

## **Receding waters: learning lessons from the floods**

This spring, the Upper Midwest was the stage for one of nature's most dramatic and costly forays. Few in the region were not touched in some way by the wrath of the Floods of '97. Whether it was the countless displays of human compassion and resiliency, or the power of nature itself, most came away with powerful memories of this spring's events. Now, however, as victims of the flood return to their homes and businesses and begin to rebuild, and as the flood waters of the Red and the Minnesota Rivers begin to dissipate, many will begin to forget. Already, newspapers and TV stations, which only a month ago gave almost exclusive attention to flood-related events, have moved on to new stories. But for those who study and manage floodplains, this year's floods have sparked a host of new and unanswered questions. Fueled in part by a public who has openly questioned the severity of the floods so soon after the devastating floods of 1993, flood researchers are faced with an array of potential inquiries.

Can we blame Mother Nature?

One pressing question for researchers is whether the impact of this year's floods was exacerbated by human land-use alterations. Specifically, the impact of artificial tile drainage systems and wetland destruction on the severity of the floods remains at least a partial mystery. In both the Red River of the North and Minnesota River Basins artificial drainage and wetland loss are pervasive. Joe Magner, senior hydrologist for the Minnesota Pollution Control Agency (MPCA) led a study from 1987-1993 to assess land-use changes to the Minnesota River Basin. By comparing current land-use surveys with 1860s surveyor maps in selected areas, the study found that wetland loss and the presence of ditches and tile lines were both extensive. "We've overdone it with drainage," Magner commented. "Changes in hydrology resulting from upland drainage are affecting riparian farmers. They (riparian farmers) used to be able to farm four out of five years; now it's only one out of five."

But the link between agricultural land modifications and basin hydrology is not as compelling or data-rich as Magner would like. Although Magner feels there is now sufficient data to link these activities with increases in bankfull-scale flows, the connection between agricultural land alterations and increases in the magnitude of large-scale events remains largely speculative. Dave Mulla, University of Minnesota soil scientist, agrees with Magner. According to Mulla, there just isn't any empirical evidence to suggest that drainage issues can be implicated in increasing the magnitude of low frequency flood events. "It's a common notion, and it's probably true, but we really don't know at this point," remarked Mulla.

Mulla is attempting to clarify the causes of flooding in this region by analyzing long term flow and climate data for the Minnesota River. Preliminary results indicate that a large percentage of increasing flows in the Minnesota River can be explained by a climate that appears to be getting

wetter. However, for certain months (May, June, and July), there is a significant portion of the increasing flow trend that cannot be explained by climatological factors. These findings point to human impacts as at least partial culprits in hydrological change in the basin. Still, Mulla is hesitant to point the finger at wetlands loss or artificial drainage. "There are several human impacts that could be contributing," Mulla stated. Among those that Mulla will be investigating in the next phases of his study are loss of floodplains, drainage of wetlands, urban storm-sewer increases, channelization, changes in cropping systems, and tile drainage.

At least part of the problem with linking human activities with flooding is an inadequate understanding of the hydrological processes that lead to flooding. "What we are lacking is a model to quantify large magnitude events," said Magner. Improving the understanding of various hydrological scenarios and their connections to flooding will be a continuing research priority for many involved with flood-related research. Mark Seely, extension climatologist for the University, points to frozen soil processes research as a critical step in improving hydrological models of flooding. According to Mulla, there are also huge errors associated with predicting flooding from snowmelt.

#### Climate key to flood story

Mulla is quick to point out that all three major drainage basins in Minnesota flooded this year. "These are extremely different basins, and yet each of them flooded," said Mulla. "This suggests that regional climate was the major player in promoting spring flooding." In fact, the climatological conditions prevailing in flooded areas were just about perfect for creating major havoc. According to Seely, five climate-related factors are common precursors to major flooding: heavy autumn precipitation, high winter snowfall, deep frost, quick snow melt, and heavy early spring precipitation.

At least four of these parameters were at near record levels in the Red River of the North drainage. Much of Minnesota had six or more inches of rainfall in late October and November. In some areas, fall rainfall was four or more inches above normal. Snowpack in the Red River and Upper Minnesota River Basins was extraordinary in many areas. Certain regions had over eight feet of snowfall, and over 40 percent of the Red River Basin, and the upper reaches of the Minnesota River Basin had near-record or record snowfall. Snowmelt in these regions was drastic and compressed. Finally, heavy precipitation in western Minnesota on April 5-6 further inflated the problem. "It was a climatological anomaly; a very rare series of events," said Seely.

#### Flood mitigation: limits and boundaries

This year's floods may also spark new interest in developing realistic flood mitigation strategies. Specifically, said Seely, the pressing issue is establishing limits of mitigation. Protection of property is a priority in a floodplain, but Seely argues that the establishment of boundaries on the magnitude of an event to be protected against needs to be carefully considered. Seely cites a relatively short record of flow and climate in many regions as a major obstacle to setting limits. With changing climates and impacts from human activities, what constitutes a 20-, or 100-year event is becoming more and more difficult to determine.

