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University of Nebraska–Lincoln Water Center

WATER CURRENT

Vol. 40, No. 1 Winter 2008

Water Quality Subject of Fifth Water Law, Policy and Science Conference

By Steve Ress

"Water Quality Challenges in the Great Plains" is the theme of this year's University of Nebraska–Lincoln Water, Law, Policy and Science conference.

The fifth annual UNL conference is April 22 and 23 at Lincoln's Embassy Suites.

"Our justifiable preoccupation with water quantity, which intensified with the effects of our recent drought and ongoing interstate water compact negotiations, have often overshadowed water quality issues that all of us in the Great Plains need to be concerned with in order to protect our way of life," said UNL Water Center director Kyle Hoagland.

"This year's conference theme is aimed at refocusing attention on water quality issues by continuing a tradition of attracting national water experts to address state and regional water challenges that impact all of us," he continued.

The conference will broadly address integrated approaches to water quality improvement, the economics of water quality, agriculture and biofuels issues, the ecology and culture of water quality, challenges to water quality from emerging contaminants and agricultural pesticides, and northern plains groundwater quality.

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Water Center History Nears Completion

By Steve Ress

It's been in the making since 1964.

The first-ever published history of the UNL Water Center, dating from its inception under University of Nebraska–Lincoln Conservation and Survey Division director Eugene C. Reed, is nearly complete.

"One of the project's goals was to have copies available to people at the fifth annual Water Law, Policy and Science Conference in April," said Water Center director Kyle Hoagland.

It appears that goal will be met after months of digging for information, writing, reviewing hundreds of photographs and personal contact with every living past director of the center.

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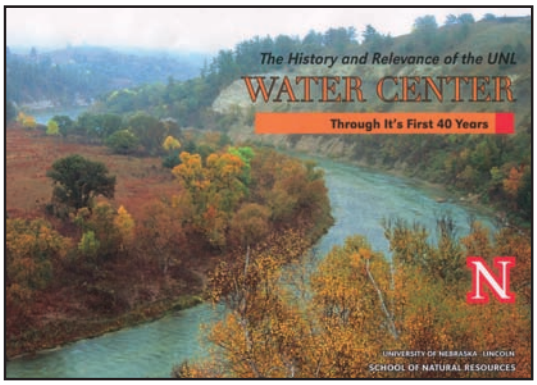

A comprehensive history of the UNL Water Center will be published this spring.

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A Wake-up Call on Climate Change

On January 16-18 I attended the eighth National Conference on Science, Policy and the Environment in Washington, DC. This annual meeting, put on by the National Council for Science and the Environment (NCSE, to which UNL belongs), included hydrologic scientists, ecologists, political scientists, past and present policy makers, sociologists, educators, media representatives, and economists.

from the DIRECTOR

Kyle D. Hoagland

Thus, its scope resembles our annual Water Law, Policy and Science Conference, on steroids (in terms of attendance — thousands!). This year's topic was, *"Climate Change: Science and Solutions."*

After listening to the best and the brightest speak on this topic for nearly three days, it was impossible to walk away without a deep sense of concern about the extent to which we have managed to "mess our nest" and an extreme sense of urgency that we must take action immediately if we are to have any chance of avoiding a myriad of dire consequences, many of which are already becoming evident.

Global warming is occurring *now*, in other words, this freight train headed for a major wreck has already left the station and we're all passengers, like it or not. Here's the reality of our present situation: the concentration of CO_2 (the principal greenhouse gas) in the atmosphere has increased by more than 30 percent over the past 250 years, mainly due to humans ("messing"), and *two-thirds of this rise has occurred within the last 50 years*! The bottom line is, unless we change how we do business *now*, our planet will see much higher CO_2 concentrations in the future, levels that we already know will lead to damaging climate change, including a 3 C increase in average global temperatures!

Most discussions about climate change envision a 50-year timeframe because humans can relate to it and it's within our capability to make reasonable global climate predictions that far into the future. The grim news is that if the world continues on its present course, CO_2 levels will roughly double by 2058 and very likely *triple* by mid-2100 if not sooner.

Here's why this matters: these high concentrations will be accompanied by major global warming, resulting in rising sea levels (imagine Florida under 8 inches of water), increased threats to human health (warmer temperatures means less potable water, more rapid spread of diseases, etc.), more frequent severe weather (floods, hurricanes, tornadoes), and serious ecological damage (for example, species extinctions at unprecedented rates and more widespread bleaching of coral reefs).

Again, this is happening now, not 50 years from now! The polar bear is nearing the brink of extinction due to loss (yes, melting) of its habitat, ice, which is apparently so alarming to the American public that several U.S. Department of Interior agencies have called an emergency summit to try and come up with a solution. Apparently, no one wants to be like the guy who cut down the last tree on Easter Island, which signaled an ecological collapse and the disappearance of an entire civilization.

As Jared Diamond, eminent biogeographer and author of *Collapse*, put it during his talk at an earlier NCSE meeting, "I wonder what he was thinking when he cut down that last tree. Technology will save us?" My guess is there isn't enough sand on the beach to bury our collective heads in when we have to explain to our grandchildren that due to our lack of resolve in dealing with global warming, polar bears are gone forever.

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WATER CURRENT

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Meet the Faculty

Steven A. Thomas, Ph.D.

Dr. Steven Thomas is an assistant professor in the University of Nebraska–Lincoln School of Natural Resources and has been a UNL faculty member for the past 18 months.

Steven A. Thomas

Education:

Ph.D., Aquatic Ecology, Idaho State University, 2000.

M.S., Zoology, University of Wyoming, 1991.

B.S., Botany, University of New Hampshire, 1987

Examples of Current Research/ Extension Programs:

Coupling consumer-resource interactions and nutrient spiraling in a stream network: The main objective of this research is to understand how stream network position influences spatial patterns in the feedbacks between multiple nutrient cycles, stream metabolism, and consumer-resource interactions. In essence, we ask where and when are biotic interactions and biological stoichiometry important determinants of nutrient transport and retention in river networks, and what are the consequences for downstream communities? Recent theory addressing consumer-driven nutrient recycling suggests that shifts in elemental content of consumers are driven in part by resource availability and in part by the emergence of specific life history traits in response to changing environmental conditions along gradients of physical variables. The effects of shifts in stoichiometric imbalance between consumers and resources on nutrient spiraling have yet to be studied. In its second year, this research seeks to establish 1) empirical relationships between stoichiometric imbalances and changing environmental conditions along a drainage area gradient in a river network; and 2) experimental determination of the effects of

(continued on page 14)

Brian D. Wardlow, Ph.D.

