tx H_2O

A Publication of the Texas Water Resources Institute

Winter 2008

In this issue:

Changing Climates

Innovative Partnering
Historic Treasures
and much more...

TEXAS A&M *Agri*LIFE

Teaching • Research • Extension • Service

Dr. C. Allan Jones

Message from the Director

Working Together for Texas Water

Reading this issue of txH2O, you will notice that two state agencies of The Texas A&M University System have changed names. Texas AgriLife Research is the new name for the Texas Agricultural Experiment Station and Texas AgriLife Extension Service is the new name for Texas Cooperative Extension.

These name changes are part of a major re-branding effort to better reflect the agencies' missions and communicate their life-changing impacts on Texans and the world (see page 27 for the complete story). As a statewide institute administered by AgriLife Research and AgriLife Extension, Texas Water Resources Institute looks forward to continue supporting and communicating the work of these two agencies and other research and education efforts around the state relating to water resources.

This issue's lead story is "Changing Climates: Researchers investigating effects, mitigation." Although not exhaustive, the story briefly reports on climate change research by scientists at different Texas universities. Before climate change and global warming became hot topics in the media, researchers were investigating the science behind climate change. As more is understood about climate change and its effects globally, these researchers are learning more about how climate change will affect Texas' water resources, as well as how new technologies and policies can reduce or mitigate the effects of the changes.

With the predictions of hotter temperatures and more extreme weather patterns along with an increasing population, Texas will indeed face increased challenges and demands on its water resources. Through continued research and education, however, these challenges and demands can be better understood and mitigation of impacts planned.

C. Allan Jones

AgriLIFE EXTENSION
Texas A&M System

tx H_2O

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On the cover:
The Blue Marble was generated by researchers in the Laboratory for Atmospheres at NASA's Goddard Space Flight Center, Greenbelt, MD, using data from three different Earth-observing satellite instruments. The presence of the Moon in this image is an artistic addition.

Texas Water Resources Institute
make every drop count

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Story by Kathy Wythe

Changing Climates

Researchers investigating effects, mitigation

Editor's note: This story highlights climate change research from only a few scientists in Texas. A more detailed story of their research is available on Texas Water Resources Institute's web site at http://twri.tamu.edu/climatechange. Other researchers are listed at http://twri.tamu.edu/climatechangeresearchers. Additional scientists may be added by clicking on the comment section.

Long before climate change and global warming became such a popular topic, scientists were researching the different aspects of the world's changing climate. In Texas alone, dozens of scientists from different universities and a wide range of academic areas are investigating the different components. More recently, they are taking information gleaned from the global climate models and applying them to research questions pertaining to Texas.

Dr. Bruce McCarl, Regents Professor of agricultural economics at Texas A&M University, has researched the economics of climate change for the last 20 years. McCarl, as a lead

McCarl

author in a 2007 Intergovernmental Panel on Climate Change (IPCC) report, shares in the 2007 Nobel Peace Prize with the other scientists on the panel as well as Al Gore. His research has focused on economic effects of climate change on agriculture and forestry and their possible roles in mitigating climate change.

In his mitigation research, McCarl has proposed that agriculture can help reduce greenhouse gases. The first option, he said, is for agriculture to reduce and control direct emissions by reducing irrigation pumping, which uses energy; reducing fertilizer use, which produces the greenhouse gas, nitrous oxide; and improving manure management of livestock herds. The second way is by modifying agricultural management to enhance the stored carbon, thus increasing carbon sequestration. McCarl said agriculture could also generate products that offset fossil fuel-intensive products.


North

Another Texas A&M researcher, Dr. Gerald North, is an expert on simplified climate models, Earth observing satellites, ancient climates, and the detection and attribution of climate change. The Distinguished Professor of atmospheric sciences recently has been studying climate models to better understand how precipitation, evaporation, and runoff over the Greater Texas region will change over the next century.

North and his colleagues in Texas A&M's Department of Atmospheric Sciences issued a statement supporting the IPCC reports and findings. The statement is available at http://www.met.tamu.edu/climatechange.php.

Katharine Hayhoe, associate professor of geosciences at Texas Tech University, uses global and regional climate model simulations to determine what climate change means to the places where we live. As a current contributor to and expert reviewer of the latest IPCC report, Hayhoe also shared in the Nobel Peace Prize. She is currently collaborating with researchers from the University of Chicago, University of Illinois, and Harvard University on a National Science Foundation grant to develop new statistical methods to relate global climate projections to what will happen at the local scale.


Hayhoe

She said people need specific examples about the effects of climate change, like an increase in the number of days a city might experience over 100 degrees Fahrenheit, or a change in the frequency of drought conditions. "People need this type of information to make decisions," she said, and individual cities need the information to make decisions when planning for the future.

"As individuals, we need to see how climate changes will affect where we live because we are being asked to make lifestyle changes to prevent potentially dangerous impacts of climate changes," she said. "If we don't know what those impacts are likely to be for us personally, it's hard to be motivated to make those changes."


Nielsen-Gammon

Professor of atmospheric sciences at Texas A&M and the state's climatologist, Dr. John Nielsen-Gammon, researches climate variability and change in the past. He has also investigated regional drought causes and mechanisms, including specific meteorological factors that lead to lack of rainfall in the summer, hurricane frequency, and climate data quality.

In one project, he is working with the Institute for Science Technology and Public Policy of The Bush School of Government and Public Service, providing climate data for a project

studying drought and drought variability over the past century in Texas and New Mexico and policy makers' perceptions of drought. His research is specifically "looking at spatial patterns of droughts in the past and frequency and whether precipitation and drought has changed significantly over the past 100 years," he said. He has found that total precipitation has increased in Texas by 10 to 20 percent over the past 100 years.

This project is one of two that are focused on climate change at the Bush School institute, according to Dr. Arnold Vedlitz, director.

Both projects are examining how decision makers and other stakeholders use science information about global climate change in their decision making process. Vedlitz said the researchers have done regional studies on the Gulf Coast, national studies of decision makers, national public opinion polls and interviewed a national sample of climate scientists to determine how different stakeholder groups use climate change information.

The second part of their research is answering the question, "How can we make this information more usable to decision makers?" ⇨

The Texas warming and rainfall manipulation experiment (WARM) is investigating the effects of climate change on oak savanna in Texas. Rainfall exclusion shelters and infrared lamps are used to control rainfall and simulate future climate warming. (Photo courtesy of MG Tjoelker.)

Vedlitz said. The researchers are developing decision tools and models to help decision makers make better use of the information.

Part of the research of Dr. Steven Quiring, Texas A&M assistant professor of geography, is focused on the influence of global climate change on the hydrologic cycle and drought. Using records from the past, Quiring said he can study drought and its natural variability to put it into proper perspective to help detect future changes from climate change.


Quiring

"We need to use the observational record to make sure we understand how the system works," Quiring said. "Once we understand how the system works then that is the jumping off point for climate change."

In research funded by the U.S. Department of Energy through the Southeastern Region of the National Institute for Climatic Change Research, Texas A&M researchers Drs. Mark Tjoelker and David Briske of the Department of Ecosystem Science and Management and Astrid Volder of the Department of Horticultural Science are conducting a large, multi-year experiment near the Texas A&M campus. They are examining the effects of climate warming and drought predicted within the next several decades on the post oak savannas and woodlands of central Texas.