## Environmentally friendly solutions

For Rick Voigt, assistant director of the University's St. Anthony Falls Laboratory, a critical issue is finding "environmentally friendly" solutions to flooding problems. Historically, the engineering discipline has focused on harnessing the power of nature through the use of structural control. This has changed. Today, engineers like Voigt are attempting to understand how to integrate human activity with catastrophic occurrences such as floods. For example, one research effort at St. Anthony Falls is looking at how bed-form processes in rivers cause bridge scour. The research may eventually lead to the development of technology that works with the hydraulic environment of the river to protect against scour.

Understanding the processes that unfold as a river floods may also enable society to deal more effectively with flood events. Voigt asserts that large floods, like this year's, can have monumental impacts on the geomorphology of river systems. For example, during one past flood, the Missouri River channel shifted nearly 20 miles. Many communities are located near rivers for transportation, drinking water, power production and other needs. Yet, societies must deal with the realities of powerful dynamic systems. "People often pick really bad places to build," said Voigt. Voigt thinks there are options that may help reduce impacts of future floods. One such option is floodplain planning. After the 1952 and 1965 floods in St. Paul, many buildings in the floodplain were removed. According to Voigt, golf courses, airports, and parks are better choices for floodplain development.

## Future of flood research

Finding funding for long term investigations on flooding continues to be a major concern for researchers. Will the recent events of this spring translate into dollars to support long-term flood research? Voigt sees a big problem as cultural amnesia. "People tend to forget about floods," said Voigt. For now, several researchers are planning to coordinate an integrated plan for flooding research. On June 4, the University will sponsor a conference on the hydrologic impacts of drainage. Magner feels this will be a critical step in developing priorities for future research. "We know the issues, but now we really need to focus on developing some specifics," said Magner.

# **Around the state: water resources updates**

## **Shaking hands with a river**

The Minnesota River Friendly Farmers Program recognizes farmers who have taken steps to protect and enhance the state's flowing waters. The program, which is sponsored by the Minnesota Alliance for Crop Residue Management (MACRM), maintains two main goals: to publicize and promote farming practices that benefit rivers in Minnesota while maintaining farm profitability, and to inform non-farm publics about farmers' positive contributions to Minnesota's rivers. To earn recognition as a river friendly farmer, individuals must meet a set of 10 criteria set by MACRM.

## **More mussels in Pepin**

Since 1995, zebra mussel densities in Lake Pepin have more than tripled in some locations. According to Mike Davis, Minnesota Department of Natural Resources river ecologist, the tiny pests are reaching levels upwards of 30,000 per m<sup>2</sup> in the lake. Davis has also observed changes in water clarity during recent dives that may be attributable to the growing zebra mussel population. Zebra mussels are known to filter large volumes of water, thereby increasing water clarity in infested areas. As for good news, Davis doesn't have much - he suspects to see even greater densities of the mussels in coming seasons.

Source: "Picking up in Pepin" in Zebra Mussel Update no. 29.

## **Environmental spending update**

On May 17, the Minnesota House and Senate approved a bill that allocates \$624 million over the next biennium to environmental and agricultural programs. A total of \$23.3 million will go to the MPCA to continue existing surface water protection programs, in addition to \$31.2 million to protect groundwater and manage solid waste. Fish and wildlife programs will receive more than \$86 million, of which \$2 million will support non-game wildlife management. In a separate bill, the University of Minnesota's College of Natural Resources may have two new faculty members and leadership of at least one new research center to support sustainable rural development research. In addition, the College of Agriculture, Food, and Environmental Sciences will also receive funding for a new research center. Both bills now go to the Governor's desk.

Source: Session Weekly and the Minnesota House Public Information Office.

## **Minnesota rivers among U.S. most threatened**

Results of an annual survey published in April by American Rivers, a leading nonprofit devoted to river protection, listed three Minnesota rivers as among the most imperiled rivers in the nation. The Minnesota River has been listed three times due to its extensive agricultural impacts. The St. Croix, a national and scenic riverway, was listed because of a \$60 million highway bridge that apparently violates the national standards protecting the river (see article on p. 6). The Red River of the North was listed because of considerable and on-going degradation of habitat and water quality. Researchers and conservationists in Minnesota hope the listings will attract funds to boost research, monitoring, and protection efforts.

Source: "Red, St. Croix and Minnesota Listed as nation's threatened rivers" in The Rivers Advocate - Spring 1997.

## **RiverWatch students produce "My River"**

Students from Brainerd, Little Falls, Aitkin, and Grand Rapids, involved in the RiverWatch program run by the Mississippi Headwaters Board are getting into the film industry. Each town's students recently filmed a five-minute video of their impressions of the river. The montage is available at no charge. Call (218) 547-7263 for more information.

