



**THE CENTER FOR GLOBAL & REGIONAL
ENVIRONMENTAL RESEARCH**



2014 ANNUAL REPORT



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CGRER

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AND CGRER MEMBERS



The names of CGRER members and those affiliated with CGRER are highlighted in boldface throughout this report.

Middle photo: CGRER is housed in the Iowa Advanced Technology Laboratories on the University of Iowa campus. (photo by Mary Moye-Rowley)

Photo at right: Samuel Saltzman does climate research in Chile. (photo by Samuel Saltzman)



THE CENTER FOR GLOBAL & REGIONAL ENVIRONMENTAL RESEARCH



THE CENTER FOR GLOBAL & REGIONAL ENVIRONMENTAL RESEARCH

The Center for Global and Regional Environmental Research (CGRER) was established in 1990 with the intent of promoting interdisciplinary efforts that focus on global environmental change. Housed on the University of Iowa (UI) campus in the Iowa Advanced Technology Laboratories (IATL), CGRER is supported by revenues generated from investor-owned utilities, as mandated by the State of Iowa's Energy Efficiency Act. Funds are used to support research and provide services to faculty members and students across the state who are interested in environmental change. CGRER currently is composed of 112 members from 36 departments at eight institutions.

While environmental change is constant and natural, CGRER focuses on the human-induced acceleration of such change caused by modern technologies, lifestyles and population growth. Concerns about global change encompass multiple issues including its effects on natural ecosystems, environments and resources, and on human health, culture and social systems. Because global change promises to touch virtually every aspect of life and requires the reinterpretation of many fields of science and engineering, the humanities, health and law, an understanding of global change requires collaborative efforts among the many disciplines involved. CGRER's mission is to foster such collaborative interdisciplinary actions in three

ways: by promoting dialogue among specialists and agencies, by educating students and the general public, and by fostering and supporting relevant research projects.

This annual report summarizes CGRER's activities in each of these three areas. Because CGRER's output is commensurate with that of its many members, a summary of which would require a small book, this annual report includes only a sampling of significant projects and efforts. Yet this sampling provides a vision of CGRER's multiple efforts to achieve its ultimate goal: assisting Iowa's agencies, industries and citizens in assessing and preparing for global change and its effects.

**PROMOTE DIALOGUE AMONG
SPECIALISTS AND AGENCIES**

**EDUCATE STUDENTS
AND THE GENERAL PUBLIC**

**FOSTER AND SUPPORT
RELEVANT RESEARCH PROJECTS**



EXECUTIVE SUMMARY

As we summarize our achievements for 2014 and enter our 25th anniversary year in 2015, it is an appropriate time to reflect on the accomplishments of the Center for Global and Regional

We believed that a deeper understanding of the human dimensions of environmental change was greatly needed. CGRER was designed to facilitate scholarship, education and outreach by

experienced and the growing number of reports about the Midwest's vulnerability to projected changes in climate.

We also know with greater precision that greenhouse gases are accumulating in the atmosphere, and that this warms the globe and changes the climate. We know with greater accuracy what sources are emitting greenhouse gases into the atmosphere and that human-related activities are very important drivers of these emissions.

Unfortunately, this increased understanding has not yet led to comprehensive climate policies aimed at mitigating and adapting to climate and environmental changes at the local, state, national or international levels. U.S. emissions are about the same today as in 1990, having grown in magnitude into the 21st century and then declined in recent years due to economic slow-downs, the switch from coal and oil to natural gas, increases in renewable energy, improved fuel efficiencies in transport, and broad gains in energy efficiencies in many sectors. But in Iowa, greenhouse gas emissions have increased by 25% since 1990. And globally, greenhouse gas emissions are 30% higher today than in 1990.

It is sobering to realize that many of the environmental issues that we were addressing in 1990 remain on center stage.

Environmental Research. CGRER was formed to support and promote interdisciplinary efforts to better understand human-induced environmental change. We recognized then that humans were influencing the environment in complicated ways, both through increased population and our more affluent lifestyles.

bringing people together from diverse backgrounds to pursue new interdisciplinary research avenues and to train students to think more holistically about the human elements of environmental change.

It is sobering to realize that many of the environmental issues that we were addressing in 1990 remain on center stage. Climate change is a prime example. Today we have a much better understanding of how climate is changing at regional and global scales and of the interconnections between various environmental issues (i.e., air pollution, climate change, land use, hydrology, and biodiversity). We have a more comprehensive knowledge of the impacts of environmental change, which have been brought home to us here in Iowa by the floods we have



Greg Carmichael



EXECUTIVE COMMITTEE

In 1990 there was concern about the possible consequences of climate change from increasing greenhouse gas emissions, but there was no great sense of urgency. Our goal was to better understand the influence of humans on the environment and then decide what, if anything, needed to be done. Today our accumulated knowledge is driving a much stronger sense of urgency. The newest, most comprehensive scientific report, the IPCC 5th Assessment, suggests a window of approximately 15 years to put in place actions that will decrease global emissions and atmospheric concentrations of greenhouse gasses and give us the best chance of avoiding the most disruptive and widespread impacts of climate change.

CGRER remains committed to research activities related to environmental change, to advancing our understanding of the human role in these changes, and to training students armed with the knowledge and critical thinking skills necessary to deal with the complicated environmental issues we face. CGRER is taking more active roles in outreach and communication to better inform the public of what we are learning about environmental change. We want to more proactively engage our members, students, stakeholders and citizens in thinking about what our climate/environment might look like 25 years from now, and how the choices we make moving forward will shape it.

The nature and breadth of CGRER activities for 2014 are highlighted in this report. We invite your comments and suggestions regarding how we can better serve you.

Gregory R. Carmichael,
CGRER Co-Director with
Jerald L. Schnoor

David Bennett
Geographical & Sustainability
Sciences,
University of Iowa

Dennis Dahms
Geography,
University of Northern Iowa

Kajsa Dalrymple
Journalism & Mass
Communication,
University of Iowa

Vicki Grassian
Chemistry,
University of Iowa

Sarah Larsen
Chemistry,
University of Iowa

Lou Licht
Ecolotree, Inc.

Charlie Stanier
Chemical & Biochemical
Engineering,
University of Iowa



Jerry Schnoor and Greg Carmichael



*Photo at right: Frac sand
mining in Trempealeau
County, Wisconsin*

MESSAGE FROM THE CGRER ADVISORY BOARD

CGRER's mission statement pledges to serve Iowa "by promoting dialogue among specialists and agencies, by educating students and the general public, and by fostering and supporting relevant research projects." That commitment to educate the public is expressed in a variety of venues, through a variety of techniques.

Many of us involved with CGRER have the opportunity for more personal engagements with the public as well. For example, I spent two weeks this summer sharing climate knowledge while walking with the crew of the Great March for Climate Action. When I joined them, the 35 marchers were two-thirds of the way into a walk across the



On the way, we learned better ways to tell and listen to stories. For example, after a hard day of walking along gravel roads in southern Iowa, I set up my tent in the city park in Cumberland and walked a few more blocks to see what the small town had to offer. At a downtown bar I met a man with a Siemens logo stitched on his shirt and cap. I knew that this company makes wind turbine blades in Fort Madison, Iowa, and also does maintenance on some of the wind farms owned by MidAmerican Energy in the state, but I learned a great deal more during our conversation.