Through three years of controlling the temperature and rainfall to mimic predictions, Tjoelker said their research suggests that juniper will increase in dominance and invasiveness in savanna grasslands with both climate warming and increased summer drought.


Masiello

Dr. Carrie A. Masiello, assistant professor of earth science at Rice University, studies the Earth's carbon cycle on timescales from five to 100,000 years. Her main interests are in fundamental mechanisms of the carbon cycle and how humans are altering these mechanisms through combustion of fossil fuel, land use change, and erosion. Masiello and her group, Rice Isotope Biogeochemistry, are currently studying how changes in climate and land use are controlling river carbon cycling.

At The University of Texas at Austin (UT), researchers at the Environmental Science Institute (ESI)—a multi-disciplinary institute for basic scientific research in environmental studies—are examining different aspects of climate change. Dr. Jay Banner, director, said its work includes climate change history, impacts, remediation and education, climate modeling, records, and abrupt climate change.

Dr. Zong-Liang Yang, associate professor in the Jackson School of Geosciences, and his Land Environmental and Atmospheric Dynamics (LEAD) group are studying the impacts of climate change on a finer scale.


Yang

They are using various computer models to study the interaction of land use and the atmosphere.

For a National Aeronautics and Space Administration grant, Yang, along with other ESI-affiliated researchers, are using a series of nested computer models that integrate climatic, hydrologic, ecological, and atmospheric processes to study how climate change on the global scale will affect people locally. The team is using the computer model to study the Nueces and Guadalupe watersheds.

Other UT researchers involved in the project are Drs. Guo-Yue Niu, Jackson School; David Maidment, Department of Civil, Architectural and Environmental Engineering; James McClelland, Marine Science Institute; and Hongjie Xie, Department of Earth and Environmental Science, University of Texas at San Antonio. Dr. Paul Montagna of the Harte

Research Institute at Texas A&M at Corpus Christi is also a member.

Dr. Charles Jackson, research scientist at the Jackson School's Institute for Geophysics, is an expert in global climate change of the past—particularly episodes of abrupt climate change within the past 100,000 years. Jackson also works on quantifying climate prediction uncertainties in order to understand how records of past change may be used to build confidence in model predictions of the future.

Through a National Science Foundation research grant, Dr. John Holbrook, professor of Earth and environmental sciences at The University of Texas at Arlington, is examining the rates and processes by which the Missouri River changes its pattern and erosion trends due to climate change. Although the area being studied is the Missouri Drainage, he said researchers will gain insight into how the High Plains, including parts of Texas, responded in general to climate change over the past 5,000 years.

Dr. Arne Winguth, assistant professor of earth and environmental sciences at UT at Arlington, has started analyzing recent

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Texas is vulnerable to climate change

Texas is expected to see hotter temperatures, more concentrated rain, higher soil evaporation rates, greater frequency of droughts, higher sea levels with increased hurricane intensities along with lower precipitation and diminished water supplies, according to two Texas A&M University researchers.

"Texas is very vulnerable to climate change," said Dr. Bruce McCarl, Regents Professor in Texas A&M University's Department of Agricultural Economics. "It has a warm, often dry, climate greatly affecting water and energy needs, agricultural and forestry production, pest populations, disease prevalence, and ecological conditions.

"Agricultural production is highly influenced by such conditions and thus is vulnerable to climate change," he said, estimating that Texas will have as much as a 40 percent reduction in acreage in crop production.

Texas is also quite vulnerable if actions are taken to mitigate climate change by reducing greenhouse gas emissions.

"Nationally over 80 percent of the emissions come from petroleum and electricity generation," he said. "Texas emits almost twice the total volume of greenhouse gasses compared with any other U.S. state. This comes from Texas' large petroleum industry and inventory of coal-fired power plants."

⇨

climate records of Texas, particularly the northern part of the state. Winguth plans to process the recent climatic trends in Texas and compare these data with predictions from the IPCC.

Professor of geography at Texas State University, Dr. David Butler, does climate change research mainly in the Rocky Mountains with U.S. Geological Survey funding. He has also done research on how climate change is affecting floods in Central Texas and on the relationships of climate change with range expansions of fire ants and their interaction with native animals.

"Climate change in Central Texas will probably make flood forecasting more unpredictable than ever, as climatic extremes seem to become more common," Butler said.

Dr. Richard Dixon, associate professor of geography at Texas State, researches a vulnerability analysis of tropical systems for Texas coastal counties, the impact of interannual climate variability on temperature and precipitation in Texas, vulnerability of south Texas to tornadoes, and reassessment of storm and flood probabilities for south-central Texas. His doctoral students are investigating regional climate change in the Big Bend National Park area, and spatial and temporal trends in precipitation and evaporation in Texas.

The researchers said that, although Texas scientists are conducting much research, more needs to done, especially at the local level.

"It's been my contention for 20 years that we haven't been doing enough research on this question (climate change) in Texas," said Dr. Gerald North of A&M's atmospheric Sciences department.

To read more about the research or to comment on this story, please visit http://twri.tamu.edu/climatechange. For a list of Texas climate change researchers or to add names, visit http://twri.tamu.edu/climatechangeresearchers.

McCarl stressed that Texas could be "squeezed" economically by attempts to lower emissions, which would increase energy prices and industry costs.

"Furthermore, Texas is expecting a large population growth that will increase its water and energy needs," McCarl said.

"My whole focus," he explained, "has been to estimate what damages arise if the 'bulldozer' of climate change hits us, and what opportunities we have for agriculture to help mitigate them."

Dr. Gerald North, Distinguished Professor in Texas A&M's Department of Atmospheric Sciences, agreed with McCarl about Texas' vulnerability, saying that, outside of Alaska, Texas may be the state most vulnerable to the effects of climate change.

"Texas will face a number of challenges, and its main problem is water," North said. "Other things, such as increased population, the decline in the Ogallala Aquifer, and increased urbanization will combine with climate change to make it worse."

Since research shows that the state's average temperature has increased by 2 degrees Fahrenheit in the last three decades and will continue to rise, North, who speaks on climate change all over the state and country, said precipitation would have to increase by 50 percent to maintain current water volumes in the state's rivers and lakes.

"The high temperatures experienced during the terrible drought in the 1950s will become the average temperature," he said.

North co-edited a 1995 book, *Impact of Global Warming in Texas*, and is currently working on a revision due in 2008. McCarl is one of the chapter authors.

Climate change primer

Intergovernmental Panel on Climate Change–The World Meteorological Organization and United Nations Environmental Program established the Intergovernmental Panel on Climate Change (IPCC) in 1988. Its goal is to assess scientific, technical, and socio-economic information relevant to the understanding of climate change, its potential impacts, and options for adaptation and mitigation. It has issued four Assessment Reports (1990, 1995, 2001, and 2007) along with other reports. A summary for policymakers of the "Synthesis Report of the Fourth Assessment Report," which was released in November 2007 is available at http://www.ipcc.ch/.

The following are some findings of the synthesis report:

- Warming of the world's climate is "unequivocal": 11 of the past 12 years (1995-2006) rank among the 12 warmest years since 1850.
- It is "likely" (meaning a 66 percent likelihood) that there has been significant man-made warming on every continent except Antarctica over the past half-century.
- Continued greenhouse-gas emissions at or above current rates would induce climate changes that would be "very likely" (meaning a 90 percent likelihood) to exceed those observed during the twentieth century.
- Fossil fuels will dominate the world's energy portfolio until at least 2030, and emissions are expected to rise by 25-90 percent during that time.
- Given our current understanding, it is too difficult to estimate the extent of future sea-level rise.

