Minnegram

Water Resources Center
University of Minnesota
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December 2010

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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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Water Resources Conference 2010 provides a forum for agriculture, research, policy, and education

Plenary session water topics at the Minnesota Water Resources Conference October 19 and 20 ranged from flood control in the Red River Valley, to consumer product chemicals in the water supply, to the question of how to assign economic value to the environment, and a lack of science in school classrooms. As the fall sun sparkled on the still flood-swollen waters of the Mississippi River, over 600 conference attendees at St. Paul's RiverCentre caught up on the new and notable in the world of water resources.

Photo credit: Ryan Rodgers

Water Conference co-chairs Faye Sleeper (WRC) and Jim Stark (USGS) with Larry Barber (center) from the USGS following Barber's Tuesday morning plenary talk, "Effect of Biologically Active Consumer Product Chemicals on Aquatic Ecosystems."

Guest speakers were featured at two plenary sessions and two luncheon presentations. UM faculty and students as well as agency staff and consultants displayed 42 posters throughout the conference,as well as presenting numerous talks and sessions.

The conference is sponsored by the Water Resources Center and the College of Continuing Education, and co-sponsored by the Department of Civil Engineering, the Minnesota Section of the American Society of Civil Engineers,

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WRC co-director Deborah Swackhamer receives University Women's Center's top award

Introduced as "simply one of the best" by the University's Senior Vice President and Provost Tom Sullivan, Water Resource Center co-director Deborah Swackhamer spoke to a full house at the University's 10th annual Ada Comstock Award Lecture on November 4 at the Humphrey Center.

The award, sponsored by the University's Women's Center, recognizes leadership and scholarly achievement of the University's tenured female faculty.

Sullivan, who introduced Swackhamer, called her "one of our best interdisciplinary thinkers and problem solvers on campus" and called out her ability to communicate complex issues clearly. "Her contributions to our university, our state and our country are profound," he said.

Photo credit: Sophia Ginis

Deborah Swackhamer holds aloft artist Jude Ryan Reiling's sculpture "Water Woman," commissioned for the Ada Comstock award.

In her lecture, "Drop by Drop: Everyday Solutions to Toxic Water Problems,"Swackhamer spoke about increasing stresses on the planet's freshwater supply. She touched on global issues, but zeroed in on Minnesota's role in the freshwater cycle. While Minnesota has a strong record of water quality protection, she said, there's more we can do. "We're part of the problem and we can be part of the solution."

It's hard to believe it is the end of a decade, and the start of a new one. Time flies the older one gets…in fact, one of our national institutions just had its 40th birthday – the US Environmental Protection Agency was signed into law by President Nixon on December 2nd, 1970. It was the beginning of an unprecedented decade of attention to environmental issues, with passage of 16 major pieces of environmental legislation which included the Clean Water Act, the National Environmental Protection Act, the Toxics Substances Control Act, the Endangered Species Act, and others. I was pleased to be part of a day-long celebration of EPA held at Harvard University last week, which included the current senior leadership of EPA including Administrator Lisa Jackson, the first (and fifth) Administrator of EPA, William Ruckelshaus, and many other important figures in EPA history. We were also treated to a rousing luncheon speech by former Vice President Al Gore. With this next decade, perhaps we can improve on the record of the 1970s. Let's address the remaining environmental issues left behind, or off the table, or unanticipated by those landmark bills. I am not suggesting adding all sorts of new legislation; rather I hope that we can use a host of policy approaches to further strengthen the protection of public health and the environment. To achieve this goal, we need to address the mounting list of chemicals in our water; we need to fully engage the agricultural community in solutions to improving water quality, we need to manage our land use and development with water sustainability in mind. Water and the environment as a non-partisan issue enjoyed significant bi-partisan support in the 1970s; perhaps it can be an issue where our divisive Congress can find common ground.

While we can't always influence Washington, we can make a difference in Minnesota. The *Minnesota Water Sustainability Framework* is nearing completion after 18 months of hard work by hundreds of people (see Legislative Update). I'd like to take a moment to provide some personal reflections on this remarkable project. One outcome of this project has already been realized, and wasn't one that was required or anticipated – that this process has built a rich and extensive community of people who didn't all know each other before, but who are all committed to our water resources. We convened many experts from so many viewpoints and interests, many of whom have been on opposite sides of issues, and over time they built trust of each other over their spirited discussions. It didn't always lead to consensus, but I believe it will lead to a better future as these discussions and relationships continue. It was an honor and privilege and often a humbling experience to lead this effort. May the New Year bring constructive deliberation of the Framework, and the beginning of its successful implementation.

