

# WRS welcomes incoming students

The Water Resources Science program celebrates the beginning of the 2004–2005 academic year by welcoming eighteen new students to the program, thirteen M.S. and five Ph.D. students. The new students join the WRS program this fall from as close as the Twin Cities campus and as far away as National Taiwan University.

Among the incoming class are Yi-Wen Chiu and Jared Trost. Chiu received a B.S. in Forestry from National Taiwan University in Taipei, Taiwan. Chiu came to the WRS program for its wide selection of courses and research opportunities. She will be focusing on watershed management with John Nieber (Biosystems and Agricultural Engineering). Trost received a B.A. in Biology from Augsburg College in Minneapolis, Minnesota. He is currently involved in several long-term ecological experiments at the Cedar Creek Natural History Area, including one that examines ecosystem function within oak savanna/woodland plots with varying burn frequencies. Trost is advised by Ray Newman

(Fisheries, Wildlife, and Conservation Biology).

Three new faces around the WRC office are incoming WRS graduate students Paul Hartzheim, Eric Otto, and

Erica Schram. Hartzheim received a B.S. in Environmental Science from the University of Minnesota. He is working with Larry Baker (Water Resources Center) on

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## University staff collect sediment cores in Spain



*The Limnological Research Center Kullenberg coring system on Lago de Montcortés in the foothills of the Spanish Pyrenees. The expedition included Anders Noren, Doug Schnurrenberger, Penélope González, Blas Valero Garcés, Valentí Rull, Mark Shapley, and Ana Moreno. Photo by Santi Giralt. See article on page 4.*

## Falkenmark to speak at Power of Water lecture



*Prof. Falkenmark received the 1998 International Hydrology Prize.*

Professor Malin Falkenmark of the Stockholm International Water Institute will deliver the second “Power of Water” lecture, Monday, October 11, 2004, at 5:15 p.m. in the Bell Museum Auditorium. Professor Falkenmark will address “the necessary shift in thinking regarding freshwater that will be needed in order to cope with the upcoming problems of feeding the world while saving healthy ecosystems.”

Professor Falkenmark is an outstanding environmental scientist and synthesizer, with particular interest in the linkages between humans, land, and water. She takes a geographical approach, involving both natural and social science in her broad-scale analysis. She has won several international awards and has written numerous books and articles. The lecture is free and open to the public as part of the President’s 21st Century Interdisciplinary Conference Series. A reception and signing of her new book will precede the lecture at 4:30 p.m. in the Bell Museum.

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# Around the State



## WATER RESOURCES UPDATES

### Wall Lake introduces voluntary chemical moratorium

Organizers want Wall Lake to be the first to swear off chemical use near the shoreline.

The Wall Lake Association is taking proactive steps to protect the quality of Minnesota lakes by asking Wall Lake property owners to participate in a voluntary moratorium to keep all chemicals 200 feet or more away from the lakeshore.

“As far as we know,” said association Vice President Brian Sundberg, “we are the first Minnesota lake to do this.”

Sundberg expressed the association’s concern about chemicals used by individual property owners as well as commercial and private farmers that end up in the lakes. Wanting to preserve the water quality in Wall Lake, the association decided to take matters into their own hands.

“Lakes are our greatest natural resource in Minnesota, but we’re losing them,” said Sundberg.

As an incentive to participate in the voluntary moratorium, the Wall Lake Association plans to provide free memberships to those who sign a pledge stating their intent to not use chemicals for the next five years and perhaps beyond.

If the program is successful, the association hopes that other Otter Tail and Minnesota lake associations follow suit so that all may enjoy Minnesota’s greatest resource for years to come.

“[Lake living] is a good life. I want the quality to be there for my granddaughter, so she can enjoy what I have had since I was a kid,” said Sundberg.

*Excerpted from an article by Mike Trosvig in the Fergus Falls Daily Journal, July 23, 2004*

## From the Director’s Desk

### On the doorstep of another academic year

As I write this letter, it feels more like the middle of October than August. Hopefully there will be some summer ahead for all of us. I hope all of you were able to take some time for yourself to reenergize for the academic year ahead. The summer has gone by even faster than usual, if that is possible. A number of activities have occupied our time. The following are just a sampling of issues and activities we have been pursuing here at the WRC.



