

# IQ - ISEE Quarterly

An update from the Institute for Sustainability, Energy, and Environment

*What's new in research ...*

## 4 Interdisciplinary Projects Launched

The Institute for Sustainability, Energy, and Environment (iSEE) announced its second round of seed funding, totaling more than \$1.2 million, for four major interdisciplinary research projects at the University of Illinois at Urbana-Champaign.

Three projects — stormwater control to manage disease-bearing mosquitoes, a new modeling system to predict plants' responses to climate change, and a framework to coalesce multiple sources of low-carbon energy for transportation — will each receive more than \$350,000 from iSEE over the next three years. The fourth project, a unique method for cleaning up oil spills, will receive \$150,000, it was announced July 13.

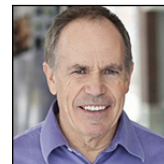
"We are excited to announce funding for four more projects that explore the grand challenges our planet faces now and in the future," iSEE Director Evan DeLucia said. "This type of 'actionable' research is why our Institute was created. With these new endeavors and the three we've already funded, iSEE now has research projects in all five of its major themes: climate solutions; energy transitions; secure and sustainable agriculture; sustainable infrastructure; and water and land stewardship."

Entomology Assistant Professor Brian Allan's project, titled "Engineering the Microbial and Stormwater Environment for Mosquito Control," will offer solutions, technology, and modeling for stormwater management in hopes of controlling mosquito populations and resulting diseases. Allan has expertise in the ecology of infectious diseases. His team includes experts in evolutionary ecology; insect-microbe interactions; vector biology; spatial epidemiology; surface-water hydraulics and hydrology; and cyberinfrastructure and geospatial information.

Crop Sciences and Plant Biology Professor Stephen Long's project, titled "*Plants in silico*: A Multiscale Modeling Platform to Predict Crop Response to Climate Change," will research how to accurately predict and model plant response to climate change — from the molecular to the ecosystem level. Long, a renowned expert in crops, cropping systems, and the impacts of global at-



ALLAN



LONG



OVERBYE



PAN

mospheric change on plants, will lead a team that features experts in genomics and plant metabolism; high-performance computing; molecular modeling and simulations; mathematical ecology; and photosynthesis.

Electrical and Computer Engineering Professor Thomas Overbye's project, titled "Interdependent Critical Infrastructure Systems for Synergized Utilization of Multiple Energy Sources toward Sustainable Vehicular Transportation," will create a framework for new strategies to expand and operate interdependent critical infrastructure systems (ICIs) — using multiple renewable energy sources to fuel better regional and national transportation systems. Overbye, who has expertise in power and energy systems operation and control, will work with experts in modeling of water-food-energy systems and infrastructure; environmental and economic policy analysis; logistics systems and transportation networks; and the water-energy nexus.

Bioengineering Assistant Professor Dipanjan Pan's project, titled "A Nanotechnology Approach for Efficient Crude Oil Pollution Treatment via Entrapment, Dispersal and Removal using Nano-CarboScavenger," will optimize a Nano-CarboScavenger (NCS), a particle designed to adsorb oil and remove it from water. Pan has expertise in developing carbon nanoparticles. He will work alongside experts in biofuels, biolubricants, and alternative fuels.

Read the full story with quotes from the PIs, and learn about the co-PIs on each project, at <http://bit.ly/1Mq1TFY>.

## Smart Water Disinfection Co-PI Publishes Paper



Microbiology Associate Professor Joanna Shisler, a co-PI on the iSEE-funded Smart Water Disinfection Project, published a paper in June on the some of the research.

Her article, titled "Waterborne

Viruses: A Barrier to Safe Drinking Water" and co-authored by PI Benito Mariñas and graduate student Aimee Gall, was published in the journal PLOS Pathogens and can be read at <http://bit.ly/1HvpUIQ>.

For updates on the project itself, and the scientists involved, visit the Mariñas page on the iSEE website at <http://bit.ly/1IJK7U3>.

To read an interview with Gall, visit <http://bit.ly/1GxnDBK>.



## FRESH FARM

Planting at the 21-acre Woody Polyculture Farm took place in early May. Grad student Kevin Wolz helped man the planter during the process.

Sonny An/iSEE

# Researcher in the Spotlight: William Eddy

William Eddy is a post-doctoral associate and member of Professor Wendy Yang's lab group in Plant Biology. He finished his Ph.D. in Ecology, Evolution, and Behavior from the University of Minnesota in May 2015.

As a team member on the Woody Polyculture Project, Eddy is tasked with understanding the ecosystem services — the benefits to humans and the environment — provided by a mixed-species woody polyculture system in the Midwest. Several benefits have been predicted, including high food production, increased carbon storage capacity of the soil (called sequestration) and increased efficiency in soil nutrient use (leading to fewer pesticide applications and therefore less chemical runoff). He said these ecosystem services have been touted by many people based on common knowledge about how trees use resources, but it's never been extensively tested on a full-scale site.

