



# IQ - ISEE Quarterly

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

What's new at the Institute ...

## iSEE Names Acting AD for Research, Hires New Media Lab Coordinator

In January, the Institute announced that Jeremy Guest has taken on the role of Acting Associate Director for Research.

Guest, an Associate Professor of Civil & Environmental Engineering, will guide the development of new iSEE research initiatives and support existing programs (*read more, page 2*).

He has taken over the iSEE research portfolio from Madhu Khanna, who was promoted to iSEE's Interim Director in September 2020.

"Jeremy Guest has been a member of the iSEE research and education family since we started in 2014," Khanna said. "He was one of the first co-instructors of the foundational course for the SEE Fellows Minor, ENVS 301: Tools for Sustainability. He is an active iSEE Water Scholar and a recipient of Institute seed grants, one of which contributed to a Bill & Melinda Gates Foundation-funded Sustainable Sanitation Project. His research expertise has contributed to



GUEST

the success of iSEE-supported teams in garnering external funding for the new Smart Farms Project and the Center for Advanced Bioenergy and Bioproducts Innovation (CABBI; *read more, page 3*).

"In short, he already has the knowledgebase to hit the ground running as our new Associate Director, and we are excited to have such an energetic, enthusiastic, and prolific scientist join us."

Guest, whose research expertise is in environmental engineering and the development of sustainable systems for the provision of water, sanitation, and energy, has had research sponsored by a number of agencies, including the National Science Foundation (NSF), the U.S. Environmental Protection Agency, the U.S. Department of Agriculture, the U.S. Department of Energy, the U.S. Agency for International Development, and the Bill & Melinda Gates Foundation.

He is the recipient of an NSF Faculty Early Career Development Program (CAREER) Award, the 2016 recipient of the Paul L. Busch Award for innovation in applied water quality research from the

Water Research Foundation, and the 2021 James J. Morgan *Environmental Science & Technology* Early Career Award for creativity and leadership in his field.

### Media Lab Coordinator in Place

In addition to Guest, iSEE also recently hired a new Media Lab Coordinator. Long-time local video expert Mark Herman,



HERMAN

who has documented research, education, and events around the state and across campus — including Marching Illini performances — was hired in November to join the Communica-

tions team.

Herman will oversee video projects that highlight iSEE and CABBI research as well as educational and campus sustainability efforts at the Institute. And he will supervise and assist all activities at the iSEE Media Lab, a small green-screen studio with video cameras and editing equipment that will be available for use by appointment.

What's inside ...

**2 Interdisciplinary Research Projects, 1 Living Lab Project Get Seed Funding — Page 2**

**CABBI Adds 2 Partner Institutions — Page 3**



**iSEE Launching Environmental Leadership Modules — Page 4**

## iSEE Seed Funds 3 Projects

The Institute announced in January that it is seed funding three new projects at the University of Illinois Urbana-Champaign — two for its interdisciplinary research initiative and one under its Campus as a Living Laboratory (CALL) program. [Read the full news release.](#)

The rundown:

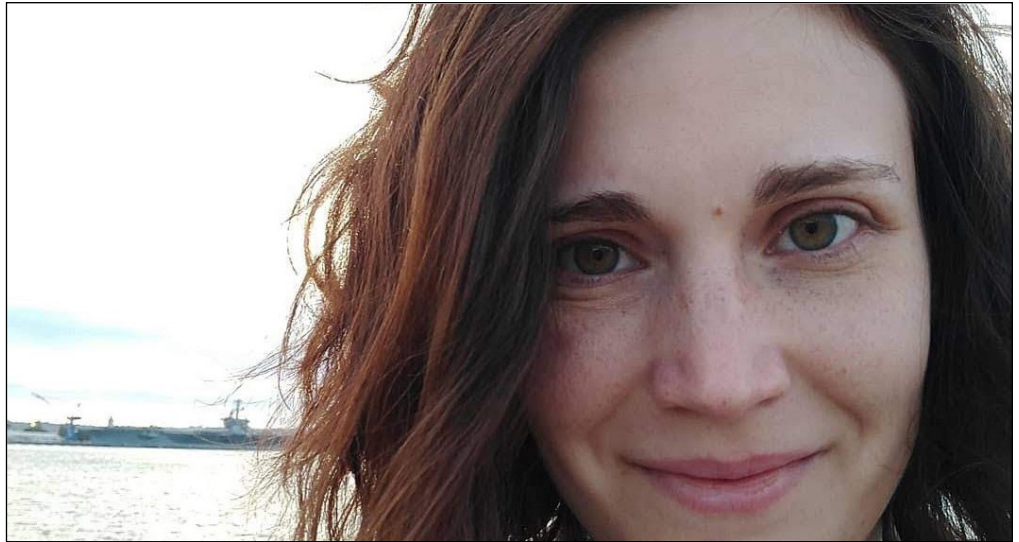
- Led by Professor of Agricultural and Consumer Economics Amy Ando, one project will investigate interaction between food, water, energy, and human systems in urban-rural communities to increase sustainability, resiliency, and equity in these critical areas.

