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Summer Water and Natural Resources Tour Examines North Platte River Issues

by Steve Ress

The University of Nebraska/Kearney Area Chamber of Commerce Summer Water and Natural Resources Tour takes a four-day look at drought conditions in the North Platte River watershed from headwaters in Colorado to Lake McConaughy this July.

The tour leaves Kearney's Ramada Inn Motel Monday, July 22 and returns there Thursday, July 25.

"Nebraska, Wyoming and Colorado are highly dependent on irrigation water and hydropower generated in the North Platte River watershed, and with the current drought conditions in those areas, the tour

should be very timely and enlightening," said tour co-organizer Michael Jess, acting director of the UNL Water Center.

"Reservoir levels in Nebraska and Wyoming are already well below normal and snow melt from the Rocky Mountains this year is forecast to be about 50 percent of what it normally is," Jess said.

In addition to current drought conditions in the watershed, tour stops and speakers will address North Platte River water use, interstate compacts and the recent settlement of litigation between Nebraska and Wyoming, irrigation development, and history.

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Wyoming's Seminole Dam. This is the first of several dams on the North Platte River that will be visited by summer water and natural resource tour participants (photo: Steve Ress).

UNL Classification Project Finds Little Variance in Nebraska Lake Water Quality

by Steve Ress

Nebraska lakes and reservoirs are so impacted by agriculture there is little variation in their water quality, a group of UNL scientists are finding as they develop new procedures to classify and monitor them for the U.S. Environmental Protection Agency (EPA).

"The EPA defines lakes by water quality and groups them into ecoregions, but that system doesn't work as well here," said NU School of Natural Resource Sciences water quality specialist John Holz. In Nebraska

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Missouri River Policy and Tensions; Faculty Receive Small Equipment Grants

from the DIRECTOR



J. Michael Jess

Missouri River Basin

Recent tensions among state leaders and policy makers in the Missouri River basin have focused upon management of the river and the federal reservoir system located in the Dakotas and in Montana. In May four states in the basin initiated lawsuits against the U.S. Army Corps of Engineers. Separating political considerations from others is never easy, but lacking an appreciation for values held by others and an absence of sound, technical understandings has sometimes fueled similar tensions in the past.

My intent with that brief summary is to introduce the guest article in this issue of the *Water Current*. It was written by my friend and colleague, Tony Prato at the Missouri River Institute in Columbia, Missouri. In his article Tony outlines the offer made by faculty members at the river basin's four-year colleges and universities. Whether to assess impacts to the environment or to commercial interests, to guide engineering design or to facilitate regulatory decisions, both the public and private sectors have a need for well reasoned and unbiased research. Faculty members in the basin have affiliated with the Missouri River Basin Consortium, and as their objective, Tony's article explains how they intend fulfilling that need.

Investments in Research

In mid-May, Nebraska faculty members were invited to submit proposals to the Water Center for the purchase of equipment needed for current research activities. A \$20,000 limit was specified, and faculty members were given less than two weeks to prepare brief applications. Given those limitations, I was pleased to learn 14 proposals were received. After reading them, it was also encouraging to consider the extent of current research activities in Nebraska.

Together, all of the proposals totaled more than the amount

available for expenditure. That made the choices more difficult, but I was pleased to announce that most of the proposals were at least partially funded. Based upon proposals they submitted, the following faculty members received full or partial funding assistance:

Dean E. Eisenhauer, Dept. of Biological Systems Engineering and **Joseph Skopp**, School of Natural Resources Sciences, UNL: acoustical Doppler velocity meter;

F. Edwin Harvey, School of Natural Resources Sciences/Conservation & Survey Division, UNL: deep well, small diameter pumping/sampling system & down-hole transducers;

John C. Holz, School of Natural Resources Sciences, UNL: chlorophyll fluorometer, data logger & optical filter kit;

Alan S. Kolok, Dept. of Biology, UNO: water quality logger & display system;

Mark Kuzila, (on behalf of) Conservation & Survey Division, UNL: ground water level and temperature monitoring instrumentation for state-wide network;

Edward J. Peters, School of Natural Resources Sciences, UNL:
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WATER CURRENT

Water Center
University of Nebraska-Lincoln
103 Natural Resources Hall
Lincoln, NE 68583-0844
Phone: (402) 472-3305
Fax: (402) 472-3574
E-mail: sress1@unl.edu
<http://watercenter.unl.edu>

Kyle D. Hoagland - Director
J. Michael Jess - Acting Director
and Water Specialist
- Director,
Water Sciences Laboratory
Steven W. Ress - Editor
Patricia A. Liedle - Editorial Assistant
Anne M. Moore - UNL CIT,
Layout and Design

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Meet the Faculty

Dr. Mohamed F. Dahab

Environmental Engineer, Professor and Chair, Department of Civil Engineering and Director, Environmental Engineering Program, University of Nebraska-Lincoln. Member of UNL faculty since 1983. Registered Professional Engineer in Iowa and Nebraska.