Source: "My River released" in Tidings - April 1997.

## **Lake Superior Center awarded funds for aquatic ecology**

Minnesota Sea Grant awarded the Lake Superior Center \$25,000 to develop aquatic ecology programming for K-12 students. The goal is to place even greater emphasis on the science component of environmental education. The grant will help students across the region explore its freshwater resources via hands-on monitoring and other programs. "This grant is the fruition of years of collaborative efforts with Minnesota Sea Grant," said Andrew Slade, Lake Superior Center program director. "This is the type of partnership we've always envisioned. The Center will help Sea Grant accomplish their educational goals for 1997 and, we hope, for years to come."

## **Future of charter industry unsure**

Minnesota charter captains and those interested in the state's charter industry should know that the industry is in troubled economic waters. The number of Minnesota's Lake Superior charter fishing captains grew from seven in 1977 to 67 in 1988, but by 1994, the number had declined 15 percent to 57. A 1994 survey of 29 Minnesota-licensed charter captains found the future of that industry in question, with 18 percent of the respondents planning to quit.

The Great Lakes Sea Grant Network has produced a fact sheet, "Minnesota's Lake Superior Charter Fishing Industry in 1994," which describes the survey findings in-depth. For a copy of this free fact sheet, contact Minnesota Sea Grant at (218) 726-6191.

## **Public access to coasts problematic**

The United States boasts more than 7.2 million acres of national rivers, lakeshores, seashores and recreation areas. While this may seem like a huge amount of publicly-owned shoreline, it may not be enough to meet the demand for coastal access by all of the people who want to boat, swim and fish. A rise in participation in water-related activities is expected to increase the demand for coastal access into the next century.

The Great Lakes Sea Grant Network has produced a fact sheet for government agencies and private landowners who are considering expanding coastal access for the public. "Providing Public Access in Coastal Areas: Options for Landowners" features case studies from the Great Lakes states and discusses options available for expanding public coastal access. For a copy of this free fact sheet, contact Minnesota Sea Grant at (218) 726-6191

## **Ecological yardsticks: sizing up wetlands using indicators**

A red sun peeks over an industrial smokestack and glimmers on the waters of an urban freshwater marsh in Minneapolis. University of Minnesota professor Sue Galatowitsch and her research team hover around the area, recording bird calls, collecting invertebrates, amphibians,

and fish, and identifying wetland vegetation. A month later, they perform similar tasks, only no industrial smoke plumes into the air. They are in northern Minnesota, surrounded by thick forest and fragrant meadows.

A year has passed and Galatowitsch and her research team now spend much of their time looking at computer screens instead of marshes. “We’ve got a huge data set on our hands,” Galatowitsch muses. All told, the team, which consists of Galatowitsch, professor John Tester, and several research assistants, has visited over 100 freshwater wetlands in Minnesota. At each wetland, they have collected extensive information on the biological communities that inhabit these areas.

This warehouse of information is now being used to develop the first set of ecological indicators (called Indices of Biotic Integrity or IBIs) for wetland ecosystems. These indicators will eventually help managers of wetland environments to monitor degradation in wetland systems, and to assess the success of wetland restoration efforts.

### **From rivers to wetlands**

IBIs have been used to assess degradation for years in river systems, but have never been applied to wetlands. Galatowitsch first became interested in applying the idea of ecological indicators to wetlands when James Karr, a leading expert in developing criteria for biological assessment, was invited to speak at a seminar sponsored by the Water Resources Research Center in 1995. “This would be fun to apply to wetlands,” Galatowitsch thought after she heard Karr speak.

But Galatowitsch’s project, a statewide effort funded jointly by the Minnesota Department of Transportation, the Legislative Commission on Minnesota Resources, and the University’s Water Resources Center, is more than just fun. As wetland restoration becomes an increasingly accepted method of ameliorating the effects of wetland drainage, accurate assessment of the quality of restored wetlands is a critical issue.

“There just aren’t adequate criteria for professional assessments of wetland restoration efforts,” said Galatowitsch, “If we can create wetlands only of a certain quality, we should use restoration only to replace wetlands of similar quality. Developing ecological indicators can help get at that issue.”

### **Recipe for success - variety**

In order to develop wetland IBIs, Galatowitsch’s project, which began over two years ago, is investigating a wide variety of wetland types in Minnesota. Eight classes of wetlands are being studied, including small river floodplain wetlands, lakeshore wetlands and prairie marshes. Within each class, the group selected 15 individual wetlands across a wide gradient of land use. After spending two field seasons gathering data on the biological communities of the 120 wetland sites, the team used GIS to map land use around each wetland at a variety of scales. GIS land-use coverages were developed at radii of 200, 500, 1,000, 2,500 and 5,000 meters around each wetland. One of the most challenging parts of the project, according to Galatowitsch, was creating up-to-date maps of land use, particularly in urban areas where land use is rapidly changing.

