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Lake Classification Project Could Establish National Water Quality Ranking Procedure

University of Nebraska-Lincoln water scientists, engineers, remote sensing experts and geoscientists have teamed on expansive research to assess and classify Nebraska's lakes based on water quality. Their research could lead to a national lake water quality ranking procedure.

The team is doing everything from extensively sampling lakes and reservoirs statewide to devising water quality assessment methods and ways to monitor lakes with the

help of remote sensing technology, said John Holz, a water quality researcher in UNL's School of Natural Resources Sciences who is coordinating this effort.

"Our team hopes to build methods to assess and classify lakes and reservoirs by more than 20 water quality parameters so we can determine how much impact human activity has had on them and how we might better be able to maintain or improve their water quality," he said.

"The overenrichment of lakes and reservoirs is a long-standing problem, to the extent that nearly half of them are impaired by excess nutrients and associated plant growth," Holz said.

Water quality in lakes and reservoirs that have been minimally impacted by human activities, as defined by U.S. EPA standards, are used as references that will become the basis for developing nutrient criteria to help protect these bodies of water.

The UNL team's research will focus on defining these reference conditions; grouping lakes of similar water quality conditions together; developing ways to use remote sensing and GIS technologies into the lake classification schemes; and maximizing technology transfer to users of the information.

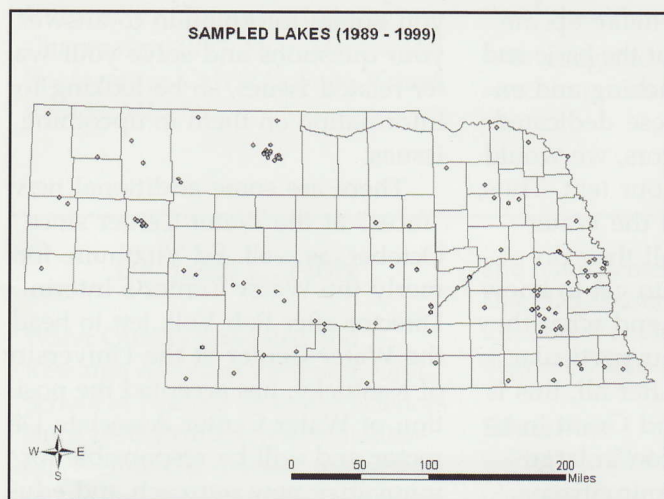
"This will result in a standardized procedure and general framework for approaching the problem, but classifying lakes in different regions may require some fine-tuning to accommodate unique regional challenges," Holz said.

Nebraska is representative of states nationally where agriculture heavily influences water quality, he said. That makes it an ideal location for the research, since most of the lake and reservoir classification efforts thus far have been in ecosystems not dominated by agriculture.

"The general classification framework we develop could be applied to all regions in the U.S., but some of the specific methods may be most useful in agricultural regions," he said.

The team started this project on a small scale about a year ago, using water samples and funding from the Nebraska Department of Environmental Quality. Holz and six other university researchers will develop their

(continued on page 12)



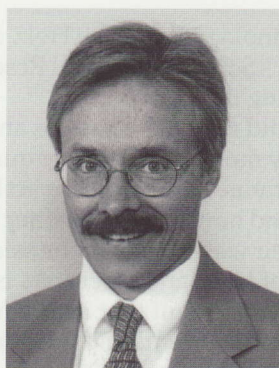
UNL researchers will sample lakes across Nebraska over the next few years, adding to a database of information that will be used to group lakes by water quality parameters. The research could lead to a standardized methodology nationally for classifying lakes.

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Profiling the Individuals and Efforts That Comprise the Water Center; Faculty Members Named to Administrative Posts

from the DIRECTOR



Kyle D. Hoagland

I hope you have noticed the new "face" of the *Water Current*, with its new logo, colors, gloss paper and features, including profiles of water science faculty members. These will continue as a regular feature in upcoming issues of the newsletter.

Our aim is to make the newsletter more attractive, user friendly and informative than ever. A new

web site is also being developed to enhance our linkages and ease the transfer of news and information to you. It will also improve our ability to recruit students and prospective faculty members by providing immediate, more comprehensive links to academic programs, research updates, extension and outreach programming, upcoming meetings and events and a wealth of other information about the water sciences as well as the Water Center and its programs.

I ask that you please pay special attention to the previously mentioned faculty profiles because these are the individuals and programs that together make-up the Water Center. Without the basic and applied research, teaching and extension efforts of these dedicated scientists and educators, we would simply have to fold our tent. Thus, it is a pivotal task of the Water Center to facilitate all they do. Please take the time to get to know them, what they do and what they have to offer for your particular water application. After all, this is Nebraska's only Land Grant institution and our mission in large measure is to serve our citizens.

We plan to highlight some of the water sciences graduate stu-

dents in future issues of the newsletter also, because as many of you know, it's the graduate students in the trenches who conduct much of the research that universities accomplish. They do some terrific work and we want to recognize them for that. A surprising number of undergraduate students also participate in basic and applied water research at NU, so they too will be included.

We also will introduce you to the Water Center's staff, a particularly dedicated and capable group of professionals who do great work, some of which goes relatively unnoticed. They can help you obtain information to answer your questions and solve your water-related issues, so be looking for information on them in upcoming issues.

There are some additional new "faces" at the Water Center since October, as well. Ed Vitzthum, formerly the Water Center's Interim Director after Bob Volk left to head the Water Center at the University of Kentucky, has accepted the position of Water Center Associate Director and will be responsible for innovative new outreach and educational programs.

