

Guest Commentary:

Nebraska Water Management Ahead of the Curve in Ogallala Region

By Jasper Fanning, Ph.D., Upper Republican NRD

Not enough food to satisfy rising worldwide populations, tighter water supplies, a possible slowing of the rate of crop-yield increases – there’s a growing amount of buzz surrounding these and other predictions of future ag-related conditions. An obvious question often follows: How adequate are current water-management policies to address these challenges?

Let’s focus for a second on our part of the world, the multi-



Jasper Fanning

state region that lies atop the Ogallala Aquifer. The largest aquifer in the U.S. and one of the largest in the world, it’s a significant reason Nebraska is a Top 5 state in seven agricultural categories – value of ag and livestock products sold, sales of grains, sales of cattle and calves, and acres in corn and sorghum, to name a few.

Nebraska’s water-management scheme may not be perfect, no regulatory framework is. But the locally-based regulatory authority provided through Nebraska’s one-of-a-kind Natural Resources Districts and in cooperation with the state Department of Natural Resources has proven in many important facets to be the most effective framework in the Ogallala Aquifer region, positioning it to be a continued leader in agricultural production for generations to come. This isn’t just my opinion as a manager of an NRD. It’s shared by experts in a range of disciplines, from economics to environmental studies, and will likely attract more attention as other states look for ways to transition from virtually unimpeded agricultural water use to reasonably regulated use that protects water resources while still allowing the economy to thrive.

Kansas Gov. Sam Brownback recently hosted a conference in western Kansas attended by more than 300 people where he bluntly stated the need for his state to enact new policies to better manage water. His staff passed out maps showing that in some parts of southwest Kansas, the aquifer has declined by 100-150 feet, and that even though 200-300 feet of saturated thickness remain, officials there project that if more isn’t done to control use the aquifer in those areas won’t be usable in just 25-50 years. Those declines are roughly double the steepest aquifer declines in Nebraska. Kansas has the ability to do more to preserve its resources, but it largely hasn’t occurred because of a system that

for a variety of reasons discourages cooperative decision-making by local and state officials.

Similar declines have occurred in larger regions of the Texas panhandle that helped prompt my NRD to successfully push for NRDs to have the authority to regulate groundwater in the late 1970’s. Our district became the first in the state to impose allocations, doing so in 1980.

Groundwater districts in the Texas panhandle just recently developed plans for how to manage their groundwater and some of the plans are beginning to emerge. In a region near Lubbock that on average gets annual precipitation similar to what is received in my NRD, a so-called 50/50 target has been established. The goal is to deplete no more than 50 percent of what remains of the aquifer over the next 50 years. While laudable that Texas is taking steps to regulate groundwater use, similar measures here in Nebraska would be considered laughable because we all agree The Good Life should last forever, not just 50 years or so.

My intent isn’t to criticize other states or hold our system up as perfect, but I think what the comparison shows is that Nebraska is well ahead of the curve with water management relative to other states because at least we are in a position to make decisions based on local conditions.

Recently in this magazine, respected UNL ag economist Ray Suppala, who is retiring, said that with the enactment of LB962 in 2005 that provided for a cooperative water-planning process conducted by NRD and state officials that balances the interests of competing water users and considers sustainability objectives, Nebraska water planning is “the most progressive of any Western state.”

Environmentalists and economists often don’t agree, but they may well on this point.

Early this year, the Environmental Defense Fund’s former senior attorney for rivers and deltas, Mary Kelly, presented a study she did exploring water management in Nebraska compared to other states. She praised Nebraska’s system as preferable.

An excerpt from the paper: “These broad and flexible powers give Nebraska NRDs distinct advantages over similar districts in other states that rely on local control. Texas, for example, also relies on local districts as the preferred approach to ground water management, but...most districts have been created on county jurisdictional lines, not on aquifer or river basin boundaries.”

“Even with distinct surface water and ground water regimes,” Kelly says in another section, “some states centralize management in

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New Institute Director Praises Strong Foundation

The Robert B. Daugherty Water for Food Institute has a strong foundation on which to build an organization that will help the world produce more food with limited water. That's the assessment of the water expert named to lead the institute.