Through the use of GIS, the research team is able to quantify a wide array of land-use parameters. In addition to more traditional expressions of land use such as percent cover, the team is using GIS to devise more sophisticated measures of land use, including indices of connectivity and isolation. These parameters will allow the team to develop more accurate and responsive ecological indicators. According to Galatowitsch, indicators historically have been most effective at quantifying extremes of degradation. “Utilizing more articulate parameters over a gradient of land use will allow us to develop indicators that are more sensitive in more moderate ranges of land use.”

Galatowitsch sees wetland degradation as a relatively deterministic process, with predictable community responses. Creating indicators that are responsive across a spectrum of land-use conditions will help managers understand at what point degradation begins to occur. Once sensitive criteria are developed, managers will be able to pinpoint the level of degradation of a given wetland, and will be able to predict what will happen to the wetland if degradation and land-use change proceed.

### **Birds are best**

Since their data-set contains several expressions of land use and numerous types of organisms, the group is now pre-screening data to formulate a preliminary appraisal of which organismal groups are most responsive to land-use change. From this pre-screening process, birds appear to be the most useful indicators across all wetlands types. Fish and plants also look promising, but the response of wetland plants to land-use impact appears to be highly type dependent.

### **The ecology of indicators**

One interesting aspect of the study that has already come to light is the importance of measuring multiple groups of organisms. For example, if amphibians are used as ecological indicators, the confounding effects of predation by fish must first be understood before a clear relationship between amphibians and land use can be developed. In many cases, Galatowitsch’s group is discovering that these effects are intertwined.

“Degradation often occurs in a cascade,” Galatowitsch commented. “Land-use change can promote changes in top predator populations, which in turn may affect the community structure of other groups of organisms.”

Galatowitsch believes that understanding the mechanisms behind the response of a group of organisms to land-use change is critical to developing defensible ecological indicators. One process she believes is critical to understanding wetland degradation is the invasion of exotic species. Like changes to top predator populations, the infusion of exotic species can unleash an ecological chain reaction that can fundamentally alter a system. Trying to uncover and understand these complex pathways of community response to land-use change is one of the research team’s top priorities. “If we understand why it’s happening, then it makes more sense to use a given indicator.”

### **It’s all about scale**

One of the most fascinating aspects of the project is the scale-dependent response of particular sets of organisms to land-use change. One of Galatowitsch's graduate students, Doug Mensing, is evaluating the potential of various types of organisms as ecological indicators on small river floodplain wetlands. His analysis shows that the response of various types of organisms to land-use variables is highly scale-dependent. For example, Cyprinids, a group of freshwater fish, appear to be responding to land use on a large scale (5,000 m), while showing little relationship with local land-use patterns. By contrast, birds appear to respond to land-use conditions at much more restricted scales. From preliminary data, Galatowitsch contends that each wetland series and indicator organism group has a optimum scale of response.

This scale-dependent phenomenon highlights the importance of using a suite of metrics when developing ecological indicators. "When people hear about indicators, they think of the canary in the cave. In reality, we really need to use entire communities of organisms," said Galatowitsch.

The research team will issue their first report on wetland IBIs this July. Work on the project, however, will continue for several years. The report will be located on a special web site. Look for the URL and an update on project findings in the next issue of the Minnegram.

## **To build or not to build:the Stillwater Bridge controversy heats up**

by Eric MacBeth

A proposed bridge and associated upgraded roadbeds are considered by some to be answers to both historic traffic bottlenecks in Stillwater, Minnesota and the needs of daily commuters between Minnesota and Wisconsin. To others, a new bridge of this magnitude is anathema to the essence of what is a national scenic riverway. For example, American Rivers, a Washington, DC-based organization, recently listed the St. Croix as one of the nation's 20 most endangered rivers because of the current bridge plan. The debate ultimately could widen and deepen the St. Croix Valley, creating a rift between the proponents and opponents of the riverway. At a minimum, the issue appears to be causing problems for many in the political arena.

### **Political maneuvering**

There is now increasing speculation that an initiative in the recent Minnesota legislative session to repeal funding for the Minnesota-Wisconsin Boundary Area Commission (MWBAC) was based largely on the MWBAC's position opposing the proposed bridge. In the end, the MWBAC was retained and fully funded. The MWBAC was established by interstate compact agreement in 1965 "for the purpose of present and future protection, use, and development in the public interest, of the boundary lands, river valleys, and waters comprising the boundaries of the (states)." For years, the MWBAC had expressed deep concern about the "build" decision and corridor selection processes outlined in the project's final environmental impact statement.

