IOWA WATCH

THE CENTER FOR GLOBAL AND REGIONAL ENVIRONMENTAL RESEARCH

FALL 2003

Outside the Laboratory

Water courses the globe as if it were the planet's lifeblood. Rising invisibly from shimmering surfaces, it condenses in cooled skies to cloud our heavens and fall once again upon land, river, or sea. Penetrating terra firma, it filters through soil and rock until coalescing into underground streams. Some of these trickle back to Earth's surface to flow overland into ever-larger channels exposed to the sun's evaporating rays, which commence the cycle once again.

Water rarely travels alone. Dissolving and reshaping Earth's surface and everything resting upon it, flowing water transports sediments, rocks and minerals, pesticides and pollutants, beach balls and bottles and even human structures, anything caught within its wake. Life-giver and life-taker, water's flow defines the boundary separating viability from death on this planet.

Accurately tracing the details of this planetary flow has stimulated creative scientific investigation for centuries. It has pulled scientists out of traditional research laboratories, away from lab benches and test tubes and, today, away from computer screens. Water's movement, in its ever-varying manifestations, has challenged researchers to measure natural processes in the most challenging of field locations – at the heart of the hurricane, underneath a river's depths, on the perimeter of a raindrop.

Doing so often requires developing novel mechanisms and measuring devices, the latter forged ever anew by technological innovation. The challenges of such endeavors shape the thoughts and careers of several CGRER members, many of whom are housed in the UI College of Engineering's IIHR-Hydroscience & Engineering, a world-renowned research and teaching institute that focuses on fluid-flow fundamentals and applications.

IIHR's **Bill Eichinger**, for example, is well known for devising novel uses for his "lidar" instruments, which are similar to radar but

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This issue of *IoWatch* examines CGRER members' innovative instrumentation and research efforts outside the traditional scientific laboratory.

Outside the Laboratory

Setting up lidar instrumentation

instead use laser beams to detect extremely small atmospheric components with high resolution. One such project utilizes lidar to measure water evaporation from rivers and reservoirs in the Rio Grande Basin. This river system constitutes a major water source for the majority of New Mexican residents, but a large portion of the river's water is lost through evaporation. Eichinger is now precisely quantifying evaporation along the river and from its reservoirs in hopes of subsequently devising methods for calculating the Rio Grande's evaporation using simple meteorological techniques. Such simpler methods, employable by technicians, would enable managers to improve the precision of water's management and to decrease waste of this crucial resource.

In a related project, Eichinger is attempting to use lidar to measure water evaporating from Iowa's soil into the atmosphere. Soil moisture, which is known to affect local climate, varies greatly with topography. Eichinger's fine-tuned measurements of moisture variations in the soil-atmosphere interface will help determine the extent to which soil-moisture variations shape weather. This knowledge may prove a crucial addition to global climate models.

Eichinger sometimes attempts to use his lidar to observe the small-scale structure of raindrops, thus feeding the passions of colleague **Witold Krajewski**, whose office is just down the hall. Krajewski is known for implementing and evaluating remote sensing devices that measure rainfall properties. His observatory, currently centered at the Iowa City airport, includes an extensive network of automated rain gauges. These gauges, 76 in all spanning a 400 km^2 area around Iowa City, are unusual in that they are doubled up at each of 38 sites, a simple but significant innovation that allows ready confirmation of each gauge's data. Even more unusual are his optical disdrometers, research instruments that measure the distribution of raindrop sizes, and vertically pointing radar units that determine the vertical structure of precipitation. These multiple instruments, operated jointly with IIHR research engineer Anton Kruger, currently are helping to assess the accuracy of a new NASA satellite that monitors rainfall worldwide. The fine-tuned precipitation picture created by the suite of instruments also complements Krajewski's development of algorithms that ultimately will improve rainfall estimates, thus benefiting water resource applications such as the operation of reservoirs and irrigation systems, flood forecasting, and the like.

IIHR's rainfall observatory

Always eager to increase his instrumental capabilities, Krajewski and his former graduate student Emmanouil (Manos) Anagnostou, now professor at the University of Connecticut, recently attempted to integrate a small mobile Doppler radar unit with polarimetric capabilities into his rainfall observatory. This unit bestowed them with two new capabilities: the ability to "see" electronically the shape of raindrops, and to distinguish among different types of precipitation (to separate hail, rain, and melting snow, for example). Krajewski hopes soon to add such a unit permanently to his slate of instruments.

