April 2016

ILLINOIS

iQ: iSEE Quarterly

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

What's new at the Institute ...

First Levenick Fellows to Study Energy Reduction Strategies on Campus


MYERS


DE SOUZA


LEVENICK

A new research endeavor to identify energy reduction strategies at the University of Illinois at Urbana-Champaign is underway as part of the Levenick iSEE Fellows Program.

On March 1, iSEE appointed its first two Levenick Fellows: Research Fellow Erica Myers, Assistant Professor of Agricultural and Consumer Economics (ACE); and Scholar Mateus Nogueira Meirelles de Souza, Ph.D. Candidate in ACE.

During their time in residence with iSEE, they will examine how individuals on the Urbana-Champaign campus make decisions relating to energy use and test a variety of behavioral intervention strategies to reduce that consumption.

The Levenick iSEE Fellows Program is supported by a $500,000 gift from Illinois alumnus Stuart L. Levenick and his wife Nancy J. Levenick, both of Peoria. It contributes to iSEE's mission of actionable research — that is, work that leads to lasting, real-world solutions to the world's current and future sustainability-, energy- and environment-related issues.

The Levenick Program will support the Institute through resident Research Fellows, Teaching Fellows, and Scholars. Illinois faculty Fellows and student Scholars will research — and teach about — specific problems of campus and global sustainability. By its very nature, Fellows' work will also support iSEE's goals in the areas of campus sustainability, education, and outreach, as they seek solutions for campus issues, teach students and colleagues, and communicate about the need for sustainable practices.

The new project will be completed in two phases:

- During spring 2016, Myers and de Souza are working with engineers and building managers on campus to identify behavioral energy savings opportunities related to office and classroom heating and cooling, electronics and lighting.
- In summer and fall 2016, they will design and test the relative effectiveness of behavioral interventions such as educational campaigns, usage information provision, and social comparisons for taking advantage of savings opportunities and reducing energy consumption.

Myers and de Souza plan to share their findings in meetings with University stakeholders, in presentations at academic conferences, and through a publicly published University of Illinois white paper in early 2017.

"Our results will not only be relevant for the U of I in meeting its campus sustainability goals, but for other campus and commercial settings where energy use is not well understood or salient for consumers," Myers said.

Read more about the Levenick iSEE Fellows Program and the new project on the iSEE website.

Read the 2015 news release about the Levenicks' gift.

What's inside ...

What's new in research ...

In the Spotlight: Allison Gardner

Allison Gardner is a Ph.D. Candidate in Entomology researching the effects of habitat quality on the reproduction of mosquitoes. In particular, she studies how different species of leaves caught in a storm drain — a favorite breeding place for mosquitoes — can help or hurt efforts to control the population of the disease-carrying insects.

A single leaf can mean life or death for newly-hatched mosquito larvae, she said. Leaf litter found in stagnant pools of water where mosquitoes lay eggs is decomposed by a small army of microorganisms, and different types of microorganisms prefer to feed on different kinds of leaves. When the mosquito larvae hatch, they feed on the microorganisms to grow.

"It turns out that the microbes that grow off (particular types of leaves) are different, and not all of them seem to be equally good resources for the mosquitoes," Gardner said. "You've got some leaf species that are really good for the mosquitoes — they'll grow quickly and emerge at very high densities. And then you have other leaves that seem to actually even kill mosquitoes for one reason or another."

It is these killing leaves that are most interesting to her and her team. Quite by accident during a previous research project, she discovered that the leaves of the Illinois-native blackberry plant are very attractive to mosquitoes as a place to lay

eggs, but are lethal to the larvae. Now, as part of the iSEE-funded mosquito control research team, she's working on ways to harness the "attract and kill" properties of blackberry leaves and a few other species.

"We're going for an approach to mosquito control that could either supplement or actually even displace the need for insecticides in these sorts of systems with this native plant," she said. "This attract and kill strategy is often used for agricultural pests and forest pests, but to our knowledge it hasn't really been explored for vector control — especially larval mosquito control. We think it could be a way we could try to improve the efficacy of existing mosquito control strategies."