Both state governors, each of whom appoint five MWBAC commissioners, have advocated as official policy the construction of a new interstate bridge bypassing the central business district

of the City of Stillwater as a high priority project. Having previously recommended priority consideration of the “no-build” alternative, the MWBAC recently adopted a new resolution: “We are no longer certain that the no-build alternative should be our first choice. We now believe that an improved river crossing is needed. We would like to be guided in making our final decision through the alternative dispute resolution process.” Having adjusted its viewpoint, the MWBAC has effectively moved in the direction of a “build” decision. However, they prefer a center corridor location closer to the existing bridge, rather than the proposed new corridor 1.2 miles south.

## **Federal Roles**

Central to the bridge dispute is whether the U.S. Department of the Interior, through the National Park Service, appropriately determined the bridge to be a water resources project. A water resources project must have “a direct and adverse effect on the scenic and recreational values of the Lower St. Croix National Scenic Riverway.” According to the December 23, 1996 determination, made under provisions of Section 7(a) of the Federal Wild and Scenic Rivers Act, “the massive structure would adversely affect the natural and historical scene, altering the scenic qualities of this segment of the river more than any development since designation.” This determination has caused federal construction permits to be withheld by the U.S. Army Corps of Engineers and U.S. Coast Guard. The bridge applicants, the respective state departments of transportation, claimed from the outset of the project planning process that Section 7(a) does not apply to bridges as “water resources projects.” They have filed motions seeking a federal court ruling to that effect.

At present, it appears political maneuvering regarding the bridge will continue. Look for updates on the Stillwater Bridge proposal in the next issue of the Minnogram.

*Eric Macbeth is the technical director for MWBAC. For more information on this issue or the activities of the MWBAC, call (612) 436-7131.*

## **Water Line scores an ‘A’ from callers**

The Minnesota Water Line is a state-wide phone line for people with water-related questions about septic systems, well design, drinking water, lakes or wetlands. In a recent survey of callers, 92 percent said their call was handled respectfully and professionally, and 90 percent said they would call the Water Line for advice again. Seventy-one percent said they believe the Water Line helped them save time, and 49 percent said the service helped them save money.

The Water Line Coordinator is available to take calls from 9 a.m. to 2 p.m., Monday through Friday. At other times, a message can be left and calls will be returned. The coordinator will provide confidential, scientifically-based information and will send written materials. If the coordinator cannot answer a question directly, the caller will be referred to appropriate volunteer water industry professionals, or state and local agency staff.

Want to save time and money with a water-related question? Call the Minnesota Water Line at 1-800-455-4526, or contact the line via E-mail at: [kanderson1@mes.umn.edu](mailto:kanderson1@mes.umn.edu).

## **WRS field course gives students hands-on training**

For Water Resources Science (WRS) Graduate Students at the University of Minnesota, the WRS 5010 field course offers a refreshing change from a long year of classwork. The field course, which will be held from August 18-30, will lead students on an intensive 13-day tour of the University's up-state field and research facilities. Students in the course will receive instruction from several University faculty in their respective areas of expertise.

The students will spend much of their time exploring the diverse aquatic landscape of the Lake Itasca region. During that time, students and faculty will stay at the University's Itasca Forestry and Biological Station. While at Itasca, students will learn a wide assortment of data collection and analysis techniques including water sampling, plankton sampling, lake sediment coring and stream flow determination. In addition, students will have the opportunity to learn and practice techniques used in wetlands research.

The course also features a stop at a USGS research site at Williams Lake for training in hydrogeology. There, students will learn how to collect and analyze groundwater samples from pumping wells.

Finally, the last day of the course features an all-day cruise on Lake Superior where students will learn various techniques for sampling larger lakes.

*For course information call the WRS at (612) 624-9282.*

## **Research focus: manure and water quality**

by Dave Schmidt

Manure can be a major contributor to water quality degradation. Manure system design and manure management practices can impact the amount of nutrients and organic material entering ground or surface water. Several ongoing research efforts at the University of Minnesota are quantifying these impacts. Data from these studies will be used to develop methods of optimizing the application of manure for crop production while minimizing the effects of manure on water quantity.

One University study, conducted by Mike Schmitt, John Moncrief, and Satish Gupta (Department of Soil, Water, and Climate), and Chuck Clanton (Department of Biosystems and Agricultural Engineering), is evaluating seepage through clay-lined manure storage structures. In this study, a plastic liner has been installed under portions of four clay-lined manure storage structures. Both volume and nutrient content of the seepage from these structures is being measured.

Several other studies are evaluating the impact of manure application on crop production and runoff potential. Factors being manipulated include application timing, application method, application rate, crop rotation, and tillage method.

For more information on the University of Minnesota's many manure research activities, visit the manure home page at <http://www.bae.umn.edu/extens/manure/programs.html>.

*Dave Schmidt is an assistant extension engineer for the manure systems research program.*

## **U of M student group teams up with Minneapolis neighborhood**

Several University of Minnesota students spent April 20th at Lynherst Park in Minneapolis for an Earth Day creek-clean-up. The students, part of a newly formed student organization, Water Resources Students in Action (WRSIA), spent the day talking with local residents about water quality, as well as doing their fair share of picking up candy bar wrappers and old antennas.

