



# IQ - ISEE Quarterly

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

What's new in research ...

## Institute Seed-Funds 6 Research Projects

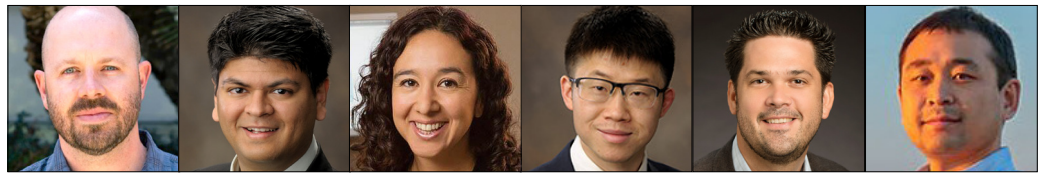
The Institute for Sustainability, Energy, and Environment (iSEE) is providing seed funding for six new research projects at the University of Illinois at Urbana-Champaign under its 2020 interdisciplinary research initiative.

The projects chosen to receive interdisciplinary research seed funding fall into one or several of iSEE's five thematic areas of interest: Climate Solutions, Energy Transitions, Sustainable Infrastructure, Water and Land Stewardship, and Secure and Sustainable Agriculture.

The work funded by iSEE will focus on collecting preliminary data that will ultimately help secure future funding from major external granting agencies in the federal, foundation, and private sectors.

"Actionable research that unites Illinois departments is a cornerstone of iSEE's original mission," Associate Director for Research Madhu Khanna said. "We are proud to offer critical resources to research teams on the cutting edge of new and innovative solutions."

From the U.S. Corn Belt to Southeast Asia, funded projects span a variety of geographic locales. They also encompass a diverse set of themes, including climate resilience, environmental justice, crop science,



KENNEDY

GARG

DOMINGUEZ

YAN

CHRISTENSEN

GUAN

architecture, transportation, and environmental engineering.

The projects selected for iSEE's 2020 seed-funding initiative will:

- Investigate the relationship between land use and renewable energy in Indonesia, Vietnam, and the Philippines, and the impact of "green growth" on the region's social and ecological climate — led by Assistant Professor of Urban + Regional Planning Sean Kennedy.

- Explore the viability for ash generated from waste incineration to be adapted as a component of sustainable construction materials — led by Assistant Professor of Civil and Environmental Engineering Nishant Garg.

- Combine sophisticated weather forecasting and innovative hydraulic modeling to increase flood tolerance in vulnerable Chicago communities — led by Associate Professor of Atmospheric Sciences Francina Dominguez.

- Optimize the role of wind power in

the national move toward renewable energy by enhancing feasibility and performance of offshore floating wind turbines (OFWT) — led by Assistant Professor of Civil and Environmental Engineering Jinhui Yan.

- Provide randomly selected metro travelers with subsidies for Uber ride-sharing to and from metro stations to assess outcomes of supplementing public transportation with low-cost, accessible mobility-on-demand technology — led by Assistant Professor of Agricultural and Consumer Economics (ACE) Peter Christensen.

- Collect precise, comprehensive data on nitrogen in U.S. Corn Belt agricultural systems to encourage stakeholders to adopt efficient nitrogen application practices and foster a sustainable food culture — led by Assistant Professor of Natural Resources and Environmental Sciences (NRES) and National Center of Supercomputing Applications (NCSA) Kaiyu Guan.

[Read more about these projects and the research teams.](#)

What's inside ...

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**Illinois Climate Action Plan Coming Soon!**

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## On the Web: U of I Global Climate Change Scholars

A new iSEE website, “Global Climate Change at Illinois,” pulls together work by faculty-level experts across campus to solve the challenges posed by climate change.

Illinois is home to a rich community of world-renowned scholars who are willing to work across disciplines to tackle those challenges. The new website features more than 120 experts who research, educate, engage, and develop programs in a range of fields — from physical and biological sciences to the impact on humans and nature, vulnerability and climate justice, and adaptability and mitigation strategies.

The Global Climate Change Scholars are faculty from the College of ACES, the Grainger College of Engineering, the College of Liberal Arts & Sciences, the Gies College of Business, the College of Law, and more — as well as faculty-level scientists from the Prairie Research Institute.

You can also read about related campus centers and initiatives, facilities and laboratories, as well as funding, research, and career opportunities.

Check it out at [globalclimatechange.illinois.edu](http://globalclimatechange.illinois.edu).