I heard about the size of the turbines in MidAmerican Energy's nearby 193-turbine wind farm (2.3 megawatts each) and how high they stood from the ground (260 feet up). I also learned about the salary of crew members who have to climb nearly 30 stories up inside the steel tubu-

Getting the word out about the important research being done by CGRER members is necessary to convince citizens that there is a need for better policies to protect the natural world that sustains us all.

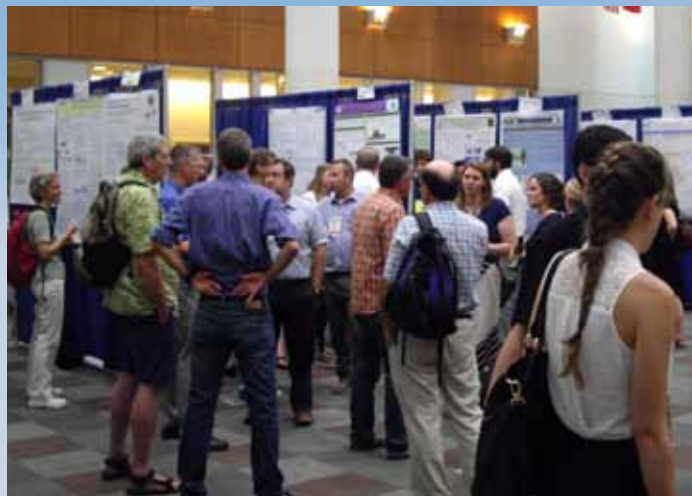
One of the most important initiatives is the Iowa Climate Statement, which has become an annual event involving many CGRER members. It is an effort by Iowa science faculty and researchers to share information with Iowans about the impacts of global warming and climate change on the state.

U.S. to draw attention to climate change and the lack of serious actions to confront it. I started in Omaha and finished in Des Moines, spending many hours with people who each had a reason to make a statement that climate change is upon us and that action is necessary.

All of us made connections along the route, from those who walked 3000 miles to myself, who had a much shorter journey. Participants passed on knowledge to all those who sought out this group, especially people in the press.



Above: Press conference for the Iowa Climate Statement 2014; Top: Meena Khandelwal teaching a "Big Ideas" class; Right: Poster session at EmCon 2014





Participants in the Great March for Climate Action

lar towers to do maintenance. A technician earns \$24.50 per hour, which is very good money in rural Iowa.

In the past I've often written about Iowa's high proportion of wind power and how that much renewable energy has not negatively affected our state's electric rates, which continue to average two cents per kilowatt hour below the national average. But it took my visit with Dan, the Siemens foreman, to show me another important aspect of the economics of renewable power. Rural families thrive because of wind power.



I think this report will give you the chance to learn some new things as well. I'm especially proud of the way CGRER does outreach to the citizens of the state. Iowa Environmental Focus, a weekly radio broadcast about Iowa environmental research, news and activities, is particularly effective in reaching a large audience.

Getting the word out about the important research being done by CGRER members is necessary to convince citizens that there is a need for better policies to protect the natural world that sustains us all.

David Osterberg
Occupational and Environmental Health,
University of Iowa

ADVISORY BOARD MEMBERS

Bob Dvorsky
Senator, Iowa State Legislature

Tim Harden
Alliant Energy

Mark Kresowik
Beyond Coal Campaign,
Sierra Club

Hiram "Chip" Levy
Retired from Geophysical Fluid
Dynamics Laboratory, NOAA

David Osterberg
Occupational and
Environmental Health,
University of Iowa

William Stigliani
Center for Energy and
Environmental Education,
University of Northern Iowa

Sharon Tahtinen
Iowa Department
of Resources

Nick Wagner
Iowa Utilities Board

Photo at right: Eric Zimmer does research on the Meskwakie Settlement in Iowa. (photo by Eric Zimmer)





OUTREACH

Outreach to the larger world is a major part of CGRER's mission. Efforts during the year included the Iowa Climate Festival, a public statement on how climate change is likely to affect the health of Iowans, and a symposium on renewable energy.

IOWA CLIMATE FESTIVAL



(photo by Amy Charles)

Elizabeth Stone organized and led the Iowa Climate Festival, held in April at the UI's Museum of Natural History. The event was attended by more than 200 community members and included the participation of 10 UI faculty and 40 student volunteers. Among its featured experts were **Vicki Grassian** and **Charles Stanier**, who gave presentations relating to the basics of climate science, and **Jerry Schnoor**, who spoke on the role of climate and land use change on water quality.

In the afternoon, students attended a Climate Science Fair that used hands-on experiments to explore topics such as how particles cool the earth, how clouds form and what makes a gas a greenhouse gas. The festival was funded through a Climate Science Challenge Grant from the American Chemical Society (ACS) and was hosted by the Iowa section of the ACS. All presentations are available through the UI Climate LibGuide (guides.lib.uiowa.edu/icf).



SYMPOSIUM ON RENEWABLE ENERGY

In October, CGRER was a co-sponsor of a symposium on *Meeting the Renewable Energy Challenge*. The two-day symposium brought together industry experts, policymakers, farmers and scholars to examine a wide range of topics relating to the technical challenges and policy issues surrounding renewable energy in Iowa and the Midwest. Topics included discussions of whether shifting toward renewables will decrease the pace of

climate change, the technical barriers to rapidly increasing our reliance on renewable energy, and policies that can promote renewable energy growth. Panels discussed infrastructure development such as wind farms and transmission lines, biofuels, emerging environmental problems, and distributed energy policy. **Jerry Schnoor**, **Scott Spak**, **Craig Just** and **Chuck Connerly** were among those involved with the symposium.

RAISING CONCERN ABOUT EMERGING CONTAMINANTS

An editorial by **Jerry Schnoor** in *Environmental Science and Technology* has helped draw national attention to the issue of emerging contaminants in the environment. Schnoor wrote that approximately 15,000 new chemicals and biological sequences are registered each day and

that the scientific understanding of many older contaminants is inadequate. Only a fraction of these compounds have been fully tested for health effects on humans and the environment. Schnoor stated that the nation needs a better system for assessing and prioritizing chemical

exposures and argued for a comprehensive reform of the Toxic Substances Control Act of 1976. Following the editorial's publication, Schnoor was interviewed by a science reporter for the *New York Times*, who quoted him in an article and blog post on the topic of emerging contaminants.

NEW FLOOD SENSORS

The Iowa Flood Center (IFC) installed 50 new flood sensors on bridges across Iowa. The project, which was done in collaboration with the Iowa DNR, expands the IFC's sensor network of stream stage sensors to more than 200. The sensors give valuable, real-time information during periods of rising waters, helping to improve the efficiency and speed of emergency responses if a flood is imminent. The sensors emit an electronic pulse that measures the distance between the bridge and the water every 15 minutes. The information is available to the public at the Iowa Flood Information System (IFIS) website (<http://ifis.iowafloodcenter.org/ifis/en>).

COLLABORATION WITH NATIONAL WEATHER SERVICE

National Weather Service Director Louis W. Uccellini and members of his staff visited the Iowa Flood Center in October. Uccellini gave a presentation on "Building a Weather-Ready Nation: Advancing the NWS Hydrology Program," which outlined the ways in which the National Weather Service is helping to make communities ready, responsive and resilient to hazardous weather. Uccellini also met with Iowa Flood Center

leaders, including its director **Witold Krajewski**, to learn more about the capabilities of the IFC and the ways in which its expertise can be of use to the National Weather Service and the new National Water Center at the University of Alabama in Tuscaloosa. He praised the IFC's contributions to flood research and said he hopes for greater collaboration between the center and national agencies working on weather-related issues.



