



DIVINING ROD

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WRRI funds research on waterborne viruses

by Jess Williams, University Communications, New Mexico State University

Kevin Oshima likes his drinking water clean, which is a good thing for all of us.

Oshima, an assistant professor of biology at NMSU, has secured more than \$55,000 in funding and equipment to detect health-damaging viruses in water supplies.

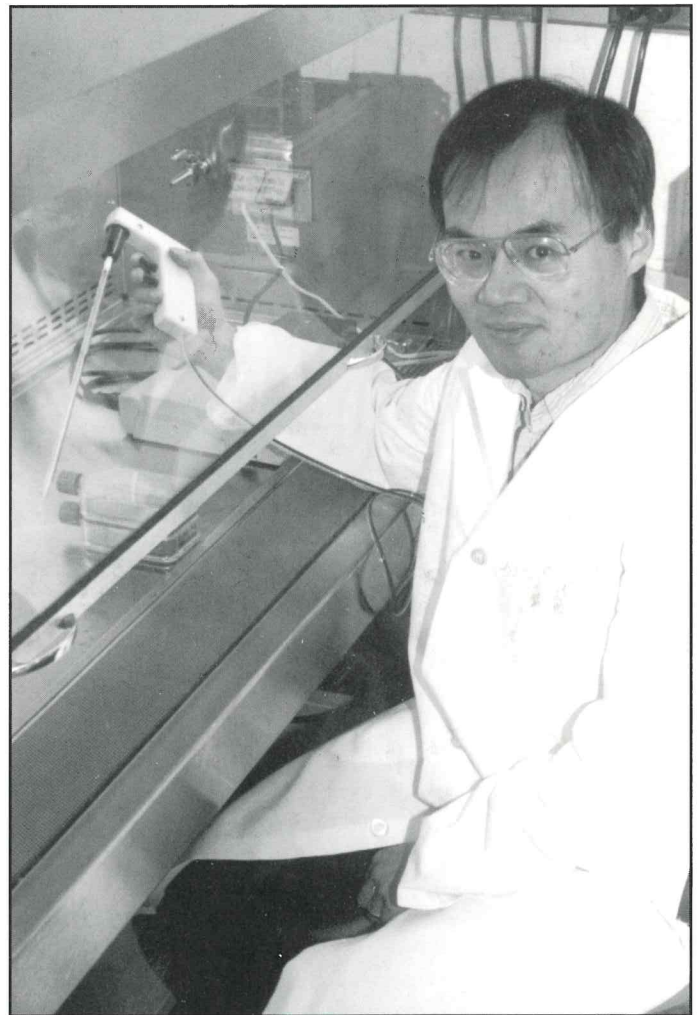
Citing a case in Milwaukee several years ago in which a bacterial outbreak caused hundreds of people to become ill, Oshima said it is important to "understand what contaminants are present and in what levels so that proper disinfection processes can be used."

Viral water contaminants, Oshima said, can cause a wide spectrum of illnesses from mild rashes and gastroenteritis to neurological diseases affecting motor skills and brain function to infections of the heart. Currently, he said, detection requires a large sample of water and a tedious process of isolating and detecting the virus. The result, he said, is that monitoring is expensive and time-consuming, and the results can be inconsistent, depending on the types of viruses present and the condition of the water being sampled.

Oshima said his research aims to develop ultrafiltration methods and state-of-the-art molecular methods to detect viral agents in water. To that end, he has received funding and supplies from the New Mexico Water Resources Research Institute and private companies.

In this, the first year of his research, Oshima said he and two research assistants—doctoral student John Olszewski and master's candidate Ann Ommani—are spiking water samples with surrogate viruses and then employing various concentration and detection strategies to find the most efficient and consistent method for detecting viruses in various water conditions.

Oshima said his research eventually could lead to better and more cost-effective detection of waterborne viruses in any water source, whether it's underground, surface, treated or untreated water. Detection, in turn, could lead to improvements in public health.



New Mexico State University Assistant Professor of Biology Kevin Oshima in his lab. Photo by Jess Williams.