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WATER CURRENT

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Meet the Faculty

Dr. David M. Admiraal

Hydraulic Engineer and Assistant Professor, UNL Department of Civil Engineering since 1999. Currently teaching Fluid Mechanics and Hydraulics courses and developing a water circulation model for Lake Ogallala. Primary research interests include physics of sediment transport, fluid mechanics instrumentation, environmental hydraulics, fluvial hydraulics and interactions between aquatic organisms and hydraulic processes.

Education:

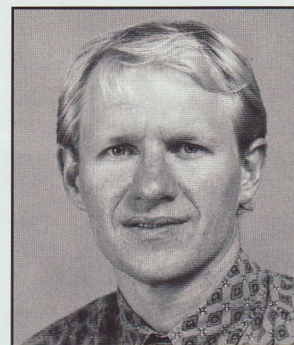
Ph.D. in Civil Engineering, University of Illinois at Urbana-Champaign, 1999; MS in Mechanical Engineering, University of Illinois at Urbana-Champaign, 1993; BS in Mechanical Engineering, Calvin College, Grand Rapids, MI 1991.

Samples of current research:

- A dissolved oxygen circulation model for Lake Ogallala.
- Development of a low cost data logger for recording velocity, depth and temperature in lakes and streams.
- Developing a dissolved oxygen budget for Lake Ogallala.

Other recent research:

- Investigated entrainment of sediment under unsteady flow conditions.
- Measured and analyzed bed shear stress distributions beneath a scale model of a barge tow.
- Analyzed the performance of Acoustic Doppler Current Profilers in inundated floodplains.
- Used a one dimensional unsteady flow model to determine the role of floodplains in flood stage reduction.
- Investigated use of the Coanda effect to prevent scour beneath outlet jets.



David M. Admiraal

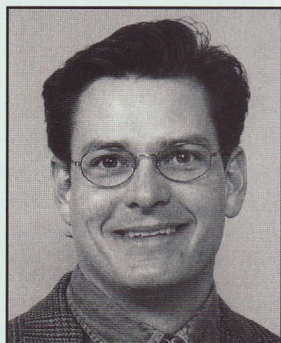
- Developed a model for predicting heat exchanger performance.
- Collected atmospheric data, wrote software to aid in tracking particle clouds and helped design testing equipment for low-level nuclear waste containers.

Journal Publications and Conference Proceedings:

Rodriguez, J.F., Admiraal, D.M. and Garcia, M.H. (2000) "Navigation-
(continued on page 7)

Dr. John C. Holz

Water Quality Specialist and Research Assistant Professor, UNL School of Natural Resource Sciences since 1998. Primary research interests include the role and interaction of nutrient limitation and herbivory in structuring freshwater plankton communities; surface water quality



John C. Holz

and management; development of lake classification methodology; restoration of environmentally degraded lakes.

Education:

- Ph.D. in Biological Sciences (Aquatic Ecology), University of Nebraska-Lincoln, 1998.
- M.S. in Forestry, Fisheries and Wildlife, University of Nebraska-Lincoln, 1994.
- B.S. in Natural Resources, University of Nebraska-Lincoln, 1991.

Samples of Current Research:

- Development and implementation of a comprehensive lake and reservoir strategy for Nebraska as a model for agriculturally dominated ecosystems.

- Development of a dissolved oxygen circulation model and oxygen budget for Lake Ogallala.

- Demonstration of the use of barley straw to control algae in Nebraska lakes.

- The role of the nitrogen-to-phosphorus ratio in controlling undesirable algal growth in high phosphorus lakes.

Other Recent Research:

- Demonstration and evaluation of aluminum sulfate as a restoration technique in a Nebraska sandpit lake.
- An experimental mesocosm study of alternate lake states and plankton community breakpoints along a phosphorus gradient.

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Quality-Assessed Groundwater Pesticide Data Available Online

by Steve Ress

A groundwater clearinghouse project at the University of Nebraska-Lincoln recently released more than 100,000 results for pesticide and nitrate samplings from water wells in every county in Nebraska.

The quality-assessed results are available online at the Nebraska Department of Natural Resources web site at <http://nrcnt3.dnr.state.ne.us/clearinghouse/index.asp>. The extensive database is a result of an ongoing, cooperative project between UNL's Water Sciences Laboratory and the Nebraska Departments of Agriculture (NDA) and Environmental Quality (NDEQ) to assess the statewide condition of groundwater pesticide and nitrate contamination.

The clearinghouse database currently contains nearly 78,000 analyses for 90 pesticides and pesticide breakdown compounds in more than 3,000 wells. Additionally, there are more than 23,000 nitrate analyses in nearly 11,000 wells.

The database enables legislators, regulators, planners and NRDs with environmental concerns to very quickly make assessments of groundwater quality, resolve controversy and propose solution," said Mary Spalding, UNL School of Natural Resource Sciences hydrochemist who coordinates the clearinghouse project.

The database contains 25 years of information from a variety of water wells, including domestic, irrigation, public supply and monitoring wells. About 56 percent of the pesticide data is from domestic wells, while more than half the nitrate results are from irrigation wells.

The database can be searched by county, NRD, well location, well registration number and other selection criteria. Results can be sorted and viewed on-screen,

downloaded or imported into other applications, such as a spreadsheet. It can be easily imported into Geographic Information Systems (GIS) applications.

"Having a central repository to compile and evaluate data collected by the NRDs, the Nebraska Department of Health and Human Services, NDEQ, the U.S. Geological Survey and NU helps facilitate timely assessments of groundwater nitrate and pesticide contamination," said Spalding.

