The Living Landscape

Georgia Institute of Technology Transforms Its Campus into a Learning Laboratory of Sustainability

Ted Mero

The aesthetics of a college campus are vital to first impressions and often central to the lasting memories of a college experience. No surprise that institutions invest tremendous resources into developing and maintaining campus grounds.

But sometimes the work unnoticed by a passing glance is the most impactful. No school is exploring beyond the cosmetic like Georgia Tech, which is using the concept of a performance-based landscape to transform the 400-acre Atlanta campus into a living laboratory of sustainability.

With the guidance of a hand-picked Planning and Design Commission made up of building and landscape architects from around the country, along with the leadership of landscape architecture and civil engineering firms, Georgia Tech is displaying what is achievable when developing a campus from an environmentally and ecologically based perspective.

Trees are utilities. Buildings are water sources. And yesterday's sewage pipe is today's streambed.

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"Most campuses have a Campus Master Plan but very few have a Landscape Master Plan—the study of the ground plane," explains Howard Wertheimer, Georgia Tech's director of Capital Planning and Space Management. "People tend to focus on buildings. But it's really the space between the buildings, in my opinion, that really creates a memory for people when they come to campus. And while some buildings are very memorable in their own right, the landscape is what puts it all together."

The master plan emphasizes the increase in campus green space and the expansion of new water conservation and reclamation methods. As an extension of Georgia Tech's Campus Master Plan, which was updated in 2004 to place a greater emphasis on sustainability principles, the Landscape Master Plan set forth three major goals for the campus:

1. Develop an integrated, ecologically based landscape and open space system that helps Georgia Tech achieve its goal of environmental sustainability, specifically, a 50 percent reduction of current storm water entering the Atlanta sewer system.
2. Develop a landscape that enhances the living, working, and learning environment of the school.
3. Develop a landscape that unifies the campus and gives it a distinct sense of place and also expresses the identity of Georgia Tech.

A System of Cisterns

While the general mission of the Landscape Master Plan remains constant, the sub-projects within it are hardly rigid, as new studies and trial and error have helped shaped the effort. In reality, Wertheimer says, the school has four master plans at work.

"It's really been a series of dominoes," Wertheimer asserts. "We went from the Campus Master Plan and the Landscape Master Plan to a Cistern Master Plan and a Storm Water Master Plan. We've done a similar study at Emory University, and held joint meetings with Emory and Spellman College to figure out ways our universities can tackle sustainability."

In a region where droughts are growing more frequent with the changing climate, the need to retain storm water runoff is critical to a more sustainable landscape. The Georgia Tech campus now contains roughly 32 cisterns, which capture storm water and building condensation. That water is harvested to irrigate the landscape and now irrigates more than 50 percent of all the irrigated areas on campus.

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When possible, the cisterns are interconnected to ensure easy transfer of water, as needed. The school built a 280,000-gallon cistern and connected it to existing irrigation systems to feed seven acres of contiguous land that make up the indoor football practice facility, the baseball field, and the track, but the design team realized that even cisterns can run dry and had to think creatively about how to service the grounds during times of drought.

The school ultimately constructed a 40,000-gallon cistern inside an adjacent research building, which during the summer months produces more water than it can harvest due to the tremendous building condensation from the air conditioning. The excess water is transferred to the large cistern and used to irrigate the fields during the high need summer months.

"We wanted to put a deeper focus on storm water issues and the performance landscape," Wertheimer says. "We started putting cisterns in buildings and we wanted to look comprehensively at the placement and sizing of these cisterns as opposed to how much can we afford or how much can we fit from a real estate point of view. So now it's sort of based on environmental and ecological reasons, as opposed to setting more arbitrary reasons."

Symbol of Sustainability

The Clough Commons, a five-story, 220,000-square-foot building at the center of campus, connected to the school library, serves as the academic hub for Georgia Tech's undergraduates. It also doubles as a symbol for Georgia Tech's sustainability efforts. Once a parking lot, Clough Commons, which opened in the fall of 2011, features a rooftop garden overlooking the adjacent Tech Green—the first central green space on campus.

Beneath Tech Green is an underground 1.4 million gallon cistern that captures storm water runoff and building condensate, as well as water from a 13-acre basin. That water is used to harvest the landscape in and around Clough Commons and Tech Green, and is also used to flush the toilets in Clough Commons. "We calculated the potable water savings and that was 6,500 gallons per day—those are 24/7 buildings," Wertheimer says. "That's a pretty significant amount of non-potable water we're able to use."

Thomas Debo, professor emeritus from Georgia Tech's School of Architecture and the author of several books and articles on storm water management, says the goal is for the campus facilities to someday have the ability to flush all the toilets without using city or potable water.

Tech Green, the outdoor seating area with the Clough Commons in the background.

Whether capturing the high quality water that comes from rooftops and air-conditioner condensate—the major source from the Clough Commons building—or lesser-quality water from grass and landscape areas, or slightly dirtier water from streets and parking lots, each storm water source serves a purpose.

"The very clean storm water in the air-conditioning condensation is ideal for toilet flushing, and one of the reasons you need clean storm water for toilet flushing is because the mechanisms will last a lot longer if there's not a lot of filth and sediment build-up in the toilet fixtures," Debo explains. "Then the storm water that is (not as clean) is ideal for irrigation of different parts of the campus."