Part of the group's impetus for attending the clean-up was to build support for upcoming community-based projects it is organizing. Currently, the group is working with the Tangletown Neighborhood District (TND) to develop a macroinvertebrate monitoring program. The effort is part of a county-wide monitoring program organized by the Hennepin Conservation District (HCD). Until this point, the program has been composed solely of secondary school groups. Connie Forton, organizer of the HCD program, says she is excited about the WRSIA effort because it will expand the focus of the program to include community groups.

WRSIA and TND have also adopted 1.5 miles of Minnehaha Creek through the MN-DNR's Adopt-a-River program.

WRSIA hopes its partnership with TND will serve as a model for grassroots conservation of urban waterways. Shandor Szalay, president of WRSIA, thinks working with neighborhood associations is ideal. "The neighborhoods are full of motivated individuals with a concern for their communities. They want to keep their creeks and lakes clean." Eventually, WRSIA plans to involve other neighborhoods in similar projects. "We're starting small. We want focus our efforts first", said Szalay.

*For course information call the WRS at (612) 624-9282.*

## **Water resources students get all wet with Project JASON**

On May 3, at the Bell Museum, several lucky children got the chance to dam rivers and create non-point source pollution. Thanks to five University of Minnesota Water Resources Science graduate students, these children got a hands-on introduction to many water resources issues, and had a lot of fun along the way. It was all part of the museum's Jason Project Sciencefest, a smorgasbord of exhibits and demonstrations designed to get kids pumped up about science.

The graduate students borrowed a large river model from the St. Anthony Hydraulic Lab. They talked to children about how rivers flood, sedimentation and erosion, as well as the influences of dams and levees on these natural processes. Also, the students used the Enviroscape landscape model to demonstrate the effects of non-point source pollution on water quality.

The graduate students really enjoyed the opportunity to share their enthusiasm for science. “It’s a wonderful opportunity to break out of the mold and do something different,” said student Carie Kowalsky. Indeed, the day proved to be a nice change of pace for the graduate students. For the children, it was a unique chance to experience science and all of its wonder.

The students, Jesse Anderson, Sara Eliason, Anne Gleason, Carie Kowalsky and Shandor Szalay, are a part of professor Jim Perry’s water quality team at the University.

## **Spotlight: Environmental Quality Incentives Program**

The Environmental Quality Incentives Program (EQIP) was established by the 1996 Federal Farm Bill to provide a single, voluntary conservation program for farmers and ranchers. EQIP combines the best features of the former Agricultural Conservation Program (ACP) and Water Quality Incentives Program (WQIP) into a coordinated program. This program encourages participants to augment more traditional crop production techniques with alternative practices to protect soil and water resources.

To qualify for assistance through EQIP, a producer must agree to implement practices throughout a 5- to 10-year period. This agreement must address the resource concerns identified both by the producer and by the agency personnel providing technical assistance. EQIP provides cost-share funds to pay up to 75 percent of the cost to implement conservation practices as well as providing incentive payments to producers for implementing improved management practices. Examples of practices for which incentives may be provided include nutrient management, manure management, integrated pest management, irrigation water management and wildlife habitat management.

Conservation priority areas for EQIP have been identified in Minnesota. This prioritization will be used to target the use of EQIP funds throughout the state. At least 50 percent of the money available will go to assist livestock producers to address environmental concerns.

For more information call Jim Anderson at (612) 625-8209

## **Minnesota Water Community News**

### **Appointments**

**Rich Axler** and **Carl Richards** (Nat. Res. Research Inst.) have been appointed to three-year terms on the Technical Committee-Research of the North Central Region Aquaculture Center sponsored by the USDA

## Awards

**David Hibbs** (St. Anthony Falls Lab.) received a doctoral dissertation fellowship and the Alvin G. Anderson Award, given to graduate students at the University of Minnesota specializing in water resources engineering.

**George Rehm** (Dept. of Soil, Wat., and Clim.) received the Werner Nelson Award from the Fluid Fertilizer Foundation (FFF). Dr. Rehm was the 1991 recipient of the FFF Research of the Year Award.

**Pierre Robert** (Dept. of Soil, Wat., and Clim.) was selected as one of the first three recipients of the SiteLiner Service Award. Dr. Robert will also be featured in the June 1997 issue of Farm Chemicals.

**Kenneth N. Brooks** (Dept. of For. Res.) has been awarded a Fulbright grant to lecture in Taiwan. His lecture will focus on integrated watershed management - opportunities and issues in Taiwan.

**Jim Perry** (Dept. of For. Res.) has been awarded the first annual Richard C. Newman Art in Teaching Award, given to College of Natural Resources faculty at the University of Minnesota for excellence and innovation in teaching.