Deb Swackhamer, WRC co-director

Water conference, continued from page 1

Minnesota Sea Grant, and the Natural Resources Research Institute.

Tuesday morning, Gene Soderbeck from the MPCA presented the Dave Ford Award to the late Nils Nelson of Barr Engineering Corporation. Charles Hathaway from Barr Engineering accepted the award from Soderbeck for Nelson, whom Soderbeck said was well-respected throughout the water resources community for his work on water management and environmental review projects. Soderbeck also noted that Nelson's interest in consulting and research began at St. Anthony Falls Laboratory while he was a UM student.

Larry Barber, a research geochemist with the USGS in Boulder, CO, presented Tuesday's plenary session, "Effects of Biologically Active Consumer Product Chemicals on Aquatic Ecosystems." The number of chemicals in our water supply is growing rapidly, said Barber as popular, one-time-use consumer products find their way into lakes, rivers, and groundwater. These products swirl down our drains to the main line of defense, wastewater treatment plants, where treatment occurs with varying degrees of effectiveness. Solutions to the problem of chemical contamination in water are fraught with complications brought on by variability in hydrology, chemistry, biology, and engineering, as well as limited scientific resources. Barber sees media coverage as a mixed blessing as it doesn't cover science technology well, preferring words like "crisis" and "war" over more accurate scientific terms in discussing the safety of the nation's water supply. Barber urged his listeners to stay focused on the science rather than journalistic hype, saying he hoped that ". . . managers and researchers will come together, stop blaming others and work on finding common ground and solutions in venues like this conference."

Congressman Collin Peterson of Minnesota's 7th congressional district, spoke by phone from a campaign stop in the Red River Valley. Peterson advocated incentive-based programs as largely effective in promoting good land and water stewardship, and warned against state and federal agencies resorting to punitive methods to enforce compliance with governmental regulations. Bottom-up support from local watersheds for water management is critical to successful programs, rather than outside ideologues imposing their concepts of what farming and farmland should look like upon working famers. "Farmers are the first conservationists," declared Peterson.

Stephen Polasky, professor in Applied Economics at the University of Minnesota, gave Wednesday's plenary talk. His topic was "Incorporating Ecosystem Services into Decision Making." Ecosystems provide a wide array of goods and services to human society, said Polasky. Assigning economic value to ecosystems is subjective, difficult, and often not reflected in the industrial bottom line. So, the consumer is not aware of the environmental cost to produce products. Understanding the value of ecosystems needs to become main stream, and that, Polasky said, will require three tasks: improved understanding of the likely consequences of human actions on ecosystems and their ultimate impacts on ecosystem services and biodiversity; improved understanding of the value of these changes in ecosystem services or biodiversity; and promoting the design of institutions and policies that provide incentives to producers and consumers as they make manufacturing and purchasing decisions. There has been a recent increase in interest among ecologists and economists in defining and quantifying the value of nature, using "green" accounting and "green GDP." Pragmatic people care about

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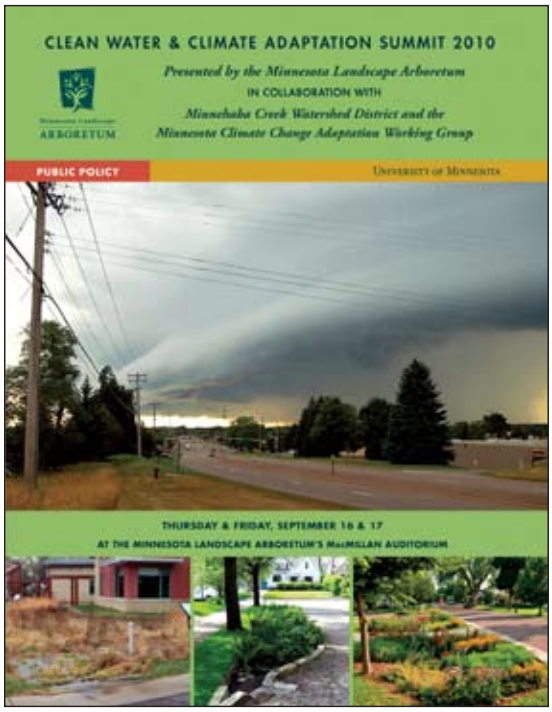
Climate adaptation summit highlights environmental scholarship and strategies

Barbara Liukkonen, Water Resources Center, liukk001@umn.edu

On September 16 and 17, 2010, nearly 300 participants gathered at the University of Minnestoa Landscape Arboretum for a conference on Green Infrastructure and Climate Adaptation. The conference goal was to bring together local government officials and staff, industry leaders, natural resource professionals, researchers, and citizens to learn how climate trends might affect Minnesota and the region, how green infrastructure will be a key water-management strategy, and how to make informed decisions and enhance the economic viability of their communities.



