GROWING TOGETHER

NORTHWESTERN AND THE CHICAGO BOTANIC GARDEN HAVE TEAMED UP TO EDUCATE GRADUATE STUDENTS IN PLANT BIOLOGY AND CONSERVATION — AND TO PROTECT ENDANGERED PLANTS AND ECOSYSTEMS FOR FUTURE GENERATIONS TO ENJOY.

by Stephanie Russell
The Buzz on Rooftop Gardens

Rebecca Tioniello (Goo) has spent the past two years consulting fees and expedite building permits for her urban rooftop beekeeping initiative. She has been focusing on green roofs in Chicago as a way to provide a suitable habitat for bees. Tioniello’s urban屋顶 beekeeping includes the rooftop garden at Chicago Botanic Garden’s new science center, which is an open-air, rooftop garden featuring beehives and native plants. The garden is designed to provide a suitable environment for bees and other pollinators. Tioniello believes that urban rooftop gardens can help address the decline in bee populations by providing a safe space for bees to thrive. She is working on expanding her initiative to other rooftops in Chicago and hopes to see more bee-friendly spaces throughout the city.
"Barbara explained how she wanted to transform the Garden into a research garden that contributes to conserving plant species that are rapidly disappearing around the world," says Linzer. "My reaction was that, in order to develop that kind of strength as a research institution that would also train the next generation of scientists in this area, you would have to create a partnership with a university."

The two exchanged business cards. Linzer recalls that Carr then told him she expected that their conversation would go no further.

But Linzer called Carr to follow up and invited her and some of her leadership team to Northwestern to discuss the creation of a new program in plant biology and conservation.

Linzer saw the program with the Garden "as a great opportunity for Northwestern to team up with a world-class institution that would add distinction to a University academic program. "A joint program would also enable the University to offer students classes in conservation biology and ecology, which had been lacking since the ecology and evolutionary biology department was phased out in 1988.

In 2004 the two institutions created a new graduate program—the nation's first master's degree in plant biology and conservation. The inaugural class entered in 2005, and the collaboration led to a doctoral program in 2009, also the first of its kind in the United States. While such partnerships exist between other universities and botanical gardens in the United States, notes Zsiga, "this program is unique in its strong focus on plant, as opposed to animal, conservation. And although many people may not realize this, Chicago is a very active place for conservation and restoration research, providing tremendous opportunities for students."

THE RICE PLANT CONSERVATION SCIENCE CENTER

Northwestern and the Garden decided that offering a doctorate in plant biology and conservation was the next logical step as the first graduates of the master's program enjoyed success in pursuing careers in the field—going on to work for places such as the Environmental Protection Agency and the Illinois Department of Natural Resources, or to enter top-notch doctoral programs at other institutions.

With the growth of the master's program and the addition of doctoral students, there was a great need for more lab facilities. Fortunately, the Garden opened the Daniel F. and Ada L. Rice Plant Conservation Science Center in September 2009, just in time to house the incoming master's students and the first cohort of doctoral students. The 31,000-square-foot, state-of-the-art green building features nine laboratories, a herbarium, a seed bank, an 18,000-square-foot rooftop demonstration garden and an interactive visitors gallery, where guests observe scientists at work in the labs.

The Garden's staff of 32 full-time scientists and research assistants is able to provide mentorship on research addressing plant conservation problems caused by climate change, habitat loss and fragmentation, invasive species and pollution.

BANKING ON SEEDS FOR THE FUTURE

One of the most important conservation projects underway at the Garden is the Dixon National Tallgrass Prairie Seed Bank and laboratory housed at the Rice Center. The seed bank is part of Seeds of Success, a national coalition of efforts to collect, bank and preserve seeds for current and future conservation work in North America. Coordinated by the Bureau of Land Management, Seeds of Success intends to collect 14,000 native plant species in the United States.

The Garden's focus in that effort is the tallgrass prairie region from the Midwest to the Great Plains, explains Mueller. Habitat fragmentation has reduced the tallgrass prairie to less than 0.21 percent of its former range, making it one of the most endangered ecosystems in the world.