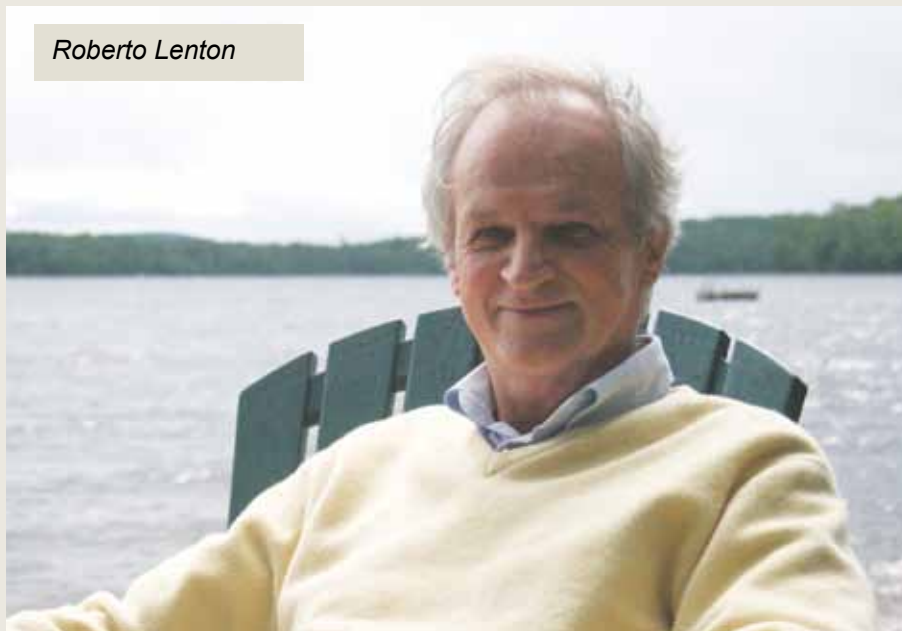
Roberto Lenton, one of the world's foremost experts in water management and development, was named founding director in August. His appointment begins in February 2012 after his responsibilities end as chair of the independent World Bank Inspection Panel. He will remain a panel member until August 2012.

Lenton said the institute has much to build on. Assets include "its base at a leading land grant university with a strong tradition of practical application of scientific knowledge; its location in the state of Nebraska, known as an innovator of good policies and practices in agricultural water management; the enormous talent of its faculty and research staff who have a long track record of addressing water and food security issues from a variety of disciplinary perspectives; its strong convening power, as illustrated by the annual Water for Food Conferences that have begun to shape the debate on this critical issue of our time; and the very generous founding gift from the Robert B. Daugherty Foundation that will enable the institute to get off to a rapid start."

"I am very excited by the opportunity to build on these strong foundations and enable the institute to fulfill its commitment to help the world use its limited freshwater resources effectively and ensure food security for current and future generations," Lenton said.

Lenton helped establish the International Water Management Institute in Sri Lanka and served as director general from 1987 to 1994. Under his leadership, IWMI grew from a small project-based organization to a major

Roberto Lenton



institute employing more than 300 people in 10 countries with an annual budget of over \$10 million.

"Dr. Lenton is an ideal choice for the founding director of the institute," said Prem S. Paul, vice chancellor for research and economic development. "His vast knowledge, global experience and international stature will serve Nebraska well as we strive to make this institute a world leader in the field of water for food. We look forward to working with him to build an internationally renowned institute."

A citizen of Argentina with degrees from the University of Buenos Aires and the Massachusetts Institute of Technology, Lenton also was director of the United Nations Development Programme's Sustainable Energy and Environment Division, program officer in the Rural Poverty and Resources program with the Ford Foundation, and an assistant professor at MIT. He also was senior adviser on water at Columbia University's Earth Institute.

Ronnie Green, Harlan Vice Chancellor of the Institute of Agriculture and Natural Resources, said Lenton brings a wealth of global experience to the Water for Food Institute. "Meeting the grand challenge of feeding a growing world population with more efficient use of scarce water resources requires great vision and we are tremendously excited to have someone of Roberto's caliber coming to lead us in this highly important initiative for Nebraska and the world."

Jeff Raikes, CEO of the Bill & Melinda Gates Foundation and a member of the Water for Food Institute board of directors, said, "Dr. Lenton is one of the most widely recognized leaders in the world in water circles. I don't believe we could have found a more qualified and respected founding director."

(Editor's Note: From 2011 University of Nebraska-Lincoln Office of Research and Economic Development.)