Note: WRRI funding for Dr. Oshima's project began July 1, 1997 and will continue through June 30, 1998. Results of Dr. Oshima's work will be published as part of the WRRI technical completion report series and reported in a future issue of the "Divining Rod."



Previously WRRI-funded investigators continue research

NMSU professor studies global climate, one leaf at a time - by Jess Williams, University Communications, New Mexico State University

Vince Gutschick isn't afraid of heights—and it's a good thing. Gutschick, a professor of biology at New Mexico State University, is the recipient of a 3-year, \$300,000 federal grant to study global environmental change. The work takes him to the tops of trees in various American forests, where he hooks up a machine to a leaf and measures the rate and volume of water vapor being given off as carbon dioxide is absorbed and energy is stored.

The machine that takes the measurements is a little bigger than a personal computer, but the machine that takes Gutschick to the tops of the trees is an 80-foot boom.

"It's exciting up there," he said with a chuckle.

Gutschick, assisted by a technician and several students, already has measured several desert plants and is now testing forested areas across the United States to get an idea of how much water vapor is in the air and how much of it comes from plants.

Knowing those things, he said, can help scientists prepare mathematical models of global environmental change. The models, in turn, can help scientists predict global warming patterns, irrigation needs in specified areas and how changes in environment affect water vapor production by plants, he said.



The grant money supporting the project comes from the Department of Energy's National Institutes for Global Environmental Change. During the course of the project, Gutschick and his students will work with researchers from NASA, the University of Minnesota, the University of California at Santa Barbara and Stanford University.

NMTech hydrologists continue research on subsurface barrier - by George Zamora, NMTech Public Information Office

An extremely efficient as well as relatively inexpensive subsurface barrier material developed by a New Mexico Tech research hydrologist is being tested at an Oregon university research facility as a pollutant filter which potentially could trap most common groundwater contaminants.

At the Oregon Graduate Institute of Science and Technology (OGI), NMTech hydrology professor Robert Bowman, Tech graduate student Stephen Roy, and their OGI research colleagues have set up a pilot-scale demonstration of an innovative groundwater remediation method which employs a permeable barrier formed of surface-modified zeolites (SMZ). Zeolites are a group of minerals

ordinarily used in water softening and as an adsorbent material in everyday "kitty litter."

In previous studies, including studies funded by the New Mexico WRRI, Bowman found that when treating zeolites with the surface-active agent HDTMA—a chemical commonly used in manufacturing mouthwashes and hair conditioners—the surfactant tended to coat the surface of the cage-like minerals, leaving the internal pores of the zeolites open for ion exchange and other mechanisms which retain different types of organic and inorganic pollutants.

The low-cost surface-modified zeolites can then be used as a subsurface permeable barrier to limit the spread of mobile pollutants in contaminated soils, protecting downstream aquifers as it filters the flow of groundwater... and significantly reducing environmental cleanup costs.



Barrier material made of treated zeolites, Bowman estimates, costs about 25 cents a pound to produce at current market prices.

At the OGI Large Experimental Aquifer Program (LEAP) site, Bowman and his research collaborators have set up a six-foot-deep barrier made up of 13 tons of surface-modified zeolite in the center of a swimming pool-sized tank to test the filtering efficiency and other possible applications of the material.

The remainder of the 10x10 yard-wide, concrete-lined tank is filled with beach sand and an array of small, plastic tubes from which the researchers can draw groundwater samples from 81 different locations and levels within the tank during the ongoing experiment.

At the LEAP site, groundwater contaminated with low concentrations of chlorinated organic compounds and metals is being pumped into one end of the small-scale aquifer and is being allowed to flow passively through the SMZ barrier.

“This phase of our research is basically a simulation of what would be taking place at, say, a Superfund site or other groundwater contaminated area,” Bowman points

out. “If it’s successful, then the next step would be to install an SMZ barrier at an actual field site.”

Bowman has found that the treated zeolites are particularly effective in trapping groundwater contaminants such as perchloroethylene, an organic solvent commonly used by dry cleaners and other businesses, and chromate, a liquid used in the chrome-plating industry, which is normally difficult to treat once it reaches aquifers.

