

What's new at the Institute ...

# iSEE Helps Bring in \$34.7M in Grants

In Fall 2021, the Institute for Sustainability, Energy, and Environment (iSEE) announced that it has successfully acquired or facilitated \$34.7 million in external grants from various agencies during the past several months. Some highlights:

- The U.S. Department of Agriculture (USDA) announced funding for a new project led by iSEE Interim Director Madhu Khanna to optimize design for “agrivoltaic” systems — fields with both crops and solar panels — that will maintain crop production, produce renewable energy, and increase farm profitability.



**KHANNA**

This \$10 million, four-year project, funded through the USDA’s National Institute of Food and Agriculture (NIFA) Sustainable Agriculture Systems program with the University of Illinois Urbana-Champaign as the lead institution, will study agrivoltaics in a variety of land types and climate scenarios in Illinois, Colorado, and Arizona. The goal is to maintain or increase crop yield, improve the combined energy and food productivity of the land, and diversify and increase farmers’ profits with row crops, forage, and specialty crops across a range of environments. [The project webpage >>>](#)

- iSEE has helped facilitate funding to enable geospatial data-driven scientific discovery at the University of Illinois Urbana-Champaign, and the resulting research will lead to better understanding of the risks and impacts of climate change and disasters.

The \$15 million Institute for Geospatial Understanding through an Integrative Discovery Environment (I-GUIDE) will receive the funding over five years as part of the National Science Foundation’s (NSF) Harnessing the Data Revolution, which establishes five institutes across the United States to explore questions at the frontiers of science and engineering.

Shaowen Wang, Professor and Head of Geography and Geographic Information Science and Founding Director of the CyberGIS Center for Advanced Digital and Spatial Studies, will lead the institute. Collaborating scientists and institutions will work with the CyberGIS Center in partnership with iSEE and the U of I’s Discovery Partners Institute. [The I-GUIDE website >>>](#)

- \$2.1M in additional five-year funding from the Leverhulme Centre for Climate

Change Mitigation for U of I researchers, led by Evan DeLucia (Emeritus Professor of Plant Biology), Carl Bernacchi (U.S. Department of Agriculture’s Agricultural Research Service), and new co-PI Lisa Ainsworth (USDA ARS) to extend the campus’s enhanced weathering experiments using basalt rock on farm fields.

- \$2M+ from NSF’s Smart & Connected Communities program for a team led by Crop Sciences Assistant Professor Andrew Margenot to build a “Nutrient Management Community (NuMC)” to help farmers adopt effective and trusted tools that will help address critical water quality issues.

- A \$1.7M USDA NIFA subaward for Margenot and Crop Sciences Professor Emily Heaton to help identify ways to diversify the corn belt ecosystem and increase rural prosperity.

- A \$1M, two-year grant from the U.S. Department of Energy’s (DOE) Advanced Research Projects Agency-Energy (ARPA-E) to bolster an iSEE 2020 seed-funded project to turn ash into energy. The Rapid AI-based Dissection of Ashes using Raman and XRF Spectroscopy (RADAR-X) Project is led by Civil & Environmental Engineering Assistant Professor Nishant Garg.

- Several other awards of \$1M or less.

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## Papers Published

iSEE research teams have published several papers during the past months. Some highlights:

- A study led by iSEE Associate Director for Research Jeremy Guest's team characterizes the spatial distribution of human urine-derived nutrients — nitrogen, phosphorus, and potassium — and agricultural fertilizer demand to define supply-demand location typologies, their prevalence across the globe and the implications for resource recovery as countries move closer to using human waste as sustainable fertilizer for agriculture. [The U of I News Bureau release.](#)

- A modeling framework, developed by Kaiyu Guan, a Blue Waters Associate Professor in Natural Resources & Environmental Sciences, and his SMARTFARM team, helps quantify carbon in agroecosystems. Combining computer models with observational data, including crop yields and photosynthesis readings from space, this framework provides the most comprehensive system to date for tracking carbon through an agroecosystem. That can help advance precision agriculture. [The iSEE news release.](#)

- Illinois Chemical and Biomolecular Engineering Assistant Professor Xiao Su led a team of researchers who demonstrated the first electrochemical redox desalination process used in the food industry, removing and recycling up to 99% of excess salt from dairy whey while also refining more than 98% of whey's valuable protein content. [The U of I News Bureau release.](#)

## In the Spotlight: Nictor Namoi

Nictor Namoi could have studied anywhere in the world but chose to travel from Kenya to the University of Illinois Urbana-Champaign to maximize the sustainability of bioenergy crops. Now a Ph.D. candidate, Namoi works with D.K. Lee on iSEE's Next-Generation Feedstocks and Emerging Bioeconomy project, designed to make sustainability accessible and equitable to farmers.