The 2011 Missouri River flood II: The past is prologue

By Alan S. Kolok, Ph.D., Aquatic Toxicologist, Department of Biology, UNO;
Department of Environmental, Agricultural and Occupational Health, UNMC

When looking at stars in the night sky, the light that we are seeing was actually produced by that star years or decades earlier. The age of the light depends upon the distance from the star to earth, the further the distance, the older the light. Effectively, we are getting a glimpse of the past.

It is much the same when we look at water flowing past a point on a riverbank. The water flowing by originated somewhere upstream days, weeks or even months before.



UNO environmental toxicologist Alan Kolok.

As such, the water that we are seeing is actually an image, in a matter of speaking, of the past.

For example, if you stand at the point where the Mississippi River enters the Gulf of Mexico, some of the water that is rushing by came from the river's headwaters in Lake Itasca, Minnesota. Those drops of water represent a snapshot into Lake

Itasca's past, three months previously, just as certainly as the light we see as a star represents a glimmer of its past.

It's not the same for a lake. While lake water does have a residence time, that time period can be so long that the water in the lake is effectively not changing. For example, the residence time for water in the great lakes is a snappy 2.6 years in Lake Erie but only a stodgy 196 years in Lake Superior. When we look at a sunset over Lake Superior, the water that we see will be, to a large part, the same water that could be viewed by our great grandchildren.

The dynamics of a river are important relative to its interaction with contaminants. Contaminants that are water soluble will be carried downstream, while the journey downstream for fat soluble contaminants will be influenced by where the compound is found: bound to sediment particles, bound to organics in the water, or bound to organics in living organisms.

Even those particles that are strongly bound to sediment particles will ultimately make the journey downstream, although their journey may be slower and more punctuated with periods of resettlement back into the underlying sediment bed. Furthermore, the total contaminant load in water when it reaches the river delta is really a function of the total contaminant load that has been flushed via runoff into the river, minus what has been removed by binding to sediments or other organic material, including the river's biota.

As discussed in last quarter's *Water Current* article, the 2011 Missouri River flood is providing an interesting case study relative to how

river dynamics influences downstream environments. The ultimate downstream environment influenced by these waters is the Gulf of Mexico, and one consequence of upstream river dynamics is enrichment of the Gulf with essential nutrients for algal growth.

When these algae die, they decompose resulting in a region in the Gulf known as the dead zone. How did the recent flood influence the dead zone in the Gulf of Mexico?

It really didn't. While there was speculation that the dead zone of 2011 could be the largest on record (exceeding 10,000 square miles) the dead zone was only 6,700 square miles, much smaller than originally expected.

It is possible Tropical Storm Don had something to do with that, as it could have remixed this region of the Gulf, so that much-needed atmospheric oxygen was infused into the water. The loading of nutrients and contaminants into the Gulf might have been at record proportions, however the surge of additional oxygen into the water might have altered its impact.

Alternatively much of the nutrient and contaminant load from the Missouri River flood might not have reached the Gulf at all.

Considering that the Missouri River is over 2,300 miles long, there are a number of dams and constriction points along the way where sediments, contaminants and nutrients can be waylaid on their march to the sea. Furthermore, the scouring of sediment and soil in the Nebraska region of the Missouri River undoubtedly led to sediment deposition somewhere downstream, well upstream of the Gulf. (If only those sediments could have reached the Barataria-Terrebonne Estuary in the Mississippi River delta, one of the fastest disappearing landmasses on earth. At least then our loss, as profound as it was, would have been someone else's immediate and dramatic gain).

Perhaps this is where the analogy between light shining from a distant star and water flowing from a distant mountainous tributary breaks down.

The light from a star, traveling through the vacuum of space, probably does not change appreciably over its long voyage. The quality of the water, however, dramatically changes based upon the water added to it from other tributaries and upon its interaction with sediments particulates suspended in the water.

The water within a river is history, but it is not merely the record of past events, but rather is an ever-changing system that contains remnants of the past that are constantly being modified by the present.

That the estimates for the dead zone were so inconsistent with the observed data, suggests that there is more for us to understand about this very dynamic and fascinating system.

Water Center Advisory Board Meets in October

By Steve Ress

The Water Center Advisory Board (WCAB) met October 21 to review the work and recommendations of its subcommittees and to consider how it might help as the Water Center more closely affiliates with the Robert B. Daugherty Water for Food Institute.

This marked the second meeting of the WCAB, who's members have been interacting with and helping to advise Water Center faculty and staff on a number of programs and projects over the summer via several subcommittees.