NMTech graduate student Steve Roy says that preliminary research shows that groundwater remediation with SMZ permeable barriers is an effective technology which also is easy to maintain.

“The idea is that it’s passive,” Roy explains. “You can put a SMZ barrier in place, turn around, and walk away. There’s very little operation and maintenance involved.”

One of the largest producers of zeolites in the United States is the



The test tank designed by NMTech researchers at the Oregon LEAP site.

St. Cloud Mining Company, which maintains a zeolite mining operation in Winston, NM, about 35 miles northwest of Truth or Consequences.

Major funding for the SMZ barrier pilot-scale demonstration study at the LEAP site at OGI is provided by the U.S. Department of Energy.

Holiday Dinner Menu for Eight

<u>Item</u>	<u>Gallons of Water</u>	<u>Item</u>	<u>Gallons of Water</u>
Turkey	16,300	Stuffing	6,004
Potatoes	72	Scalloped corn	1,824
Green beans	1,000	Carrots	1,000
Waldorf salad	580	Fresh fruit salad	2,000
Bread	300	Margarine (including cooking)	2,212
Pumpkin pie	1,240	Ice cream	1,142
Milk (for 4)	1,000	Wine (for 4)	8,000

Total 42, 674 gallons of water (to produce one holiday dinner, for example, one slice of white bread represents the consumption of 35 gallons of water—to grow the wheat, harvest it, transport it, mill it, handle it, and bake it)

Source: U.S. Water News, December 1996, article by Dick Gray on the true value of water

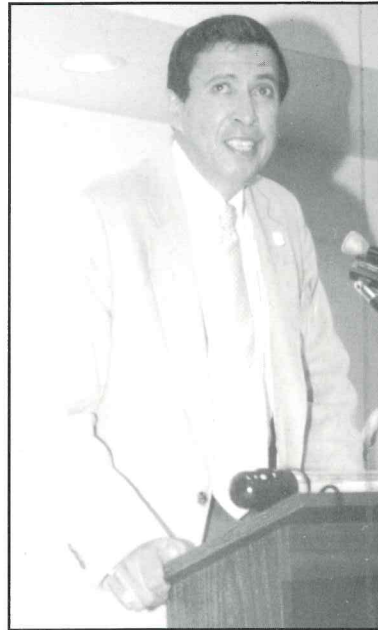


Images of the 42nd annual Tucumcari, Oo

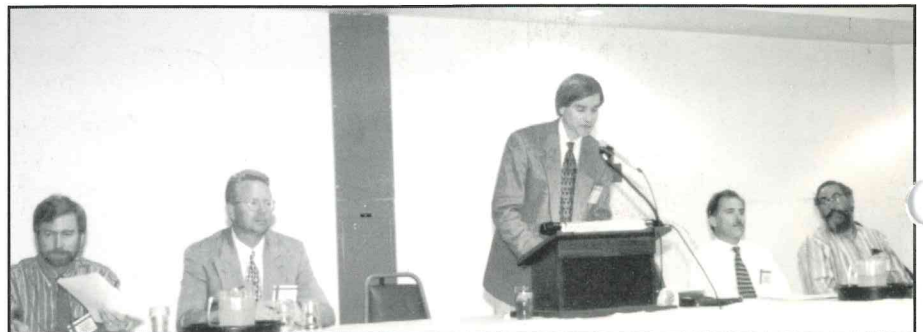
Top row (left): The Tucumcari Convention Center was the site of this year's annual water conference. Nearly 150 participants attended the conference; (right) Tour participants enjoyed a late afternoon snack and the tranquility of Conchas Lake at the Southside Conchas Lodge.



Middle row (left): Bureau of Reclamation Commissioner Eluid Martinez gave the keynote address; (center) Phil Mutz described the development of Ute Reservoir; (right) John Utton (at podium) moderated a session focusing on local water issues, panelists included (from left) Larry Wallin (Logan), Glenn Briscoe (Quay County), Ron Harris (Tucumcari), Nathan Tharp (Texico) and Don Davis (Portales).