Cover art: Maria Klein

Nationally renowned speakers presented keynotes, followed by breakout sessions on a variety of subjects.

Andrew Reese, vice president for AMEC Earth and Environmental, opened the summit Thursday, focusing on design, policies, and techniques for urban development and redevelopment to protect clean water. Subsequent speakers addressed stormwater, LID, water-centric design, and other facets of Green Infrastructure.

To kick off Friday's conference on climate adaptation, Ben Santer, Lawrence Livermore Laboratory, spoke about climate change models, highlighting strengths and weaknesses and giving listeners guidance on how to assess how well certain models work. Eileen Shea, from NOAA, described the challenges and opportunities for providing climate information that meets the needs of society and decision-makers. Peter Mulvaney inspired participants by showing how Chicago is planning for and implementing adaptation strategies to deal with climate change. University of Minnesota professor and state climatologist Mark Seeley served as emcee and provided perspectives on current trends in Minnesota's climate.

Climate breakout sessions included: public engagement, downscaling models, agricultural adaptation, preparing for extreme events, climate change in forests and lakes, and implications for human health, plus several others. In each breakout session participants discussed needs, opportunities, and next steps for climate adaptation strategies in Minnesota. The Climate Change Adaptation Working Group (CCAWG) will compile those responses into a report and direction for future collaborative work. Those wishing to join the Climate Adaptation networking site may visit mnclimate-adaptation.ning.com.

Following the summit, one participant said: "The best, most useful, professional conference I've ever attended. Climate change is a new area of work for me but it relates to all else I do. I've had excellent leads from so many people I met."

The Conference was co-sponsored by the Landscape Arboretum, CCAWG, Minnehaha Creek Watershed District, University of Minnesota Extension, Water Resources Center and the Pulte Group.

The summit agenda and powerpoint presentations may be viewed at:

www.arboretum.umn.edu/cleanwaterclimatechangeconferencereport.aspx

Legislative Update

Since the last *Minnegram*, there has been a tremendous change to the political landscape resulting from the mid-tem elections here in Minnesota and across the nation. Minnesota's congressional delegation saw one major change - the venerable James Oberstar, who served the 8th district for 36 years, lost his seat to Chip Cravaack. Congressman Oberstar, chair of the Transportation and Infrastructure Committee, was a strong supporter of Great Lakes issues and worked to strengthen the Clean Water Act. We hope that Congressman Cravaack will do the same.

Within Minnesota, the Legislative landscape change was more akin to an earthquake, with both the Senate and the House changing to Republican leadership after years of dominance by the DFL party. The Environmental and Natural Resource committee of the Senate will be chaired by Senator Bill Ingebrigtsen and the Environment, Energy and Natural Resources Committe will be chaired by Representative Denny McNamara.

The change in the leadership in the federal legislature means new committee chairs to brief regarding the Water Resources Research Institutes, which includes the WRC. The reauthorization of the Water Resources Research Act that provides for the network of Institutes did not pass out of the Water and Power subcommittee of the Natural Resources Committee of the House in this last session, and has not seen action in the Senate. It will be "priority 1" of the coming year to see this act re-authorized, ensuring our continued appropriation from Congress. Water resources should be a non-partisan issue, but can get tangled up in the political process.

The *Minnesota Water Sustainability Framework* is close to completion. More than 250 experts and professionals contributed to this landmark effort. The draft recommendations have been presented in a number of public venues, and are undergoing final review by the project's external Headwaters Council and internal Synthesis Team. Presentations can be viewed at wrc.umn.edu. Recommendations include determining our water balance, reaching equity in pollutant load reductions, integrating water and land planning, and including the value of ecosystem benefits in water pricing. The Framework will be posted on the WRC website in early January, and delivered to the Legislature on January 15, 2011. To receive notification of the Framework's release, sign up at wrc.umn.edu.