Namoi studies the ecological benefits of incorporating perennial grasses like switchgrass into agricultural fields, as well as the profitability of switchgrass versus traditional corn and soybeans. Eventually, he plans to research ag in developing countries, including Kenya, using his ecosystem services knowledge to make farming more sustainable.

"In Kenya, we're trying to find the best technologies for farmers to improve productivity," he said. "Since most Kenyan farmers are small-scale, we also have to find the cheapest options for them. So I want to find out the best way to enhance the sustainability of small-scale agriculture in terms of long-term productivity and ensure those technologies will be environmentally and economically sustainable for small farmers."

Next-generation feedstocks might have huge impacts on the regional agricultural system. "It is going to help us recommend to farmers management practices to best maximize the productivity of marginal lands and to best reduce the impact of agriculture on the environment," Namoi said.

iSEE's \$5 million interdisciplinary project also holds global significance: It is essential to bringing bioenergy crops into the mainstream agricultural system. Currently, bioenergy crops are not as profitable as typical commodities like corn and soybeans because the former



are simply not incentivized. What Lee's team aims to do is to identify the tangible ecosystem service benefits of energy crop production and then communicate that information to farmers.

"Bioenergy crops do not require as much management as your typical crops. So, farmers can spend way less time in terms of management, and that's a financial benefit. Still, bioenergy crops may require more investment, and it's difficult for farmers who are already struggling with profitability to make additional investments targeting the environment that do not show immediate financial benefits," Namoi said.

[Read the full profile.](#)

## Regenerative Ag Initiative Seed-Funds Three Projects

Three teams have been awarded up to \$50,000 in seed funding from the Illinois Regenerative Agriculture Initiative (IRAI) following its spring call for project proposals.

Sponsored by Fresh Taste, IRAI is a partnership between the Department of Crop Sciences, College of ACES, U of I Extension, and iSEE to bring stakeholders together to create agriculture and food systems resilient to climate change, improve soil and water quality, support healthy communities, and enhance food security. Teams of Illinois scholars and partners were asked to address three key

issues: soil health, on-farm biodiversity, or community health and resilience.

The funded projects:

- "U.S. Chestnut Cultivar Exploration — Integrated Bioprocessing and Quantity."
- "Prototyping an Autonomous Robotic Harvester for Enabling Large-Scale Chestnuts Farming in the U.S."
- "Regenerative Agriculture and the Human Health Nexus in the Age of Climate Change."

[Read more about the teams and the projects on the IRAI webpage.](#)

## iSEE Seeks Interdisciplinary, Campus as a Living Lab Research Proposals

iSEE has issued a call for proposals to support interdisciplinary research projects related to sustainability, energy, and environment, as well as for its Campus as a Living Lab (CALL) program for projects related to Illinois Climate Action Plan goals.

The iSEE seed funds are available to promote research collaborations among faculty and scientists across campus that will improve their potential for attracting external support. Research teams working in any of the five thematic areas of interest to iSEE

can use the funding to collect preliminary data or other information and to develop a strong proposal that can be submitted for external funding through the Institute in 2022-23.

A successful proposal will involve applicants from at least two different disciplines and two different departments and is limited to a maximum of \$30,000 for a year. The deadline is Nov. 9, 2021.

[Details on the interdisciplinary seed funding.](#)

[Details on the CALL seed funding.](#)

## Sustainable Ag Site Launched

Harnessing sunlight and atmospheric CO<sub>2</sub> into the food, feed, fuel, and products needed for a circular economy requires a fundamental understanding of agricultural systems and their complex and dynamic interactions with society and the environment.



iSEE's new "Sustainable Agriculture at Illinois" website — [sustainable-ag.illinois.edu](http://sustainable-ag.illinois.edu) — pulls together work by

scholars across the University of Illinois Urbana-Champaign campus focusing on critical topics related to physical, biological, and social sciences.

The website provides information about research, education, and engagement programs in four main categories (Production & Management; Supply Chains & Markets; Health & Food Safety; and Policy & Communities), as well as related campus centers and initiatives, facilities and laboratories, the Sustainable Agriculture Scholars and Council, and funding, research, educational, speaking, and career opportunities!



## CABBI Profile: Rachel Van Allen

Lab Manager Rachel Van Allen is a sustainability research jack-of-all-trades — a water specialist working in a soils lab, the go-to person for help in Wendy Yang's CABBI Sustainability group, and even a resident expert on quantum cascade lasers.