In today’s climate of reduced funding and the ever-present need to set priorities, WRC staff have been involved in a series of one-day sessions preparing us to complete a strategic planning process that will help us focus our efforts for the next five-year planning period. These activities will culminate in September with a facilitated session leading to a report to Deans Stafford, Casey and Muscoplat. Setting priorities and having both a short- and long-term plan of action is essential to the continued success of the Center in obtaining outside grants and contracts that allow faculty to conduct the research and education programs to enhance management of our water resources.

At the end of August and during the first part of September, the Great Lakes Regional USDA-CSREES water quality leadership team will be hosting the National Committee for Shared Leadership to highlight program successes and issues in our region. This will be conducted in Duluth and northwestern Wisconsin. Our region has had great success in obtaining funding through the CSREES Section 406 Water Quality Program, and we hope this will help us continue that success.

The State of Minnesota, under leadership from the Minnesota Pollution Control Agency, and in partnership with cities and communities, has undertaken a major effort to enhance research, education, and practice implementation in partnership for storm water management. The Center is involved at all levels of this activity, which, in the short term, should result in establishing protocols for monitoring and assessing storm water practice performance. This is an issue of key importance to Minnesota cities as they address how to treat their storm water.

In preparation for the legislative session in 2005, the state is revisiting the Impaired Waters Initiative begun last year, specifically exploring funding mechanisms to address the many impaired waters in the state. If this initiative moves forward, there will be increased need for the University to provide research and education about these impairments and how they can be corrected.

This is all happening against the backdrop of the start of another school year, with reenergized faculty and students returning to campus. As always, the WRS graduate program is welcoming a whole new set of faces that will help guide and conduct these activities in the coming few years.

Jim Anderson, WRC co-director

# Does development decrease lake clarity?

by Johanna Schussler, WRS Graduate Student

Between 1980 and 2000, Minnesota added almost 900,000 people to its population. By 2010, another 500,000 will be living in the land of 10,000 lakes. Part of our identity as Minnesotans lies in those lakes, and in the experiences that we have with them: fishing and swimming, boating and water skiing, going up to “the cabin,” and watching the sun set over sparkling waters on warm summer evenings. As the population of the state continues to rise, how will our lakes be affected? Are there steps that we can take now that will ensure their future health and clarity?

These are the questions that inspired the project “Hotspots of Landscape Change: Identifying Key Linkages between Water Quality and Land Development Patterns in Riparian Areas of the North Central Region.” As a Water Resources Science Master’s student, I have been working for the past two years with Larry Baker of the Water Resources Center and Stephanie Snyder and Robert

Potts of the U.S. Forest Service to collect data that traces urban development in eleven northern Minnesota watersheds from 1980 to 2000. We have also gathered water clarity data for those watersheds over the same time period. Our hope is that by analyzing the effects of past urban development on lake water clarity, we will begin to understand what kind of development practices maintain clean, healthy lake ecosystems for future generations.

In our study, we have focused mainly on determining the changes in nutrient inputs (specifically phosphorus) to lakes in the study watersheds. We are focusing on the following factors that contribute to phosphorus inputs to lakes (above background levels):

- changes in the number of lakeshore homes, and changes in the numbers of seasonal versus permanent homes,
- the area of each watershed that is sewered,

- the functionality of individual sewage treatment systems in unsewered areas,
- the number of feedlots in the watershed,
- the number of facilities in the watershed that discharge to surface water, and
- the percentage of each watershed that is cultivated agriculture.

To determine changes in water clarity, we have collected Secchi disc measurement records for the time period covered by the study. Gaps in the Secchi measurement record are being filled by satellite-inferred values of clarity (see “Minnesota lakes get checkup from space” in *Duluth News Tribune*, January 13, 2003, at [www.duluthsuperior.com/mld/duluthsuperior/news/4934579.htm](http://www.duluthsuperior.com/mld/duluthsuperior/news/4934579.htm)).

When we began our research, we expected to find that lakes in areas that had undergone population growth and increased development had experienced declines in water clarity. Preliminary data analysis has proved this assumption to be

**Hotspots** continued on page 4

## First annual Festival of Fish showcases cultural traditions

by Roland Sigurdson, MinnAqua Aquatic Education Specialist

Have you ever flown a fish kite, cast a fly rod, or wondered how to build a fishing net?