Water resources educators field test potential climate change effects on common shoreline plants

Shoreland plants protect water quality by stabilizing shorelines, reducing runoff and erosion, and improving wildlife habitats. But until now, researchers have been unsure how climate change could affect shoreland plants' ability to survive.

Photo credit: Barb Liukkonen

John Chapman, BBE, and Shane Missaghi, UM Extension, plant perennials in project research study basins. The plants are commonly used for shoreline restoration.

"The possible effects of climate change haven't been investigated in current shoreland bioengineering best management practices," says Barb Liukkonen, a water resources educator with University of Minnesota Extension who is leading a team of researchers in two-year project, funded by a 319 grant awarded to the WRC from the Minnesota Pollution Control Agency, studying how climate change could impact shoreline plants and water quality.

Research models have shown that climate change is likely to result in intense rain events, followed by periods of drought or very little rainfall, all of which could spell trouble for shorelines. "One of the biggest issues is erosion, which results in the transportation of sediments, nutrients and pollutants downstream," says Liukkonen. "In addition to water quality problems, there's the potential loss of vegetation and habitat."

The field study is part of a larger climate adaptation project that involves Liukkonen, St. Anthony Falls Laboratory (SAFL) researcher Miki Hondzo, Bioproducts and Biosystems Engineering researchers Bruce Wilson and John Chapman, Extension Educators Mary Blickenderfer, Shane Missaghi and Karen Terry, and Camilla Correll, Emmons and Olivier Resources. The project also includes facilitation of a statewide Climate Change Adaptation Working Group, which meets monthly to identify needs, share results and improve interagency communication regarding the need for management practices and policies adaptable to conditions resulting from climate change, and a hydrodynamic modeling project focusing on Minnehaha and Brown creeks.

The experiment, conducted adjacent to the St. Anthony Falls Laboratory's Outdoor Stream Lab, set out to assess the survivability of various shoreline plantings in changing water level regimes. In each of four test basins, researchers planted about 225 plants in a random matrix. The study is designed to test the survivability and growth of eight plants commonly used in shoreline bioengineering including river bulrush, softstem bulrush, lake sedge, giant bur-reed, fox sedge, common reed, bottle brush sedge, and prairie cordgrass.

Over the course of four months during the summer of 2010, researchers manipulated water levels in the test basins, raising and lowering it according to climate change scenarios identified through modeling. Sediment and nutrient loss were monitored throughout the experiment, and in October, the plants were harvested and weighed—their above-ground mass, number of stems, and flowering culms being indicators of their health and survivability.

While final results are pending, Liukkonen is confident the project will help improve current bioengineering practices. Project recommendations will be shared with local units of government, Extension educators, and consulting firms engaged in designing, restoring, and installing shorelines throughout the Midwest.

"Our recommendations will save municipalities, local units of government and state agencies money by avoiding costly failures," says Liukkonen. "More effective planting and bioengineering techniques that are likely to survive in the face of a changing climate will also help protect water quality, reduce erosion, and enhance habitat."

To view a video about the research, visit: www.youtube.com

Photo credit: Shane Missaghi

Mid-summer, four research study basins near the SAFL outdoor stream lab show varied growth related to water levels.

Water Resources Science doctoral student Christy Dolph wins EPA STAR fellowship for southwest Minnesota stream restoration study

The Environmental Protection Agency recently awarded WRS P.h. D. student Christy Dolph a Science to Achieve Results (STAR) Graduate Fellowship. STAR fellowships support the training of the next generation of environmental science leaders.Dolph's dissertation explores the biological indicators that provide a comprehensive picture of stream health by summarizing trends in species diversity and environmental processes within an ecosystem, and seeks to improve confidence in stream management decisions. The fellowship furthers Dolph's research on ecosystems, specifically, "Linking ecosystem processes to macroinvertebrate community structure in restored stream systems of Southwest Minnesota." Dolph discussed her work with the *Minnegram* editor.

Photo credit: Christy Dolph

Field assistants on Christy Dolph's ecosystem research project collect water samples for study in Elm Creek.

What are your study objectives in stream restoration in southwest Minnesota?