Using in-ground monitors and elemental analysis of soil samples, he'll track the water, gas, and nutrients coming into and out of the test plot — and try to understand the way they do so.

"The nice thing about looking at mechanisms [for nutrient cycling] is once we understand that, then we can extrapolate better from our research to other regions and places, other systems," he said.

In addition to his work directly at the woody polyculture research site, he will bring together farmers already practicing mixed-crop agriculture throughout the



Midwest into a study network. He hopes to learn what ecosystem services different regions of the "corn belt," with its wide variety of soil types and terrains, are capable of producing under woody polyculture systems. He is also eager to see the diverse ways farmers employ mixed species.

"(F)armers have chosen a whole different range of species planted together, and different arrangements, and they might just be planted based on what they think, on the recommendation of others, or on what they know grows together well and what doesn't. We're trying to harness some of that knowledge," he said.

Eddy earned a Bachelor's degree in

## More on iSEE Project Graduate Researchers

► To read interviews with graduate students involved with iSEE-funded research, find the links off the individual project pages at [sustainability.illinois.edu/research](http://sustainability.illinois.edu/research).

► To view a video of Matthew Alonso describing his research and the Stored Solar Stove project, visit the iSEE YouTube page at <http://bit.ly/1CCuS03>.

Biological Science from Baldwin-Wallace University in Ohio and a Master's in Natural Resources and Environment from the University of Michigan. In 2007, he moved to Minnesota to research effects of a warming climate on forest ecosystems there, and then decided to get his Ph.D.

About his motivation to work in sustainability, William said: "I think it is just tremendously important. It seems like the things I have studied could actually contribute even if it's in a really small way to provide information or to guiding what the next step is to improve agriculture.

"Also, I have a young daughter now. And it's cliché, but I do think about her and how I really want to leave the planet better than it is now for her."

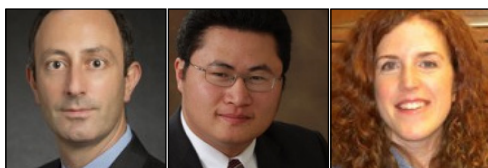
Read iSEE's full article on Eddy at <http://bit.ly/1Kibqbx>.

*What's new in research (continued) ...*

## iSEE Builds Research Team, Shows Funding Clout

In May, iSEE demonstrated its leadership of interdisciplinary research — and its ability to acquire federal funding — on campus, announcing a new project to model the impact that extreme natural and human-made events can have on communities and ecosystems.

The Institute helped secure more than \$220,000, including direct pay for student researchers, from the U.S. Army Construction Engineering Research Laboratory (CERL), which will fund the study titled “System Dynamics Modeling of the Ecosystem-Infrastructure Interface.”



**GARDONI**

**OUYANG**

**MURPHY**

Primary Investigators Paolo Gardoni, an Associate Professor in the Department of Civil and Environmental Engineering (CEE), Yanfeng Ouyang, an Associate Professor of CEE, and Colleen Murphy, an Associate Professor in the College of Law

and the Department of Philosophy, will lead a team that will examine the effects of possible natural events such as earthquakes, tsunamis, and hurricanes — as well as human actions such as terrorist attacks or interventions.

“Evidence from several case studies shows that the socioeconomic status of a community influences how it is impacted,” Gardoni said. “The focus of this project is to predict measures of impact of future events.”

Read the full news release on the CERL project at <http://bit.ly/1Lf2W3P>.

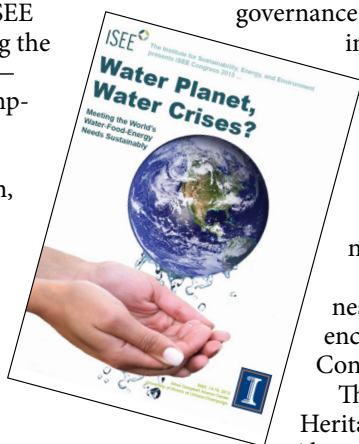
*What's new in outreach ...*

## Upcoming: Congress, Energy Conversation

► Planning continues for the second annual iSEE Congress — “Water Planet, Water Crises? Meeting the World’s Water-Food-Energy Needs Sustainably” — which will take place Sept. 14-16 at the Alice Campbell Alumni Center.

The opening keynote address for this international conference will come from Robert Glennon, Udall Professor of Law and Public Policy at the University of Arizona and author of “Unquenchable: America’s Water Crisis and What To Do About It” (2009) and the acclaimed “Water Follies: Groundwater Pumping and the Fate of America’s Fresh Waters” (2002).

