CGRER Center for Global & Regional Environmental Research

ioWatch

Fall 2010

Planetary Change: A Personal Reflection

by Connie Mutel

Family legend has it that my great-great-grandmother, one of many Germans who immigrated to eastern Wisconsin in the mid-1800s, walked wilderness trails to the village of Milwaukee to file the family's farmland claim. Passing alone through the forest, she sang the entire way as a protective measure: listening Native Americans were charmed by her voice. They watched her pass, but did not attack.

I love the image this story raises: a woman walking fearlessly through primeval oaklands, seeking protection with song. And I love our aging family journals that tell of her newly-arrived clan assembling stick structures in Wisconsin creekbeds to repel nearby howling wolves. Such stories of nature's power and proliferation speak to me of a world so vibrant and complex that planetary change seems unimaginable.

But, of course, my family lore is nothing but a story of major impending change, of Native American populations ceding to white immigrants, of wolf packs positioning themselves for annihilation. I'm not comfortable with this fact. Even though I have studied ecological change for decades, I personally crave stability – my grandchildren visiting the same swimming holes that their parents once used, falling in love with the same woodland birds and flowers, assuming that the natural world holds the same opportunities for them that it did for their parents and for me. But does it?

For nearly 20 years, I have written about environmental change issues for CGRER. This work has been among the most satisfying of my professional career. I've grown to love the people I've written about, their work, and their intellectual passions. I've relished learning ever more about environmental issues and research. Now I feel that it's time for me to move on. Thus, this newsletter represents my handing over the reins to a new CGRER editor, Lori Erickson, an experienced writer who I know will communicate CGRER's message and activities with skill, clarity, and depth.

CGRER has been good to me in many ways. Most recently, CGRER and my home institution, IIHR-Hydroscience & Engineering, supported my two latest books,

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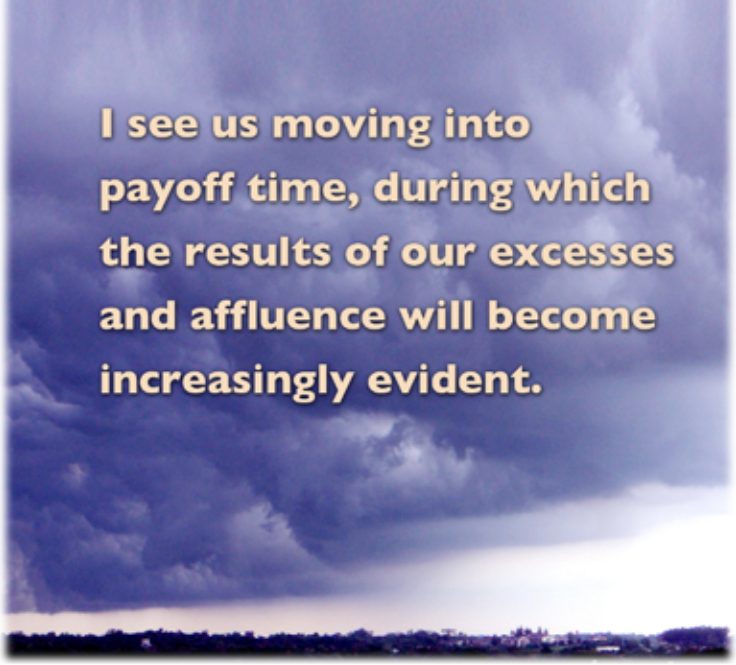
This issue of IoWatch reflects on CGRER's 20 years of leadership in environmental change research and education.



which report on Iowa's ongoing environmental changes: *The Emerald Horizon - A History of Nature in Iowa* and *A Watershed Year: Anatomy of the Iowa Floods of 2008.* Writing these books and the CGRER publications has broadened my thoughts. It has forced me to become intimate with aspects of accelerating environmental change that deeply concern me, and to attempt to synthesize them into a cohesive whole.

Through this work, I have come to think of myself as living in the middle of a century that is redefining the very nature of life in a fundamental and elementary fashion, not only for humans but also for our planet and its other inhabitants. It's as if my life were balanced on the pivot point of a fulcrum. On the one hand, I look

back on the world from around 1950 to the present, a period some call "The Age of Acceleration," when human numbers, consumption, technology, resource use, waste production, and physical and chemical manipulation of nature soared exponentially.[1]

During this time, I have been one of the planet's fortunate Golden Billion who – unlike the world's other nearly 6 billion – have never lacked for food, home, medical care, or energy.

