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Winter 2009

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## MEET THE FACULTY

## Chad E. Brassil, Ph.D.

Chad Brassil is an assistant professor in the University of Nebraska–Lincoln School of Biological Sciences, where he uses mathematical tools to address ecological questions from a theoretical perspective as well as a statistical perspective. His work has crossed systems from plants to predators, from antler flies to Pacific Salmon.



## Education:

Ph.D., Zoology (Ecology), University of Toronto, Toronto, Ontario, 2005

Ph.D., Biology, University of Maryland, College Park, Md, 2000

B.A., Biology and Chemistry (Summa Cum Laude), University of St. Thomas, St. Paul, Minn., 1997

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## Water Current

PART OF THE SCHOOL OF NATURAL RESOURCES

## When Water Meets Money Topic of Sixth Annual Conference, April 29,30

By Steve Ress

“Blue Gold: When Water Meets Money” is the theme of this year’s sixth annual University of Nebraska–Lincoln Water Law, Policy and Science conference. The conference is April 29 and 30 at Lincoln’s Embassy Suites hotel.

Conference participants can register for general sessions, or select a “law track,” session which will convene on the second day of the conference.

“We are still finalizing a few of our topics and speakers, on top of an already stellar list of both local and national experts from water science, economics and law,” said UNL Water



**WATER LAW,  
POLICY AND  
SCIENCE  
CONFERENCE**

Center director Kyle Hoagland.

The conference pairs the latest topical science with related economic issues. For example, attendees will learn about the science of ecosystem services, followed by the economic value of those services.

Other topics are the basics of how water is valued, potential costs and economic impacts

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## Database Connects Public to University of Nebraska Research

By Steve Ress

There’s a wealth of water-based research available from the University of Nebraska. Finding and making sense of it just got a whole lot easier.

An easily accessible and searchable database sponsored by the University of Nebraska–Lincoln’s Water Center and NU’s Rural Initiative makes it easy for the public, policymakers and others to find-out exactly what sorts of water-related research and programming are being done across the state, as well as where it’s being done.

“The site is intended as a tool for legislators, government officials and the public alike to keep track of the water-related research and programming NU faculty are conducting,” said Rachael Herpel, outreach and education specialist at the UNL Water Center.

The database can be found at [watercenter.unl.edu/researchdb/researchdb.asp](http://watercenter.unl.edu/researchdb/researchdb.asp). The site address may be long, but accessing the information it contains is easy, since the database can be searched by legislative district, natural resources district (NRD), county, congressional district or weed management area.

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#### Director

Kyle D. Hoagland, Ph.D.

#### Associate Director

J. Michael Jess, P.E.

#### Director of Laboratory Services,

Water Sciences Laboratory

Daniel D. Snow, Ph.D.

#### Editor

Steven W. Ress

#### Designer

Renee J. Lanik, UNL CIT

#### Layout

Anne M. Moore, UNL CIT

#### Water Center

University of Nebraska–Lincoln

506 Hardin Hall

Lincoln, NE 68583-0979

Phone: (402) 472-3305

Fax: (402) 472-3610

E-mail: [sress1@unl.edu](mailto:sress1@unl.edu)

<http://watercenter.unl.edu>



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## From the Director

**Dr. Kyle Hoagland**

# Where Were You on the First Earth Day?

For those of you old enough to chuckle at this photo from the early 1970s (or *not* to do a double take, instead thinking, “Yeah, I’ve got one of those, too”), the following reminisces about the first Earth Day on April 22, 1970 may be like mentally flipping through an old yearbook. For those who are older, or younger, these reflections will hopefully provide some context for where the American conscience now stands with respect to our environment and perhaps where we need to go. Others of you may well have been off in Vietnam, thanklessly serving our country in an unpopular war, during a time of great social unrest and confusion in the minds of many about how to make a difference in a world increasingly viewed as crumbling - morally, culturally, and environmentally.

To set the scene, in 1969-1970 America was deeply engaged (in the word of the day, “quagmired”) in Vietnam. College campuses across the country were home to many anti-war protests such as peace marches, sit-ins, and teach-ins. The Woodstock (Music) Festival was held in upstate New York, four student war protestors were shot and killed by Ohio National Guardsmen at Kent State University, Jimi Hendrix died of an apparent drug overdose, the Beatles released their last album, and Apollo 13 was already the third manned lunar-landing mission.

At about the same time, the Cuyahoga River in northeast Ohio caught fire in June 1969 as a result of massive water pollution, an event that was believed to have ultimately spurred many to become more actively environmentally aware. Rising environmental concerns were also sparked by popular literature, such as Rachel Carson’s *Silent Spring*, which published in 1962, as well as a

relatively minor (and seldom remembered) event that took place in 1969 along the coast of California, near Santa Barbara: an oil spill.



That spill was directly observed by then-Senator Gaylord Nelson (D-Wisc.), who became outraged and returned to Washington D.C., where he later was able to pass a bill that established Earth Day. He selected Denis Hayes, a Harvard graduate student, to spearhead the event.

Hayes chose to model Earth Day after the Vietnam War protests (which themselves were modeled after the successful Civil Rights movement!), which were already having a major political impact in the U.S. There has always been lots of speculation regarding the date selected for the first Earth Day, 22 April, which incidentally(?) coincided with the birthdates of the infamous environmentalist John Muir, J. Sterling Morton (founder of Arbor Day), and Vladimir Lenin (the latter was vehemently espoused by the Daughters of the American Revolution as evidence that the event was a “Communist trick”!). The first Earth Day was by all accounts a huge success, with an estimated 20 million participants nationwide. This grassroots protest over the abuse that was allowed to be heaped onto the environment, resulted in demonstrations on college campuses across the US, as well as huge rallies in the nation’s capitol where Pete Seeger was a keynote speaker, and in New York City where Paul Newman and Ali McGraw attended.

But what was the real success of that first Earth Day, and how might it help form new

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## MEET THE FACULTY

## Zhenghong Tang, Ph.D.

Zhenghong Tan is an assistant professor at the University of Nebraska–Lincoln, recently associating with the university through the Community and Regional Planning program, College of Architecture. He also is a Faculty Fellow in the UNL School of Natural Resources Center for Advanced Land Management Information Technologies (CALMIT).

## Education:

Ph.D, Urban and Regional Science, Department of Landscape Architecture and Urban Planning, Texas A&M University, 2007

M.S. Soil Science, Department of Resources and Environment, Huazhong Agricultural University, China, 2000

B.S. Land Management, Department of Resources and Environment, Hunan Normal University, China, 1997

## Examples of Current Research Programs:

Linking local jurisdictions' responses with climate change. The research focuses on 1.) To what extent did local jurisdictions indicate awareness of climate change in their local land use plans? 2.) How well did local jurisdictions analyze the impacts of climate change in local land use plans? 3.) What actions have local jurisdictions taken to mitigate and adapt climate change, and which strategies received the greatest and least attention? 4.) Do the traditional contextual variables affect climate change planning capacity? 5.) How can local jurisdictions be improved to address climate change in their plans?



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## Chad E. Brassil, Ph.D.

## Examples of Current Research:

Part of his current work uses aquatic ecosystems to examine questions related to environmental fluctuations. The aquatic ecosystems studied are duckweed communities. Duckweed are a family of plants which grow as small green circles that range in size from a pencil tip to the size of a pencil eraser. Various duckweed species are found on the surface of ponds and wetlands around Nebraska, along with a suite of interacting species including duckweed flies and duckweed weevils. Brassil is testing some previous mathematical predictions about how those duckweed communities will respond to increases in environmental fluctuations over time. The results should provide insights into the predicted effects of global climate change for a variety of ecosystems.

## Examples of Past Research:

Brassil has conducted mathematical work examining the theoretical effect of environmental fluctuations on indirect interactions in food webs. Indirect interactions describe the effect that changes in one species in a food web can have on another species that is part of that habitat but which it does not directly come in contact, through predation or competition. He has shown how environmental conditions which change over time to a greater or lesser extent can ameliorate those indirect interactions.

## Examples of Outreach Programs:

He has been working with the Lincoln Children's Museum to introduce ecosystem concepts to preschool and elementary-age children. An experiment on duckweed-based aquatic ecosystems was featured in their spring 2008 Science Camp for elementary students. Late last year he conducted a Preschool Playtime at the Lincoln Children's Museum where each preschooler goes home with their own duckweed ecosystem in a cup.