(taken from Nature News at www.nature.com/news)

Global warming–Scientists say that the earth's temperature has warmed by 0.6 ˚C to 0.9 ˚C in the last 100 years. They expect it to warm by as much as 10 ˚F over the next 100 years.

Greenhouse Gases (GHG)–Greenhouse gasses, which include carbon dioxide, methane, and nitrous oxide, trap heat, thus increasing temperatures. The IPCC maintains that, since the industrial revolution began around 1750, carbon dioxide levels have increased 35 percent; and methane levels have increased by 148 percent.

Climate, Weather and Water on the Web

Compiled by Ric Jensen

Climate

- **The Texas Weather Connection**

  http://twc.tamu.edu

  Information about climate factors (temperatures, dewpoint, humidity, wind, and precipitation) from many regions throughout Texas.
- **The Climate Atlas of the United States**

  http://gis.ncdc.noaa.gov

  National maps that can display trends associated with temperature, precipitation, wind and other variables.
- **The National Drought Mitigation Center**

  http://drought.unl.edu/monitor/monitor.htm

  Current drought conditions, the number of dry and rainy days and the impact of drought on water supplies and vegetation.

Climate Change

- **EPA's Climate Change Site**

  http://www.epa.gov/climatechange/

  Comprehensive information on the issue of climate change, including science, U.S. climate policy, greenhouse emissions, health and environmental effects, and what you can do.
- **United Nations Gateway to the UN System's Work on Climate Change**

  http://www.un.org/climatechange/

  Climate change information from various UN agencies, featuring scientific reports from the UN, developments on efforts to reach a new international climate change agreement, climate change events, news, webcasts, projects in the field, and climate change information for youth.

Weather

- **The National Weather Service**

  http://www.weather.gov

  Current and historical weather information, including weather conditions, weather forecasts, and weather watches and warnings. Users can sign up for automatic weather alerts about specific locations.

Water Resources

- **The National Weather Service's Advanced Hydrologic Prediction Service**

  http://water.weather.gov

  Water-related information, including current conditions and forecasted flows for rivers, precipitation, and runoff.
- **The U.S. Geological Survey's National Water Information System**

  http://waterdata.usgs.gov/nwis

  Information such as trends associated with river flows, water levels in reservoirs and groundwater conditions, water quality parameters, water temperature, dissolved oxygen, salinity, and pH.

Surface Water Reservoirs

- **Texas Water Development Board's Texas Water Conditions**

  http://www.twdb.state.tx.us/publications/reports/waterconditions/watercon.asp

  Information, current and historical, about the volumes of water stored in major surface water reservoirs and information about trends related to the amount of water stored in Texas lakes.

Groundwater

- **Texas Water Development Board's Water Information Integration and Dissemination System Web site**

  http://wiid.twdb.state.tx.us

  Detailed information about individual water wells. This system uses a geographic information system-based tool to show locations of water wells and download data on water levels and water quality. Reports that were developed about on-site conditions before a well was drilled and installed can be downloaded.

- **U. S. Geological Survey's Groundwater Data for the Nation program**

  http://waterdata.usgs.gov/nwis/gw

  A variety of groundwater data, including information about current or real-time groundwater levels as well as daily, monthly, and annual data and statistics.

Irrigation Scheduling

Web-based information networks that present real-time data on potential evapotranspiration and other climate parameters to help urban and rural water users schedule irrigation.

- **Texas Evapotranspiration Network**

  http://texaset.tamu.edu/

- **North Plains Weather Network**

  http://amarillo2.tamu.edu/nppet/petnet1.htm

- **Texas High Plains Evapotranspiration Network**

  http://txhighplainset.tamu.edu/

- **Uvalde Research and Extension Center's Potential Evapotranspiration Network**

  http://uvalde.tamu.edu/

- **The Crop Weather Program, Texas AgriLife Research and Extension Center at Corpus Christi**

  http://cwp.tamu.edu/

Climate change conference set

The River Systems Institute is hosting "Forecast: Climate Change – Impacts on Texas Water," April 28-30, 2008, at the Texas State Capitol Extension in Austin.

The conference will take a comprehensive look at what is known about climate change and what needs to be known to prepare for the local impact on Texas water resources and on the communities, both natural and human, that depend on them.

The conference will feature national climate change scientists who have conducted cutting-edge work in the prediction of global warming and the impending changes on the Earth's climate and state scientists who are working to understand the impact on Texas and its water resources.

Speakers include Drs. Warren Washington of the National Center for Atmospheric Research; Connie Woodhouse of the University of Arizona's Department of Geography and Regional Development, Gerald North of Texas A&M University's Department of Atmospheric Sciences, Bruce McCarl of Texas A&M's Department of Agricultural Economics, and Ruby Leung of the Pacific Northwest National Laboratories.

The conference is being co-hosted by Texas Water Resources Institute, an entity of Texas A&M AgriLife, and Environmental Sciences Institute of The University of Texas at Austin. Co-sponsors include Guadalupe – Blanco River Authority, Lower Colorado River Authority, Magnolia Charitable Trust, The University of Texas's Jackson School of Geosciences, and U.S. Geological Survey.

For more information, visit http://www.rivers.txstate.edu/CCTW/CCTW08index.htm.

Story by Danielle Supercinski

Educating the community

AmeriCorps members contribute to water conservation

Educating communities about water conservation has been a hot topic during recent times of drought and low water levels. One group of volunteers in El Paso, Texas, is making sure they play a part in educating residents on conserving water for the future.

The Upper Rio Grande Water Conservation Corps project provides water conservation and water quality education to homeowners, farmers, and youth. It is funded by AmeriCorps, a network of local, state, and national service programs. In 2006-2007 the project had 17 members, eight of whom are returning for a second year.

Dina Corral is one AmeriCorps member who started in the program in October 2006 and is currently working on her second year as a full-time member. "I joined because I have always enjoyed working with my community and outreach programs," she said. "And I love gardening, so I was lucky to be placed on the horticulture team."

The project has three water education programming focus areas: agriculture, community, and youth. The agriculture team works with farmers and local agricultural-related programs. The community team is involved in horticulture, landscapes, sports fields, parks, pesticide-use safety, and in-home demonstrations and education. Youth team programs increase knowledge and skills in water, change behaviors associated with water conservation and quality, and support 4-H-based water curricula delivery in schools.

Corral and other AmeriCorps members have been working at the Texas AgriLife Extension Service xeriscape demonstration garden at the Texas AgriLife Research and Extension Center at El Paso, potting seedlings that are later donated to Habitat for Humanity homes. They also installed the irrigation and put in plants at three of these homes.

Last year, as part of "Make a Difference Day," AmeriCorps members cleaned a historic cemetery in Clint, Texas, that was overgrown and barely visible because of the weeds. Some residents from the area were not aware the cemetery was even there, Corral said.