On the other hand, looking forward toward the mid-point of the 21st century, I see us moving into payoff time, during which the results of our excesses and affluence will become increasingly evident, and humans and many other species will be forced to cope with the results of current trends. By that time, the human population is expected to peak at around nine or ten billion people, signaling the end of rising environmental pressures from sheer human numbers (although not necessarily from increasing human needs and desires). Humans then may have the chance to enter a more stable and

sustainable relationship with Earth, one that will depend on the amount and quality of environmental resources and services that remain. It's uncomfortable living here on the point of a fulcrum, sensing how my actions and those of my nation each day are reshaping the potential for my children to live with the same abandon and abundance I've relished.

To better understand the "fulcrum century" concept, consider some numbers. Between 1950 and 2000, the world's population soared from about 2.5 to 6.1 billion. Between 1960 and 2000, global freshwater use doubled; five to 25 percent of use now exceeds long-term accessible supplies. Biogeochemical flows were altered in crucial ways – for example, reactive nitrogen in terrestrial ecosystems doubled, and phosphorus tripled, causing serious excess nutrient loading and water pollution. About half of the total increase in atmospheric carbon dioxide dates from the last four decades of the 20th century (55 ppm of the total 280-to-388 ppm rise since 1750). Tens of thousands of new synthetic chemicals were released. From 1950 to 2000, world ecosystems were structurally and functionally altered more rapidly and extensively than during any comparable historic period, with for example 40 percent of the world's coral reefs being destroyed or seriously degraded. Global genetic diversity declined substantially and irreversibly as extinction rates soared to as much as 1,000 times background rates. Up to a third of all mammals, birds, and amphibians are now threatened with extinction. By 2000, about two-thirds of life-support functions (ecosystem services) that were surveyed – including nature's regulation of air, water, climate, and pests, and the propagation of insect pollinators, wild fisheries and food, and genetic resources – were being degraded or used unsustainably.[2]

Humans are now powerful enough to affect life not just regionally but around the globe – a strength exemplified by World War II's creation of the atomic bomb, as well as acidification of the world's oceans (global ocean pH down about 0.1 units since 1800[3]) and global rises in greenhouse gases. As the scope and magnitude of human influences on the natural world continue to soar, climate scientists, ecologists, and others have speculated that our environmental systems are

[1]Robert Costanza et al. 2007. "Sustainability or Collapse: What Can We Learn from Integrating the History of Humans and the Rest of Nature?" *Ambio 36(7)*, 522-527.

[2]Most statistics are from *Ecosystems and Human Well-Being: Synthesis* (2005, Washington DC: Island Press), a product of the Millenium Ecosystem Assessment, a UN-initiated multinational effort involving thousands of authors and reviewers.

[3]http://ioc3.unesco.org/oanet/FAQacidity.htmls

increasingly likely to break: that rising pressures, rather than incrementally intensifying ongoing trends, will produce non-linear and abrupt climate or ecological changes. Current regional examples of such quantum shifts include increasing numbers of dead zones in coastal waterways, regional collapse of fisheries, and disease emergence[4]. Some visionaries are attempting to clarify this concept by defining "planetary boundaries" beyond which environmental change will be unacceptable. See for example Figure 1, which states that of nine crucial variables, three – biodiversity loss, the cycling of nitrogen, and climate change – have already exceeded safe planetary boundaries.

Certainly humans have always reshaped their environment. Societies have come and gone, sometimes failing because of environmental degradation. But they always did so within the womb of a larger natural world that buffered their actions and maintained an overarching environmental stability, sustained by the globe's tremendous biodiversity and the complexity of healthy integrated ecosystem functions. In general, people could assume an abundance of clean water and air, pollinators and migrating birds, natural buffers to reduce floodwaters, renewed soils, recycled nutrients to feed crops, and countless other natural amenities. Our planet was a self-sustaining and life-supporting homeland. That was a given.

Today's unprecedented massive changes represent a potential reversal of these assumptions. As we compromise the planet's stabilizing diversity, interactions, and processes, Earth is losing its resilience, constancy, and regenerative capabilities. In many ways it is becoming more erratic, brittle, and limited. We are, some would say, creating a no-analogue world in which we cannot predict the future based on past patterns.