"Ecological integrity" has become a key concept and management goal in natural resource disciplines, particularly among water resource scientists. To date, the vast majority of methods designed to assess the ecological integrity of streams and rivers focus on various aspects of ecosystem structure, such as the types and abundance of organisms found in a given habitat. Implicit in these structural approaches to water quality assessment is the assumption that structural indicators serve as a proxy for the functional integrity of surface waters. Whereas ecosystem structure refers to various aspects of biodiversity, ecosystem function pertains to rates and patterns of ecological processes such as primary production, nutrient cycling, and decomposition of organic matter. Because these ecosystem processes account for many services valued by human society, it has been argued that comprehensive assessments of stream integrity should consider functional, as well as structural, components of stream systems.

Recently, scientists have recognized that the extent to which highly disturbed streams continue to provide ecological services may depend on whether these systems can either be returned to a prior condition, or designed *de nouveau* to maintain key ecological functions. While attempts to restore or rehabilitate degraded streams have become widespread, the ecological effects of stream restoration are rarely evaluated in systematic fashion, particularly with regards to ecosystem function.

My work evaluates the response of stream community structure and function to stream restoration through study of secondary production of macroinvertebrates; for example, the amount of macroinvertebrate biomass that is produced over time and leaf litter decomposition —the amount of coarse organic material that decays or is lost over time. Both of these processes critically affect energy flow in lotic systems, and are indicative of a stream's potential to provide a number of ecological services including nutrient cycling, protection of biodiversity, and fisheries production.

You are looking at three rivers where restoration has occurred and you are studying up-and-down stream effects. What are your preliminary findings?

We began collecting data for this project in earnest back in April of this year, and data collection has continued through summer and fall. Our analysis of invertebrate population entails collecting a sample each month, identifying each specimen we collect to genus and measuring its length, which is lot of labor. So we have a lot of work to do this winter before we can make too many conclusions. But preliminarily, I would say that we do see some changes in stream habitat conditions associated with the restoration, both in terms of the amount of leaf litter trapped by rock and boulder structures added during restoration, and in terms of some differences in stream substrate, which is to say, more exposed gravel and cobble in the restored channel, and more fine sediments in the unrestored channel. Both of these factors could affect invertebrate production and leaf litter decomposition, which are the two ecosystem functions we are evaluating. We have also seen that the importance of stream restoration structures for aquatic organisms likely changes throughout the season, as stream flow rises and falls. These structures may provide important habitat for invertebrates when they are submerged at higher flows during the spring, early summer and late fall, but they may be less important at base flows.

The EPA states its purpose for the STAR Graduate Fellowships is in part "to fund students at the graduate level who are committed to meeting the challenges of today." How do you see your research accomplishing this objective?

My research provides evidence for how

STAR Fellowship, continued on page 6

CommunityNews

Larry Baker (WRC) and his research team's proposal to develop a "Twin Cities Urban Sustainability" forum will be funded by the National Science Foundation, with matching funds from the McKnight Foundation and two UM Centers (CTS and CURA). **Baker** presented a seminar at Portland State University, "Mass flow analysis of urban systems at various scales," October 15, 2010. **Baker** also presented a lecture, "Applications for urban biogeochemistry," at Yale University, New Haven, CT, October 28, 2010.

Valerie Brady (WRS graduate faculty, NRRI, Minnesota Sea Grant) leads the western Great Lakes group of coastal wetland researchers who received $10M Great Lakes Restoration Initiative grant to implement a Great Lakes coastal wetland monitoring program. Other researchers involved include **Lucinda Johnson** (WRS graduate faculty, NRRI), **Rich Axler** (WRS graduate faculty, NRRI), Jerry Niemi (NRRI), **George Host** (WRS graduate faculty, NRRI), and Terry Brown (NRRI).

Pat Brezonik (former WRC director) retired from the University in May 2010. Brezonik's contributions to the University and the field of environmental science and engineering were honored at a symposium and reception September 24, 2010, on the UM Twin Cities campus.

Karlyn Eckman (WRC) presented "Evaluating Social Outcomes in Water Resources Projects: Five Lessons from Minnesota," at the American Evaluation Association conference in SanAntonio, TX, November 10, 2010.

John Gulliver (WRS graduate faculty, CE) and **John Nieber** (WRS graduate faculty, BBE) received a three-year $312,000 grant from the Minnesota Local Road Research Board for their project, "Assessing and Improving Pollution Prevention by Swales." **Gulliver** gave the keynote address, "Gas Transfer from Bubble Swarms," at the 6th International Symposium on Gas Transfer at Water Surfaces, Kyoto, Japan, May 16–21, 2010.