Rivers may be less transient than rainfall, but

precise measurement of their flows remains difficult and complex. For centuries, hydraulicians have used measuring devices that protrude into the water, an act that in itself may disrupt the field of flow. About 15 years ago, non-intrusive video-based techniques ("PIV," or particle image velocimetry) started to be applied in the laboratory to determine fluid velocity and discharge.

Now **Allen Bradley**, Krajewski, IIHR research engineers Marian Muste and Anton Kruger, and others are among the first in the U.S. to apply this fairly new research technique in the field, to real streams and rivers. Its advantages – easy and fast application of a non-intrusive device, employed without posing danger to field personnel – are posturing this as the future technique-of-choice for rapidly obtaining multiple river flow measurements, for example of flooding rivers. IIHR is investing in a mobile laboratory to test the technique through performing large-scale field experiments. IIHR researchers are also pushing the technique's use beyond the current two-dimensional surface-motion applications. Through integrating principals of basic hydraulics and flow kinematics, they are attempting to use PIV to determine three-dimensional flows. By coupling the measurements with numerical models of fluid motion, they will provide an efficient field method for obtaining three-dimensional views of river flows over a river reach.

Attempting to measure water depth with radar

Robert Ettema also has been viewing rivers through the eyes of new instrumentation. For the past few winters, he has been studying the Missouri River's flow underneath ice surfaces, an attempt to better understand cold-weather erosion and scouring patterns. Wintertime hydropower-generating water releases from the Fort Peck Dam in northeastern Missouri scour away large chunks of the Missouri's fragile floodplain and sometimes steal cattle as well as land from ranchers. Ettema attempted to employ ground-penetrating radar to trace changes in the river's bathymetry, but was thwarted by the water's salinity. He thus resorted to traditional techniques (augering through the ice and inserting a rod to measure distance to the river's bottom), and also electromagnetic bed-surface probes attached to extended rods that were driven six feet into the river's bed. The latter monitored changes in the river's bed throughout the winter. These measurements, combined with photographs from fixed-view video cameras mounted adjacent to the river that were accessed via the internet, provided numerical and visual images of the river's erosive power, generating understanding that Ettema hopes will translate into more effective river management.

For the past 13 years, **Louis Licht** has been using

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Gooding's mussels

Tried and true research techniques continue to carry CGRER researchers into the field and yield significant data. **Meredith Gooding** has been collecting adult mussels from Iowa's rivers so she can obtain mussel larvae upon which to perform toxicity tests for synthetic musk fragrances, compounds commonly added to personal care products (shampoos, sunscreens, etc.) that are washing into our water bodies. **Keri Hornbuckle** has been sailing the Great Lakes to collect water, air, and sediments for studies of the presence and fate of synthetic musk fragrances. Both studies received CGRER seed grants this year.

Extruding a sediment core

Outside the Laboratory

tree plantations to pull soil and water pollutants from confinement lagoons, landfills, and other polluted sites. Now, newly designed instruments and field techniques allow researchers to monitor and predict the fate and movement of water and regulated contaminant flows – abilities that encourage acceptance of Licht's bio-engineered systems by landowners and regulators. This is accomplished by tying instrumental data to Geographical Information System (GIS) technologies and analytical programs to provide real-time display of cleanup processes. "We can now integrate instrumentation to present an understandable story of how a bare landfill evolves into a forest that can become a safe neighborhood park," Licht explains. He feels that such integrated visions will not only enlighten researchers, but also will help educate the public and decision makers.

Licht and **Pedro Alvarez** recently took Iowa-based technology to Central America. Working with a Nicaraguan rum producer, they helped devise a scheme whereby bio-digesters would convert distillery wastewater containing unfermented sugars and spilled alcohols into usable products. Using phytoremediation techniques developed over the past 13 years, wastewater effluent (which currently drains untreated into a coastal estuary) will be used to irrigate sugar cane in the summer and eucalyptus trees in the winter, the latter being used to heat the sugar refinery. Such applications of new technologies hopefully will help Third World nations advance in an environmentally sensitive manner.