Brian Wardlow is an assistant professor and remote sensing specialist in the National Drought Mitigation Center, School of Natural Resources at the University of Nebraska–Lincoln. He conducts research on the use of remote sensing, geographic information systems (GIS) and geospatial modeling techniques for drought monitoring and vegetation characterization. His research also involves the development of integrated decision support systems for drought planning and working with stakeholders and decision makers to effectively utilize information from new drought monitoring tools for planning and mitigation. His other research interests include land use/land cover change, vegetation dynamics, biogeography, and environmental planning.

Education:

Ph.D., Geography (with honors), University of Kansas, Lawrence, Kan., 2005.

M.A., Geography (with honors), Kansas State University, Manhattan, Kan., 1996.

B.S., Geography (Magna Cum Laude), Northwest Missouri State University, Maryville, Mo., 1994

Current Research Programming:

Wardlow's current research programming revolves around remote sensing, land use/land cover characterization, drought monitoring, geographic information systems, human impacts on the environment, biogeography, environmental/physical geography and natural resource management. Current projects include:

1) Developing new drought monitoring tool for the U.S. called the Vegetation Drought Response Index (VegDRI), which integrates traditional climate-based drought index information with satellite-based observations of vegetation conditions and other biophysical data,
2) Developing new tool called the Vegetation Outlook, which provides future outlooks of vegetation

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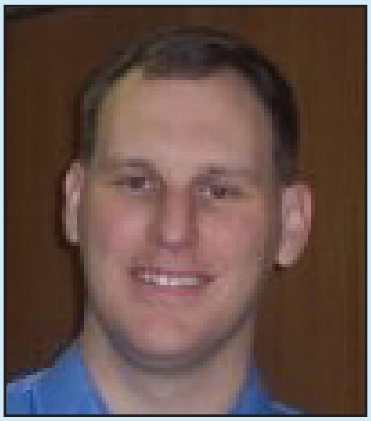

Brian D. Wardlow

Planning Begins for June Tour of Republican River Basin

By Steve Ress

The University of Nebraska–Lincoln/Kearney Area Chamber of Commerce summer water and natural resources tour will travel to the Republican River basin in Nebraska and Kansas sometime the first week in June.

"We haven't set definite dates yet, due to some ongoing discussions with colleagues in Kansas that could benefit the overall tour agenda," said UNL Water Center associate director and tour co-planner Michael Jess.

Tour stops and speakers will focus on water use in the Republican River basin. The 1943 Republican River Compact, and a settlement under the compact that was negotiated in 2002, limit irrigation and other water uses in Nebraska's portion of the watershed. The interstate compact and subsequent settlement govern use of basin waters in Nebraska, Colorado and Kansas.

"It's been well reported of late, that despite the 2002 settlement, Kansas officials have criticized Nebraska for being too lax in restricting water consumption in the basin and have claimed that Nebraska has used more than its share of basin waters nearly every year since the settlement was signed," Jess said. Kansas has threatened legal action if the current situation can't be resolved by the end of this year.

"All of this makes it especially pertinent for Nebraska legislators and water professionals to be up to date on issues in the (Republican) basin and thus the reason the tour is going there," Jess said.

Tour routing details are not final, but organizers expect to visit potential tour locations in both Nebraska and Kansas in the coming weeks.

Main Street Red Cloud could be the location for a joint meeting between the Nebraska summer water and natural resources tour and a separate tour group from Lawrence, Kan., sponsored by the Kansas State Geological Survey. Nebraska tour co-organizer Michael Jess said the two groups could mingle and spend time discussing water and related issues (photo: Steve Ress).

The Republican River just south of Red Cloud. The summer water and natural resources tour will visit the basin, in both Nebraska and Kansas, in the first week of June. (photo: Steve Ress).

A tentative tour stop in Red Cloud will likely be newsworthy. Nebraska tour participants and those from a separate tour originating in Lawrence, Kan., sponsored by the Kansas State Geological Survey, will cross paths that day.

"While in Red Cloud, it is expected individuals from both tours will mingle and spend some time discussing water and related issues. The Kansas tour group traditionally consists largely of state legislators and public officials," said Jess.

In addition to legal issues in the basin, the tour plans to explore irrigation, agricultural, biofuels, including Switchgrass production, and conservation efforts, among other topics.

Tour co-sponsors include Central Nebraska Public Power and Irrigation District, Nebraska Association of Resources Districts, Nebraska Public Power District, UNL 's Water Center and School of Natural Resources and Gateway Farm Expo.

Last year's tour explored the Pecos River basin in New Mexico.

LB 701: Is it an Answer to Nebraska's Republican River Problems?

By Katherine Kalisek-Vogel

For the past half century, Nebraska has faced significant problems managing its water resources in the Republican River Basin. Beginning with the Republican River Compact of 1943, Nebraska, Kansas and Colorado have attempted to equitably divide basin waters to provide stable water resources for agricultural, industrial and domestic purposes in each state.

Today, however, Nebraska is using more than its allotted share under the compact resulting in Kansas receiving less water than it is entitled to. In hopes of preventing litigation with Kansas, Nebraska enacted Legislative Bill 701, designed to alleviate Nebraska's Republican River water shortage by allowing Republican basin Natural Resources Districts (NRDs) to purchase or lease water rights from basin water users thereby ensuring additional water reaches Kansas.

Signed into law on May 1, 2007, LB 701 grants Republican River NRDs permission to lease or acquire surface water and groundwater rights using bonds issued to outside investors. In order to fund repayment of the bonds, NRDs can levy property taxes, up to 10 cents $100 dollars of property valuation, and place fees on irrigated acres in the form of an occupation tax, up to $10 per acre.

Many believe LB 701 is a great answer to Nebraska's compact problems. Nebraska needs to find a way to ensure that Kansas receives its allotted amount of the Republican waters pursuant to the compact and purchasing and leasing water rights so more water stays within the main stream of the Republican River appears, on its face, to be a good solution to the problem. Kansas gets water and Nebraska water users get paid not to use their water rights.

However, Nebraska water users are paid with money raised through property taxes and the Nebraska Constitution forbids the state to levy a property tax for state purposes. This raises the question whether, by granting Republican River NRDs the authority to levy a property tax in order to comply with the compact, the state is in fact levying a property tax to achieve a state goal in violation of the Nebraska Constitution.

The constitutionality of the property tax levy LB 701 adds to Nebraska Revised Statute § 2-3225 turns on Article IIIV, section 1A, of the Nebraska Constitution: "The state shall be prohibited from levying a property tax for state purposes."

Known as the "Duis Amendment," it was adopted in 1954 and amended to its current reading in 1966, after Nebraska adopted a state sales and income tax. By keeping the state out of the realm of property taxation, state interests and functions cannot not be financed by means of state-levied property taxes. The state must continue to administer its traditional functions and it cannot avoid or circumvent the Duis Amendment by converting the traditional state functions into local functions supported by property taxes. In sum, the state must finance its functions at the state level using funds raised through means other than a property tax.