Education:

Ph.D., Iowa State University, Ames, IA, 1982.
MSCE, Iowa State University, Ames, IA, 1976.
BSCE, University of Iowa, Iowa City, IA, 1974.

Current Research/extension programs:

- Professional interests in water purification and wastewater treatment systems with emphasis on nitrate and nutrients

removal from water and small community wastewater systems; use of biological treatment systems for water purification and wastewater treatment and resources and energy recovery; solid and hazardous waste management engineering with emphasis on pollution prevention and minimization technologies; and risk management techniques for the prevention and control of groundwater contamination.

- High-performance side-stream nitrification of municipal biosolids treatment decants.
- Side-stream nitrification of biosolids treatment decant at the Lincoln Theresa St. Plant.
- Advanced monitoring of

constructed wetlands performance in eastern Nebraska.

- Pollution prevention technical assistance and training for small business and industry.

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Mohamed F. Dahab

Dr. Vitaly A. Zlotnik

Hydrogeologist, Professor, UNL, Department of Geosciences since 1990. Primary research interests include various aspects of physical hydrogeology: characterization of



Vitaly A. Zlotnik

permeability of heterogeneous aquifers, groundwater-surface water interactions, modeling of the groundwater flow and mass transport, sedimentary models of alluvial aquifers, and use of thermal infrared imagery in hydrogeology. Currently teaching graduate level courses in hydrogeology in Geosciences.

Education:

Ph.D. in Hydrogeology, National Institute for Hydrogeology and Engineering Geology, Moscow, USSR, 1979
M.S. in Hydrogeology/Physics, Belarus State University, Minsk, USSR, 1971

Samples of Current Research:

- Development of methods for estimating the hydraulic conductivity in heterogeneous aquifers (multi-level slug test, dipole-flow test, borehole flowmeter tests, air injection,

chemical and heat tracer tests)

- Hydraulic characterization of the stream-aquifer interface: theory, field implementation, and practical ramifications on the Platte River watershed, Nebraska
- Investigation of stream depletion under pumping conditions considering interaction of hydrogeology, sedimentology, and geomorphology on the Prairie Creek watershed, Nebraska
- Mathematical models of groundwater flow and mass transport: passive and active techniques for investigation of groundwater-surface water interactions; aquifer hydraulics for vertical and horizontal wells; capture zones
- Use of ground-based, airborne, and space thermal infrared imagery for delineation of groundwater discharge zones surface in surface water-groundwater interactions: the Sand Hills lakes
- We cooperate with colleagues in the U.S. (Texas A& M, Okla-

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Managing the Missouri River System: A Role for Universities

**by Tony Prato,
Director, Missouri River Institute,
University of Missouri-Columbia**

In the past 60 years, the once free-flowing 2,341-mile long Missouri River has been altered to achieve multiple benefits, including agricultural and urban development, flood control, hydroelectric power generation, irrigation, navigation, recreation and municipal water supply. The Missouri River System's six mainstem dams and reservoirs impound 35 percent of the river's length to create the nation's largest reservoir system. The lower 1,893-mile stretch of the river between Sioux City, Iowa and St. Louis, Missouri has been channelized and dikes and levees installed to create and maintain a 9-foot deep, 300-foot wide channel that permits navigation and urban-agricultural development in the floodplain.

The \$1 billion in benefits generated by the Missouri River System has come at a cost in terms of reduced natural hydrologic variability in the river and resulting impairment of fish and wildlife. As the National Research Council pointed out in its February 2002 report, Degradation of the natural Missouri River ecosystem is clear and is continuing.

Stakeholder groups have taken sides on the five management alternatives proposed for the Missouri River System by the U.S. Army Corps in their Revised Draft Environmental Impact Statement issued in August 2001. At one extreme, agricultural and navigation interests oppose changes in current management on grounds it will impair agricultural production and navigation.

At the other extreme, the U.S. Fish and Wildlife Service has written a biological opinion that favors managing the river to achieve a more natural hydrograph for the benefit of threatened and endangered species.

One group that has been relatively silent and uninvolved in the evaluation of management alternatives for the Missouri River System is universities. Why is this so?

Several reasons seem plausible. First, universities may believe it is inappropriate for them to take a position on management of the Missouri River System. While this concern is legitimate, universities have valuable multidisciplinary expertise that can be brought to bear on the evaluation of management alternatives and design of monitoring programs for the Missouri River System.

Second, a single university may feel uneasy about addressing a hotly contested issue that transcends the

state that provides its financial support. This viewpoint is countered by the fact that many universities conduct research and educational programs on topics that go beyond state borders. Moreover, academic freedom protects university faculty from reprisals motivated by research results that are unpopular with stakeholders.

Third, any single university may feel ill suited to address the broad and complex social, economic and ecological issues facing large river systems, such as the Missouri. While this concern is understandable, it is now common for universities in several states to cooperate in research and educational programs that address interregional problems and issues, such as those faced by a major river system.

