

## Water Resources Center

UNIVERSITY OF MINNESOTA

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*The Water Resources Center is affiliated with the College of Food, Agricultural and Natural Resource Sciences and University of Minnesota Extension.*

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## Legislature approves \$750,000 funding for WRC to create sustainable water framework for Minnesota

After hours of debate in the Minnesota Legislature, the Clean Water, Land and Legacy bill was passed into law at 11:55 p.m. on May 18, 2009. The bill is expected to spend \$397 million over the next two years. The money, generated from a three eighths of one percent sales tax increase, was divided into three parts, \$88 million to fund outdoor habitat, \$151 million to the Clean Water Fund, and \$158 million to support parks and trails and the arts.

The WRC was allocated \$750,000, effective July 1, 2009, to create a 25-year water framework for the state, protecting, conserving and enhancing the quality and quantity of surface and ground waters. According to the bill, the framework will contain an "implementation schedule and associated benchmarks for policy,

research, monitoring, and evaluation in order to achieve sustainable ground and surface water use." It goes on to say, "water use is sustainable when current use does not harm ecosystems, degrade water quality, or compromise the ability of future generations to meet their own needs." WRC co-director Deb Swackhamer laid out the reasoning for a Minnesota sustainable water plan to the Minnesota legislature, citing a lack of comprehensive federal water policy or national vision. To fill that leadership gap, some states are creating individual water policies that fit their unique water needs.

The WRC will hire a framework project coordinator, who will collaborate with state and local agencies, water management organizations, citizen groups and private business. Issues to be

*Water framework continued on page 2*

## Model will allow managers to forecast impact of policies on toxic chemicals in the Great Lakes

Home to 35 million people, the Great Lakes Basin contains 22 percent of the world's freshwater—and several classes of synthetic organic chemicals that pose potential threats to

"legacy" pollutants such as PCBs, and chemicals of more recent concern such as polybrominated diphenyl ethers and perfluorooctane sulfonates. PBTs can be found in industrial chemicals and

pharmaceuticals, pesticides, and even everyday personal care products.

PBTs are of critical concern to water quality experts because they transfer easily across air, water, and land, and span geographical and generational boundaries. Individuals who eat large amounts of fish from waters contaminated with certain PBTs are at risk for adverse health effects, and mothers can pass these chemicals to their unborn children. Birds and mammals at the top of the food chain are also threatened—the most



*Photo credit: Dave Hansen*

Lake Superior contains several classes of persistent biochemical and toxic chemicals (PBTs). This model will help resource managers prioritize research and monitoring to reduce PBTs in the Great Lakes.

human and ecological health. These synthetic compounds, referred to as persistent bioaccumulative and toxic chemicals, or PBTs, include

*Great Lakes basin continued on page 2*



*Great Lakes basin continued from page 1*

famous example being the bald eagle, whose decline in the 1960s was traced to DDT, another long-lived PBT.

With funding from the US EPA Great Lakes Air Deposition Program, University of Minnesota's Water Resources Center Co-Director Deb Swackhamer has teamed up with Senior Scientist Joe DePinto of Michigan-based LimnoTech to develop a multi-media screening model to help water resources managers prioritize research and monitoring for an ultimate reduction of PBTs in the Great Lakes.

Their model works by establishing a quantitative relationship between PBT sources, cycling, and exposure through various pathways, particularly PBT concentrations in fish. It will allow water resources managers to anticipate basin-wide relative exposure and risks from emerging chemicals of concern based on emissions, potential pathways in the basin, and known or estimated properties of those chemicals.

Swackhamer, also a professor in the University of Minnesota's School of Public Health and whose research is focused on the bioaccumulation and exposure of toxic chemicals in food webs, is providing the chemical data needed to calibrate and validate the model. She also is working on the hazard assessment aspect of the model.

DePinto, who previously served as a professor at Clarkson University and the State University of New York at Buffalo and as director of the Great Lakes Program at SUNY-Buffalo, has received international attention for his work on surface water modeling. Limno-Tech researchers, who have worked with national policy makers on computer modeling for projects involving the Gulf of Mexico, Chesapeake Bay, and Florida Everglades, are designing the Great Lakes-wide model.

