# Responding to Climate Change in Illinois: A New Initiative at UIC

While emergency management specialists and local health departments are ready to respond to extreme weather events, planning for the future generally does not take into account an expected increase in frequency and severity of extreme weather events. Likewise, patterns of vector-borne disease, such as West Nile Virus, are expected to occur as a result of global climate change. With the East Coast of the US still suffering from the devastating effects of Hurricane Sandy on homes, businesses, transportation, and health, government agencies around the US are contemplating how they should prepare for floods, heat waves, droughts, and other extreme weather events. The US Centers for Disease Control and Prevention (CDC) is supporting initiatives for States to develop climate change adaptation plans in order to protect the health of the public. A climate change adaptation plan will be developed for Illinois and seven other States using the CDC’s Building Resilience Against Climate Effects (BRACE) model. UIC School of Public Health and IESP faculty member Samuel Dorevitch recently received CDC funding to develop BRACE-Illinois over the next four years. Dr. Dorevitch notes that “Illinois residents have been impacted by the 1993 Mississippi River floods, the 1995 Chicago heat wave, ozone-related

## Mission Statement

The mission of the Institute for Environmental Science and Policy (IESP) at the University of Illinois at Chicago (UIC) is to advance multidisciplinary research and scholarship within the environmental and health sciences, engineering, economics, urban planning and the social sciences among UIC’s faculty and students, to prepare the next generation of environmental scientists and decision makers, and to transmit workable solutions for environmental problems to the public sector.
FROM THE DIRECTOR

As attractive as the concept of sustainability may be as a means of framing our thoughts and goals, its definition is rather broad and difficult to work with when confronted with choices among specific courses of action. Devising appropriate and meaningful metrics in support of sustainable decision-making is an active area of sustainability science today. An early type of metric was introduced by Paul Ehrlich and John Holdren in the 1970s as one way to begin to apply sustainability concepts: the “IPAT” equation. As is the case for any equation, “IPAT” expresses a balance among interacting factors. It can be stated as

\[ I = P \times A \times T \]

where I represents the impacts of a given course of action on the environment, P is the relevant human population for the problem at hand, A is the level of consumption per person (“affluence”), and T is impact per unit of consumption, a general term for technology (hence the “T”), interpreted in its broadest sense as any human-created invention, system, or organization that serves to uncouple consumption from impact. The equation is not meant to be mathematically rigorous; rather it provides a way of organizing information for a “first-order” analysis.

So, suppose we wish to project future needs for maintaining global environmental quality at present day levels for the mid-twenty-first century. For this we need to have some projection of human population (P) and an idea of rates of growth in consumption (A). Future global population estimates vary but mid-range estimates suggest that by 2050 human population will grow from the current 6.8 billion to about 9.2 billion, an increase of 35%. Global GDP (Gross Domestic Product, one measure of consumption) varies from year to year but a long term annual growth rate of about 3.5% is historically accurate (growth at 3.5%, when compounded for forty years, means that the global economy will be four times as large at mid-century as today). Thus the “P” times “A” parts of the IPAT equation are 4 x 1.35 = 5.4.

This means that just to maintain current levels of environmental quality in the face of growing population and levels of affluence, our technological decoupling will need to reduce impacts by about a factor of five. So, for instance, many recently adopted “climate action plans,” such as the Chicago Climate Action Plan, typically call for a reduction in greenhouse gas emissions (admittedly just one impact measure) of eighty percent from today’s levels by mid-century. The means to achieve such reductions, or even whether or not they are necessary, are matters of intense debate; where one group sees expensive remedies with the potential to disrupt economies, another sees opportunities for investment in new technologies, businesses, and employment sectors, with collateral improvements in global and national well-being.

All of the foregoing might seem rather hypothetical without any firm data on the “A” and “T” parts of the equation. As it happens just such a study has recently been completed.

Jeff Dahmus and Timothy Gutowski at MIT gathered together historical information, in some case going back over a hundred years, on efficiency improvements and consumption levels for several key sectors of US and global economies. The sectors included were major materials, food production, transportation, and energy production. The study can be accessed at http://web.mit.edu/2.813/www/readings/DahmusGutowskiEfficiency.pdf. Their findings are summarized in the following table.