Fourth, lack of federal funds for intercollegiate research on Missouri River issues has dampened the development of intercollegiate programs. This situation appears to be changing with the recent call for proposals by EPA to develop ecological and socioeconomic indicators of status and trends for the Missouri, Mississippi and Ohio Rivers.

Fifth, the lack of coordinated university programs aimed at the Missouri River System is due, in part, to the absence, until recently, of suitable organizations. This situation is improving with creation of a Missouri River Institute at the University of South Dakota (<http://www.usd.edu/mri>) and the University of Missouri-Columbia (<http://mri.missouri.edu>), and formation of the Missouri River Basin Consortium (MRBC).

The Missouri River Institutes are involved in research and educational programs designed to improve understanding and appreciation of the Missouri River. The goal of the MRBC, which includes 14 colleges and universities from nine basin states, is to advance knowledge and understanding of the unique ecological, economic, historical, social, political and cultural issues shaping the environmental and economic future of the Missouri River Basin. MRBC has developed seven research and educational initiatives that are described on its website (<http://mrbc.missouri.edu>).

Universities in the Missouri River Basin are awakening to their potential role in developing research and educational programs that contribute to a better understanding and appreciation of the social, economic and ecological issues surrounding sustainable use and management of the Missouri River System and associated land and water resources. What better time for this to occur than on the eve of the Lewis and Clark Bicentennial Celebration.

Nebraska's Diverse Wetlands

By Ted LaGrange,
Wetland Program Manager,
Nebraska Game and Parks Commission

Nebraska's wetland resources are as diverse and dynamic as those of any state in the nation. They include marshes, lakes, river and stream backwaters, oxbows, wet meadows, fens, forested swamps, and seep areas. Some wetlands hold water for only a few weeks or less during the spring while others never go completely dry. Many wetlands receive their water from groundwater aquifers while others are totally dependent on precipitation and runoff. Finally, the water chemistry of wetlands ranges from freshwater to saline and from acidic to basic.

Wetlands are defined using the presence of hydric vegetation, hydric soils, and hydrology. All three are required for an area to be considered wetland.

Because of the presence of water, even if for only a brief period, wetlands can provide a variety of unique functions, including:

Improving Water Quality -- Wetlands are a great natural cleanser of many common water pollutants. They act as a filter, slowing water down and allowing

sediment and many pollutants to settle out. As the water slowly moves through the wetland, a series of chemical transformations take place that tie-up or alter a variety of pollutants. As a general rule, the water leaving a wetland is of higher quality than the water entering the wetland. In fact, studies have shown that up to 80 percent of the nitrate pollution entering wetlands are converted to harmless nitrogen gas by the time the water exits the wetland. Wetlands are increasingly being used for water pollution control and waste water treatment due to their water cleansing functions.

Providing Habitat for Wildlife, Fish, and Unusual Plants — Wetlands are one of the most productive biological systems known. This high level of productivity makes wetlands important habitat for an abundance of different kinds of wildlife and fish. Wetlands are home to thousands of different plant and animal species, and 9 of Nebraska's 12 federal endangered and threatened species use wetland areas.

Reducing Flooding — Many wetlands store water temporarily, allowing it to percolate into the ground, evaporate, or be slowly released back into a stream or river. This temporary storage can reduce flooding after a storm.

Producing Food and Fiber — The productivity of wetlands can be tapped to produce food, fiber, and livestock forage.

Supplying Water — Many wetlands slowly release water into the ground to recharge groundwater. Some wetlands also slowly release water to streams and rivers, helping to maintain stream-flows.

Providing Recreation and Education — Wetlands provide numerous recreational opportunities including hunting, trapping, wildlife watching, photography, and enjoyment of the serenity. Anglers also benefit from wetlands because many species of fish use these areas for feeding and spawning. Wetlands provide an excellent setting for environmental education because of the many unusual life forms present.

At the time of statehood in 1867, Nebraska contained an estimated 2,910,000 acres of wetlands. They included Rainwater Basin marshes, Sandhill lakes, Platte River wet meadows, Missouri River sandbars and oxbows, Salt marshes, playa wetlands in the south-west, and many more types.

However, through much of the state's history, wetlands were viewed as an impediment to transportation, agriculture, and development. Wetlands were impacted directly by filling, ditching, tiling, digging concentration pits, channelization, and declining water tables, and indirectly by changes in the surrounding uplands that caused increased sedimentation or the diversion of surface runoff away from wetlands.



A view of Crescent Lake and its associated wetlands. Nebraska's wetlands come in many sizes, shapes and types, though their number is much smaller than it was more than a hundred years ago (photo: Ben Gawne).

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EPA's Risk Assessment on Atrazine

In April, the U.S. Environmental Protection Agency presented a revised risk assessment for atrazine, a widely used corn and sorghum herbicide.

At an April 16 technical briefing, the EPA opened a 60-day public participation period for comment on risk mitigation and management ideas as well as recommendations and proposals for transition.

