Paving the Way

How the guru of stormwater management uses technology to save our fishing streams
Downpours often pollute North Carolina's waterways when stormwater washes oil, gravel, pollen, and other debris off the pavement into nearby streams. One inch of rain on a one-acre parking lot can send 27,000 gallons of water gushing into storm drains. NC State researchers have developed practices for controlling such runoff and are helping craft state and local regulations to limit its impact in the future.

Dr. Bill Hunt has been a guru of stormwater management technologies since joining NC State in the mid-1990s, shortly after lawmakers adopted the Neuse River rules to cut pollution that had resulted in fish kills.

“The General Assembly decided that farmers shouldn’t be the only ones responsible. They wanted to make everyone limit runoff,” says Hunt, an associate professor and extension specialist in the Department of Biological and Agricultural Engineering.

Hunt has studied a number of innovative solutions to reduce runoff, including permeable pavement and bioretention areas. In urban areas, impervious surfaces like parking lots and driveways are the main targets in reducing runoff. Hunt has used pavers with holes to design parking areas where precipitation drains into the pavement and not the nearest gutter. As the stormwater passes through a sand and gravel base beneath the pavement, pollutants are filtered out.

“People said it wouldn’t work, that sediment would clog the holes,” he says. “We’ve used permeable pavement on several sites across eastern North Carolina and found it works well.”

After storms spawned by Hurricane Dennis dumped 5 inches of rain on the region in 2005, for example, Hunt recorded just 1¼ inches of runoff from one of his parking lots. Because of his research, the state Department of Environment and Natural Resources (DENR) now gives special permitting allowances to developers who use permeable pavement. A state law that took effect in April requires permeable pavement for all parking lots at least one acre in size.

Dr. Bill Hunt says permeable pavement, like that used for this Centennial Campus sidewalk, reduces stormwater runoff. Photos by Roger Winstead.

**PAVING THE WAY**

**PERMEABLE PAVEMENT AND BIORETENTION AREAS REDUCE RUNOFF AND SAVE STREAMS.**

Article from *Results*
Hunt has also shown that, in addition to capturing and filtering urban runoff, bioretention areas are critical to preserving fishing streams in the North Carolina mountains. Bioretention areas are depressed medians or other plots with filtering vegetation built into parking lots and along streets. The soils can hold excess water until it percolates into the ground water, is taken up by the grasses and bushes, or evaporates. The areas allow water coming off steaming asphalt parking lots to cool before flowing into nearby streams, preventing fish kills among trout and other species sensitive to changes in water temperature. State officials now recommend building bioretention areas near all new parking lots in mountain counties.

Across campus, Jay Tomlinson and Dr. Hugh Devine have incorporated some of Hunt’s findings in a development model for Brunswick County, where rapid growth threatens water quality. The DENR-funded project was designed to demonstrate the impact alternative development designs could have on preserving clean water.

Devine, the director of the Center for Earth Observation in the College of Natural Resources, and research associate professor Dr. Perver Baran used satellite images and geographic information systems data on land use and watersheds to help select three test sites: one along the coast, one along the Cape Fear River, and one in the interior of the county.

Tomlinson, assistant dean for research, extension and engagement in the College of Design, led a team of students who laid out subdivisions on each tract using both conventional designs and cluster development plans that feature smaller lots. The cluster designs led to cutting the amount of impervious surface by up to 35 percent. The denser developments also left more area for green space and incorporated bioretention areas between rows of houses to channel stormwater.

Devine and Baran then used a U.S. Geological Survey software model and a formula used by Brunswick County planners to determine the environmental impact of the cluster designs. Compared to conventional subdivisions, the developments were shown to produce less stormwater runoff, and the levels of nitrogen, phosphorus, and sediment were each cut by 13 to 40 percent.

The findings show the need for a new approach to development, says Tomlinson, a former developer who designed the Long Bay Club golf course community in Myrtle Beach, South Carolina.

“They now sell home sites like we’d sell carpet – by the square foot,” he says. “We should be using natural assets to create amenities in developments that encourage buyers to forgo larger lots.”

