



# Water Currents

The Newsletter of the Center for the Management, Utilization and Protection of Water Resources  
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## CITIZENS CONCERNED ABOUT WATER SUPPLIES

In a survey titled "A Clear Perspective--A National Syndicated Study of Americans and Their Drinking Water," conducted this year by Probe Research, approximately half of the 1,801 Americans surveyed were concerned that, without more attention to our nation's water supplies, more tragedies will occur, including drinking water-related deaths. Survey participants' concerns ranged from water safety and contaminants--including microbes, viruses, mercury and lead--to infrastructure failure, supply shortages, terrorist acts and additives.

These fears are leading to greater anxiety about the future of our nation's drinking water supplies, according to an article in the American Water Works Association's *MainStream*. The survey above also revealed a strong support of public-private partnerships in owning and managing drinking water utilities. It showed that bottled-water consumption was increasing. According to *MainStream*, one-quarter of the nation's population is drinking more tap water, and bottled-water consumption has increased by about one-third.

With the increasing use of our nation's water resources and a greater sense of threat to these resources if unprotected, the work of the Center for the Management, Utilization and Protection of Water Resources is all the more important. As it expands into new directions to improve ecological environments for aquatic habitats, as well as protect human health through water and wastewater treatment, the Center's research continues to prove invaluable. The Center will continue to invest in protecting our water resources through emerging technology that will put it on the cutting edge of environmental research. Part of this work will involve using microelectromechanical systems (MEMS) technology and nanotechnologies in biosensors. Through MEMS tags implanted in aquatic animal life, water utilities can be alerted to changes in the environment, and thus, the existence of toxins in the

water source. The Center will explore new analytical techniques to discover contaminants and pathogens in the environment, and it will also seek innovative approaches to culturing and reintroducing endangered species into the state's lakes and rivers. These types of investments will be expanded along with the Center's already established work in fisheries assessment, nonpoint source pollution, waterborne pathogens, and water and wastewater treatment.



The Center's future plans depend on a commitment to increasing water-resource awareness. The health of these resources relies on the combined efforts of citizens, industry and government along with the knowledge built on Center research. Citizens are concerned about water issues but are, perhaps, unsure of how to manage them. The Center's purpose now and in the future is to invest in the most up-to-date technology and resources available to provide these

answers. Together, the Center and citizens can bring solutions to these problems that continue to foreshadow our future and hint at a greater threat if unmanaged or unheeded.

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### WEB CAST LINKED SPEAKERS ACROSS THE GLOBE

When Larry Keith, of Instant Reference Sources, Inc., suggested the idea of holding an Internet symposium on the implications of pharmaceuticals and personal care products (PPCPs) in our environment, Martha J.M. Wells—environmental chemist with the Center—ran with it. Together, they coordinated an international symposium in which the audience and presenters were thousands of miles apart yet could ask questions and interact as if they were in the same room.



*An Internet-broadcast symposium on pharmaceuticals and personal care products in the environment brought together speakers and participants from 20 remote locations. Shown are participants at the Central Science Laboratory in England. (Photo used by permission and courtesy of Helen Thompson, Environmental Risk Assessment Team Leader, Central Science Laboratory)*

Funded by the U.S. Environmental Protection Agency, the event was broadcast live over the Web on August 25 at no charge to participating sites.

“The Web cast was held in conjunction with the American Chemical Society [ACS] meeting in Philadelphia,” Wells said. “But we had a total of 20 remote site locations in Germany, England, Canada and the United States.

“In one instance, a question posed from a remote site in Texas was answered by a person connected from a remote site in Massachusetts.”

Approximately 100 people made up the live audience in Philadelphia, and around 220 were part of the remote audience. Five of the 14 speakers in the virtual symposium made their presentations by remote. Participants included representatives from the University of Toronto, governmental agencies like the U.S. Geological Survey and the National Institute of Standards and Technology, among others, and one of the remote sites was housed at the Institute for Technological Scholarship (Institute) on the Tennessee Tech campus.

“The EPA agreed to try the experiment with us to organize and conduct part of the symposium virtually, even with the limitation of a few

speakers, from remote sites,” Keith said. “Tammy Jones-Lepp, of the EPA, originally started me thinking about a virtual symposium when she asked if there was a way to reach more people with a follow-up conference on PPCPs as water pollutants.”

Keith and Wells, along with Christian Daughton and Jones-Lepp, both from the National Exposure Research Laboratory, Environmental Science Division of the EPA in Las Vegas, took on the massive responsibility of coordinating the event.