Another developing element of the Landscape Master Plan is the concept of an Eco-Commons, which will include an engineered waterway designed to recall the natural stream that existed on the north end of campus as late as the 1940s. The Eco-Commons will allow Georgia Tech to more effectively manage its storm water by reducing inflows into city sewers and creating a system for reuse on campus landscapes while also providing a recreational entity to the campus.

The Eco-Commons, which comprises about 80 acres of the 400-acre campus, will be divided into two basins, one of which will include a new research building to be called the Engineered Biosystems Building (EBB). But as the EBB plan developed, it became clear to Wertheimer and the team that storm water and the cisterns alone could not be relied upon as a primary water source.

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Clough Commons/
Tech Walkway

In an effort to utilize additional water sources, Georgia Tech is in the early stages of a black water (or sewer water) feasibility study to explore the possibility of putting the sewer water through a natural filtration system and use it to power the air conditioning on campus, among other functions.

Shaping the Vision

When Linda Jewel was selected to join Georgia Tech's planning and design commission more than 13 years ago, the group's focus was, like most college campuses, primarily on building mapping. While Jewel and some of the other commission members had backgrounds in landscape architecture, landscape design was only discussed in general terms. But the discussions shifted to landscape and sustainability when Rob Fisher, a landscape architect with a background in storm water management, joined the team.

Fisher proposed what would become the Landscape Master Plan, though no one on the commission realized the extent Fisher and Georgia Tech would go to develop the system. "I think we (on the commission) all bought into it immediately," says Jewel, now a professor of landscape architecture and urban design the University of California, Berkeley, and still a commission member. "But the key thing was the administration got behind it. A lot of landscape architects, particularly, will propose such things, but they just die on the vine or sit as a booklet on the shelf somewhere in the university."

But at Georgia Tech, Jewel says, the administration has continued to implement, revisit, and revise the plan as needed, keeping Fisher on as a consultant to see the project through.

Jewel has been involved with campus master plans going back to her days with the University of Pennsylvania in the 1970s, where she worked on the project as a campus landscape architect. Storm water management was incorporated into that plan, too, but was only given lip service as a way of organizing the landscape. Usually, Jewel says, storm water calculations are a hope and a wish at best. Better than not doing them at all, but so generalized that they don't have a significant impact.

At Georgia Tech, engineers have crafted a method of updating storm water calculations specific to data collected on campus. "I've never seen anything as comprehensive as (the Georgia Tech plan) in terms of dealing with storm water management," Jewel asserts. "There are plans out there and overall master plans, but they're not specifically crafted to the place. That's the wonderful thing about the Georgia Tech plan."

The commission still meets on a quarterly basis, holding intensive two-day sessions on campus to discuss the progress of the work and share ideas. Jewel remembers when she first stepped foot on campus and is amazed at how much the grounds have changed.

"It was kind of a dead campus in a lot of places," Jewel says. "An empty lawn and a scattering of trees. The landscape was not particularly developed in a thoughtful manner. A few places were developed, but it had great potential because things grow well there. It still has a ways to go, but it's quite a different place."

Most noticeably is the introduction of tree canopies across the campus, as Georgia Tech works toward its goal of 55 percent tree canopy and 22 percent woodlands coverage around the campus in order to maintain its Tree Campus USA status, which it has earned for four years running. A recent GIS-based inventory identified that the school now has more than 11,000 trees on campus.

As part of the Landscape Master Plan, the tree canopies are mapped out in design corridors to establish a consistent style among streetscapes throughout campus.

"It's a very unique feature," says Landscape Architect and Master Planner Anne Boykin-Smith, with Capital Planning and Space Management. "Most campuses cite their outdoor furniture—benches, accessories, that sort of thing. Ours explains how we treat the soil in different zones of campus before we plant, and what plants are preferred."

A Model for Atlanta and Beyond

Debo, who teaches a course on storm water management at Georgia Tech, each semester takes his class out for a tour of the campus to show them an exam-

ple of how the concepts presented in their textbooks are being put into action. He hopes the Georgia Tech example will also serve as a model for the Atlanta metropolitan region. He is particularly concerned about the Chattahoochee River, the main fresh water source for Georgia, Alabama, and parts of Florida.

"Everything we do in the Atlanta area ends up in the Chattahoochee River," Debo says. "The sooner we discharge the water, the less we discharge the water, the better off we are. If we develop a business park or a shopping center or a housing development, my hope is we can use the principles (of Georgia Tech's Landscape Master Plan) inside those developments and that will all help the river."

Accomplishing that goal, however, is far from easy. One of the advantages of Georgia Tech's plan is that the school has a large piece of land that it can control, which is not the case for the greater Atlanta region. "In the greater Atlanta area, there are a lot of smaller developments and it's really up to whatever municipality has control to figure out a way to control the water coming off the larger area," Debo says.

In the meantime, Georgia Tech continues to do what it can to use the work of its Landscape Master Plan as an example to other universities. At the 2012 Association for the Advancement of Sustainability in Higher Education conference, Wertheimer led a discussion on thinking beyond a traditional Campus Master Plan "in developing holistic tools that fully integrate the ecological and human landscape into a performance landscape that transforms the campus culture and expands the academic and research opportunities across the university."

"We continue to try to share what we've learned with other universities to see what might work for their campus," Wertheimer affirms.


Courtesy of AECOM and Dave Carrillo, photographer

Clough Commons Building 2012

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