When I contemplate these trends, I wonder: Are we indeed headed toward cataclysmic planetary change, when nature will insist on shouting out the last word? Or will the planet and human race continue to muddle along, even as the environment and our resulting quality of life continue to decline, the world as we know it ending not with a bang but a whimper? I hope that neither prediction is true. But I've come to accept that all our attempts to recreate a self-sustaining world will not vacuum excessive greenhouse gasses from our atmosphere, resurrect extinct species, or bring about the other regenerative changes I desire. Even as CGRER members have continued to teach and research the questions at hand, I've wondered about how we might create a sense of urgency that would motivate people and governments to make necessary changes. And about policies, institutions, and practices that might somehow slow the massive momentum of current trends. I've wondered about where we could find political and economic leadership to look in new directions and fund dramatic environmental initiatives. And about whether, just maybe, the attempts of individuals around the globe might miraculously coalesce to form a societal and political common vision that would lead to collective action that redirected the current incorrigible trajectory of our planet.

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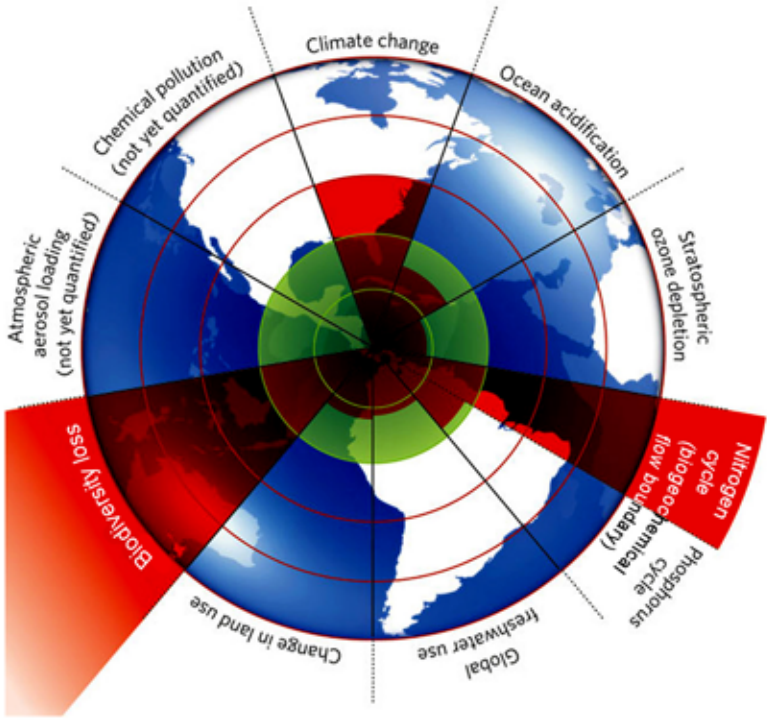


Figure 1: *Nine planetary systems identified as crucial to life on Earth, along with their safe operating space (indicated by green). Note that estimates of three of the systems (biodiversity loss, climate change, and changes in the nitrogen cycle) are identified in red as already exceeding their safe limits. Others remain within safe limits or have not yet been quantified.*

(Reprinted from Rockström et al, 2009. "Planetary Boundaries: Exploring the safe operating space for humanity", Nature 461, 472-475 | doi:10.1038/461472a, with permission.)

[4]See note 2 above.

Meanwhile, life goes on. Several years ago, when I had the joy of becoming a grandmother, I acknowledged that my grandkids' greatest inheritance would be one of environmental integrity and health – not monetary wealth, goods, or outdated traditions. With this belief in mind, and my continuing faith in active lives guided by personal integrity, I offer the following suggestions (see below). These thoughts have helped me maintain hope and continue to work for positive change. Applied collectively, by governments as well as individuals, I believe that they also could reshape our planet's future.

I have usually ended my ***IoWatch*** articles with words about CGRER members rising to the challenge and doing the right thing. But not today. Instead, I retreat to the natural world that I love. I did so this spring, when enjoying indigo buntings, eastern wood-pewees, eastern phoebes, and other birds nesting near our woodland home. One morning, I noticed a walnut-shell-size nest on a tree limb overhanging our deck, a lichen-covered cup fused to the branch with strands of stretchy spiderweb silk. A hummingbird nest. I started rising at

1 **Fight fear.**

Look environmental problems straight in the face. Educate yourself about both personal lifestyle changes and larger trends, and then live accordingly.

2 **Stay active.**

Believe that every action is either part of the solution or part of the problem. Apply your skills as broadly as you can, but don't underrate the power of small acts and personal example.

3 **Renew yourself**

by taking time to relish and enjoy the beauty of the world we now inhabit.

4 **Encourage**

your family, students, and anyone else you influence to fall in love with the natural world. Those who cherish nature and all its life-sustaining intricacies will work for their preservation.

5 **Welcome thoughtful change.**

Accept that "business as usual" may no longer be acceptable; clinging to our current habits, assumptions, and economic self-interests may lead to greater discomfort in the future.