“One of the main challenges we had was figuring out how to train the coordinators at the remote locations,” Wells said. “But we found that we could do all the training from our offices or our homes, without leaving our computers.”

According to Wells, the driving factor behind the virtual symposium was the fact that the leading researchers on PPCPs are in Europe, and the cost for bringing together these experts would be astronomical and a logistics nightmare.

“Europeans are far ahead of the U.S. in this type of research,” Wells said, “possibly because PPCPs seem to be a greater problem there with the large, congested populations.”

*(cont. on page 6)*

## HURRICANE IVAN UPROOTS MORE THAN PEOPLE: AN ENDANGERED SPECIES OF DOVES FEELS THE EFFECTS

When Hurricane Ivan hit land, it took with it lives, homes and livelihoods. But for one endangered species of doves in Grenada, it might have taken its habitat.

Wildlife and fisheries science student Daniel Twyman was studying the Grenada dove, through a project funded by a grant from the Global Environment Facility, administered by the World Bank and government of Grenada, and run through the Center, when Ivan pounded the island and left a pathway of debris and devastation.

“Obviously, the focus of the project will shift now,” said Steven Hayslette, project principal investigator and Center associate. “Hurricanes are a natural part of the ecological dynamics, and right now, the answer isn’t clear whether or not the birds survived.”

Twyman had only been in Grenada a month when the storm struck.

“The data gathering had just begun,” he said, “but I had already found a number of nesting structures used by the doves in previous nesting attempts.”

A typical day would involve leaving his apartment early in the morning and listening for the birds. He would then take a count and look for nests, observing the types of trees they used.

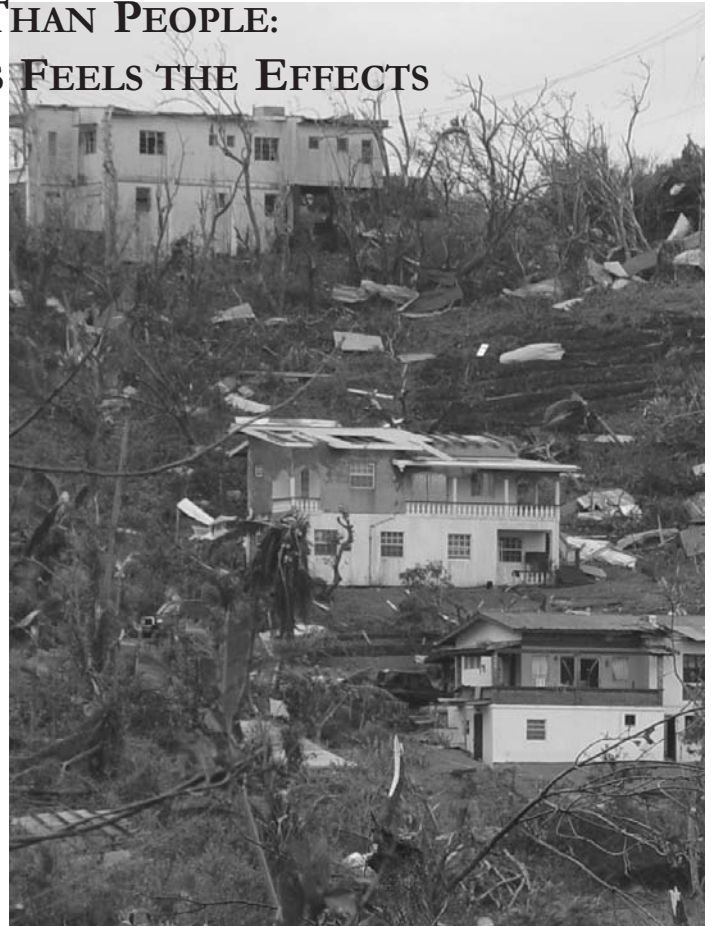
“I mainly found them in open, sloping areas with lots of vine cover, thorny shrubs and trees,” Twyman said. “It wasn’t uncommon to walk out of the forest and be in someone’s backyard.”

Twyman was supposed to have been in Grenada a year, with another student arriving in January.

“We don’t know yet how the storm will affect that schedule,” he said.

Project collaborators in Colorado and Grenada will decide when the research will continue.

“How the people interact with the environment may change because of the storm,” Hayslette said.



*Houses destroyed and trees uprooted were typical images seen in Grenada after Hurricane Ivan hit with the deadly force that devastated the island community. (Photo by Daniel Twyman)*

When the hurricane hit, Twyman sought shelter in the basement of his apartment. He said it initially sounded like a bad thunderstorm.