This information shows a series of patterns that broadly reflect human consumption of goods and services that we (Continued on page 3)
consider essential for modern living and for which efficiency gains have not kept pace; in a world of finite resources such consumption patterns cannot continue indefinitely. Of course our consumption of goods and services creates a viable economy, and also reflects our social needs. For example most of us consider it a social good that we can travel large distances rather quickly, safely, and more or less whenever we feel the need. Similarly, we realize social value in having a material like aluminum available (lightweight, strong, and ductile), in spite of its energy costs, because it makes so many conveniences, from air travel to beverage cans, possible. This is at the center of the sustainability paradigm: human behavior is a social and ethical phenomenon, not a technological one. Whether or not we must “overconsume” to realize social benefits is at the core of sustainable solutions to complex problems.

<table>
<thead>
<tr>
<th>Activity</th>
<th>Time Period</th>
<th>Avg Annual Efficiency Improvement (%)</th>
<th>Avg Annual Increase in Consumption ($)</th>
<th>Ratio: Consumption/Efficiency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pig Iron</td>
<td>1800-1990</td>
<td>1.4</td>
<td>4.1</td>
<td>3.0</td>
</tr>
<tr>
<td>Aluminum</td>
<td>1900-2005</td>
<td>1.2</td>
<td>9.8</td>
<td>7.9</td>
</tr>
<tr>
<td>Fertilizer</td>
<td>1920-2000</td>
<td>1.0</td>
<td>8.8</td>
<td>8.9</td>
</tr>
<tr>
<td>Electricity-Coal</td>
<td>1920-2007</td>
<td>1.3</td>
<td>5.7</td>
<td>4.5</td>
</tr>
<tr>
<td>Electricity-Oil</td>
<td>1920-2007</td>
<td>1.5</td>
<td>6.2</td>
<td>4.2</td>
</tr>
<tr>
<td>Electricity-Nat Gas</td>
<td>1920-2007</td>
<td>1.8</td>
<td>9.6</td>
<td>5.5</td>
</tr>
<tr>
<td>Freight Rail Travel</td>
<td>1960-2006</td>
<td>2.0</td>
<td>2.5</td>
<td>1.2</td>
</tr>
<tr>
<td>Air Passenger Travel</td>
<td>1960-2007</td>
<td>1.3</td>
<td>6.3</td>
<td>4.9</td>
</tr>
<tr>
<td>Motor Vehicle Travel</td>
<td>1940-2006</td>
<td>0.3</td>
<td>3.8</td>
<td>11.0</td>
</tr>
</tbody>
</table>

IESP SUPPORTED EVENTS AND SEMINARS

The Inaugural Pacific Rim Energy and Sustainability Congress: The Energy Debate: Challenges and Alternatives, August 5-9, 2012, Hiroshima, Japan

Seminar: Brenda Ekwurzel, Climate Scientist, Assistant Director of Climate Research and Analysis at the Union of Concerned Scientists, author of “Cooler Smarter: Practical Steps for Low-Carbon Living,” October 16, 2012, University of Illinois at Chicago

Seminar: Harry Saunders, Managing Director, Decision Processes, Inc. presented “Sustainability and the Rebound Effect,” October 29, 2012, University of Illinois at Chicago

Great Lakes Bioneers Chicago Meeting, November 2-4, 2012, University of Illinois at Chicago

Chicago Wilderness Congress 2012: Shaping the Future of Regional Conservation, November 15, 2012, University of Illinois at Chicago Forum
Moira Zeller, IESP/Urban Planning and Policy joint faculty, is part of a multi-institutional team that received a three-year $1,425,000 grant from National Science Foundation for their project titled “(CNH): From Farm Management to Governance of Landscapes: Climate, Water, and Land-Use Decisions in the Argentine Pampas”. The team is led by Guillero Podesta from the University of Miami.