What sets the database apart from others is that each groundwater sample received by the clearinghouse is scrupulously checked by Spalding and clearinghouse data manager Dottie Harrell to see that it meets an established set of parameters.

"'Quality assessed' sets this database apart from others and makes it unique," Spalding said. Quality assessment parameters applied to each sample

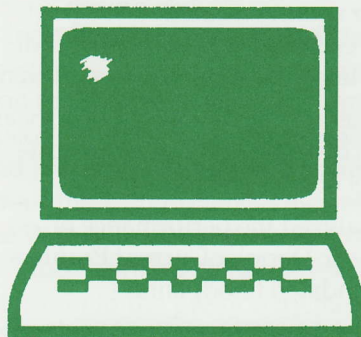
include the location of the sampled well, it's depth, how the sample was collected, stored and analyzed and other practices that were used when the sample was collected and analyzed.

"This strictly adhered to quality assessment ranking allows data covering a period of 25 years and from many different sources to be compared and imparts confidence in the use of the data," said Spalding.

The nitrate and pesticide data now available in the on-line database represents an investment of hundreds of thousands of dollars in laboratory costs alone.

"In the past, these data would have been relegated to a desk drawer once they served their initial purpose. The clearinghouse provides a large, quality-assessed database to interested parties for incorporation into local and regional assessments and applications," Spalding said.

The NDA and NDEQ fund this ongoing project.



Groundwater Guardians

On-hand to accept the UNL Water Center's recognition plaque as a Groundwater Guardian National Partner at last month's Groundwater Guardian conference in Nebraska City were (from left) Peter Gross of Mutual of Omaha's Wild Kingdom, UNL Associate Professor and Groundwater Foundation Consultant Bob Kuzelka, Water Center Associate Director Ed Vitzthum and Groundwater Guardian Program Director Rachael Herpel. National Partners help support the Groundwater Guardian's community-based educational programs. (photo: Shirley Niemeyer)

Pesticides Discovered in Ogallala Aquifer According to Recent USGS Study

Pesticides are getting into groundwater in the Ogallala Aquifer faster than authorities expected, according to the U.S. Geological Survey (USGS).

"The aquifer is more susceptible than we ever thought it was," said Bill Andrews, chief of studies for the USGS office in Oklahoma City, OK.

Andrews said experts had thought it could take hundreds or even thousands of years for contamination to seep into the aquifer.

A survey of groundwater samples taken in cooperation with the Oklahoma Water Resources Board found traces of pesticides that have been in use for only the last 30 years.

The survey looked at water samples from wells at 12 sites in the Oklahoma panhandle. Samples showed a median nitrate concentration of 3.5 milligrams per liter of water.

For comparison, results of 167 samples taken between 1940 and 1992 revealed a median nitrate concentration of 2.3 milligrams per liter.

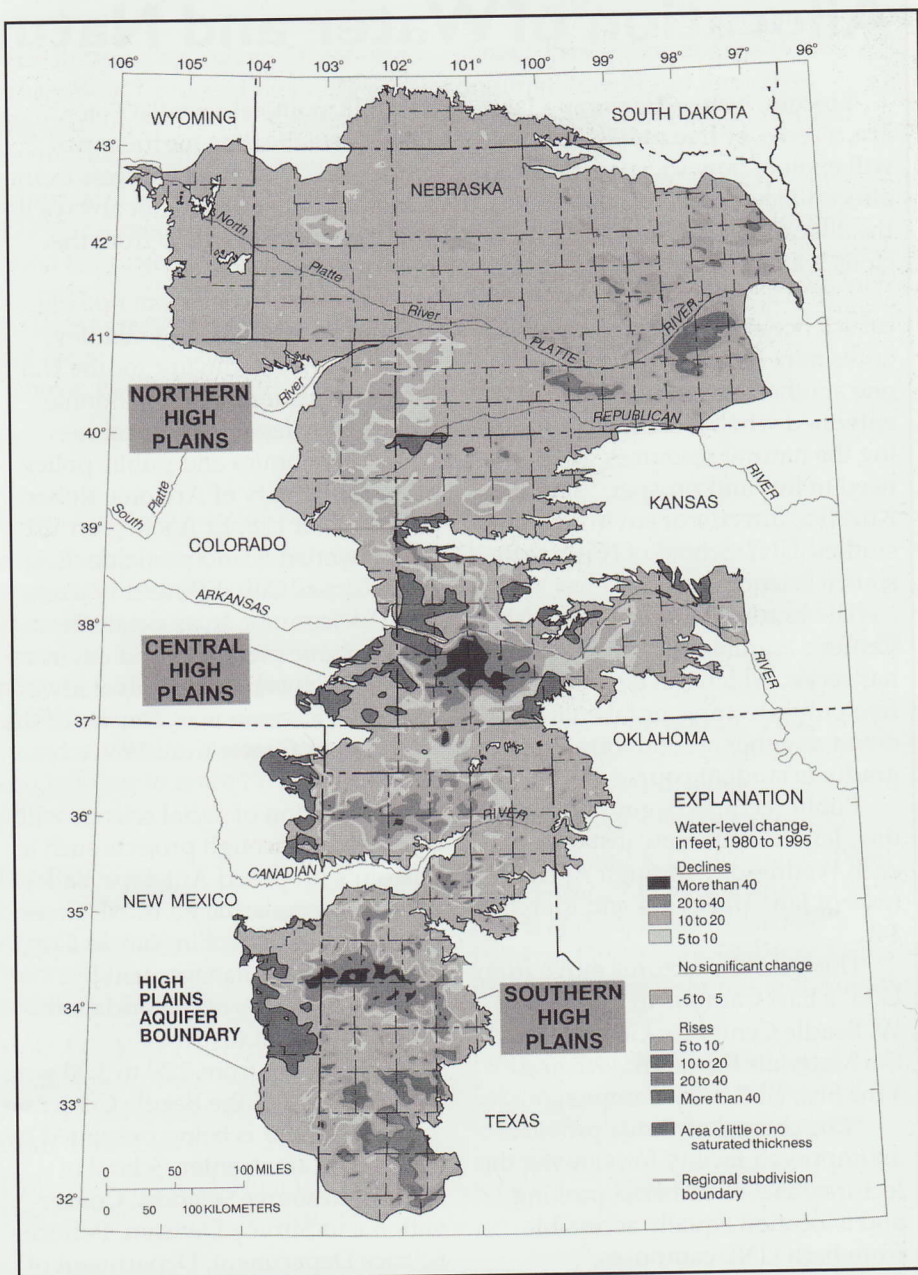
Pesticide traces found included atrazine, simonize and metalachlor, Andrews said.