Her research year is cut neatly into two halves: summers in the field and winters indoors analyzing her data. From June to September, she works with undergraduate students to add different mixtures of leaves to storm drain mosquito nurseries and measure their effects on mosquito egg laying behavior and the numbers of surviving larvae. During the winter months, she teaches applied statistics classes and focuses on writing up the results of her summer observations.

Gardner conducted her first study on mosquitoes when she was 14 years old. A unique three-year program at her New York high school paired students interested in science with opportunities to work in a laboratory environment.

After high school she attended Williams College in Massachusetts and completed a History degree. Gardner then joined Illinois professor Marilyn O'Hara Ruiz's lab to study the transmission of West Nile virus by the *Culex pipiens* mosquito in the Chicago area and earned a Masters in Pathobiology.

Read the full profile on Gardner on the iSEE website.

More about the Stormwater and Mosquito Control Project can also be found on the website.

What's new at the Institute (continued) ...

Institute Makes 2 Hires to Further Mission

In Spring 2016, iSEE added two full-time positions to its office. We're pleased to introduce:

HARRIS

WEBB

Olivia Harris, Communications Specialist. Olivia H. graduated from the University of Illinois in May 2015 with a Bachelor's Degree in Agricultural and Environmental Communications with a focus area of Journalism. She first started working for iSEE in May 2014 as an undergraduate intern and loves uncovering the inspiring stories of students, faculty, and staff who are dedicated to making Illinois an environmental leader. In her new role with iSEE, she is eager to support the wide variety of iSEE programs and to find creative ways to spread the word and grow campus' sustainability movement.

Olivia Webb, Sustainability Programs Coordinator. Olivia W. earned her Bachelor's Degree in Bioengineering from Illinois in May 2015. As an undergraduate, she served three years on the Student Sustainability Committee (SSC) as the Vice Chair of the organization, and Chair of its Food and Waste working group. After graduating, she worked with John Marlin of the Illinois Sustainable Technology Center (ISTC, a Division of the Prairie Research Institute) on native plantings projects in Urbana and was a Seasonal Naturalist with the Champaign County Forest Preserve District. Now, she's eager to meet students who are passionate about sustainability and help them realize their goals.

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

iSEE-backed Project Earns 3-Year Grant from CERL


OUYANG


GARDONI


MURPHY

In April, the U.S. Army Construction Engineering Research Laboratory (CERL) awarded Principal Investigator Yanfeng Ouyang and co-PIs Paolo Gardoni and Colleen Murphy an additional three years and $499,964 to continue their research into the resiliency of communities during times of manmade or natural extreme events.

In addition, the Extreme Events & Resilient Communities Project team will receive direct funding for four graduate students to assist in the project.

iSEE, which helped form the team and gain the $220,000 initial CERL grant in 2015, also assisted in applying for this extended federal grant.

The project seeks to model the impacts of natural events such as earthquakes, tsunamis, and hurricanes — as well as human actions such as terrorist attacks or interventions — on communities and ecosystems.

Ouyang, Gardoni, and Murphy are using a "capability approach" that will explain what residents can do — or be — after such a stressor occurs.

Read more about the Extreme Events & Resilient Communities Project on the iSEE webpage.

Update: Agroforestry for Food Project

In March, Principal Investigator Sarah Taylor Lovell updated the iSEE Steering Committee on the progress of one of the Institute's 2014 seed-funded projects: Agroforestry for Food.