“Then I saw pieces of sheet metal flying through the air,” he said. “When the storm hit its peak and my walls hadn’t fallen, I knew I was going to be OK. I’m not going to tell you I wasn’t scared, though.”

Sailors, who had Internet access, alerted Twyman to the storm, giving him time to gather supplies.

“I stored some water, sardines and powdered milk, so I could live on that,” Twyman said.

“I was able to leave my house at 5:30 in the morning and found that the only damage to my apartment came from the roof of the main house landing on it. But everything at my office was destroyed.”

*(cont. on page 5)*



### **CENTER WELCOMES NEW FACULTY MEMBER: *Faisal Hossain joins Civil and Environmental Engineering to pursue research in remote sensing***

*Faisal Hossain, assistant professor in Civil and Environmental Engineering (Photo by Amy Knox)*

who is an established hydrologist working with the Center] have been very helpful and taken me under their wings,” Hossain said. “Dr. George has also helped me by giving me tips on finding funding and writing proposals.”

Winning the competitive NASA Earth System Science Fellowship (effective from 2002 through 2005) and the Environmental Engineering Pre-Doctoral Fellowship at the University of Connecticut, Hossain has proven his talent as an engineer and an academic. He also reviews articles for *Water Resources Research*, *Environmental Modeling and*

For Faisal Hossain, life happens fast. Just earning his doctorate at the University of Connecticut this past summer, he’s already settled into an assistant professor position in Civil and Environmental Engineering. And Dennis George, Center director, hopes he will use some of his energy, enthusiasm and expertise to benefit the Center.

Hossain’s main research interest is in remote sensing with overlapping interests in hydrologic modeling, water quality management and operations research. His work deals with the use of satellites to understand large-scale hydrologic systems on Earth, particularly those remote regions where ground-based measurement facilities are lacking.

“My focus is mainly on natural hazards like floods,” Hossain said. “It’s more cost-effective to get a large-scale picture of rainfall using satellites than through conventional ground-based methods on Earth.”

Hossain’s immediate goals are to establish a viable research program for himself that dovetails with the research expertise of the other water resources faculty. He also plans to design new courses on hydrometeorology and remote sensing due to significant student demand for advanced study in water resource systems.

“Drs. David Huddleston [chair of the Civil and Environmental Engineering Department] and Vincent Neary [an associate professor

*Software, Environmental Forensics, and Water, Air and Soil Pollution* and is teaching a graduate course this fall. As part of his professional peer duties, Hossain maintains membership in the American Geophysical Union, American Meteorological Society and the American Society of Civil Engineers.

Hossain is originally from Bangladesh and earned his master’s in Singapore. But he seems to enjoy the atmosphere he’s found at Tennessee Tech.

“I like Cookeville and the university,” he said. “It’s a small, close-knit area where everyone seems like a family.

“There’s not much pressure, and everyone is very cooperative.”

A firm believer in balancing work and recreation, Hossain’s interests range from making music to making documentaries. He also published a nonfiction book on his college experiences, and a textbook that he co-wrote on water engineering is currently under review.

“We’re looking forward to working with Faisal,” George said. “His experience in hydrologic systems will fit perfectly with the Center’s mission of improving our nation’s knowledge of our water resources.”

## Doves (cont. from page 3)

According to Twyman, the streets were filled with looters, and the Trinidad and British armies were attempting to retain order by throwing tear gas into the crowds.

“On the second day after the storm,” Twyman said, “they shut down the capital.”

Approximately 30 people were killed in Grenada alone.

“I relayed a message to my wife through some travelers from Guyana,” Twyman said. “They let her know I was safe.”

Hitching a ride to within about a mile of the airport, Twyman found he had to walk the rest of the way and then couldn’t get a flight until



*This photo is one of the few images of the endangered Grenada dove in its actual habitat. (Photo by Daniel Twyman)*

later that night. Now, he is awaiting word in Tennessee on when, and if, the project will continue.

“The people of Grenada had been working with me well,” Twyman said. “They seemed to be proud of the fact that their island is home to this bird.”

“We realize, though, that their priorities will be on surviving and rebuilding their homes.”

“For the long term,” Hayslette said, “we need to get a better idea of the bird’s ecology to preserve its habitat, which is vulnerable to development anyway.”

In terms of the progress the researchers have made toward that goal, Hayslette said, “We were getting there, and we’ll be there again.”