This Minnesota native is applying her diverse skills to support researchers probing the sustainability of bioenergy crops. Growing up in the Land of Ten Thousand Lakes, Van Allen was always drawn to environmental sciences. Her family road-tripped and car-camped to a variety of cherished destinations like Yellowstone and the Canadian Rockies, helping a young Rachel develop her keen relationship with ecology.

At the University of Illinois, however, Van Allen has shifted her focus to the terra firma: "In my educational background, I was always more interested in lakes, wetlands, and aquatic systems, so it's interesting to be here in a soils lab. Like most ecologists, I didn't sign up to be an analytical chemist, but that's a part of the research that I really enjoy now," she said.

Yang and Van Allen began working together before CABBI existed. She joined the Yang lab because of her interest in biogeochemistry, particularly the stable isotope methods used by researchers in the group.

## More from CABBI

- More than a dozen undergraduates nationwide participated in CABBI's Research Internship in Sustainable Bioenergy (RISE) program, a paid summer internship. [Read more and view a short video.](#)

- Since May, CABBI has published 42 scholarly papers, bringing its total in four-plus years to 196. [View the publications page.](#)

- The Center has also raised its total of publicly available published datasets by 18, to 75. [View the data page.](#)

Stable isotopes are a powerful tool for tracking the movement of carbon and nitrogen through the environment — from the shift in vegetation in a marsh due to sea-level rise, which she studied for her master's thesis, to soil nitrogen transformations in bioenergy cropping systems. Once CABBI launched in 2017, Van Allen was already on board.

[Read the full research profile.](#)



## Luis Rodríguez Named Associate Director

iSEE welcomed Luis F. Rodríguez as its new Associate Director for Education & Outreach in August.

Rodríguez, an Associate Professor of Agricultural & Biological Engineering, assumed a leadership role for iSEE's educational programs, including the Sustainability, Energy, and Environment Fellows Program (SEE FP, a campus-wide honors minor) and the new undergraduate Environmental Leadership Program (ELP; *see box*). Additionally, he will oversee the Levenick iSEE Teaching Fellows program, which funds faculty from across campus to build new courses in sustainability or to incorporate sustainability elements into existing courses. Among his outreach duties, Rodríguez will spearhead organization of the annual iSEE Congress each fall.

"We are delighted to bring Luis on board at iSEE," Interim Director Madhu Khanna said. "Luis brings rich experience in developing interdisciplinary educational opportunities for students at the graduate



RODRIGUEZ

### Spring 2022 ELP Applications Open

After piloting two successful workshops in Spring 2021, iSEE is launching its new Environmental Leadership Program (ELP) this fall. Designed to prepare Illinois undergraduates for leadership roles in the sustainability field, the ELP focuses on developing students' communications skills around environmental problems, mobilizing social resources, and implementing plans for sustainable change.

In the Spring 2022 program, participants will learn about the policy-building process at the local and state levels, develop real-world environmental policies linked to the current legislative session, engage with local and state government officials, and present policy proposals to legislative staff and decision-makers in Springfield and Urbana-Champaign.

Applications opened Oct. 4 and closed Oct. 31. Participation is free, including travel expenses for the trip to Springfield during spring break — thanks to a generous gift from the Baum Family Fund. iSEE has encouraged interested students from all backgrounds, class standings, and majors to apply.

[The ELP webpage.](#)

and undergraduate level and in engaging students in experiential learning. Under his leadership we anticipate keeping iSEE's education and outreach offerings trending upward and engaging an increasing number of students and faculty through campuswide educational offerings."

Rodríguez's predecessor, Gillen Wood, was awarded a 2021 Carnegie Fellowship. He will remain with iSEE as Director of the Certificate in Environmental Writing (CEW) and Editor of *Q Magazine* (*see article below*).

[Read the full news release.](#)

## Q Magazine 4.1 Features 'Suburban Warfare'

In October, iSEE published the latest issue of *Q Magazine*, the flagship student environmental writing publication at Illinois. In Volume 4, Issue 1, climate change comes to our backyards as writers from the U of I's Certificate in Environmental Writing and other undergraduate authors tackle environmental and social justice. Andy Sima argues that single-use plastic water bottles not only kill sea turtles, but damage human health, too. Nikki Palella investigates behind the scenes at Goodwill — and it's not so good. Jane Halloran sat down with Karma Trade's



Mona Fang to discuss the clothes-swapping business she started in high school to make style more sustainable.

Back in suburbia, Miranda Johnson describes how the emerald ash borer is driving precious trees to the brink of extinction.