Instruments that quantify moisture drifting from soil into air, that outline the shape of a raindrop, or that follow polluted water into purifying trees. Technologies that allow researchers to measure floodwaters without getting wet and decipher flows beneath icy surfaces. New instruments and technologies utilized "Outside the Laboratory" provide answers to questions that, in past decades, might only have been whispered. While continuing to root themselves firmly in traditional laboratory techniques and analysis, CGRER's researchers will continue to probe the natural world in manners that push the limits of inquiry outward, in this way adding details of Earth's natural functions to comprehensive pictures of our planet's ever-changing environments. ✻

Further Reading:

Lidar measurements of water evaporation:
Cooper, D.I., W. E. Eichinger, J. Archuleta, L. Hipps, J. Kao, M. Y. Leclerc, C. M. Neale and J. Prueger. "Spatial source-area analysis of three-dimensional moisture fields from lidar, eddy covariance, and a footprint model." *Agricultural and Forest Meteorology* 114: 213-234, 2003.

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IIHR's rainfall observatory:
Miriovsky, B.J., A.A. Bradley, W.N. Eichinger, W.F. Krajewski, A. Kruger, B.R. Nelson, J.-D. Creutin, J.-M. Lapettite, G. Lee, I. Zawadzki, F.L. Ogden. "An experimental study of small-scale variability of reflectivity." *Journal of Applied Meteorology*, 2003 (in press).

Anagnostou, E.N., M.N. Anagnostou, A. Kruger, W.F. Krajewski, and B. Miriovsky. "High-resolution rainfall estimation from X-band polarimetric radar measurements." *Journal of Hydrometeorology*, 2003 (in press).

PIV measurement of river flows:
Creutin, J.D., M. Muste, A.A. Bradley, S.C. Kim, A. Kruger. "River gauging using PIV techniques: A proof of concept experiment on the Iowa River." *Journal of Hydrology* 277(2003):182-194, 2001.

Bradley, A.A., and A. Kruger, E.A. Meselhe, M. Muste. "Flow measurement in streams using video imagery." *Water Resources Research* 38(12): 51.1-51.8, 2003.

Sub-ice measurements along the Missouri River:
Ettema, R. and L. J. Zabilansky. "Ice influences on channel stability: Insights from Missouri's Fort Peck Reach." *ASCE Journal of Hydraulic Engineering*, 2003 (in press)

Zabilansky, L. J., R. Ettema, J. Wuebben, and N. E. Yankielun. *Survey of River-Ice Influences on Channel Bathymetry along the Fort Peck Reach of the Missouri River, Winter 1998 – 1999*. CRREL Technical Report 02-14, U. S. Army Corps of Engineers, Cold Regions Research and Engineering Laboratory, Hanover NH, 2002.

SEEDS

CGRER has awarded a total of $127,993 to seven new research projects for fiscal year 2003-2004. Each of these projects will aim to gather preliminary data that will enable the future preparation of larger, more comprehensive grant proposals to outside funding sources.

Synthetic Musk Fragrances in Great Lakes Sediments
Bryan Boulanger, Keri Hornbuckle, Jerald Schnoor
(all UI, Civil and Environmental Engineering), $20,000

Synthetic musk fragrances (SMFs), compounds widely used in cosmetics, soaps, shampoos, and other personal care products, are released in treated wastewater effluent and also exhibit aerial transport. These persistent chemicals, now ubiquitous in the environment, are known to be endocrine disruptors, but details of their fate and potential toxicologic impacts on humans and ecosystems remain poorly understood.

This project aims to evaluate the presence and fate of SMFs in the Great Lakes. Concentrations of specific SMFs and their breakdown products will be measured in air, water, and sediment samples collected at four sites during scientific cruises in Lakes Ontario and Erie. Sediment cores will yield information about trends in SMF lake contamination over the last 30 years. These data will improve understanding about the presence, storage, and decomposition of SMFs in the Great Lakes, laying down a firmer baseline for understanding exposure to these compounds as well as their possible health impacts.