National Weather Service Director Louis W. Uccellini (photo by Tim Schoon/UI News Service)

ADDRESSING WASTEWATER ISSUES IN SMALL COMMUNITIES

Researchers, policy makers and water treatment experts met at the UI in August to discuss ways to help small Iowa communities that are struggling to address the rising cost and increased regulation of their aging municipal wastewater treatment systems. An estimated \$10 billion is

needed for wastewater treatment upgrades throughout the state. For several years CGRER researchers have had an interest in prototyping and piloting alternative treatment approaches geared to the approximately 500 Iowa towns with a population of less than 500. **Craig Just**,

Lou Licht and colleagues are working to find ways to treat wastewater and storm water as efficiently and inexpensively as possible and hope to partner with small communities in the state to test the new technologies at no cost to them.

CGRER-IFC LEGISLATIVE BREAKFAST

CGRER and the Iowa Flood Center once again co-hosted a legislative breakfast reception at the Iowa State Capitol in March. The reception provides a valuable opportunity for state policy makers and state and local officials to learn more about the work of the two centers in addressing environmental challenges in the state. The event also allows faculty and staff at the centers to gather ideas and learn from state legislators about environmental issues in their home districts.

CGRER members participating included **Witold Krajewski**, director of the Iowa Flood Center and **Larry Weber**, director of IIHR—Hydroscience & Engineering. More than 50 legislators as well as state environmental officials and non-governmental organization representatives attended the reception.



Press conference for the Iowa Climate Statement 2014

IOWA CLIMATE STATEMENT 2014

The fourth-annual Iowa Climate Statement was released in October during a press conference at the Iowa State Capitol. *Iowa Climate Statement 2014: Impacts on the Health of Iowans* examines public health issues associated with climate change in Iowa. The statement is an effort by Iowa science faculty and researchers to share information with Iowans about the impacts of global warming and climate change on health in the state. Threats include flooding, air pollution, allergens, vector-borne disease and extreme weather events. The statement was endorsed by 180 scientists and researchers from 38 Iowa colleges and universities. The lead authors of the statement included **Peter Thorne** and **David Osterberg** and many other CGRER members were co-signers.

In conjunction with the release of the statement, the Iowa Public Health Association and CGRER co-hosted a webinar for Iowa public and environmental health professionals. The lead authors of the statement, including Thorne and Osterberg, presented their findings and took questions from participants. The webinar had 66 participants from around the state and provided the opportunity for health professionals to learn about the latest climate impacts on public health in Iowa and what the climate models predict about Iowa's future weather extremes. It also facilitated an exchange of information between state and local public health professionals and leading Iowa climate and public health scientists.



Photos at left and above: CGRER members visit with legislators about their research at the CGRER-IFC Legislative Breakfast at the Iowa State Capitol.





IOWA ENVIRONMENTAL FOCUS

The audience for CGRER’s blog, Iowa Environmental Focus, continues to grow. The year saw a 14 percent increase in page views over 2013 and more original content created by our communications interns about Iowa environmental research, news and activities.

During the year CGRER also produced 50 one-to-two-minute news segments that were distributed to radio stations throughout Iowa and posted on our blog. The radio segments highlight the work of CGRER members as well as current Iowa environmental issues and efforts toward greater sustainability. For more information, see IowaEnvironmentalFocus.org.



Jerry Schnoor, Nick Fetty, KC McGinnis, Maggie St. Clair and Joe Bolkcom

CGRER INTERNS

Nick Fetty serves as a media assistant for CGRER while pursuing an MA in journalism at the UI. He joined CGRER in May after working for the *Iowa City Press-Citizen* and the Johnson County Auditor’s Office. His CGRER responsibilities include writing blog posts, radio scripts and feature stories as well as managing social media and shooting videos and photos of events. He continues to write freelance articles on environmental issues for the *Iowa City Press-Citizen*.

KC McGinnis is a multimedia journalist earning his MA in Journalism & Mass Communication at the UI. He joined CGRER in June of 2014 after serving as Multimedia Specialist at the *Dubuque Telegraph Herald*. He currently writes for CGRER’s Iowa Environmental Focus blog, records audio for the weekly On the Radio segment, and produces video features for CGRER and related departments.

Maggie St. Clair has spent the past two summers serving as a media assistant at CGRER while residing in her hometown of Mount Vernon. Her work included writing for the blog, producing radio scripts and managing social media. She is a junior environmental studies major at Knox College in Galesburg, Illinois.



Jerry Schnoor records a radio spot with interns Nick Fetty and KC McGinnis.

A SAMPLING OF AWARDS, ACHIEVEMENTS & APPOINTMENTS



Richard Cruse was named president-elect of the National Institutes for Water Resources. In addition, his graduate student **Karl Gesch** received a Research Excellence Award from ISU.

Andrew Forbes was a guest on a program on biodiversity on Iowa Public Radio's Talk of Iowa. Forbes spoke about his research on insect biodiversity.



Witold Krajewski (at right above) was given the UI's Leadership in Research Award, which honors a faculty member for extraordinary leadership of a large collaborative and interactive team science grant.



David Cwiertny received the UI's Early Career Scholar of the Year Award, which is given to faculty members who have served five or fewer years who are involved in research or scholarly activity demonstrating significant promise.



Tori Forbes (pictured above with UI President Sally Mason) received the UI's Distinguished Mentor Award, which is given to faculty and staff who have mentored undergraduates as they complete research and creative projects.

Marian Muste received the J.C. Stevens Award from the American Society of Civil Engineering's Environmental and Water Resources Institute.



Diane Debinski was invited to serve on a National Academy of Sciences panel that produced the report *Enhancing the Value and Sustainability of Biological Field Stations and Marine Laboratories in the 21st Century*.

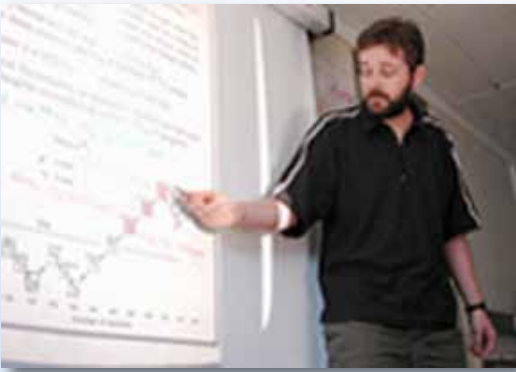


Vicki Grassian received three awards during the year: the American Chemical Society Midwest Award, the Royal Society of Chemistry John Jeyes Award for Chemistry in Relation to the Environment, and the UI Scholar of the Year Award.



Amanda Nelson (above), a UI graduate student advised by **Andrew Forbes**, won the Joan Ehrenfeld Award for Best Student Presentation in Urban Ecology at the annual meeting of the Ecological Society of America in Sacramento, California.

Andrew Forbes does research on biodiversity in black walnut trees. (photo by Amanda Nelson)



David Peate received a Collegiate Teaching Award from the UI's College of Liberal Arts and Sciences.



Caitlin Shanahan, a UI Urban & Regional Planning M.S. student working with **Scott Spak**, received the American Institute of Certified Planners Outstanding Student Award.



Tawny Tibbits, a UI PhD student advised by **Art Bettis**, received a T. Anne Cleary International Dissertation Research Fellowship for her work on using portable X-ray fluorescence to source ground stone tools made by the ancient Maya in Belize.



Jerry Schnoor was elected to the Nominating Committee for the National Academy of Engineering.