**Patrick Brezonik** (Dept. of Civ. Eng.) will be awarded the "Friend of UCOWR" award at the AWRA/UCOWR joint symposium in Keystone, CO. The award is given in recognition of distinguished and exemplary service to the Universities Council on Water Resources.

## New Grants

**Carol Johnston** and **John Pastor** (Nat. Res. Research Inst.) have received a 3-year, \$600,000 award from the National Science Foundation for their continuing studies of beaver influences on the environment in Voyageurs National Park. Under this project, "Control of productivity and plant species segregation by nitrogen fluxes to wetland beaver meadows," they will develop a coupled hydrologic-plant growth model to predict diversity and productivity in beaver meadows.

## Personnel

**Keith Anderson** (Minnesota Sea Grant) was hired as the new Water Line Coordinator, replacing Deanne Roquet, who remains on the Water Line Steering Committee. Keith provides Water Line callers with straight-forward, scientifically-based answers to their questions about septic systems, wells, drinking water, lakes, rivers and wetlands.

**Gary Parker** (Dept. of Civ. Eng.) was named as an IT (College of Information and Technology) professor on May 21.

## Publications

**Lucinda Johnson** (Nat. Res. Research Inst.) was co-editor of a special issue of the journal *Freshwater Biology*: Allan, J.D., L.B. Johnson (eds). 1997 Advances in catchment scale analyses of aquatic ecosystems. Special Issue, vol. 37(1).

## Research Findings

**Robert Tipping** (MN Geol. Surv.) is investigating the hydrogeology of saline- and boron-bearing ground waters in the North Shore Volcanic Group. These naturally occurring waters contain boron at concentrations above 2,000 ppb and chloride as high as 36,000 ppm, significantly above the health risk limit for both substances.

Related work by **Doug Allen**, a graduate student of **W. E. Seyfried** in the Dept. of Geology, suggests that the rocks that now host these waters were once inundated with sea water, providing boron to the system. Investigations of this intriguing geochemical anomaly are continuing.

## Travel

**John Gulliver** (St. Anthony Falls Lab.) spent half of Spring Quarter, 1997 as a visiting professor at the University of Sao Carlos, School of Engineers, Sao Carlos. He spent much of his time giving seminars on water quality enhancement technology, aeration design and testing and the prediction of the effects of riverine oil spills.

**K. William Easter** (Dept. of Appl. Econ.) presented a paper entitled "Conflict in managing water resources in an international setting" at the Toulouse Conference on Environmental and Resource Economics in Toulouse, France, May 14-16, 1997.

## Upcoming Investigations

**Nigel Watrus** and **Tom Johnson** (Large Lakes Obs.) will conduct a reconnaissance survey of Lake Nicaragua using seismic reflection profiling in collaboration with scientists from the University of Michigan and the Universidad Nacional Autonoma de Nicaragua. The survey will be conducted in August.

Tom Johnson and **Elise Ralph** will conduct a pilot study of water column properties and lake floor sediments of Lissyk Kul, a large lake in Kyrgystan, in collaboration with scientists from the Smithsonian Institute and Kyrgystan. The pilot study will be conducted in June.

## Upcoming Events

### Meetings and Workshops

June 9-11. **Great Lakes Fishery Commission Annual Meeting**. Ottawa, Ontario. Guided tour of the Canadian Parliament Buildings. Reception will immediately follow the tour. Contact: Pat Bronkowski at (313) 662-3209 ext. 11 or E-mail: patb@glfc.org.

June 11. **Project WET Workshop.** Staples, MN. Program is designed by teachers for teachers to provide interdisciplinary hands-on activities to use both inside and outside the classroom. Curriculum and activity guide focuses on water resources education. Workshop cost is \$25. Graduate credit is available through Hamline University. Contact: Marlene Schoeneck at (218) 338-4079 ext 342.

June 15-18. **Building Native American Partnerships Project: Wetlands Conservation Planning for the Protection and Restoration of Wetland, Floodplain, Riparian, and River Systems.** Green Bay, WI. Goal of the conference is to help Native Americans and Non-native Americans develop and implement cooperative wetland/floodplain/riparian zone conservation partnerships. Contact: Jon A. Kuster at (518) 872-1804 or E-mail: aswmi@aol.com.

June 21. **Aitkin County Rivers and Lake Fair.** Contact: Jean Pitt at (218) 927-7311.

June 29-July 3. **AWRA-UCOWR Joint Symposium "Water Resources Education, Training, and Practice: Opportunities for the Next Century."** Keystone, CO. Contact: John D. Stednick at (970) 491-7248.

July 10-13. **Third Annual Mississippi River Conference.** St. Louis, MO. This year's theme is "Health of the River: Health of the People." Contact: The Mississippi River Basin Alliance at (314) 822-4114.