## Teaching:

BIOS 207 Ecology and Evolution: A required course for all biology majors which introduces them to the fundamental concepts in ecology and evolution. The course also features a strong mathematical component and specific training on writing manuscripts in the sciences.

BIOS 805 Principles of Ecology: Introduces beginning graduate students to methods and approaches in ecological science.

## Selected Publications:

Kawasaki, N., C.E. Brassil, R.C. Brooks, and R. Bonduriansky. 2008. Environmental effects on the expression of lifespan and aging: an extreme contrast between wild and captive cohorts of *Telostylinus angusticollis* (Diptera: Neriidae). *American Naturalist*. 172:346-357

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## Arctic Lakes May Hold Clues to Understanding Climate Change

By Kelly Smith, UNL School of Natural Resources

Tracking changes in the thaw lakes of northern Alaska, which is experiencing rapid warming, will improve our understanding of climate change and its effects, say School of Natural Resources researchers who returned from Barrow, Alaska, this summer.

John Lenters, climatologist, and Sandra Jones, graduate student, spent much of June launching floating weather stations and drilling holes in ice to suspend under-water thermometers. They are working with a team of researchers from other universities under a three-year National Science Foundation grant to observe how the lakes form, evaporate, and flow.

Alaska is warming more rapidly than other parts of the planet, Lenters said, because as snow and ice melts it exposes darker ground, which absorbs more of the sun's heat. Relatively little research exists on the climate and hydrology of thaw lakes, which form as permafrost melts. The underlying permafrost keeps the lakes from draining, but some of the water evaporates.

Lenters' goal is "to measure the entire energy balance of the lakes. How much energy is going in, and how much is coming out." This will enable researchers to compute the rate of evaporation. Ultimately, researchers can use

Others on the research team are Yongwei Sheng, a Remote Sensing and GIS researcher from the University of California at Los Angeles, and Ken Hinkel, from the University of Cincinnati, a geographer who studies periglacial geomorphology and climatology. In addition, Wendy Eisner



*Snowmobile engines provided enough warmth for SNR researcher John Lenters to model his Lincoln marathon T-shirt on the tundra. The orange tag is a tundra permit, which is required to prevent too many people from venturing into the delicate ecosystem (School of Natural Resources photo).*



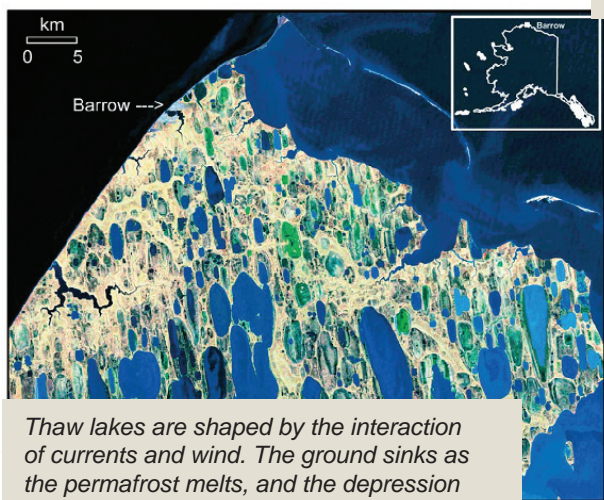
*Sandra and Ken Hinkel put a thermistor chain into the lake to take temperature readings at various depths throughout the summer (School of Natural Resources photo).*

use the water to crease ice roads, as seen on the reality show *Ice Road Truckers*.

This was the team's first field season. Lenters and Nathan Healey, another student, will return in late August to retrieve equipment, and are curious about what they'll find. "This is fieldwork," he shrugged. "If you're 80 percent successful, that's good." Bears have been known to dismember weather stations, and foxes will often chew on wiring.

For each of the next two years, they will add measuring equipment to about five lakes, moving southward, so by the third year of the project, they'll have buoys and sensors in about 15 lakes. Instrumentation mounted on a buoy on the primary "focus lake" measure all the energy coming in and out of the lake – solar and infrared radiation, temperature of the water and the air, wind speed and direction, relative humidity, barometric pressure, and precipitation.

While in Barrow, a film crew from Exploratorium, a museum in San Francisco, visited and made a 30-minute video, *Energy Dynamics Within Alaska's Thaw Lakes*, that is on the web at: <http://www.exploratorium.edu/webcasts/index.php>.



*Thaw lakes are shaped by the interaction of currents and wind. The ground sinks as the permafrost melts, and the depression fills with water. Winds are northeasterly dominant, which sets up a circulation of currents in the lakes. This dislodges and redistributes silt, which forms distinctive, shallow, oblong, depressions. The lakes are shallow and can drain in a matter of hours (School of Natural Resources photo).*

from the University of Cincinnati and Chris Cuomo from the University of Georgia are creating an "integrated Geographic Information System" for indigenous people to share their observations and history of the area.

The information will also be of use to the local community, where people sometimes haul water from the thaw lakes for household use. During downtime, Jones and other researchers visited with local leaders about how the scientific data could be made useful to the community. Corporations also

# June Tour Examines California's Bay-Delta

By Steve Ress

This year's water and natural resources tour will visit Northern California's Bay-Delta region June 14-19.

"California's Bay-Delta is a unique ecosystem, as well as the source of water for major metropolitan areas of the state and for extensive farmland irrigation," said tour co-organizer Michael Jess, associate director of the University of Nebraska-Lincoln Water Center.

"The area was chosen for this year's tour because it provides an opportunity for comparison with water use and endangered species recovery efforts in the Platte River valley," he continued. "Also, water right transfer procedures and water resources planning are important issues in both states and will be featured elements on the tour."

Tour costs have not yet been set and will be announced when registration details are distributed in early April, Jess said.

Similar to 2007, when the tour went to New Mexico's Pecos River basin, tour participants will make their own travel arrangements.

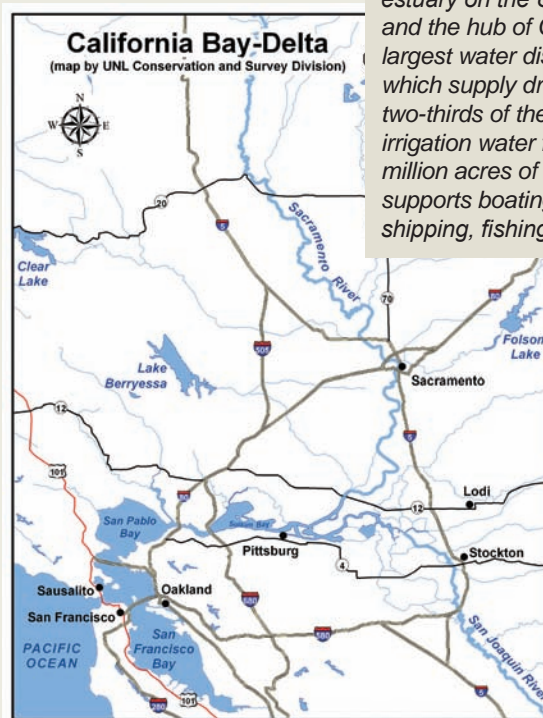
Tour registration will cover all motor coach, food, lodging, and related expenses.

Tour highlights will include inspection of Bay-Delta channels and islands. Besides large pumps, canals, pipelines and other "plumbing" used to convey water through the Delta to Los Angeles and to irrigate farmland in Southern California, participants will also visit a vineyard owned by Craig and Nancy Kirchhoff, former grain producers from Byron.

The tour will also visit Oroville Dam and fish hatchery. The scenic structure is the tallest earthen dam in North America and a key feature of the California State Water Project.

"Given the prospect of severe drought conditions continuing for the coming growing season, a visit to the Glenn-Colusa Irrigation District will be a timely

*The California Bay-Delta is the estuary for the Sacramento and San Joaquin Rivers. It is called the "Delta" because it forms a triangle of waterways from Sacramento (north) to Stockton (south) to Pittsburg (west). It is the largest estuary on the U.S. Pacific coast and the hub of California's two largest water distribution systems which supply drinking water to two-thirds of the state's population, irrigation water for over seven million acres of farmland and supports boating, commercial shipping, fishing and wildlife.*



*Jeff Buettner, Mike Jess, Michael Miller and David Kracman on a Delta levee, overlooking one of the many islands. Miller, tour coordinator for the California Department of Water Resources, helped the Nebraska tour planning contingent "navigate" the Delta and its many issues (photo: Steve Ress).*



*Mike Jess (left) and Jeff Buettner (right) examine drought-stricken Lake Oroville from the top of Oroville Dam, the tallest dam in the U.S. at 770 feet tall. Lake Oroville can hold more than 3.5 million acre-feet of water (photo: Steve Ress).*

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## Fall Symposium: Platte River Basin Science and Resource Management October 14 and 15 in Kearney



The latest Platte River research and management efforts, including adaptive management, will be showcased at a Platte River symposium in October.