Elizabeth Stone (above) received a Career Development Award from the UI's Environmental Health Sciences Research Center. She was also named an "Emerging Investigator" by the journal *Environmental Science: Processes & Impacts*.



Larry Weber (above) received the 2014 Regents Award for Faculty Excellence for contributions that included his leadership during the campus renewal following the flood of 2008.



Hunter Schroer, a PhD student working with **Craig Just**, received a UI Presidential Graduate Research Fellowship.



E D U C A T I O N

CGRER members were involved in many educational initiatives during 2014, including an Iowa Climate Science Educators Forum, a new course on People and the Environment at the University of Iowa, and a STEM festival attended by hundreds of students and their families.

IOWA CLIMATE SCIENCE EDUCATORS FORUM



The second annual Iowa Climate Science Educators Forum in October brought together approximately 50 Iowa climate science faculty, researchers and public health professionals to share information and discuss how climate change is affecting the health of Iowans. The forum was held at the State Hygienic Laboratory in Coralville and provided an opportunity for top Iowa scientists to present the latest research in the field

and network with science faculty from all sectors of higher education in Iowa, including public universities, private colleges and universities, and community colleges. Its speakers included **David Osterberg**, who spoke about water quality issues related to climate change, and **Peter Thorne**, who gave a presentation on air pollution and respiratory and cardiovascular problems that are likely to be triggered by a changing climate.

STEM FESTIVAL IN MUSCATINE



The Lucille A. Carver Mississippi Riverside Environmental Research Station (LACMRERS) in Muscatine hosted the IExploreSTEM Festival in May, an event attended by hundreds of K-12 students and their families. Its 30 hands-on exhibits covered a wide variety of topics in the

fields of science, technology, engineering and math. The event was coordinated by LACMRERS director **Doug Schnoebelen** and included interactive flood models demonstrated by Iowa Flood Center engineers. LACMRERS is a unit of IIHR—Hydroscience & Engineering.

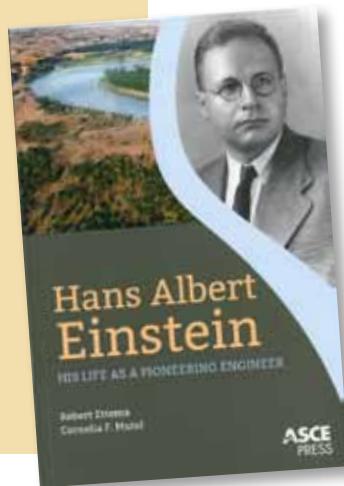
(photos by Aneta Goska, Iowa Flood Center)



PEOPLE AND THE ENVIRONMENT COURSE

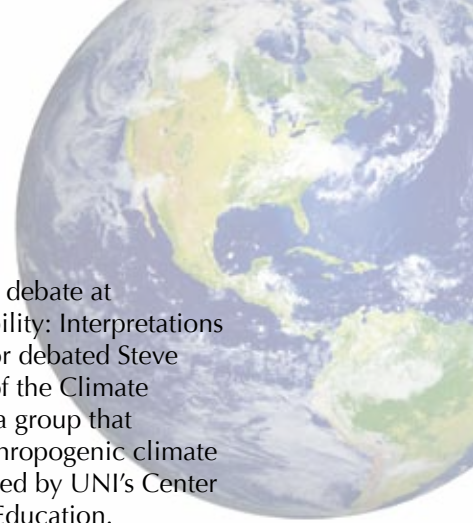
Meena Khandelwal directed a new UI course in People and Environment: Technology, Culture and Social Justice. The course will be offered each fall in coming years. Her co-teachers include **H.S. Udaykumar**, **Matt Hill** and **Marc Linderman**. The offering is one of the “Big Ideas” courses that are pioneering a new type of interdisciplinary general education course at the UI. The course focuses on globalization through issues of technology, social justice and environment and brings together perspectives from anthropology, gender studies, geography, energy science and urban development.

To explore these big ideas, the class looks at the problems, impacts and potential solutions to rapid deforestation in Rajasthan, India. Much of the inspiration for the course grew out of experiences its faculty have had teaching in the UI’s Winterim study abroad program in India. The course also looks at interactions between the environment and society/culture in Iowa, comparing and contrasting the situation in the two states. It is taught in a TILE classroom, a new style of UI classroom equipped with laptops, document cameras and HDTV screens that encourages collaborative learning.



CLIMATE INSTABILITY DEBATE

Jerry Schnoor participated in a debate at UNI in June on “Climate Instability: Interpretations of Scientific Evidence.” Schnoor debated Steve Goreham, Executive Director of the Climate Science Coalition of America, a group that promotes skepticism about anthropogenic climate change. The event was sponsored by UNI’s Center for Energy and Environmental Education.



CLIMATE CHANGE SPEECH



James Hansen, UI alumnus and prominent climate scientist, gave a lecture at the UI in October. Former director of the NASA Goddard Institute for Space Studies, Hansen was one of the first to

raise awareness of the risks of human-induced climate change. He is a member of the U.S. National Academy of Sciences and serves as director of the Climate Science, Awareness and Solutions Program at Columbia University. His talk was entitled “Speaking Truth to Power: Lessons from Iowa and Relevance to Global Climate Policies.” Hansen spoke as part of the symposium on *Meeting the Renewable Energy Challenge* (page 6), which was co-sponsored by CGRER.

EINSTEIN BIOGRAPHY

Hans Albert Einstein: His Life as a Pioneering Engineer, written by **Robert Ettema** and **Connie Mutel**, was published by ASCE Press. The book describes the life and legacy of Albert Einstein’s elder son, a 20th century river engineer who added significantly to our understanding of rivers and their transport of water and sediment. The book interweaves efforts to reshape and manage rivers through the ages, thus tracing the history of human interactions with these critical but constantly changing elements of the natural environment.

CONFERENCE TRAVEL GRANTS FOR GRADUATE STUDENTS

In 2014, \$17,172 was awarded to graduate students advised by CGRER members who were traveling to professional conferences to make oral or poster presentations.

Patrick Bitterman
Geography, UI
Association of American Geographers Annual Meeting

Robert Bullard
Chemical & Biochemical Engineering, UI
American Association for Aerosol Research

Erica Damman
Environmental Humanities, UI
Dimensions of Political Ecology Conference

Shani Niresha Egodewatte
Chemistry, UI
American Chemical Society National Meeting

William Ettema
Civil & Environmental Engineering, UI
World Environmental and Water Resources Congress 2014 of the Environmental and Water Resources Institute

Vanessa Fixmer-Oraiz
Urban and Regional Planning, UI
Association for Asian-American Studies Annual Conference

Aruni Indika Gankanda
Chemistry, UI
American Chemical Society National Meeting

Karin Grimlund
Ecology, Evolution, and Organismal Biology, ISU
Washington University course on Identification and Ecology of Tallgrass Prairie Bees

Jason Haase
Civil & Environmental Engineering, UI
American Chemical Society National Meeting

Gabriela Hamerlinck
Biology, UI
Society of Mathematical Biology Annual Conference

Nathan Janecek
Chemical and Biochemical Engineering, UI
EmCon 2014

Wen Xin Koh
Interdisciplinary Human Toxicology, UI
American Chemical Society National Meeting

Olga Laskina
Chemistry, UI
American Chemical Society National Meeting

Xikun Liu
Civil & Environmental Engineering, UI
9th International Conference – Remediation of Chlorinated and Recalcitrant Compounds

Theodore Marks
Anthropology, UI
Paleoanthropology Society

Kumar Vijay Mishra
Electrical & Computer Engineering, UI
American Geophysical Union Fall Meeting