Bottom row (left): AWRA President John Copland (at podium) introduced speakers who responded to the Call for Papers, (from left) Andrew Lieuwen (NM State Engineer Office), Eddie Livingston (Livingston Associates), Jay Lazarus (Glorieta Geoscience, Inc.), and Mustafa Chudnoff (NM State Engineer Office); (right) Conference participants enjoyed a hearty dinner at the NMSU Agricultural Science Center at Tucumcari.

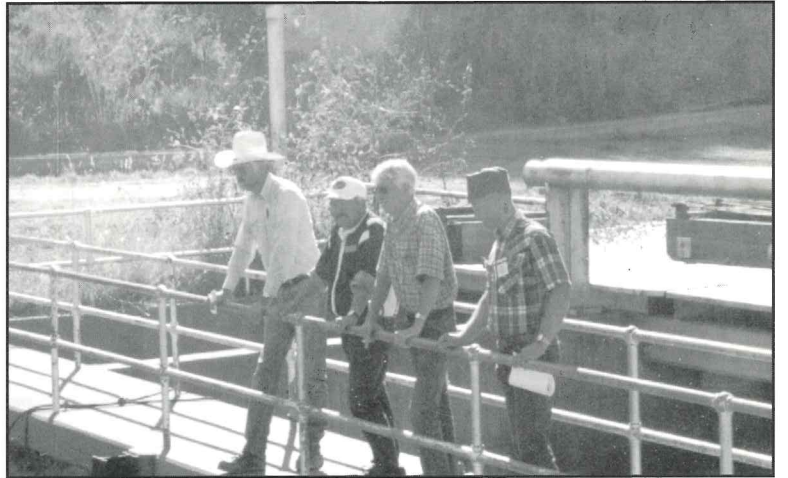




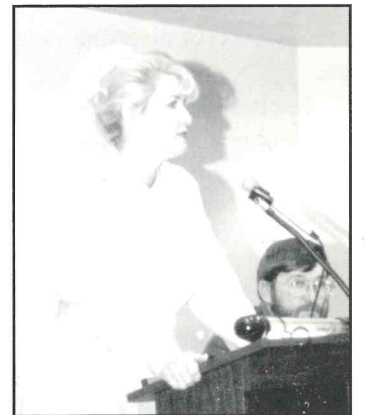
Annual water conference October 1-3, 1997



John Hernandez (left) makes a point during his talk on the history of water development on the Eastern Plains.



Above (from left): Gary Daves, Tom Bahr, Bob Creel and Erik Nelson look over the irrigation works at Conchas Dam; (right) Scotty Savage, Natural Resources Conservation Service, described new agricultural water conservation techniques.





NMSU to offer ITV course in water resources management

Professor John Hernandez of New Mexico State University's Department of Civil, Agricultural and Geological Engineering will teach a course this spring, *Water Resources Development* (CE 557). The course is sponsored by the Waste-management Education and Research Consortium. The class will meet on Tuesday and Thursday evenings from 7:00-8:15 p.m., January 14th through May 15th, on the main campus. The course will be broadcast live throughout New Mexico via interactive TV.

Students at NMSU, University of New Mexico, New Mexico Tech, Los Alamos Graduate Center, and Sandia Labs can register for the class as they would for any other class offered at their institution. Other off-campus students interested in taking the course can register as NMSU students through the office of Distance Education. Contact Teresa Nevarez, 1-800-821-1574, for registration information. The course will be broadcast live via satellite. Because of the nature of the course, each site must have at least two students. For broadcast information contact Denise Welsh (505-646-3700) at the NMSU Center for Educational Development (CED). For sites not able to receive live broadcast, registered students can purchase a set of tapes through CED.