Robert Hecky (WRS graduate faculty, UMD Biology), Norine Dobiesz, (LLO), **Richard Axler** (WRS graduate faculty, NRRI), **George Host**, (WRS graduate faculty, NRRI), and **Cynthia Hagley** (Minnesota Sea Grant), held a workshop in Jinja, Uganda, September 15–17, 2010, to discuss fisheries data management and decision support tools. The workshop was requested by the Lake Victoria Fisheries Organization (LVFO) for advice and assistance in managing the burgeoning amount of data and information from Africa's largest lake.

Joe Knight (WRS graduate faculty, FR, SWC) and his students received a grant award of $250,000 from the U.S. Fish and Wildlife service to develop new mapping methods for Minnesota's wetlands using geospatial data such as optical and radar imagery. The project is "Innovative Wetland Mapping Methods using Geospatial Data." **Knight** is the principal investigator.

Euan Reavie (WRS graduate faculty, NRRI) attended the "Workshop on harmful phytoplankton that could potentially be transported or introduced by ballast water," held in Copenhagen, Denmark, October 14–15, 2010.

Faye Sleeper (co-director, WRC) attended the Lake Superior National Estuarine Research Reserve designation ceremony, October 26, 2010, in Superior, WI. Wisconsin and the National Oceanic and Atmospheric Administration (NOAA) designated portions of the St. Louis River Freshwater Estuary as a National Estuarine Research Reserve.

Deb Swackhamer (WRC co-director) participated in the conference EPA@40: Protecting the Environment and Our Communities at Harvard University in honor of the 40th anniversary of the EPA on December 3, 2010. She was part of the panel, "From Science to Policy,"that also included OSEPA Associate Administrator for research and development, Paul Anastas. EPA Administrator Lisa Jackson gave a keynote speech and former Vice President Al Gore gave the lunch address. **Swackhamer** attended the annual USGS Coalition Reception in Washington, DC, October 20, 2010. She assumed the position of President of the National Institutes of Water Resources October 1, 2010. **Swackhamer** was also reappointed for a second two-year term as Chair of the US EPA Chartered Science Advisory Board. **Swackhamer** also spoke at the Society for Environmental Toxicology and Chemistry's annual North American meeting in Portland, OR, November 8–12, 2010, on the topic "Coordinated Research Strategy for Contaminants of Emerging Concern," coauthored by **Paige Novak** (WRS graduate faculty, CE).

A number of presentations were made in November and December by **Swackhamer** to highlight the draft recommendations of the Minnesota Water Sustainability Framework. These included a presentation to the state Clean Water Council, the national Sustainable Water Resources Roundtable, held at the Freshwater Society, Navarre, MN, a Minnesota Environmental Initiative forum entitled "Policy in Minnesota: Planning the Next Chapter," and the annual meeting of the Minnesota Association of Soil and Water Conservation Districts.

Thomas C. Winter, scientist emeritus with USGS, died October 8, 2010. Although Winter retired from USGS in 2007, he continued to pursue research on lake and wetland hydrology and groundwater-surface-water exchange. His work in lake hydrology at Williams Lake in northern Minnesota, and throughout the country and world, fundamentally changed understanding of lakes and groundwater interaction.

STAR Fellowship, continued from page 5

human societies can live sustainably within ecosystems. The question of sustainability is particularly relevant for highly disturbed landscapes, such as the intensively managed agroecosystems that constitute the setting for the project. By evaluating whether relatively small-scale, targeted restoration efforts influence patterns in stream processes, I hope to understand whether such efforts can contribute to the sustainability of stream ecosystem services within the context of a highly disturbed landscape.

Student News

Yi-Wen Chiu won a runner up award at the poster competition at the Gorden Research Conference: Industrial Design, in New London, NH, July 11–16, 2010. Her presentation was "Water Consumption by Energy Sector under Climate and Population Change Effects." Chiu is employed by Argonne National Lab, Chicago, IL, as a postdoctoral appointee, and will continue her study interests in water-energy nexus and water sustainability policies. Chiu was advised by **Sangwon Suh** and **John Nieber**.

Larissa Herrera and her advisor **Valerie Brady** received a $48,000 grant from the Minnesota Lake Superior Coastal Program for the project, "Developing a Diagnostic Tool for Assessing Excessive Sediment Harm to Stream Invertebrate Communities."