In interpreting the Duis Amendment, the Nebraska Supreme Court has held that simply because the state is not directly levying the property tax, that does not remove the tax from the Duis Amendment limitation. For instance, certain property taxes imposed by local political subdivisions may be considered state levies for the purpose of this limitation.

Katherine Vogel

If the Court were to hold otherwise, and construe the constitutional amendment to prohibit only a direct statewide property tax levied by the state itself, it would eviscerate the amendment. The state could avoid the limitation by requiring political subdivisions to levy property taxes and then turn the proceeds over to the state. Additionally, the state cannot avoid or circumvent this constitutional mandate by converting the traditional state functions into local functions supported by property taxes.

In the current context, Nebraska cannot require local Republican River NRDs to impose a property tax in order to achieve a state goal of compliance with the Republican River Compact. Therefore, the inquiry focuses on whether the new property tax is designed not to achieve a local NRD purpose but has in fact been enacted by the Nebraska legislature to achieve the state goal of Republican River Compact compliance through a property tax that the state could not constitutionally levy under its own taxing authority.

It is first important to note that while NRDs have always had the authority to levy property taxes under Nebraska Revised Statute § 2-3225, LB 701 expanded this power by allowing the Republican River NRDs to place a property tax on all taxable property within each NRD. LB 701 states that property tax will allow the NRDs to implement its duties and obligations and resolve local water conflicts under the Nebraska Ground Water Management and Protection Act (LB 962).

However, given the fact that only those NRDs with jurisdiction "Including a river subject to an interstate compact among three or more states" are given the new taxing authority, resolution of local water issues, such as the implementation

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Griffin Named Groundwater Foundation President

The Groundwater Foundation has hired Jane Griffin as organization president, where she replaces founding president Susan Seacrest.

Griffin assumed her duties Feb. 11, said Groundwater Foundation board chair, Don Kraus, general manager of Central Nebraska Public Power and Irrigation District, Holdrege.

"Jane Griffin possesses the qualities needed to increase The Groundwater Foundation's role in groundwater education and protection. She has a strong commitment to groundwater protection and to educating the public about the resource. The board of directors look forward to working with Jane as she develops new opportunities for the organization," Kraus said.

Jane Griffin

Griffin brings extensive business management and nonprofit operation experience to the foundation.

"It is with great pleasure and excitement that I have accepted the position as president of The Groundwater Foundation. I am truly looking forward to this new chapter in my life," she said.

Her initial vision for the foundation includes heightening public awareness on the importance of groundwater protection and the national and international profile of the organization.

"The increased level of public awareness of environmental issues brings challenges and opportunities: increased competition is a challenge but public reception towards the need of water protection and conservation is much higher, thus an opportune time to take the foundation to a new level," Griffin said.

The foundation's board of directors hosted a welcoming reception in her honor on Feb. 25.

The Groundwater Foundation is a nonprofit organization located in Lincoln. Its mission is to educate the public about the nature and value of groundwater. In its first 24 years it has provided a wide range of adult and youth programs including the Children's Groundwater Festival, Groundwater University and Groundwater Guardian program that collectively have help educate thousands on the importance of groundwater. To learn more, go online to www.groundwater.org or call (402) 434-2740.

Jackson Joins Water Center as Intern

The UNL Water Center welcomed a new student intern to its staff this winter.

University of Nebraska–Lincoln environmental studies student Kyle Jackson is the new outreach intern at the UNL Water Center. Bringing previous experience from the public sector, Jackson will be working to communicate effectively to our state's decision makers in regard to Nebraska water issues.

Jackson is currently working on a Bachelors of Science degree in environmental studies and is planning to continue his education after graduation by attending law school. The education that he has received by being an environmental studies student has been very diverse through participation in courses focusing on a broad range of scientific, policy, and leadership areas.

"My future career goals are very environmentally law orientated," he said.

Previous employment experiences have been at the Nebraska Legislature, Nebraska Attorney General's office and working for U.S. Senator Ben Nelson and the National Park Service. He also got to fine-tine his walking backwards and acting skills as a new student enrollment orientation leader, he said.

Jackson grew up on a Sand Hills ranch near Bassett and as a student at Rock County High was awarded the State Future Farmers of America (FFA) degree and attended Cornhusker Boys State.

Kyle Jackson

"It was growing up in the Sand Hills that fostered my deep appreciation for the environment and the people that make a living off of it," he said.

After law school, Jackson hopes to begin a career in the environmental policy field that would focus on stakeholder collaboration and conflict resolution when solving environmental-related challenges.

Other interests, many of them related to his current studies and goals, include outdoors, food, and travel. During UNL's spring break in March, he is planning a study abroad trip to Argentina to tour its agriculture industry. Hobbies include hiking, skiing, cycling, and boating. Also, since coming to UNL as a student, he has been involved with many endurance and adventure races throughout the state.

Spring Seminars Continue Through April 16

The University of Nebraska–Lincoln's annual spring semester water seminar lectures began in January and continue through April 16. The free public lectures are examining a wide-range of local to international water and climate change issues.

"One of our goals this spring is to expose attendees to some of the most provocative speakers on issues ranging from future water use policy here in the Great Plains to perspectives on international concerns over global climate change and drought policy," said UNL Water Center assistant director Lorrie Benson.

Lectures are 3:30 to 4:30 p.m. each Wednesday, except March 19. All remaining lectures are in the first floor auditorium of Hardin Hall, northeast corner of 33rd and Holdrege Sts., UNL East Campus.

For the first time the lectures are being taped and posted to the UNL Water Center's website at http://watercenter.unl.edu. Along with a video or audio recording of each speaker, the site includes each speaker's PowerPoint presentation. Lectures are posted within five working days of their presentation. They can be viewed or listened to online, or downloaded.

"Posting the lectures online is an experiment for us," Benson said. "We're learning which equipment and formats to use to make them as widely accessible as possible. The timing is right as the public's interest in water issues and technology options both grow.

"We'd appreciate feedback on whether you liked having the lectures online and if you had any difficulties accessing them," she said.

A complete list of this year's lectures can also be found on the site.

Remaining Lectures:

Feb. 27 Eran Hood, University of Alaska Southeast, *Glaciers, Salmon, and Wetlands: The Hydrology and Biogeochemistry of Coastal Temperate Rainforest Streams in Southeast Alaska*

Mar. 5 Zohrab Samani, New Mexico State University, *Estimating Riparian Evapotranspiration - An Application of Remote Sensing Technology*

Mar. 12 Williams Memorial Lecture: Jeff Lazo, National Center for Atmospheric Research, *Weather and Society: Integrating Social Sciences into the Hydrometeorology Community*

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Nebraska DNR Sponsors Modeling Group Meetings

By Steve Ress

The Nebraska Department of Natural Resources (DNR) sponsors monthly groundwater modeling seminars through the coming year that are open to students and the general public.