Taking the place of the fall research colloquium, normally held on the University of Nebraska–Lincoln's East Campus, the event will be Oct. 14 and 15, in Kearney.

The Platte River Basin Science and Resource Management Symposium will examine research and management from the physical sciences to the human dimensions aspects of economics, sociology, law and policy. The entire reach of the Platte River,

including the North and South Platte Rivers, will be examined.

"Anyone doing research or management work on the Platte River will be invited to submit abstracts to be an oral or poster presenter," said organizer Lorrie Benson, assistant director of the UNL Water Center.

The symposium opens the afternoon of October 14 with tours on the Platte and will include an informal evening reception and dinner. The symposium continues the following day with a series of fast-paced presentations from researchers and managers. Posters will be available for viewing both days.

The call for abstracts will be in early April and registration will open in late July. Information will be posted at [www.watercenter.unl.edu](http://www.watercenter.unl.edu) as it becomes available.

The event is cosponsored and hosted by the UNL Water Center, U.S. Geological Survey Nebraska Water Science Center, Platte River Recovery Implementation Program, and Headwaters Corporation.

Address questions to Benson at (402) 472-7372 or [lbenson2@unl.edu](mailto:lbenson2@unl.edu).

## From the Director continued from page 2

strategies for the future? I would argue that it raised the awareness of an entire generation of Americans, transforming our thinking about what our role and responsibility was and still is regarding the health of our planet. As a second-semester freshman at Michigan State University on the first Earth Day, I clearly recall the atmosphere on campus during the teach-in as one of optimism with special "ecology" lectures, marches, and a general attempt to raise awareness on campus and in the surrounding neighborhoods of East Lansing. I recall distributing leaflets at the local A&P supermarket (how's that for an old term!?) about which detergents had lower phosphate levels, products that only relatively recently have become readily available.

Much more importantly, much of the federal legislation that now defines our entire environmental legal structure was spawned during that same time. While Earth Day was undoubtedly not the direct "cause" of this legislation, it clearly played a role in raising

the collective awareness about environmental issues, as well as sending a message to Washington that something needed to be done. Thus, the Clean Air Act of 1970, Clean Water Act of 1972, and the Endangered Species Act of 1973 (which repealed the Endangered Species Conservation Act of 1969), all arose near the first Earth Day, as the nation responded to what was perceived to be an environmental crisis at the time (rivers aren't supposed to catch on fire, right?). As stated in *Ecotactics: The Sierra Club Handbook for Environment Activists* (Pocket Books, publ. April 1970), "If we choose to be plagued by big nightmares, we are entitled to offset them with equally big daydreams."

Today's nightmare, global warming, is no less an environmental crisis than our nation and our planet faced in 1970. Then it was water and air pollution, and while today those problems still exist in many parts of the world, the 800- pound gorilla in the room is global warming. Given what we now

know to be the effects of global warming and the predictions that the best science has to offer regarding future outcomes, it's not hard to argue rather convincingly that this crisis is one of even greater magnitude than the ones faced in 1970. The question remains: what can the first Earth Day teach us about how to deal with our current state of the environment? First, what I believe we need is a teach-in like event focused on global warming, and we need it now. Many people are still "on the fence" about whether or not global warming even exists, which is analogous to fiddling while the Cuyahoga River is burning. Much of the current ballyhoo regarding global warming is politically based, not scientifically based. "Unfortunately, there is a growing tendency to find niches or categories for various environmental groups, just as we tend to over-classify environmental problems" is as true today as when it was written in 1970

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# UNL Faculty Provide Updates to the Water Resources Advisory Panel

By Rachael Herpel, UNL Water Center and NU Rural Initiative

The University of Nebraska–Lincoln's Water Resources Advisory Panel (WRAP) met January 22 to kick off its fourth year as an important source of guidance for UNL's water research, education and outreach programming.

When WRAP first met in 2006, the group focused on prioritizing state water research needs. While water quality research needs have yet to be officially added to the priority list, a recent review of the list showed that many of its water quantity-related research needs are still relevant and as yet unmet.

With this in mind, at the January meeting faculty who developed project ideas in response to WRAP's first priority list, but did not receive funding, provided updates on any research progress made since the original proposal was written and any project modifications that may have been needed.

WRAP also received updates on the three funded projects currently underway, information about a possible new project, and information about how the UNL School of Natural Resources' survey and outreach expertise have been reorganized.

UNL faculty who presented at the meeting were: Suat Irmak, Ron Yoder, Derrel Martin and Wayne Woldt, Biological Systems Engineering; Mike Hayes, Cody Knutson, Erkan Istanbuluoglu and Ayse Irmak, School of Natural Resources; and Ray Supalla, Department of Agricultural Economics.

A WRAP website is currently under construction. It will provide basic information on activities, as well as facilitate information exchanges between university faculty and WRAP members.



*Attending a Jan. 22 meeting of the Water Resources Advisory Panel (WRAP) at UNL were (back row, from left) John Owens, NU Vice President and IANR Harlan Vice Chancellor; Kirk Nelson, Nebraska Game and Parks Commission; Lee Orton, Nebraska Well Drillers Association; Mike Linder, Nebraska Department of Environmental Quality; Dayle Williamson, Office of Senator Ben Nelson; Dennis Strauch, Pathfinder Irrigation District; Kyle Hoagland, UNL Water Center; Ron Yoder, UNL Biological Systems Engineering Department and Agricultural Water Management Extension and Agricultural Research; (front, from left) Frank Kwapnioski, Nebraska Public Power District; Ann Bleed, CDR Associates; Mark Brohman, Nebraska Environmental Trust; Bob Bettger, Nebraska Department of Natural Resources; John Miyoshi, Lower Platte North NRD. WRAP Members not pictured include Brian Dunnigan, Nebraska Department of Natural Resources; Eugene Glock, Cedar Bell Farms; Marian Langan, Spring Creek Prairie Audubon Center; Jerry Obrist, City of Lincoln Water System; Jay Rempe, Nebraska Farm Bureau Federation; and Ed Schrock, farmer and former state senator (photo: Rachael Herpel).*



## Through the Looking Glass: Multifaceted Fate of Emerging Contaminants in Nebraska Waterways

By Alan S. Kolok, Ph.D., Aquatic Toxicologist, Department of Biology, University of Nebraska at Omaha and Department of Environmental Agricultural and Occupational Health, University of Nebraska Medical Center

*"When I use a word," Humpty Dumpty said, in rather a scornful tone, "It means just what I choose it to mean – neither more nor less." "The question is," said Alice, "Whether you can make words mean so many different things." Through the Looking Glass – Lewis Carroll*

I reread *Through the Looking Glass* the other day, and realized that Lewis Carroll had a fascination with words; what they stand for, how they can have multiple meanings, and how those meanings can lead to serious misinterpretation.

After reading the book, I realized that the environmental fate of emerging contaminants might equally have fascinated Carroll.

Let me explain: When following the fate of a contaminant in the environment it would be ideal if it remained in one chemical form – neither more nor less. Some metals effectively act this way, which forms the basis for current U.S. Environmental Protection Agency (EPA) regulations regarding metals in drinking water.

For example, the arsenic standard for drinking water is currently set at 10 parts per billion (ppb) while the standard for lead is 15 ppb. Considering that neither lead nor arsenic is particularly reactive in water, this regulatory approach is both practical and scientifically sound.

Not necessarily so for emerging contaminants. In a previous issue in this series (Summer 2008) emerging contaminants were defined as chemical and/or microbial

constituents that have not been considered historically to be contaminants, and most of these contaminants are organic. Organic molecules contain carbon, and are often subject to biological transformation, a process known as metabolism. This alteration of an emerging contaminant by metabolism makes it very difficult to establish its chemical form.

Let's suppose a physician gives a person a steroid, such as corticosterone. Corticosterone is lipophilic meaning that it is fat, or lipid, soluble (conceptually, the technique used to determine the relative water or lipid solubility of a compound is as easy as making salad dressing. The compound is added to a solution containing both water and oil, generally octanol. The mixture is shaken, then allowed to re-separate. The concentration of compound is quantified in both liquids, and the relative solubility determined from those results).