A Geochemical Survey of Iowa's Freshwater Mussels: Understanding Their Historical Decline
Donna Surge (ISU, Geological and Atmospheric Sciences) and **Scott Carpenter** (UI, Geoscience), $20,000

Freshwater mussels constitute excellent biological monitors of water quality. These bottom-dwelling animals, once common in Iowa's streams, depend on specific host fish and clean streamwater for life and reproduction. Iowa's mussels, once a mainstay of a national button industry, are now in serious decline. Proposed explanations include the disappearance of host fish due to damming of rivers, and habitat degradation through agriculturally-induced siltation, eutrophication, and waterborne pesticides.

Project leaders will perform the first geochemical analyses of Iowa's mussels, comparing carbon and oxygen isotopes of shells from the late 1800s with those of the late 1900s. Resulting data should allow the researchers to reconstruct changes in stream productivity and climate and relate these to agricultural practices and dam construction, thus clarifying mechanisms responsible for current mussel declines. They also will age extant mussel populations through geochemical analysis, relating their data to mussel management and environmental variants, possibly including global warming.

SEEDS continued

Environmental Effects on Stable Isotopes and Carbon Cycle Processes in Agricultural Settings of Iowa
Germán Mora (ISU, Geological and Atmospheric Sciences), $14,000

Concentrations of atmospheric carbon dioxide have increased over 25% since the onset of the Industrial Revolution, but the fate of these emissions remains poorly understood. Terrestrial ecosystems both absorb and emit this greenhouse gas in varying amounts that depend on ecological, seasonal, and environmental conditions. The complexity of these processes significantly impacts computer models that attempt to predict future climate change based on altered atmospheric CO_2 levels.

This project will collect critical data about day-to-day and seasonal changes of both carbon and oxygen isotopes in Iowa's corn and soybean fields. The data will provide insight into carbon fluxes related to the plants' respiration (which releases CO_2) and the assimilation of CO_2 during photosynthesis. By elucidating the complexities of gaseous interchange between terrestrial ecosystems and the atmosphere, the research promises to constrain model outputs of carbon cycling for the Midwest, and also to help predict cropland responses to future atmospheric changes.

Applicability of Aquatic Life Cycle Testing to the Assessment of Ecological Health Impacts of Emerging Contaminants
Meredith Gooding (UI, CGRER), $14,000

Pharmaceuticals and personal care products (PPCPs) such as prescription drugs, food supplements, sunscreens, and cosmetic ingredients constitute an emerging group of little-tested water contaminants, with synthetic musk fragrances (SMFs) forming one member of this larger category. Innovative approaches are needed to evaluate untested, potential, subtle ecological effects of these compounds that are not discernable through standard toxicological methods.

This project will examine responses of a sensitive group of imperiled invertebrates, freshwater mussels, to SMF contamination. Following laboratory exposure to SMFs, mussels will be studied for changes in growth, morphology, bioaccumulation, and mortality. Consideration of chronic, low-level exposure at different life stages will be addressed by testing both mussel larvae and juveniles. The results will provide data on the suitability of using mussels as test organisms for PPCPs, and more broadly will help determine the need to further evaluate environmental PPCPs' health impacts. Results also will contribute toward developing methods for doing so.

Characterization of Particulates and Their Role in Environmental Health
Vicki Grassian (UI, Chemistry) and **Patrick O'Shaughnessy** (UI, Occupational and Environmental Health), $20,000

Rural inhabitants are exposed to unique health hazards. For example, concentrated animal feeding operations (CAFOs) have long been known to affect significantly the respiratory health of humans who work therein. Airborne contaminants combine to form a complex mixture that is deleterious to health at unexpectedly low levels.

One poorly understood component of the CAFO problem involves synergistic health effects of gases adhered to inhalable particles. This project will quantify, both in the laboratory and in the field, ammonia gas adhered to corn dust and swine-confinement dust, characterizing the complexes under varying environmental conditions (relative humidities and temperatures). Similar efforts will be made with gaseous polycyclic aromatic hydrocarbons (PAHs) adhered to tractor diesel exhaust. This second complex (not associated with CAFOs) is thought to resemble the soot-adhered PAHs that are known to impact respiratory health in urban environments. The project will establish new collaborative efforts between researchers in chemistry and environmental health.