6 **Don't let the perfect become the enemy of the possible.**

Emphasize positive solutions, but also stress compromise. "Win-win" solutions (for example, those that are both economically and environmentally beneficial) among seemingly divergent groups will become increasingly necessary as environmental stressors continue to rise.

7 **Question authority**

especially when that authority emphasizes short-term interests, financial gain, or blind allegiance to the status quo.

8 **Help create a vision**

of where we want to go. Without positive alternatives, we will end up where we are now heading.

9 **Think big.**

Train yourself to think about distant people, other species, and future times, and consider all of these in your choices and actions.

dawn to watch the nesting mother awake, rustle her feathers, and raise her head. After a few minutes she'd lift her tiny body, her wings flapping at over 50 beats per second, and zip down to a nearby flower for a morning feast. There was something sacred in that event and in the recognition that this three-gram bird had flown to the Midwest from Central America, just as her ancestors had likely done for thousands of years before. These processes, these elementary patterns and habits of nature that still abound, are struggling to hold the world together with intermeshed strands that – like spiderweb silk – are stronger than steel. They are indeed sacred and profound. They are indeed worth fighting to preserve. I know that I'll continue to do so, and that CGRER and its members will do the same.

Schnoor Receives National Honor

CGRER co-director Jerry Schnoor traveled to Costa Mesa, California, in July to accept the Athalie Richardson Irvine Clarke Prize, which is given by the National Water Research Institute to honor individuals who have made outstanding contributions to the field of water research. The prestigious award includes a $50,000 prize, a major portion of which Schnoor has donated to the UI student chapter of Engineers Without Borders in recognition of their excellent work in Ghana on clean water. Schnoor's acceptance speech, "Water Sustainability in a Changing World," can be found at www.nwriusa.org/laureates.htm.

Learning From Disaster

The Iowa Floods of 2008 are receding into history, but information gleaned from the disaster can help mitigate against future floods. That was the message put forth in five community seminars sponsored in part by CGRER during June and July.

The two-hour sessions on "Anatomy of Iowa Floods: Preparing for the Future" were held in the Iowa cities of Burlington, Cedar Rapids, Waverly, Mason City, and Ames. Topics included climate change trends in Iowa precipitation; floodplain management strategies; rural–urban watershed coalition building; the work of the Iowa Flood Center; and a review of public policy issues.

More than 350 people attended the presentations, which included a question and answer period. Copies of Connie Mutel's *A Watershed Year: Anatomy of the Iowa Floods of 2008* were available at each site. The events were so well-received that additional seminars have been scheduled for Red Oak, Cherokee, Elkader, and at Honey Creek Resort State Park at Lake Rathbun in south central Iowa.

What do you think is important for the larger world to know about your work during the past decades?

REFLECTING BACK

G. Edgar Folk, Jr.
Professor Emeritus
Molecular Physiology
& Biophysics
University of Iowa

I've filled nearly each day of eight decades of my life with the study of biology, and I've enjoyed every minute of it. I like the challenge of figuring out the similarities and differences between living things. I think of myself as an explorer of ideas.

I feel very pleased that I've been able to develop new methods to help understand the comparative physiology of animals living in the Arctic and Antarctic. One of my major projects was the invention of a radio that can be implanted in animals so that we can observe them all winter long, even when the snow is 40 feet deep. I'm proud to say we put radios in 30 species and never had a single infection. It's an incredible thing to have a secret window into the lives of animals that live so far away and in an environment so different from our own. Some of our most significant findings have been in polar bear research. Before our studies, no one knew whether these bears hibernated. We discovered that they do indeed hibernate, though their body temperature and metabolism don't slow down as much as that of other bear species.

Our research has also given important quantitative information about climate change, because you can't study animals without taking into consideration the environment in which they live. I collected data that supported the theory that climate changes are more detectable in the polar regions than they are in temperate regions, a theory which many people had postulated but which was lacking in evidence.

Diana Horton
Professor Emerita of Biology
University of Iowa

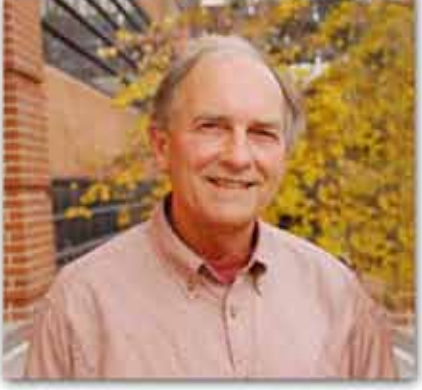
Most of my work has been as a taxonomist who documents plant species, including two decades as director of the University of Iowa Herbarium. Looking back on my career, I hope that I've raised consciousness among students and the general public about how important it is to take personal responsibility for helping to preserve the environment.