According to Dr. Hernandez, the course will focus on resources development issues addressed in designing a major water project. The project selected for the class is the re-design of the Rio Grande Project including Elephant Butte and Caballo reservoirs. A great deal of data will be

available for the re-design: over 100 years of hydrologic records of stream flows, sediment, water-use, farm production, and water quality data. The dam sites will be the same, but the reservoirs' sizes will be a design variable. The project must be self-sustaining, economically feasible without government subsidy, and must meet broad multi-purpose objectives. The re-designed project must meet environmental concerns and New Mexico's water rights laws. Tradeoffs will be made among project costs, spillway and reservoir capacities, flood storage, firm water yields vs. shortages, environmental and recreational values, income from the sale of water to municipal and industrial users and irrigators, and income from power generation. Students in the class will function as members of a consulting panel and prepare reports on major water resources development problems. Political, financial, and social aspects of water resources development are to be considered in the re-design as well as scientific and technical details. Students will work in teams of two or three to produce four reports and a final project design. The course will provide an open-ended design opportunity for graduate level students. The course is appropriate for planners, resource economists and engineers in the water resources field and those with a background in regional consulting and government.

If you have questions, please call Dr. John Hernandez at (505) 646-2311 or email hernandez@nmsu.edu.

UCOWR dissertation/thesis award announced

The Universities Council on Water Resources has announced its competition for the best dissertation in each of three areas: Water Management, Water Processes, and Water Quality.

Submissions will normally be a Ph.D. dissertation; however, master theses can be submitted but they will be reviewed in the context of dissertation level criteria. Applicants must be in the process of graduating or within two years after graduation.

A scholarly panel will review the applications in each category. The applications will be ranked by each reviewer and will be graded 0-25 on each of the following items:

- originality and innovative aspects of the research
- technical quality and soundness of the research
- applicant's understanding of previous related research
- contribution to and impact on water resources research

Two students from New Mexico have been successful in this competition. Engineer Susan Bolton, formerly of NMSU, received second place in 1992 for her dissertation, *A Methodology for Estimating Water, Sediment, and Nutrients from New Mexico Watersheds*. NMSU master's student Jianmin Lu was the first place recipient of the 1997 award. His thesis was entitled, *Stripping Analysis-based Remote Electrochemical Sensors for Trace Metal Contaminants*.

The postmark deadline for application materials is **January 12, 1998**. Winners will be notified by May 1, 1998 and will receive a certificate and \$500. For more details, contact Cathy Ortega Klett, WRRI, 505-646-1195.



Report available

The Colorado River Compact, a legal document that initiated the process of allocating water among the seven Colorado River Basin states, is 75 years old. The document's historical importance and relevance to many of today's water management issues was celebrated May 28-31, 1997 at Bishop's Lodge in Santa Fe.

The Water Education Foundation (WEF) will publish the proceedings of the celebration which included a talk by Dan Tyler, Professor of History at Colorado State University. Dr. Tyler presented original insights into the personality and motivations of the Colorado River Commission's Colorado representative, Delph Carpenter, considered the "Father" of the Colorado River Compact. Another featured speaker was Stewart Udall who spoke on the changing values and political climate in the Colorado River Basin.

The proceedings should be ready by the end of 1997. Contact the WEF at 916-444-6240 for a copy.

USGS grant awards

The U.S. Geological Survey has announced awards in conjunction with the FY 1997 Regional Competitive Grant Program. Over \$3.2 million was awarded to 59 projects.

The WRRRI has a list of the funded projects. The list also is available via the internet at: <http://water.usgs.gov/public/wrri/director.html>

USGS news flash

To provide faster service to the news media, the U.S. Geological Survey has set up several listservers that will automatically provide by email the latest news releases, bulletins, and other information about USGS activities. The listservers are organized by topics: water, geologic hazards, biological mapping, new products, and lectures.

To subscribe to any list, send mail to: listproc@listserver.usgs.gov. In the body of the message say subscribe (name of listserver) (your name) (Example: subscribe water-pr Joe Smith). You may subscribe to more than one list; just be sure to list each command on a separate line.

Name of Listservers:

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geologic-hazards-pr
biological-pr
mapping-pr
products-pr
lecture-pr

Conference scheduled

Cross Currents in Water Policy is the theme of the Universities Council on Water Resources 1998 annual meeting. The conference will be held in Hood River, Oregon, on the banks of the Columbia River in the spectacular Columbia Gorge. The conference is scheduled for August 4-7, 1998.