The draft study also shows that in two of the wells sampled, nitrate concentrations were higher than what is allowed in drinking water (higher than the U.S. Environmental Protection Agency's recommended 10 milligrams per liter) and one well tested just below that level.

Nitrogen in two of the samples could be traced to animal wastes.

Andrews said the new study is based on only a few samples and "Doesn't necessarily mean the whole aquifer is becoming more contaminated."

The Ogallala is a groundwater formation that cuts through much of



The Ogallala Aquifer supplies groundwater in South Dakota, Nebraska, Wyoming, Kansas, Colorado, Oklahoma, Texas and New Mexico. New studies indicate that pesticide contamination of the formation may be a growing concern (USGS illustration).

the midwest, including Nebraska, Colorado, Kansas, Oklahoma, Texas and New Mexico.

(Taken in part from U.S. Water News, November, 2000).

Spring Semester Water Resources Seminar: Social Sciences Affect on Allocation of Water and Natural Resources

Lincoln, Neb — Beginning January, a series of free public lectures will explore how social sciences can affect policy decisions relating to the allocation of Nebraska's precious water and natural resources.

"As academic disciplines, political science and natural resource sciences may seem far removed from one another, but are actually very entwined when it comes to allocating the natural resources we all need to live and prosper," said Bob Kuzelka, director of environmental studies, UNL School of Natural Resource Sciences.

The lectures comprise the Water Center's annual spring water seminar series, which can be attended as free public lectures or taken for credit as either an undergraduate or graduate student course.

Public lectures begin Wednesday, Jan. 17, with new installments each Wednesday through April 25 (except Jan. 31, Feb. 14 and March 14).

This year the lectures move from UNL's East Campus to the George W. Beadle Center for Genetics and Bio Materials Research, 19th and Vine Sts., UNL City Campus.

"The change of venue provides an improved facility for viewing the lectures, as well as better parking and a location equally accessible from both UNL campuses," Kuzelka said.

"The sessions as a whole explore how social sciences affect policy relating to allocation of water resources specifically and natural resources in general. This will be accomplished by focusing on three social science academic research areas: assessment, theory and application," he said.

UNK political scientist Peter Longo sets the tone for the series with a Jan. 17 keynote address examining "Why people do not always listen to scientists: A view from the political arena."

Notable speakers from outside Nebraska include John J. Audley, trade policy coordinator for the U.S. EPA in Washington, D.C.; Bonnie Colby, a professor of natural resource economics and public policy at the University of Arizona; Robert Fenemore of U.S. EPA's Region VII water, wetlands and pesticide division, Kansas City, KS.; and Warren "Bud" Viessman, Jr. associate dean for academic programs and environmental engineer at the University of Florida. Viessman was director of the UNL Water Center from 1968 to 1975.

Application of social science will be explored through projects such as Lincoln's proposed Antelope Valley project, the constructed Brush Creek flood control project in Kansas City, MO. and water management by Nebraska's NRDs and Florida's water management districts.

Lectures are from 2:30 to 3:20 p.m. in Room E103 of the Beadle Center.

The seminar is being presented by the UNL Water Center, School of Natural Resource Sciences, Conservation and Survey Division, Political Science Department, Department of Sociology, Department of Agricultural Economics, Public Policy Center, Institute of Agriculture and Natural Resources and UNL. Partial funding is provided by the Williams Trust.

For more information on the seminar or parking arrangements at the Beadle Center, phone (402)472-3305 or e-mail sress1@unl.edu.

Weekly Schedule:

Jan. 10: NO PUBLIC LECTURE (seminar introduction and requirements for registered students only).

Jan. 17: Keynote address: "Why People Do Not Always Listen to Scientists: A View from the Political Arena," Peter Longo, Professor of Political Science, UNK.

Jan. 24: "Reflections on the Middle Platte Community," Robert Fenemore, Water, Wetland and Pesticide Division, U.S. EPA Region VII, Kansas City, KS.

Jan. 31: NO PUBLIC LECTURE (exercise for registered students only).

Feb. 7: "Values, Priorities and Agenda-Setting: Surveying Stakeholders and the Construction of Political Possibilities, Lyn Kathlene, Associate Professor of Political Science, UNL.

Feb. 14: NO PUBLIC LECTURE (exercise for registered students only).

Feb. 21: "Resolving Environmental Disputes Through Mediation: A Case Study," Jamee K. Wolfe, Ph.D. candidate in Sociology, UNL.