Iowa has one of the most disrupted environments of any place on earth, but we have remnants that can give us glimpses of what once was here. I'm proud of having documented a number of native species that had never before been recorded, and I've worked hard to help protect fragile areas that would otherwise have been lost. I've also tried to help people gain an appreciation for the importance of organismal biology, which involves studying plants and animals in their native habitats as part of complex ecological communities. While today a lot of important research is being done with high-tech tools, I believe that it's vitally important for people to get out in the field to experience what they're studying. We're losing an older generation of scientists who actually know the organisms. In a way it's like someone who knows of nature only through the TV. A documentary can have amazing footage, but it's not the same as being there and experiencing something firsthand.

Partly for that reason, I've tried to convey to others my own love of plants, insects, and birds, to show people how the study of these things can be a source of great enjoyment. Learning about and caring for the natural world can give endless fascination and meaning to our lives.

LOOKING AHEAD

How do you hope your work might make an impact on the world in the coming years?



Gene Takle
Professor of Geological & Atmospheric Sciences
Iowa State University

I've been working on climate change research since the mid-1990s, focusing on what these changes are likely to mean for the Midwest. Iowans aren't experiencing the kind of in-your-face climate change that shows up in the polar regions, such as melting ice fields, but we're seeing more subtle changes: farmers planting crops earlier because winters are shorter, for example, and increased frequency of extreme precipitation events. These less dramatic changes may happen slowly, and we typically don't notice them. I've tried to play a role in making these changes evident, exploring their scientific basis, and trying to figure out how we can adapt to them. How are our streams and rivers going to be affected? How will these changes alter agriculture? These are the sorts of questions I consider.

I hope that my work motivates people to better understand climate change and then be motivated to conserve energy and reduce their carbon footprint. I also hope my research will help us adjust to changes that already are occurring so that their negative impacts can be lessened.

I find it hard to turn down an invitation to talk to a group about these issues, whether it's a high school class, church group, library event, or a corporate board of directors. I do it in part because the people of Iowa pay my salary and they're entitled to an accounting of what I do. But I also want people to know how climate change might affect their future.

Marc Linderman
Assistant Professor of Geography
University of Iowa

I work in the area of land change science, which studies how and why we change the terrestrial landscape of the Earth and what the impacts of these changes are on natural and social systems. My involvement in this field grew out of my time in the Peace Corps in southern Africa, where I became interested in environmental monitoring methodologies and the complex relationships between the environment and humans.

Since then I've done research around the world– in China, India, and Africa, among other places. One of my projects involved using declassified spy satellite photography from the 1960s and civilian satellite imagery from 1970 - 1990s to examine human impacts on giant panda habitat over several decades. This information allowed us to estimate not only the quantity of the changes, but also to show how differing patterns of land use affect habitat, the dynamics of the ecosystem, and the human communities of the region.

I work closer to home as well and have done projects throughout the state of Iowa. One area of interest has been the hydrology of the state as it relates to biodiversity and land use. I hope that my work will improve the discussions we have about the complexity of the relationships between ecosystems and humans, so that we can make wise decisions about land use and development. A better scientific understanding of how we alter the landscape will help us predict more accurately what will happen if certain changes are made. My hope is that my research will contribute to more sustainable land use practices that take into account both human and environmental needs.

Charlie Stanier
Assistant Professor of Chemical & Biochemical Engineering,
Research Engineer in IIHR – Hydroscience & Engineering,
University of Iowa

I'd like to see our state and national energy and climate policy moving forward based on the best science possible. In order to achieve that, we not only need to do exceptional scientific work– we also need to communicate what we're doing to the larger public.

I do atmospheric research in two main areas. The first tries to contribute to our scientific understanding of the global climate system. My projects in this field include studying ultrafine aerosols through field sampling and computer simulations and improving the representation of cloud formation in climate models. Another climate-related project is the monitoring and simulation of carbon dioxide emissions. I collaborate with the National Oceanic and Atmospheric Administration on atmospheric measurements in West Branch, Iowa. All of this work is part of a worldwide scientific effort to better understand climate, research that will hopefully contribute to appropriate public policy decisions over the next decades.