Humans, and most other animals, have difficulty excreting fat-soluble organics from the body, therefore if no metabolism occurred, the corticosterone would persist in the patient in an active form. To help clear this steroid from the body, proteins known as enzymes, add side groups to the steroid backbone making it more water-soluble. Once water-soluble, the steroid is much more easily cleared from the patient.

Now suppose we are concerned that corticosterone is an emerging contaminant found in local waterways, and that it was entering the environment via human excretion (there is absolutely no reason to believe this is a real problem, however I am merely using this example to demonstrate the point.) What would we look for in the environment? Would we analyze for the parent compound, corticosterone, even though the patient would



University of Nebraska, Omaha biologist Alan Kolok (photo: Brett Hampton, IANR).

have altered its form prior to excretion? Or would we analyze the water for a series of water-soluble metabolites, and if so, which ones would we analyze for?

There are two different phases in the metabolism of steroids (phases I and II) and different metabolites exist within and between each phase of metabolism. To liberally paraphrase from *The Looking Glass*, “The question is what do you look for when one emerging contaminant can be present as so many different things?”

In fact, the presentation of the problem as stated above simplifies the issue, since humans are not the only organisms that can metabolize or bio-transform, these compounds.

When a subgroup is added to a contaminant to make it water-soluble, the addition increases the total amount of energy in the

resultant molecule. Bacteria can harvest that energy associated with the side group, and in so doing, convert the molecule back to its parent form! Therefore in the example above, corticosterone might very well be detectable in the environment even if all of the steroid excreted from the patient was excreted in a metabolized, water-soluble form.

If we are concerned about a potential emerging contaminant in the environment, and if that contaminant is metabolizable, our job of detection has just become a lot more difficult.

Compounds in water can never be identified if we don't know what we are looking for. If we look for the wrong metabolite, we may falsely assume that the water is cleaner than it really is.

Conversely, if we identify metabolites in the water, this does not necessarily mean that these were the compounds initially released at the initial source.

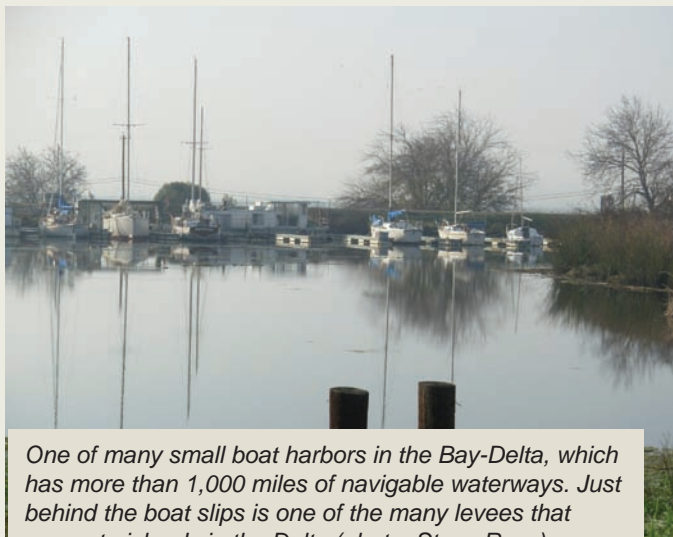
All is not lost. In humans and livestock, the predominant metabolic pathways converting lipid soluble compounds into water soluble ones are reasonably well understood. Furthermore, for some of these compounds there are “Signature metabolites”, those that almost always appear downstream whenever the parent compound has been released into the environment. Nevertheless, some emerging contaminants change with metabolism, the changes can be reversible, and both parent compound and metabolite can simultaneously persist in the environment. It is enough to make even Alice's head spin!

## June Tour Examines California's Bay-Delta

*continued from page 5*

part of the tour in exploring water right transfer issues. Water needs of local threatened and endangered species have complicated those efforts and district officials will discuss innovations successfully employed to mitigate their impacts,” Jess said.

Also planned are visits to state and organizational offices in Sacramento for overviews of California institutional structure, hydrology, water demands, water rights, etc. Part of these discussions will focus on where the state's water supplies and demands are located, how the water is transported and how the Bay-Delta acts



*One of many small boat harbors in the Bay-Delta, which has more than 1,000 miles of navigable waterways. Just behind the boat slips is one of the many levees that separate islands in the Delta (photo: Steve Ress).*

*California's state capitol building in Sacramento. Construction of the building dates to the 1870's. This summer's water and natural resources tour will begin with a round of presentations on the state's water issues and challenges before touring the Bay-Delta and locations north of Sacramento (photo: Steve Ress).*



as both a conduit and impediment to the state's water delivery system.

In Sausalito, just north of San Francisco, and located in a four-acre building constructed by the U.S. Navy to build patrol boats during World War II, is a physical model of San Francisco Bay and the Bay-Delta, that will provide an opportunity for tour participants to view the region in miniature.

Other tour stops and topics are still being examined.

Tour cosponsors include Central Nebraska Public Power and Irrigation District, The Flatwater Group, Gateway Farm Expo, Kearney Area Chamber of Commerce, Nebraska Water Conference Council and UNL's Water Center and Conservation and Survey Division.

## Water Seminar Lectures Continue Through April

The University of Nebraska–Lincoln's long-standing spring semester water and natural resources seminar is again hosting local, national and international experts addressing topics from dryland agricultural conservation to what's really contained in floodwaters.

The 14-lecture series began Jan. 14 and concludes April 22. All but one of the free public lectures are in the first floor auditorium of Hardin Hall on the northeast corner of N. 33<sup>rd</sup> and Holdrege St., UNL East Campus, Lincoln. Weekly lectures are Wednesdays, 3:30 to 4:30 p.m., except March 18, when there is no lecture because of UNL spring break.

Some highlights of remaining lectures include the following:

**March 11:** Greg Ruark of the U.S. Forest Service delivers a lecture on the historic presence of trees along Great Plains rivers. This lecture is at the Great Plains Art Museum, 1155 Q St., Hewit Place, Lincoln beginning with a 3 p.m. reception.

**April 1:** University of Cincinnati geologist Ken Hinkel presents a study of the thermal effects of large bodies of water on local and regional climate.

Colorado State University environmental soil chemist Thomas Borch takes the Hardin Hall stage on April 8 to talk about the occurrence and fate of steroid hormones in rivers due to run-off and other sources.

"Speakers are covering a very broad and timely slate of water and climate-related topics that there is wide local interest in," said UNL Water Center director Kyle Hoagland.

After they are presented, lectures are available online at [watercenter.unl.edu](http://watercenter.unl.edu).

For more information, contact the UNL Water Center at (402) 472-3305. Cosponsors are UNL's Institute of Agriculture and Natural Resources, Water Resources Research Initiative and School of Natural Resources.

Remaining lectures:

**Feb. 25:** Reed Maxwell, Colorado School of Mines, *Interdependence of Groundwater Dynamics and Land-Energy Feedbacks Under Climate Change*

**March 4:** Williams Memorial Lecture: Ken Williams, U.S. Geological Survey, *Adaptive Management of Water and Related Resources*.

**March 11:** Greg Ruark, U.S. Forest Service, *Historic Presence of Trees Along Rivers*

*in the Great Plains*. Note location: Great Plains Art Museum, 1155 Q Street, Hewit Place, Lincoln. Reception 3 p.m., lecture 3:30 p.m.

**March 18:** No Seminar (UNL Spring Break)

**March 25:** Thomas Kwak, North Carolina State University, *Ecology and Management of a Domestic Invasive Species -or- Why We Shouldn't Move Fish Around*.

**April 1:** Ken Hinkel, University of Cincinnati, *Thermal Effects of Large Water Bodies on Local and Regional Climate*.

**April 8:** Thomas Borch, Colorado State University, *Environmental Fate of Steroid Sex Hormones*.

**April 15:** Ryan Sponseller, University of Alabama, *Understanding Relationships Among Long-term Climate Variability, Hydrologic Disturbance, and the Ecology of Desert Streams*

**April 22:** Williams Memorial Lecture: Paolo Cherubini, Swiss Federal Institute for Forest, Snow and Landscape Research, *Tree Rings and Water: How and Where Can Dendroecological Methods Help Hydrological Research?*

## Get Your Water Map

Anyone interested in an overview of Nebraska water issues – irrigation, nitrate and atrazine levels, aquifers and groundwater level changes, threatened and endangered species, topography and more – now has one map that tells it all, in varying degrees of detail.