After a brief welcome by Water Center interim director Bruce Dvorak, Water Center assistant director Lorrie Benson told assembled board members the Oct. 12 and 13 Water Law Conference and climate change/ecosystems symposium at Lincoln's Holiday Inn had both been unqualified successes, marked by much stronger attendance than the past few years.

Special guest for the meeting was new UNL Institute of Agriculture and Natural Resources associate vice chancellor Ron Yoder, who updated the group regarding the Water Center's affiliation with the Daugherty Institute and what that could mean for both entities once

the institute's director, Roberto Lenton, arrives on campus in February, 2012.

Yoder said that IANR Vice Chancellor Ronnie Green was meeting, in the next several days, with Lenton in Washington D.C. discussing, among other things, the future of the Water Center in terms of how it may fit with the Daugherty Institute and what new opportunities that could mean for both entities. He said that no decisions regarding affiliations of the two entities would likely be made until after Lenton has an opportunity to consider it carefully, however.

Yoder did say the connection between the two entities would be "strong" and that the Daugherty Institute is hoping to build on the strength and successes of the Water Center.

Several WCAB members responded to Yoder's presentation by acknowledging that the new institute will bring new research and outreach opportunities to UNL for both entities, but were also concerned about the implications of the specific details of the possible relationship between the Water Center and the Daugherty Institute. They noted that agricultural water use and water quality were key to much

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WRAP Meeting Brief

By Rachael Herpel

The University of Nebraska Water Resources Advisory Panel (WRAP) met September 15, in the Whittier Building, which houses the Robert B. Daugherty Water for Food Institute.

Recognized for their service to WRAP, their terms having ended over the summer were Frank Kwapnioski, H2Options Engineering, LLC; John Miyoshi, Lower Platte North NRD; and Dennis Strauch, Pathfinder Irrigation District.

New WRAP members welcomed were Brian Barels, water resources manager, Nebraska Public Power District; Lyndon Vogt, general manager, Upper Niobrara-White NRD; and Jerry Kenny, executive director, Platte River Recovery Implementation Program. Returning to the panel are Frank Albrecht, assistant division administrator, Realty and Environmental Services Division, Nebraska Game and Parks Commission; and Mike Linder, director, Nebraska Department of Environmental Quality. Ronnie Green, NU Vice President and Institute of Agriculture and Natural Resources Harlan Vice Chancellor noted it was his one-year anniversary of meeting with this group.

Green offered the latest on the Water for Food Institute, noting that Roberto Lenton would begin February 1, 2012 as the institute's founding director. Marc Andreini joined the Water for Food Institute as an international research fellow on July 1. As a result of NU's partnership with UNESCO-IHE, Ed Harvey is in the Netherlands to help establish a joint graduate degree program and develop research partnerships and collaborations in the area of water and food production. Current plans focus on developing an executive management short course.

In five years Green expects the Water for Food Institute to have leveraged resources and shown measurable progress in reducing the amount of water used for irrigating crops at both the local and global level, thus achieving "more crop per drop."

While the University of Nebraska already has over 100 faculty working in water arenas, a recent gaps analysis was done to identify what was missing and needed to achieve even more. A "Cluster Hire of Faculty Addressing the Efficient and Sustainable Use of

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UNL Extension Works with Afghan Farmers to Improve Techniques and Efficiencies

By Vaughn Hammon and Jenny Rees, UNL Extension Educators

Greetings from Afghanistan. My name is Vaughn Hammon, Extension Educator with University of Nebraska–Lincoln Extension on assignment in Afghanistan working with local agriculture producers.

Agriculture in Afghanistan is very similar to agriculture in the U.S. in the very early 1900's. Issues that dictate what Afghan farmers grow are similar to those facing American agriculture producers. Some of these include market, price, transportation and WATER. Water is the overriding factor that determines if the Afghan farmer has a chance of success.

Afghanistan has a rich culture dating back thousands of years and agriculture has played a central role in their history. It has a predominately dry continental climate. Negligible precipitation occurs during the growing season in the majority of the country's cultivatable land. Most of the annual precipitation occurs at the higher elevations of the Hindu Kush mountain range. Afghan producers have been irrigating for centuries and do it much the same way they did hundreds of years ago. They have learned how to harvest seasonal moisture primarily from the mountains and divert, collect, store and move it throughout their arid land. This is accomplished successfully, but inefficiently through ancient, manual, labor-intensive methods.