Charith Eranga Nanayakkara
Chemistry, UI
American Chemical Society National Meeting

Amanda Nelson
Biology, UI
Ecological Society of America Annual Meeting

Andrew Nelson
Interdisciplinary Human Toxicology, UI
American Chemical Society National Meeting

Kristina Ottens
Biology, UI
10th European Congress of Entomology

Jason Patton
Agronomy, ISU
13th Specialist Meeting on Microwave Radiometry and Remote Sensing of the Environment (2014 MicroRad)

Katherine Peter
Civil & Environmental Engineering, UI
American Chemical Society National Meeting

Jamie Sanchagrin
Geographical and Sustainability Studies, UI
Association of American Geographers Annual Meeting

Stewart Sankey
Urban and Regional Planning, UI
American Planning Association 2014 National Conference

Yiqing Shang
Geographical and Sustainability Sciences, UI
Association of American Geographers Annual Meeting

Ashish Singh
Chemical & Biochemical Engineering, UI
American Association for Aerosol Research Conference



Photo by Tawny Tibbits

Tawny Tibbits
Earth and Environmental Sciences, UI
Association of American Geographers Annual Meeting

Jennifer Trivedi
Anthropology, UI
Society for Applied Anthropology Annual Meeting

Achilleas Tsakiris
Civil & Environmental Engineering, UI
World Environmental and Water Resources Congress 2014 of the Environmental and Water Resources Institute

Meredith Wismer-Lanoe
Anthropology, UI
Society for American Archaeology Annual Meeting

Chang Zhao
Geographical and Sustainability Sciences, UI
Association of American Geographers Annual Meeting

CGRER VISITING SCIENTISTS

Jian Cao worked with **Jerry Schnoor** on a variety of projects relating to electronic waste recycling in China, including writing a journal article on the rapid progress China has made in this field. Cao is on the faculty of the College of Economics & Management at Zhejiang University of Technology in China.

Greg Carmichael worked with three visiting scientists during the year. **Sosuke Shinoda**, a student at the National Institute of Technology, Gifu College, Japan, spent three weeks at CGRER as part of an exchange program between the UI and Gifu College. **Caiqing Yan**, a PhD student at Peking University in China, visited Iowa to establish a research collaboration on the contributions of "brown" carbon to atmospheric absorption and global warming. **Sarath K. Guttikunda** visited CGRER to carry-out collaborative research on assessing the health impacts of urban air pollution in Asian cities. Guttikunda is a UI graduate and an independent researcher at UrbanEmissions.Info in New Delhi, India. His company develops tools for sharing information on air pollution and climate change in developing countries.



Jerry Schnoor and Jian Cao

A SAMPLING OF GRANTS AWARDED TO CGRER MEMBERS

David Cwiertny (PI) and colleagues at George Washington University and the University of California-Riverside received a \$550,000 NSF grant for *Development and Application of Piezoelectric Nanoheterostructures to Reduce the Chemical and Energy Demand of Water Treatment* (2014-17). Cwiertny's share of the grant is \$141,308.

Ibrahim Demir (co-PI) received a \$180,865 grant from the U.S. Department of Defense, Army Corps of Engineers, for *Prototype Multi-Jurisdictional Decision Making Web Platform for Integrated Water Resources Management: From Interagency Collaboration to Implementation in Iowa-Cedar Watershed (Iowa)* (2014-2015). He is also PI for *Improving Visualization and Access to Radar Data using Unidata Tools for Flood Prediction and Management* (2014), an \$11,629 grant from Unidata Equipment Awards Program.

Vicki Grassian and **Mark Young** (co-PIs) were awarded a \$411,000 NSF grant for *Spectral Analysis of Brown Carbon Secondary Organic Aerosol from the IR to the UV* (2014-17).

Sarah Larsen (co-PI) received a \$275,000 NSF grant for *REU Site: Undergraduate Research Opportunities in Nanoscience and Nanotechnology* (2014-16).

Marian Muste (PI) received a \$200,000 grant from USACE Institute for Water Resources for *Prototype Multi-jurisdictional Decision-Making Web Platform for Integrated Water Resources Management* (2014-16).

James Raich (PI) received a \$32,082 grant from the Leopold Center for Sustainable Agriculture for *Soil Health and Productivity in Riparian Grass Buffers: A Re-evaluation After 13 Years* (2014-15).

Elizabeth Stone (PI) and colleagues at the University of Montana, Emory University and the University of Virginia were awarded a \$789,645 NSF grant for *Measurements of Selected Combustion Emissions in Nepal and Bhutan Integrated with Source Apportionment and Chemical Transport Modeling for South Asia* (2014-2017). The UI's portion of the grant is \$216,291. Stone is also PI for a \$350,000 NSF grant for *Source Apportionment of Anthropogenic Secondary Organic Aerosol* (2014-2017).

A \$599,383 NSF grant, *Decision Processes, Climate Change, and Water Resources in the Agricultural Midwest* (2014-2017) involves a number of CGRER members. Co-PIs are **Adam Ward**, **Kajsa Dalrymple** and **Scott Spak**; Co-Is are **Heather Sander**, **Aaron Strong** and **Eric Tate**.

RESEARCH

Research by CGRER members probes the causes and effects of environmental change and identifies possible solutions to environmental problems. During the year, CGRER co-sponsored a major conference on emerging contaminants such as pharmaceuticals and nanoparticles, while research efforts included studies on the health effects of frac sand mining and threats to biodiversity in urban landscapes.

EMERGING CONTAMINANTS CONFERENCE



David Cwiertny is interviewed by KCRC during the EmCon Conference.

In August, CGRER was a co-sponsor of *EmCon 2014: Fourth International Conference on Occurrence, Fate, Effects and Analysis of Emerging Contaminants in the Environment*. The conference focused on the environmental effects of emerging contaminants, which include pharmaceuticals, antibiotics, hormones, personal care products and nanoparticles. Complex mixtures of these substances have been found in many aquatic and terrestrial environments and have been

associated with effects such as the altering of fish physiology, the decline of bird populations and suppressed algal growth. *EmCon* has been held at locations around the world since 2007. The four-day event at the UI explored the most recent research in this rapidly evolving research area and gave scientists and public officials the chance to share ideas and information. **David Cwiertny** and **Keri Hornbuckle** helped organize the conference and **Jerry Schnoor** was one of its keynote speakers.

RESEARCH ON FRAC SAND MINING



The UI's Environmental Health Sciences Research Center (EHSRC) is helping Midwestern communities make informed decisions about policies regulating silica sand mining. The sand plays a major role in the process of hydraulic fracturing, also known as fracking. When the sand is mined, a fine dust is released that can cause health difficulties that include silicosis, an incurable scarring of lung tissue. **Peter Thorne** leads an EHSRC team that is developing new methods for sampling and monitoring air around mining operations. The team is conducting research in northeast

A device monitors air quality next to a rail line that carries silica sand for frac mining.

Iowa, southwest Wisconsin and southeast Minnesota that will contribute to a better understanding of the health risks associated with mining and help communities determine whether mines are complying with environmental standards.

David Osterberg and **Aaron Kline**, a graduate student in the UI School of Urban and Regional Planning, prepared a policy report on the environmental and health issues relating to frac sand mining in northeast Iowa and possible regulatory responses. Both Osterberg and Thorne have also consulted with citizens and local officials in northeast Iowa about mining's potential impact on the region.