In recent years, triazine pesticides, including atrazine, have been given high priority for review by the EPA under the Food Quality Protection Act, which mandates maximum allowable limits of pesticide residues in food or animal feed.

Triazine pesticides are widely used to control broadleaf and some grassy weeds. Atrazine is perhaps the most widely used pesticide in this group. Usage on corn accounts for approximately 86 percent of U.S. domestic usage (in pounds), followed by sorghum at 10 percent and sugarcane at three percent. An estimated 76.4 million pounds of atrazine are applied annually. About 75 percent of all U.S. corn acres are treated with atrazine.

Among other things, the EPA's risk assessment found that atrazine has low acute toxicity in humans. EPA has classified it as "not a likely human carcinogen" because the mode of action by which atrazine causes mammary gland tumors is specific to the female Sprague-Dawley rat. Acute and chronic dietary risk from food is not of concern.

The risk assessment also noted that acute (one-day) exposures to surface water community water systems do not exceed levels of concern. Twenty-nine community water systems had intermediate term exposures of chlorotriazines that exceeded levels of concern for infants. Community water systems of concern are located in Illinois, Iowa, Louisiana, Indiana, Kentucky, Missouri and Ohio.

Rural drinking water wells acute (one day) exposures also do not exceed levels of concern. Eight of 1,505 rural wells sampled once or twice, several years apart, had concentration of chlorotriazines greater than the infant levels of concerns.

Community water systems using groundwater are not impacted as heavily by atrazine use as systems using surface water so acute exposures do not exceed levels of concern, the assessment found.

Residential risk, which comprises less than one percent of all atrazine use, is of concern for the following exposure scenarios, according to the assessment:

1. Homeowners who apply granular atrazine with a "bellygrinder" applicator to 0.5 acres.
 2. Adults and children who play on wet turf following the application of liquid atrazine.
 3. Children who play on turf following application of liquid atrazine through hand-to-mouth activity.
 4. Children who play on turf following application of granular atrazine and then eat granules.
 5. Residential aggregate exposures to children who play on turf following application of liquid atrazine.
- Additional information on atrazine, including the



About 86 percent of the U.S. domestic usage of atrazine is on corn, like this irrigated field in central Nebraska. Residential use of the broadleaf pesticide nationwide amounts to less than one percent (photo: UNL Water Center).

specific risk assessments, is available at <http://www.epa.gov/pesticides/reregistration/atrazine/>. This site links to *Overview to Atrazine Risk Assessment*, a 23-page document summarizing the EPA's human health, environmental fate and transport and ecological risk findings.

(Taken in part from *EPA Releases Risk Assessment on Atrazine*, Larry D. Schulze, *NU Extension Pesticide Coordinator, The Label*, Vol. 14/No. 5 May 2002).

UNL Classification Project Finds Little Variance in Nebraska Lake Water Quality

(continued from page 1)

and other agricultural states, land use, or agricultural effects on water quality, is the overriding factor effecting lake water quality.

The EPA's ecoregions characterize bodies of water based on ecological similarities such as climate, topography, soil type and natural vegetation. The system is used to develop baselines for water quality by comparing current levels of pollutants and suspended sediments to what those levels were before settlement.

"The classification system works well in places like Maine, Wisconsin and Minnesota where lakes aren't impacted by agriculture to the degree that they are here," he said. "We are redefining the system for states heavily impacted by agriculture, where intensive land use virtually masks all natural environmental characteristics of the water body."

The Institute of Agriculture and Natural Resources

interdisciplinary of researchers, graduate

students and Ph.D. candidates have analyzed samples from more than 250 Nebraska water bodies, finding that almost all fall into one ecoregion. The samples are ranked on more than 20 water quality perimeters, including amount of suspended sediments, nutrients (like nitrogen fertilizer), chlorophyll (amount of algae) and water transparency.

Only a few small lakes in extreme northwestern and southeastern Nebraska have been sampled that don't fall into the project's one overriding classification of ag-dominated ecology.

Finding ways to remotely monitor lakes and reservoirs for these water quality perimeters is another key element of the overall project.

"UNL remote sensing specialists Donald Rundquist and Anatoly Gitelson are developing a "spectral signature" of the lakes using a spectroradiometer that can identify blue-green algae concentrations based on reflected light patterns. The extent of blue-green algae blooms can reveal a great deal about overall water quality," Holz said.

Geographic information systems researcher Jim Merchant is using this information and factors such as land use, elevation, slope and soil types to develop detailed watershed characterizations to define different lake regions.

"These characterizations will group lakes and reservoirs into fundamental hydrological units that follow natural watershed boundaries," Merchant said.

"Ecoregions don't currently follow these boundaries."

"The ecoregion system is heavily weighted toward natural lakes, where pre-settlement water quality information is easier to determine. We will need to do some modeling when taking the reservoirs into account on this project," Merchant said.