The seminars are used to promote technical discussion to improve the collective understanding of Nebraska's hydrology and hydrogeology and to discuss ongoing state investigations by the DNR.

If you are conducting research you would like to share with this group, contact Doug Hallm at DNR to get on the schedule.

Several of the seminars will be presented at Hardin Hall, on UNL's East Campus, providing opportunities for UNL students, faculty and staff to learn groundwater modeling techniques and get up-to-date on state modeling projects.

The schedule is subject to change and a current schedule is always available online at http://www.dnr.ne.gov/docs/currentmeetingschedule.html.

Scheduled seminars, times and locations include the following:

Feb. 28: **DNR Baseflow Separation Study,** Jesse Bradley and Jim Schneider, DNR, 3 to 4 p.m., 901 Hardin Hall, UNL East Campus.

Mar. 27: **Developing the Eastern Nebraska Water Resources Assessment,** Dana Divine, ENWRA project coordinator, 3 to 4 p.m., Lower Platte South Natural Resources District (NRD), 3125 Portia St., Lincoln.

Apr. 24: **Optimization Modeling,** Steve Peterson, U.S. Geological Survey (USGS), time and location TBA.

May 29: **Geophysical Investigations: Magnetic Resonance Sounding,** Jim Cannia, USGS, time and location TBA

June 26: **A Risk Management Approach to Numerical Modeling,** Jim Schneider, DNR, 3 to 4 p.m., 901 Hardin Hall, UNL East Campus.

July 31: **Platte River Conjunctive Management Study,** Duane Woodward, Central Platte NRD, time and location TBA.

Aug. 28: **Streambed Conductance – Implications for Calculating Baseflow Depletions,** Xun-Hong Chen, UNL School of Natural Resources, 3 to 4 p.m., 901 Hardin Hall, UNL East Campus.

Sept. 25: TBA

Oct. 30: TBA

Nov. 27 and Dec. 25 No group meetings due to holidays.

Nebraska's Current Top 10 Water Challenges

This list appeared in the last issue of the *Water Current*, but was misnumbered due to an editing error. It has also appeared in numerous other venues, but in an effort to get your feedback and suggestions, we present it again for your benefit.

This listing is *unranked*, also recognizing that several challenges may fit into more than one of the three sub-categories (e.g., challenge #7 - monitoring system, also has immediate water quantity implications, and #8 also poses water quality challenges); K-gray education/outreach are inherent and very important needs inherent in all of these challenges:

Water Quantity

1. Effects of water consumption and conservation practices on instream-flows, groundwater recharge and water supplies, including ethanol production; realizing the maximum water use efficiency for irrigation (e.g., changing from gravity flow to center pivot) is a key factor.

2. Invasive exotic species (e.g., purple loosestrife, salt cedar, *Phragmites*), particularly in riparian buffer strips and in stream channels.

3. Climate change, especially the impacts of global warming and increased climate variability, particularly the frequency and severity of droughts and floods on water availability.

Water Quality

4. Nitrate, uranium, arsenic, and pesticide contamination of drinking water supplies, and nitrate contamination of irrigation sources.

5. Non-point source (NPS) nutrient and sediment inputs in lakes, streams and reservoirs, including toxic algae treatment and prevention, and establishing of Maximum Contaminant Loadings (MCLs) for nutrients in NE.

6. Potential surface and ground water contamination by "emerging" contaminants (including endocrine disrupting compounds), such as steroid hormones, antibiotics, pesticides, surfactants, and disinfectants, from grain and livestock production, biosolids application, biofuel production, and municipal/residential wastewater sources.

Water Institutions

7. Creating and supporting more comprehensive, ongoing, real-time water monitoring, including stream gauging and cyberinfrastructure networks that are linked to predictive models, readily accessible to the public, and coupled with smart decision-support tools. Understanding the connection between surface and ground water is especially important.

8. Aging water infrastructure, including drinking water distribution systems (esp. in small rural communities), wastewater treatment, storm runoff, irrigation systems, dams, levees, and canals.

9. Water economics and water policy, including establishment of water markets and water banking, and recognition and development of water resources as a natural resource amenity for recreational use (incl. greater public access) and wildlife habitat.

10. Creation of effective social systems to influence individual and institutional behavioral change for sustainable management of water resources, including a viable legal framework, ongoing financial support, and an increased focus on collaborative solution development.

Gary Lynne and Ashok Samal talk with Dean Ellen Weissinger at a water faculty retreat at Lincoln's Wilderness Ridge Lodge. The January retreat focused on UNL's new water science undergraduate major, current opportunities for water-related graduate students and overview of a professional science master's degree (photo: Steve Ress).

UNL School of Natural Resources' undergraduate coordinator Aris Holz talks with UNL Water Center director Kyle Hoagland at January's water faculty retreat at Wilderness Ridge Lodge in Lincoln (photo: Steve Ress).

ENWRA: Accessing Groundwater Resources in Eastern Nebraska

By Julie Wragge
Lower Elkhorn Natural Resources District

The Eastern Nebraska Water Resources Assessment (ENWRA) project recently finished a second round of test hole drilling at each of the three pilot study sites. The pilot study sites are located near Oakland, Ashland, and Firth.

The geologic information collected from the test holes will be used by the U.S Geological Survey (USGS) to help interpret maps produced by helicopter flyovers performed earlier this year. Geologists will also install ground water monitoring wells at some of the test hole locations. The water levels in these wells will be continuously monitored to assess the water table response to precipitation. Additionally, water samples will be collected from the wells to determine how long the water has been in the ground and its chemical composition.

The next step in the project will be evaluating the usefulness of a new geophysical technology to determine depth to bedrock beneath glacial till. These tests will be conducted, in conjunction with USGS, at some of the same locations where they have previously drilled test holes.

The geophysical equipment is about the size of a coffee can, so no heavy trucks will be needed and no additional test holes will be made. The equipment sits on the ground surface and records ambient vibrations from passing vehicles, wind in trees, etc.

Theoretically, geologists can analyze the movement of these vibrations through the subsurface and estimate depth to bedrock. Geologists will be assessing this technology at locations where depth to bedrock is known from test holes. These known depths will be used to evaluate how well the technology works in eastern Nebraska.

The overarching goal of ENWRA is to assess the groundwater resources in eastern Nebraska so that Natural Resources Districts can successfully balance ground water supply and demand now and in the future.

UNL Conservation and Survey Division drilling manager Matt Marxsen, hydrogeologist Sue Lackey and research technician Waylon Hullinger retrieve geologic samples near Oakland. Test holes are typically drilled into the top of bedrock, which in the Oakland area generally occurs between 60 and 260 feet below ground surface (LENRD photo).

Ethanol Plants, Continuous Corn Could Impact State's Water Resources

There are 115 ethanol refineries online and another 86 being constructed. Many of these are in the Midwest, or Corn Belt, which includes Nebraska.