### Five Students Earn Writing Awards

Tyler Swanson's exploration of the Bitcoin gold rush — and its impact on the fossil fuel industry — is the grand prize winner of the second annual Janelle Joseph Prize for Environmental Writing, iSEE announced in October. In all, five undergraduates were honored in the contest, created through the generosity of iSEE supporter Janelle Joseph.

Swanson, a junior, will receive \$1,000, and the four category winners — Kayla Vittore, Erinn Dady, Michelle Verlinsky, and Julia Marsaglia — earned \$500 each. All will have their work published in *Q Magazine*!

[The full news release.](#)

White-tailed deer are invading the same backyards, and Olivia Grubisich explains how culling, as barbaric as it seems, might be the only solution to a sustainable coexistence. Nicolas Ramkumar explores the environmental costs of pristine green grass, and the possibilities for suburban sanctuaries that are both beautiful and sustainable.

[Check out the full issue at the Q website.](#)

## Fall Congress 'Circular Food Systems' Ongoing

Because of the continued uncertainty surrounding the COVID-19 pandemic, iSEE transformed iSEE Congress Fall 2021, "Circular Food Systems," into an online format. Congress became a series of one-hour Zoom webinars in October and November.

The eighth iSEE Congress returns to the topic of feeding the world: providing a safe, secure supply of food and fuel to an ever-increasing human population using agricultural practices that are ecologically sustainable and adaptable to climate change. Speakers were invited to offer cutting-edge thinking about advancing the sustainability of our agricultural and food systems. The sessions:

- Oct. 19: "21st Century Technologies for Sustainable Agriculture," featuring Ken Cassman, the Robert B. Daugherty Emeritus Professor of Agronomy at the University of Nebraska; and Girish Chowdhary, Associate Professor of Agricultural and Biological Engineering and Computer Science at Illinois.

- Oct. 27: "Transforming Food Systems for a Circular Economy," co-sponsored and co-hosted by the Council on Food, Agricultural and Resource Economics (C-FARE) and endorsed by the Agricultural and Applied Economics Association (AAEA) and the American Society of Agricultural and Biological Engineers (ASA-

BE). Speakers included Bruno Basso, MSU Foundation Professor of Crop Modeling and Land Use Sustainability, Michigan State University; James Jones, Distinguished Professor Emeritus of Agricultural Systems Modeling, University of Florida; Charles

Rice, Distinguished Professor of Soil Microbiology, Kansas State University; and David Zilberman, Robinson Chair and Professor of Agricultural and Resource Economics, University of California at Berkeley.

- Nov. 3: "How Can We Reduce Waste from Agricultural and Food Systems?" featuring Brian Roe, Van Buren Professor of Agricultural, Environmental, and Development Economics, Ohio State University; and Tom Theis, Professor of Civil, Materials & Environmental Engineering and Director of the Institute for Environmental Science and Policy, University of Illinois Chicago.

- Nov. 9: "Turning Agricultural Waste into Usable Products," featuring Thomas Trabold, Research Professor at the Golisano Institute for Sustainability, Rochester Institute of Technology; and Yuanhui Zhang, Founder Professor of Agricultural and Biological Engineering at Illinois.

[More details on the Congress webpage.](#)



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

### Celebration, Waste Challenge Highlight October

iSEE planned a series of events throughout October to celebrate Campus Sustainability Month.

The main attraction was Campus Sustainability Celebration on Oct. 20, at which iSEE's new Sustainability Training Video debuted (*see more details, page 6*). More than 50 people attended the event at the National Center for Supercomputing Applications, and more watched the livestream.

The campus community was also invited to take part in iSEE's month-long Waste Reduction Challenge by cutting the amount of waste sent to the landfill. Participants received a weekly grid with a point system to help track waste and any positive actions to reduce it. [More details on the Challenge webpage.](#)

Additionally, iSEE took part in Green Quad Day and hosted Illini Lights Out (*see more details, page 6*) and "TED Talk: Eco-Edition" (*see box at left*). And student groups hosted dozens of other events. [More info on iSEE's annual events webpage.](#)



### New Take on 'TED'

Led by Sustainability Programs Manager Meredith Moore, iSEE has been drawing dozens of campus and community members to participate in monthly 'TED Talk: Eco-Editions.'

One evening a month on Zoom, these iSEE Certified Green Events take on a different sustainability issue — from discussions of climate justice to waste reduction to plenty more.

A pre-recorded TED Talk is shown, then a student, staff, or faculty member leads participants through a discussion and roundtable as our community explores how a topic can apply to campus, work, or everyday life.