Have you wondered how the Minnesota Department of Natural Resources manages fish populations in our state, how many kinds of fish live in our waters, or what equipment is needed to go fishing?

Visitors found answers to these and many other delightful questions at the First Annual Festival of Fish organized by the MinnAqua program. The fish festival theme was chosen for the event because of the bountiful water resources we are fortunate to enjoy in Minnesota, and because fish and fishing are a heritage shared by all of the people in our state.

The Festival of Fish was a wonderful opportunity to share our cultural



*A Festival of Fish volunteer teaches children about the diverse species of fish present in the Mississippi River.*

traditions with fellow Minnesotans of all backgrounds. It brought people together to celebrate the role fish play in the history, foods, traditions, art, recreation, and social customs of Minnesota’s many cultures. Agency and citizen presenters took time from their busy schedules to share their knowledge and skills with

members of the public.

Some of the presentations included traditional Afro/Caribbean dances performed by the El Arco Iris performance school, woodcarving, net making, and antique lure collectables. In addition, partners like the Minnesota Department of Natural Resources, National Park Service, Adopt-A-River, Three Rivers Park District, and Minnesota Department of Health all shared knowledge and information with the public. Volunteers assisted children and adults in making fish hats and fish prints, learning to tie fishing flies, and even casting a fly rod.

The MinnAqua program hopes to make this an annual event and has already scheduled next year’s Festival of Fish for August 6, 2005, at Fort Snelling State Park.



# Spanish lake-coring expedition

by Anders Noren, Scientist, Limnological Research Center

During April and May 2004, three members of the Department of Geology and Geophysics – Limnological Research Center (LRC) traveled to Spain to participate in collaborative paleoclimate research with scientists from Spanish universities and scientific institutions.

Blas Valero-Garcés, a former postdoctoral research fellow at the LRC and now a scientist with the Instituto Pirenaico de Ecología – Consejo Superior de Investigaciones Científicas (Pyrenean Institute of Ecology – Spanish Scientific Research Council) in Zaragoza, Spain, recently received funding to coordinate a major expedition. For many years, Blas has hoped to use the specialized LRC field equipment and expertise to retrieve sediment samples from several Spanish lakes. These lakes have been high-priority targets for research: they are thought to contain deep stacks of sediment that span long periods of time (perhaps 50,000 years) and provide a particularly clear reflection of past climate, geological processes, and human activities near the lakes.

While all lake basins slowly accumulate layers of sediment over time, differences in water chemistry, inflows and outflows, lake morphometry, and other variables make some lakes (such as these) more sensitive recorders of changes in their surrounding

environment over time. And unlike most Minnesota lakes, which were bulldozed by glaciers (or not formed) until major ice sheets departed approximately 12,000 years ago, these Spanish lakes contain extraordinarily long land-based archives of past climate – which would yield important clues for deciphering major paleoclimatic problems.

Despite these appealing qualities, the target lakes had kept most of their secrets – they are too deep, or too big (or both), to permit the use of common, low-cost sediment coring devices. And they are never ice-covered, which further limits the types of equipment that can be used to retrieve sediment samples.

But Blas was familiar with the LRC's unique equipment, and knew it could be used on these lakes. These devices were originally designed by Swedish scientist Borje Kullenberg for use in the most challenging coring conditions on earth: the oceans. They were used on large ships, which have dedicated hydraulic hoists and other heavy machinery to lift the equipment, and which also provide large, stable platforms from which to deploy the coring device. The LRC Kullenberg corer was specifically designed to be disassembled, transported on a single trailer or shipped in a standard shipping container, and

reassembled on-site. It consists of two 20-foot boats that nest inside each other on the trailer, but lie next to each other in the water (see photo on page 1). A platform is constructed across the two boats, and a tower is raised above them. The hydraulic winch, capstan, pipes, and other equipment are then positioned on the platform. In this way, the capability of the ocean-proven Kullenberg system can be used on any lake that can be reached with a car or truck.