Quantifying the Health and Climate Benefits of Curbing Air Pollution in Megacities: Comparing Shanghai and Santiago
Gregory Carmichael (UI, CGRER), $20,000

Developing countries face tremendous challenges when attempting to balance the costs and benefits of economic development. The fossil fuels used to power increasing numbers of vehicles and industries also degrade human health and magnify climate change processes. However, these longer-term problems are often overlooked in the search for short-term economic gain.

This project seeks to provide a tool that will encourage megacities in the developing world to consider certain economic benefits of reducing greenhouse gas emissions. An existing numerical model for analysis of multiple development-related questions, "IAMS," will be further refined and tested for its ability also to integrate costs and benefits of air quality management systems. Health-related improvements (e.g. decreasing chronic bronchitis or work-day losses) can then be compared with expenditures on emission control measures. This model, once refined, is expected to encourage megacities around the world regularly to integrate protection of their citizens' health into policy decisions.

Responses of Vegetation and Fire to Little Ice Age Climate Change Across a Wisconsin Sand Plain
Elizabeth Lynch (Luther College, Biology), $19,993

Ecologists and land managers now realize that wildfire was crucial to many pre-settlement ecosystems, and thus are increasingly using prescribed fire to restore habitats for endangered native species. However details about fire's long-term historic interactions with specific native communities often remain poorly understood.

This project proposes to clarify the issue for one area: northwestern Wisconsin's sand plain. Charcoal and pollen deposits will be tested for their ability to relate changing vegetation to fire history in three sand plain sites. Project results will be immediately useful to land managers and restoration ecologists working in the region. However this effort also constitutes the initial phase of a larger sand plain interdisciplinary investigation of interactions among vegetation, fire disturbance, climate, and soil. The larger project will aim at delineating the region's long-term ecological history through mapping evolving vegetation and fire patterns at 200-year intervals for the past 2,000 years. ✻

Miscellanea

CGRER members' efforts "Outside the Laboratory" also include non-research activities to influence public understanding and governmental policy. The following types of efforts are crucial to the dispersal and application of scientific knowledge:

- **Dick Baker** (UI, Geoscience) has been leading natural area field trips for the local Senior Center, as well as directing management of two nature preserves and restoring prairies, savannas, and wetlands around his home.
- **Allen Bradley** (UI, Civil and Environmental Engineering) is a member of the National Research Council's *Committee on the U.S. Geological Survey's Water Resources Research,* which routinely advises the U.S.G.S. on water use, stream gaging, river science, and like research programs.
- In February, CGRER helped sponsor a one-day UI symposium for students and the general public, entitled *The Green Awakening: Redefining Prosperity for Business, the Environment, and Humanity.*
- In April, CGRER was instrumental in initiating and then co-sponsored Alliant Energy's *Energy Policy and Global Climate Change: A Path Forward* conference, where **Jerry Schnoor** lectured on energy – climate interactions. This conference gave visible recognition to CGRER's efforts to promote "green energy" in the Midwest.

Miscellanea

- Last year, CGRER helped sponsor a *Sustainable Futures for Iowa* project in conjunction with the U.N.'s World Summit on Sustainable Development. The Iowa U.N Association has just released a publication based on that project, which includes essays and student thoughts concerning sustainable development in Iowa. To request the publication, call (319)337-7290 or e-mail <unaiowa@inav.net>.

- **Greg Carmichael** (UI, Chemical and Biochemical Engineering) continues to chair the World Meteorological Society's *Scientific Advisory Group for the Urban Research and Meteorology and Environment Project*, which assists governmental agencies around the world in managing air quality problems. He also serves on NSF's *Cyberinfrastructure for Research and Development in the Atmospheric Sciences* steering committee. He lectured at, and served on the advisory board for, the *Advanced Institute on Urbanization, Emissions, and the Global Carbon Cycle*, an interdisciplinary gathering held in August at NCAR that critically examined variables related to urban emissions and their long-term control.

- **Diane Debinski** (ISU, Ecology, Evolution, and Organismal Biology) was an invited participant in a National Park Service's *Vital Signs Monitoring Workshop* in Montana, where she helped prioritize biotic and other indicators to be monitored for determining the ecological health and long-term ecosystem changes of Yellowstone, Grand Teton, and Big Horn Canyon National Parks.