The University of Nebraska–Lincoln has issued a poster-sized "Nebraska Water Map," available free if it's picked up at Hardin Hall on the school's East Campus. And a great resource it is.

Water is one of this state's most precious and vulnerable resources. Arguments about it – who can use it, how much, what's an appropriate use, how the ecosystem can be protected and on and on – have smoldered and flared in the major river basins and some smaller watersheds for many years.

In the Platte River area, for instance, Nebraska, Colorado and Wyoming are finalizing and putting into effect a multistate and federal agreement to protect the river environment, endangered species and

other things. The states will make sure that enough water stays in the Platte to protect the habitat of such creatures as the piping plover downstream of Lake McConaughy and Kingsley Dam.

Important environmental and irrigation issues have arisen in the Republican and Niobrara River systems too. All three of these river basins are delineated on the map, which also is available online (for shipping costs) at <http://nebraskamaps.unl.edu>.

UNL, the Nebraska Departments of Natural Resources and Environmental Quality, the Groundwater Foundation and other partners who helped produce the map have done a fine thing for Nebraskans. Awareness of a problem and background information are the first steps toward a solution.

(Editor's Note: Reprinted from the opinion page of the *Omaha World-Herald*).



# One Lot at a Time

By Bobbi Holm, UNL Southeast Research and Extension Center

We count on the U.S. Environmental Protection Agency (EPA) to protect us from industrial polluters and those who intentionally dump harmful substances into our water. But who protects us from ourselves?

EPA says nonpoint source pollution is currently the leading cause of water quality degradation, and that's us. Nonpoint source pollution (NPS) can't be traced to a specific source. It's just not as easy as spotting a pipe spewing toxic waste into a river.

NPS comes from lawns, driveways, roads, farms, parking lots, basically anything that produces runoff water. It's a particular problem in urban areas because of all the surfaces that don't absorb water and so produce runoff.

Stormwater runoff isn't only water, there's stuff in that water, some of it benign and some of it toxic. Stuff like nitrogen and phosphorus from fertilizers and organic waste; sediment from erosion; pathogenic bacteria; metals from roofs, automobiles, and businesses; and oil, grease, and detergents.

All of these things end up in our rivers and lakes because most of our runoff

isn't treated. Just the volume and velocity of stormwater that a modern urban community produces is, in itself, a detriment to the receiving streams. It's a rush and gush thing. Water that runs off our hard-surfaced lives hits streams in a huge gush and at such a rush that the stream functions as little more than a gutter. And in reality, engineering processes over the last century have effectively turned many of our urban streams into channelized, straightened pipelines.

Add thermal pollution to the mix, because runoff is usually at a higher temperature than the water in the stream, and the streams don't have much of a chance.

We could always recycle, never litter, and be model green commuters, but we would most likely still contribute to the problem.

We are, therefore we pollute (my apologies to Descartes.)

So who advocates for water? Who educates the average citizen on ways to reduce their impact on our water resources?

University of Nebraska–Lincoln Extension is one of many groups that take on this task.

Others include Nebraska's 23 Natural Resources

Districts, the Natural Resources Conservation Service, state agencies such as the Nebraska Department of Environmental Quality, Nebraska Department of Natural Resources, Nebraska Game and Parks Commission, and cities, counties, and private and non-profit advocacy groups



Bobbi Holm

(let's credit EPA with being the flint that ignited many of these programs through the Clean Water Act and its many amendments.)

In Douglas and Sarpy Counties, the Extension Clean Lakes program is a grant-funded effort with the objective of educating people to reduce NPS pollution in their own neighborhood.

Clean Lakes has helped citizens in metro lake watersheds formulate watershed management plans to improve and maintain the health of their lakes. Through this process, UNL Extension helped guide lake councils in voicing concerns for their lakes and stating objectives that needed to be met in order to achieve their goals for water quality.

As management plans were produced, professionals from many water quality-related fields advised council members. These experts provided invaluable assistance with scientific analysis and grant writing.

Management plans have resulted in community education efforts, watershed modifications and efforts to protect water quality by regulating future watershed development.

After the plans are in place, Extension continues to offer support and educational assistance to the lake councils and watershed residents.

An ongoing goal of the Clean Lakes program is to partner with other Omaha metro



UNL Extension's Clean Lakes program helps people in metro lake watersheds formulate watershed management plans to improve and maintain the health of their lakes. Urban runoff can greatly affect water quality in ponds and lakes. Pictured is Carter Lake, near Omaha (photo: Bobbi Holm).

continued on page 13

## Reduce Costs of Irrigation Pumping Plants by Improving Efficiency

By Sandi Alswager Karstens, IANR News Service

To save energy and money, Nebraska irrigators should check their irrigation pumps for maximum efficiency, a University of Nebraska–Lincoln Extension educator said.

Irrigation pumps that operate at the average efficiency found in university tests are using 30 percent more energy than necessary, said Tom Dorn, extension educator in Lancaster County.

“At today’s energy prices, identifying a pumping plant that needs adjustment or repair could save hundreds if not thousands of dollars per year,” Dorn said. “Now that irrigation season is over, look at your records and decide which of your pumping plants should be looked at by a professional. If you do it now, you have all winter and early spring to have those repairs made.”

This and other cost saving tips to help deal with high input costs in crop production can be found at UNL’s Surviving High Input Costs in Crop Production Web page at <http://cropwatch.unl.edu/survivinghighinputcosts.htm>.

Statewide UNL pumping plant efficiency studies conducted on hundreds of farmer-owned pumping plants for the last 50 years were developed into the Nebraska Pumping Plant Performance Criteria. These criteria state the amount of useful work to expect for each unit of energy consumed by an irrigation pump.

Results varied considerably – about 15 percent achieved good efficiency, leaving the other 85 percent using more energy per unit of work than expected by the criteria.

The tests revealed the overall average pumping plant in Nebraska is producing only

77 percent of the work that it should be for the fuel it is using, Dorn said.

If repairs are made to bring a typical diesel powered pumping plant operating at 77 percent of the performance criteria up to 100 percent of the criteria, it would result in an annual savings of nearly 800 gallons of diesel per year, Dorn said.

“That’s why it’s important for farmers to know how much work is being done to pump the water versus the energy consumed,” he said.

*“At today’s energy prices, identifying a pumping plant that needs adjustment or repair could save hundreds if not thousands of dollars per year.”*

When a pumping plant is not as efficient as it should be, the problem is either in the power unit or in the pump, or both, Dorn said.

“Internal combustion power units on irrigation pumps can have the same problems as those in cars and trucks,” Dorn said. Bad bearings or a far larger motor than needed for the job causes poor electric motor efficiency.

Poor pump performance can be caused by pump designs poorly matched to the job, such as when an operator switches from gated pipe to a center pivot sprinkler. Converting from a high-pressure sprinkler package to a lower pressure package without changing the pump also can cause it. Pumps with worn impeller vanes and/or internal seals as a result of pumping sand and impellers that were not properly adjusted within the pump bowls also can cause poor pump performance.

If making impeller adjustments be sure a qualified professional who knows how to calculate the lineshaft elongation that occurs when the pump is operating under load performs them, he said.

“Great harm can be done to the pump if impellers are improperly adjusted,” Dorn said. “Don’t attempt to adjust the impellers yourself unless you know how to account for line shaft elongation based on your particular impeller model, lineshaft diameter and length and the total head the pump is producing.”

In a study involving 130 farmer-owned pumping plants in Nebraska, test data revealed 58 percent benefited from adjustments, Dorn said. Field adjustments made with a wrench either to the engine or pump or both resulted in 14 percent average savings in energy costs compared to the initial test results.

In addition, inefficient pumping plants were identified and the feasibility of making repairs beyond the field adjustments were calculated.

An analysis, based on the average field pumping plant efficiency found in studies, is presented in the paper titled Repair or Replace Inefficient Irrigation Pumping Plants. This paper is posted on UNL’s Surviving High Input Costs Web site at <http://cropwatch.unl.edu/survivinghighinputcosts.htm>.

After spending up to \$17,000 for repairs, the annual extra profit averaged over a twenty-year life was \$16.51 per acre per year after the cost of repairs were paid out of anticipated energy savings. Total added profit over 20 years was \$41,288, assuming the average price of farm-delivered diesel fuel is \$4 per gallon over the 20-year period.

# Man-Made Chemicals Found in Drinking Water at Low Levels

Low levels of certain man-made chemicals remain in public water supplies after being treated in selected community water facilities.