"This model can be used by Great Lakes managers and policy-makers to forecast the impacts of newly-marketed chemicals and assess existing chemicals of emerging concern. There are too many chemicals to physically measure and assess in the field, and this allows us to see what impact a given regulatory or management strategy might have on protecting the Great Lakes," says Swackhamer.

*Water framework continued from page 1*

considered include infrastructure; drinking water; ground and surface water interactions; storm water; agricultural and industrial needs; the interfaces of climate change, development, and land use; and demographics.

"The process will be highly collaborative with robust citizen participation," said Swackhamer. "It's an honor to help lead the effort to develop a long-term framework to ensure Minnesota's water sustainability."

It's a great time to be in Minnesota. Spring came early, and summer is following on her heels. I watched the ice go out on Lake Carnelian on April 8, and our pair of loons arrived the next morning. Trillium have come and gone, and Jack-in-the-Pulpit are currently showing off. We ate our first spinach salad from the garden this week. So yes, life is good. And on top of all of it, we live in a place where the citizens amended the Constitution to dedicate part of the sales tax to the arts and outdoors, even in the face of a major recession. The first step in implementing that commitment came this spring, with the first round of funding decisions made on the funds, including \$151 million for water resources (see Legislative Update, page 3). The hope I feel for the future of Minnesota's waters is nearly boundless.

While spring is a time of renewal, summer is a time when things at the University slow down, a time to take stock. I am embarking on a new journey by accepting the Charles M. Denny, Jr., Chair in Science, Technology, and Public Policy at the Humphrey Institute of Public Affairs, where I will spend half my time. I am looking forward to this exciting opportunity to meld my scientific expertise with my interests in how science informs policy, and to learn from and interact with the faculty and students at Humphrey. The timing is right, given my involvement with the Statewide Water Framework (see page 1) and the US Environmental Protection Agency Science Advisory Board.

This is also a time of transition for the Center – this month we say farewell and best wishes to two most valued and longtime staff, Maria Juergens and Barb Liukkonen. Maria has been the administrator of the Center since 1992, and has seen it grow from a staff of four part-time people to a staff of 22 FTEs. She has managed a budget that grew to 40 times its original size, and helped bring life to the highly successful Water Resources Science graduate program. Barb has been our Renaissance Water Woman, handling education and outreach programs across all topics of water since 1996. She has been our voice on drinking water, shoreland protection, and volunteer monitoring as well as our face at every water event around the state. We will miss both of these women more than they can ever know.

Enjoy the summer!

Deb Swackhamer

## MinnAqua fishing program adapts to changing demographics

The tag line for MinnAqua, the fishing education program of the Minnesota Department of Natural Resources, is “Minnesota Waters—Fishing, Sharing, Caring.” These days, the challenge for Roland Sigurdson, DNR MinnAqua aquatic education specialist and part of the Water Resources Center, is to integrate caring for Minnesota’s natural resources into a fishing program geared to recent immigrants. For many immigrants, fishing and hunting are not recreation, but traditionally key to their survival. The concepts of a limited fishing season and fish catch limits can be puzzling to those struggling with language barriers and the stress of feeding their families.

Sigurdson uses the North American Wildlife Conservation Model, created in the late 1800s by hunters and anglers to preserve disappearing wildlife, as the basis for the MinnAqua fishing clinic curriculum, *Fishing: Get in the Habitat*. The MinnAqua message is that natural resources belong to all Minnesotans, and it is our responsibility to conserve and manage resources in a sustainable way.

At a typical clinic, participants play “Run for your Life Cycle,” in which players become northern pike, and must overcome the barriers the fish encounter during their life cycle. Then they might play “Fish Families,” and learn about the physical structure of a fish, a skill that will help them to identify their catch and follow regulations. “The Lake Game,” developed by the WRC’s Barb Liukkonen, promotes understanding of how land activities affect the water quality of nearby lakes and rivers. The session usually wraps up with casting practice, a lesson about safety at the water’s edge, and the chance to try one of Minnesota’s oldest and most time-honored traditions: fishing.