BIODIVERSITY IN URBAN TREES

Andrew Forbes and UI graduate student **Amanda Nelson** led a three-year study of urban biodiversity, focusing on black cherry and black walnut trees and the insects that interact with them. The study involved insect



The wasp predator Coptera pomonellae is one of the insects associated with walnut trees. (photo by Gabriela Hamerlinck)

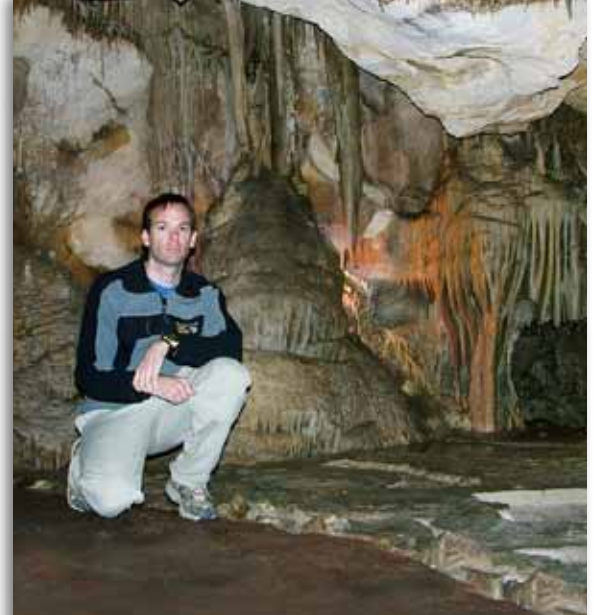
counts at 250 sites in Iowa City and revealed that there are fewer insects associated with urban trees than with those in rural areas. The results suggest that simply adding green spaces to city environments isn't enough to create biodiversity and that urban landscapes have unrecognized barriers to insect populations. Forbes and Nelson will next try to identify which landscape characteristics have the most negative impacts on the health of insect populations in cities. Forbes' study was funded through a CGRER Seed Grant.

SUPREME COURT AMICUS BRIEF

Greg Carmichael and **Scott Spak** were among a dozen atmospheric scientists and air quality modeling experts who played a role in a major court case involving the regulation of air pollution. The scientists filed an amicus brief to the U.S. Supreme Court in regard to a case that challenged the EPA's Cross-State Air Pollution Rule, which seeks to protect the health of citizens of downwind states by placing limits on air pollution that crosses state lines. The brief supplied the court with an understanding of the complexity of interstate air pollution transport and air quality modeling and explained why the approach used by the EPA is a scientifically reasonable way to meet the requirements of the good neighbor provision of the Clean Air Act. In a 6-2 decision in April, the court ruled in favor of the EPA and upheld the way it is interpreting the Clean Air Act.

EXTREME WEATHER RESEARCH

Gabriele Villarini received an NSF Faculty Early Career Development (CAREER) Award, which brings \$508,405 in funding to support Villarini's research over the next five years. Villarini will focus on extreme weather events over the continental United States and will examine whether they tend to cluster in time, with periods of enhanced activity alternating with quieter periods. If the weather events cluster, then he will attempt to identify the physical processes responsible for this observed behavior. The CAREER award is the most prestigious NSF honor for junior faculty and recognizes scholars who are likely to become future academic leaders.



ANCIENT CLIMATE CHANGE

Rhawn Denniston co-authored a paper published in *Nature Communications* that resolves a long-standing debate about the causes of ice age climate variability in the Great Basin of the western United States. Denniston and lead author Matthew Lachniet from the University of Nevada-Las Vegas, as well as researchers from the University of New Mexico, analyzed stalagmites from three caves in southern Nevada. When combined, these samples formed a nearly continuous climate record spanning the last 170,000 years. Their data revealed that ice ages started and ended in this region at the time predicted by the prevailing model, which focuses on changes in sunlight reaching the high latitudes due to aberrations in Earth's orbit. The work of Denniston and his colleagues also advances understanding of the rises and falls of the enormous ice age lakes of the American Southwest, which at times were comparable to modern-day Lake Michigan. This spring, the National Science Foundation awarded these scientists a \$470,000 grant to refine their data set and to extend their record further into the past in order to examine even older ice ages.

A SAMPLING OF PUBLICATIONS BY CGRER MEMBERS

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- Cwiertny, D.M.**, S.A. Snyder, et al. 2014. Environmental designer drugs: when transformation may not eliminate risk. *Environmental Science & Technology*, doi: 10.1021/es503425w.
- Cruse, R.**, D. Abbas, K. Gesch, et al. 2014. Grand Challenge 1: Sustainability. In: *Science, Education and Outreach Roadmap for Natural Resources*. Association of Public and Land-grant Universities Board on Natural Resources and Board on Oceans, Atmosphere, and Climate.
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- McGranahan, D.A., A. L. Daigh, J. J. Veenstra, D. M. Engle, J. R. Miller, and **D.M. Debinski**. 2014. Connecting soil organic carbon and root biomass with land-use and vegetation in temperate grassland. *The Scientific World Journal*, doi:10.1155/2014/487563.
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- Collins, M., R. Knutti, J. M. Arblaster, J.-L. Dufresne, T. Fifehet, P. Friedlingstein, X. Gao, **W. J. Gutowski**, et al. 2014. Long-term Climate Change: Projections, Commitments and Irreversibility. In: *Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*. [Stocker, T. F., D. Qin, G.-K. Plattner, M. M.B. Tignor, S. K. Allen, J. Boschung, A. Nauels, Y. Xia, V. Bex, P. M. Midgley (eds).] Cambridge University Press.
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- Bril, J. S., J.J. Durst, B.M. Hurley, **C.L. Just**, et al. 2014. Sensor data as a measure of native freshwater mussel impact on nitrate formation and food digestion in continuous-flow mesocosms. *Freshwater Science*, doi: 10.1086/675448.
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- Lehman, S. and **S.C. Larsen**. 2014. Zeolite and mesoporous silica nanomaterials: green syntheses, environmental applications and toxicity. *Environmental Science: Nano*, doi: 10.1039/C4EN00031E.
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- Smith-McKenna, E., **G.P. Malanson**, L.M. Resler, et al. 2014. Cascading effects of feedbacks, disease, and climate change on alpine treeline dynamics. *Environmental Modelling & Software*, doi:10.1016/j.envsoft.2014.08.019.
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Walnut fly (photo by Andrew Forbes)

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Laskina, O., **M.A. Young**, P.D. Kleiber and **V.H. Grassian**. 2014. Infrared optical constants of organic aerosols: organic acids and model humic-like substances (HULIS). *Aerosol Science and Technology*, doi: 10.1080/02786826.2014.904499.

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SEED GRANTS

In 2014, CGRER awarded a total of \$149,150 in Seed Grants to five projects.

Constraints on the Movement of Insects in Urban and Agricultural Landcover: A Novel Landscape Genetic Approach; **Andrew Forbes**, UI Department of Biology; \$30,000.

Understanding a Surface Film's Role in Atmospheric Chemistry: Creating Molecular Views of Urban Films; **Scott Shaw**, UI Department of Chemistry; \$30,000.

Counting (on) Trees for Carbon Sequestration: Understanding the Energy-Environment-Gender Nexus in Rural India; **H.S. Udaykumar**, UI Department of Mechanical and Industrial Engineering; Co-PIs at the UI: **Meena Khandelwal**, Gender, Women's and Sexuality Studies;

Marc Linderman, Geographical & Sustainability Studies; **Paul Greenough**, History; **Matt Hill**, Anthropology; Jerry Anthony, Urban and Regional Planning; \$29,450.