The Argentine Pampas, the region targeted by this project, is a unique geographical location with an extremely flat relief found only in few other places on Earth, for example parts of the U.S. Midwest or central Europe. In these flat plains, there is a strong, two-way coupling between climate, groundwater, and land use. Groundwater is close to the surface, tightly associated with surface water and climate, and can have either positive or negative impacts on natural and human systems depending on its depth. For instance, shallow groundwater can provide a useful backup that stabilizes crop yields when precipitation is low, but also may trigger massive flooding events if it reaches the surface. Conversely, land use (e.g., crops vs. pastures) can have a strong effect on the quantity and quality of groundwater, as vegetation influences groundwater recharge through evapotranspiration and drainage. Additionally, climate variability and change can pose serious challenges to water availability and demand in agriculture and, consequently, to global food security.

The project is assembling a linked modeling framework to explore the interactions between surface and groundwater, plausible climate scenarios (e.g., wet or dry periods), and individual and land use decisions. This framework combines a physically-based hydrological model, biophysical crop growth models and an agent-based model of land use decisions and farm production. The linked models will be used to explore the outcomes of decisions (e.g., land allocation) that balance economic and agronomic considerations (profits, crop rotations) with management of flooding and drought risks through groundwater depths. These decisions are embedded in the context of uncertain future climate. The tight coupling between climate, land use, and groundwater in the flat Pampas offers a unique opportunity to study feedbacks between hydrological and ecosystem processes, and how these are influenced by human decisions under uncertain climate and socio-economic conditions. The emphasis is on finding strategies that will perform relatively well across most future conditions, even if we do not know precisely what those futures will be.

The complex two-way dynamics of shallow groundwater in flat plains set up another interesting social science problem: flood and drought risks faced by a farmer are influenced not only by his or her own decisions, but also by those of others nearby. This so-called “interdependent security” problem requires co-
This past summer, IESP has welcomed its newest faculty member, Sybil Derrible, who holds a joint appointment with the Department of Civil and Materials Engineering. Originally from St Pierre and Miquelon (French overseas territory of 6,000 inhabitants close to Canada), Dr. Derrible received his PhD in Civil Engineering from the University of Toronto in Canada, his Diploma of Engineering in Industrial Engineering from the Ecole Centrale of Lyon in France, and his MEng in Mechanical Engineering from Imperial College London in UK. Dr. Derrible recently spent a year in Singapore as a Visiting Research Fellow at the Singapore-MIT Alliance for Research and Technology.

As his educational background suggests, Dr. Derrible is highly interdisciplinary and strives to integrate and apply concepts from a broad spectrum of fields in his research, ranging from traditional civil engineering to complex systems thinking, and from computer programming to urban economics. His primary focus and goal is to rethink and redesign urban infrastructure systems for the 21st century.

“I’m thrilled to have joined such a unique interdisciplinary institute as IESP, and I simply can’t wait to collaborate with my new colleagues in the great city of Chicago” says Dr. Derrible. “Whether it is the water/wastewater system, the electricity grid, the building stock, or the transportation system”, he states, “all are part of a nexus of co-dependent and ubiquitous elements of infrastructure that is vital to our cities”. He further argues that “as a result and for a sustainable and resilient future, the design of these systems must be rethought towards more and better

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Four IESP predoctoral fellowships were awarded to UIC students pursuing doctoral degrees whose research is related to interdisciplinary environmental scholarship. This year’s winners are Anna Czupryna from Biological Sciences, Andrea Hicks from IESP/Civil and Materials Engineering, Eunjung (EJ) Shin from Public Administration, and Kristin Woycheese from Earth and Environmental Sciences. Each winner will receive $10,000 award for the 2012-2013 academic year.