Comparing current lake water quality to what it was or may have been before

farming impacts allows researchers to determine how much impact human activity has had on water quality and how better to maintain or improve it.

"Since virtually none of Nebraska's reservoirs were around before settlement, having been built for agricultural use, this means computer modeling many of them for a pre-settlement baseline on water quality," he said.

UNL limnologists (those who study lakes and ponds) will date individual bodies of water by boring into the bottoms of lakes and reservoirs to collect soil and sediment core samples. The numbers of the fossilized silica cell walls of microscopic organisms (diatoms) in these samples will help them determine historical water quality and soils in the samples will help date the body of water.

The research will continue through the coming year using more than \$1.2 million in funding and assistance from the EPA and Nebraska Department of Environmental Quality through NU's Institute of Agriculture and Natural Resources.



UNL researchers check the turbidity, or level of suspended solid materials, in a Nebraska reservoir. These and other samples are being used in an interdisciplinary lake classification project (photo: Tadd Barrow).

Meet the Faculty

Mohamed F. Dahab (continued from page 3)

Other Recent Research and Extension Programs:

- Evaluation of constructed wetlands performance for small community wastewater treatment, 1997-1998.
- Evaluation of constructed wetlands performance in eastern Nebraska, 1996-1998.
- Development of an interagency plan for providing pollution prevention and environmental services to Nebraska business and industry, 1996-1998.
- An integrated biode-nitrification system for the treatment and remediation of nitrate-contaminated groundwater.
- Development of engineering undergraduate and graduate pollution prevention coursework and curriculum, 1995-1998.
- Transfer of multi-media pollution prevention technology to the commercial and industrial sector in Nebraska, 1993-1997.
- Effects of treatment systems on pathogen reduction in municipal; biosolids, 1993-1996.
- Risk management for nitrate-contaminated groundwater under uncertainties, 1992-1994.

Publications:

- Woodbury, B.L. and M.F. Dahab, 2000. "Effect of retention time and flow reversal on effluent quality from reversible-flow biode-nitrification reactors," *Water Environment Research*, 72(5), 574-584.
- Dahab, M.F., 2000. "EPA/NSF ETV Equipment Verification Testing Plan - Heterotrophic biological denitrification for the removal of nitrate," in: *Protocol for Equipment Verification Testing for Physical Chemical*

and Biological Removal of Nitrate, NSF International, Research and Engineering Services, Ann Arbor, MI.

- Woodbury, B.L. and M.F. Dahab, 2000. "Comparison of conventional and two-state, reversible-flow static-bed biode-nitrification reactors," *Water Research*, Vol. 34, in press.
- Doderiya, F.S., M.F. Dahab, W.E. Woldt and I. Bogardi, 1998. "Environmental impact evaluation of spacial management practices using simulation with spacial data," *ASCE Journal of Water Resources Planning and Management*, 124(4) 181-191.
- Gutierrez-Martin, F. and M.F. Dahab, 1998. "Issues of sustainability and pollution prevention in environmental engineering and science education," *Water Science and Technology*, 38(11) 271-278.
- Woodbury, B.L., M.F. Dahab, P. Mihaltz and Zs. Csikor, 1998. "Evaluation of reversible fixed-film static-bed Bio-denitrification reactors," *Water Science and Technology*, 38(1) 311-318.
- Ponugoti, P., M.F. Dahab and R. Surampalli, 1997. "Effects of different biosolids treatment systems on pathogen and pathogen indicator reduction," *Water Environment Research*, 69(7), 1195-1206.
- Tannehill, C., M.F. Dahab, W.E. Woldt and I. Bogardi, 1997. "Evaluation of nitrate treatment methods under uncertainty," *Journal of Environmental Systems*, 25(4), 421-444.

Web/E-mail addresses:

www.civil.unl.edu/
mdahab@unl.edu

Vitaly A. Zlotnik (continued from page 3)

homa State, University of Kansas, Los Alamos National Laboratory) and Germany (University of Tuebingen).

Teaching:

- Courses Introduction to Groundwater Modeling, Contaminant Hydrogeology, Field methods in hydrogeology, and seminar Modern problems in Hydrogeology
- Chair of Advisory Committee, Hydrogeology specialization,
- Director of Graduate Admissions in Geosciences Department.

Recent Publications:

- Zurbuchen, B.R., V.A. Zlotnik, J.J. Butler, Jr., 2002, "Dynamic interpretation of slug tests in highly permeable aquifers," *Water Resources Research*, 38(3), 7-167-18.
- Rus, D.L., V.L. McGuire, B.R. Zurbuchen, and V.A. Zlotnik, 2001, "Vertical Profiles of Streambed Hydraulic Conductivity Determined Using Slug Tests in Central and Western Nebraska, U.S. Geological Survey," *Water-Resources Investigations Report 01-4212*, 32 p.
- Zlotnik, V.A., B.R. Zurbuchen, and T. Ptak, 2001, "The steady-state dipole-flow test for characterization of hydraulic conductivity statistics in a highly

permeable aquifer: Horkheimer Insel Site, Germany," *Ground Water*, 39(4), 504-516.

