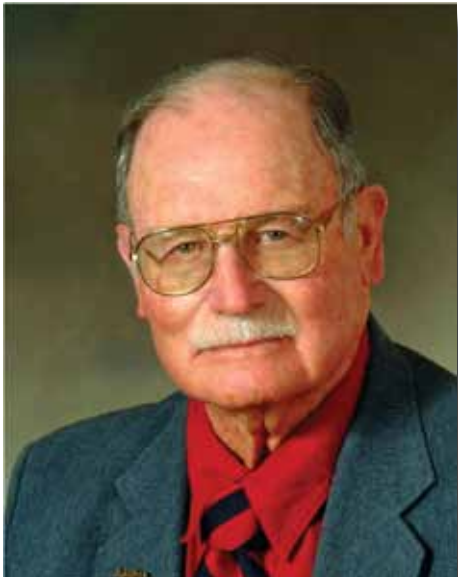
Endangered Species Collaborative Program. Two refugia were designed by HDR/FishPro, with input and funding from NMISC: Albuquerque Refugium operated by the BioPark and Los Lunas Refugium operated by NMISC.

Functions: The SRM spawns and propagates silvery minnow to stock the existing population in the middle valley, as well as other stretches of Rio Grande; houses a refugial population in case of river disasters so the species will not go extinct; and houses an additional “insurance” captive population in case a disease affects other silvery minnow breeding and propagation facilities.



Features: The SRM consists of a 700-ft² office, a 2,000-ft² storage building, a 1,500-ft² indoor hatchery, and a 0.5-acre outdoor refugium. The indoor hatchery houses tanks, aquaria, and three recirculating systems that filter and purify the water. The outdoor refugium mimics the Rio Grande and has all habitats critical for different life stages of the silvery minnow: a 458-foot stream, 5 ponds, 2 islands, shelves, overbank areas. It also produces water conditions similar to the Rio Grande, including the spring flood.

Cost: The SRM cost \$1.7 million for design, engineering, and construction, was built by general contractor SmithCo, and was funded by NMISC and two grants from the New Mexico Water Trust Board.



Albert E. Utton Memorial Water Lecture: A Kaleidoscope of Water Issues

The 2009 Albert E. Utton Memorial Lecture will be given by Joe Stell, former New Mexico Representative from District 54, Eddy and Otero counties. A ten-term representative, Joe Stell served as chair of the Agriculture & Water Resources committee and as a member of the Energy & Natural Resources committee during his tenure. Stell has been recognized for his many years of service to the legislature, his knowledge of New Mexico water issues, and his very careful consideration, as a legislator, of changes to New Mexico water law.

A former school teacher and football and basketball coach, Mr. Stell was educated in New Mexico and has received degrees from UNM and WNMU and has earned graduate credits from NMSU and ENMU. In retirement, Mr. Stell continues to work his cattle ranch near Carlsbad.

2009 New Mexico Water Research Symposium

The WRRI, in cooperation with Los Alamos National Laboratory, Sandia National Laboratories, the University of New Mexico, New Mexico Tech, New Mexico State University, New Mexico Interstate Stream Commission, New Mexico Office of the State Engineer, the U.S. Geological Survey, and the American Water Resources Association – New Mexico Section will host the annual technical research symposium on August 11, 2009.

As in the past, the one-day symposium will be held at the Macey Center on the New Mexico Tech campus. Oral and poster presentations on a wide range of water-related topics will be given. This year the symposium will include a special session devoted to water resources management modeling for New Mexico.

Also, this year the symposium will begin with a lecture given by Patricia Bobeck. She will talk about the life and scientific legacy of Henry Darcy (see article below).

Participants can register for the symposium at <http://wri.nmsu.edu/conf/tc09/symposium.html>. The fee for the symposium is \$20 but is waived for students presenting an accepted paper or poster.