Water from nine selected rivers, used as a source for public water systems, was analyzed in a study by the U.S. Geological Survey (USGS).

"Most of the man-made chemicals assessed in the USGS study are unregulated in drinking water and not required to be monitored or removed," said Tom Jacobus, General Manager of the Washington Aqueduct. "These findings are not surprising and they will be important in helping regulators and assisting water utility managers arrive at decisions about future water treatment processes."

Scientists tested water samples for about 260 commonly used chemicals, including pesticides, solvents, gasoline hydrocarbons, personal care and household-use products, disinfection by-products, and manufacturing additives. This study did not look at pharmaceuticals or hormones.

Low levels of about 130 of the man-made chemicals were detected in streams and rivers before treatment at the public water facilities. Nearly two-thirds of those chemicals were also detected after treatment. Most chemicals found were at levels equivalent to one thimble of water in an Olympic-sized pool.

"Low level detection does not necessarily indicate a concern to human health, but rather indicates what types of chemicals we can expect to find in different areas of the country," said USGS

lead scientist, Gregory Delzer. "Recent scientific advances have given USGS scientists the analytical tools to detect a variety of contaminants in the environment at low concentrations; often 100 to 1,000 times lower than drinking-water standards and other human-health benchmarks."

Testing sites include the White River in Indiana; Elm Fork Trinity River in Texas; Potomac River in Maryland; Neuse River in North Carolina; Chattahoochee River in Georgia; Running Gutter Brook in Massachusetts; Clackamas River in Oregon; Truckee River in Nevada; and Cache La Poudre in Colorado. The populations in communities served by these water treatment plants vary from 3,000 to more than a million.

This study is among the first by the USGS to report on a wide range of chemicals found before and after treatment. The full source-water quality assessment ( <http://water.usgs.gov/nawqa/swqa> ) and listing of chemicals are available online.

The USGS National Water-Quality Assessment Program is planning to complete as many as 21 additional surface-water assessments through 2013 ( <http://pubs.usgs.gov/fs/2007/3069/> ). A companion study is scheduled for release in 2009 that summarizes the occurrence of the same chemicals in high-production wells and the associated treated water in 13 states.

USGS provides science for a changing world. For more information, visit [www.usgs.gov](http://www.usgs.gov).

## One Lot at a Time *continued from page 11*

area agencies in sponsoring programming for land developers and builders. To this end, Extension co-sponsors an annual educational seminar. "Building for the Future, Sediment and Erosion Control Seminar VII" will be held in February. Last year's seminar attracted about 300 professionals in the building and development industry.

Topics vary annually and the goal is to help these professionals make their best effort to protect water quality. Because EPA water quality regulations have strict requirements for new and re-development projects,

the seminar helps developers avoid fines and work slowdowns.

Last fall, Extension also co-sponsored a "Post Construction Stormwater Management Workshop." This first such workshop focused on Omaha's new stormwater ordinance and what builders and engineers would need to do to comply with it.

Whether from the perspective of the engineer who designs a land development project or the eventual lot owner who is responsible for maintenance, the UNL Douglas/Sarpy Extension Clean Lakes program

aims to help people keep their water resources clean.

Some examples of good water stewardship for homeowners are properly disposing of pet waste, sweeping fertilizers and pesticides off hard surfaces, keeping leaves out of gutters, being careful with automobile maintenance and having downspouts empty onto green space not concrete.

Extension helps you "Know How, Know Now" to do your part to protect water quality. You can make a real difference by starting one lot at a time.



### New Coop Assistant Unit Leader

The University of Nebraska–Lincoln's Nebraska Cooperative Fish and Wildlife Research unit has named Joseph Fontaine as its new assistant unit leader.

Coop leader Craig Allen, an associate professor in UNL's School of Natural Resources, said that Fontaine's research focuses on "Examining ecological and evolutionary sources of variation in life history expression." His research employs a hypothetico-deductive approach to gain insight into long-standing theories that aid in the understanding and advancement of general concepts and provide important information for conservation and management.

The majority of Fontaine's research addresses questions and concepts concerning the expression of avian life histories including habitat selection, reproductive strategies and physiological mechanisms of trait expression.

Fontaine received his Ph.D. from the University of Montana and is currently completing a post-doctoral research assignment in Arizona. He expects to arrive at UNL sometime this spring.

### 2008 Ends With Improvement

An October report from the Wyoming office of the U.S. Bureau of Reclamation holds some good news, and some bad news. It indicates some improvement in inflow, especially at Seminoe Reservoir, but continues to record low levels in Pathfinder Reservoir.

According to the report, Seminoe Reservoir experienced a 159 percent increase in inflows for September, chalking up 31,700 acre-feet of water. The 30-year average is 19,900 acre-feet. Pathfinder Reservoir, the other large dam on the North Platte River, received 700

acre-feet, or 12 percent of the 5,900 acre-foot 30-year average.

September 2007 inflows were 16,400 acre-feet at Seminoe. In Water Year 2006, inflow was 21,100 acre-feet. Only 11,000 acre-feet were recorded in September 2005. Pathfinder Reservoir recorded 700 acre-feet in September 2008. This compares to 4.3 acre-feet in September 2007. Just 700 acre-feet were received in September 2006. In September 2005, Pathfinder received 1,800 acre-feet.

Storage in the major North Platte River Basin reservoirs remained below average in September. Seminoe was at 84 percent, with 534,500 acre-feet of water in storage. This compares to the 30-year average of 633,100 acre-feet. Pathfinder stood at 72 percent at the end of September, with 348,200 acre-feet. The 30-year average is 484,300 acre-feet. Storage at the end of September 2007 was 226,400 acre-feet in Seminoe. It was 267,800 acre-feet in 2006, and 438,600 acre-feet at the end of Water Year 2005.

Pathfinder held 348,200 acre-feet of storage at the end of Water Year 2008. This compares to 171,100 acre-feet in 2007, 202,700 acre-feet in 2006, and 238,900 at the end of September 2005.

(Editor's Note: From the Oct. 10, 2008 *Scottsbluff Star-Herald*, Sandra Hansen, Ag Editor).

### Final Rulemaking on CAFOs

The U.S. Environmental Protection Agency (EPA) has finalized a rule to help protect the nation's water quality by requiring concentrated animal feeding operations (CAFOs) to safely manage manure.

The final rule responds to a February 2005 federal court decision that upheld most of the agency's 2003 rule, but directed further action or clarification on some portions.

The rule adds new requirements relating

to nutrient management plans (NMPs) for permitted CAFOs. The rule also includes a no-discharge certification for CAFOs that can establish that they will not discharge. Additionally, the rule revises the requirement for all CAFOs to apply for National Pollutant Discharge Elimination System (NPDES) permits and instead requires only those CAFOs that discharge, or propose to discharge, to apply for permits.

Federal and state CAFO Contacts: EPA Region 7 CAFO coordinator Donna Porter, [porter.donna@epa.gov](mailto:porter.donna@epa.gov), (913) 551-7929, (800) 223-0425.

State CAFO contacts: Iowa, Gene Tinker, [gene.tinker@dnr.iowa.gov](mailto:gene.tinker@dnr.iowa.gov), (515) 281-3103; Kansas, Terry Medley, [tmedley@kdhe.state.ks.us](mailto:tmedley@kdhe.state.ks.us), (785) 296-0075; Missouri, Darrick Steen, [darricksteen@dnr.mo.gov](mailto:darricksteen@dnr.mo.gov), (573) 751-1403; and Nebraska, Dennis Heitmann, [dennis.heitmann@nebraska.gov](mailto:dennis.heitmann@nebraska.gov), (402) 471-4288.

### Malathion Contributes to Amphibian Decline

*Environmental Toxicology and Chemistry* has published a study showing that malathion, used as an agricultural insecticide and pesticide, is responsible for interfering with the normal development of pickerel frog embryos, thus leaving them more susceptible to parasite invasion.

Malathion is present in natural water sources that have been exposed to urban and agricultural runoff. It is the only organophosphate insecticide that may be applied by planes to control mosquito populations, and so it also enters water from the air.

Although direct lethal and sublethal effects of chemical contaminants have been documented, latent and long-term effects have been less well documented. Therefore, researchers sought to fill this knowledge gap and found, as suspected, that tadpole survival

rates decreased and malformations and susceptibility to parasite encystment rates increased as a result of exposure to malathion concentrations mimicking those found in actual water sources.