Sigurdson has become adept at communicating with non-native English speakers, but sometimes he encounters an unusual challenge. “I was asked to present a seminar

to recent Southeast Asian immigrants on fishing regulations,” he recalls. “The catch was that they were all deaf. It took me and three translators to answer a single question.” Because sign language differs from country to country, a translator who knew the South East Asian sign language had to translate the question into American Sign Language. The next interpreter translated it into



A happy angler shows off her catch.

Photo Credit: Minnesota DNR

English. “I think each question took about three minutes to move down the chain, but at the end of the evening there was common understanding and more citizens understanding Minnesota fishing laws.”

Sigurdson enjoys working with new Minnesotans, and cannot list the many highlights of the last eleven years. “The most rewarding times are when our program is instrumental in helping an adult and a child connect to the new activity of fishing that they enjoy together. Time on the water together leads to understanding of the resource they enjoy, participation in environmental stewardship, and fun.”

The halls of the Capitol in St. Paul are much quieter these days, following a frenzied finish to the legislative session. The house and senate passed the Cultural and Outdoor Resources Dedicated Funds bill appropriating new sales tax revenues from the recently approved constitutional amendment. Nearly \$151 million was allocated for clean water for the biennium, with more than \$69 million in the first year and \$81 million in FY11. The appropriation included nearly \$397 million over two years for clean water, parks and trails, habitat restoration and preservation, and arts and culture.

The Minnesota Pollution Control Agency (MPCA) will get about a third of the funds for Total Maximum Daily Load (TMDL) monitoring, planning and implementation to protect water quality. Monitoring will expand to include endocrine disrupting chemicals in surface and ground water across the state and sampling near waste water treatment plants for endocrine disrupting chemicals, pharmaceuticals, and antimicrobial chemicals. The MPCA will provide grants for waste water reuse pilot projects, the Clean Water Partnership Program, and specific projects on the St. Louis and Lower St. Croix Rivers.

The Public Facilities Authority (PFA) and Board of Soil and Water Resources (BWSR) will receive about a quarter of the funds. The PFA funds are mostly for waste water and drinking water infrastructure; the BWSR funds are for conservation easements and grants to watershed districts, reduction of non-point source pollution, and improvements in animal feedlot water quality. Approximately 10% of the funds will go to the DNR for TMDL activities, drinking water planning and protection, the Mississippi River corridor critical area, county geologic atlases, and the collection of high resolution digital elevation data (LiDAR). The Department of Agriculture funds (about 6%) are for their BMPs loan program, increased monitoring of agricultural contaminants in surface and ground water, drinking water protection, and TMDL activities. The Minnesota Department of Health will receive \$3.75 million for drinking water source protection and for addressing public health concerns related to contaminants found in drinking water.

The WRC will receive \$750,000 to develop a 25-year comprehensive, statewide sustainable water management framework (page 1).

## Study finds households are flushing more organic carbon

A pilot study conducted by the Colorado School of Mines, in cooperation with the WRC's Onsite Sewage Treatment Program team, sampled sixteen households in Minnesota, Colorado, and Florida for what flowed into and out of their septic tanks. They compared these findings to a compilation of reports in the literature since 1969. By adding a mechanical diverter to the homes' building sewers, researchers were able to sample water from each home seasonally for a 24-hour period.

Samples were evaluated for a number of conventional waste water parameters, including suspended solids, nitrate, ammonia, phosphate, carbonaceous biological oxygen demand (cBOD), and chemical oxygen demand. At some sites, additional compounds were measured, such as pharmaceuticals, the antimicrobial additive triclosan, caffeine, and certain endocrine disrupting compounds found in household products. A resident survey provided household population data, ages, and water-use habits. While municipal waste water treatment plants are

studied for effectiveness of contaminant removal, the effectiveness of individual septic systems has not received the same scrutiny.

The small number of households sampled represents a qualitative snapshot, and so only broad comparisons are possible. Overall, it was found that the cBOD was higher in the household samples compared to the literature, which may be due to increased use and disposal of pharmaceuticals and personal care products. Also, the cBOD of the septic tank effluents was less than that of the tank influents and much closer to the literature value, indicating that the tanks successfully reduce cBOD.