"This year's 'Make a Difference Day' project was also very fulfilling," she said. "We did the landscaping for a 12-year-old girl who has leukemia and has always wanted a

Photos left to right: AmeriCorps members worked with the El Paso Habitat for Humanity. (L to R) Vanessa Melendez, Yesenia Perez, Dina Corral, Laura Herrera, Stephanie Madrid and Jessica Molina. AmeriCorps members leveling land at leukemia patient Georgina Gomez's home on Make a Difference Day 2007. (L to R) Liz Tabarani, Jessica Molina, Korina Navarro and Antonio Sanchez. Korina Navarro teaching a girl how to make a butterfly bookmarker. (Photos courtesy of Dina Corral.)

garden. We created a prayer garden, all made possible through donations from community partners. AmeriCorps members planted low water use plants and mostly native trees."

Members also educated students from elementary through high schools on recycling and water conservation. As part of the Martin Luther King Can Drive, members collected more than 20 tons of food for area shelters around El Paso.

Daphne Richards, AmeriCorps project manager and El Paso County Extension agent–Horticulture, said, "The project has not only made a difference in the lives of our community residents, but also on the members themselves, who are learning valuable job skills." In addition, the members learn about leadership, conflict resolution, problem solving, and other important life skills to become future leaders of their communities.

"I have learned many things from AmeriCorps," Corral said, "but the most important is that people are willing to change their habits and become earth-friendly and aware that our natural resources need to be taken care of. The only problem is the lack of information. But, once you give them the information, they do take it and use it wisely. So the main thing to learn is that the word needs to get out on water conservation."

In the first year, the El Paso AmeriCorps members contributed 22,277 hours to the program. Thus far, more than 11,500 youth and homeowners have been contacted through water education, recycling, summer camp and in-school programs, and other special educational events. Agricultural producers have benefited from various AmeriCorps workshops and demonstrations, with more than 1,022 farmers being contacted between December 2006 and August 2007.

"We are looking forward to making a difference in even more people's lives in the second year," Richards said.

Corral said she could write a book about her experiences and everything the Upper Rio Grande Water Conservation Corps members have done.

"My time with AmeriCorps has been a phenomenal experience, and two years is not enough time to do all the projects I have in mind."

Photos left to right: As part of the community-based team, members test soil moisture on local sports fields. The 2006 community-based horticulture team at the Desert Poppies Festival Water Conservation Educational Booth: (top) Liz Tabarani, Jessica Molina, Claudia Vargas and Laura Herrera, (bottom) Dina Corral and Korina Navarro. Members participated in the 2007 Make a Difference Day program with exhibits and volunteer work. (Left photos courtesy of Dina Corral.)

Story by Emilie Lowe

Innovative partnering

Texas A&M, McKinney develop water conservation venture

The city of McKinney, Texas and Texas AgriLife Research and Extension Urban Solutions Center at Dallas are partnering on a six-year plan to educate and bring research-based innovations to McKinney residents. The goal is to help them manage water resources efficiently.

This partnership developed after the summer of 2006 when McKinney, one of the fastest growing cities in the United States, was faced with a severe drought that placed the city in a stage three drought contingency plan. City officials had to limit water usage and worried that, if the drought continued into 2007, McKinney would go into stage four.

"Stage three was a major wake-up call for the area and required us to implement limitations on water use," said Brian Loughmiller, a McKinney city council member. "We looked for creative measures that we could implement in water conservation that would last beyond the end of the drought and hopefully result in a greater appreciation for water conservation even during times where it appears that we have a water surplus."

McKinney Mayor Bill Whitfield agreed. "McKinney has no choice," he said. "It is the second fastest growing city in the country (among cities of 100,000 or more). Its population reached 100,000 in 2005 and is expected to eventually top 350,000."

According to both city officials, partnering with the Dallas center provided the city with a way to develop long-term water conservation strategies.

The University of Texas at Arlington's Program in Landscape Architect assisted in the design of a one-acre water conservation garden for McKinney. The garden will demonstrate drought-tolerant plants and turfgrasses, new irrigation technologies and other water conservation techniques.

Clint Wolfe, the center's grant and program coordinator, said the first goal of the partnership is to educate city officials, developers, landscapers, homeowners, adults, and children about water conservation and quality. The center developed a water conservation seminar series and a three-part television series on water conservation that airs on the city's local cable access channel.

"The first television piece focused on the city's water supply," Wolfe said. "The remaining news pieces focus on areas in which homeowners overuse water resources, do not plan for landscape water use, are unaware of water-conserving plant material choices, and do not know where to go for irrigation planning and efficiency or information on new technologies such as evapotranspiration (ET) controllers."

The center's last goal is to change McKinney residents' perception of what a water-conserving landscape looks like by developing a one-acre water conservation garden consisting of drought-tolerant plants.

The center will demonstrate for residents and other water users how well-researched, drought-resistant plants can conserve water in the rapidly growing city.

"We could pass ordinances that would require developers to use these water conserving plants," Whitfield said in a Dallas Morning News article last year. "We're trying to be conscious of our water and the plants we use. We've got to make this a better place to live and work."

Wolfe said, "The overall goal is to show homeowners and developers how they can use the plants in their landscapes while conserving water."

The garden, scheduled for completion by May 2008, will also demonstrate new irrigation technologies, such as drip irrigation for turf, the use of ET controllers, and other similar technologies. The site will be a key educational component for changing the opinions of residents on what a water conscious landscape can look like, he said.

"In addition to the technical and scientific expertise they lend to the city, the Urban Solutions Center also provides us a mechanism for identifying funding sources through the state and possibly federal government agencies that may be necessary to help implement water conservation procedures," Loughmiller said.

Wolfe agreed, explaining that the center is committed to soliciting third party funding to help answer these questions. To date, the center has received $530,834 in grants for educational programs, demonstrations, and research plots.

These research projects include a turfgrass drought-tolerance study conducted by Drs. Jim Heitholt and Ambika Chandra, and a management of salinity in landscape ornamentals study by Dr. Raul Cabrera.

In another project, Dr. John Sloan and Cabrera are measuring the quality of urban stormwater runoff and are devising ways in which to clean up or treat water with plant material before it enters local streams or reaches water supply reservoirs.

The center is seeking other funding for research on water efficiency, ET irrigation controllers, using green roofs to mitigate urban stormwater runoff, and breeding salt-tolerant grasses and ornamentals.

"San Antonio has gone a long way in the last 20 years in reducing its per capita consumption," Wolfe said. "That's what McKinney said it planned to do, and it is the first city in the metroplex to spend significant money to make it happen.

"The center can deliver complete solutions using the experience of other cities in Texas that already have had success with these kind of research-based solutions," Wolfe said. "We will provide these solutions, new technologies, and information for McKinney residents to use."

To comment on this article, visit its electronic version at http://twri.tamu.edu/news/2008.

Story by Kathy Wythe

Marketing water savings

Cities, groups promote landscape management, water conservation programs

With rapid population growth and the memory of the worst drought in 50 years, cities and groups are promoting programs that educate their constituents about water quality, water conservation, and landscape management.

Many cities are partnering with federal and state agencies and universities to develop new programs or market existing ones.

In North Central Texas, the city of McKinney and Texas AgriLife Research and Extension Urban Solutions Center at Dallas recently began partnering to develop water conservation programs for McKinney (see story on page 14). Fort Worth is working on an educational plan with Dallas Water Utilities and the Tarrant Regional Water District.