Anna’s project focuses on domestic dog ecology in villages west of Serengeti National Park, Tanzania. Free-roaming domestic dog research has generally focused on disease ecology and efforts to control zoonotic diseases such as rabies. Few aim to understand free-roaming domestic dog “ecology”. What regulates their population sizes? How do disease control interventions, such as vaccination programs, alter demography, health, and ownership practices? Anna’s research will investigate factors regulating the free-roaming domestic dog population in rural villages west of Serengeti National Park and determine the impact of vaccination campaigns on dog abundance, health, welfare and population growth. This population of domestic dogs is a reservoir for rabies and distemper and poses concerns for both public health and conservation of wild carnivores in the Serengeti. Annual dog vaccinations conducted since 2003 may be affecting dog population growth and changing the mechanisms which regulate it. To determine the effect of vaccination on domestic dog population dynamics Anna will compare demography, welfare and dog ownership practices in two villages receiving annual dog vaccinations and two villages without annual vaccinations. She will characterize free-roaming domestic dog ecology by marking and assessing individual dogs and conducting household questionnaire surveys in a four year longitudinal study to determine: (a) dog demography, including estimating annual survival, fecundity and population growth, (b) dog welfare and health using endocrine measures and body condition score, and (c) dog ownership practices, including feeding, vaccination and population control practices. This innovative approach of following individual dogs in addition to surveying owners will provide valuable information about the ecology of free-roaming domestic dogs to ultimately determine what factors regulate the population.

While domestic dogs are a commonly studied organism, free-roaming domestic dogs, which depend on people for food but roam freely amongst livestock and wildlife, live within a complex and dynamic system. As a result, unlike typical “pet” dogs, whose population size is strictly controlled by humans, free-roaming dog population growth may be regulated by humans, disease, and wildlife predation. The Serengeti ecosystem in Tanzania poses a unique opportunity to study these relationships due to the interconnectedness of wildlife, humans, and domestic animals. Understanding how these factors affect dog population ecology in the context of the Serengeti ecosystem will provide vital information to continue dog rabies vaccination programs in Tanzania and in other areas where free-roaming domestic dogs pose a public health and conservation concern.

Anna’s research is significant in that it provides critical data for the Serengeti Health Initiative (SHI), Alliance for Rabies Control, and Tanzanian officials, whose mission is the eradication of rabies in Tanzania. Understanding the population dynamics of these dogs will reveal the number of dogs to target for vaccination to achieve the recommended coverage to control rabies outbreaks. Mitigating rabies risk and exposure with dog vaccination campaigns would eliminate human death due to rabies and the severe financial burden of post exposure treatment, wound treatment, and livestock loss, all of which are major financial hardships on communities struggling with poverty. Anna’s research incorporates community capacity building, using the infrastructure of the SHI to hire and train local Tanzanians as field assistants and data collectors. She will visit village schools to

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teach children about rabies risk and importance of wound washing. She will make presentations to villagers about dog nutrition and ownership practices that promote dog health and welfare. Data gathered will serve as a basis for greater community involvement in shaping rabies education programs and planning/execution of the rabies vaccination programs.

Anna’s research has considerable implications for wildlife conservation in Serengeti National Park and other areas because managing dog populations may decrease devastating disease outbreaks in wildlife populations. This has economic ramifications because the wildlife of Serengeti National Park is an integral part of the tourism industry in Tanzania. Finally, as these communities continue to grow and develop economically, these data will provide a benchmark for free-roaming domestic dog ecology and how it changes with human development. Anna’s research advisor is Dr. Joel Brown.

Andrea’s work has an interdisciplinary focus in regards to understanding how humans consume artificial light and the impacts of that consumption. Solid state lighting (SSL) or Light emitting diodes (LED) are more energy efficient than conventional lighting, such as incandescent. And although LED costs more to purchase than an incandescent, due to the increased efficiency and longer lifetime, it is much cheaper in terms of ownership cost. Traditionally in engineering, a more efficient product is considered without question to be a more sustainable product, however, Andrea’s research focuses on whether that will really be the case for LED. Often, when a product becomes less expensive, people tend to consume more of it – a phenomenon known as rebound. Sometimes that rebound is so large that it backfires, where all of the benefits gained through efficiency are overtaken by increases in consumption of that resource. Andrea’s research focuses on studying the overall lifecycle of lighting, and understanding at what phases the greatest impacts occur, and also how changes in consumption may shift those impacts. Her research advisor is IESP Director Dr. Thomas L. Theis.