## In the Spotlight: All A-Buzz with Cameron Schwing

Commonly written off as mere nuisances, mosquitoes actually pose a significant threat to human health, as they are vectors for dangerous diseases such as Zika virus, West Nile virus, and malaria. According to National Geographic, mosquito-borne diseases are responsible for millions of deaths worldwide each year.

A creature that plays such a crucial role in disease ecology across the globe is a prime candidate for research. Cameron Schwing, a dual master's student in Biology and Education at the University of Illinois at Urbana-Champaign, studies mosquitoes and their ecological interactions with other species as a member of iSEE's [Stormwater and Mosquito Control project](#).

Schwing grew up in the small town of Fisher, Ill., not far from Urbana-Champaign. His interest in biology took off during his high school days.

“I had an amazing biology teacher,” Schwing said. “He was involved with research here at the University, so he would take students on little field excursions, like going out and collecting bees. We’d head out, and he’d teach us about the different plants and animals that were there.”

Schwing began his undergraduate journey at Parkland College, and later transferred to the

U of I as an Integrative Biology (IB) major.

With a budding interest in research, he joined the lab of Professor Carla Cáceres — disease ecology lab with a focus on stormwater habitats. At first, Schwing supported his lab mates’ projects through tasks like analyzing the variety and density of organisms present in pond water samples.

Schwing soon started devising an independent research project of his own. Upon graduation, he earned High Distinction for his research. The following semester, as he began his journey as a master's student, he set out to expand on his senior thesis by considering new factors and taking different approaches. Schwing provided an explanation of his project:

“It’s a competition experiment with mosquitoes and one of their common competitors, *simocephalus*. I set up treatments with different densities of mosquitoes and their competitors, and I am looking at how the mosquitoes’ microbiome changed in response. This is important because microbiomes are increasingly tied to the mosquitoes’ fitness during development. Then I ran another trial where I let them grow to adulthood and I measured their wing lengths, which are a very strong indicator of body size and a proxy for their fitness.”

[Read the full research profile.](#)

# CABBI Researcher Profile: Yingqi Cai

Growing up in a small town on the east coast of China, Yingqi Cai was fascinated with plants.

Her mom loved gardening, and their home was filled with greenery. Cai would sit and stare at the plants, waiting in vain to catch the exact moment they flowered.

"It was always the next morning, when I woke up, that I saw the flowers coming out, a new bud," she said.

Plants, she said, are "just so cool. They don't eat, they can't move, but they have found their own ways to survive."

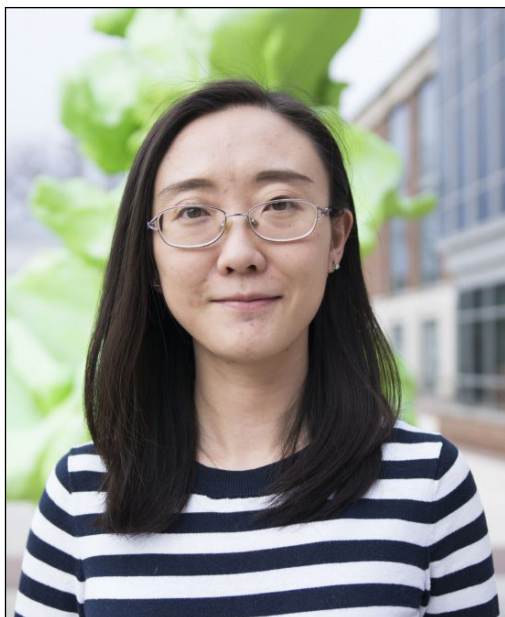
That fascination led Cai to study biology at Shandong Agricultural University in China, where she took an interest in plant metabolism and the vast array of organic compounds produced from photosynthesis. She decided to pursue graduate research at the University of North Texas, studying plant lipids, and earned her Ph.D. in biochemistry and molecular biology in December 2018.

Cai is now a Postdoctoral Researcher with CABBI's Feedstock Production Theme, working at Brookhaven National Laboratory in New York with John Shanklin, a Plant Biochemist and Brookhaven's Biology Department Chair.

The Shanklin team is focused on increasing lipid production in plant vegetative tissue to provide a sustainable alternative for the growing demand for fossil fuels: renewable biofuels made from perennial grasses.

Each plant is like a small factory converting sunlight and carbon dioxide into lipids. Those plant lipids — oily compounds like triacylglycerols (TAG) that plants use to store energy — have become an important target for renewable bioenergy feedstocks.

"Plant lipids are among the most energy-rich compounds found in nature. They can easily be converted into biodiesel," Cai said.



But lipids are mostly produced in seeds, which are used for food production and animal feed. So scientists turned to other parts of the plant that are typically considered waste products: leaves and stems, which constitute most of the biomass of the crop.