Between 2007 and 2010, Garden scientists, students and volunteers collected seeds from native species across the Midwest, a flora of 1,400 that includes more than 800 tallgrass prairie species. Back at the science center, volunteers document, clean and dry the seeds and place them in a walk-in deep freezer where they can be stored for up to 200 years. Eventually the Garden plans to bank 100 million seeds that will help future generations preserve plant biodiversity and restore natural areas in the upper Midwest.

"We want to germinate the seeds, so we need to know more about seed biology," says Mueller. "And then we want to use the seeds in restoration projects. That means that we have to do much more than just grow them. We'll need to know how seeds will do in different places and in changing climates. We're doing a lot of research to understand the genetic diversity of plants and to see how far away from a seed source a plant will effectively grow."
Plants and Plans

The Chicago Botanic Garden announced a 10-year strategic plan last spring, but president and CEO Sophia Siskel (BS'90, MS'94, PhD'96) has a longer range plan in mind for the Garden's future.

"Here at the Chicago Botanic Garden, we are ourselves as stewards," she says. "We're responsible for stewarding an organization that will be here 500 years from now." She compares it to the Garden of Papalzi in Italy, which was founded in 1454 and is still in operation. By that yardstick the 37-year-old Chicago Botanic Garden is still a sapling.

Siskel hopes to keep the Garden growing, increase its educational programs and reliability, research scientists to save hundreds of native plants in the Midwest for generations to come. The $20 million master plan she announced last April calls for the creation of a new entrance to the Garden, children's learning campus, rebuilt greenhouses, reconfigured parking and a miles-long extension to the Cook County Forest Preserve lake walking path.

Since being named the Chicago Botanic Garden president and CEO in 2007, Siskel has managed a $42 million budget and 500 employees and has invested over $28 million in the garden's research and science education programs and putting it at the forefront of plant conservation science.

"Though already respected as a teaching and plant science research center, the Garden is now becoming the nation's leading center for training the next generation of scientists, restoration ecologists, land managers and policymakers," she says. "The goal is to revitalize this garden's reputation as a leader in hard science, not just as a place with pretty flowers. We're putting the Garden in the midst of a renaissance in plant science, and it's wonderful. Now we say, 'Yes, we're a really pretty place, but we're also a smart, important place. We can be both.'"

Siskel worked as vice president of exhibitions and education at Chicago's Field Museum and as an assistant curator at the Museum of Contemporary Art before joining the Garden as its vice president of visitor programs and operations in 2006.

A committed gardener herself, Siskel is passionate in her belief in the transformative power of plants.

"The world will go on without us," she concludes. "But it won't be the same without them. We need to save the Earth's plants. All life depends on plants, not just to satisfy basic needs but for beauty, for joy, for inspiration, for our health, for bringing our families together, for work, for play. For it is with this connection to nature that we can bring out the best in ourselves." — S.R.

Siskel credits Northwestern University professors Dan Lattimer (head of the Weinberg College of Arts and Sciences) and her predecessor, former Garden president and CEO Barbara Coral, for their vision in developing the joint program.

"The partnership speaks volumes about our Midwestern sensibility, the way this relationship has grown and flourished," she says. "It's so nice about the Garden and the Northwestern partnership is that it not only benefits our institutions beautifully, it benefits the world. These botanists and conservation biologists could not get this training anywhere else."

When she first took the helm, Siskel was charged with building the Garden's reputation as a leader in hard science, not just as a place with pretty flowers.

"We were struggling as an institution with the concept that people thought the Garden was just another pretty place," explains Siskel. "Then we invested in plant science, and it's wonderful. Now we say, 'Yes, we're a really pretty place, but we're also a smart, important place. We can be both.'"

Graduate student Kate Gallagher is studying three warm-season prairie grasses — big bluestem, side oats grama grass and Indian grass — for her master's project on the role of seed origin in prairie restoration success at several sites in Minnesota. These perennial, long-lived prairie plants are dominant components of the prairie ecosystem and are widely used in restoration projects.