## ENVIRONMENTAL QUALITY LAB UNDERGOES CHANGES



*Daniel Dodson, Environmental Quality Lab manager (Photo by Amy Knox)*

During the past year, the Center’s Environmental Quality Laboratory has undergone changes as personnel retired or moved on to different opportunities. Former lab manager Susana Harwood retired, leaving the lab to be run in the interim by Tammy Boles, former metals analyst. Daniel Basham, research technician II, also left the Center.

According to Dennis George, Center director, the transition has been smooth as the lab continues to work under personnel changes. Daniel Dodson, a native of White County and alumnus of Tennessee Tech, recently took over the lab manager position to ensure that operations remain smooth. He brings more than thirty years of experience as an environmental chemist and lab supervisor with Eastman Chemical Company in Texas.

“This is an excellent opportunity,” Dodson said. “I think the job will be both challenging and interesting.”

Dodson, who was seen as an “innovator” at Eastman Chemical, says he envisions a larger lab that has the capabilities and best equipment to be on the leading edge of technology.

“The first thing I hope to do is continue the established tradition of satisfying our customers with quality data,” Dodson said. “I want businesses to see us as a ‘go to’ lab for their water testing.”

He says that this can only be done through communicating with each of the clientele and determining the best way the lab can handle their projects.

“The lab is already significantly recognized by the state, regulatory groups and businesses,” Dodson said, “but I want to interface with these groups more to make our capabilities widely known.”

Dodson says he will work toward motivating the lab’s work force and ensuring that the employees feel they are contributing.

“Leadership is the key to getting people on board,” he said.

## 6 The Center for the Management, Utilization and Protection of Water Resources

### Web Cast (cont. from page 2)

Robert Clougherty, director of the Institute at Tennessee Tech, and students Daniel Smithson (project manager), Jessie Holt and Fred Myers provided Wells the technical support to establish Internet links among all the sites.

“The original plan was to install phone lines at the remote locations,” Wells said, “which would have been very expensive.”

Clougherty said the low cost of virtual symposia using available software is one of their advantages.

“Besides the cost benefits,” Clougherty said, “they also expand other intellectual possibilities. The software we used for this broadcast is also being used for virtual-learning experiences in the classroom.”

While technology can lower costs of establishing a symposium, it cannot prevent all of the challenges involved in uniting globally dispersed participants. Time differences and technical glitches can sometimes be difficult to maneuver.

“At the very end, we lost bandwidth,” Wells said. “So the last

presentation and half of the previous one were not transmitted.”

According to Clougherty, even though bandwidth was lost, participants could still communicate through the network in real-time, without hearing the formal presentations. This allowed a previously unavailable opportunity for international colleagues to discuss the PPCP topic informally.

“PPCPs are being used more and more,” Wells said. “And they’re showing up in our water systems. Prozac has been found in water sources in England, and even ingredients from antibacterial soaps are appearing.”

PPCPs can be potentially harmful to fish and other aquatic life. If they’re harming the fish, they can also threaten human populations, according to Wells. She says that methods for looking for these problems must be developed.

“We’re finding out these things because we’re looking for them,” Wells said, “and we’re able to communicate what we find through outlets like this virtual symposium.”



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*(Photos by TTU Photo Services)*

## CENTER ESTABLISHES NEW ADVISORY BOARD

Enlisting six professionals and colleagues from across the state, the Center reinstated its advisory board this year. The board's purpose is to guide the Center in developing goals and objectives that will affect its ability to achieve its mission in research, education and service activities.

“The Advisory Board will be an active participant in advising the Center in ways to improve and address the future water resource needs of the region and nation,” said Dennis George, Center director.

The board will guide the Center in presenting a workshop on the scientific water issues facing the state of Tennessee and the region; enhancing the scientific recognition/value of the research the Center provides; and increasing the ratio of money provided by external funding sources versus the state's appropriations.

## NEWS NUGGETS

- New research assistant Blake Martin will work on environmental chemist Martha J.M. Wells' project titled "An Assessment of the Occurrence of Chemicals Causing Endocrine Disruption in Fish in the South Branch of the Potomac River," based in West Virginia.
- Yoshimasa Amano, doctoral student from Japan, returned to the Center this summer. While here, under the guidance of Dennis George, environmental engineer and Center director, and Sharon Berk, microbiologist, he prepared an article on entropy as a possible index of a lake's trophic condition for *Water Research*.
- Sharon Berk received a grant from the National Science Foundation to purchase a new confocal laser scanning microscope for her lab that will enable her to obtain high-quality digital images and photographs of thin sections through cells. It will also be able to generate 3-dimensional views of cells and biofilms. The microscope has stereo-pair projection and topological projection, as well as a movie function, and can store and retrieve images.