The 2009 New Mexico Water Research Symposium is dedicated in fond memory of Professor Robert S. Bowman (1950-2009, see article on page 11). Rob was a member of the symposium planning committee and was instrumental in developing the symposium since its inception in 2002. He leaves a legacy of scholarship, generosity, and support to the New Mexico water community as well as to hundreds of students who benefitted from his teaching and advisement.

Patricia Bobeck to give Darcy Presentation at the 2009 New Mexico Water Research Symposium

Patricia Bobeck is the translator of Henry Darcy's major work, *The Public Fountains of the City of Dijon*, originally published in 1856. In the book, Darcy describes the planning and construction of the water supply system in Dijon France in 1832-1840. Buried at the back of the book is Darcy's rationale for and description of the experiments that led to Darcy's Law.

The French original of *The Public Fountains* is a rare book, available in only 10 special libraries in the U.S. and accessible only to speakers of old-style French. The English translation makes Darcy's wealth of knowledge available to the modern scientific community.

The presentation focuses on Henry Darcy's life and scientific legacy. It includes a discussion of the book and its



accompanying engineering drawings, photographs of the water supply system as it exists today, and research and discussions that the translation has generated.

Patricia Bobeck is a geologist and linguist. She has master's degrees in geology from the University of Texas and in linguistics from the University of Michigan and a bachelor's degree in French. She worked for environmental agencies in Texas for 17 years overseeing groundwater and soil remediation at industrial, hazardous, and radioactive waste sites.

Prior to her geologic career, she studied languages in France and

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Testing Saline Irrigation of Turf Grasses

by Will Keener, WRR

Drought, climate change, and population growth all contribute to an increasing demand for freshwater supplies in the southwestern U.S. In response, many have turned attention to large supplies of salty, or brackish, groundwater that have largely been ignored up to now.

But can these saline waters be treated, mixed with potable water, or otherwise employed to provide beneficial use in the thirsty Southwest? A long-term experiment at New Mexico State University is looking at that question in terms of using saline water for turf irrigation.

The experiment is providing hard data, says Bernd Leinauer, associate professor and extension turfgrass specialist at NMSU's Extension Plant Sciences department. The initial project, in its third year of funding by the Water Resources Research Institute, has shown that warm season grasses – such as bermudagrass, seashore paspalum, and inland saltgrass – can be irrigated successfully, he says. But the longer-range question of whether the salinity will damage the soil horizons or possibly the groundwater or aquifer beneath the turf areas is still under study.

“We hope to run the test further to determine if we are damaging the underlying soil and the aquifer,” says Leinauer. “We are increasing salt in the upper root zone. The question is, are we damaging the soil?”

The experiment adjacent to NMSU's golf course is beginning its fifth year overall. It has enabled Leinauer and his team to measure salinity at three depths – from surface to 4 inches, 4 to 8 inches, and 20 to 24 inches. By coring twice a year, once in mid-June

and again in November at the end of the growing season, researchers capture data on salinity at each of the three depths. Soil samples can also be chemically analyzed to determine how different chemical salts move within the soil horizon.

Components of the experiment have included three quality levels for water, two irrigation systems, two grass types (warm and cool season grasses) and three depths of testing. Problems with the subsurface irrigation have caused it to be shut down, but irrigation by sprinkler continues. Water qualities include potable water, saline water, and a 50-50 mix of the two.

The picture painted by the data so far is a “push-pull” effect. As plants grow and use water, they draw salts up from deeper in the soil. Then, due to irrigation and because of precipitation during the late summer rainy season, a “push” cycle causes the salts to move deeper. Soil physicists and hydrologists at the university have

suggested that the likely extent of the impact of the salt is about 24 inches; however Leinauer wants to verify that.



In these photos, NMSU student Chris Dominguez takes a core sample at the experiment site. The core (closeup) is then measured and divided into samples by depth. Then measurements of salinity and analysis of the various salts present can be made.

Photos by Matteo Serena, NMSU.