[Find the next one on the Sustainability Calendar.](#)



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

# Our Bid for 'Herd Sustainability'

In October, iSEE was proud to present a set of new Sustainability Training Videos designed to help students, faculty, and staff incorporate sustainability into their everyday lives and support Illinois Climate Action Plan goals in all their actions.

Interim Director Madhu Khanna sent out a campus massmail on Oct. 20 — Campus Sustainability Day— asking all members of the campus community to join us in becoming more sustainable and maintaining the University of Illinois reputation as a worldwide leader in commitments to carbon neutrality and climate resilience.

The videos highlight the extensive progress campus has made as well as specific steps each individual can take to be more sustainable, from recycling to biking to water conservation.

The Institute tailored videos to individuals' role on campus as students, faculty/re-

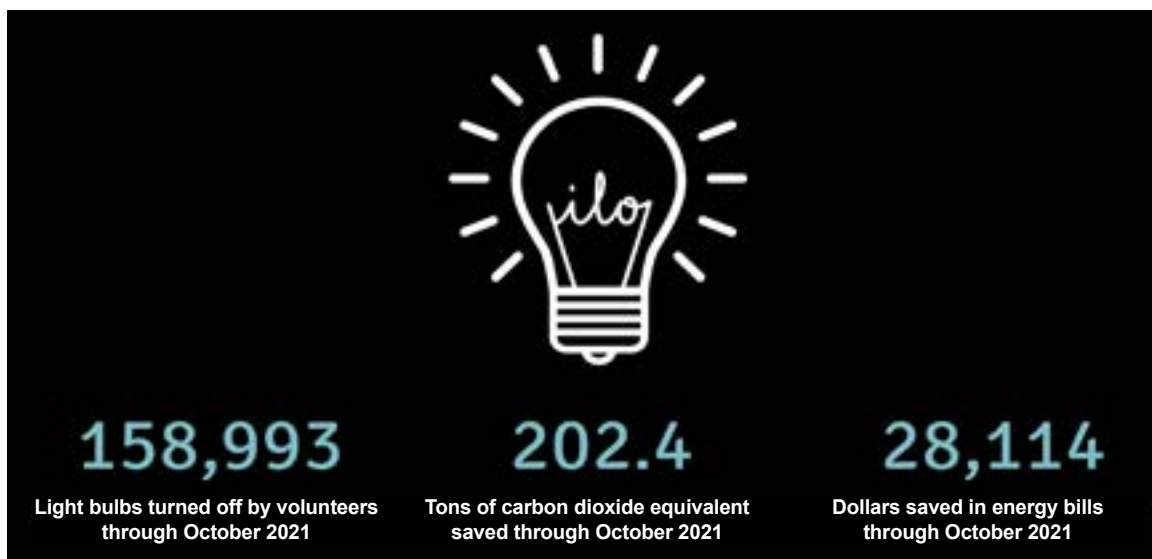


searchers, or staff/administration/community members. All are asked to take a brief survey to let iSEE know what campus is doing right and what should be prioritized. Additional helpful links are included below

each video as well.

As our narrator says, "Let's show the world what it means to be sustainable Illini!"

[View the videos on our webpage.](#)



## Illini Lights Out Makes Triumphant Return

After more than a yearlong hiatus during the COVID-19 pandemic, [Illini Lights Out \(ILO\)](#) is back and better than ever.

The popular monthly event, which started in 2016, has averted the equivalent of more than 200 metric tons of carbon dioxide and saved campus more than \$28,000.

iSEE Intern Jenna Schaefer scheduled four events for the Fall 2021 semester, and thus far the results speak for themselves.

At the official ILO relaunch in September, 86 Illi-

nois students turned off 2,636 light bulbs in a dozen campus buildings for the weekend, saving 4,547.1 kilowatt hours of energy, 3.2 metric tons of carbon dioxide equivalent, and \$382.41 in energy bills.

And on Oct. 22, more than 185 students turned off 3,266 bulbs in 23 campus buildings, saving more than 5,600 kWh, 4 metric tons of greenhouse gases, and nearly \$475 for the weekend.

iSEE has ILOs planned for Nov. 12 and Dec. 3 — and Spring 2022 dates are in the works.

[View a feature story and short video on ILO.](#)



### More Green Events, Chapters, Offices

Over the summer and fall, iSEE has certified ...

- Two new [green offices](#): The Oak Street Library Facility Conservation Unit; and iSEE.
- One new [green chapter](#): Zeta Psi
- 17 [green events](#), including Illini Lights Out.