EJ is interested in how natural resources are managed, shared and collectively governed across individuals, organizations and sectors. Currently, she is working on a dissertation project that aims to investigate the mechanism through which individual researchers get access to non-plant genetic resources and share the benefits from the resources with others. It first develops an integrated framework of social-ecological systems. Biological diversity is understood to delineate a scope of potential legal, economic, social applications that human society can develop. At the same time, such human institutions are proposed to influence the resilience of ecological systems and biodiversity. Given the interplay between ecological and social systems, individual behaviors regarding material-exchange and benefit-sharing are explained by both ecological and social factors in this research. Ecological factors refer to biological and natural environmental attributes of genetic resources regarding reproduction and growth. Social factors include human institutions such as national borders, laws and regulations, market incentives, public vs. private sectors, and science field norms. Furthermore, it proposes a sequential process model through which social-ecological systems influence the access to genetic resources and, in turn, the patterns of benefit-sharing. EJ’s research interests also include knowledge networks in environmental policy. In the spring 2013 semester, EJ will be teaching a new course offered by the Department of Public Administration. The course, PA 310 Environmental Policy, provides an introduction to political, economic and social dimension of environmental policy and teaches methods needed to understand, evaluate, design and implement environmental policies. It primarily focuses on environmental policy in the Unit-
In what may be the start of a tradition, IESP was a co-sponsor of the Chicago Wilderness (CW) Congress 2012, held at the UIC Forum on November 15th. IESP has now been a co-sponsor for three consecutive biennial CW Congresses. Dr. David Wise, Associate Director of IESP and Co-Chair of the Chicago Wilderness Science Team, welcomed Congress participants on behalf of IESP and UIC. This year’s Congress attracted over 600 people. In his opening remarks Dr. Wise lauded CW’s efforts to involve more young people in the Congress; over 100 students, ranging from high school students through graduate students and postdoctoral researchers, participated.

The opening plenary of the Congress featured an address by conservation activist Juan Martinez, who grew up in south central Los Angeles and is now a national leader in the movement to connect children with nature. The plenary was followed by day-long concurrent sessions featuring talks and discussions on the four core initiatives of the Chicago Wilderness alliance: Leave No Child Inside, Greening Infrastructure, Climate Action, and Restoring Nature, plus a fifth session on Research. This is the first Congress that has devoted a full day-long session to research findings that relate directly to CW’s central themes.

Chicago Wilderness is a conservation alliance of over 260 organizations (including UIC) that collaborate to restore and protect the biodiversity and ecosystem functions of lands and waters throughout the greater Chicago metropolitan area. A major goal of CW efforts is to strengthen connections between people and nature. Member organizations include local, state and federal agencies; large regional and national conservation organizations; cultural, education and research institutions; volunteer groups, municipalities; corporations; and faith-based groups. Since its founding in 1996, Chicago Wilderness has leveraged more than $13 million in federal funding and over $1 million in CW Corporate Council funding to implement collaborative projects to protect, restore and manage the rich natural heritage of the Chicago Wilderness region, which includes nearly 370,000 acres of protected lands and waters stretching from southeast Wisconsin through northeast Illinois and northwest Indiana to southwest Michigan.

Since its inception Chicago Wilderness has based its programs upon current scientific understandings of how nature and people connect, a knowledge base that includes both the natural and social sciences. This breadth was apparent in talks in the Research track at the Congress, as well as the research presentations in other sessions, such as those on applied climate change research, and restoration ecology and bioenergy production. In concert with the goal of this this year’s Congress to incorporate more youth, well over half the talks in the Research track were given by students (undergraduate and graduate) and postdoctoral researchers from a range of institutions: UIC, UIUC, Northwestern University, University of Wisconsin, Roosevelt University, and the Field Museum.

The Chicago Wilderness Congress brings together practitioners, policy makers, researchers, business leaders, politicians, volunteers and students—all of whom share an interest in fostering sustainable connections between people and nature in a dynamic, complex metropolitan landscape. Thus IESP is pleased to have again co-sponsored a CW Congress, as the networking and synergies developed in the UIC Forum on November 15 reflect a core IESP goal—to bring together multidisciplinary teams in the public and private sectors to devise solutions for today’s complex environmental challenges.