Researchers found caffeine in all samples tested, aspirin in about three quarters of samples, ibuprofen in half, and endocrine disruptors in more than three quarters. Water use did not vary from season to season but was affected by the participants' ages, with younger households using nearly twice the amount of water per person as households with occupants 55 and older.

The amount of oil and grease flushed down the drain was lower in sampled households than in the literature. Concentrations of phosphates were also down—possibly due to the adoption of phosphate-free cleaners. The amount of nitrogen in waste water remained the same.

"It's a little like going through someone's trash can—you get a snapshot of what's being used inside the home," said WRC research assistant Jessica Wittwer, the field sampler for Minnesota. "While fewer households are flushing oils and grease down the drain, households are putting more organic carbon down the drain—possibly due to greater use of pharmaceuticals and anti-microbial cleansers. The concern with these chemicals is their long-term effect on the larger ecosystem and food chain."

Study results underscore the need to improve septic system design and to target human behaviors that might be modified through education.

## Administrator created an environment of nurturing for both WRC and students

Underneath an ability to create a budget or slice through bureaucratic messes, Maria Juergens possesses the heart of a mom. For sixteen years, she nurtured the Water Resources Center from a staff of four, through the establishment of the WRS graduate program, the expansion of the Water Resources Conference, and the growth of the water research, outreach and education programs that give the WRC the scope it has today. As she retires this June, Maria leaves behind a culture of thoughtfulness and respect.

Maria began her service at the WRC as a conference organizer. Her duties expanded until she was both assistant to the director of graduate studies (DGS) and office administrator.

Maria says she enjoyed constructing budgets and managing the many parts and participants of the WRC's projects, but clearly her role as assistant to the DGS, a position she held until 2007, holds a special place in her heart. "Maria had a

special compassion for the students," said Jim Anderson, WRC co-director until 2008, "She took an interest in each one's unique situation and helped them work through any problems, whether it were schedules or just adjusting to life as a graduate student." Over the years, Maria helped students find apartments, renew visas, open bank accounts, and even get to the hospital. "She handled my problems like a mom hoping for the best for her kids," said Yi-Wen Chiu, a WRS graduate student. It is no wonder that she received the Graduate School's Best DGS Assistant Award in 2004.

What outlet will Maria find for her talents when she leaves the WRC? "I would like to volunteer to be an interpreter for hospitals or the judicial system," says the native Ecuadorian. And in proper maternal fashion, she will help her daughter prepare for a September wedding. The WRC, meanwhile, will miss its matriarch. "Maria was the heart and soul of the Center for so long, and

our Mission Control for operations—it will be very difficult to replace her," said WRC co-director Deb Swackhamer, "She will be greatly missed."



Photo credit: Christine Hansen

Connie Post (WRC and Minnesota Sea Grant), with longtime co-worker and friend Maria Juergens.

## OSTP septic system article reaches *Cabin Life* subscribers

When Nick Haig was approached by *Cabin Life* to submit an article for publication in the July/August issue of the nationally distributed lakeshore lifestyle magazine, he eagerly greeted the opportunity. "This was a chance to communicate directly to an audience beyond the septic professionals I usually deal with and make direct connections about proper waste water management with those most affected by poor waste water treatment – home and cabin owners." In his article "Septic Systems—More Than Meets the Eye," Haig, a program coordinator with WRC's Onsite Sewage Treatment Program (OSTP), gets straight to the point: "Understanding the difference between proper waste water treatment that protects water quality and improper waste water treat-

ment that threatens water quality is critical information when making plans to improve your cabin or when discussing the future of your community's waste water management policies."

The purpose of a septic system is the collection, treatment, and dispersal of all water used in the building. The septic tank transforms waste water into effluent, a liquid that contains reduced amounts of suspended solids and organic content and significant amounts of nutrients and disease-causing organisms. This effluent poses a threat to public and environmental health if it does not then flow to a specially designed soil treatment area that destroys pathogens, filters out fine solids, and retains phospho-

rus. Compliant septic systems protect water quality by fully treating septic tank effluent before it recharges the ground water and enters surface waters.

Many people live in homes or cabins built before enforcement of sewage treatment standards. Straight-pipe discharges, surfacing systems, cesspools, drywells, or systems without the necessary aerobic conditions for final treatment continue to threaten water quality. Haig hopes that getting the word out about efficient sewage treatment through articles in publications such as *Cabin Life* will encourage lakeshore stewardship and issue ownership, resulting in increased water quality, property values, and great days at the lake.