Other Congress topics include water resources and climate change; the water-food-energy nexus; water, human health and ecosystems; water



governance and policy; and water conservation and safety innovations. Speakers include water experts from across the nation and world as well as from the corporate world.

Visit <http://bit.ly/1Gn1dUH> for the Congress schedule, speaker information, accommodations and more. To register, visit <http://bit.ly/1J2BKmM>.

► In addition, iSEE is planning a major community outreach event in October.

The Institute is inviting East Central Illinois businesses and nonprofit organizations to share experiences and learn about opportunities at “A Community Conversation on Energy Conservation.”

The event is set for noon-3:30 p.m. Oct. 20 in the Heritage Room of the ACES Library, Information, and Alumni Center, 1101 S. Goodwin Ave., Urbana.

*What's new in education ...*

## 2 iSEE-Related Courses to be Offered During 2015-16 Academic Year

► In fall 2015, the ENVS 491 Sustainability Experience course, in which undergraduate or grad students will work with faculty, staff, and/or the Student Sustainability Committee to advance campus sustainability goals and the Illinois Climate Action Plan. iSEE Associate Director Ben McCall will be the instructor.

According to the course description,

students will use “their disciplinary knowledge to tackle interdisciplinary problems” on campus as Campus Sustainability Interns, SSC members or working group members, or iSEE clerks serving Sustainability Working Advisory Teams (SWATeams) tackling specific areas of campus sustainability.

► In spring 2016, iSEE Associate

Director Madhu Khanna will lead the team-taught ENVS 301 Tools for Sustainability, which will “teach systems-thinking skills to enable better understanding of the different dimensions of sustainability — and the problems and trade-offs involved in achieving that sustainability.”

More on Environmental Studies courses can be found at <http://bit.ly/1f0Gejr>.



## Certified Green Office Program Stars

On Earth Day — April 22 — iSEE announced its Certified Green Office Program honorees.

All 24 participating offices agreed to the five basic commitments to become a Certified Green Office: appoint a Sustainability Ambassador; adopt a sustainable travel policy; use 30% recycled-content and FSC-certified paper; identify, label and communicate the location of office recycling stations; and turn off and unplug all unnecessary electronics.

And 23 participants chose to go the extra mile choosing from among 17 extra suggested commitments to earn Gold, Silver, or Bronze levels of achievement. Two of the star programs:

- ▶ Campus Recreation was a top performer, completing 21 of the 22 required and bonus actions suggested.

Kristina Pettigrew, Facilities Coordinator at Campus Recreation, said getting complete buy-in from the 52 professional and 750+ student staff was the true success story of the Certified Green Office experience.

“We always had things like turning off the power strip at night, and our IT department had been really good about setting all that up, but workers just wouldn’t do it because they didn’t realize there was a benefit in it,” she said.

So, Campus Rec changed the automatic default screensavers in

the office to read at the very top “please turn off your power strip” as a friendly reminder. Power strips were placed on employees’ desks and labeled with a large sign stating “please turn off your power strip at night.”

See the full feature on Campus Rec at <http://bit.ly/1RznBVF>.

- ▶ University Housing was another program leader, completing 20 of the 22 required and bonus commitments.

Many of the actions suggested on the “extra miles” form — such as educating staff about public transportation systems and recycling ink cartridges from printers — were already being done there, said Bryan Johnson, University Housing Project Manager and Housing’s contact person for the CGOP.

He said one of the easiest changes was the integration of teleconferencing.

“We talked with our information technology staff, and they were able to put instructions together and give that to our help desk. Now it’s just a matter of communicating it out to the rest of Housing that the opportunity is available,” Johnson said.

See the full feature on Housing at <http://bit.ly/1GqO7Id>.

To read the full news release on all 24 program honorees, visit <http://bit.ly/1FPxkOe>. To read about the program itself, visit <http://bit.ly/1LiRsMB>.

## Associate Director to Share Campus Process at Conference

iSEE Associate Director Ben McCall will present his case study on the Illinois’ new campus sustainability process in October at the annual Association for the Advancement of Sustainability in Higher Education (AASHE) Conference in Minneapolis.

McCall was asked to share “A New Model for Collaborative and Effective Campus Sustainability Decisions,” about how to gain buy-in from students, faculty, staff, and campus leadership. You can read more about the process at <http://bit.ly/1K6cRXJ>.

In addition, Sustainability Engagement Specialist Nishant Makhijani will be at the conference to present his poster, titled “Tested Techniques — Increase membership, organize engaging events & raise funds for your student group.”

### Coming Soon — We Promise!

The 2015 Illinois Climate Action Plan is very close to approval at the campus level.

Stay tuned for the latest on the plan — and be the first to download it once it is published — at

[sustainability.illinois.edu](http://sustainability.illinois.edu).