Feb. 28: Williams Lecture (title to be announced), John J. Audley, Trade Policy Coordinator, U.S. EPA, Washington, D.C. (invited).

Mar. 7: "The Human Side of Water Conservation," Gary D. Lynne, Professor of Natural Resource and Environmental Economics, UNL.

(continued on page 10)

Meet the Faculty

Dr. David M. Admiraal (continued from page 3)

induced bed shear stresses," *ASCE Journal of Hydraulic Engineering* (accepted for publication, subject to revisions).

Admiraal, D.M., and Garcia, M.H. (2000) "Laboratory measurement of suspended sediment concentration using an acoustic concentration profiler (ACP)," *Experiments in Fluids*, 28(2), pp. 116-127.

Admiraal, D.M., Garcia, M.H., and Rodriquez, J.F. (2000) "Entrainment response of sediment to time-varying flows," *Water Resources Research* 36(1), pp. 335-348.

Rodriquez, F.J., Garcia, M.H., Admiraal, D.M. and Lopez, F. (2000) "Statistical analysis of unsteady bed shear stresses: Implications for sediment resuspension," Proceedings 14th Engineering Mechanics Conference, Austin, TX.

Admiraal, D.M. and Garcia, M.H. (1999) "Entrainment rate predictions for a sand bed subjected to steady and unsteady flows." Proceedings of the IAHR Symposium on River, Coastal and Estuarine Morphodynamics, Genova, Italy.

Admiraal, D.M. and Garcia, M.H. (1999) "Application of existing sediment entrainment relations to unsteady flows." Proceedings of the 1999 International Water Resources Engineering Conference, ASCE, Seattle, WA.

Garcia, M.H., Rodriquez, J. and Admiraal, D.M. (1999) "Effects of navigation on sedimentation." Proceedings of the 28th Congress of the International Association for Hydraulic Research, Graz, Austria.

www.civil.unl.edu

Dr. John C. Holz (continued from page 3)

—Phytoplankton community response to reservoir aging.

Current Extension and Outreach Programming:

—UNL/NDEQ/NGPC Lake Water Quality Extension Program. The source of information for lake water quality issues for private lake property owners and others in Nebraska. This program has youth and adult education components, as well as ongoing research implications. Also part of the program is the *Community Lake Enhancement Restoration (CLEAR) Program*. This program consists of a four member team of lake resource experts from UNL's Lake Water Quality Extension Program, NDEQ, and NGPC. The program's purpose is to provide technical assistance to Nebraska communities for high-use lake

improvement and restoration projects (e.g., city park lakes). The CLEAR program also assists the community in obtaining funding for these lake projects. CLEAR would also be responsible for assisting communities develop sound restoration/education projects and helping to grant funds to eligible projects.

Publications:

Holz, J.C., 2000, *Controlling Pond Algae with Barley Straw*, University of Nebraska Cooperative Extension NebFact NF00-429.

Holz, J.C., K.D. Hoagland and A. Joern, 2000, *Aquatic Food Web Interactions: Microcosms as Lake Models*, Proc. 21st. Conf. Biol. Lab. Educ, 21:305-323.

Holz, J.C. and K.D. Hoagland, 1999, *Effects of Phosphorus Reduction on*

Water Quality: Comparison of Alum-Treated and Untreated Portions of a Hypereutrophic Lake, Journal of Lake and Reservoir Management, 15:70-82.

Holz, J.C., K.D. Hoagland, R.L. Spawn, A. Popp and J.L. Anderson, 1997, *Phytoplankton Community Response to Reservoir Aging*, Hydrobiologia 346:183-192.

Holz, J.C. and K.D. Hoagland, 1996, *Experimental Microcosm Study of the Effects of Phosphorus Reduction on Plankton Community Structure*, Canadian Journal of Fisheries and Aquatic Sciences 53:1754-1764.

Holz, J.C., K.D. Hoagland, et al, 1996, *LakeScapes: Environmentally-sound lake management*. Outreach pamphlet sponsored by U.S. EPA Region VII, NDEQ and UNL Water Center.

Nominations Solicited for 2001 Nebraska Water Conference

Nominations are being sought for the Nebraska Water Conference Council's 2001 Pioneer and Progress Awards that will be presented at the NWCC's March water conference. NWCC annually presents the Pioneer Award to an individual and the Progress Award to a group or organization who have made outstanding achievements in the water resources arenas. Nominations for either or both awards should go to Bob Kuzelka at rkuzelka1@unl.edu or by phoning (402)472-7527. Nominations should be submitted at your very earliest convenience. This year's NWCC conference will be on March 12, 2001 at Grand Island's Interstate 80 Holiday Inn. Morning topics include "Groundwater quality monitoring objectives and purpose" by Ed Harvey of UNL; "Siting considerations for monitoring wells" by Dave Gosselin of UNL; and "Sampling, handling and analysis considerations" by Ray Ward, Ward Laboratories, Kearney. In the afternoon, Jim Cannea, North Plate Natural Resources District, Gering presents "Dedicated monitoring well network." Conference details and registration information will be sent to Water Current subscribers in January.



Water News Briefs

Congratulations To Our Winners

Congratulations to the winners in our Husker Harvest Days drawings in September.

Winning University of Nebraska sweatshirts were: **Joseph Abbenhaus, Bloomfield; Judi Hughes, Osceola; and Ann Winans, Elkhorn.**

Winning Cross-brand pens were: **Jan Benad, Wilsonville; Martha Spotanski, Broken Bow; and Warren Larick, Phillips.**

Thanks to all those who visited the Water Center display in the NU Institute of Agriculture and Natural Resources Building at this year's Husker Harvest Days in Grand Island. See you there again in September.

