SEGUE: Focusing on green roof research at SIUE

Madelaine Deardeuff

Thursday, May 16, 2019



Over the last several years, three members of Southern Illinois University Edwardsville's diverse faculty have been working together to conduct cutting-edge research on developing and maintaining green infrastructure.

On this week's episode of Segue, CAS Dean Greg Budzban, Ph.D., interviews Bill Retzlaff, Ph.D., Susan Morgan, Ph.D., and Serdar Celik, Ph.D. The trio has been working together conducting research on green roof

systems.

This episode of Segue will air at 9 a.m. Sunday, May 19, on WSIE 88.7 FM The Sound and siue.edu/wsie.

A distinguished research professor of biological sciences and CAS associate dean, Retzlaff had previously conducted regional and national-scale air quality monitoring and evaluated how air quality might affect forest

ecosystems. His work naturally led to research on water quality, and he began collaborating with Morgan, a professor of civil engineering and associate dean of the SIUE Graduate School. Though her previous research was in waste management, her work shifted to the topic of storm water management.

Combining Retzlaff's expertise of plants and Morgan's knowledge of environmental engineering and storm water, the two extensively researched green roofs, which are living systems that are placed on building rooftops to provide many environmental benefits. The duo ultimately created the Green Roof Environmental Evaluation Network (G.R.E.E.N.) in 2004.

Celik, an associate professor in the Department of Mechanical and Industrial Engineering and 2018 Paul Simon Outstanding Teacher-Scholar Award recipient, joined SIUE in 2007. One year later, he joined Retzlaff and Morgan at G.R.E.E.N. to use his knowledge of thermal and fluid sciences, and energy to focus on the energy-saving aspects of green roofs.

"Serdar is being modest," Retzlaff says. "He has the wind tunnel in his lab, and one of the first projects we worked on together was to look at the effect of high-speed wind uplift on green roofs.

"That work went into the national building code, and had we not conducted that research within his lab with the wind tunnel, we could not have made that impact."

"In what ways does wind impact living architecture?" Budzban asks.

"States like Florida experience high winds in hurricanes, and there are building standards that have to meet or exceed regulations to withstand wind gusts," Retzlaff says. "By putting a living, green roof inside of a wind tunnel, we were able to use 200 miles-per-hour windspeeds to see how high winds would affect a green roof system."

"We tested those samples at different orientations, including the different angles a roof might receive various wind gusts," Celik says. "It was great to see everything come together."

"We found that there are ways to make it work," Morgan mentions.

The interdisciplinary work of G.R.E.E.N. combines the disciplines of environmental science, biology, engineering and other fields. Since these roofs are living structures, there are many factors that contribute to the success of green roofs. There are also a number of ways that green roofs can be used to offset energy costs and provide other environmental benefits.

Through his own research, Celik has come to understand various insulation techniques. When green roof systems are used as a method of insulation, the engineer has been surprised by its efficacy as an insulator. He was also shocked to discover that in instances of high winds, plants in a green roof system experience water loss (through the process of transpiration) at a reduced rate.

"This went against everything I had learned through heat transfer and fluid mechanics," Celik says. "Bill explained that these plants, when they're under windy conditions, close their pores or stoma, which allows them to retain moisture."

In September 2018, SIUE was designated as a Living Architecture Regional Center of Excellence by Green Roofs for Healthy Cities and its charitable arm, the Green Infrastructure Foundation. SIUE is only one of four higher education institutions in the nation to receive the honorable designation.

G.R.E.E.N. will also be engaging the community through numerous professional development opportunities throughout the region, including an upcoming professional development symposium on Sept. 23 and a training session for those hoping to become Green Roof Professionals on Sept. 24.

"If I'm a working contractor or architect, what would I gain from these events?" Budzban asks.

"The symposium is themed around the idea of maintenance," Morgan says. "We are going to have speakers sharing information about maintaining green roof systems, since you can't just install the system and forget it. We are also going to have speakers discuss policies that encourage living architecture."

Student researchers from SIUE and other institutions will also have the opportunity present their green roof research findings during a poster session.

"This seminar will be helpful for architects and other professionals, since they will learn the proper and incorrect ways to maintain these systems," Celik says.

"Though we started by studying green roofs, we are also researching living walls, growing food on green roofs, evaluating rain gardens and the use of pervious pavements among other projects," Retzlaff mentions.

The entire conversation between Budzban, Retzlaff, Morgan and Celik will air at 9 a.m. Sunday, May 19, on WSIE 88.7 FM The Sound and siue.edu/wsie.