In addition, Dallas has its Save Dallas Water (http://www.savedallaswater.com/) campaign that strives to raise awareness about water conservation by educating local citizens to encourage conservation at all levels of the community. The main goals of its water conservation program are to extend the life of existing water supplies, reduce water waste, and reduce per capita consumption.

"Texas SmartScape®," a program developed by multiple partners in North Central Texas, educates citizens about the ecological, economic, and aesthetic benefits of using landscaping plants, shrubs, grasses, and trees that are native or adapted to the regional climate and local conditions. The program uses an interactive "how to" web site (http://www.txsmartscape.com/) and seminars to teach citizens how to design and care for a garden planted with plants, shrubs, and trees that thrive in the area and need less water. In 2005, SmartScape® expanded to West Texas.

In Central Texas, Austin, known for its progressive approach to conserving the environment, is promoting programs addressing water quality and quantity.

"Grow Green" (http://www.ci.austin.tx.us/growgreen/) is a comprehensive landscaping program designed for Central Texas. The program, a partnership between Austin and Texas AgriLife Extension Service, gives "earth friendly" gardening solutions to reduce water pollution.

Austin is also tailoring a water conservation program, developed for the Texas Water Development Board, to the city's needs. The campaign, "Water IQ: Know your water," educates people about their water source. It offers simple tips to help save water and change the way Texans use water in their homes and businesses. The Lower Colorado River Authority and Austin have collaborated in this campaign and are using ads, billboards, a web site (http://austin.wateriq.org/), and other outlets to inform their citizens about how to curb water use.

The city of Lubbock with the High Plains Underground Water Conservation District No. 1, and the North Texas Municipal Water District, are also adapting the Water IQ program to their areas.

The El Paso Water Utilities' water conservation department, created in 1991, has ongoing

Many cities are promoting landscape management and water conservation practices with their citizens. This garden demonstrates the EARTH-KIND principles of environmentally tolerant, low water use ornamentals.

public information programs and materials that increase awareness about regional water issues. The company recently opened the TecH2O, a water resource learning center with 16 interactive exhibits on water management. The center will provide meeting places and resources to promote the understanding and study of water and water issues to educators, students, policy makers, and the public.

For the Upper Texas Gulf Coast, a group of partners has developed "WaterSmart," a water education program with an interactive web site (http://www.watersmart.cc/). Its goal is to educate citizens on producing beautiful landscapes while using less water, fertilizers, and pesticides. The WaterSmart program provides information about runoff pollution and water conservation to homeowners, garden clubs, environmental groups, and city planners. Organizations that developed the web site include the Galveston Bay Estuary Program of the Texas Commission on Environmental Quality, Texas Coastal Watershed Program, AgriLife Extension, Texas A&M Sea Grant College Program, U.S. Fish and Wildlife Service, and U.S. Environmental Protection Agency.

AgriLife Extension, Texas Nursery and Landscape Association, and Texas Water Development Board recently developed a Texas Urban Landscape Guide. The publication and its web site (http://urban-landscapeguide.tamu.edu/) are resources of science-based information on designing, installing, and maintaining WaterWise landscapes in Texas. (A WaterWise landscape is a landscape designed and maintained according to basic good horticultural principles that allow for a beautiful healthy landscape with minimal supplemental irrigation

and no adverse runoff from the landscape property.)

Dr. Don Wilkerson, AgriLife Extension horticulturist and one of the urban guide developers, said the guide targets three audiences—homeowners, horticulture professionals, and municipal government and water utility personnel. It provides different tracks of information for each audience, with each track containing resources and links to different web sites with specific information for the target audiences.

The TCEQ debuted its "Take Care of Texas" (http://www.takecareoftexas.org/) program in April 2007. In addition to water quality and quantity and air quality, it addresses energy conservation and waste reduction.

EARTH-KIND promotes environmental stewardship

EARTH-KIND, Texas AgriLife Extension Service's Department of Horticulture landscape management program, promotes research-proven techniques to provide maximum gardening and landscape enjoyment while preserving and protecting the environment. The program is used throughout Texas by AgriLife Extension, Master Gardeners, and others.

A recent addition to its web site is the "EARTH-KIND Challenge," an online quiz that tests people's knowledge of EARTH-KIND principles. This 25-question quiz asks for input about topics such as landscape design, plant selection, efficient irrigation, and insect and disease management. The quiz then generates a personalized score to show the person taking the challenge how well his or her garden is sustaining a healthy environment.

Dr. Don Wilkerson, AgriLife Extension horticulturist, said if the person is using anything other than the optimal EARTH-KIND practices, the challenge will then suggest changes in landscape practices. It will also provide additional information, including links to AgriLife Extension publications on related topics. The quiz is available at http://aggie-horticulture.tamu.edu/EarthKind/EKChallenge.html.

Its web site also contains the "EARTH-KIND On-Line Master Gardener Training Program" that enables Master Gardeners to receive special certification in its environmental stewardship program.

EARTH-KIND recently partnered with the Texas Water Resource Institute to increase the public's and specific stakeholders' knowledge of environmental stewardship of urban landscapes and water resources.

Water education curriculum targets children

The National Junior Master Gardener (JMG) program recently developed a water education program specifically targeted to children. "Operation W.A.T.E.R.: Dr. Thistle Goes Underground" is a horticulture and environmental science curriculum for sixth to eighth grade students.

The curriculum consists of group and individual activities that teach important concepts about soil and water, said Lisa Whittlesey, Texas AgriLife Extension Service program specialist and National JMG coordinator. The program can be used for a school class, JMG club, 4-H program, kids gardening group, or individual study.

Topics in "Operation W.A.T.E.R." include soil texture, aquifers, watersheds, wetlands, soil nutrients, the water cycle, soil improvement, soil structure, and water and soil conservation. An integrated web site (www.jmgkids.us/) for students is a part of the curriculum.

"Students will learn about important concepts of soils and water as they work together on a mission to foil the newest plans of the villainous character Dr. Thistle," Whittlesey said. "It's a novel and engaging way to connect with these students.

"It should be very popular for teachers in that it addresses important issues for Texas, is correlated to the Texas Essential Knowledge and Skills, and is a great fit for both school and after school programs."

The program is seeking groups to sponsor training workshops to educate teachers and youth leaders about using this curriculum. To order a copy of "Operation W.A.T.E.R," call toll free at 877-900-2577 or go online to www.jmgkids.us.

Proactive planning

Landowners and agricultural producers in the Cedar Creek watershed are working with agency representatives and government leaders on a proactive plan to help reduce pollution flowing into Cedar Creek Reservoir.

The 34,000-acre reservoir, southeast of Dallas, is the first of five reservoirs managed by the Tarrant Regional Water District (TRWD) that is being studied through the North Central Texas Water Quality project.

Stakeholders in the reservoir's four-county watershed have an opportunity to voice their opinions and help draft the watershed protection plan for the reservoir. The plan, which will outline ways to reduce pollution and improve water quality, is an outgrowth of years of water quality monitoring and research by TRWD, The Texas A&M University System, and other collaborators.

Fifteen years of monitoring Cedar Creek by TRWD confirmed increasing levels of chlorophyll-*a*. An indicator of algae growth, chlorophyll-*a* is accelerated by excessive nutrients flowing into the reservoir from the surrounding watershed.