Avoid Fall Irrigation

NU irrigation experts recommend not irrigating this fall, despite dry fields. Irrigation specialists Bill Kranz of Norfolk and Dean Yonts of Scottsbluff agree that the potential for off-season precipitation looks fair. If Nebraska receives average precipitation this fall and winter, additional water from fall irrigation could result in deep percolation of water and push nutrients below the root zone.

And if the off-season moisture doesn't come, Kranz said, usually there will be enough time to refill the profile close to capacity in the spring, using center pivot irrigation systems.

NU state climatologist Al Dutcher said predictions show from now through spring, there are equal chances of receiving above normal, normal or below normal precipitation and temperatures.

Last fall, Yonts said most irrigated fields had an estimated 3-4-inch depletion of the soil profile. Refilling that

profile should be possible in the spring.

However, playing a role in whether to irrigate this fall and winter would include those trying to establish a fall cover crop, soil type and type of irrigation system used, the experts advised.

TGF National Award Recipients

The Lincoln-based Groundwater Foundation (TGF) has presented its Vern Haverstick Groundwater Hero Award to Frank Coss of Puerto Rico. The annual award was created to showcase groundwater protection activities by the unsung, yet heroic efforts of community residents.

Coss is the founder and president of the Steering Committee of Environmental Quality of Puerto Rico, known in Spanish as COTICAM. The organization is composed of community volunteers, industry representatives, civic groups, religious organizations, schools, colleges and government agencies.

TGF's annual E. Benjamin Nelson Government Service Award, that recognizes government officials who have significantly advanced environmental and groundwater stewardship, went to California State Senator David Kelley.

During his term, Kelley provided critical leadership and support for the largest agriculture to urban water transfers. This transfer will move 200,000 acre feet of conserved water from the Imperial Irrigation District to the San Diego County Water Authority.

The Edith Stevens Groundwater Educator Award was presented to Melissa Henke of Wyoming. The award recognizes individuals who understand the importance of groundwater and motivate others to protect it. Among other activities she is involved in, Henke planned and organized the first Wyoming Children's Water Festival for local fourth and fifth graders.

All three awards were presented last month at TGF's annual conference in Nebraska City.

Our New Look

We hope you like The *Water Current's* new look. In either case, we want to hear from you.

This is the second issue of the *Water Current's* new and updated look and we have received both compliments and suggestions from many of you. We would like to hear more.

If you have suggestions on how to further improve the appearance or content of the newsletter, give us a call at (402)472-3305 or e-mail sress1@unl.edu.

Watch Us On the Web

Just as the *Water Current* has undergone some needed revamping, so too is our internet web site getting an overhaul.

One of the first things to go was our old 49-character web address of <http://www.ianr.unl.edu/ianr/waterctr/wchome.html>. Though that address will still get you to the Water Center's web site, you can now access us using the simpler and more straightforward address of <http://watercenter.unl.edu>.

In the coming weeks, webmaster Staci Vacek and the Water Center's faculty and staff will join in a total overhaul of the site's general lay-out, appearance, links and content. When the overhaul is finished the site will be organized around the following focus and content areas: 1. about the Water Center, 2. *Water Current* newsletter, 3. academic programs (for both undergraduate and graduate students), 4. research, 5. extension and outreach programming, 6. events, 7. faculty and staff and 8. information library.

We are excited about the new changes to our online appearance and content. The prospect of change promises to be both dynamic and ongoing over the next several months. As with our changes to the *Water Current*, we invite your input to this process. Let us know what you think.

DECEMBER

8: School of Natural Resource Sciences seminar: Remote Sensing/GIS Papers, Don Rundquist and Jim Merchant, 2-3 Natural Resources Hall, UNL East Campus, 3-4 p.m.

13-16: Ground Water: A Transboundary Strategic and Geopolitical Resource, Las Vegas, NV. Contact Bob Masters, National Ground Water Association at (800)551-7379 ext. 527 or e-mail rmaste@ngwa.org.

15-19: American Geophysical Union fall meeting, San Francisco, CA. For information, contact Harvey Leifert, American Geophysical Union, 2000 Florida Ave., NW, Washington DC 20009, phone (800)966-2481 or e-mail hleifert@agu.org.

JANUARY, 2001

10-12: Environmental Factors in Medically Unexplained Physical Symptoms and Related Syndromes, Piscataway, NJ. Symposium convened by the Environmental and Occupational Health Sciences Institute at Rutgers University. Contact Candace Botnick, EOHSI Public Affairs, EOHSI, 170 Frelinghuysen Rd, Piscataway, NJ 08854, phone (732)445-0206 or e-mail botnick@eohsi.rutgers.

14-19: American Meteorological Society annual meeting, Albuquerque, NM. Contact Candace Botnick, EOHSI Public Affairs, American Meteorological Society, 45 Beacon St., Boston, MA 02108-3693, phone (617)227-2425 or e-mail amsinfo@ametsoc.org.

FEBRUARY, 2001

5-9: International Erosion Control Association, Las Vegas, NV. Contact Wendy Raeder, NSF International, 789 N. Dixboro Rd, Ann Arbor, MI 48105, phone (970)879-3010 or e-mail raeder@nsf.org.