Currently Afghanistan uses two types of irrigation systems which they call the informal and formal systems. Informal systems are developed and managed by communities, with no government assistance. Community resources dictate their success. Farmers using informal systems are allocated specific amounts of water, which are allocated to each farmer in proportion to sweat-equity the farmer puts forth in maintaining the system and to cash paid by the farmer.

In Afghanistan, a crude open canal transports water one-quarter mile to where it will be used to irrigate crops.



Surface water accounts for 30 percent of irrigation water and supplies 86 percent of the irrigated land. The infrastructure used includes diversion structures called surbans; main, secondary and tertiary canals that are predominantly unlined and made of earth, conveyance structures such as culverts, siphons and aqueducts and then access points. Small earthen retention dams are also used to capture runoff from the mountains.

Groundwater systems tap into shallow groundwater sources through springs, karez, and wells. Springs are an important water source for rural communities and their survival. An estimated 5,600 spring-fed irrigation systems provide water to approximately 188,000 hectares. The spring-fed systems are generally lower volume systems and are often supplemented by other water sources. Water allocation is again based on sweat equity and cash payment.

The karez extracts groundwater through a series of sub-surface tunnels and canals to gravity-feed water to communities for distribution. These underground tunnels and canals can stretch several kilometers and some are hundreds of years old. It is estimated that there are 7,000 karez responsible for irrigating 170,000 hectares of land. These are operated and maintained by individual communities and are long-term sources of good, quality water.

Wells are the final water source in the informal system. Information is sketchy due to the war and loss of many records. The last good records date to the 1960's. At that time, less than 1 percent of the water came from wells. Traditionally wells are shallow and



Nebraska ADT2 team members undergo resources training prior to deploying to Afghanistan in July.

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UNL Water Center Hosts Annual Water Law Conference and Climate, Water and Ecosystems – Shaping the Great Plains symposium Oct. 12 & 13 in Lincoln (symposium cosponsored by USGS Nebraska Water Science Center)



John Guretzky and Dave Wedin, both of UNL, talk at the Oct. 13 Climate, Water and Ecosystems symposium.

Tricia Liedle (center) of the Water Center registered guests for the water law conference and ecosystems symposium, both events that were held at Lincoln's downtown Holiday Inn.

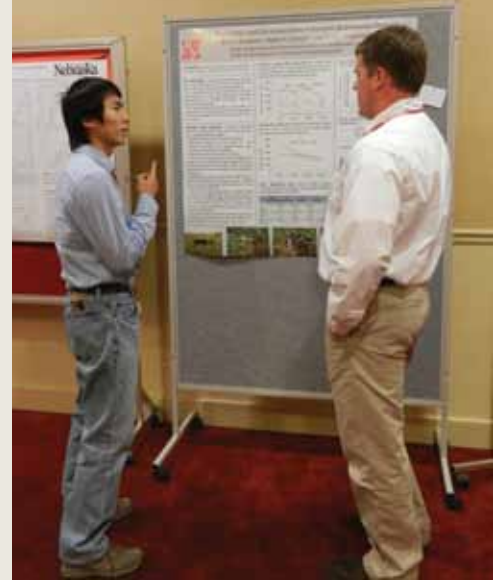


Water law conference moderator and panelists (from left) Anthony Schutz, Don Blankenau, Stephen Mossman and David Cozad.

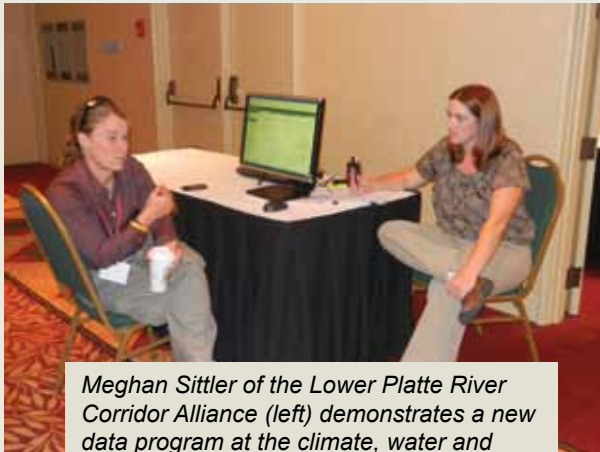
UNL graduate student Jonathan Traylor (left) explains his poster during a break in the climate, water and ecosystems symposium.