## Retiring WRC education co-ordinator leaves a legacy of cleaner water

Despite her shelves of awards from professional and community organizations, appointments to local and national planning committees, and memberships in professional organizations, Water Resources Center (WRC) education coordinator Barb Liukkonen is most energized by the ordinary—ordinary people that is, who care about their environment.

Retiring this year after 28 years with the University of Minnesota, Liukkonen is considered by her colleagues to be the ultimate motivator and team player. A tireless advocate for research-based educational programs, Liukkonen is known throughout Minnesota for spearheading community engagement projects through her appointments with the WRC, Minnesota Sea Grant, and University of Minnesota Extension.

Her legacies include the Volunteer Stream Monitoring Partnership, the Shoreland Education Program, and the Citizen Monitoring Bacteria Project, which grew from a project designed to test the effectiveness of a home-based *E. coli* test kit into a statewide community action movement involving nearly one hundred trained volunteers in more than 23 Minnesota counties. Volunteers contributed thousands of hours to

assess the health of their favorite lakes and streams; data they collected will be used by the Minnesota Pollution Control Agency to identify impaired waters.

"Barb's ability to pull diverse groups of people together toward a common good is truly astonishing," said Roger Becker, a University professor of agronomy and plant genetics who has worked with Liukkonen on water quality projects since the early 1990s. "Her charisma, her enthusiasm, her intellect and her collegiality all work to move people forward – in some cases, even without them knowing it," says Becker.

Recipient of the Extension's Distinguished Faculty Award, Barb exemplifies the best of Extension's outreach education and research efforts. Wayne Seidel, a county extension educator with Lake County in Two Harbors, supported Liukkonen's nomination for the Extension award. "Her expertise is highly regarded, her enthusiasm is contagious and she makes a real difference in whatever she does. Barb has a high level of personal integrity that results in relationships built on trust with colleagues and work associates."

Liukkonen's ability to reach out extends to her work with the media. While some

academics might dodge a call from the producers of the KQRS Morning Show, one of the highest-rated radio shows in America



Photo credit: Don Breneman

Barbara Liukkonen created the Citizen Monitoring Project, which helps the MPCA to identify impaired waters.

known for its wise-cracking personalities, Liukkonen stepped up and charmed the crew with her fearless effervescence and solid knowledge of water issues. Says University News Service media release representative Drew Swain, "Barb is a

*Liukkonen, continued on page 7*

# Community News

**Larry Baker** (WRC) presented at the symposium Complexity in Human-Nature Interactions across Landscapes at the U.S.-IALE Conference in Snow Bird, Utah, April 12–16, 2009. Co-authors included Kristen Nelson (Forest Resources) and Sarah Hobbie (EEB), and Joe McFadden (EEB) and Jennifer King (UC-Santa Barbara).

**Karlyn Eckman** (WRC) presented “Minnesota’s Experience in Testing Social Indicators to Measure Behavior Change” at the USDA-CSREES National Water Conference February 8–12, 2009, in St. Louis, MO. Eckman will also present “Understanding Target Audiences in Water Resources Programs” at the UCOWR/NIWR Conference in Chicago, July 7–9, 2009.

**Les Everett** (WRC) is a 2008–2009 recipient of the CFANS Faculty and Staff awards for professional and academic staff in the category of research. Everett helped to create and now oversees a series of “Value of Manure” workshops around the state, which show farmers how using manure as fertilizer can save both money and application time.

**Lucinda Johnson** (WRS graduate faculty, UMD) was named Interim Director of UMD’s Natural Resources Research Institute Center for Water and the Environment. Johnson also presented “Impacts of a Conservation Field Day for Youth” at IAGLR, Toldeo, OH, May 19–22, 2009, in a special session on evaluation impacts.



Photo credit: Christine Hansen

Ed Nater (Soil, Water, and Climate) and Les Everett (WRC) exchange congratulations following the CFANS 2008–2009 Faculty and Staff Awards.