My other area of study is air pollution monitoring in the Midwest, both as it relates to health effects and to compliance with the Clean Air Act. In contrast to climate change research, far fewer people work in this area. It's possible to get them together in a room, in fact, and make recommendations that become a reality within a year. So the time frame of this research is much different than the climate change work.

I appreciate the way CGRER members are interested in the broader implications of their work, not just in the science itself. I hope my own research plays a role in helping establish sound environmental and public policies.

seeds

In 2010, CGRER funded five new seed grants for the coming fiscal year, for a total of $150,595.

Tracing the Links Between Crops and Climate

Feedbacks Between Agriculture and Climate Revealed Through the Coupling of an Agricultural Land Surface Model to a Regional Climate Model; Brian K. Hornbuckle (ISU Agronomy Dept) with Jason C. Patton and Raymond W. Arritt (ISU Agronomy Dept) and Eugene S. Takle (ISU Geological and Atmospheric Sciences Dept and Agronomy Dept), $30,000

We know that agricultural practices have an influence on climate, but until now there haven't been good models for accurately mapping the feedback loop between crops and the atmosphere. This seed grant makes use of a recently developed agroecosystem model, Agro-IBIS, which is much more precise in predicting crop growth than previous systems. Software developed through the grant will couple the Agro-IBIS system with existing regional climate models. The long-term goal is to better predict the effects of climate change on agriculture as well as how agricultural practices influence climate. This research will also make it easier to predict how changes in agricultural practices (such as the planting of perennial crops in environmentally sensitive areas) might influence regional climate.

Research on Coral Reefs

Sustaining the Biodiversity of Coral Reefs: Evolutionary Insight from Coral Skeletons; A. F. Budd (UI Dept of Geoscience), $30,598

Coral reefs are among the most diverse – and endangered – ecosystems on earth. Despite their ecological importance, their evolutionary history is poorly understood. Scientists are using a variety of methods to correct the current inadequate taxonomy of reef corals, including studies of the morphology (the shape and size of the skeletal anatomy) of the coral colonies that form the reefs. This seed grant funds aquarium experiments on four kinds of coral, which will be grown under different environmental conditions to see how their skeletal features develop. The results will help correct the coral reef evolutionary model and will help provide information on how to better protect these fragile ecosystems from threats that include climate change, ocean acidification, pollution, and sedimentation.

Mapping Contaminants in Cropland Watersheds

Remote Sensing Based Distributed Hydrologic Modeling in Midwestern Landscapes for Predicting "Tile-to-Tide" Responses; Nandita Basu (UI Dept of Civil and Environmental Engineering and IIHR--Hydroscience and Engineering) and Marc Linderman (UI Dept of Geography), $29,997

We know that the levels of contaminants that are released from cropland are strongly correlated to the amount of water that flows off the land. Up until now, however, it's been difficult to get a precise picture of how those contaminants are distributed throughout a watershed system. This grant funds the creation of computer models that will use remote sensing data, including those garnered from NASA satellite images, to link vegetation patterns with water run-off. The models will integrate these data to show how the different areas of the landscape contribute different volumes of run-off water, and thus will provide a better picture of areas where pollutants like nitrogen and pesticides are released into the river system. With such information, it will be easier to target remediation efforts to where they will be most effective.

Studying Climate Change Through Butterfly Behavior

Climate Change Effects on Trophic Interactions in Montane Meadow Systems; Diane Debinski (ISU Dept of Ecology, Evolution, and Organismal Biology), with field studies by graduate student Jill A. Sherwood, $30,000

Research on climate change can require decades of labor. Insects provide an excellent model for examining these issues in a much shorter time frame because of the insects' close relationship with host plants, short life spans, and sensitivity to changing conditions. This seed grant funds a project in Grand Teton National Park involving *Parnassius clodius*, a butterfly common in this region. Twelve experimental plots will be constructed to mimic some of the changes expected to occur in this region as the result of climate change, including warmer temperatures, less precipitation, and reduced snowpack. The emergence, maturity, and reproduction of the butterflies will be monitored along with the growing patterns of their host plant, Steer's head (*Dicentra uniflora*) and their nectar plants. Studying this subset of species will provide valuable information on how climate change may affect the larger ecological community in these regions.

Improving Arsenic Detection

Arsenic in Iowa Groundwater: Identifying Important Geochemical Processes; Michelle M. Scherer and Gene F. Parkin (UI Dept of Civil and Environmental Engineering), $30,000

The toxic compound arsenic is present in groundwater around the globe. As people in developing nations rely more on wells, rather than surface water, for their drinking supply, the arsenic becomes a serious health problem. In Iowa this is also a concern, with a recent survey indicating arsenic in a significant number of private drinking water wells. While there is evidence that the minerals in soil affect how arsenic is released into the water table, that geochemical process is not well understood. This grant funds laboratory research that looks at the interaction between arsenic and iron oxides in clay soils, with the goal of reducing arsenic levels in drinking water. The work is part of a larger effort to establish an Iowa arsenic groundwater monitoring network.