In Nebraska, there were about nine million acres of irrigated land in 2007. What would happen if a significant number of existing soybean acres are switched to corn? What if all soybeans were taken out of production, leaving nine million acres of irrigated corn?

These scenarios may never occur in reality, but a University of Nebraska–Lincoln Extension team is working to provide answers about the effect ethanol expansion has on Nebraska's water resources.

The price of corn is now approximately double what it was about a year and a half ago, so naturally some farmers are switching from traditional corn/soybean rotations to a continuous corn farming practice.

Education about this alternative renewable ethanol energy and its impact is key to Nebraska's future as ethanol production expands both in state and across the nation. Continuous corn and its demand on water is an important topic, since on average corn uses 15 to 20 percent more water than soybeans, depending on several factors, including soil, climate and management practices.

In addition, with some farmers making the switch from a traditional soybean/corn rotation to continuous corn, the team will not only address the affect that growing more corn has on water resources, but also the water being used by ethanol plants.

New ethanol plants use about three to five gallons of water for each gallon of ethanol produced, according to the Nebraska Center for Energy Science Research. Newer plants also are designed to recycle 80 percent of the water they use. So, they are not drawing fresh water continuously.

(Editor's note: From UNL water resources engineer Suat Irmak and UNL extension educators Alan Corr and John Hay.

How Human Activity Has Transformed the Great Plains

Since the late 19th century, human activity has transformed the Great Plains from primarily temperate grassland to a mix of rangelands, croplands and population centers.

While population growth may cause cropland expansion in many regions of the world, it also causes a decline in farmland near expanding urban boundaries.

In the Fall 2007 issue of *Great Plains Research*, a publication of the University of Nebraska–Lincoln's Center for Great Plains Studies, U.S. Geological Survey geologist Mark A. Drummond examined contemporary land cover between 1973 and 2000 in the northwestern Great Plains and the western high plains.

"Due to the dynamic nature and consequences of land use, it is critical to understand the rates, types, and causes of land change," Drummond wrote.

Guest editors James W. Merchant, professor, UNL School of Natural Resources and Rex Honey, professor of geography, University of Iowa, chose four peer-reviewed papers from the 2006 joint meeting of the Association of American Geographers' Great Plains-Rocky Mountain and West Lakes Divisions for publication in this issue of Great Plains Research.

In their introduction to this special section of the journal, Merchant and Honey wrote, "The emphasis geographers place upon illuminating the spatial components of environmental, societal, economic and cultural issues has often afforded them a unique perspective on important questions confronting the region."

Kansas State University geographer Gina K. Thornburg explored the impacts of "shop locally" initiatives on small town economics in Kansas. Laura Smith, Macalester College geographer, analyzed the relationships between American Indian and non-Indian peoples as they addressed native land acquisition in the Minnesota River valley.

University of Minnesota geographer Roxanne Ornelas discussed connections between sacred landscapes and spiritual beliefs among indigenous peoples, with special focus on the impacts of North Dakota's Garrison Dam.

In addition to the special geography section, four natural science articles highlight recent research in Nebraska and Canada. Among these is an article by UNL researchers Tala Awada, School of Natural Resources, and Scott Josiah, Nebraska Forest Service, on responses of hazelnut hybrids to water availability.

In another article, Patrick E. Reece, professor at UNL's Panhandle Research and Extension Center, Scottsbluff, and his colleagues studied the effects of grazing and drought stress on prairie sandreed, a warm-season tall grass, in subsequent-year production.

The journal is available for purchase from the center at (402) 472-3082, in the Great Plains Art Museum gift shop, 1155 Q St., Lincoln or contact Robert F. Diffendal Jr., editor, *Great Plains Research*, (402) 472-6970

Nebraska Invasive Species Project Builds Awareness

By Annabel Major,
Nebraska Invasive Species Project Coordinator

On February 7t, the Nebraska Cooperative Fish and Wildlife Research Unit, with support from the Nebraska Environmental Trust, kicked off the first Nebraska Invasive Species Conference in Lincoln.

The event attracted invasive species managers from across Nebraska.

Speakers were from a variety of agencies and organizations actively involved in managing invasive species. Representatives discussed current and future perceived threats viewed by their agency or organization, providing input into what future steps are needed in invasive species management.

From this information, the group is becoming a united front in invasive species management, beginning a process of filling gaps in research and overcoming communications barriers.

During breakout sessions, smaller groups covered important issues in partnering and collaboration, policies and legislation, threatened and endangered species and developing recommendations for the future of invasive species management in Nebraska.

Recommendations came out of each session, all with similar perspectives: improving cooperation and information sharing, including an online resource; the need for formalized state coordination; developing legislative and policy proposals; establishing conservation actions necessary to reduce invasive species impact; creating prevention and early detection systems, including risk assessment, prediction maps, and monitoring networks; incorporating adaptive management methods into current management practices; and developing public education and outreach focus.

Some recommendations are already being developed such as the online resource and formalizing state-level coordination. The Nebraska Invasive Species Project is housed within the Nebraska Cooperative Fish and Wildlife Research Unit and is part of the University of Nebraska–Lincoln School of Natural Resources.

The project helps coordinate communications and management of invasive species interests. For more information, go online to http://snr.unl.edu/invasives.

Water Quality Subject of Fifth Water Law, Policy and Science Conference

(continued from page 1)

A second day law track for attorneys and professionals new to water law and others needing a better understanding of water law will address the basics of surface and groundwater, water law, water management, the roles and goals of water engineers, water speculation and other topics.

Lincoln attorney Tom Wilmoth will talk about how federal environmental laws impact water management and Holdrege attorney Mike Klein will address the impacts of water transfers on property titles and taxes.

Key speakers on the conference's first day include G. Tracy Mehan III, former assistant administrator for water for the U.S. Environmental Protection Agency (EPA) on integrated watershed approaches for the 21st century and former *Wall Street Journal* environment editor Frank Allen on journalism's duty to report Great Plains water issues.

Other speakers of note during the two-day conference include William Reilly, former head of the EPA under President George H.W. Bush, Vicki Colvin of Rice University, speaking on nanotechnology in the environment and Tufts University's Frank Ackerman, who will talk about possibly questionable economic benefits of the farm pesticide atrazine.

Many well-known UNL water faculty will also speak at the event.

"We are expecting a lively discussion from a panel composed of Nebraska water sages," said UNL Water Center assistant director Lorrie Benson. Panelists are longtime UNL environmental studies professor Bob Kuzelka, *Prairie Fire* newspaper publisher W. Don Nelson, former UNL Water Center director Warren Viessman, Steve Oltmans of Olsson Associates and consultant Dennis Grams, a former EPA administrator.

A broad menu of conference registration options and brief summaries of each talk are available online at http://watercenter.unl.edu/WaterConference/.