July 14-25. **Operation Pathfinder.** Duluth, MN. A summer workshop to educate elementary and middle school teachers on oceanography and coastal processes. Topics will include pollution of the Great Lakes, deep sea technologies and marine habitats. Contact: Bruce Munson, Minnesota Sea Grant Program at (218) 726-8106 or E-mail: bmunson@d.umn.edu. Also, see the Operation Pathfinder web site: <http://www.d.umn.edu/~seagr/pathfinder/pathbro.html>.

July 15-17. **AWRA Short Course: Site Characterization for Environmental Purposes with Emphasis on Soil, Rock, & Groundwater.** Minneapolis, MN. Contact: Kristina Falkenstein at (610) 832-9685.

### **Calls for Papers**

**Watershed Management: Moving From Theory to Implementation.** May 3-8, 1998. Denver, CO. *Abstract deadline is June 16, 1997.* Topics include: sustainable watershed protection, use of GIS and databases, public education and stakeholder development and water quantity and quality monitoring. For more information contact: The Water Environment Federation at (703) 684-2400.

**The River Management Society's Rivers: The Future Frontier" 1998 Symposium.** April 23-May 3, 1998. Anchorage, AK. *Abstract deadline is June 30, 1997.* Topics include: social carrying capacity, boater allocations, impacts of new fee systems, federal/state/local partnerships, teaching river ethics, water rights and instream flows, sanitation obligations of river users, international river management, new ideas in private-land rivers, interpretive programs and wilderness river management. For more information contact: The River Management Society at (406) 549-0514 or E-mail: rms@igc.apc.org.

**42nd Annual Midwest Groundwater Conference.** Coralville, IA. October 22-24, 1997. *Abstract deadline is July 1, 1997.* Topics include various aspects of groundwater assessment, remediation, contamination and monitoring. Contact: Paul VanDorpe at (319) 335-1580 or E-mail: pvandorpe@gsbth-po.isgb.uiowa.edu.

**59th Midwest Fish and Wildlife Conference.** December 7-10, 1997. Milwaukee, WI. *Abstract deadline is June 30, 1997.* Theme of this year's conference is "Managing Natural Resources: Integrating Ecology and Society." Contact: Violet Lehmann at (608) 266-4359.

## Requests for Proposals

**National Sea Grant College Program, NOAA National Strategic Investments Program is requesting proposals for funding in marine biotechnology.** Funding available for FY 1998 is approximately \$1.88 million. Proposals will be accepted for one- or two- year duration. Acceptable topics include: aquaculture endocrinology and molecular genetics; bioprocessing, bioreaction, cell, and tissue culture; natural products and biomaterials; resources management and environmental technology; seafood and aquacultural pathogens and contaminants; and policy, socioeconomics and technology transfer. *Proposal submittal deadline is June 16, 1997.* For more information contact: Judy Zomerfelt at (218) 726-8107 or E-mail: jzomerfelt@mes.umn.edu.

## New Publications

*Dams and Rivers: Primer on Downstream Effects of Dams.* M. Collier, R.H. Web, and J.C. Schmidt. Published by the USGS, Circular 1126. 1996. 94 p. Available free of charge, call: (303) 202-4210.

*Floods, Floodplains, and Folks: A Casebook in Managing Rivers for Multiple Uses.* Published by National Center for Recreation and Conservation, National Park Service. 1996. 88p. Available free of charge, call: (202) 565-1200.

*Seas Grant Abstracts - Publications From the Nation's Sea Grant Programs.* 1997. Published by the National Sea Grant Depository. Vol. 11 No. 4. Available from the National Sea Grant Depository, call: (401) 874-6160.

*Floodplain Management: Ecologic and Economic Perspectives.* N. Philippi. 1996. 225 p. Published by Academic Press. Available for \$69.95, call: (800) 321-5068.

*Quantity and Quality of Runoff from Selected Guttered and Unguttered Roadways in Northeastern Ramsey County.* G.B. Mitton, and G.A. Payne. Published by the USGS, Water-Resources Investigations Report 96-4284. 1997. Available from the USGS, call: (612) 783-3100.

*Physical and Chemical Properties of Water and Sediments, Grand Portage and Wausaugoning Bays, Lake Superior, Grand Portage Indian Reservation, Northeastern Minnesota, 1993-96.* Published by the USGS, Open-File Report 97-199. Available from the USGS, call: (612) 783-3100.

*The Mississippi River in the Upper Midwest: Its Economy, Ecology, and Management. 1996. Published by the McKnight Foundation. Available free of charge, call: (612) 333-4220.*

*An Inquiry into the Relationship of Wetland Regulations and Property Values in Minnesota. C. Holtman, S.J. Taff, A. Meyer, and J. Leitch. 1996. Published by the Dept. of Appl. Econ., University of Minnesota. Available free of charge, call: (612) 625-1222.*

*Document Publications - 1996. Published by the Dept. of Appl. Econ., University of Minnesota. Available free of charge, call: (612) 625-1222.*