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Switzerland, and taught languages in the Caribbean, South America, and Hawaii, where she encountered the Alps, the Andes, and the volcanoes that led her to the field of geology. In addition to French, Patricia speaks Spanish and Chinese. She is a consulting geologist and freelance translator.

The translation of Darcy's book took three years of nights and weekends (while Patricia worked full-time as a hydrogeologist for the State of Texas). In 2004, the American Foundation for Translation and Interpretation awarded her the E.S. Berger Prize for Excellence in Scientific and Technical Translation for the Darcy translation. ♦

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"We would love to go deeper, but with our destructive sampling and hard soils, coring to 24 inches can be difficult," he says.

Addressing this problem has led to a spinoff experiment that actually allows deeper testing. Using in-place dielectric sensors that measure soil moisture and calculate soil salinity, sensors are placed at four inches (in the root zone), at 20 inches (just below the roots), and at seven feet. These sensors allow more frequent data collection without destruction of the turf and can help provide a more detailed portrait of how the salts move over time. ♦

Gila Planning Economic Forum

Bobby J. Creel, New Mexico WRRI, David S. Brookshire, University of New Mexico, and Steven L. Piper, U.S. Bureau of Reclamation coordinated a one-day forum at Western New Mexico University in Silver City on May 28, 2009. The forum brought together eight experts to present an array of economic tools and techniques that could provide the Gila-San

Francisco Coordinating Committee with additional decision making and management capabilities. The Committee has the statutory responsibility for implementation of the New Mexico portions of the 2004 Arizona Water Settlements Act.

Congress directed in the 2004 Arizona Water Settlements Act that New Mexico's Interstate Stream Commission (ISC) approve expenditures of monies or contracts for water received by New Mexico in the settlement. The ISC has sought to "... apply the best available science to assess and mitigate the ecological impacts on Southwest New Mexico, the Gila River, its tributaries and associated riparian corridors, while also

considering the historic uses of and future demands for water in the Basin and the traditions, cultures and customs affecting those uses."



As a step in the process, speakers at the Gila Planning Economic Forum presented examples of decision systems modeling that could assist in their decision processes, an update on demographic and economic activity for the four-county area, expected impacts of climate change on the watershed of southwestern New Mexico, and assisted in the identification and prioritization of scientific and technical needs required to support water management decisions in the Gila River Basin.

The forum's final report is available at: ftp://water.nmsu.edu/pub/gila/economic_forum/. The report includes speakers' presentations and their PowerPoint slides.

Robert Bowman 1950-2009

New Mexico Tech Hydrology Professor Robert Bowman died on June 8, 2009 after a brief bout of colon cancer. New Mexico Tech President Dr. Daniel H. Lopez said Bowman represented the best of the university and was an extraordinarily well-rounded man. He balanced the rigors of teaching, research, and mentoring with grace and professionalism.

Bowman's 20-year plus association with the WRRRI included serving as a principal investigator on several research projects, providing guidance to student recipients of the institute's Student Research Grant Program, and serving on the technical research symposium committee. He was instrumental in organizing the technical research symposium, which has been held yearly since 2002. In the past few months, Rob was helping to organize a special session at this year's symposium on water resources management modeling for New Mexico. The WRRRI has dedicated the 2009 Water Research Symposium in fond memory of Rob Bowman.

Bowman received an A.B. in chemistry from the University of California, Berkeley in 1972 and a Ph.D. in soil chemistry from New Mexico State University in 1982. He joined the faculty at New Mexico Tech in 1987. One of Rob's internationally noted areas of research was the use of zeolites, a type of naturally occurring porous mineral, for water treatment. Bowman employed modified zeolites for the removal of volatile organics from produced water in the petroleum industry and for the in situ removal of chlorinated solvents from contaminated groundwater. He and his students focused on a wide range of applications from small-scale operations in rural developing country communities, to large-scale operations for industry and large municipal water systems.