17-19: Global Change and Sustainable Development in Southeast Asia, Chiang Mai, Thailand. Contact Louis Lebel, SARCS Science Coordinator, Faculty of Social Sciences, Chiang Mai University, Chiang Mai, Thailand 50000, phone (66)53-263-215 or e-mail llebel@cmnet.co.th.

27-28: Eleventh Platte River Basin Ecosystem Symposium, Holiday Inn, Kearney. To present, to register, or for information, contact Gary Lingle at (308)236-1235 or e-mail glingle@unl.edu. Also on the internet at www.ianr.unl.edu/ianr/pwp.

MARCH, 2001

12-14: Riparian Habitat and Floodplains Conference, Sacramento, CA. Contact Lyann Comrack, California Department of Fish and Game at (858)467-4208 or e-mail lcomrack@dfg.ca.gov.

19-22: West Coast Conference on Contaminated Soils, Sediments and Water, San Diego, CA. Contact Heather McCreary, AEHS, 150 Fearing St., Ste. 20, Amherst, MA 01002-1944, phone (413)549-5561 or e-mail heather@aehs.com.

21-23: International Scientific Program on Bases for the Evaluation of Chemical Risks, Bordeaux, France. Contact Catherine

Bennetau, Enita de Bordeaux, 1 Cours Du General De Gaulle, B.P. 201, 33 175 Gradignan, France, phone (413)549-5561 or e-mail c-bennetau@unitab.fr.

28-April 1: Making Environmental History Relevant in the 21st Century, Durham, NC. Contact Dale Goble, University of Idaho College of Law at (413)549-5561 or e-mail gobled@uidaho.edu.

APRIL, 2001

18-20: Fourth National Mitigation Banking Conference, Radisson Bahia Mar, Ft. Lauderdale, FL. How to conference on mitigation and conservation banking. For information, contact the Terrene Institute at www.terrene.org or phone (800)726-5253.

22-25: Small Drinking Water and Wastewater Systems: Treatment, Management and Financing, Washington, D.C. Contact Cherrie Bacon, NSF International, 789 N. Bixboro Rd, Ann Arbor, MI 48105, phone (734)827-6865 or e-mail bacon@nsf.org.

Calendar

MAY, 2001

15-17: Second National Nonpoint Source Pollution Information and Education Conference, Chicago Botanic Gardens, Clencoe, IL. For information, contact conference coordinator Bob Kirschner at (847)835-6837, FA (847)835-1635 or e-mail bkirschn@chicagobotanic.org.

20-23: National Watershed Conference: Small Watershed Programs - Past, Present and Future, Richmond, VA. Contact John W. Peterson at (703)455-6886 or e-mail jwpeterson@erols.com.

JUNE, 2001

4-7: In Situ and On-Site Bioremediation, San Diego, CA. Contact Andrea Leeson at (614)424-5942 or e-mail leeson@battelle.org.

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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From the Director (continued from page 2)

Mike Jess also recently accepted the position of Water Center Assistant Director, where he will continue his leadership role in organizing and conducting the annual water conference, water seminars and summer water tour. Many of you already know Mike from past conferences and tours, as well as from his many years as Director of the former Nebraska Department of Water Resources.

The mission and goals of the Water Center clearly require a team effort and we are very fortunate and delighted that Ed and Mike are adding their expertise and experience to our team.

Major projects on the horizon include a new fund-raising program, formation of new external and internal advisory committees and new outreach programs and workshops for the NRDs and

other water-related natural resource agencies.

Needless to say, our plate is full and we welcome your suggestions and comments as we explore new paths.

Other items of note on my desk as this issue went to press included the following:

— The search for a new senior-level water scientist in NU's Department of Geosciences. A review of applications for a water geochemist or surface water hydrologist will begin in February, so hopefully we will have a new addition to the faculty to profile in an upcoming issue of the *Water Current*.

— Dr. Sherilyn Fritz, a paleolimnologist in the Department of Geosciences, recently published a paper in the prestigious inter-

national science journal *Nature* (Nov. 9) on lake evolution in Alaska. Her findings challenge the current dogma that lakes generally become more alkaline and productive with age.

— Mike Jess and Bob Kuzelka have finalized the list of speakers for the spring semester water seminar series. Mike is working on finalizing the agenda for our one-day water conference, that will be held in Grand Island coinciding with The Children's Groundwater Festival. You should be receiving a conference registration mailing sometime late next month.

Finally, on behalf of the Water Center faculty and staff, I want to wish each of you a very happy holiday season, as well as a joyous and healthy 2001.

Spring Semester Water Resources Seminar: Social Sciences Affect on Allocation of Water and Natural Resources

(continued from page 6)

Mar. 14: NO PUBLIC LECTURE (UNL spring break).

Mar. 21: "The Brush Creek Flood Control Project in Kansas City, MO," Tom Kimes, Brush Creek Project Manager, Kansas City (MO) Public Works Dept.

Mar. 28: "Lincoln's Antelope Valley Project," Kent Seacrest, Attorney and Planner for the Antelope Valley Project, Lincoln.

Apr. 4: Kremer Lecture: "Water Management in the State of Florida," Warren "Bud" Viessman Jr., Associate Dean for Academic Programs and Professor of Environmental Engineering Sciences, University of Florida.

Apr. 11: "Water Management by Nebraska's Natural Resources Districts," Kuzelka and Rachael Herpel, The Groundwater Foundation, Lincoln.

Apr. 18: Williams Lecture: "Water Marketing: The Good, the Bad and the Ugly," Bonnie Colby, Professor of Natural Resource Economics and Public Policy, University of Arizona.