"All three of these species are present in the Dixon Prairie," says Gallagher. "So when I needed to know how to clean the seeds and how to overwinter and plant them, I could just walk across the hall at the Rice science center to ask the experts."

"The Dixon Prairie is a beautiful re-creation," she continues, "with hundreds of diverse plant species supporting a huge variety of insects, birds and mammals. It's such a success. I want to know why. Walking through the prairie is a reminder of what all the numbers I stare at all day mean. They represent the answer to my question: Does seed source matter?"

Much of the research that Northwestern graduate students undertake deals with the hard science of what's happening in the habitat — below ground, in the soil and in waterways. And that means mucking about with wetlands, through thick woodlands and overgrown fields.

"When you talk to people about prairie," says Rachel Gross (Geology), a graduate of the master's program, "they aren't sure what's going on," she says. "The prairie is a place where you can see so many different things going on at once."

After taking soil samples at the sites and collecting nutrient and microbial diversity, "The prairie has given me a new perspective on how to think about restoration," she says. "It's a place where you can see the connections between different species and how they all work together to create a diverse ecosystem."
method that seems to be working so far, and where the native plants are starting to come back," she says, "is where we cut down the buckthorn, then rototilled mulch into the soil, so we're changing the soil and disturbing mini-buckthorn seedlings.

Glen Madeja (W'03, KSM'02, G'04), who earned his master's degree in the Northwestern Chicago Botanic Garden graduate program last year, conducted five years of research on the ornamental grass miscanthus. There's increasing consensus among plant biologists that the grass should be considered an invasive because it has invaded and been naturalized in native plant communities in many areas of the United States.

"Miscanthus grows well in the southeastern United States," says Madeja, who lives and gardens in Evanston. "Our climate in the Midwest is getting warmer.

He is now considering the launch of a pilot program to label invasive plants sold in stores to help consumers better understand the environmental risks of placing such plants in their gardens.

In the meantime, Madeja is restoring the gardens of Frances Willard's "Rest Cottage" in Evanston, where he serves as head landscaper. He says he's optimistic that as gardeners become more educated about invasives, they'll avoid planting them.

"Gardeners are caretakers," he says. "If you can put the issue of invasive plants out in front of gardeners, they will respond."

GROWING GRANTS AND HONORS

Last year graduate students Rebecca Tonietto (G'09) (see "The Buzz on RoofTop Gardens," page 21) and Kate Gallagher each received the highly sought after Garden Club of America Restoration Ecology Research Award. Only three were awarded in the country.

Tonietto was awarded $8,000 for her research on the effects of prairie restoration methods on native bee populations. Gallagher received the same amount for her study on the role of seed source in plant performance in prairie restorations.

Lauren Umek was honored with the 2010 Conservation and Native Landscaping Award from the U.S. Environmental Protection Agency and Chicago Wilderness for her prairie restoration work in the buckthorn thicket at Whippoorwill Farm.

These awards may be one of the best indicators yet of the growing demand for the type of hard science research that the Northwestern Chicago Botanic Garden plant ecologists and conservationists do.

Of course, the creation of a new academic program is not without its growing pains.

"I was the first person to graduate from the master's program," says doctoral student Umek. "There were a lot of tweaks that needed to be made to the program. Initially I wasn't sure that I wanted to come back for a PhD."

But the opportunity to be in a new program for practical field application of conservation science convinced her to go for it.

"The Northwestern Chicago Botanic Garden program is one of the few where application in the field is essential to the work," she said. "How we use our knowledge to conserve plants is the future of what's so valuable."

Some students appreciate being in on the ground floor of the startup program.

"Our professors are keen on asking for our input on classes," says doctoral student Hartung. "It's great to be part of a new program, provide constructive criticism and actually have an impact as a student."

Stephanie Russell is editor of Northwestern magazine.

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