Tadpoles are being exposed to increasing numbers of parasites in waters that are warming as a result of global climate change, and the researchers who performed this study speculate that, as a consequence, those exposed to malathion will have weakened immune systems that render them less able to defend themselves from invasion. Indeed, trematode infection was observed in tadpoles seven weeks after embryonic exposure to low concentrations of malathion.

This study shows that declines in amphibian populations are related to the agricultural application of malathion, which causes various kinds of damage to frog embryos and tadpoles that are, as a consequence, increasingly susceptible to parasite invasion.

## Video to Manage Stormwater Runoff

The U.S. Environmental Protection Agency (EPA) and U.S. Botanic Garden produced an on-line video, "*Reduce Runoff: Slow It Down, Spread It Out, Soak It In*," that highlights green techniques such as rain gardens, green roofs and rain barrels to help manage stormwater runoff.

The film showcases green techniques that are being used in urban areas to reduce the effects of stormwater runoff on the quality of downstream receiving waters. The goal is to mimic the natural way water moves through an area before development by using design techniques that infiltrate, evaporate, and reuse runoff close to its source.

The techniques are innovative stormwater management practices that manage urban stormwater runoff at its source, and are very effective at reducing the volume of stormwater runoff and capturing harmful pollutants. Using vegetated areas that capture runoff also improves air quality, mitigates the effects of urban heat islands and reduces a community's overall carbon footprint.

The video highlights green techniques on display in 2008 at the U.S. Botanic Garden's "One Planet – Ours!" Exhibit" and at EPA, Washington, D.C., including recently completed cisterns. To watch the video: <http://www.epa.gov/nps/lid>.

For more information on stormwater management go to <http://www.epa.gov/greeninfrastructure>.

## Response to the Riparian Invasion

Seventeenth annual North American Weed Management Association Conference and Trade Show, Holiday Inn, Kearney, September 21-24.

RSVP now by e-mailing Kristi Paul at [kossweed@gpcom.net](mailto:kossweed@gpcom.net) and you will be kept informed of registration information. Also, see [www.NAWMA.org](http://www.NAWMA.org) for more information as it becomes available.

North American Weed Management Association (NAWMA) is a professional association of individuals interested in managing invasive plants. Their annual conferences highlight the efforts of the state or province of the conference location.

The Conference: The riparian plant invaders present a unique challenge and threat across North America - very invasive weeds which can gobble up the narrow but extremely important riparian areas quite rapidly. These threats in Nebraska were addressed at the 2006 "Threats to Nebraska Rivers-Invasive Plants Conference". The governor established a riparian vegetation management task force and the legislature provided \$4 million of grants for use in 2007 and 2008. With the help of these funds, weed management areas are expending about \$7 million to fight the invading riparian vegetation over this two-year period. Conference attendees can hear about and see the results of this two-year effort and learn about future planned actions including what we should be doing to get ready for the next riparian plant invaders.

## Dvorak Will Lead Nebraska AWWA

Bruce Dvorak, UNL faculty, and member of UNL's drinking water team was recently installed as the 2009 chair of the Nebraska Section of the American Water Works Association (AWWA). The Nebraska Section of the AWWA is the professional organization of the public water industry in Nebraska. Their mission is to promote quality drinking water in sufficient quantity for all Nebraskans served by public systems. Their efforts include providing system support, offering career development including continuing education opportunities, and improving all facets of public water system operations. In addition, AWWA in Nebraska supports Water For

People, an international organization benefiting people in developing countries by providing access to safe water, improved sanitation, and health and hygiene education.

Dvorak is an Associate Professor in the Civil Engineering Department and Department of Biological Systems Engineering. His expertise is physical and chemical treatment processes for water. Current research includes environmental engineering, focusing on industrial pollution prevention as a method of minimizing the need for later environmental remediation; and on small community drinking water issues, including corrosion control.

## When Water Meets Money Topic of Sixth Annual Conference, April 29,30 *continued from page 1*

of global warming on water resources; the value of water for different societal purposes, such as agriculture, manufacturing and recreation; and water for irrigation and biofuels production.

Several conference sessions will be devoted to water marketing and banking, exploring the basics of these topics as well as emerging best practices and ideas to reduce costs and make markets more efficient.

The second day law track is specially designed for attorneys and professionals new to water law and others needing a better understanding of water law issues.

A sampling for first-day speakers includes Ari Michelsen, Texas A&M University, with an overview on economics and Colorado State University's Christopher Goemans, who will speak on the values of water for different societal purposes.

Former Nebraska Department of Natural

Resources director Ann Bleed, now of CDR Associates, will begin an afternoon slate of speakers with a presentation on the science needed to implement water ownership regimes and to have water markets: What's needed, what don't we have and how are scientists involved.

Also speaking that afternoon are Garth Taylor, University of Idaho; Ellen Hanak, Public Policy Institute of California; David Brookshire, University of New Mexico; Ron Bishop, Central Platte Natural Resources District; and others.

Thursday's general session continues with an overview of what climate change may mean by National Drought Mitigation Center director Mike Hayes; the latest science on irrigation and the water-related aspects of crops and biofuels by UNL's Suat Irmak, Gary Hergert and others.

The second day law track features water modeling by DNR's Jim Schneider, river basin

discussions led by Tom Wilmoth, Husch Blackwell Sanders, LLP; Mike Klein, Anderson, Klein, Swan and Brewster; and David Barfield, Kansas Division of Water Resources, among others.

The all-day law track concludes with a panel discussion that includes representatives from the League of Nebraska Municipalities, the U.S. Army Corps of Engineers, U.S. Environmental Protection Agency and several state agencies.

Conference information and registration options are online at [watercenter.unl.edu](http://watercenter.unl.edu).

Conference cosponsors are the University's Office of Research, Water Resources Research Initiative, Institute of Agriculture and Natural Resources, Water Center, School of Natural Resources, College of Journalism and Mass Communications and College of Law.

## EPA Green Power

### 1. Reduce, Reuse and Recycle

- Reduce the waste and the water you use. Reuse all those bags and stuff you can choose.
- Recycle thing-a-ma-bobs, papers, bottles and such.
- Join the team to save the world that we love so much.

### 2. Use Green Power

- Choose to use energy made by the wind and the sun.
- It's renewable green power that can make your home run.
- Power like this doesn't hurt our climate at all.
- Just modify your house to catch it or, for help, give us a call.

[epa.gov/greenpower](http://epa.gov/greenpower)

### 3. Change Your Lights

- Change out 5 light bulbs to ENERGY STAR ones,
- You'll fight global warming and save 65 dollars in funds.
- They use 75 percent less energy than the standard light,
- And last up to 10 times longer brightly illuminating the night.

### 4. Use ENERGY STAR Products

- When buying new products for your work and your house,
- ENERGY STAR helps keep air pollution the size of a mouse.
- Even brand new houses feature the ENERGY STAR label,
- To save greenhouse emissions, pollution and even cash if you're able.

[energystar.gov](http://energystar.gov)

### 5. Heat and Cool Efficiently

- Lots of energy is used to heat and cool your home,
- So insulate your attic and seal up air leaks with foam.
- Tune up all your equipment in the spring and the fall,
- So when your energy bill comes it will be nice and small.

### 6. Calculate Your Household's Carbon Footprint

- By using the EPA's greenhouse gas emissions calculator,
- You can learn about how to make your conservation greater.
- Reducing your emissions and learning all new ways,
- To keep the earth clean and bright for the rest of its days.

[epa.gov/climatechange](http://epa.gov/climatechange)



## Zhenghong Tang, Ph.D. continued from page 3

### Examples of Past Research Programs:

Past research programming has focused on soil erosion and watershed management, environmental models, non-point pollution mechanisms, environmental risk assessment, and land use analysis. A major project Tang participated in was *Soil Erosion Management and Application of Geographical Information Systems in North China*, funded by the Canadian International Development Agency. One of the primary outcomes of this project was a GIS-supported watershed management information system in the Hilly Loess Region in China.

### Examples of Outreach Programs:

These include training local decision-makers in watershed management, soil and water conservation, non-point source pollution control, and agricultural land management in North China. Also some training for K-12 students to understand census demographic data and local land use planning.

### Teaching:

Environmental Planning and Policy

GIS in Environmental Design

Planning Theory

**2009 Spring (scheduled):**

CRPL 802 Planning Theory

CRPL495P: gis Application in Environmental Design

## Chad E. Brassil, Ph.D. continued from page 3

Duffy, M.A., C.E. Brassil, S.R. Hall, A.J. Tessier, C.E. Cáceres and J.K. Conner. 2008. Parasite-mediated disruptive selection in a natural *Daphnia* population. *BMC Evolutionary Biology*. 8:80.