- Butler, J.J., Jr., V.A. Zlotnik, M.-S. Tsou, 2001, "Drawdown and stream depletion produced by pumping in the vicinity of a partially penetrating stream," *Ground Water*, 39(5), 651-659.
- Zlotnik, V.A., Zurbuchen, R.F., Ptak, T., Teutsch, G., 2000, "Support volume and scale effect in hydraulic conductivity: experimental aspects, in D. Zhang and C.L. Winter, eds., Theory, Modeling, and Field Investigation in Hydrogeology: A Special Volume in Honor of Shlomo P. Neuman's 60th Birthday: Boulder, Colorado," *Geological Society of America Special Paper 348*, 215-231
- Tartakovsky, D.M., J.D. Moulton, and V.A. Zlotnik, 2000, "Kinematic structure of mini-permeameter flow," *Water Resources Research*, v. 36 (9), 2433-2442.
- Zlotnik, V.A., and B.R. Zurbuchen, 2000, "Discussion of Papers: Dipole probe: Design and field applications of a single-borehole device for measurements of vertical variations of hydraulic conductivity," November-December 1998 issue, v.36, no. 6: 884-893", *Ground Water*, 38(2), 163-165.

Web/E-mail Addresses:

<http://www.unl.edu/geology>
vzlotnik1@unl.edu

Nebraska's Diverse Wetlands (continued from page 5)

The net result of all of these activities statewide was a reduction in wetlands by an estimated 35 percent, to 1.9 million acres. The destruction of wetlands was much higher in some regions of the state, approaching 90 percent for the Rainwater Basin, Eastern Saline wetlands, and some reaches of the Missouri River.

In recognition of these losses and the valuable functions that wetlands can provide, a wide variety of

conservation programs has been put in place to help protect, restore and enhance Nebraska's wetlands. These programs include technical guidance on management, payment for wetland restoration and management practices, and purchase of easements or title on select areas. It is hoped that these programs will reverse the long history of wetland declines and provide wetlands for future generations.

Summer Water and Natural Resources Tour

Examines North Platte River Issues (continued from page 1)

On Monday, Sharon Whitmore of the U.S. Fish and Wildlife Service will discuss how water releases from Lake McConaughy are used to augment fish and wildlife habitat requirements in Nebraska and members of the Sidney Chamber of Commerce will address irrigation, agri-business and farming concerns in the area. The first night's stop is in Fort Collins, CO.

On Tuesday, buses pass over the continental divide and through Cameron Pass enroute to North Platte River headwaters at Walden, CO. and from there north to Wyoming. John Lawson and Ken Randolph of the U.S. Bureau of Reclamation will overview irrigation and hydroelectric issues at Seminoe Dam, the first of a series of North Platte River reservoirs the tour will visit in Wyoming.

"From both operational and historic points of view, the dams and reservoirs in Wyoming are nothing short of impressive. They are extremely important to both irrigated agriculture and power generation in Nebraska," Jess said.

Before overnighting in Casper, WY, tour participants will also view Pathfinder, Alcova and Gray Reef dams.

As buses head toward Nebraska the following day, Glendo and Guernsey dams will be viewed, including hydro-electric operations at Guernsey and Glendo.

At the Wyoming-Nebraska border, buses will stop at the Mitchell-Gering diversion dam to discuss allocation of stream flows among irrigators in Nebraska and Wyo-

oming. The dam was the site of a 1936 call-up of the Nebraska Army National Guard to enforce water right regulations.

From there the tour will visit subsurface drip irrigation research projects at UNL's Panhandle Research and Extension Center research plots near Mitchell. Overnight will be at Scottsbluff.

On the final day, local irrigators will discuss conjunctive water use tensions in the Pumpkin Creek valley in Banner and Morrill Counties.

"There is little to no natural flow in the creek, creating a very volatile situation for many surface and groundwater irrigators in the area," said Jess.

After a stop at the new visitors center at Lake McConaughy and discussion of UNL dissolved oxygen research at Lake Ogallala, tour buses return to Kearney.

Tour cost is \$450 single occupancy or \$400 double occupancy. Registration includes all food, motel, and motorcoach expenses. Registration is through the Kearney Area Chamber of Commerce at (800)652-9435. Registration deadline is July 5.

Other sponsors are Central Nebraska Public Power and Irrigation District; Nebraska Public Power District; Nebraska Association of Resource Districts; Gateway Farm Show; Nebraska Water Conference Council and UNL's Institute of Agriculture and Natural Resources, Conservation and Survey Division, Water Center and Panhandle Research and Extension Center.