The DENR project is only an advisory effort, and it remains up to county officials in Brunswick and elsewhere to use the findings to guide future development.

“As North Carolina grows, more communities will need to address their runoff problems,” Hunt says. “We need as many tools as possible to deal with stormwater. Continued research will allow us to predict which tools will work best in certain areas. After all, we’re all downstream.”
Science, Technology and Values
“Beyond Modes, Beyond Media,” the 2009 Rolf Buchdahl lecture on science, technology and values will take place from 4:30 to 6 p.m. on Friday, Sept. 25, in the newly-renovated Park Shops building. The featured speaker is Dr. Jennifer Daryl Slack, a professor of communication and cultural studies at Michigan Technological University.

This year’s lecture is part of a two-day symposium about the social impacts of communication technologies sponsored by the Communication, Rhetoric and Digital Media and Science, Technology and Society programs. The event is free and open to the public. For details, visit http://crdm.chass.ncsu.edu/symposium.

Logic and Cognitive Science Initiative
Experts from Yale, Notre Dame, Columbia, Stanford, SUNY Buffalo and Texas A&M will speak Friday, Sept. 25, and Saturday, Sept. 26, at the Logic and Cognitive Science Initiative Conference on Ontology. The Department of Philosophy and Religious Studies is hosting the event, with all sessions in Withers Hall, Room 140. The conference is sponsored by a grant from GlaxoSmithKline. Registration and payment are required. Visit http://www.ncsu.edu/chass/phil/phil_lcsi.html.

Hispanic Heritage Month Events
The Department of Multicultural Student Affairs invites the campus to join in celebrating Hispanic Heritage Month.

> Annual Futbol/Soccer Tournament: Saturday, Sept. 26, 9 a.m. to 5 p.m., upper intramural fields
> U.S. Census 2010 – It’s In Our Hands (Esta en Nuestras Manos): Monday, Sept. 28, 5:30 to 7 p.m., Walnut Room, Talley Student Center
> CNN “Latino in America,” Interactive Watch Party: Wednesday, Oct. 1, 8:30 p.m., Washington Sankofa Room, Witherspoon Student Center

Rescheduled Astronomy Open House
Stargaze to your heart’s content (weather permitting) during the fall astronomy open house beginning at 8 p.m. on Friday, Sept. 25, at the Reedy Creek Observatory. The event was rescheduled because of cloud cover last week.

The evening’s activities include viewing stellar attractions such as Jupiter and the Andromeda galaxy, finding constellations and enjoying refreshments. School-age children and their families are encouraged to attend. Signing up in advance is appreciated but not required. RSVP to Brian Williams at bjwilli2@ncsu.edu. For information, visit http://astro.physics.ncsu.edu/Astro/openhouse.

Landscape Architecture Lecture
Professor Lois Brink from the University of Colorado will give a landscape architecture lecture at 7 p.m. on Monday, Sept. 28, in Burns Auditorium.

Pulitzer Prize Winner’s Reading
Pulitzer Prize-winning author Tracy Kidder will read from his latest book, Strength in What Remains, on Wednesday, Sept. 30, at the McKimmon Center. NC State’s Friends of the Library and Quail Ridge Books and Music are sponsoring the reading, which is supported by the NC State Foundation. Admission is $5 or free with purchase of Strength in What Remains from Quail Ridge Books and Music. Contact the group at 515-2841 to purchase a ticket and reserve a seat.

Conversations with State Leaders
State Treasurer Janet Cowell will speak from 4 to 5 p.m. on Thursday, Oct. 1, in Caldwell Hall lounge. Her talk is part of the Conversations with State Leaders Series, sponsored by the School of Public and International Affairs. For more information, contact Dr. Andrew Taylor at 515-8618 or andrew_taylor@ncsu.edu.

Entrepreneurship Lecture Series
Meet a man who’s been named Ernst & Young’s “Master Entrepreneur” and one of Advertising Age’s “Digital Media Masters.” Christopher Evans, an entrepreneur and philanthropist with offices in Raleigh, will open the fall Entrepreneurship Lecture Series from 5:30 to 7 p.m. on Thursday, Oct. 1, at the McKimmon Center.