He also had a great interest in the solute budget and groundwater-surface water interactions of the Rio Grande that is the agricultural lifeblood of central New Mexico.



Robert Bowman (center) chatting with colleagues at the 2004 Water Research Symposium. Rob served on the symposium committee and was instrumental in developing the program each year. This year's symposium is dedicated to him.

Bowman had secured two patents and had two others pending. One of his crowning scientific achievements was in 2006, when Bowman hosted the International Natural Zeolite Association's quadrennial conference, a week-long event that brought 150 people to New Mexico Tech from 30 countries.

Dr. Robert Bowman will be remembered for his scientific contributions, his dedication to hundreds of students, and for his kindness and generosity. WRRRI sends its condolences to his wife, Karen Bailey-Bowman and his son, Danny. Rob will be terribly missed. 💧

(Contributors include Thomas Guengerich and Valerie Kimble of New Mexico Tech.)

The New Mexico MCLE Board has approved 9.0 continuing legal education credits for the 54th Annual New Mexico Water Conference

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Zohrab A. Samani, a professor in NMSU's Department of Civil Engineering, adapted existing modeling software to make use of Bleiweiss's data. The model takes the satellite image and calibrates against ground measurements of weather information to calculate ET, Samani explains. Because of the many variables involved in ET – some of them invisible to the satellite – ground measurements are needed to supplement the remote data, he says.

Graduate student Aldo Piñon-Villareal digitized the pecan fields using Geographic Information Systems (GIS) technologies to create vector files, which accurately bound areas with pecan tree vegetation. These files were then overlaid with the model developed by Samani, with graduate student Vien Tran providing the programming expertise.

There are a number of steps in the process leading to periodic maps that are, in turn, converted to daily maps of water use,

says Samani. "On the maps you can point to a specific field and get the usage numbers. A farmer can use GIS coordinates to find out about his water use and figure out future needs." Efforts are under way to expand the water use estimation to cotton, alfalfa, wheat, lettuce and, in all, a suite of 16 crops grown in the valley.

Rhonda Skaggs, a professor in the university's Department of Agricultural Economics and Agricultural Business, is involved in the socio-economic component of the study. "We are looking at the larger impacts on the agricultural sector of having this kind of remote sensing information," says Skaggs. The work should eventually allow assessment of output units of crops based on input units of water across a variety of farm sizes and types, she says.

Also of interest is the role remote sensing information can play on water accountability. In New Mexico, where allocation is based on historical usage, these issues are now beginning to be addressed in more technical ways, where detailed data can be useful. 💧

WRRRI Sponsors International Conference on Water

The New Mexico Water Resources Research Institute with NMSU's International Relations Institute and co-sponsors Sandia National Laboratories and NMSU's Institute for Energy and the Environment gathered experts from around the United States, Mexico, and the Middle East to discuss the similarities and problems of the Rio Grande and Jordan River basins.

The Transboundary Water Crises: Learning from Our Neighbors in the Rio Grande (Bravo) and Jordan River Watersheds conference took place in January on the NMSU campus. Over two hundred participants gathered for the day-and-a-half conference to learn about and discuss the similarities and problems of the Rio Grande and Jordan River basins.

An impressive list of 16 speakers, all experts on water issues, discussed "the exploding human population along both rivers, water quality issues such as waterborne diseases, salinity problems, and because it is an arid environment, limited supplies," said Karl Wood, Director of the New Mexico WRRRI and principal organizer of the conference. "It's a limited resource with greater demands, and the demands are increasing while the supplies are not."

All conference presentations can be viewed via NMSU's ICT video service at: <http://mediasite.nmsu.edu> by clicking on Transboundary Water Crises. The videos include PowerPoint slides used by speakers during their talks. The publication of papers from the conference will be included in the inaugural issue of the *Journal of Transboundary Water Resources* to be published by the WRRRI in early fall.



Jordan River