"If we can increase the production of lipids in leaves and stems, we can use these abundant vegetative tissues as a platform to produce biodiesel," Cai said.

Through her CABBI research on plant genetics, Cai has identified promising proteins that may be able to increase lipids in vegetative tissue without stunting plant growth.

"If we can combine those two factors, one making oil and one making a bigger plant, then we can have a normal size plant that has a lot of oil," she said.

[Read the full research profile.](#)

## CABBI Website Debuts New Research Data Pages

Nearly midway through its third year, the Center for Advanced Bioenergy and Bioproducts Innovation (CABBI) has [published nearly 90 papers in research journals](#), and researchers in the U.S. Department of Energy-funded Bioenergy Research Center have made [eight new](#)

[invention disclosures](#).

In April, CABBI took the next step toward supporting sustainable bioenergy and bioproduct production, making its published data sets more readily available on the web. [Check them out here.](#)

### New Publications

Since early winter, the Center for Advanced Bioenergy and Bioproducts Innovation (CABBI) has [published 13 new papers](#) in research journals. Highlights from the University of Illinois include:



- A team led by Sustainability Theme scientist Kaiyu Guan, Assistant Professor of Natural Resources and Environmental Sciences, has developed a new satellite-based algorithm to pinpoint crop water use. The team's paper was published in *Hydrology and Earth System Sciences*. [Read more.](#)

- A team led by Conversion Theme Leader Huimin Zhao, Professor of Chemical and Biomolecular Engineering, has created a triple-threat genetic toolkit to produce eco-friendly chemicals. That study was published in *Metabolic Engineering*. [Read more.](#)

- A team led by Sustainability Theme scientist Jeremy Guest, an Associate Professor of Civil & Environmental Engineering, has developed BioSTEAM, an open-source simulation software package in Python to analyze the economics of biofuels and bioproducts. The team's paper was published in the American Chemical Society's *ACS Sustainable Chemistry & Engineering*. [Read more.](#)

## What's new in education ...



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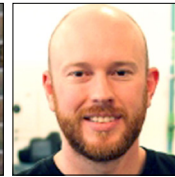
KENNEDY



KONTOU



SCHNEIDER



STILLWELL



VINCENZI



WILSON

## iSEE Names Levenick Teaching Sustainability Fellows

In February, iSEE named eight instructors 2020-21 Levenick iSEE Teaching Sustainability Fellows and will support them in their efforts to integrate sustainability into courses on everything from costume design to urban transportation.

Funded by a generous endowment from Illinois Alumnus Stuart L. Levenick and his wife Nancy J. Levenick, this second cohort of faculty and teachers will incorporate sustainability into existing classes or create entirely new courses built around sustainability elements.

The fellows are Alison Anders, Associate Professor of Geog-

raphy; Kim Curtis, Adjunct Lecturer in Theatre; Sean Kennedy, Assistant Professor of Urban + Regional Planning; Eleftheria Kontou, Assistant Professor of Civil and Environmental Engineering; Daniel Schneider, Professor of Urban + Regional Planning; Andrew Stillwell, Assistant Professor of Electrical and Computer Engineering; Chiara Vincenzi, Adjunct Instructor in Art and Design; and Andrew Wilson, Teaching Associate in Social Studies at University Laboratory High.

[Read more about each new member of the cohort on the Levenick iSEE Fellows webpage.](#)



## Associate Director's New Book Released

Congratulations to iSEE Associate Director for Education & Outreach Gillen D'Arcy Wood on the March publication of his new book, "Land of Wondrous Cold: The Race to Discover Antarctica and Unlock the Secrets of its Ice."



Wood, a Professor of English and Langan Professorial Scholar of Environmental Humanities, writes about the first explorations of Antarctica, interwoven with its geological history and framed by the current threat of climate change.

"The glaciation of Antarctica set the global thermostat for us and our evolution," Wood said. "It's crucial for the Earth we inhabit. We are, in an ecological sense, intimately tied to Antarctica."

## Q Magazine 2.2 Online

Volume 2, Issue 2 of *Q Magazine* — a collection of diverse, investigative pieces written by current students and recent grads of iSEE's undergraduate Certificate in Environmental Writing (CEW) program — was officially published online in February.

Readers can learn what our student researchers learned about the Gila River's struggle to survive in the American West, the toxic history of Washington State's Hanford Site, Chicago's Large Lots Program transforming vacant property into thriving symbols of community and environmental justice, the policy surrounding black carbon, bird species' struggle for survival on the Illinois prairie, and the ethical implications of gene editing technology. [Visit the magazine website.](#)

### Q Announces Writing Award

Donor Janelle Joseph, who has sponsored travel awards for students writing for *Q Magazine*, has also helped foster a new initiative with her continued generosity.