Chicago Botanic Garden - Member of the Chicago Wilderness Alliance
Several UIC faculty members are part of the BRACE-Illinois initiative, bringing expertise in infectious diseases, emergency preparedness, spatial data analysis, environmental health, public health workforce development, and preventive medicine. The UIC team is working closely with the Illinois Department of Public Health, other State Agencies, local health departments, and others to develop a climate change adaptation plan for Illinois. The work involves collecting data about climate, vulnerable populations, climate-sensitive health outcomes, and using that as the basis for assessing interventions that will reduce the burden of climate-sensitive illnesses.

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ordinated action by neighboring farmers to manage groundwater levels and associated risks. This project will develop laboratory experiments and participatory modeling sessions with farmers and stakeholders in the area of study to understand the conditions that encourage informal or formal cooperation in such situations. By exploring the outcomes of strategies under multiple plausible futures, stakeholders can identify vulnerabilities and design adaptation mechanisms to cope with change.

Dr. Zellner will serve as an advisor for the development of the existing agent-based model of agricultural production, contributing to the refinement of decision-making rules and mechanisms leading to emergent land-use and social patterns. She will also advise in the integration of the social/land-use model with hydrological models that respond to and feed back into the agricultural decisions. Dr. Zellner will assist in developing simplified games for lab experiments where students will decide on land allocation and crops, based on simulated impacts on yields and water levels. These exercises will allow the researchers to derive basic decision-making rules for the agent-based model above, and to test whether collective governance naturally emerges from the interaction of participants, or whether policies must be set in place to support their emergence. These games will also serve as a basis to develop a suite of simplified models and protocols to conduct training of and participatory modeling with governmental and NGO staff in the area of study, who will provide context-specific information on decisions and interactions that will help the researchers further refine the agent-based model. The trained staff will subsequently facilitate outreach workshops with farmers, technical advisors and policy-makers in the region. The goal of such workshops is to support stakeholder learning about the complexity of interactions among farmers and their biophysical and policy environment, how individual decisions may lead to unintended consequences, and how undesirable outcomes may be prevented. While uptake of the lessons learned cannot be guaranteed, the protocols will be designed to encourage stakeholder ownership of the modeling process and of the governance implications.

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integration and distribution. Such a challenge requires new and creative solutions that conventional engineering cannot provide. For instance, the picture above shows 33 subway networks in the world (nodes are stations and links show connections between stations regardless of distance), and it is by viewing the same “problem” from a different perspective that we develop novel solutions.”

Dr. Derrible also plans to further the pedagogy of UIC by introducing a new course on Cities and Sustainable Infrastructure. He would like to incite students to think of urban infrastructure not as separate systems but as a single entity from which the failure of one system can cascade into the failure of an entire urban environment.
**TALKS, SEMINARS, CONFERENCES**

**Ning Ai:**
- Attended the Waste Fleet Conference, June 25-27, 2013 in Indianapolis, IN

**Thomas L. Theis:**
- Served as conference chair and presented a paper at the Inaugural Pacific Rim Energy and Sustainability Congress: The Energy Debate: Challenges and Alternatives, August 5-9, 2012 in Hiroshima, Japan
- Attended and presented a paper at the 244th American Chemical Society National Meeting and Exposition: Materials for Health and Medicine, August 19-23, 2012 in Philadelphia, PA
- Attended the American Geophysical Union’s 45th Fall Meeting, December 3-7, 2012 in San Francisco, CA

**Moira Zellner:**
- Attended the Illinois Water Conference 2012, September 24-25, 2012, University of Illinois in Champaign, IL
- Attended the Association of Collegiate Schools of Planning 53rd Annual Conference, November 1-4, 2012 in Cincinnati, OH

**David Wise:**
- Presented a talk, "Arthropods of the leaf-litter food web in forests across the Chicago Wilderness," during NSF-sponsored SIFT & TERF National Dissemination Workshop at Washington University’s Tyson Research Center and Missouri Botanical Garden’s Shaw Nature Reserve, June 2012

**RECENT SCHOLARLY PUBLICATIONS**


**Kaplan, S., B. Sadler, K. Little, C. Franz, and P. Orris.** Can Sustainable Hospitals Help Bend the Health Care Cost Curve? The Commonwealth Fund, November 2012