Because of those findings, in 2004 Texas A&M University's Spatial Sciences Laboratory began modeling the upland, in-stream, and in-reservoir processes that led to the chlorophyll-*a* increases. The computer models indicate that excessive deposits of the nutrients phosphorus and nitrogen are transported via direct runoff and sediment transport from a combination of urban and rural sources. Researchers point to agricultural practices, wastewater treatment plant discharges, and urban stormwater runoff as contributing factors.

If chlorophyll-*a* levels escalate at the current rate, TRWD officials said the reservoir may appear on the U.S. Environmental Protection Agency's (EPA) listing of impaired water bodies as outlined in section 303(d) of the Clean Water Act. Such a designation could likely result in regulatory measures by the Texas Commission on Environmental Quality.

TRWD officials hope to avoid mandatory regulation by engaging in stakeholder-based watershed protection planning focused on holistic solutions to water pollution by examining the impacts of upstream activities.

Watershed-based planning is a relatively new approach to pollution reduction in all sizes of water bodies. The process evaluates the relationship of water quality to land use, soils, hydrology, and climate within a single geographic area.

Photo courtesy of Tarrant Regional Water District

"Watershed protection planning is based on the management of activities that take place within the landscape that drains into a specific body of water," said Clint Wolfe, grant and project coordinator with Texas AgriLife Research and Extension Urban Solutions Center at Dallas and manager of the project. "By incorporating water quality testing and computer modeling, we are able to assess the condition of Cedar Creek Reservoir and its tributary streams to develop a specific plan of action to address the excessive pollutants."

Stakeholder involvement began in July 2007 with a series of public meetings targeting urban and agricultural interests in which the issues facing Cedar Creek Reservoir were presented. A steering committee comprised of people attending these meetings will work with project staff on the viability of proposed strategies for pollution reduction.

Darrel Andrews, TRWD's environmental services assistant director, said this format will offer stakeholders a unique opportunity to prevent regulatory involvement.

"This is a proactive approach," Andrews said. "Let's get everybody involved before it (pollutant loads) gets to the level that draws somebody in who is going to make us do it."

Stakeholders are discussing a series of best management practices such as grassed waterways, filter strips, rainwater harvesting, stream bank stabilization, and educational programs to prevent urban and agricultural nonpoint source pollution.

Project leaders plan to have the Cedar Creek Watershed Protection Plan finalized by the summer of 2008.

"We are striving to create a program that will be duplicated in other watersheds," Wolfe said.

Also under way is preliminary modeling of Eagle Mountain Reservoir, located northwest of Fort Worth and managed by TRWD. Similar ⇨

Water quality works to improve reservoir

stakeholder-based watershed protection planning efforts will begin in early 2008. Project members plan to complete watershed planning for Richland-Chambers Reservoir within the next two years.

In addition to water quality modeling and stakeholder activities, Texas AgriLife Extension Service is conducting an extensive nonpoint source pollution educational campaign. Leading the project is Dr. Bruce Lesikar, AgriLife Extension specialist and agricultural engineer.

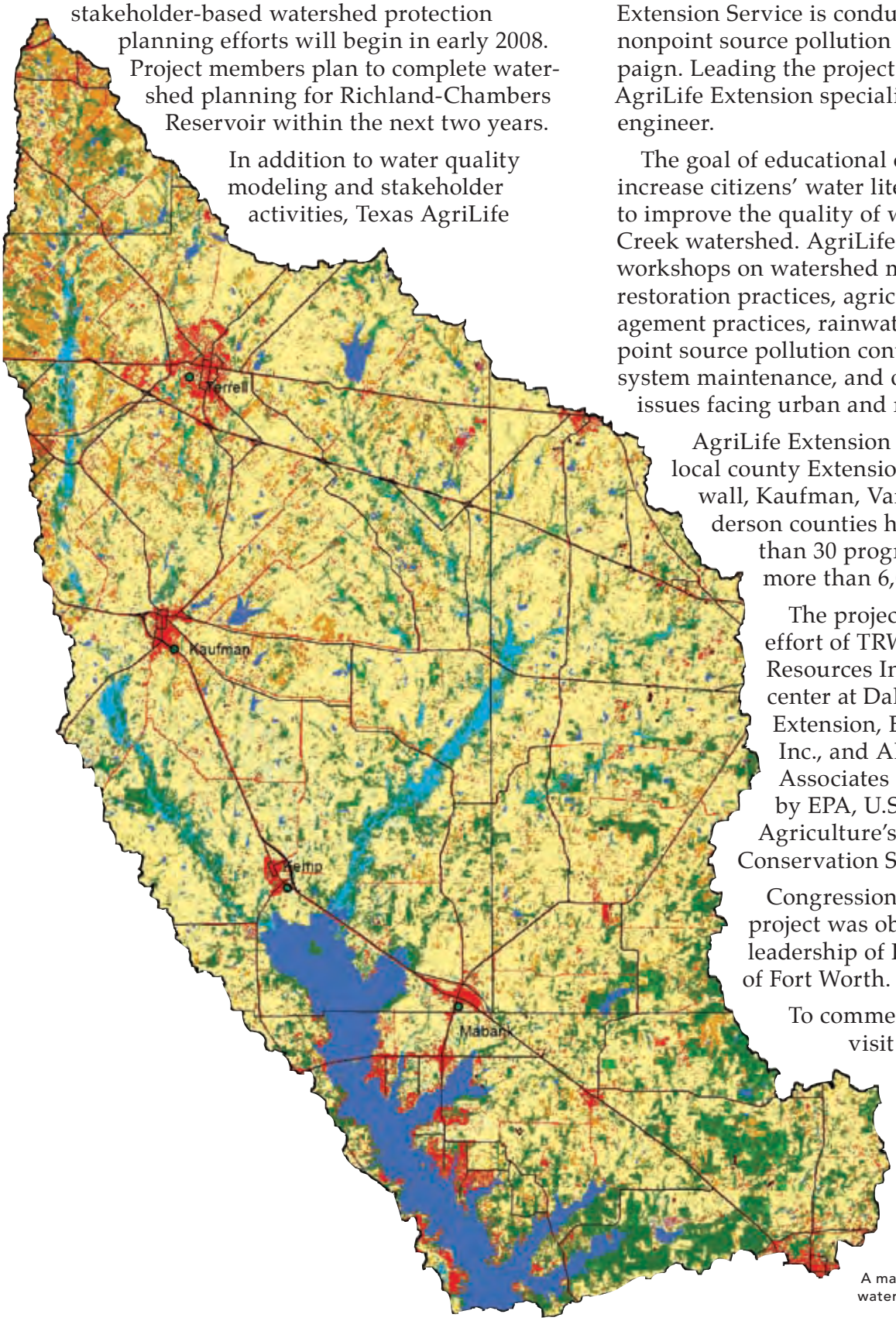
The goal of educational outreach is to increase citizens' water literacy while working to improve the quality of water in the Cedar Creek watershed. AgriLife Extension has held workshops on watershed management, stream restoration practices, agricultural best management practices, rainwater harvesting, nonpoint source pollution control, on-site septic system maintenance, and other water quality issues facing urban and rural stakeholders.

AgriLife Extension with help from local county Extension agents in Rockwall, Kaufman, Van Zandt and Henderson counties has conducted more than 30 programs and reached more than 6,000 individuals.

The project is a collaborative effort of TRWD, Texas Water Resources Institute, AgriLife center at Dallas, AgriLife Extension, Espey Consultants Inc., and Alan Plummer and Associates Inc. It is funded by EPA, U.S. Department of Agriculture's Natural Resources Conservation Service, and TRWD.