Apr. 25: Concluding Panel: Gene Glock, former staff member of former U.S. Senator Bob Kerrey's Office; Sandy Scofield, Director, Center for Science, Mathematics and Computer Education, UNL; J. Michael Jess, assistant director, UNL Water

Center; and Alan Tomkins, Director, Public Policy Center and Professor of Psychology and Law, UNL.

CONTACTS:

Robert D. Kuzelka, director of environmental studies, UNL School of Natural Resource Sciences, (402)472-3305

Steven W. Ress, communications specialist, UNL Water Center, (402)472-3305

Arsenic Occurrence in Groundwater Illustrated In New USGS Map

A map showing where and to what extent arsenic occurs in groundwater across the nation is now available from the U.S. Geological Survey (USGS).

The highest concentrations of the element were found in samples analyzed in the west, as well as parts of the midwest and northeast.

The map can be accessed on-line at co.water.usgs.gov/trace/arsenic.

Arsenic, a toxic element, was included in amendments to the Safe Drinking Water Act by the Congress in 1996 because of its known prevalence and possible adverse health effects, according to USGS Chief Hydrologist Robert Hirsch. The new USGS map provides a snapshot of where groundwater resources are or could be at risk from arsenic contamination.

Arsenic is a naturally occurring element. Its presence in groundwater is largely the result of minerals dissolving naturally over time, as rocks and soils weather and age.

Several cancers have been linked to arsenic present in drinking water concentrations higher than that observed in U.S. drinking water supplies. High levels of the element have also been linked to vascular system

affects and have been associated with development of diabetes.

Concentrations of arsenic in the USGS study were almost always lower than the current U.S. Environmental Protection Agency (EPA) drinking-water standard of 50 micrograms per liter. But in looking at where arsenic concentrations might exceed possible new standards, being looked at by the EPA, the USGS chose the international guideline for arsenic in drinking water of 10 micrograms per liter, as set by the World Health Organization (WHO). By that standard, about 10 percent of the samples in the USGS study exceed the WHO guideline.

The countywide findings on the map were calculated from about 18,850 samples of potable groundwater, but do not necessarily represent testing of every well or drinking water supply system within a given county.

Information about public water supplies in your community can be had from the EPA at www.epa.gov/safewater/dwinfo.htm.

Information about the USGS technical report, *A retro-spective analysis on the Occurrence of Arsenic in Groundwater Resources of the United States*

and Limitations in Drinking Water Supply Characterizations

(USGS Water Resources Investigations Report 99-4279) is available at the previously mentioned USGS on-line map site, or by calling 888-ASK-USGS. The report summarizes more than two decades of data collected in various studies done in cooperation with state, local and federal agencies.

Private well users who are concerned about the possibility of arsenic in their water should have their well tested. Public health departments and local Natural Resources District offices can help in locating laboratories to have the water tested.

For more information on arsenic, visit these websites:

U.S. Geological Survey (USGS):
www.usgs.gov

U.S. Environmental Protection Agency (EPA):

www.epa.gov
Environmental Health Information Service: ehis.niehs.nih.gov/topic/arsenic.html

(Taken in part from *The Groundwater Foundation's The Aquifer*, vol. 15, no. 2, September 2000).



Season's Greetings!

from the Water Center



Lake Classification Project Could Establish National Water Quality Ranking Procedure

(continued from page 1)

methods over the next several years with more than \$1.2 million in state and federal grants. Much of the funding was predicated on the U.S. EPA's desire for a standardized set of processes for assessing lake and reservoir water quality nationally.

The NDEQ's samples from 159 lakes and reservoirs were tested for temperature, dissolved oxygen, chlorophyll, turbidity (cloudiness of the water), nutrients, pesticides and other information.

The university team will add sampling data from 65 more lakes and reservoirs over the next two years to bring the total to more than 220 statewide.

To determine how a lake or reservoir's water quality has changed since the European settlers and commercial farming developments and to date individual bodies of water, geoscientist Sherilyn Fritz will bore into the bottoms of lakes and reservoirs to collect soil and sediment core samples. The presence and numbers of the fossilized remains of microscopic diatoms will help determine historical water quality. Soils in the samples will help date the lake.

As data is collected for each body of water, hydraulic engineer Istvan Bogardi will rank them based on water quality and recommend which could be candidates for restoration. Jim Merchant, a geographic information systems researcher, will use geographic information systems technologies to identify factors such as land use and soil types to help define the environmental characteristics responsible for different lake regions.

An important element of the project is developing methods for continued remote monitoring of the lakes and reservoirs.

"The ultimate goal is to be able to ascertain the biological condition of these bodies of water by surveying them from an aircraft or satellite," Holz said.

Donald Rundquist and Anatoly Gitelson, remote sensing researchers in the university's Center for Advanced Land Management and Information, are working on a way to measure water quality from afar.



University of Nebraska wetlands students study a Nebraska Sandhills lake. UNL researchers are embarking on a statewide lake classification program with the U.S. Environmental Protection Agency and Nebraska Department of Environmental Quality that could have national implications (photo: Kyle Hoagland).

They're using an instrument called a spectroradiometer, which detects different kinds of algae and their concentrations based on reflected light patterns. Algae information can reveal a lot about overall lake water quality, Holz said.

Others contributing to the study are Kyle Hoagland, a lake ecologist with NU's Water Center and more than a half dozen graduate students.

"We hope the methods we are developing for classifying, dating and remotely sensing the conditions of these bodies of water will have national implications and usage," Holz said.

EPA and NDEQ are helping to fund this research, conducted through NU's Institute of Agriculture and Natural Resources.

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