Best Practices with LGBT Populations
The Department of Social Work will host a workshop on best practices for working with lesbian, gay, bisexual and transgender youth, adults, couples, families and communities, from 9 a.m. to 3 p.m. on Friday, Oct. 2, in the Talley Student Center ballroom. Registration is open to faculty and students.

Dog Olympics
Cue the theme music and fetch some Milk Bones: The Dog Olympics is back on Saturday, Oct. 3. Here’s your chance to root for canine athletes in the high jump, applaud the best howler or adopt a shelter animal in need of a home. Organizers have temporarily moved the event downtown to Moore Square due to construction at the Centennial Biomedical Campus.

The event is sponsored by the student chapter of the American Hospital Association in the College of Veterinary Medicine.

Events run from 10 a.m. to 3 p.m. Admission is $1 for spectators and owners and $7 for dogs; children 5 and younger are free. Canine admission includes an entry fee for one event and a photo of your dog in the winner’s circle.

Computer Security Day
Faculty, staff and students are invited to OIT’s third annual Computer Security Day: Cybersecurity Self-Defense from 9 a.m. to 3 p.m. on Monday, Oct. 26, in the Talley Student Center. The event provides insight into the privacy and security issues surrounding electronically stored sensitive information and offers ways to keep your computer and data safe.

Faculty and Staff Notes
Alumni To Give $2.5 Million
A Raleigh couple has made a planned estate gift of approximately $2.5 million to NC State that includes funding for a professorship, scholarships and the J.C. Raulston Arboretum.

The planned gift from Keith and Margaret Collins, both of whom are NC State alumni, will establish endowments in the College of Engineering’s Department of Computer Science and in the College of Agriculture and Life Sciences.

In the College of Engineering, the charitable bequest establishes the Collins Distinguished Professorship in Computer Science to help the computer science department attract top talent to study ways to use data management and high-performance computing to develop large-scale business analytic solutions. The gift also establishes the Collins Leadership and Computational Excellence Scholarship in Computer Science, which will be awarded to top students who have demonstrated strong aptitude and interest in research and mathematics. The Collins Computer Science Discretionary Fund will give the department head resources to recruit students and faculty, provide support for student organizations, support lecture series and make faculty awards.

In the College of Agriculture and Life Sciences, the Margaret “Marge” P. Collins Fund already provides annual support for the CALS Ambassadors student leadership program and two undergraduate student
leaders scholarships. When fully realized, the Collins’ gift will establish several named endowments to benefit the college: the Margie Collins Endowment for the JC Raulston Arboretum, the Margie Collins Endowment for the CALS Ambassadors, and the Margie Collins Scholarship Endowment for CALS, which will fund a number of leadership and merit-based scholarships.

**NSF Grant Funds Rural Outreach**

A team of researchers led by Dr. Sarah Stein, associate professor of communication, recently received a $1.8 million grant from the National Science Foundation to bring advanced mathematics software to rural, underserved high schools in North Carolina through NC State’s innovative cloud computing solution, the Virtual Computing Lab (VCL). The program, called “Scale-Up: Scaling up STEM Learning with the VCL,” is designed to be replicated across the state and country.

**Nominate a Book for Common Reading**

The Common Reading Selection Committee invites you to nominate a fiction or nonfiction book by Wednesday, Sept. 30. The selected book will be assigned for next fall’s incoming undergraduate students. For selection criteria, visit http://www.ncsu.edu/uap/reading. Make your nomination using the “Suggest a Book” link.

**Forestry Team Honored**

Team members with Extension Forestry and Forestry and Environmental Outreach received an award of excellence (silver) from the Southern Extension Forest Resource Specialists for their work with the Woody Biomass Program. The program provides education and materials to promote economic opportunities related to renewable energy derived from woody biomass.