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NEW RESEARCH PROJECTS

BRACE: Building Resilience Against Climate Effects in Illinois
Sponsor: Centers for Disease Control and Prevention National Center for Environmental Health
PI: Samuel Dorevitch (IESP/Environmental and Occupational Health Sciences); Co-PIs: Linda Forst, David Ibrahim and Bernard Turnock (Environmental and Occupational Health Sciences)

CNH: From Farm Management to Governance of Landscapes: Climate, Water, and Land-Use Decisions in Argentine Pampas
Sponsor: National Science Foundation through University of Miami
PI: Moira Zellner (IESP/Urban Planning and Policy)

Workshops on Big Data and Urban Informatics: e-Infrastructure for Social Science Research on Sustainable Urban Systems
Sponsor: National Science Foundation
PI: Piyushmita Thakuriah (Urban Planning and Policy); Co-PIs: Moira Zellner (IESP/Urban Planning and Policy), Neblyou Tilahun (Urban Planning and Policy)

ICES: Small: Collaborative Research: Dynamic Parking Assignment Games
Sponsor: National Science Foundation
PI: Bhaskar DasGupta (Computer Science); Co-Is: Ouri Wolfson (Computer Science), Jane Lin (IESP/Civil and Materials Engineering)
DEPARTMENTAL NEWS

IESP Director Thomas L. Theis and IESP/Earth and Environmental Sciences joint faculty Kathryn Nagy together with Martin Jaffe (Urban Planning and Policy), Molly Doane (Anthropology), and Cindy Klein-Banai (Office of Sustainability) were panelists at the UIC Student Dialogue: Climate Change and the Campus on September 13, 2012. The dialogue was hosted by the Institute for Policy and Civic Engagement in partnership with the Office of Sustainability and the Energy Initiative. The campus student dialogue intended to increase understanding about climate change science, increase awareness of climate change policy issues, and provide a forum for discussion among students and experts about those issues. The event examined climate action approaches on the UIC campus.

IESP/Civil and Materials Engineering joint faculty Jane Lin spent the fall 2012 semester on sabbatical leave in Hong Kong and Guanghzou, China. She visited transportation colleagues at the Hong Kong Polytechnic University, Hong Kong University, Hong Kong University of Science and Technology, and South China University of Science and Technology to develop international collaboration on transportation and environmental research.

IESP/Earth and Environmental Sciences joint faculty Kathryn Nagy was named Head of the Department of Earth and Environmental Sciences effective August 16, 2012.

Andrea Hicks, IESP/Civil and Materials Engineering graduate student, has been granted second year renewal of the Chancellor’s Graduate Research Fellowship award. She received the award to support her research on lighting as a consumer application of nanomaterials, particularly on how nano-enabled lighting technology will change how humans consume light, and the impacts of the consumption of light. Chancellor’s Fellowship is awarded to students who “show exceptional promise for future multidisciplinary research and creative activity in their fields of interest.”

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Kristin Woycheese

Kristin studies carbon sequestration in modern lacustrine microbialites. Microbialites—organosedimentary structures produced by the precipitation, trapping, and/or binding of sediments by microorganisms—have the potential to sequester large amounts of carbon dioxide from the atmosphere. Microbialites accrete sediment by the production of extracellular polymeric substances (EPS), which provides a sticky substrate to trap and bind particles. EPS also induces microenvironments of mineral super-saturation, encouraging precipitation of calcium carbonate (carbon sequestration). Cyanobacteria are the primary components of microbialite ecosystems, and produce the bulk of EPS. These sedimentary structures have been actively sequestering carbon on Earth for over three billion years, yet few studies have investigated the rates of growth in modern microbialite ecosystems. In the face of anthropogenic climate change, it is critical to investigate all avenues of carbon capture from the atmosphere and storage in the geosphere to attempt to remediate future climate concerns. Kristin’s study seeks to 1) evaluate the carbon sequestration potential of microbialite ecosystems in lacustrine environments, 2) establish which geochemical parameters encourage the highest rates of carbon sequestration, and 3) develop new technologies to analyze the geochemistry of mineralizing microbial mats. The results of this study will have relevance to the fields of environmental engineering, biogeochemistry, and paleobiology. Kristin’s research advisor is Dr. D’Arcy Meyer-Dombard.