- Led by Xiao Su, Assistant Professor of Chemical and Biological Engineering, the second project will establish a fully renewable system to recover excess nitrogen from polluted waterways for upcycling into value-added products like ammonia, with a view toward encouraging sustainable land management and energy-efficient nutrient reuse.

[Full details on these two projects and teams.](#)

- The new CALL project, led by Girish Chowdhary, Associate Professor of Agricultural and Biological Engineering and Computer Science, will integrate early-season, under-canopy cover crop planting with cattle grazing at an on-campus living lab.

[Read more about CALL and the new project and team.](#)



## In the Spotlight: Megan Matthews — Growing our Soybean Models

Crop researchers worldwide are constantly advancing our understanding of the plants we rely on. One approach that many scientists take is the development of *in silico* models — computational models meant to simulate the mechanics of biological systems. However, an incredible depth of knowledge is needed to model even one small part of a plant. Modeling entire crops is a massive collaborative effort involving the skills of many specialists from different backgrounds and the integration of various models with each other.

Megan Matthews, an Assistant Professor of Civil & Environmental Engineering at the University of Illinois who started as a Postdoctoral Research Associate on iSEE's [Crops in silico \(Cis\)](#) team, is developing and integrating multiscale crop models that will help us optimize crop growth even as the climate changes.

Matthews began her academic career at North Carolina State University, where she earned her bachelor's degree in electrical engineering. Her interest in biology sparked during the final semester of her undergrad, when she took a biological modeling course as an elective. The course focused on the techniques used to model traditional applications of electrical engineering, such as circuits and power systems, and how those techniques can also be applied to model and study biological systems.

"It was almost like a lightbulb moment," she said. "I had never thought of biology on those terms — being able to quantitatively model and study biological systems. I think that's really

cool!"

Diving into biological modeling is no easy feat, however. Until taking that biological modeling elective, Matthews hadn't taken a biology class since high school.

"It was doable, but it was a lot of extra work, too," she said. "I took several additional courses because I needed to learn the language."

In 2019, Matthews came to the University of Illinois, where she joined the Amy Marshall-Colón Lab and became part of the *Cis* team.

"I really wanted to study and develop models to understand how crops are going to change in the future climate scenario," she said. "Can we identify strategies to improve how they will behave in a rapidly changing climate?"

Her first goal when she started on the project was to create a soybean-specific version of BioCro, a crop growth model for simulating and optimizing photosynthesis. Now that she's created the base model, she's working to integrate it with some other more detailed models, such as a model of the photosynthesis pathway, which operates from the leaf level all the way down to the gene regulatory level. She hopes to expand the scope of the model so that it can model the development of entire fields of crops over time.

"The goal is to be able to identify gene modification strategies and metabolic modification strategies that may improve the plant's health, photosynthesis, or soybean production," she said.

[Read the full profile.](#)

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

# CABBI Research Profile: Sierra Raglin

Spunky, intelligent, and engaging are the three words that best describe CABBI's Sierra Raglin. A Ph.D. student, Raglin has a lot to say on agricultural sustainability.

She grew up along the Hudson River in Nyack, N.Y., where her fascination with aquatic systems began. She was a self-described “super-nerd” and enrolled in a unique program through her high school in which students conducted a three-year research project. She studied how nitrogen pollution impacts phytoplankton growth in biological oxygen demands at the Lamont-Doherty campus of Columbia University.

Raglin cites this opportunity as the reason she became a scientist: “I 150 percent wouldn't be a scientist if it wasn't for this class. Shout out to Ms. Foisy in Nyack High School. I wouldn't be here if it wasn't for her.”

Concerned for the health of the aquatic systems that she loves so much, Raglin decided that the best thing she could do for water ecosystems is work to keep nitrogen in the fields and out of waterways in the first place. Congruent with that goal, she is currently working



I have a degree in animal science (from Rutgers University), I wouldn't call myself an animal scientist by any means.”

The culmination of her reverence for microorganisms and agricultural studies is manifested in her work for CABBI. In Angela Kent's lab, under the Sustainability Theme, Raglin studies the ability of maize and sorghum to manipulate ammonia-oxidizing bacteria over time. She wants to know if bioenergy sorghum, compared to its wild varieties, has the weakest ability to inhibit nitrification — an important step in the nitrogen cycle — since it wasn't bred in an environment where that process is necessary.

[Read the full research profile.](#)

## More from CABBI

- CABBI has added two new partner institutions for Year 4: The University of Minnesota and Feedstock Production Co-Investigator Daniel Voytas, an expert in genetic engineering and plant genetics; and Lawrence Livermore National Lab and Sustainability Co-Investigator [Jennifer Pett-Ridge](#), an expert in ecology and soil microbes.

- Since fall 2020, CABBI has published 19 scholarly papers. [View the publications page.](#)

on her Ph.D. in Natural Resources and Environmental Sciences at Illinois, the heartland of agriculture.