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Tang, Z., M. Lindell, C. Prater, S.D. Brody, 2008, Measuring Tsunami Hazard Planning Capacity on the U.S. Pacific Coast, *Natural Hazards Review* 9(2): 91-100.

Tang, Z., 2008, Integrating the Principles of Strategic Environmental Assessment into Local Comprehensive Land Use Planning, *Journal of Environmental Assessment Policy and Management* 10(2), 143 – 171.

Brody, S.D., H. Grover, S. Bernhardt, Z. Tang, B. Whitaker, C. Spencer, 2006, Identifying Potential Conflict Associated with Oil and Gas Exploration in Texas State Coastal Waters: A Multicriteria Spatial Analysis, *Environmental Management* 38:597-617.

### Web/e-mail addresses:

[http://architecture.unl.edu/people/bios/tang\\_zhenghong.shtml](http://architecture.unl.edu/people/bios/tang_zhenghong.shtml)

ztang2@unl.edu

Morbey, Y.E., C.E. Brassil, and A.P. Hendry. 2005. Rapid senescence in Pacific salmon. *American Naturalist*. 166:556-568.

Brassil, C.E., and P.A. Abrams. 2004. The prevalence of asymmetrical indirect effects in two host-one-parasitoid systems. *Theoretical Population Biology*. 66:71-82.

### Web/e-mail addresses:

<http://www.unl.edu/cbrassil>

cbrassil2@unl.edu

## Readers submit Water-Centric photos



*The Dismal River at Hwy 83's scenic overlook  
(photo: Emily Krondak, North Platte).*



*Flowing stream in Northfield, Minn., October 2008  
(photo: Aimee Poor, Nebraska Humanities Council,  
Lincoln).*

## What's New at the Laboratory *continued from page 20*

uses of stable isotope analysis in contaminant “finger-printing,” environmental forensics, nutrient cycling, ecology and climate change, in addition to classical applications in geology and hydrology.

The WSL currently offers a dozen different methods for stable isotope analysis using dual inlet or continuous flow mass spectrometer systems.

Demand also continues for standard water quality tests using WSL’s autoanalyzers, chromatography, and spectrophotometry systems.

Though we focus on developing new methods for water-related research, we continue to offer routine tests as part of our services.

UNL undergraduate and graduate students can be trained and get hands-on experience with a variety of equipment under the supervision of our staff.

The WSL is uniquely equipped to enhance a wide variety of water resources research and education in Nebraska. To learn more about our facility, visit us online at [watercenter.unl.edu](http://watercenter.unl.edu).

## Database Connects Public to University of Nebraska Research *continued from page 1*

An “All Nebraska” search key allows for more advanced searching by keyword or individual researcher.

“Water research plays a big part in providing necessary information and data that will be used to help solve Nebraska’s current and future water challenges, as well as many other state challenges that are related to water, or have a strong water component, such as agriculture, industry, electric power generation, recreation and others,” Herpel said.

“The site lets legislators, government officials and others to keep easy track of NU water-related research and Extension and education programs, especially research

associated with a particular topic of interest or that impacts a particular (legislative) district or NRD,” she continued.

Included with each project report is contact information for the primary researcher and others involved with the project, as well as links to more detailed information about the project where appropriate.

Many of the research projects and programs listed cross county and district lines and the total listed projects isn’t comprehensive, “But continues to grow as individual researchers realize the benefits of having their work listed in the database,” Herpel said.

As the database grows, many previously completed state surveys are being made avail-

able electronically through the site.

“There is a good deal of public and governmental interest in these surveys, so we thought it was a natural, via this site, to make them easier to access,” said Herpel. “It’s all part of developing the database into a more comprehensive library for those interested in or working in natural resources areas statewide,” she said.

The database project is supported by NU’s Institute of Agriculture and Natural Resources and School of Natural Resources.

The database can also be easily accessed from the research page of [water.unl.edu](http://water.unl.edu).

## From the Director *continued from page 6*

by Cliff Humphrey (Ibid, 1970), founder of Ecology Action (see [www.ecoact.org](http://www.ecoact.org)). Despite all of the hype from both sides of the political aisle, global warming is not a political issue, but one that will require political solutions to help resolve. So, much like the first Earth Day, perhaps what’s needed is a national awakening that is prompted by a national education day, one that has begun by former Vice President Al Gore’s Nobel Peace Prize-winning effort, but one that needs to go further.

The Ecotatics Activist’s Checklist (Ibid, 1970) included items such as, don’t buy beverages in no-deposit, no-return containers (remember, there was no recycling in 1970!), put bricks in your toilet tank to save water (low-volume toilets did not exist in the U.S.), and generally consume less. Today’s checklist also might include: switch to compact fluorescent bulbs (which could reduce carbon emissions by 250 million tons over the next 50 years), and commit to a more fuel-efficient vehicle the next time you buy a new car (a

doubling of current gas mileage of automobiles could save nearly 800 million tons of carbon)(see Socolow et al. 2004. Solving the climate problem: technologies available to curb CO<sub>2</sub> emissions. *Environment* 46(10): 8-19 ([www.princeton.edu/~cmi/resources/CMI\\_Resources\\_new\\_files/Environ\\_08-21a.pdf](http://www.princeton.edu/~cmi/resources/CMI_Resources_new_files/Environ_08-21a.pdf)). As a colleague in the Water Center “who was there” pointed out, “also let your elected officials know that the environment is always an important issue for you, and be sure to vote for those who take environmental issues seriously!”

Since that first Earth Day nearly four decades ago, several other notable Earth Day events have taken place, mainly in other parts of the world. In 1990, Earth Day involved 200 million people in 141 countries, which lead to the United Nations Earth Summit in Rio de Janeiro in 1992; Earth Day 2000 involved an estimated one billion people worldwide. It is now observed in 175 countries, has apparently become the “largest secular holiday in the world” ([www.earthday.net](http://www.earthday.net)) and is coordinated

by the nonprofit Earth Day Network, located in Washington, DC.

As Tom Armstrong, current USGS senior advisor of global change programs recently put it, “Climate change is real. It’s no longer a question of who’s responsible or whether it’s real. It’s a question of what are we going to do about it?” For those among us old and fortunate enough to have been there, perhaps remembering that first Earth Day will motivate us to make similar commitments to help deal with global warming, each in our own small way. For those who are younger, and even those not yet part of the global gene pool, it is my sincere hope that you take up the cause, so that 30 years from now you can read, “Rising concern about the environmental crisis is sweeping the nation’s campuses ...”<sup>1</sup> with a sense of pride and satisfaction that you too did the right thing.

<sup>1</sup>reported five months before the first Earth Day, in the *New York Times*



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## What's New at the Laboratory

By Daniel Snow, Ph.D., Director of Laboratory Services

I'm sometimes asked if there are times during the year when we're not so busy here at the University of Nebraska-Lincoln's Water Sciences Laboratory.

If there have been, I don't recall any since we moved into our current building...nearly 29 years ago. Each year seems to be busier than the last, with new methods to develop, equipment to maintain, and projects to support.

In 2008, we logged nearly 2,800 samples, compared to about 2,000 the year before. About half of these were for low level measurement of contaminants such as algal toxins, pharmaceuticals, munitions, pesticides and steroid hormones.

Most of these groups represent new or "emerging" contaminants that are the focus

of many current research projects here in Nebraska and throughout the world. All of these methods depend on the sensitivity of the lab's triple quadrupole and ion trap mass spectrometers along with the expertise of our staff.

Our algal toxins method includes measurement of five different microcystin compounds – nonribosomal peptides produced in freshwater lakes by cyanobacteria or blue-green algae. Other algal toxins in this method include smaller molecules such as anatoxin-a and cylindrospermopsin.

The WSL has developed a couple of different methods for pharmaceuticals and antimicrobial compounds each list tailored to those we would expect in municipal or agricultural wastewater sources.

Our method for steroid hormone analysis includes both natural (endogenous) and synthetic (exogenous) compounds used or suspected to occur in wastewater.

In addition to water samples, we receive sediment, manure, plants, and passive samplers used to concentrate contaminants from streams or lakes over time.

The number of samples received for our stable isotope analyses continues to grow as we develop new methods. Instrumental technology has evolved considerably over the past 20 years so that much previously laborious and time-consuming sample preparation has become automated, greatly reducing its cost.

Everyday there are new studies describing

*continued on page 18*