In April, iSEE announced the Janelle Joseph Award for Environmental Writing. Q editors will accept manuscripts in late summer and fall, and give cash awards for best article and winners in each of the following categories: op-ed, Q&A, memoir, and feature. The top stories will be published in Q. [Read more about the award.](#)

## What's new in outreach ...

### Earth Week Recap

Despite the cancellation of all in-person campus events during the COVID-19 pandemic, participation in iSEE's "virtual" Earth Week events was impressive:

- More than 265 people attended The "Zero Carbon" Keeling Lecture on Zoom on April 20. Katharine



Hayhoe, Professor of Political Science and Director of the Climate Center at Texas Tech University, presented "Climate Science in a Fact-Free World." [Read more and view the video of her presentation.](#)

- The Illinois Climate Action Plan (iCAP) Celebration and Forum on April 23 — in which the first draft of iCAP 2020 objectives was unveiled by student SWATeam and iCAP Working Group members — drew more than 70 participants. [Read more about iCAP 2020 on Page 6.](#)

## iSEE Congress 2020: 'THE FUTURE OF WATER'



Oct. 5-6, 2020

National Center for Supercomputing Applications (NCSA)  
University of Illinois at Urbana-Champaign

#iSEECongress2020

## Institute Partnering with JACS for 7th Annual Congress in October

The Institute's seventh annual congress will revisit global water crises, this time as a modified teach-in event.

iSEE is partnering with the Joint Area Centers (JACS) at the Illinois Global Institute for "The Future of Water." On Oct. 5-6, the U of I will host a diverse group of researchers, educators, journalists, and activists to dive deeper into the topic — and introduce the campus and community to cutting-edge thinking from influential scholars on topics ranging from drought, to the global politics of water, to pollution, public health, and biodiversity.

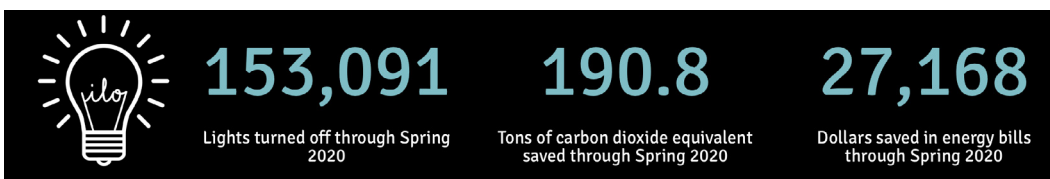
Pacific Institute Co-Founder Peter Gleick, George Washington University's Marcus King,

and New York Times environmental reporter Somini Sengupta will deliver keynotes.

The Congress 2020 organizing committee includes iSEE Associate Director for Education & Outreach Gillen D'Arcy Wood, Geology Professor and Illinois Water Scholars Chair Jim Best, Center for Global Studies (CGS) Director and Associate Professor at the International & Area Studies Library Steven Witt, Musicology Associate Professor Michael Silvers, CGS Associate Director Donna Tonini, iSEE Academic Program Instructor/Advisor Eric Green, iSEE Graduate Educational Research Intern Paul Gharzouzi, and student volunteers.

[Read more about the event and speakers.](#)

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



## Illini Lights Out Events Successful

Under the leadership of senior Taylor Holin, Illini Lights Out events — groups of students scouring campus buildings on Friday evenings to turn off all unused lights for the weekend — had unprecedented success in 2019-20.

Despite losing the final three ILO events of the spring after students left campus during the COVID-19 pandemic, the campaign achieved

significant results. The Jan. 31 and Feb. 21 events averaged 100 participants and totaled 6,463 bulbs turned off for the weekend. This saved the campus 11,150 kilowatt-hours of electricity (or 7.9 metric tons of CO<sub>2</sub> equivalent gases) — and \$1,762 on its power bill! Check out our totals over the first three years in the graphic above.

[Find out more on our webpage.](#)

### iSEE Green Office Program Updated

In February, iSEE published the latest version of its Certified Green Office Program, in which offices



and units can take some simple steps to reduce resource use and emissions, and earn certification.

[Read more about the Program.](#)

What's new in campus sustainability (continued) ...

## iSEE 'Alumni' Taking Leadership Roles at New Campuses



Cathy Liebowitz, who served as the Student Sustainability Committee Coordinator from 2017 to '19, has been named the Director of Sustainability at College of the Holy Cross in Worcester, Mass. Liebowitz is now establishing an Office of Sustainability at Holy Cross.