Inventing the Renewable Century: How Governments, Universities, Non-Profits and Corporations Shape the Global Development of the Clean Energy Sector; **Ion Bogdan Vasi**, UI Department of Sociology; \$29,700.

How is Discharge Projected to Change for an Agricultural Watershed in Iowa Over the 21st Century?; **Gabriele Villarini**, UI Department of Civil & Environmental Engineering; \$30,000.



CGRER AIDS TO RESEARCHERS

CGRER provides high-performance computing and visualization resources to support the interdisciplinary research done by its members and their students. CGRER research is done primarily on shared computing clusters capable of delivering the CPU power and storage needed for high-end parallel computing environments. Two computing clusters, Helium and Neon, are located at the Lindquist Center and the UI Research Park. Their purchase and implementation has helped the UI to become recognized as a national data science center. CGRER has invested financially in both clusters, which provides our researchers priority when conducting research and analysis. In 2014, CGRER researchers logged 205,000 CPU hours on Helium and 116,500 CPU hours on NEON.

In addition, the UI has an unlimited site-wide license for all Environmental Systems Research Institute products (ESRI). **Jeremie Moen** is on the campus GIS Advisory team and facilitates campus requests for support.

Above photo: Samuel Stalzman and Brennan Van Alderwerelt do research in a volcanic region of Chile. (photo by Brennan Van Alderwerelt)



INTERNATIONAL EFFORTS

CGRER members work both regionally and around the globe to address problems relating to environmental change. In 2014, international efforts ranged from studying groundwater depletion in India and the environmental impact of a controversial canal in Nicaragua to helping to modernize the London sewer system.

ANALYZING GROUNDWATER DEPLETION IN INDIA

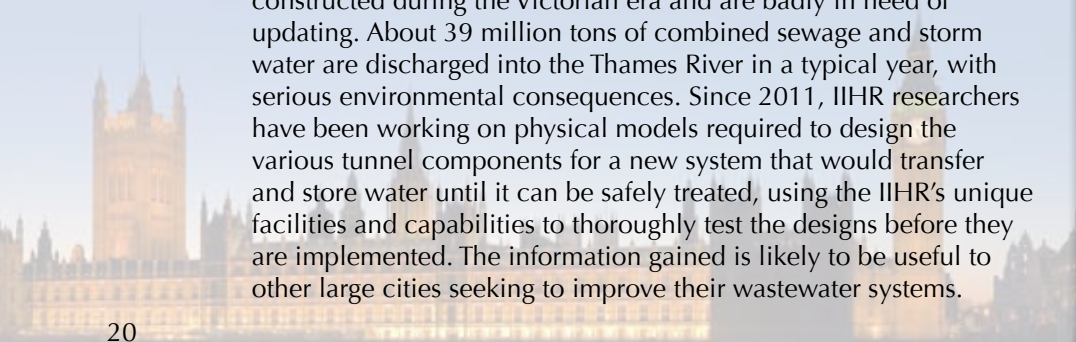
Eric Tate and colleagues published an article in *Environmental Science & Technology* on their research on the natural and societal factors influencing the sustainability of water resources in southern India. In 2013 he spent three weeks doing fieldwork in Tamil Nadu, along with **Nandita Basu**, a former CGRER member who now teaches at the University of Waterloo in Canada, as well as six graduate and undergraduate students. Tamil Nadu is a semi-arid region that receives most of its moisture during two annual monsoons. For centuries, rural communities have

relied on rainwater harvesting in surface reservoirs to alleviate problems of water scarcity. Over the past few decades, many of these tanks have fallen into disrepair, placing greater demands on groundwater sources and negatively impacting farming in the region. Tate and his colleagues are working to map the traditional methods of water management and explore the social, economic and environmental dimensions of rainwater harvesting ponds and the ways they can be part of a holistic solution to climate and population pressures on water supplies. Tate's research is supported by an NSF grant.

TRANSOCEANIC CANAL IN NICARAGUA

Jerry Schnoor was part of a 15-member international panel asked to identify major scientific and technical issues associated with a new canal through Nicaragua that will compete with the Panama Canal. The panel, which included participants from the InterAmerican Network of Academies of Science, met with Nicaraguan researchers and scientists to help inform public debate on the \$50 billion project. Schnoor assisted with the water and sediments portion of the report, which concluded that the canal would have a wide variety of serious negative consequences for the ecology of the region. Of particular concern is the canal's likely damage to Lake Nicaragua, which is Central America's largest lake and a vital source of fresh water for the country.

MODERNIZING LONDON'S SEWERS



Jacob Odgaard and colleagues at IIHR—Hydroscience & Engineering are helping to modernize London's sewer system. The tunnels underneath one of the world's greatest cities were constructed during the Victorian era and are badly in need of updating. About 39 million tons of combined sewage and storm water are discharged into the Thames River in a typical year, with serious environmental consequences. Since 2011, IIHR researchers have been working on physical models required to design the various tunnel components for a new system that would transfer and store water until it can be safely treated, using the IIHR's unique facilities and capabilities to thoroughly test the designs before they are implemented. The information gained is likely to be useful to other large cities seeking to improve their wastewater systems.

ENVIRONMENTAL LEADERSHIP IN CHILE

Marcelo Mena-Carrasco was appointed Undersecretary of the Environment in the administration of Chilean President Michelle Bachelet. He was also named a Working Group Co-Chair and member of the Steering Committee for the Climate and Clean Air Coalition to Reduce Short-Lived Climate Pollutants (CCAC). The CCAC is an international initiative coordinated by the United Nations Environment Programme. Mena-Carrasco earned his doctorate in civil and environmental engineering at the UI under the supervision of **Greg Carmichael** and has collaborated with CGRER members on efforts to improve air quality in Santiago, Chile.

FIELD RESEARCH TRAVEL GRANTS FOR GRADUATE STUDENTS

In 2014, \$14,483 was awarded to graduate students advised by CGRER members who were traveling to sites to complete field research for their thesis or dissertation.

David Cordie
Earth & Environmental
Sciences, UI
Coral Histology



Andrew Nelson
Interdisciplinary Human
Toxicology, UI
*Naturally-Occurring Radioactivity
Liberated by New Natural Gas
Mining Technologies:
A Pilot Study of the Geochemi-
cal Partitioning and Potential
for Radionuclide Migration and
Exposure to Higher Organisms
and Humans*



Renu Pariyadath
Communication Studies, UI
*When Corporations Migrate
South: Migrant Citizenship and
the Role of Privileged Mobilities
in Equitable Development*



Finn Piatscheck
Ecology, Evolution
& Organismal Biology, ISU
*Spatial and Temporal Variations of
Costs and Benefits Involved in an
Obligate Mutualistic Symbiosis*

Samuel Saltzman
Earth & Environmental
Sciences, UI
*Disentangling High-Frequency
Climate Phenomena in a Vol-
canic Setting: Laguna Lejia, Chile*

Stefan Schoberlein
English, UI
*Herman Melville and the
International Paper Machine*

Matthew Tibbits
Earth & Environmental
Sciences, UI
*The Split Nature of Euphyllidae
(order: Scleractinia) and Poten-
tial Conservation Implications*



Eric Zimmer
History, UI
*Red Earth Nation:
Meskwaki Land and
Tribal Sovereignty
from 1856 to 2003*



Tawny Tibbits
Earth & Environmental
Sciences, UI
*A Comparison of State-of-the-Art
Geochemical and Thin Section
Technologies for the Geochemi-
cal Sourcing of Granite Ground
Stone Tools from Belize*

Justin Van Goor
Ecology, Evolution and
Organismal Biology, ISU
*Virulence Evolution of Fig Wasp
Nematodes in Response to Host
Population Dynamics and Global
Climate Change*



Brennan Van Alderwerelt
Earth & Environmental
Sciences, UI
*Cerro Overo Maar: Timing and
Volatile Content of Eruption*

ADMINISTRATION



Greg Carmichael and Jerry Schnoor

CGRER is directed by University of Iowa professors **Gregory Carmichael** (Dept. of Chemical and Biochemical Engineering) and **Jerald Schnoor** (Dept. of Civil and Environmental Engineering). Center activities are guided by an elected Executive Committee that consists of seven members (listed on page 3) plus the two co-directors. The Executive Committee meets monthly to plan initiatives and chart CGRER's course. An Advisory Board of 8 members (listed on page 5) from outside the academic community meets annually to lend oversight to CGRER's activities.