Professor Mladen Franko from the University of Nova Gorica, Joe Bolkcom, David Osterberg, John Moreland and Ed Woolsey.

Green Bike Tour

CGRER had a major presence on a Green Bike Tour of the European nation of Slovenia on June 5-13. The eighth-annual event helped spread the word about renewable energy and was organized and led by David Osterberg, CGRER advisory board member, executive director of the nonpartisan Iowa Policy Project, and associate clinical professor in the UI Department of Occupational and Environmental Health.

The group also included Joe Bolkcom, CGRER outreach and community education director; John Moreland, staff assistant for U.S. Senator Tom Harkin; Edward Woolsey, owner of an Iowa renewable energy business; and Mladen Franko, an environmental sciences professor from Slovenia. The Green Bike Tour was held in Slovenia in 2008 and has also traveled to locations in the Midwest and northern Europe.

The 300-kilometer tour featured visits to renewable energy sites and meetings with public officials and scholars in several Slovenian cities. The group learned how Slovenia has worked to reduce its energy consumption and develop renewable sources. The Iowans on the trip also touted their state's leadership in wind power. When the first bike tour was held in 2002, Iowa produced just four percent of its energy from renewable sources. Today the state gets 20 percent of its energy from wind power, making it a world leader in this clean, environmentally friendly energy source.

The bicyclists put their pedaling efforts to good use in another way as well: two of the bikes were outfitted with solar panels, which powered laptop computers that participants used to send information back to the U.S. about their experiences.

New CGRER Members

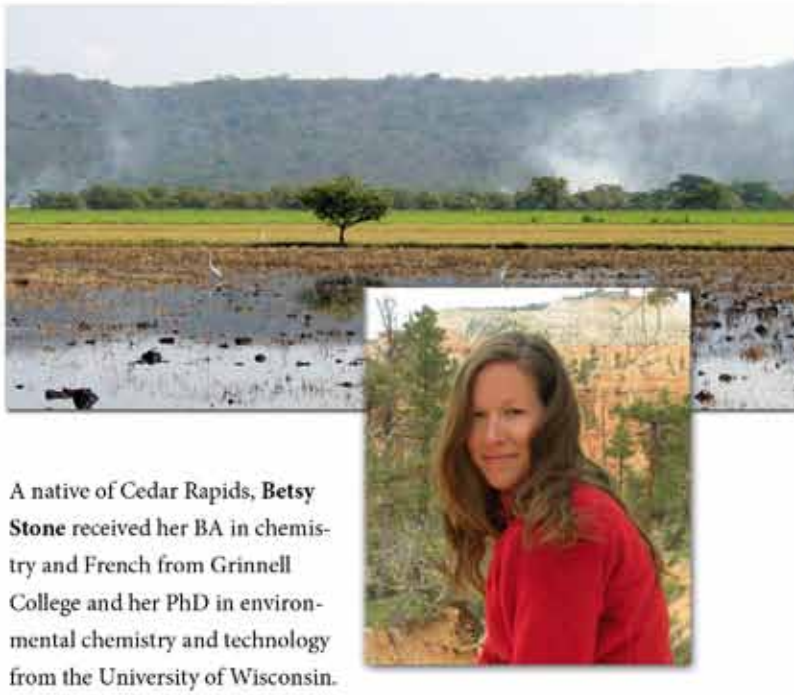
Kate Cowles has been at the University of Iowa since 1997 and is an associate professor in the Department of Statistics and Actuarial Science and in the Department of Biostatistics. She received her PhD in biostatistics from the University of Minnesota and also has an MM in music from Northwestern University. In her research, she develops statistical models and computational strategies for studying large-scale environmental data. She has worked on applications that include evaluating changes in acid rain deposition in the eastern U.S. and predicting the water equivalence of snow (a primary source of the water supply) in the western U.S. A new research interest is how to harness the computing power of computer graphics cards for spatial statistical modeling. Cowles joined CGRER because she is a strong advocate for interdisciplinary research and believes that large environmental problems can most effectively be addressed by collaboration across disciplines.