In early February, LRC researchers Doug Schnurrenberger, Mark Shapley, and Anders Noren loaded the Kullenberg corer into a shipping container and sent it to Barcelona. Two months later, they flew to Spain and met Blas and more than thirty other Spanish researchers. Thus began the six-week expedition, which covered eight lakes via a road trip of more than two thousand miles through Spain. At each lake, they assembled the platform, retrieved several four- to nine-meter sediment cores, and then disassembled and packed everything for the next leg of the trip. In all, the total haul was more than 210 meters of core, which were shipped with all of the equipment back to the LRC for initial analyses and description. They are likely to keep Blas and company busy for many years to come.

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false. Secchi disc records have shown a decrease in water clarity in only one of our study lakes. In the others, clarity has remained constant or has increased. One possible explanation for this is that better management of phosphorus has countered potential increases in phosphorus inputs that would otherwise be associated with urbanization. Examples of better management of phosphorus are the 1985 state-wide ban on phosphorus-containing detergents, improved management of septic tanks, improved management of manure in confined animal facilities, and improved sewage treatment.

Our final report to the U.S. Forest Service will include chapters on hydrologic and climatic factors and the past develop-

ment history of these watersheds, and an analysis of lake sensitivity. The report will be available in early 2005. Ultimately, we hope that regional planners and lake managers will use our findings to help them plan for the continued enjoyment of our lake resources long into the future.

*The two photos at right are examples of the common property types seen on the study lakes' shores: the fishing cabin and the mansion. It is not uncommon for these two types of structures to be located on adjacent lots. This demonstrates the changing nature of lake use from seasonal recreation to year-round residential.*



# WRS student's research put to use by State

by Melinda Erickson, WRS Graduate Student

Research conducted by Water Resources Science Ph.D. candidate Melinda Erickson comes at a crucial time in the struggle to identify and understand arsenic-contaminated groundwater. The U.S. federal drinking water standard for arsenic was changed from 50 mg/L to 10 mg/L in 2001. Public water systems must comply with the new standard by January 2006. This change will have a direct effect on the estimated 250,000 to 350,000 people in Minnesota who use a public or private drinking well supply with arsenic concentrations over 10 mg/L.

Erickson, under the supervision of her advisor Randal Barnes (Civil Engineering), is completing her dissertation research on arsenic occurrence and geochemistry in upper Midwest and Minnesota ground water. The two keys to Erickson's research are understanding the geochemical mechanisms governing arsenic in ground water, and understanding the relationship between the geology/hydrogeology and arsenic concentration in ground water. The results of her research are permitting better characterization of spatial variability of arsenic in ground water, as well as modeling and prediction of temporal variability of arsenic in ground water.

Arsenic contamination in upper Midwestern ground water is widespread, naturally occurring, and associated with the lateral extent of northwest source late Wisconsin-aged (Des Moines lobe) glacial drift. Contrary to previous assumptions, arsenic concentrations in ground water do not appear to be directly related to arsenic concentrations in sediment. However, according to Erickson's research, there is a link between well characteristics and increased risk of high arsenic levels in private wells. In west-central Minnesota, private wells that have relatively short screens set close to the upper confining till unit are more likely to have elevated arsenic concentrations than otherwise comparable private wells.

Erickson's research has better defined the areas of the state and the types of private wells that are most at-risk for arsenic contamination. In the future, public health education can be focused in areas

that are most in need of arsenic testing. Additionally, new guidelines could be developed to change common private well-drilling practices. Well drillers could be encouraged to set well screens routinely



Melinda Erickson labels soil core samples for use in arsenic research.

farther away from the till unit overlaying the sandy aquifer and to use longer screens in private wells.

Although it was hypothesized that arsenic concentrations in a new well would change over time because constructing a well changes the geochemical environment of the aquifer, this hypothesis proved to be false. Arsenic concentrations in new wells vary over time in a manner similar to arsenic concentrations in older wells. This result has provided the answer to one of the questions that had been delaying the promulgation of a rule to test all new domestic wells in Minnesota for arsenic: If an arsenic sample is required for a new well, when should the well be sampled so that the measurement is representative of the typical arsenic concentration? It is now known that an arsenic sample can be collected from a new well whenever it is most convenient because arsenic concentrations in new wells do not increase or decrease systematically over time.

In collaboration with Minnesota Department of Health engineers and hydrogeologists, Erickson identified two

potential low-cost public water system options to combat arsenic contaminated groundwater, developed methodologies for evaluating the viability of the low-cost compliance options, and proved that the methodologies are effective in evaluating these low-cost options on a community-by-community basis. The Minnesota Department of Health is already using both the 'site investigation' methodology and a prescribed temporal sampling scheme on a regular basis in Minnesota communities that have elevated arsenic concentrations in their water supply. Implementing a viable, low-cost arsenic compliance option allows communities to avoid building an unnecessary and expensive community water treatment plant.