"Menu pricing allows people to pay only for the portions of the conference and associated meals that they choose to attend," Benson said. Registration fees increase after April 7's preregistration deadline. Students can attend the conference free, but need to register for meals.

Registration is online at the above address. If you need more information or help with the registration process, contact Jackie Loomis at UNL's School of Natural Resources at (402) 472-7550 or email jloomis3@unl.edu. Conference room rates are available at the Embassy Suites through March 31. Phone (402) 474-1111 for reservations or information.

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

Water Center History Nears Completion

(continued from page 1)

Hoagland commissioned Water Center communications coordinator Steve Ress and former Water Center administrative assistant Karen Stork to begin the project over a year ago.

"It's been a marvelous learning experience and I can't wait to see it in print," Stork said.

"She's been a real force in keeping this project focused and moving along," said Ress. "Karen (Stork) did the vast majority of the research and writing on this project and I think she's captured both the history and the essence of the center over the last 40-plus years."

Sections of the book examine the early years of the Water Center, as well as the decades of the 1970's, 1980s, and 1990's and into the 21st century. Chapters also detail the Water Center's accomplishments in the areas of water resources planning and management, service to the public, drought management, hiring of water-related faculty, the Water Sciences Laboratory and special projects and programs such as annual conferences, water tours and seminars, the Burlington Northern study, "MSEA" project of the 1990's and many others.

Recollections of past directors, in their own words are included as separate chapters.

"The book highlights the center's contributions to Nebraska and the nation over the last 40-plus years, documenting why the now-established network of state water institutes was created and the unique make-up and accomplishments of our UNL Water Center in particular since the late 1960's," Stork said.

It is anticipated that copies of the book will be available by late April. Watch coming issues of the Water Current or go to http://watercenter.unl.edu for more information on how to get a copy.

Spring Seminars Continue Through April 16

(continued from page 7)

Mar. 19 <u>No Seminar</u> (UNL Spring Break)

Mar. 26 Elizabeth Burleson, University of South Dakota, *Legal Frameworks for Water and Climate Change*

Apr. 2 Williams Memorial Lecture: Sarah Bruce, Bureau of Resource Sciences, Australia, *The National Agricultural Monitoring System - Supporting Australian Drought Policy*

Apr. 9 School of Natural Resources Director's Series Lecture: Gene Whitney, White House Office of Science and Technology Policy, *Communicating Science Information to Policy Makers and the Public*

Apr. 16 Kremer Memorial Lecture: Kathleen Miller, National Center for Atmospheric Research, *Uncertain Future for Water Resources: Grappling with Climate Change*

Water News Briefs

WaterSense

A new voluntary program sponsored by the U.S. Environmental Protection Agency (EPA) uses a WaterSense label to indicate a product or service is about 20 percent more water efficient than its counterparts. The purpose is to help consumers decrease water use, make informed decisions about products and encourage manufacturing innovation.

Standards are developed for high-efficiency bathroom sink faucets, faucet aerators, and showerheads.

WaterSense-labeled faucets are independently certified to perform as well as or better than standard faucets, maintaining good water pressure while not exceeding 1.5 gallons per minute flow.

More than 30 bathroom fixture models have already earned the WaterSense label since EPA released the final specification in October 2007. These water-efficient, high-performing faucets and accessories (such as aerators) should now be available in stores.

To learn more about WaterSense-labeled faucets and specifications, go online to http://www.epa.gov/watersense/specs/faucet_final.htm.

A new University of Nebraska–Lincoln Extension community lesson titled "Make Every Drop Count In The Home" provides information on efficient water use in the home, including information on WaterSense.

— Sharon Skipton, extension water quality educator, (402) 472-3662.

Tundra to Tropics

Educational materials on 2008 International Migratory Bird Day (IMBD) are available online at http://birday.org/. The theme for this year's IMBD is "Tundra to Tropics.

— Jeanine Lackey, wildlife education specialist/Project WILD coordinator, Nebraska Game and Parks Commission.

Water Lexicon

Breakout your water dictionary. There are many words and phrases associated with water education and water-related professions that we often don't hear in our daily conversations. A few of them, and their meanings, are listed below.

If there are others you would like to share with the Water Current readership, email them to sress1@unl.edu.

Brook: A small stream that carries fresh water. Use of the term is generally confined to the upper Midwest (Wisconsin, Minnesota, Michigan) region of the United States.

Swale: A small valley; depression between slopes, low area of moist land.

Draw: A shallow gulley; shallow natural channel into which rainwater drains.

Depression: A hollow area on the land surface that is lower than the surface surrounding it.

Run: A small fast moving stream; use of the term is generally confined to Eastern and Southern regions of the U.S. (i.e., Bull Run in northern Virginia).

Waterway: A man-made feature intended for drainage; often-linear alignment.

Watercourse: A general term connoting all of the above.

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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Send update to:

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P.O. Box 830844, Lincoln, NE 68583-0844
FAX (402)472-3574
or e-mail changes to sress1@unl.edu

From the Director *(continued from page 2)*

Keeping global CO_2 emissions even at their current levels, a goal that we must achieve to avoid a doubling of CO_2 concentrations, will require an unprecedented global effort.

To achieve this flat-line goal, no- or low-carbon emission strategies will have to be implemented in every country on earth, regardless of the respective level of economic development, political system, or religious base.

Nevertheless, according to researchers at Princeton University, "A portfolio of technologies now exists to meet the world's energy needs over the next 50 years and limit atmospheric CO_2 to a trajectory that avoids a doubling of the preindustrial concentration" (Pacala and Socolow 2004. *Science* 305(5686): 968-972; available at http://www.princeton.edu/~cmi). If you never read another word about global warming, I highly recommend the more popularized version of this *Science* paper entitled, *"Solving the climate problem. Technologies available to curb CO_2 emissions"* (Socolow et al. 2004. *Environment* 46 (10): 8-19; available at http://www.princeton.edu/~cmi_resources_new_files/Environ_08-21a).

Often referred to as the "low hanging fruit" paper, it clearly describes existing technologies, their relative potentials to reduce CO_2 emissions, and what longer-term measures should be pursued. In essence, it's a common sense guide to what can and needs to be done *now* to reduce CO_2 in the atmosphere and head off global warming. I'll list some of the "fruits" here briefly, because some of the technologies that Socolow and his colleagues site are things that each of us can employ and contribute to holding global warming at bay:

- Increase fuel efficiency of all light-duty vehicles (cars, vans, SUVs and light trucks), which currently emit one-eighth of all global CO_2 emissions.
- Add a carbon focus to new capital construction, including new buildings and factories, especially in developing countries.
- Use more efficient lighting and appliances, e.g., compact fluorescent bulbs alone could reduce energy consumption by 250 million tons of carbon over the next 50 years compared to incandescent bulbs.
- More rapid introduction of renewable energy (again using existing technology) such as wind power (which is growing globally at 30% per year already) and solar (photovoltaic or PV) electricity (also growing at 30% per year, but from a significantly smaller base).
- Greater use of biofuels, with some caveats (land demands are significantly higher for biofuel production than solar PV for example.
- Enhance natural carbon sinks by halting deforestation and (re)establishing major tree plantations.
- Widespread use of conservation tillage, to promote carbon retention in soils.
- Expand nuclear power by constructing 700 new plants worldwide.
- Increase use of natural gas versus other fossil fuels (carbon emissions per unit of energy content are lowest for natural gas when compared to coal and oil).
- Geological storage of CO_2, as is now being piloted in Canada and Norway.