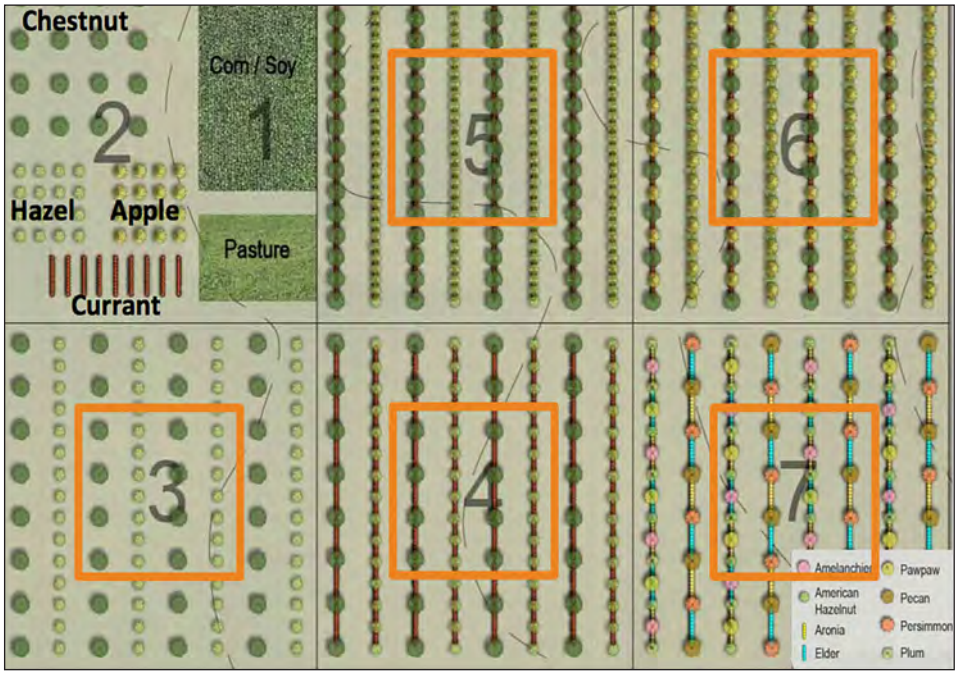
Originally titled the Multifunctional Woody Polyculture Project, it will soon mark one year after team members planted roughly 12,000 trees and shrubs on about 30 acres of test plots.

The plots include seven treatments (and several subtreatments; see figure at right) as the team uses this long-term field study to look for alternatives to traditional Midwest row crops that will produce the most food.

The team completed planting of most shrubs and trees in Spring 2015, and spent last summer weeding, fencing, and mowing. A plant census was conducted in the winter, and more maintenance of the plots is planned for this spring and summer.

In the fall, the team will plant hazelnuts, and in Spring 2017 the team will graft chestnuts and apples into the rootstock planted last year

Lovell expects the site to begin producing hay this year, and currants in 2017. Longer term, of course, as the trees mature, will come fruit and nuts — including hazelnuts in Year 6 or 7, and chestnuts in Year 11 or 12.



The team hypothesizes that a woody polyculture-based form of agriculture will help:

- decrease nitrogen leaching;
- make for more efficient evapotranspiration and water use; and
- decrease greenhouse gas emissions.

To read more about the Agroforestry for Food Project, visit the iSEE website. Also, keep up to date with the project on the team's Facebook and Twitter accounts.

What's new in campus sustainability ...

Chancellor Signs Resilience Commitment

The University of Illinois at Urbana-Champaign took on a leadership role to more actively respond to global climate change when Interim Chancellor Barbara Wilson signed Second Nature's Climate Resilience Commitment in February.

Illinois is a Charter Signatory of the Second Nature Climate Commitment, which combines a Carbon Commitment the campus signed in 2008 with the newly signed Resilience Commitment. The full Climate Commitment formally acknowledges that the effects of climate change are already felt — and that universities and colleges must pursue both mitigation and adaptation to combat the unfolding crisis. By adding the Resilience Commitment, Illinois has made a pledge to evaluate campus vulnerabilities to a changing climate in its landscapes, natural resources, and energy production — and to make an action plan that addresses those weaknesses.

iSEE Director Evan DeLucia said that carrying out the terms of the commitment, which Wilson signed Feb. 9, will create a more holistic picture of sustainability on campus.

"I think this commitment will make us think about sustainability in a broader way," he said. "Rather than only asking, 'How much renewable energy do we use?' we'll also be asking, 'Do we have a diverse enough pool of energy resources so that if one fails, the entire system doesn't fail?'