**Paige Novak** (WRS graduate faculty, Civil engineering) has been selected as a 2009 Leopold Leadership Fellow. Novak is among the 19 mid-career academic environmental scientists named as Fellows this year. More information about the program is available at [www.leopoldleadership.org](http://www.leopoldleadership.org).

## WRC co-director Swackhamer named Humphrey Institute’s Charles M. Denny, Jr. Chair

Deborah Swackhamer has been named the Charles M. Denny, Jr., Chair for Science, Technology, and Public Policy, beginning July 1, 2009. Swackhamer joins the Humphrey Institute after a long and highly respected academic career at the University of Minnesota, where she has served on the faculty at the School of Public Health, as interim director of the University’s Institute on the Environment, and as co-director of the University’s Water Resources Center. She is chair of the Scientific Advisory Committee to the administrator of the U.S. Environmental Protection Agency. She also serves in advisory roles to the International Joint Commission, the National Oceanic and Atmospheric Administration’s Undersea Research Program, *Environmental Science and Technology Journal*, *Journal of Environmental Monitoring*, and the Minnesota Clean Water Council.

“I’m excited to move the research and education programs in environmental science and policy forward, and connect the terrific work done at the Humphrey Institute with other work being done across the University, state, and nation,” said Swackhamer.

## Student News

**Filiz Dadaser-Celik** (WRS) was selected by the Universities Council on Water Resources as the first-place recipient of the 2009 Ph.D. Dissertation Award in the field of Water Policy and Socioeconomics. Dadaser’s dissertation was titled: “Impact of Large-scale Irrigation on a Closed Basin Wetland: Water Flow Alterations and Participatory Irrigation Management on the Sultan Marshes Ecosystem in Turkey.” She was advised by Heinz Stefan and Patrick Brezonik.

**Claire Serieyssol Bleser** (WRS) presented “Interactive Effects of Hydromanagement, Land-Use, and Climate on Water Quality of Border Lakes in Voyageurs National Park and Vicinity” at the Lake of the Woods Water Quality Forum in International Falls, MN, March 11–12, 2009. Bleser also presented a poster, “Volunteer Stream Monitoring Interactive Verification Program and Other Web-Based Tools,” at the Mississippi River Research Consortium in La Crosse, WI, April 30–May 1, 2009. She is advised by Mark Edlund and Leonard Ferrington, Jr.

**Jeremy Erickson** (WRS, Duluth) presented “Determining the effects of urbanization on stream metabolism of Duluth streams” at the 57th Annual Meeting of the North American Benthological Society, Grand Rapids, MI, May 17–22, 2009. He is advised by Lucinda Johnson.

**Jake Galzki** (WRS) received the 2009 MN GIS/LIS Consortium Scholarship Award for his research: “Identifying Critical Portions of the Landscape for Water Quality Protection Using GIS and Terrain Analysis.” Galzki will compete in the

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*Student News continued from page 6*

MN GIS/LIS Consortium's student paper competition in the fall of 2009. Galzki is advised by David Mulla.

**Allison Gamble** (WRS, Duluth) presented "Trophic connections in the nearshore and offshore food webs of Lake Superior: a diet analysis approach" at the International Association of Great Lakes Research 2009: Bridging Ecosystems and Environmental Health across our Great Lakes, Toledo, OH, May 18–22, 2009. Gamble is advised by Thomas Hrabik.

**Nick Haig** (WRS) presented "Subsurface Sewage Treatment Practitioner Experience Program Evaluation" at the National Onsite Wastewater Conference in Milwaukee, WI, April 6–9, 2009. Haig is advised by Jim Anderson.

**Jason Kish** (WRS, Duluth) presented "Archaeal Diversity in the Pelagic Zone of Lake Superior" at the International Association of Great Lakes Research 2009: Bridging Ecosystems and Environmental Health across our Great Lakes, Toledo, OH, May 18–22, 2009. Kish is advised by Randall Hicks.

**Eric Merten** (WRS) presented "Eco-hydraulics of wood transport in streams: empirical models from Minnesota" at the 57th Annual Meeting of the North American Benthological Society, Grand Rapids MI May 17–22, 2009. Merten is advised by Jacques Finlay and Heinz Stefan.