“I would call myself a microbial ecologist,” she said, explaining her less-than-straightforward educational pathway. “Even though

## Paper: Model Can Predict Spread of Lyme Disease

University of Illinois Associate Professor of Entomology Brian Allan and former Illinois Postdoc Allison Gardner, now a Principal Investigator and faculty member at the University of Maine, have developed a model to predict the spread of black-legged ticks — and the resulting spread of Lyme disease — in the Midwest.

Allan is the Primary Investigator of iSEE's [Stormwater and Mosquito Control](#) team as well as an iSEE [Water Scholar](#) and [Global Climate Change Scholar](#). He and the team used data from historical studies of black-legged or deer ticks — along with an analysis of county-level landscape features associated with their spread — to build a model that

can predict where ticks are likely to appear in future years.

Researchers observed “a wavelike pattern of spread, where counties that get invaded with black-legged ticks tend to be adjacent to a county that has already been invaded,” Allan said. “And in some Midwestern states, we see that areas adjacent to major rivers are invaded in sequence. In Illinois, for example, the ticks first arrived along the Illinois River and then spread up and down the river quite quickly.”

The study was published in December 2020 in *Proceedings of the Royal Society B*.

[Read the full news release by the Illinois News Bureau.](#)

## Coming Soon ...

iSEE has convened a Sustainable Agriculture Council and will soon develop its fourth Illinois Scholars website: [sustainable-ag.illinois.edu](#). This site is expected to go live in 2021.

Featuring faculty-level experts, [sustainable-ag.illinois.edu](#) will join three other sites:

- [water.illinois.edu](#);
- [energy.illinois.edu](#); and
- [globalclimatechange.illinois.edu](#).

## What's new in education & outreach ...



# iSEE Launches Environmental Leadership Program in Spring

In February, the Institute announced the launch of its new Environmental Leadership Program. Targeted at undergraduate students, the Program will include pre-professional workshops, field trips, and networking opportunities.

In Spring 2021, iSEE is piloting two ELP workshops:

- one on March 24 focusing on environmental policy;
- the other on April 13 dealing with corporate sustainability.

Up to 25 undergraduates may register for each event, which are scheduled on campus non-instructional break days.

These workshops will allow students to develop their sustainability leadership and communication skills, to learn about relevant

career paths in sustainability, and to establish valuable networking connections. Successful professionals in the environmental policy and corporate sustainability fields will lead the sessions.

iSEE created the ELP as an undergrad leadership program was a key educational objective in the Illinois Climate Action Plan — which calls for increased sustainability education opportunities for University of Illinois Urbana-Champaign students. The program will supplement the Institute's curricular educational efforts; iSEE has partnered with academic units across campus to offer a sustainability minor, environmental writing instruction, individual classes, and course development opportunities.

[Visit the ELP webpage.](#)

## iSEE Congress Reimagined as Online Lectures

iSEE Congress, "The Future of Water," was rescheduled from Fall 2020 to Spring 2021 — and it has been redesigned due to the ongoing pandemic. Instead of a full-day event, iSEE, the Joint Area Centers (JACS), and the Illinois Global Institute will host a series of noon lectures. The current slate ([stay tuned for more scheduling updates on our website](#)):

- **Tuesday, April 6** — "The Weaponization of Water in the Middle East and Africa," Marcus King, Associate Professor of International Affairs, George Washington U.

- **Tuesday, April 20** — "The Past, Present, and Future of Water," Peter Gleick, Co-Founder, Pacific Institute

- **Friday, April 23** — "From Polio to Covid: Environmental Virology at its Best," Joan Rose, Nowlin Chair in Water Research, Michigan State U.

## What's new in campus sustainability ...

### Sustainable Resolution Guide for the New Year

In a welcome back to campus for Spring 2021,

the iSEE Campus Sustainability team compiled a guide for individual sustainable actions that students, faculty, and staff can take to begin the new semester.

[View and download the guide.](#)



## Greener Campus Program Suite Grows

iSEE's Campus Sustainability team continues to report progress in getting campus entities involved in its Certified Greener Campus Program. Some updates from the 2020-21 winter months:

- **Certified Green Chapter Program:** Launched in Fall 2020, the program has already seen two campus Greek chapters certified: Zeta Beta Tau and [Triangle Fraternity](#).

- **Certified Green Event Program:** iSEE relaunched this program in late 2020. Two upcoming Illinois Sustainable Technology Center events — the Sustainability Seminar Series and the Emerging Contaminants in the Environment Conference — were certified in December.

- **Certified Green Office Program:**

In late 2020, iSEE added a certification option — and a new guide — for offices in which many employees are working from home. Additionally, the International Student & Scholar Services office was certified gold in December 2020.

- **RSO, Lab programs coming:** iSEE intends to launch the Certified Green RSO Program and eventually to relaunch the Certified Green Lab Program.

- **Greener Campus Program Intro:** In January, iSEE hosted more than a dozen interested groups for an online introduction to our suite of programs. If you are interested in the programs but were unable to attend, you may [view the video here](#).