"It will be less about being 'green' and more about being truly sustainable."

Read the full story on the iSEE website.

Styrecycle Program Off, Running

Styrecycle, a new iSEE-supported and student-pioneered program at Illinois, will cut down on the amount of expanded polystyrene (more commonly know by the brand name Styrofoam), headed to landfills at the campus' expense. Styrofoam is notoriously hard to get recycled — not because it is difficult to process into new products, but because it isn't economical for recyclers to transport large volumes of a material designed to weigh little more than air. The solution, then, is to get more of the raw commodity into the truck to make the trip more profitable.

In 2015, iSEE was given a grant by the Student Sustainability Committee to buy a Styrofoam densifier, a machine that grinds the polystyrene collected from campus into small beads and extrudes it in a very dense tube that looks somewhat like toothpaste. Local recycler Community Resources Inc. (CRI) in Urbana houses and operates the University-owned densifier for free, in exchange for the proceeds from the sale of the densified Styrofoam. CRI owner Matthew Snyder doesn't expect to make a profit, but says he's dedicated to doing the right thing for the community.

"We're really trying everything that we can to reduce our campus' impact on the environment," iSEE Associate Director Ben McCall said, "and this may be a small step, but it's a step that we can take at relatively little cost right now."

Read the full story on the iSEE website.

Campus Earns Arbor Day Designation

Congratulations to the University of Illinois at Urbana-Champaign, which in early April was awarded designation as an official Tree Campus USA by the Arbor Day Foundation for its commitment to effective urban forestry. To care for its more than 20,000 trees, campus maintains a tree advisory committee and a campus tree-care plan.

Tree Campus USA is a national program created in 2008 by the Arbor Day Foundation to acknowledge colleges and universities for successful campus forest management initiatives and for engaging staff and students in conservation goals. Currently, only 10 percent of four-year, degree-granting campuses nationally have achieved this prestigious certification.

View the full release on the Facilities & Services website.

What's new in education ...

SEE Fellows Program Admits New Cohort

In Fall 2016, 29 Illinois undergraduate students will participate in iSEE's new minor — the Sustainability, Energy, and Environment Fellows Program (SEE FP) — after 18 more students were enrolled this spring. They join the 11 who enrolled in Fall 2015.

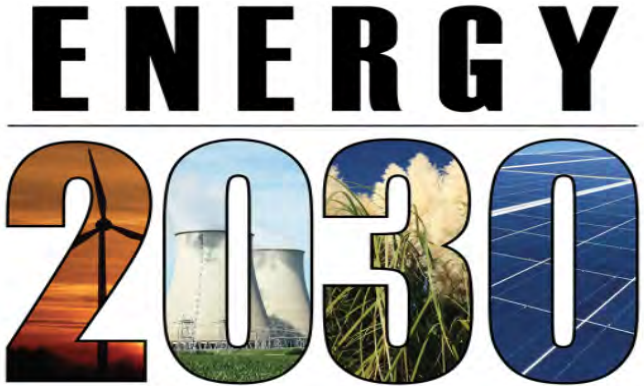
The SEE FP is offered in partnership with six academic units — the Department of Agricultural and Consumer Economics (ACE), the Department of Civil and Environmental Engineering (CEE), the School of Integrative Biology (SIB), the Department of Natural Resources and Environmental Sciences (NRES), the School of Earth, Society and Environment (SESE), and the Department of Urban and Regional Planning (DURP) — which are also contributing teaching faculty.

More details about the SEE FP, including academic requirements, prerequisites, etc., may be found on the iSEE website.

The SEE FP will offer a capstone experience to students wishing to complete their minor. Stay tuned for information on that as it develops.

To see information on courses offered by iSEE and others in sustainability, energy, and environment, visit the iSEE webpage.

What's new in outreach ...



Congress 2016 Speakers, Agenda Nearly Complete

Former U.S. Department of Energy Undersecretary for Science Steve Koonin and author Jonathan Mingle are among the keynote speakers who will visit Illinois on Sept. 12-14, 2016, for its third annual iSEE Congress, "Energy 2030: Paths to a Sustainable Future."