No single "low hanging fruit" approach will accomplish the daunting task at hand. In addition, time is of the essence, for as Socolow and his colleagues point out, "Unless campaigns to reduce carbon emissions are launched in the immediate future across all sectors of the economy and in countries at every stage of economic development, there will be little hope of avoiding a doubling of atmospheric CO_2."

I have one other action item for you to consider, namely writing a brief e-mail to your Nebraska congressional representative and your two senators (please see http://www.congressmerge.com/onlinedb/cgi-bin/newseek.cgi?site=congressmerge&state=ne), informing them of your concern that not enough attention is being paid to this environmental crisis, urging them to take immediate action.

At the NCSE meeting, I heard a very interesting talk by Dr. Jon Krosnick from Stanford University, *"American perspectives on climate change."* He pointed out very matter-of-factly, that climate change was not an issue addressed by the current Republican presidential candidates (based on an absence of the topic from their websites), whereas the Democratic candidates each had 1-2 web pages dedicated to it. I raise this issue not to sway anyone's political leanings, rather to point out that global warming is not universally recognized *even now* as a crisis in Washington D.C.

As representative Jay Inslee (D-Washington) stated at the conference, "The congressional response to this issue has been pathetic." So, one sub-theme of the conference was that it's time to alert Congress to take action immediately to reduce carbon emissions in the U.S., and establish meaningful ties with India and China to work together specifically on this crisis.

Thanks for your patience in "listening" to all of this and for your consideration as to how you might personally respond. Hopefully the next meeting I attend will involve something more mundane, like skydiving or bungee jumping.

Meet the Faculty

Steven A. Thomas *(continued from page 3)*

stoichiometric imbalance in consumer-resource interactions on nutrient spiraling.

(Funding source: NSF-Ecosystems)

From genes to ecosystems: How do ecological and evolutionary processes interact in nature? In this research we experimentally evaluate reciprocal feedbacks between evolution and ecosystem processes and hence evaluate such theory in a natural setting. We do so using a focal species, the guppy (Poecilia reticulata), in which the rapid evolution of body size, life histories and other traits have already been documented. Our prior results suggest that feedbacks between evolution and ecology are important in this system because some of the evolutionary changes that we have observed are inconsistent with theory that does not include ecological interactions. We are conducting experiments in which we transplant guppies from sites where they co-occur with a diversity of predators to streams from which they have been previously excluded by waterfalls and that contain a single predator/competitor, Rivulus hartii, then to evaluate the ecological and co-evolutionary interactions that result. Our experimental setting benefits from additional barrier waterfalls that limit the upstream dispersal of guppies, but do not exclude Rivulus, providing a built-in control. We are also manipulating the light environment in a subset of experimental sites in order to alter basal resources and assess how the ecological context influences evolutionary trajectories. (NSF-FIBR award number 0623632)

Ecological Evaluation of Bank Stabilization in the Cedar River: 2007-2009. In this research, which begins this summer, we will be assessing the structural (algae, aquatic plants, macroinvertebrate) and functional (metabolic rates, nitrogen cycling) consequences of bank stabilization in the Cedar River, a tributary to the Loup R. This work will be spearheaded by Chris Paracheil (an MS student) and will employ a UNL undergraduate student in each of the next two summers.

Teaching:

Stream and River Ecology to be offered this Fall for the first time

Selected Publications:

2006 Mulholland, P.J., **S.A. Thomas**, H.M. Valett, J.R. Webster, and J. Beaulieu. Effects of light on NO3- uptake in small forested stream: diurnal and day to day variations. Journal of the North American Benthological Society 25(3):583-595.

2006 Fellows, C.S., H.M. Valett, C.N. Dahm, P.J. Mulholland, and **S.A. Thomas**. Coupling nutrient uptake and energy flow in headwater streams. Ecosystems 9:788-804.

2005 **Thomas S.A.,** T.V. Royer, E.B. Snyder, and J,C, Davis. Organic carbon spiraling in the Snake River, Idaho, USA. Aquatic Sciences. 67:424-433.

2005 Brookshire, J.D., H. M. Valett, **S. A. Thomas**, and J.R. Webster. Cycling of dissolved organic nitrogen in a forested headwater stream. Ecology. 86:2487-2496.

2005 Cross, W.F., J.P. Benstead, P.C. Frost, and **S.A. Thomas**. 2005. Applying principles of ecological stoichiometry to freshwater benthic ecology: recent progress and future potential. Freshwater Biology. 50:1985-1912

2005 Johnson, A.N., B.R. Boer, W.W. Woessner, J.A. Stanford, G.C. Poole, **S.A. Thomas,** and S.J. O'Daniel. Evaluation of an inexpensive small-diameter temperature logger for documenting ground water-river interactions Ground Water Monitoring and Remediation 25(4):68-74.

2005 Newbold, J.D., **S.A. Thomas**, G.W. Minshall, C.E. Cushing, and T. Georgian. Deposition, benthic residence, and resuspension of fine organic particles in a mountain stream. Limnology and Oceanography. 50:1571-1580.

2005 Schade, J., J. Espeleta, C.A. Klausmeier, M.E. McGroddy, **S.A. Thomas**, and L. Zhang. A conceptual framework for ecosystem stoichiometry: balancing resource supply and demand. Oikos. 109:40-51.

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Brian D. Wardlow *(continued from page 3)*

conditions based on the analysis of historical climate, satellite, and biophysical information,

3) Development of new classification methods to map and monitor large-area cropping and irrigation patterns in the U.S. Great Plains

4) Application of remote sensing observations to characterize the spatial extent and rate of cropland expansion and intensification in the Brazilian Amazon

5) Application of remote sensing to monitor vegetation phenology over large areas, particularly for crops and rangeland.

Teaching:

Guest Lecturer, Spring 2006, GEOG 980 Remote Sensing Graduate Seminar, Department of Geography, University of Kansas, Lawrence, Kan. Lecture topics include time-series analysis of remotely sensed data for land cover

characterization and environmental modeling and data mining techniques (i.e., classification and regression trees).

Guest Lecturer, Fall 2004, GEOG 526 Remote Sensing I, Department of Geography, University of Kansas, Lawrence, Kan. Lecture topics included vegetation indices (theory, historical development, and applications), time-series VI data and temporal compositing techniques, the AVHRR and MODIS sensors, and examples of specific application of time-series VI data (land cover classification, vegetation monitoring, and biophysical modeling).