**Dana Vanderbosch** (WRS) received her M.S. in April 2009. Her thesis was titled: "Revegetating Lakeshores in Urban Landscapes." Vanderbosch was advised by Susan Galatowitsch.

**Prosper Zigah** (WRS, Duluth) presented "Sources and Cycling of Carbon in Lake Superior: Insights from  $\Delta^{14}C$ " at the International Association of Great Lakes Research 2009: Bridging Ecosystems and Environmental Health across our Great Lakes, Toledo, OH, May 18–22, 2009. Zigah is advised by Elizabeth Minor and Josef Werne.

*Liukkonen continued from page 5*

wonderfully responsive expert, a genuinely warm personality and a terrific ambassador for the University."

Liukkonen will continue her association with the WRC this fall as the principal investigator on a grant studying how climate change may affect shoreline BMPs, collaborating with the University's St. Anthony Falls Research Laboratory, the Department of Bioproducts and Biosystems Engineering, UM Extension, and Oakdale-based Emmons and Olivier Resources.

"The most rewarding thing about my work is that it gets people thinking about lakes and streams in their own communities," said Liukkonen. "Most people really care about their water resources and want to do the right thing, but often, they're not sure what that is or how to go about doing it. That's what's made my job so much fun."

## Minnegram

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**Submissions:** Minnegram welcomes articles, community news, news stories, photos, and other materials for publications.

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## Upcoming Events

*July 7–9, 2009*

### 2009 UCOWR/NIWR Annual Conference: Urban Water Management: Issues and Opportunities

*Chicago, IL*

To register, [www.visit](http://www.visit):

[www.ucowr.siu.edu/](http://www.ucowr.siu.edu/)

*August 2–5, 2009*

### CUAHSI/USGS/University of Vermont Workshop: In-situ Optical Sensors for Water Quality

*Burlington, Vermont*

This training workshop will focus on how to successfully deploy, maintain and process data from *in situ* optical sensors in freshwater systems. To register, visit:

[www.cuahsi.org/hmf/sensor/](http://www.cuahsi.org/hmf/sensor/)

*August 10–13, 2009*

### Visions of a Sustainable Mississippi River: Merging Ecological, Economic, and Cultural Values

*Collinsville, IL*

For information, visit:

<http://aces.illinois.edu/node/89>

*October 26–27, 2009*

### Minnesota Water Resources Conference

*RiverCentre, Saint Paul, MN*

This conference presents innovative and practical water resource management techniques and highlights research about Minnesota's water resources, including best practices in design and application of water resource management techniques, implications of water policy decisions, and research into current and emerging water issues. Register at:

<http://wrc.umn.edu/waterconf>

# Publications & Resources

## **USGS Studies on Mercury Cycling in Stream Ecosystems**

The USGS studied eight streams in Oregon, Wisconsin, and Florida during 2002–2006. Findings show that the relative amount of methylmercury in streams is strongly correlated with streamflow and the production of methylmercury in the watersheds (particularly in wetland areas), which is subsequently transported in runoff to streams. An unexpected finding was that methylmercury production in channel sediments appears to be relatively unimportant for governing within-stream methylmercury levels.

Publications and data from this study can be accessed electronically at:

<http://water.usgs.gov/nawqa/mercury/pubs/>

## **Quality of Water from Domestic Wells Across the United States, 1991–2004**

This study from the National Water-Quality Assessment (NAWQA) Program of the U.S.

Geological Survey (USGS) assesses water-quality conditions for about 2,100 private domestic wells across the United States. Study results can be found at: [http://water.usgs.gov/nawqa/studies/domestic\\_wells/](http://water.usgs.gov/nawqa/studies/domestic_wells/)

## **Toward a Sustainable and Secure Water Future: A Leadership Role for the U.S. Geological Survey**

Committee on Water Resources Activities;  
National Research Council

Water is our most fundamental natural resource, a resource that is limited. Challenges to our nation's water resources continue to grow, driven by population growth, ecological needs, climate change, and other pressures. The nation needs more and improved water science and information to meet these challenges. To view this publication, visit: [www.nap.edu/catalog.php?record\\_id=12672](http://www.nap.edu/catalog.php?record_id=12672)

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