A detailed article about this arsenic research is presented in the Spring 2004 edition of the *CURA Reporter*, which is available online at [www.cura.umn.edu/reporter.html#archive](http://www.cura.umn.edu/reporter.html#archive).

Financial support for this project was provided by the Water Resources Center and the Center for Urban and Regional Affairs at the University of Minnesota, the Minnesota Department of Health, and the U.S. Geological Survey. Karla Peterson and Richard Soule (Minnesota Department of Health) collaborated on portions of the research.

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household-scale nutrient modeling. Otto replaces Johanna Schussler as the Student Editor of the *Minnegram*. He received a B.S. in Civil and Environmental Engineering from the University of Iowa and has spent the last four years working as a civil engineer in Chicago. Otto is advised by John Nieber. Schram is working with her advisor, Jim Perry (Fisheries, Wildlife, and Conservation Biology), on the Sarita wetland project. She received a B.S. in Biology from Iowa State University.

Ray Newman and Erik Brown assume the roles of Director of Graduate Studies and Associate Director of Graduate Studies, respectively. For more information about the WRS program, visit the WRS Web site at <http://wrs.coafes.umn.edu>.



## U of M Water Community News

**Larry Baker** (WRC) and co-authors published “Environmental Consequences of Rapid Urbanization in Warm, Arid Lands: Case Study of Phoenix, Arizona (USA)” in *The Sustainable City III*, part of the Advances in Architecture Series published by WIT Press, Boston.

**Ken Brooks** (Forest Resources) presented an invited paper titled “Upland Watershed Management: Sustaining Land and Water Resources” at the Henry A. Wallace/ CATIE Inter-American Conference Series, May 2–5, 2004, held at CATIE, Turrialba, Costa Rica. The conference was sponsored by USDA, the Global Water Partnership and the Inter-American Institute for Cooperation on Agriculture.

**Emi Ito** (Geology and Geophysics and Limnological Research Center) participated in the annual Drilling, Observation and Sampling of Earth’s Continental Crust workshop and also attended the Board of Directors meeting, held in mid-May.

**Barb Liukkonen** (WRC, Sea Grant, and University of Minnesota Extension) presented the paper “Use care when water gardening and restoring shorelines: Prevent the spread of aquatic exotics” at the biennial meeting of the Association of Natural Resource Extension Professionals in Wheeling, West Virginia, May 16–18.

She also presented “Enhancing Citizen *E. Coli* Monitoring in Streams in the Upper Midwest” at the National Water Quality Monitoring conference in Chattanooga, Tennessee, May 17–20.

**Doug Schnurrenberger** (LacCore curator), **Anders Noren** (Limnological Research Center), and Ph.D. student **Mark Shapley** (Geology and Geophysics) went to Spain for a month this spring to collect sediment cores from more than a dozen lakes using the LRC Kullenberg coring system (see article on page 4).

**Doug Schnurrenberger** went to Ghana in July to work with scientists from several countries on an International Continental Drilling Programme and NSF drilling project to obtain sediments and shocked rocks from Lake Bosumtwi, an impact crater.

**Harvey Thorleifson**, the director of the Minnesota State Geological Survey, **Emi Ito**, and **Paul Morin** (Geology & Geophysics) submitted a collaborative proposal to NSF’s Computer and Information Science Directorate to jointly develop a 3-D hydrostratigraphic map of Minnesota and surrounding regions with scientists from the Electronic Visualization Laboratory, University of Illinois at Chicago.

### University of Minnesota

#### Water Resources Science Program Degree Recipients

**William Herb** received an M.S. in April 2004. His thesis was titled “The Effect of Environmental and Physiological Variables on the Growth of Submersed Macrophytes in Lakes.” Herb’s advisor was **Heinz Stefan** (Civil Engineering).

**Shannon Scibilia-Skally** received an M.S. in April 2004. The title of her Plan B paper was “Hydroacoustic Surveys: Repeatability in Lakes of Varying Vegetative Structure.” Scibilia-Skally was advised by **Ken Brooks** (Forest Resources).