Selected Publications:

Wardlow, B.D. and S.L. Egbert, 2008. Large-area crop mapping using time-series MODIS 250 m ndvi data: an assessment for the U.S. Central Great Plains, *Remote Sensing of Environment*, in press.

Brown, J.F., **B.D. Wardlow**, T. Tadesse, M.J. Hayes, and B.C. Reed, 2008. The vegetation drought response index (VegDRI): a new integrated approach for monitoring drought stress in vegetation. *GIScience and Remote Sensing*, in press.

Gitelson, A.A., **B.D. Wardlow**, G.P. Keydan, and B. Leavitt, 2007. Green leaf area index estimation in crops using MODIS 250 meter data. *Geophysical Research Letters*, 34, L20403, doi:10.1029/2007GL031620.

Wardlow, B.D., S.L. Egbert, and J.H. Kastens, 2007. Analysis of time-series MODIS 250 meter vegetation index data for crop discrimination in the U.S. Central Great Plains. *Remote Sensing of Environment*, 108. 290-310.

Gu, Y., J.F. Brown, J.P. Verdin, and B.D. Wardlow, 2007. A five-year analysis of MODIS ndvi and ndwi for grassland drought assessment over the central Great Plains of the United States. *Geophysical Research Letters*, 34, L06407, doi:10.1029/2006GL029127.

Brown, J.C., W. Jepson, J. Kastens, B. Wardlow, J. Lomas, and K. Price, 2007. Multi-temporal, moderate spatial resolution remote sensing of modern agricultural production and land modification in the Brazilian Amazon. *GIScience and Remote Sensing*, 44(2), 1-32.

Wardlow, B.D., J.H. Kastens, and S.L. Egbert. 2006. Using USDA crop progress data for the evaluation of greenup onset date calculated from MODIS 250-meter data. *Photogrammetric Engineering and Remote Sensing*, 72(11):1225-1234.

Wardlow, B.D. and S.L. Egbert, 2003. A state-level comparative analysis of the GAP and NLCD and cover data sets. *Photogrammetric Engineering and Remote Sensing*, 69(12):1387-1397.

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LB 701: Is it an Answer to Nebraska's Republican River Problems? *(continued from page 5)*

of LB 962, seems to be a narrow view of LB 701, especially when the timing of the bill's enactment is viewed in the context of the compact, Nebraska's increasing consumptive water use, and the rising conflict with Kansas.

If the authority granted to Republican River NRDs can be linked to compact compliance, there is a persuasive argument that such compliance is a "state purpose" prohibited by the Duis Amendment. Perhaps the most substantial element of the state purpose argument is the fact that the bonding and taxing authority granted in LB 701 extends only to the NRDs affected by the compact. This factor alone is significant evidence that compact compliance, a state goal, is in fact the primary goal of the property tax authorized in LB 701.

In addition to the fact that only Republican River NRDs are giving the new taxing authority, the unambiguous language of the taxing statute excluding the new property taxes from use in operating the district provides additional persuasive evidence that the property tax is not designed to achieve a local purpose but rather a state purpose, specifically compact compliance.

The original taxing authority of each NRD – the taxing authority that existed prior to LB 701 – is to be used for the operation of the NRD. In contrast, the new property taxing authority LB 701 grants to the Republican River NRDs is explicitly excluded from use for the operation of the district. The implication from this exclusion is that property taxes raised to repay bonds used to purchase or lease water rights are not taxes that are used for the operation of the district but rather are taxes that are to be used for a bigger purpose, namely state compliance with the Republican River Compact.

In sum, the plain language of the statute authorizing NRDs to levy new property taxes provides a strong argument that the new taxing authority violates the Duis Amendment.

First, only those NRDs whose jurisdiction includes the Republican River Basin are granted the new taxing authority and second, the new tax is expressly excluded for use for the operation of the local Natural Resources District. This language makes a persuasive argument that the Nebraska legislature has enacted LB 701 in order to allow a local NRD to levy a property tax to achieve a state purpose – compliance with the Republican River Compact – in violation of the Nebraska Constitution.

While Nebraska must find a way to comply with its Republican River Compact obligations, the legislature must create a constitutional solution to Nebraska's Republican River problems.

(Editor's note: Katherine Vogel is a third-year student at the UNL College of Law from Gretna. She received a B.S. in Biology from UNL in 2005. The opinions expressed in this article are solely those of the author and do not represent the opinions of the University of Nebraska–Lincoln, UNL's Institute of Agriculture and Natural Resources or the UNL Water Center. We welcome your comments and opinions. Contact the editor at (402) 472-9549 or email sress1@unl.edu).

What's New at the Water Sciences Laboratory

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

Last year was a busy one for the UNL Water Sciences Lab (WSL).

We received nearly 2,000 samples from a wide variety of clients supporting multiple projects. New methodologies we are working on include analysis of pesticides, steroid hormones, pharmaceuticals, and wastewater-related contaminants.

The new GVI Isoprime mass spectrometer and other stable isotope equipment is being used to develop methods for carbon, nitrogen, oxygen isotopes in organic samples, carbonate and nitrate for isotope "fingerprinting" and other environmental applications.

The Isoprime is one of the most sensitive stable isotope mass spectrometers available today.

We completed our building and office updates, which are welcome improvements to our suite of labs, which we have occupied since the WSL began in 1990.

The open house we held last October, in conjunction with the water faculty colloquium, prompted development of new displays describing the equipment we have and the methods we can offer. We were gratified to see so many colloquium attendees come over to the lab for a tour and explanations of our capabilities.

In addition to our facility updates, we also recruited new staff to fill open positions at the WSL. Xianghua (Jenny) Lou received her Ph.D. in Environmental Engineering from the University of Missouri-Columbia. In her research, Jenny worked on developing analytical methods for measuring trace levels of disinfection by-products to study contaminant formation in water treatment processes.

She will apply her analytical chemistry skills in developing and applying methods for analysis of metals and metal species using the Lab's Platform XS inductively coupled plasma mass spectrometer (ICP-MS). She will also assist in developing and applying new methods for stable isotope analysis.

Sathaporn (Tong) Onalong has a Ph.D. in Natural Resources from the University of Nebraska–Lincoln. His research included developing analytical methods to study the chemistry behind remediating (clean-up) soil and groundwater contaminants. He will oversee the lab's sample preparation methods and auto-analyzers, as well as assist in developing new methods for pesticides and organic contaminants.

We welcome Tong and Jenny to our team.

The WSL's new brochure is online at http://watercenter.unl.edu and lists many of the new methods we have at hand to help support water research in Nebraska and beyond and our staff is available to help determine the methods that are best for your research and water monitoring needs.

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