Newcomers

CGRER has welcomed four new members since the fall of 2002:

JEFFREY DORALE

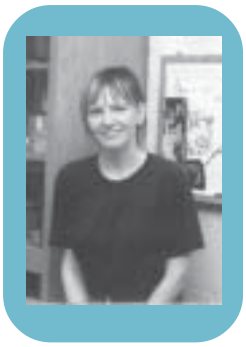
A native Iowan, Jeff Dorale recently returned to the UI Geoscience department, where many years ago he earned his B.S. and M.S. He then received his doctorate from the University of Minnesota and joined the University of Missouri – Columbia's faculty for two years. During his UI studies, Dorale initiated detailed studies of speleothem geochemistry to trace prehistoric changes in precipitation and temperature. Now he assumes directorship of the Paul H. Nelson Stable Isotope Laboratory, established (in part by CGRER) in 1999. Dorale will continue to work with stalagmites collected in the Midwest, Alaska, China, and the Rocky Mountains, using these to decipher local variations among ancient climates and to produce a unified global picture of climate change, one that can be tied to sequences determined through other sources (such as the much-used Greenland ice cores).

Dorale became a CGRER member immediately upon joining the UI faculty. He had already worked with several CGRER members as a student, before CGRER's formal existence. His future contact with CGRER members is sure to stimulate new thoughts and directions among members, even as he spurs the Stable Isotope Laboratory on to new endeavors.

GERMÁN MORA

Mora left his home in Columbia to perform graduate studies at Indiana University. In 2001, after a year's post-doc at Johns Hopkins, he joined the ISU Geological and Atmospheric Sciences faculty. There he utilizes stable isotopes to perform detailed geological and ecological assessments relating to gas exchange between the biosphere and atmosphere (read about his Seed Grant on page 6). His diverse projects include measuring the transpiration of Midwestern forests and correlating this with other plant-growth factors; differentiating respiration of soil microorganisms from that of plant roots; using peat deposits to reconstruct Lake Superior's water levels for the past 4000 years; and analyzing plant remains found in archaeological digs. He hopes eventually to define the details of incorporation of stable isotopes into plant tissues so that he can apply this understanding to fossil plants. This, in turn, will allow more accurate reconstruction of past climates and the refinement of existing numerical climate models.

Mora's work already entails interdisciplinary research with ecologists, archaeologists, and others including CGRER members Jim Raich and Donna Surge. He trusts that CGRER membership will further broaden his contacts with colleagues who have similar interests and will enhance his understanding of past climates and climate models.



DONNA SURGE

Surge joined ISU's Geological and Atmospheric Sciences faculty in 2001, after completing her doctorate at the University of Michigan. At both institutions, she has used geological techniques to answer questions about the role of humans in changing Earth's environments, thus addressing matters of immediate relevance to Iowa's citizens. More specifically, much of her work has used analysis of stable isotopes in mollusk shells to reconstruct ecological and climatic features of the past 10,000 years. She points out that her efforts have entertained broad questions relating to the organisms' life histories and current management practices, as well as the implications of land use practices (such as effects of agriculture on water quality and riverine habitats).

Surge's work encompasses collaborations with diverse disciplines – for example she is now working with ecologists and archaeologists as well as fellow geologists. Thus her CGRER membership is a natural extension of her desire to interact with colleagues in disciplines and institutions outside her home base. The seed grant that she just received with Scott Carpenter (see page 5) is a concrete manifestation of that desire.

JAN THOMPSON

Thompson first came to ISU as an agronomy graduate student in 1981. She since has earned her doctorate in forestry, served as a post-doctoral fellow, and in 1998 joined ISU's Forestry (now Natural Resource Ecology and Management) faculty. There she teaches and conducts research in urban forestry, specializing in impacts of development and land use on woodland structure, composition, and function.

Her interests have prompted her to integrate sociological, economic, and policy questions into her analyses of forest stewardship and sustainability. Most recently, for example, she has examined the changes in hydrologic function and plant diversity that accompany construction of woodland housing developments, asking how perceived social and economic values (e.g., the value that residents place on living in a natural setting) could be utilized to conserve native woodlands.