Congressional funding for this project was obtained through the leadership of Rep. Kay Granger of Fort Worth.

To comment on this article, visit its electronic version at http://twri.tamu.edu/news/2008.



A map of the Cedar Creek watersheds.

Darrel Andrews, Tarrant Regional Water District environmental services assistant director, talks with stakeholders during an agricultural workgroup meeting for the Cedar Creek watershed protection plan.

Dr. Bruce Lesikar, AgriLife Extension specialist, demonstrates the instillation of a rainwater harvesting system as a means to decrease stormwater run-off from home landscapes.

Bob Pritchett, Tarrant Regional Water District environmental technician, takes a stream survey at Cedar Creek Reservoir. (Photo courtesy of Tarrant Regional Water District)

Dr. Dotty Woodson, AgriLife Extension specialist at the Urban Solutions Center in Dallas, demonstrates the instillation of drip irrigation during an educational program in the Cedar Creek watershed.

'The goal of educational outreach is to increase citizens' water literacy while working to improve the quality of water in the Cedar Creek watershed.'

Story by Kathy Wythe

Historic treasures

Watershed provides real-world information

A historic experimental watershed in the Blackland Prairie of Central Texas is providing a treasure trove of information that the water resource community throughout the United States is using.

For more than 70 years, scientists with the U.S. Department of Agriculture (USDA) have collected hydrologic data such as rainfall, evaporation, runoff, and soil erosion at the Agricultural Research Service (ARS)'s Grassland Soil and Water Research Laboratory's watershed near Riesel, Texas, making it one of the longest continuous, intensively monitored hydrological research sites in the country.

The Riesel experimental watershed, part of the larger Brushy Creek watershed, has approximately 800 acres divided into smaller watersheds. The research staff operates 17 runoff stations, 15 rain gauges, one weather station, and seven shallow groundwater wells.

Dr. Daren Harmel, an ARS agricultural engineer and manager of the watershed, recently co-authored a paper on the history of the Riesel watershed. He said in the mid-1930s, the USDA realized the importance of understanding hydrologic processes on agricultural fields and watersheds. Formerly known as the Blacklands Experimental Watershed, Riesel was one of three experimental watersheds established at that time to analyze the impact of land use practices on soil erosion, flood

events, water resources, and the agricultural economy. Of the three, Riesel and the North Appalachian Experimental Watershed near Coshocton, Ohio, are still operating.

At first, USDA researchers asked farmers on the land to keep account of their farming practices, and researchers evaluated the effect of such practices on soil erosion and runoff, Harmel said. They also divided the federally managed land into smaller watersheds and set up different management practices, such as fertilizer application, contour terraces, grassed waterways, and conservation tillage. The researchers then compared the differences.

Through the years, techniques for collecting the information have become more sophisticated. In the early days, laboratory staff often collected data manually from the 40 small watersheds and 57 rain gauges. They were on call 24/7 to collect runoff water quality data during storms. Now the staff handles collection electronically with state-of-the-art instrumentation.

Harmel explained that the advantage Riesel has over other research sites is its field-scale, real-world setup. Some of the fields are planted in corn, wheat, or oats; others are pastures grazed with cattle. One is a native grassland prairie that has never been cultivated. Each small watershed has a defined point for runoff of water that is collected and analyzed. Researchers use the information obtained from each field to make comparisons and draw conclusions about the different management practices.

Over the years, scientists have used Riesel data to make significant contributions to water resources and agricultural research. The developers of watershed computer models, including EPIC (Erosion Productivity Impact Calculator), APEX (Agricultural Policy/ Environmental eXtender), and SWAT (Soil and Water Assessment Tool), used the Riesel watershed data to develop their models. These models are now used worldwide to manage field-, farm-, and basin-scale water quality, Harmel said.

Dr. Peter Allen, professor in the Department of Geology at Baylor University, said the department's researchers use the Riesel watersheds for "senior and graduate classes in hydrology as an excellent example of a world-class hydrological field lab with examples of instrumentation from weather stations to weirs."

They also use it as a field test site to examine processes such as infiltration, runoff, and recharge to shallow aquifer systems and their incorporation into models. In addition, they use it to investigate shrink and swell soil behavior of Vertisols, the clay soil found in the Blackland prairie, under changing moisture conditions.

Realizing the importance of the data, a team produced a CD containing measured data and supporting GIS information, maps, and photographs. Members included Harmel, Allen, ARS scientists Drs. Kevin King, Clarence Richardson and Jeff Arnold, and Texas AgriLife Research scientist Dr. Jimmy Williams. Much of this data is also available on the Internet at http://www.ars.usda.gov/spa/hydro-data.

Harmel has put this data to good use in his own research projects.

In one project, he and other researchers tackled the challenge of determining the best method for collecting stormwater quality samples. "Before we started, there was not much research on how best to do that," Harmel said, adding that agencies and universities spend a lot of money on water quality monitoring.

"Many people don't know how difficult it is to operate a successful storm sampling project," he said. Through research, they sought answers to questions such as: "Do I sample every single storm? Do I take small separate samples or composite samples?"

The team also researched the uncertainty inherent in sampling data. "We made the ⇨

(Top photo) USDA employee manually checks runoff measurements at a newly installed station at the Blacklands Experimental Watershed (circa 1937). (Second photo) In the early days, water quality sampling was done manually by USDA employees on-call 24/7 to collect runoff data during storms. Today, most of the samples are collected with automated equipment. (Third photo) USDA began construction at the Blacklands Experimental Watershed in 1937. This is a photo of the Riesel headquarters building on Sept. 1, 1938. (Bottom photo) Streamflow measurements are taken at a Brushy Creek sampling station. This station was located on private land downstream of the federally owned smaller watersheds.

first attempt to quantify the uncertainty of measured stormwater data," he said. "That research seems to be attracting a lot of attention nationally and internationally."

Based on their research, the scientists have prepared a series of papers that outline "how to" guidance for water quality sampling. These publications are available at http://www.ars.usda.gov/spa/hydro-collection.

Because of this research, Harmel has received numerous requests for training from government agencies, consulting firms, and universities.

"Our overriding goal was to determine how to balance efficient spending of monitoring resources and collection of high quality stormwater data," he said.

Kevin Wagner, a Texas Water Resources Institute project manager, said he used the methods suggested in Harmel's research when he began setting up sampling stations for his doctoral research.

"Daren's work was invaluable in helping me get my sites established," Wagner said. "He had already worked out a lot of the kinks through his work at Riesel, which made my site setup much smoother and also saved me a lot of time. I'd still be trying to figure out what to do instead of monitoring."

Harmel and other researchers, including Dr. Monty Dozier with Texas AgriLife Extension Service, are using the Riesel watersheds to research the long-term impact of using poultry litter as a fertilizer and a soil amendment. This research is funded largely by the Texas State Soil and Water Conservation Board.

Harmel said the project has demonstrated the optimal annual litter application rates that can minimize environmental problems and maximize on-farm profit, which is what farmers want to know.

"With what we know from this research, I think we have the opportunity, as the poultry industry grows in Central Texas, to act proactively to prevent water quality problems like we have seen in other areas, instead of waiting to fix it," Harmel said.