She's not the first former iSEE employee to take on a

leadership position at another campus. In 2019, former Sustainability Programs Coordinator Micah Kenfield was named Sustainability Director at Vassar College; in 2018, former Associate Director for Campus Sustainability Ben McCall was named Executive Director of the Hanley Sustainability Institute at the University of Dayton.



### iSEE Begins Composting Initiative

With funding from the Student Sustainability Committee (SSC), iSEE Sustainability Programs Coordinator Meredith Moore has initiated a composting project at the National Soybean Research Center, where the Institute is housed.

The hope is that this pilot project will be successful and eventually expand composting offerings across campus.

The SSC-funded compost receptacles for NSRC offices will be a collection point for compostable food scraps and paper products — and will contribute to a large outdoor tumbler.

[Read more about composting on the iSEE website.](#)

## iCAP 2020: Coming Soon!

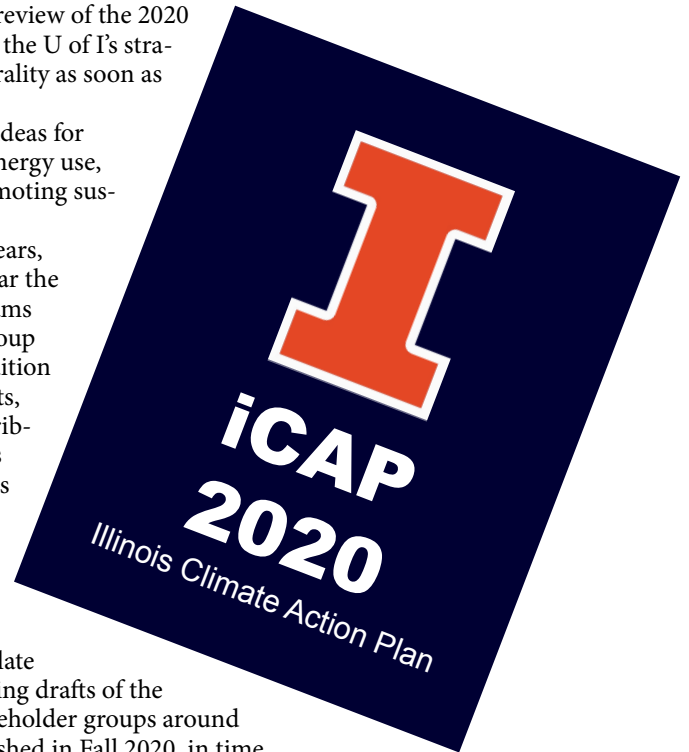
In April, iSEE released the first preview of the 2020 Illinois Climate Action Plan (iCAP), the U of I's strategic plan for achieving carbon neutrality as soon as possible, by 2050 at the latest.

iCAP 2020 already features new ideas for reducing waste, curbing water and energy use, lowering carbon emissions, and promoting sustainability on campus.

The iCAP is updated every five years, and during the 2019-20 academic year the Sustainability Working Advisory Teams (SWATeams) and iCAP Working Group have been drafting objectives. In addition to the dozens of faculty, staff, students, and community members who contributed their time, thoughts, and efforts to drafting these objectives, hundreds of students from across campus weighed in at monthly input sessions as well.

The Sustainability Council, chaired by Chancellor Robert J. Jones, will discuss the iCAP 2020 in late May, and iSEE will continue circulating drafts of the plan throughout the summer to stakeholder groups around campus. The final book will be published in Fall 2020, in time for the annual Campus Sustainability Celebration in October.

[Stay tuned for the latest on our iCAP webpage — which contains a survey for people to continue offering input.](#)



### In the Age of COVID, Some Positives are Possible ...

The global reach of the COVID-19 pandemic has had an enormous impact on society and our daily lives, affecting the way we work, shop, learn, and socialize.

As public places close and residents shelter at home, some cities have reportedly seen a significant drop in pollution emissions, with clear waters in the canals of Venice and blue skies over Wuhan, China.

What has been the impact on the U of I, where classes have moved online and many employees are working from home? In a Q&A for



the iSEE website, Baum Family Director Evan H. DeLucia explained how the shift will undoubtedly cause a dramatic decrease in campus energy consumption and travel-related emissions — but only temporarily. “We need to remain steadfast in our commitment to bring our campus to carbon neutrality once this health crisis passes,” he said.

[Read the full Q&A on the pandemic's impacts on campus — and get a link to DeLucia's Chicago radio interview on moving ahead more sustainably once the crisis is over.](#)