**Carrie Reinhardt** received a Ph.D. in April 2004. Her dissertation was titled “Increasing Wetland Restoration Success: Effective Control Techniques for the Invasive *Phalaris Arundinacea*.” Reinhardt’s advisor was **Susan Galatowitsch** (Horticulture Science and Landscape Architecture).

**Laurie Fairchild** received an M.S. in May 2004. The title of her Plan B paper was “Private Landowner Perspectives Affecting Retention of Restored Wetlands.” Fairchild was advised by **Dorothy Anderson** (Forest Resources).

**Jeremy Pavlish** received an M.S. in June 2004. His thesis was titled “Effects of Sub-Water Table Mining on the Hydrogeology of a Sand and Gravel Aquifer feeding a Clay County, Minnesota, Calcareous Seepage Fen.” Pavlish’s advisor was **E. Calvin Alexander** (Geology and Geophysics).

**Darin Albrecht** received an M.S. in June 2004. His thesis was titled “The Fate of Nemadji River Sediment in Western Lake Superior.” Albrecht was advised by **Erik Brown** (Geochemistry) and **John Swenson** (Geological Sciences).

### 2003–2004 WRS Travel Grants

The following WRS students were awarded travel grants to attend national conferences during the 2003–2004 academic year:

Meghan Brown  
William Christner  
Michael Donahue  
Melinda Erickson  
Rebecca Forman  
Nathaniel Hemstad  
Brian Huser

Lindsay Powers  
Carrie Reinhardt  
Kari Rolf  
Claire Serieyssl  
Holly Swanson Dolliver  
Valerie Were  
Joseph Werne

Funding was provided to the WRS program via a Graduate School Block grant.





## Upcoming Events

September 13, 14, 27, 28. **Anoka Sand Plain Training 2004.** Cedar Creek Natural History Area, Bethel, Minnesota. The University of Minnesota Onsite Sewage Treatment Program will present four specialized all-day training sessions focused on the problem soils of the Anoka Sand Plain. Each session will study the sandy outwash soils common in the counties of the northern Twin Cities metropolitan area. For more information, call (800) 322-8642, e-mail [septic@umn.edu](mailto:septic@umn.edu), or visit the program Web site at <http://septic.umn.edu>.

September 18, 8 p.m. and 11 p.m. EST. **After the Storm.** The EPA is pleased to announce a half-hour television special about watersheds. "After the Storm" shows the connection between weather and watersheds and the importance of watershed protection. Visit the EPA Web site at [www.epa.gov/weatherchannel/](http://www.epa.gov/weatherchannel/) for more information. Order a free copy by contacting the National Service Center for Environmental Publications (NSCEP) at (513) 489-8190 or (800) 490-9198 or send an e-mail to [ncepimal@one.net](mailto:ncepimal@one.net).

October 14–16, 2004. **Urban Waterfronts 22: Gathering by the Waters.** Pfister Hotel, Milwaukee, Wisconsin. Meet the pioneers, the movers and shakers in the field, and share your concerns and knowledge while learning first-hand at this all-day workshop about the difficulties faced in a lake/river environment. For more information, visit the conference Web site at [www.waterfrontcenter.org/conference/](http://www.waterfrontcenter.org/conference/).

October 26, 2004. **37<sup>th</sup> Annual Water Resources Conference.** Earle Brown Heritage Center, Brooklyn Center, Minnesota. This conference provides a major professional development opportunity for consultants; city, county, and state engineers; and others interested in water resource issues. The 2004 Conference seeks to highlight emerging technological developments, best practices in addressing water resource issues, and reports on effective projects. For more information contact Ruth Martin at (612) 624-3492, or e-mail [rmartin@cce.umn.edu](mailto:rmartin@cce.umn.edu).

October 26–28, 2004. **2004 Great Lakes Regional Data Exchange Conference.** Detroit Marriott Renaissance Center, Detroit, Michigan. The conference and workshops are designed to facilitate information exchange between participants, to identify opportunities for collaboration, and to seek a consensus on a vision for integrated decision support tools to meet the needs of regional policy and decision-making. For more information, visit the conference Web site at <http://rdx.glc.org>.