Because water supply shortage, flood occurrence, and water quality degradation will increasingly affect the environment and future generations, Harmel said, watershed-based studies will continue to be needed to solve these problems.

"With the Riesel watersheds, we sit here ready and willing to attack these new challenging questions."

(Left photo) Dr. Daren Harmel, agricultural engineer for the USDA's Agricultural Research Service, looks out over the Riesel watersheds. Currently, 17 watershed sampling sites are located on the 800-acre federal facility. (Center photo) Dr. Monty Dozier, Texas AgriLife Extension Service, inside the Y2 station which is used to measure farm-scale water quality impacts of poultry litter fertilizer. (Right photo) Harmel checks the data logger and radio telemetry system at one of the 15 precipitation gauges located on the facility.

Agriculture agencies change names

Two agencies of The Texas A&M University System recently changed their names and logos to better reflect their missions and to reposition themselves in the marketplace.

As of January 2008, the Texas Agricultural Experiment Station is now Texas AgriLife Research and Texas Cooperative Extension is Texas AgriLife Extension Service.

In a news release announcing the changes, Dr. Mark Hussey, director of AgriLife Research, said, "We are making these changes to better communicate the life-sustaining and life-changing impacts that both AgriLife Research and AgriLife Extension deliver to the people of Texas and beyond." Hussey is also interim vice chancellor of agriculture for the A&M System and interim dean of the College of Agriculture and Life Sciences at Texas A&M University.

"But we also want to tell our story to a larger audience and a changing state population, attract new resources and build new partnerships, while strengthening our existing ones," Hussey said.

Texas A&M's new Director of Communications and Marketing Jason Cook, who previously was director of communications and marketing for Texas AgriLife, said the changes were also made to better align the names with the teaching, research, and extension missions of the agencies and the College of Agriculture and Life Sciences at Texas A&M University. By changing the names, the agencies, and college are more closely tied together, he said.

"It is a natural step to bring these three separate entities together under a family brand," Cook said.

The name changes are part of a re-branding initiative launched this year after two years of study and planning. These efforts were led by former vice chancellor Dr. Elsa Murano, who was named president of Texas A&M University on Jan. 3.

"The re-branding efforts are centered on one foundational message: 'Agriculture is Life!'" Hussey said. "The central idea is that life itself is the core value that our agencies seek to sustain and enhance.

"People usually don't realize how much we all depend on agriculture and the life sciences. Discoveries and innovations in these fields directly impact the quality of the food we eat, the clothes we wear, the air we breathe, the water we drink, the homes we live in, and, more and more, even the fuels we pump into our vehicles."

Dr. Ed Smith, director of AgriLife Extension, said, "These new brands will impact not only our marketing materials and signage, but also the way we position and prioritize our programs and work with our federal, state, and county partners to serve the state of Texas. It is vitally important to tell our story and that people connect our agencies to the tremendous impacts they have on the state."

One of the drivers of the re-branding initiative was a market study that showed that the work of the research and extension agencies was not widely known across the state of Texas.

"We hope to help people better understand the vital role that agriculture and life sciences still play in improving the prosperity of their lives," said Smith. "We believe that if they come to know us better, they will see that connection more clearly, even within a state population that is now 85 percent urbanized."

SSPEED research at Rice University

A new multi-university research center that focuses on predicting and planning for disasters caused by hurricanes and tropical storms is developing a prototype smart-sensor system that can offer real-time analysis of flood risks and water quality hazards in Houston-area waterways.

The Watershed Information Sensing and Evaluation (WISE) system is a project of the Severe Storm Prediction, Education and Evacuation from Disaster (SSPEED) Center. Based at Rice University, the center was established in May 2007 following legislation signed by Gov. Rick Perry.

Co-principal investigators of the Houston Endowment Inc.-funded project are SSPEED Director Philip Bedient, the Herman Brown professor of engineering at Rice; and SSPEED Co-director Hanadi Rifai, professor of civil and environmental engineering at the University of Houston.

The researchers will install in-stream water-quality sensors in test areas in urban drainage watersheds, including Brays and Buffalo bayous. They will collect and analyze water-quality sensor data, state-of-the-art radar rainfall, and land-use data from GIS information using advanced geographic databases.

Researchers will use their findings to refine a computer model that can predict flood and water-quality risks related to land use and topography. The results will be published on the Internet so city and emergency officials can quickly respond to specific storm threats as they occur.

In addition to researchers from Rice and the University of Houston, the SSPEED center includes researchers at Louisiana State University, The University of Texas at Austin, Texas A&M University, Texas A&M at Galveston, Texas Southern University, and

The University of Texas at Brownsville. It also involves the Houston–Galveston Area Council, a council of local governments.

New Faculty

Dr. Paul DeLaune

Texas AgriLife Research and Extension Center at Vernon

Dr. Paul DeLaune joined the Texas AgriLife Research and Extension Center at Vernon as an assistant professor and environmental soil scientist. He will develop a soil science program at the center.

DeLaune earned his bachelors degree from Oklahoma State University; and masters and doctorate degrees from the University

of Arkansas, where he studied soil sciences and agronomy.

He plans to help producers mesh management practices, such as sub-surface drip irrigation, nutrient management, and conservation tillage, in a way that will conserve water and improve water quality through reduced nitrate leaching. By working with different scenarios, he will identify best management practices and quantify how well they work. His work will be primarily with cotton and wheat crops. In addition, he will use subsurface drip irrigation, which may be applied to future biofuel crops such as canola.

Dr. Ambika Chanda

Texas AgriLfie Research and Extension Urban Solutions Center

Dr. Ambika Chandra joined the Texas AgriLife Research and Extension Urban Solutions Center at Dallas in September 2007 as an assistant professor for turfgrass breeding and molecular genetics. She received her doctorate from Pennsylvania State University in agronomy in 2007 and her masters of science from Punjab Agricultural University of India in plant breeding and genetics in 2003.

Chandra's research interests include breeding and development of improved cultivars of turfgrass species and identification of molecular markers closely associated with agronomically important traits to be used in marker-assisted breeding and map-based cloning of important genes. She also studies the use of genomic and cellular tools to genetically manipulate or engineer turfgrass species for tolerance for environmental stress, resistance to insects and pathogens, competitiveness against invasive weeds, and enhanced nutrient uptake efficiency.

Dr. Fouad Jaber

Texas AgriLfie Research and Extension Urban Solutions Center

Dr. Fouad Jaber joined the Texas AgriLife Research and Extension Urban Solutions Center at Dallas in October 2007 as an assistant professor and integrated water resources management specialist.

Jaber received his doctorate in agricultural and biological engineering with an emphasis in natural and environmental resources engineering from Purdue University in December 2001.

As a post-doctoral research associate at the University of Florida, he worked in extension and research in stormwater management and modeling, surface and groundwater quality, hydrologic instrumentation, lysimetry, crop water requirements, and groundwater recharge.

His focus at the Dallas center will be conducting research and Extension programs related to stormwater management, nonpoint source pollution management from the urban environment, and water quality studies.

TWRI Welcomes New Face

Amy Rangel joined the Texas Water Resources Institute in September 2007 as an Arroyo Colorado Partnership project grant writer and water quality data analyst. Rangel is a program assistant at the Texas AgriLife Research and Extension Center at Weslaco. She has a bachelor's degree in biology from The University of Texas at Austin.

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