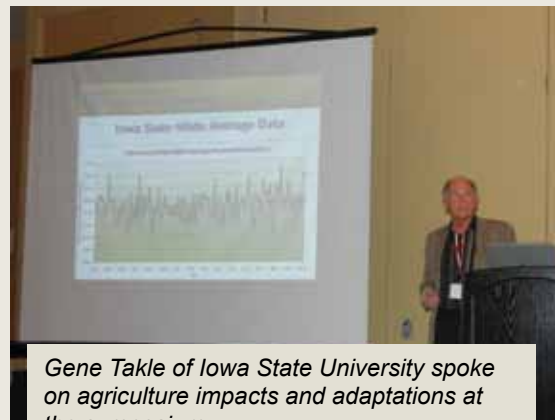
John Guretzky of UNL's Department of Agronomy and Horticulture (right) discusses his poster during a viewing session at the climate, water and ecosystems symposium.



Jerry Obrist of the Lincoln Water System talks on drinking water and wastewater during the symposium's impacts and adaptations session.



Meghan Sittler of the Lower Platte River Corridor Alliance (left) demonstrates a new data program at the climate, water and ecosystems symposium.



Gene Takle of Iowa State University spoke on agriculture impacts and adaptations at the symposium.



Gene Takle of Iowa State University and William Badini of HDR, Denver, Colo., talk during the symposium's lunchtime poster viewing session.



Kyle Hoagland, Bob Swanson and Craig Allen enjoy a moment during a break in the symposium.



Adell Amos of the University of Oregon School of Law spoke on the realities of climate change law and practice at the water law conference.

(Steve Ress photos)

Kremer Award *continued from page 4*

Beginning his career as legal counsel for the Nebraska Soil and Water Conservation Commission which later became the Natural Resources Commission, Lee was actively involved with the law portions of the framework study of the Nebraska Water Plan and with several special recommendations of the plan. His work involved many aspects of Nebraska Water Law Study and extensive activity with the implementation of Nebraska's Natural Resources Districts.

Orton was the first executive director of the Nebraska Association of Resources Districts for 10 years before entering private practice which he devoted to water resources matters, representing business and agribusiness on all nature of water resources problems.

Today he is principle of the Orton Law Office and remains actively involved with natural resources and environmental issues. He also serves as executive director of the Nebraska Well Drillers

Association, Nebraska State Irrigation Association, and the Nebraska Onsite Waste Water Association and works with the Bureau of Reclamation, irrigation and public power districts and other environmental programs and issues.

Past Kremer recipients: 1986, Vincent Dreeszen; 1987, Maurice Kremer; 1988, Eugene Reed; 1989, Val Kuska; 1990, Warren Fairchild; 1991, Ralph Marlette; 1992, Ted Filipi; 1993, Robert B. Crosby; 1994, Virginia Smith; 1995, Fred Salmon and Family; 1996, Frank A. Smith; 1997, Robert B. Daugherty; 1998, Les Sheffield; 1999, Richard Harnsberger; 2000, Wayne Madsen; 2001, Jim Goeke; 2002, Eugene Haarberg; 2003, Chris Beutler; 2004, Darrell Watts; 2005, Roger Patterson; 2006, Senator Ed Schrock; 2007, Jim Cook, 2008, Ann Bleed; 2009, Vance Anderson; 2010, Michael Jess.

Nebraska Center Advisory Board *continued from page 8*

of what the Water Center has historically done, but also said there is a wide range of water-related research, teaching and outreach conducted at UNL that is not linked to agriculture and that those areas need to continue being a Water Center focus. They felt the WCAB should be proactive in reminding university leadership of the importance of a strong Water Center as an anchor to broad-based water research and outreach.

Reports were then given on what the WCAB's four primary subcommittees had been working on over the summer:

Outreach and Communications: Discussions have focused on speakers, topics and venues for the 2012 water and natural resources tour that will focus on the Missouri River and recent flooding in the basin. Water Center assistant director Lorrie Benson has also been asking the group for possible themes and dates for a Fall 2012 symposium, as well as their thoughts on possibly organizing a future Nebraska Water Conference. If such a conference is reinstated (the last was held about 10 years ago) the one-day Water Law Conference could be folded into it.