November 18, 2004. **Volunteer Stream Monitoring Partnership River Summit.** Science Museum of Minnesota, St. Paul, Minnesota. The purpose of the summit is to celebrate the work of Twin Cities area volunteer monitors and share data collected over past years. E-mail Barb Liukkonen ([liukk001@umn.edu](mailto:liukk001@umn.edu)) to register.

December 6–10, 2004. **The First National Conference on Ecosystem Restoration.**

Wyndham Palace, Lake Buena Vista, Florida. The conference is designed to bring together scientists, engineers, managers, and policy-makers who are actively involved in and/or affected by all aspects of ecosystem restoration. This will be the first time that people working on the science of large system restoration in the Everglades, Chesapeake Bay, Lower Mississippi, Great Lakes, San Francisco Bay, Puget Sound and others will be sharing information in this kind of formal session. For more information, visit <http://conference.ifas.ufl.edu/ecosystem>.

Winter 2004–2005. **Small-Group Nutrient Management Planning Workshops.** University of Minnesota Extension staff, Soil and Water Conservation Districts, County Feedlot Officers, producer organizations, and others are encouraged to host half-day sessions for groups of 12–15 livestock and/or crop producers. This is especially timely for those livestock producers who are required to have nutrient/manure management plans by January 1, 2006. Funds are available to assist local organizers of these workshops, and Extension specialists are available to lead farmers through development of their plans. Contact University of Minnesota Extension Educators Kevin Blanchet ([blanc013@umn.edu](mailto:blanc013@umn.edu)) in Farmington or Jodi DeJong-Hughes ([dejon003@umn.edu](mailto:dejon003@umn.edu)) in Marshall to schedule a workshop for your area.

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# Publications and Resources



*The Clean Water Act: An Owner's Manual (2nd Edition)*. Don Elder, Gayle Killam and Paul Koberstein. 2004. This is a comprehensive manual for people who want to clean up their rivers, streams, and watersheds. This down-to-earth, information-packed book explains crucial sections of the Clean Water Act, points out how to get involved in regulatory decisions, and tells the stories of others who've done so. Packed with references, Web sites, and other resources, this manual turns legalese and scientific terminology into language you can use. Reserve a copy by sending an e-mail message to [gkillam@rivernetwork.org](mailto:gkillam@rivernetwork.org). Please include your contact information (*name, affiliation, e-mail, address, and phone*) and the number of books you would like to reserve.

*Confronting the Nation's Water Problems: The Role of Research*. National Research Council. 2004. The report urges the United States to make a new commitment to water research in the face of severe water problems in all parts of the country. In

particular, a new mechanism is needed to coordinate water research currently fragmented among nearly 20 federal agencies. The best statement on current research needs can be found in the 2001 National Research Council report *Envisioning the Agenda for Water Resources Research in the 21st Century*. The new report is a follow-up to that study. It identifies a set of principles that can be used to help set priorities in the future. The report was sponsored by the U.S. Geological Survey. The National Research Council is the principle operating arm of the National Academy of Sciences, the National Academy of Engineering, and the Academy of Medicine. A pre-publication copy of this report is available on the National Academies Web site at [www.nap.edu/books/0309092582/html](http://www.nap.edu/books/0309092582/html).

*Guide to Aquatic Invertebrates of the Upper Midwest*. R.W. Bouchard, Jr. 2004. This new taxonomic key identifies macroinvertebrates to the Family level and is intended for use by students, teachers, other volunteers, or anyone who requires

that level of identification. This guide was developed to replace or augment existing publications that were incomplete or confusing for volunteers monitoring biological communities. For purchasing information, call the Water Resources Center at (612) 624-9282, or visit the VSMP Web site at [www.VSMP.org](http://www.VSMP.org)

*Protecting the Source*. The Trust for Public Land and American Water Works Association. 2004. This report explains why watershed conservation is one of the best ways to protect water quality, and details on-the-ground strategies for watershed conservation. The report is intended for local governments, water suppliers and agencies, and community drinking water advocates. The 56-page report is available for free download on the Trust for Public Land's Web site at [www.tpl.org/download\\_protect\\_src\\_report.cfm](http://www.tpl.org/download_protect_src_report.cfm). Hard copies of the report can be purchased for \$15 at [www.cafeshops.com/tpl\\_store/305748](http://www.cafeshops.com/tpl_store/305748).