Eric Hettler received the Department of Civil Engineering 2010 Best Master's Thesis for "A Modified Elutriation Device to Measure Particle Settling Velocity in Urban Stormwater Runoff." Hettler's advisor is **John Gulliver**.

Jason Kish received his M.S. in August 2010. His thesis was titled, "Planktonic Archaeal Communities Change Seasonally in Lake Superior." Kish was advised by **Randall Hicks**.

Melissa Wilson presented "Aerially Seeding Winter Rye into Standing Corn in Minnesota: Successes and Failures," at the ASA, CSSA, SSSA 2010 International Meetings in Long Beach, CA, October 21–November 4, 2010. Wilson was also awarded the Hueg-Harrison Fellowship for 2010–2011. Wilson is advised by **John Baker** and **Deborah Allen**.

Water conference, continued from page 2

nature because of stewardship and value, and understand that conservation doesn't mean a drop in economic productivity. While continually learning more about natural sciences and valuation, and factoring the maintenance of ecosystems services into societal decision-making may seem daunting and laborious, Polasky stated that the ". . . long road is better than quick fixes; we need good science to inform better policies."

Wednesday's luncheon speaker was Peggy Knapp, assistant professor at Hamline University, who spoke on "Delightful Wisdom: Science and Environmental Education in Minnesota." Environmental literacy, defined as the exploration of the relationship between social and natural systems, is critical to citizens as they exercise their personal and civic responsibilities to protect the environment. Unfortunately,science education suffers in schools, as MAP (Measure of Academic Progress) testing, counts and values only reading and math, not science. Knapp stated that Minnesota needs more science in the classroom, especially science that is connected to other subjects like literacy and art, to create responsible environmental citizens. Environmental literacy skills, that use evidence to put value on multiple water uses and then judge which use has the most value, takes science from the classroom out into the natural world where good ecological stewardship begins.

Visit wrc.umn.edu to view Water Conference presentations and abstracts.

Upcoming Events

January 19, 2011
Annual Minnesota Wetlands Conference, Wetland Science: The Next Generation

Continuing Education and Conference Center, St. Paul Campus
Hosted by the Minnesota Wetland Delinator Certification Program and the Minnesota Wetland Professionals Association. This conference will focus on the three parameters of wetland identification, featuring some less-commonly discussed topics. For more information, visit:
www.mnwetlands.umn.edu/annualconference/index.htm

January 31–February 1, 2011
Land Grant and Sea Grant National Water Conference

Washington, DC
For information and registration visit:
http://www.usawaterquality.org/conferences/2011/

February 2, 2011
Environmental Internship and Career Fair

North Star Ballroom
St. Paul Student Center
No attendance fee or RSVP required for students. For information and registration visit:
www.stpaulcareers.umn.edu/envjobfair/index.html

May 30–June 3, 2011
IAGLR 54th Conference on Great Lakes Research

Duluth, MN
Hosted by the University of Minnesota Duluth. For more information, visit:
www.iaglr.org/conference/

Minnegram

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

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Publications & Resources

Tsui, M. T. K., J. C. Finlay, S. J. Balogh, Y. H. Nollet. "*In situ* production of methylmercury within a stream channel in northern California," Environmental Science and Technology, 2010, 44 (18), pp 6998-7004; also in, Environmental SCENCE in C&EN, http://pubs.acs.org/cen/news/88/i35/8835news10.html

"Elevated Nutrients in the Nation's Streams and Groundwater—A Continuing Issue," is a comprehensive national analysis of nutrients in streams and groundwater from 1992 through 2004. Visit: water.usgs.gov/nawqa/nutrients/pubs/circ1350/ and related links.

New USGS findings released in the journal of *Ecological Society of America, Frontiers in Ecology and the Environment,* visit: http://www.esajournals.org/doi/abs/10.1890/100053

This USGS assessment provides the most geographically extensive analysis to date of streamflow alteration. Findings show that the amount of water flowing in streams and rivers has been significantly altered from land and water management in nearly 90 percent of waters that were assessed in the nationwide USGS study.

The *National Water Monitoring News* is an online newsletter that provides a forum of communication among water practitioners across the Nation. In support of the national Council's mission, this newsletter is geared to foster partnerships and collaboration; advance water science; improve monitoring strategies; and enhance data integration, comparability, and reporting. Visit: http://acwi.gov/monitoring/newsletter/index.html

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