Science Advisory: Subcommittee members helped choose a first-ever state "Impact" research award winner, who's name will be entered in a national impact research award sponsored by the National Institute for Water Resources (NIWR) Karrie Weber of UNL's School of Biological Sciences was chosen for the state award. Members are also reviewing three USGS 104b proposal submissions. External reviewers

will also help determine which of these proposals are accepted for USGS funding.

Research Support: It was reported that subcommittee discussions have revolved around building interdisciplinary research teams and engaging research faculty with external stakeholders to address state research needs.

Water Sciences Laboratory: Lab director Dan Snow delivered an overview of the lab and the services it provides to research faculty and students. He noted that outside funding for the lab is becoming increasingly competitive at the same time that the lab must become more self-sustaining. Subcommittee members are working with Snow in helping to identify what analytical equipment is most important for replacement or repair in order to preserve and enhance the lab's capabilities. About two-thirds of lab users are from NU, the other one-third being primarily federal or from other academic or government institutions.

WCAB members are John Bender, Nebraska Department of Environmental Quality; Alan Kolok, University of Nebraska, Omaha and University of Nebraska Medical Center; John Miyoshi, Lower Platte North NRD; Ron Zelt, USGS Nebraska Water Science Center; Rick Holland, Nebraska Game and Parks Commission; Steve Gaul, Nebraska Department of Natural Resources; and Dean Eisenhauer, Valery Forbes, John Gates, Sarah Michaels, Steve Thomas and Tim Shaver, all of UNL.

be the best time to hold it. We know there is considerable interest in reviving something along the lines of the annual Nebraska Water Conferences the Water Center used to hold, but need to flesh-out the thought process on this a bit more. If you have ideas, please let me know. We are also asking our Advisory Board for their thoughts on this.

There is much currently in the news about what we have learned from last summer's historic flooding on the Missouri River and what the possibilities may be for additional flooding in the basin this coming spring. In light of that, a decision has been made to conduct next year's Water and Natural Resources Tour on the Missouri River and surrounding area July 17-19, 2012. The tour could be looking at flood-affected areas of the river from Gavins Point Dam, south to Nebraska City and will likely headquarter in Omaha. There is no better time to tour this area and see what we can learn from last spring and summer's epic flood.

We want to approach the tour from a "lessons learned" standpoint, so we anticipate exploring a very wide range of topics, including river management and use, post-flood reconstruction of

infrastructure and agricultural lands, fish and wildlife and natural resources issues, what effects the flood has had on agriculture and life in the basin, emergency response to the flood and many others. The challenge will be in deciding what speakers and topics we have to leave off the agenda within the limits of the three-day tour. We already are receiving some welcome advice and planning assistance from many members of our faculty, our advisory board and area Natural Resource District managers, all of which we welcome.

We are also pleased to welcome the USGS Nebraska Water Science Center as a tour sponsor and co-planner.

More details of the tour will be published online at watercenter.unl.edu as they become available.

In closing, I am excited about our spring Water Seminar series. An important component of the seminar series are speakers related to groundwater and surface water modeling. We have a slate of internationally respected modelers speaking in the series, as well as sessions that address important Nebraska topics. Please read the article about the Seminar series on page 1. We hope you will participate in the series.

Nebraska Water Management *continued from page 5*

a state resource agency, as opposed to locally-based regulation. In theory, there are potential benefits to this approach assuming state decision-makers are more insulated from local political pressures, but it is certainly no guarantee of sustainable management. And, in some cases, local interests may be more aggressive than state policy makers in protecting their resources."

Water-resource conditions in Ogallala Aquifer states illustrate the truth of that last sentence. As the NRDs approach their 40th anniversary of protecting lives, property, and the future, it's Nebraskans who are to thank for establishing a system that could

be a template for water and resource management beyond the state's borders.

(Editor's Note: Fanning, who holds a Ph.D. in agricultural economics, has been general manager of the Upper Republican Natural Resources District in Imperial since 2004. The article strictly reflects the views and opinions of the author. Guest submissions to the Water Current are encouraged, with the Water Center reserving all rights to edit and publish any and all submissions at receives).



Groundwater Foundation President Jane Griffin (right) presents a Groundwater Guardian plaque to Rachael Herpel as part of a designation ceremony held at the foundation's 2011 national conference in October. Herpel represented the Mayor's Water Conservation Task Force, which has served as Lincoln's Groundwater Guardian Community Team since 1995, and the UNL Water Center, a Groundwater Guardian Affiliate for two years.