Research assistant  
Blake Martin  
(Photo by Amy Knox)

## CHEMICAL ENGINEER DONALD VISCO RECOGNIZED FOR EXCELLENCE IN HIS SCIENTIFIC CAREER

Winning awards, earning tenure and being promoted from assistant to associate professor are accomplishments that some faculty only hope to achieve in a lifetime. Donald P. Visco Jr., chemical engineer and Center associate, accomplished all that in just one summer.

Recently, Visco was awarded the Presidential Early Career Award for Scientists and Engineers and was one of only 57 receiving the honor, which is bestowed on those researchers who exhibit exceptional potential for leadership early in their careers.

"Dr. Visco is an exceptional young faculty member, and we are very proud to have him here at Tennessee Tech," said Glen Johnson, dean of the College of Engineering. "We are very pleased that he is being

recognized for his contributions and long-term potential at this time."

The Center is supporting a graduate student for Visco's work and funding software not covered by the award.

Visco's research on inverse quantitative structure-activity relationships, done in collaboration with Sandia National Laboratories in Albuquerque, N.M., and Livermore, Calif., seeks to design molecules having desired properties. The results of this research can be used to assist pharmaceutical drug companies in creating new drugs that may not possess undesirable side effects. A more in-depth article about Visco's work is posted at [www.tntech.edu/wrc/pdfs/CurWn02.pdf](http://www.tntech.edu/wrc/pdfs/CurWn02.pdf).

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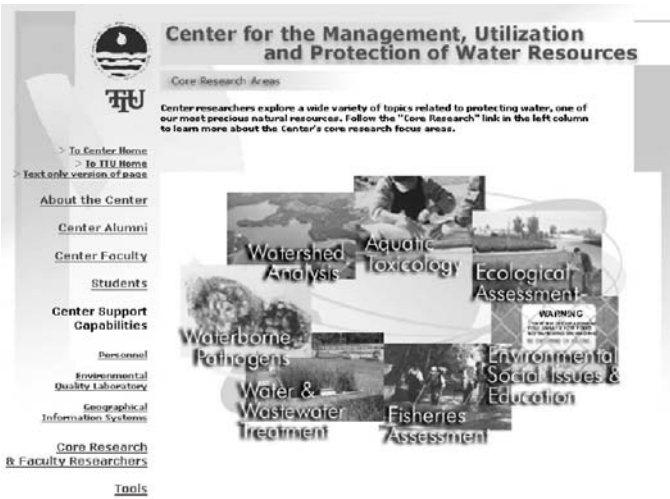
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## CENTER'S WEB SITE GETS NEW LOOK AND NEW FEATURES



The Center's Web site, at [www.tntech.edu/wrc](http://www.tntech.edu/wrc), received a new look recently, incorporating more high-tech tools and descriptive information about projects and research focus areas. The site, created in Macromedia Dreamweaver 2002, was designed by the Center's editor, Amy Knox, and has been approved by the Tennessee Tech Office of Public Affairs.

New features include pop-up menus with easy-to-access links to subtopics within each page, and a budget calculator, featuring a step-by-step flowchart, that walks faculty researchers through the sometimes grueling task of preparing proposal budgets. The information for the calculator was provided by Mary Williford, the Center's financial analyst, and the design was formatted by Knox.

Knox received format and design assistance from Tamara Guzlas, Tennessee Tech's Web master, and personnel of the Institute for Technological Scholarship.

"I appreciate all the support that Tamara and the Institute provided during this project," Knox said. "It was a learning curve manipulating the new software, and their assistance was invaluable in helping me create a site that is easy-to-manuever as well as aesthetically pleasing."

To make the site more easily accessible by a wider range of Internet users, Knox incorporated text-only pages for each page in the site.

"The text-only pages make it easier for everyone to view the site without waiting a long time for pictures to download, but the pictures are still there when viewing the regular pages," Knox said.

The site took almost a year to complete, from the design to final approval and posting stages.

"The project took a lot of cooperation from our faculty and faculty associates to ensure that the entire breadth of the Center's work was covered," Knox said. "I realize, though, that it's a work-in-progress, and I'll continually be making updates and improvements."

***Previous issues of Water Currents can be downloaded at [www.tntech.edu/wrc/publi.htm](http://www.tntech.edu/wrc/publi.htm).***

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