From the Director (continued from page 2)

depth sounder, velocity meter & multi-probe system meter;

James R. Rosowski, School of Biological Sciences, UNL: hand held turbidometer, submersible pumps, oxygen tanks & water chemistry kits;

Patrick J. Shea, School of Natural Resources Sciences, UNL: toxic contaminated soil diagnostic analyzer;

Daniel D. Snow, Dept. of Agronomy & Horticulture, UNL: chemical laboratory computer & software;

Jozsef Szilagyi, Conservation & Survey Division, UNL: three dimensional ground water systems modeling software.



Water News Briefs

Latest USGS Fact Sheet

Use of Environmental Tracers and Isotopes to Evaluate Sources of Water, Nitrate and Uranium in an Irrigated Alluvial Valley, Nebraska, a two-page fact sheet, is now available from the U.S. Geological Survey and the UNL Water Center.

This was released in late January as USGS Fact Sheet FS-100-01 by I. M. Verstraeten, J.K. Bohlke, T.F. Kraemer and J.C. Cannia. The fact sheet reports findings on the effects of irrigation canals and the North Platte River on groundwater movement and quality in an irrigated alluvial valley in western Nebraska, using environmental tracers.

Request copies from Technical Editor Kathy Wilson, U.S. Geological Survey, Water Resources Division, Federal Building, Room 406, 100 Centennial Mall North, Lincoln, NE 68508, phone (402)437-5663 or email kewilson@usgs.gov; or from the UNL Water Center, P.O. Box 830844, University of Nebraska, Lincoln, NE 68583-0844, phone (402)472-3305 or email sress1@unl.edu.

Free Tabloids

Copies of *Wetlands-Understanding a Resource (1997)* and *Drinking Water-Understanding a Resource (1999)* are available for summer programming needs free from the UNL Water Center.

Organizations wanting copies for educational use or general distribution can have up to several hundred copies of either or both publications at no cost, providing they make arrangements to pick them up at our UNL East Campus office. If copies need to be shipped, you will be asked to pay shipping/ mailing costs.

Call the Water Center at (402)472-

3305 or email sress1@unl.edu. For a list of other free publications, go to <http://watercenter.unl.edu>.

Free Directories

The UNL Water Center has a pocket-size directory of federal and state agencies, Natural Resources Districts and NU water research and cooperative extension offices designed to help answer your water-related questions. Listings are by telephone and FAX number. If you would like a copy, phone (402)472-3305 or email sress1@unl.edu. Copies will be distributed on a first-come, first-served basis.

Going Up

The average price of water has risen 3.8 percent worldwide according to a recent survey by NUS Consulting Group.

The average price for a cubic meter of water (264 gallons) is 76.4 cents (US currency), with Germany having the highest water prices at \$1.52 and South Africa the lowest average price of 34 cents.

Following is the ranking of the surveyed countries and their average water price in U.S. dollars per cubic meter: Germany: \$1.52, Denmark: \$1.46, United Kingdom: \$1.11, The Netherlands: \$0.98, France: \$0.93, Belgium: \$0.75, Italy: \$0.62, Spain: \$0.58, Finland: \$0.53, United States: \$0.52, Sweden: \$0.51, Australia: \$0.48, Canada: \$0.37 and South Africa: \$0.34

Drinking Water News Online

[Safedrinkingwater.com](http://safedrinkingwater.com) is a free, weekly, electronic newsletter bringing subscribers links to news stories on drinking water quality such as source water quality and protection, water treatment plants and processes and the water distribution system. The newsletter is produced by McGuire Environmental Consultants, Inc., Santa Monica, CA. To subscribe, go to safedrinkingwater.com.

Things That Work

Flies or bees bothering you? Spray them with hairspray and they will take a dive.

Crayon marks on walls? A damp rag dipped in baking soda and the mark comes off with little effort.

For permanent marker on appliances/counter tops (like store receipt blue) use rubbing alcohol on a paper towel.

Use vertical strokes when washing outside windows and horizontal strokes for inside windows....this way you can tell which side has the streaks. Straight vinegar will get outside windows really clean, but don't wash them on a sunny day, as they will dry too quickly and will probably streak.

Candles last longer if placed in the freezer for at least three hours prior to burning.

Spray Tupperware with nonstick cooking spray before pouring in tomato-based sauces and there won't be any stains.

To unclog a drain, drop three Alka Seltzer tablets down the drain, followed by a cup of white vinegar. Wait a few minutes, then run hot water.

GWF Award Nominations

The Groundwater Foundation is accepting nominations for its three national awards. These awards honor individuals who create a legacy of groundwater protection through local action, education, and government service.

The Vern Haverstick Groundwater Hero Award established to showcase groundwater protection activities by the unsung, yet heroic, efforts of community residents. Any member of the public is eligible for this award.

The Edith Stevens Groundwater Educator Award to recognize educators who understand the importance of groundwater, motivate others to protect groundwater, and lead by personal example. Anyone actively involved with the implementation and delivery of groundwater education programs is eligible for this award.

The E. Benjamin Nelson Government Service Award to recognize and honor an elected or appointed

(continued on next page)

JULY

1-3: AWRA Annual Summer Conference, "Groundwater/Surface Water Interactions," Keystone, CO. For information, phone (540)687-8390 or mike@awra.org.