Joe Bolkcom, Jane Frank and Jeremie Moen

CGRER employs two full-time staff members. Administrative assistant **Jane Frank** oversees office operations. **Jeremie Moen** manages CGRER's computer facilities with the aid of services contracted from the Iowa Computer Aided Engineering Network. In addition, **Joe Bolkcom** serves as half-time Director of Outreach and Community Education. CGRER reports directly to the UI's Vice President for Research.

NEW MEMBERS



Christopher Anderson is a member of the research faculty in ISU's department of agronomy. He also serves as assistant director of the Climate Science Initiative, an ISU research program that provides authoritative, scientific information for short-term and long-

term decision-making relating to climate change and climate variability. His research examines how climate variability relates to the hydrological cycle and water resources.



Ann Budd is the F. Wendell Miller Professor of Earth and Environmental Sciences at the UI. She is one of the world's foremost authorities on the evolution of coral reefs. Her work on how fragile marine ecosystems

respond to climate change has proved invaluable in the effort to preserve critically endangered reefs.

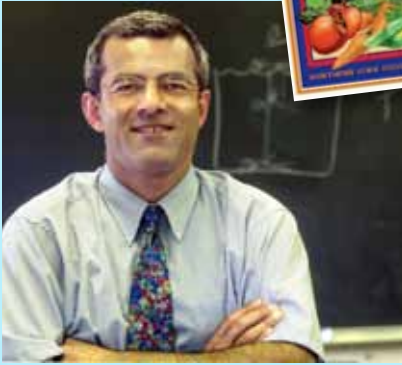


Meral Moroydor Dogan is an associate professor of geological engineering at Hacettepe University in Turkey. She studies the quantitative aspects of medical mineralogy, including the health impacts of fluorite mineralization, arsenic

in drinking water, and mesothelioma caused by erionite, a fibrous mineral in the soil.



Clown fish in Euphyllia paradivisa (photo by Matthew Tibbits)



Kamyar Enshayan is director of UNI's Center for Energy & Environmental Education, which helps children, youth

and adults make sense of complex environmental and energy-related issues while finding ways for the community to participate in solution-oriented responses. An engineer by training, Enshayan launched UNI's Local Food Program in 1997 and often consults with communities on strengthening their local food economy. He also teaches environmental studies at UNI.



Scott Shaw is an assistant professor of chemistry at the UI. His research combines modern analytical techniques with materials and physical chemistry to create new understanding of the molecular-level behavior at interfaces. His work advances understanding of microscopic chemical processes in energy production, corrosion

science, environmental remediation and microfluidic devices.



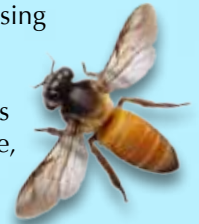
David Swenson is an associate scientist in the department of economics at ISU. His work focuses on community and regional economic studies and evaluations, economic development research and technical assistance, economic impact studies, fiscal impact research, public

finance and tax policy, community change and worker mobility issues, and public program and project evaluation.



Amy Toth is an assistant professor in the Departments of Ecology, Evolution, and Organismal Biology and Entomology at ISU. She is interested in the mechanisms and evolution of insect social behavior, using honey bees and paper wasps as

model systems. Her current research projects involve assessing the influences of landscape, nutrition and viruses on bee behavior and health, and genomics and epigenetics of foraging behavior, queen and worker castes, and individual behavioral differences.



Ion Bogdan Vasi is an assistant professor of sociology at the UI. His specialties include how social movements contribute to the diffusion of technological innovations, organizational change and policymaking. He also studies industry

emergence and the adoption and implementation of environmental practices by businesses.



Gabriele Villarini is an assistant professor in civil and environmental engineering at the UI and a faculty affiliate of IIHR—Hydroscience & Engineering and the Iowa Flood Center. His research focuses on flood hydrology, extreme events, hydroclimatology, economic impacts of

natural hazards and seasonal forecasting. He is particularly interested in examining whether it is possible to detect an anthropogenic climate change signal in the historical records of extreme flooding, rainfall and tropical cyclones.

BUDGET & FUNDING

Research & Education
49%



GIS Lab
34%



Administration
14%



Publications
2%



Speakers & Visitors
1%



\$3,942,241 in new external funding



In fiscal year 2014 (July 1, 2013-June 30, 2014), CGRER received \$732,075 in revenue from investor-owned utilities as mandated by the State of Iowa's Energy Efficiency Act. These funds helped CGRER assist its members in a wide variety of initiatives.

This funding was magnified many times in the research money awarded to CGRER members from other sources. In calendar year 2014, CGRER members brought in \$3,942,241 in new external research funding.

\$732,075 in revenue from rate payers through investor-owned utilities



MEMBERS

UNIVERSITY OF IOWA

Anthropology

Margaret E. Beck
Michael S. Chibnik
Russell L. Ciochon
James G. Enloe
Matthew E. Hill, Jr.
Meena Khandelwal

Biology

Andrew A. Forbes
Stephen D. Hendrix
Diana G. Horton

Chemical and Biochemical Engineering

Gregory R. Carmichael
A. Umran Dogan
Charles O. Stanier

Chemistry

Tori Z. Forbes
Vicki H. Grassian
Sarah C. Larsen
Sara E. Mason
Scott K. Shaw
Elizabeth Stone
Mark Young

Civil and Environmental Engineering

Allen Bradley
David M. Cwiertny
William E. Eichinger
Keri C. Hornbuckle
Craig L. Just
Witold F. Krajewski
Lou Licht
Timothy E. Mattes
Marian V. Muste
Wilfrid A. Nixon
A. Jacob Odgaard
A.N. Thanos Papanicolaou
Gene F. Parkin
Michelle Scherer
Jerald L. Schnoor
Richard L. Valentine
Gabriele Villarini
Larry Weber

Earth and Environmental Sciences

Richard G. Baker, Emeritus
E. Arthur Bettis
Ann F. Budd
Robert S. Carmichael
Jeffrey Dorale
Lon D. Drake, Emeritus
David W. Peate
Mark K. Reagan
Holmes A. Semken, Jr., Emeritus
Frank H. Weirich
You-Kuan Zhang

Economics

Thomas F. Pogue
John L. Solow

Electron Spin Resonance Facility

Garry R. Buettner

English

Barbara Eckstein
Laura Rigal

Geographical and Sustainability Sciences

Marc P. Armstrong
David Bennett
Margaret Carrel
Marc Linderman
George P. Malanson
Michael L. McNulty, Emeritus
R. Rajagopal
Gerard Rushton
Heather A. Sander
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