This conference will explore the inherent conflicts between old water policies and new conceptions of sustainable development. As examples of pressing policy issues in the region of the meeting, attention will be given to issues in the Western U.S. through discussion of the current Western Water Policy Review and examination of river

management in the Pacific Northwest. Implications for university research and the education of future water professionals will be discussed.

Contributed papers and posters are invited that address contemporary issues in water policy and management, national, regional or international. Abstracts of no more than one page are due January 15, 1998. For more information, check: <http://www.uwin.siu.edu/ucowr>

UWIN web site

The Universities Water Information Network (UWIN) is a web site sponsored by the U.S. Geological Survey and the Universities Council on Water Resources (UCOWR). Its pages are accessed over 1.2 million times each year.

Current on-line informational resources include:

- employment listing for academic and non-academic jobs
- press releases of water-related information
- conference announcements and Calls for Papers
- requests for proposals and other grant-related information
- WRSIC research abstracts
- WetList: searchable database of water sites on the World Wide Web
- announcements of new book and software releases
- directory of U.S. water organizations
- links to U.S. water utilities
- UCOWR home page

To access the network: <http://www.uwin.siu.edu>. You can submit water-related information for posting on the UWIN web site by email to admin@uwin.siu.edu or by fax to 618-453-2671.



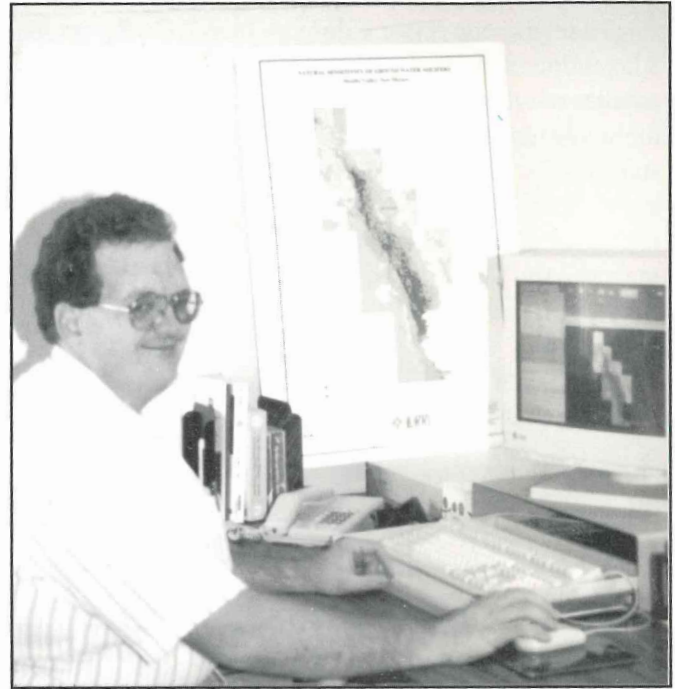
WRRI welcomes new staff member

Although not a new face around the institute, John F. Kennedy recently was hired as WRRI's Geographic Information Systems (GIS) Coordinator. John previously worked for the institute as a GIS research assistant while attending graduate school. In this position, he assisted the local Bureau of Land Management office in completing coverages depicting ranch boundaries of lands as well as helping the WRRI establish its GIS laboratory.

John's new duties include the development of GIS-related resources, data and the coordination and management of WRRI's GIS laboratory. He currently is working on several projects related to the institute's Water Resources Data System and on developing GIS databases.

An NMSU graduate with both B.S. and M.S. degrees in geology, John's master's thesis focused on the characterization of geomorphic surface stability utilizing geology/agronomy concepts and GIS. John has been accepted into the Ph.D. program in Geology at the University of Texas, El Paso. He is the author or co-author of many publications.

In his free time John enjoys hiking, photography, camping, fishing, golf, watching movies, reading science fiction, country-western dancing and listening to Jazz and Blues.



GIS Coordinator John F. Kennedy

Those of you who attended this year's water conference may remember John as the conference photographer. The WRRI is very pleased to have John on board.



Tom Bahr, Director

New Mexico Water Resources Research Institute

Catherine Ortega Klett, Editor

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