The conference, which will be in the Alice Campbell Alumni Center, will feature more than two dozen local, national, and international speakers with expertise in energy. It will focus on the potential for improvements in energy efficiency, alternative forms of renewable energy, and other forms of low-carbon sources of energy to meet societal needs for electricity, transportation, and heating more sustainably in the future.

In this year's event, iSEE will provide a forum to not only discuss the near- and medium-term challenges on the path toward sustainable energy consumption, but also to highlight an agenda for actionable research and policy directions that could contribute to long-term solutions.

View the Congress webpage and a tentative agenda (registration link coming soon!).

Registration Deadline May 4 for Plants *in silico* Symposium & Workshop

Registration will close May 4 for the the Plants *in silico* Symposium & Workshop, which will bring together leaders in the fields of computation, mathematics, plant sciences, data visualization, and molecular-, cellular-, organ-, and ecosystem-level modeling.

The event will be May 18-20 at the National Center for Supercomputing Applications, 1205 W. Clark St., Urbana. Its purposes:

- to learn from similar modular multiscale modeling platforms that P*si* can emulate;
- to exchange information on the latest developments in plant modeling from molecular to system levels; and
- to map a course to achieve plants *in silico* by creating a community framework model that takes full advantage of the latest developments in computer software and communications engineering.

The event, which will feature plenary sessions and workshops with experts from multiple disciplines, will kick off with a public lecture at 5 p.m. Wednesday, May 18, in the NCSA Lecture Hall by Daniel Beard, Professor of Molecular and Integrative Physiology at the University of Michigan and the developer of the Virtual Physiological Rat, a modular multiscale modeling platform representing molecular-to-whole-organ function.

On Friday afternoon, participants will work toward a white paper on how to achieve plants *in silico*.

Visit the Symposium page for info on registration, speakers, and accommodations.

Read more about the Plants *in silico* Project here.

LEFT: Tomatoes from the Sustainable Student Farm are prepped for processing into tomato sauce for use in campus dining halls. Thanks to SSC funding this year, campus will be able to process wheat grown on campus farms into flour.

Photo from Brian Jacobson

BELOW: A machine clears some of the understory of invasive species at the U of I Arboretum, a project funded in part by the Student Sustainability Committee. This year, SSC is funding more native plantings on the site.

Photo from John Marlin

From Flour to Solar to Biodiesel and More, SSC Funds a Multitude of Campus Projects

The Student Sustainability Committee (SSC) has finalized its awardees for its Fall 2015 Funding Cycle, and it is pleased to announce a number of exciting new green initiatives coming soon to campus. Funded project budgets ranged from a few hundred dollars to more than $250,000 — but SSC believes each one is guaranteed to make a significant impact on campus.

A few highlights:

• A few years ago, SSC helped fund campus' tomato processing plant. The result? While it lasts, the tomato sauce used daily in the dining halls comes from plants grown on campus at the Sustainable Student Farm. This funding cycle, SSC has expanded Sustainable Agriculture Food Systems on campus by supporting the purchase of flour milling equipment. Once completed, wheat grown on campus can be processed into flour and used for everything from cookies to pizza crusts.

• In a completely different vein, SSC also funded a proposal to add solar-powered lighting to Campus Parking Lot E37 southwest of the State Farm Center. While improving the safety of the parking lot through sustainable lighting is noteworthy, this project goes even further. The University of Illinois will be the first college or university in the state to use this type of technology for parking lot lighting — one more way we're breaking new ground.

• Finally, SSC is proud to support the student efforts of the Illini Solar Car team. The allocation this semester was enough to bridge the gap between in-kind donations and the resources needed to complete the first full-size prototype solar car on campus.

Other funded projects include a partnership between the Sustainable Student Farm and Fresh Press; expanded native plantings at the U of I Arboretum; and support for the Illinois Biodiesel Initiative.

For more information about everything that was funded this semester, please visit the SSC website.