Thompson hopes to continue to integrate diverse interdisciplinary questions into her land use studies, using the results to elucidate the multiple ways in which we impact the land, and pointing to new paradigms for a "better future Iowa." She sees CGRER membership as a mechanism for further integrating the humanities and social sciences into her scientific research. ✻

Miscellanea

- This past June, **Dale Zimmerman** (UI, Statistics and Actuarial Science) presented a two-day short course on spatial statistics at the Coastal Research Institute at the University of Rhode Island.

- **Keri Hornbuckle** (UI, Civil and Environmental Engineering) is current Vice President and future President of the thousand-member *International Association for Great Lakes Research*, a professional group that promotes research and provides scientific information to policy makers and the public. She also is active with the *Lake Michigan Air Toxics Task Force* (which includes scientists, regulators, industrialists, and others). She is a scientific advisor to the EPA on their *Air Toxics Research Strategy*, an associate editor of the *Journal of Great Lakes Research*, and serves on NSF review panels for certain types of proposals.

- **Sarah Larsen** (UI, Chemistry) participated in *Nanotechnology Grand Challenges* in the *Environment Research Planning Workshop* in Arlington this past May, an event intended to develop a strategic roadmap to guide environmental technology research. She also recently presented a seminar to the EPA's Office of Environmental Information (OEI) and Office of Research and Development (ORD).

UI graduate student Abiodun Oluyomi spent two months in The Gambia, West Africa, thanks to a CGRER travel grant. There he investigated domestic water-handling practices at sites such as this, relating them to the occurrence of the common blindness-inducing illness trachoma.

CGRER's recognition of the importance of research performed "Outside the Laboratory," out in the field where life flourishes in its natural setting, spurred the development of the Graduate Student Travel Grant program in 2000. This year CGRER awarded eight such travel grants, ranging in size from $500 to $1,600, for a total funding of $7,000. Half of the recipients used their travel funds to study varied aspects of diversity, survival, and pollinator-plant relationships in Iowa's prairies. The other half wandered farther abroad, visiting U.S. natural history museums to investigate primate evolution, flying to Panama to collect strangler figs, and traveling to Zimbabwe and Mozambique to initiate an environmental history of the *Save* River, and to West Africa to investigate water-related diseases. ✻

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Biology
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Cornell College

Geology
Rhawn Denniston

Hydrologic Research Center, San Diego, CA

Konstantine P. Georgakakos

Miscellanea

- In June, **Gerald Rushton** (UI, Geography) traveled to Trnava, Slovakia, to present a two-day workshop on geographic information systems (GIS) and health, at a *Rural Environmental Health* meeting of Eastern European students and faculty. He also is working with the Iowa Department of Health to develop a surveillance system for pollution-induced health problems in Carroll County, and with Oakridge National Laboratory on a project to assess geographic patterns of cancer incidence rates.

- **Jerry Schnoor** (UI, Civil and Environmental Engineering) is a member of the National Academy of Science's *Water Science and Technology Board*, which initiates and oversees all NAS committees and efforts concerned with water and technology.

- **Gene Tackle** (ISU, Geological and Atmospheric Sciences) is teaching an online course about global change to U.S. Department of Agriculture employees across the country (see http://www.meteor.iastate. edu/gccourse/). ✻

The University of Iowa

IOWA WATCH

THE CENTER FOR GLOBAL AND REGIONAL ENVIRONMENTAL RESEARCH

The University of Iowa's Center for Global and Regional Environmental Research (CGRER) promotes interdisciplinary efforts that focus on the multiple aspects of global environmental change, including its regional effects on natural ecosystems, environments, and resources, and on human health, culture, and social systems. Center membership is composed of interested faculty members at any of Iowa's colleges and universities.

Center goals are promoted by encouraging interdisciplinary research and dialogue among individuals whose disciplines touch upon any of the multifaceted aspects of global change. More specifically, the Center awards seed grants, fosters interdisciplinary courses, provides state-of-the-art research facilities and equipment, and holds seminars and symposia. The Center encourages students to broaden their studies and research through considering the multidisciplinary aspects of global and regional environmental problems. Through such activities, the Center attempts to assist Iowa's agencies, industries, and citizens as they prepare for accelerated environmental change that may accompany modern technologies.

Housed in the Iowa Advanced Technology Laboratory at the University of Iowa, the Center was established by the State Board of Regents in 1990 and received funding from a public utility trust fund, as mandated by the State of Iowa's Energy Efficiency Act.

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