Barbara Eckstein brings the perspective of a humanities scholar to CGRER. A professor of English, she received her PhD from the University of Cincinnati and came to the UI in 1990. Her primary research interest is the social role of literature, including how literature and storytelling relate to environmental sustainability. In 2007 she organized and led a series of three tours focused on the Iowa River, which has been designated as one of the nation's most endangered waterways. Participants learned about farming practices, water quality issues, and livestock confinement operations throughout the river's watershed. Her current research focuses on children and nature, including the influences that shaped the childhoods of Aldo Leopold and Rachel Carson, and she is also interested in issues relating to public health and the environment. She appreciates the collegiality of CGRER members and welcomes the chance to learn from their wide-ranging expertise.

James Enloe, an associate professor of anthropology at the UI, received his BA from the University of Pennsylvania and PhD from the University of Mexico. He joined the UI faculty in 1990 and is a Paleolithic archeologist who studies the differences between Neanderthals and anatomically modern humans, including investigating whether there were ecological as well as anatomical differences in their adaptations to climate. Much of his work is done through analyzing animal bones, which provide information about diet, hunting methods, and social organization. In 1994 he received a CGRER seed grant to study climate change at the end of the Pleistocene Epoch in northern France. For the past four years Enloe has taken UI students on summer archeological expeditions to a cave site in France with remains from 40,000 years of human occupation, research that is funded through the Leakey Foundation. Enloe joined CGRER to interact with colleagues who share his theoretical and field interests.

Cory Forbes came to the UI in the fall of 2009 after completing his PhD in science education at the University of Michigan, where he also earned an MS in natural resources and environment. As an assistant professor of education, his research focuses on how to support inquiry-based science education at the K-12 levels. Among his current projects is an initiative with the Davenport, Iowa, school district, where he is helping to establish a professional development program that will assist teachers in meeting new national and state science education standards. His goal is to help teachers translate these broad educational guidelines into classroom instruction. Forbes is looking forward to learning from the expertise of fellow CGRER members and hopes there might be ways to use that knowledge to enrich the education of children, who will need to be informed citizens as they deal with environmental issues in the future.

Laura Rigal has been at the UI since 1997 and is an associate professor of American Studies and English. She received her PhD in English and American literature from Stanford University in 1989. Her academic specialty is eighteenth and nineteenth century U.S. history and culture, including the history of industrial and territorial expansion. Environmental history has always been part of American Studies, and in the past several years Rigal has become interested in water-related topics. Last spring she taught an undergraduate research seminar focused on Iowa City's Ralston Creek, and she is currently working on a book on the environmental and cultural history of the creek. Rigal serves as the humanities representative on the advisory committee for the Certificate in Sustainability, a newly instituted UI undergraduate interdisciplinary program. As a CGRER member, she appreciates the chance for collaboration with other members who are passionate about environmental research and stewardship.



A native of Cedar Rapids, **Betsy Stone** received her BA in chemistry and French from Grinnell College and her PhD in environmental chemistry and technology from the University of Wisconsin. Before coming to the UI this fall, she spent a year as a senior scientist at the Carlsbad Environmental Monitoring and Research Center at New Mexico State University. As an assistant professor of chemistry at the UI, her research focuses on how the chemical composition of atmospheric aerosols plays a role in global climate change. Aerosols influence climate through absorbing or reflecting light, decreasing solar surface radiation, changing cloud cover, and altering precipitation cycles. At Iowa, her work will include research on the chemical composition, sources, and transformations of organic aerosols. Stone is pleased to join a group of colleagues committed to environmental research and hopes to gain a greater perspective on environmental issues.

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Staying Connected to CGRER

For the latest updates on the work being done by CGRER, check out our website at **www.cgrer.uiowa.edu.** The site continues to undergo enhancements thanks to the efforts of CGRER staff members, including Morgan Yarker, a UI graduate student in science education. Over the past months a website news archive has been added so that past articles can be easily accessed, and the education and outreach section is being expanded to make it easier for teachers, students, and the general public to learn from the work being done by CGRER.

www.cgrer.uiowa.edu.

IoWatch is published each fall. Comments, questions, and requests for additional copies should be directed to:

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THE UNIVERSITY OF IOWA

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Printed by The University of Iowa Printing Department
Illustrations by Claudia McGehee

CGRER's New Editor

With this newsletter, Lori Erickson takes over from Connie Mutel as editor of CGRER publications.

Erickson has written for several University of Iowa publications as well as many national and regional magazines. She enjoys writing about environmental issues and topics and welcomes the chance to help tell CGRER's story.

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 multi-disciplinary 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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THE CENTER FOR GLOBAL AND REGIONAL ENVIRONMENTAL RESEARCH