10-13: "Energy, Climate, Environment and Water: Issues and Opportunities for Irrigation and Drainage," San Luis Obispo, CA. Contact Larry Stephens at (303)628-5430, email stephens@uscid.org or go to <http://www.uscid.org/-uscid>.

22-25: UNL/Kearney Area Chamber of Commerce Summer Water and Natural Resources Tour. Follow the North Platte River basin in Colorado, Wyoming and Nebraska. For information or registration materials, phone the Kearney Area Chamber of Commerce at (800) 652-9435 or the UNL Water Center at (402)472-3305.

AUGUST

11-14: Eighth Annual Industrial Wastes Technical and Regulatory Conference, Tropicana Casino and Resort, Atlantic City, NJ. For information, contact the Water Environment Federation at (800)666-0206, email confinfo@wef.org or go to www.wef.org/conference.

11-13: 20th Annual College and

GWF Award Nominations

(continued)

public official who has significantly advanced environmental and groundwater stewardship. Any government official on the local, state, or federal levels; elected, appointed, or career civil service is eligible to receive this award.

Award recipients will receive complimentary travel, lodging, and registration for the Groundwater Foundation's Annual Conference November 18-20, 2002, at the Valley River Inn in Eugene, Oregon..

To receive a printed copy of the "National Awards Program" booklet containing nomination requirements or a copy of the "Awards Recipients" booklet containing brief biographies of past award winners, e-mail info@groundwater.org or call toll free (800)858-4844. Award nomination requirements and past recipient biographies can be found online at www.groundwater.org. All nominations must be received by July 14, 2002.



University Hazardous Waste Conference, Iowa State University, Ames, IA. Visit: <http://p2ric.org/cgi-shl/nph-t.pl?U=1254&M=336&MS>.

SEPTEMBER

18-21: Fifteenth Annual Arizona Hydrological Society Symposium, Radisson Woodlands Hotel, Flagstaff, AZ. For information, go to www.AzHydroSoc.org or email Sean.Welch@nau.edu.

NOVEMBER

3-7: American Water Resources Association (AWRA) annual conference, Philadelphia, PA. For information, go to www.awra.org or contact Harriette E. Bayse at (540)687-8390.

We're Updating!!

We are updating our mailing list. If you have a change of address, title and/or name, or would like to have your name added to or removed from the *Water Current* mailing list, please let us know. Also, if you know of anyone who might be interested in receiving our publications, please give us their names and we will be glad to add them to our mailing list.

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More Than 40 Attend Water Faculty Forum

by Steve Ress

More than 40 faculty, staff and graduate students attended a day-long forum on University of Nebraska water sciences research and issues at Lincoln's Embassy Suites Hotel in April.

Nine presentations on current research highlighted morning sessions of the forum, while in the afternoon participants broke into small groups to discuss the potential for collaboration on future research, as well as what the focus of that research should be.

"Our main goals were to give faculty an opportunity to get together in an off-campus setting in order to become more familiar with one another, as well as more familiar with their colleagues' research in related disciplines. In those regards I think we were successful," said Water Center acting director J. Michael Jess.

NU Vice Chancellor for Research Prem S. Paul delivered the forum welcome and opening remarks, that helped set the tone for charting future research courses and collaborations.

Faculty and staff represented UNL and UNO as well as UNL's West Central Research and Extension Center in North Platte. Representation was from the School of Natural Resource Sciences, Conservation and Survey Division, Cooperative Extension Division, Water Center, Water Sciences Laboratory, Groundwater Chemistry

Laboratory, Civil Engineering, Geosciences, Biological Systems Engineering, Agriculture and Horticulture, Agricultural Economics, Entomology and Biology (UNO).



UNL Water Center Acting Director Michael Jess (standing at right) facilitates small group discussions that were part of an April forum for NU water-related faculty members (photo: Steve Ress).

"I think those attending learned a great deal from each other, and in some cases, began forging potentially advantageous research collaborations by the end of the day," Jess said.

Participants overwhelmingly said the forums should be continued on an every-other-year or yearly basis. Many expressed hope that the forum would lead to "Participation in a multi-disciplinary water sciences effort."

"We get so involved in our own programming, teaching and research efforts on a day-to-day basis that we don't have the

opportunity to learn more about what our colleagues are doing, and from that, gain a better appreciation for where potential research or programming collaborations might exist," Jess said.

Others thought the forum was helpful in identifying research needs in Nebraska and where opportunities might exist for funding new or existing research projects.

Summaries of the forum evaluation and afternoon break-out sessions were sent to forum participants. If you attended the forum and did not receive this mailing, please request a forum summary via email to sress1@unl.edu.

The April 9 forum was the first such event for faculty that the Water Center had held in more than two years.

WATER CENTER
103 Natural Resources Hall
University of Nebraska
P.O. Box 830844
Lincoln, NE 68583-0844

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