The honorees are Dr. Robert Bardon, department extension leader; Dr. Dennie Hazel, extension specialist; Dr. Mark Megalos, extension specialist; James Jeuck, extension associate; Christopher Hopkins, outreach associate; Jasmine Shaw and Susan McIntyre, graduate students; Dr. Susan Moore, extension associate professor; and Kelley Duffield McCarter, program coordinator.

Earlier this year, the NC Woody Biomass Team won the 2009 Innovator Award from the Southern Growth Policies Board and the Outstanding Subject Matter Program Developed by a Team Award from the North Carolina Association of Cooperative Extension Specialists.

**Spintronics Grant Will Develop Smaller, Faster Electronic Devices**

NC State researchers have received a three-year, $1.2 million grant from the National Science Foundation’s Center for Chemical Innovation for research in the emerging field of molecular spintronics, used to develop smaller, faster, more energy-efficient electronic devices with increased storage capacity.

The grant will fund a center for molecular spintronics and support a research coalition with scientists at the University of North Carolina-Chapel Hill. NC State’s Dr. David Shultz, professor of chemistry, is the principal investigator. Co-PIs at NC State include Drs. Dan Dougherty, Marco Buongiorno-Nardelli, Jack Rowe (physics), Joe Tracy (materials science and engineering) and Gail Jones (math, science and technology education).

**Pramaggiore Presents at Film Conference**

Dr. Maria Pramaggiore, professor of film studies, presented The Global Repositioning of the City Symphony: Sound, Space, and Trauma in 11’09’01 at the Visible Evidence Documentary Film Conference held at the University of Southern California.

**Laux’s Poems Translated**

English Professor Dorianne Laux’s selected poems have been translated into Arabic by Kalima Press.

**Reavis’ Labor Hall Stories Published**

Assistant English professor Dick Reavis’ collection of on-the-job tales, Catching Out: Life in a Day Labor Hall, will be published in February by Simon & Schuster. The stories are based on Reavis’ experiences working out of labor halls in the summers 2007 and 2008. The publisher’s catalog describes the collection as “a gritty, hard-time evocation of the sometimes colorful men and women on the bottom rung of the workforce. It is partly a guide to performing hard, physical tasks, partly a celebration of strength, and partly a venting of ire at stingy and stern overseers.”

**Remembering Dr. Funderlic**

Dr. Robert E. Funderlic, department head (1986-1992) and professor emeritus in the computer science department, lost a long and courageous fight with cancer on September 5. The department mourns his loss and remembers his legacy with a story on its site at http://www.csc.ncsu.edu/news/904.
With all the media attention focused on the spread of the novel H1N1 influenza virus, it's easy to forget that the seasonal flu is just around the corner.

"Influenza this year is not likely to be a one-hit wonder," says Dr. Mary Bengtson, medical director of Student Health Services.

That's right, there may be two types of flu going around in the coming months, H1N1 and a seasonal variety. If you don't get vaccinated, you risk coming down with either or – if you're really unlucky – both.

What you may not realize is that you have to get two separate flu shots. The vaccine that will protect you against H1N1, due out in mid-October, won't keep you from picking up the seasonal flu. And vice versa.

The good news is that seasonal flu shots will be available on campus for faculty and staff starting Tuesday, Sept. 29. You can get the vaccination free under the State Health Plan; just show your insurance ID card when you get your shot.

To register for your seasonal flu shot, visit http://www7.acs.ncsu.edu/hr/benefits/enrollment/flushots/.

Bengtson says to remember that flu isn't unique to NC State, it's in the community. So even if you work all by yourself in a quiet, little office, you still need to get your flu shots. And the seasonal flu is nothing to sneeze at. In an average year, flu is responsible for 200,000 related hospitalizations and 36,000 deaths.

Symptoms of flu may include fever over 100, sore throat, cough, stuffy or runny nose, fatigue, headache, body aches, nausea, vomiting and diarrhea. If you come down with flu symptoms, the Centers for Disease Control and Prevention (CDC) recommends that you remain at home until at least 24 hours after you are free of fever (100 degrees) or signs of a fever without the use of fever-reducing medications. If your symptoms are more than mild or your diagnosis is not certain, contact your health care provider.