

Virginia
Cooperative
Extension

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A Few Words from Bob Smith

The semester has started with a little winter and more snow than we have had in recent years. This reminds me of my northern roots and why I moved to Virginia. Students are busy with classes and activities that make the university come alive. I am always impressed with the energy that our young folks have (and I also wonder where mine went!). It is that energy that is captured in our engagement activities for the college. Last year nearly 150 College of Natural Resources and Environment (CNRE) students contributed over 4,000 hours to service-learning projects in Virginia. Projects ranged from urban forestry to green building systems to energy efficiency in state-owned structures. These are faculty-led programs conducted through their classes. The students are asked to apply what they have learned in the classroom to real situations in the community. It greatly adds to their educational experience and allows them to work with individuals who they would not normally have the opportunity to work with.

Last year we developed a mission statement for our engagement efforts. This was a result of an 18-month study on the perceptions of CNRE by our stakeholders. Our statement is: **Partnering for Sustainable Solutions** - *The College of Natural Resources and Environment's Engagement Program partners with landowners and communities to provide science-based solutions to natural resources and environmental issues facing the world. Its goal is to improve the lives of the citizens of Virginia and beyond by providing information to make better decisions to sustainably manage and utilize natural resources.* The college has also developed a new publication on our overall vision as we move forward; it can be found at: <http://cnre.vt.edu/media/publications/advancing-the-science-of-sustainability/index.html>.

We are constantly adapting and modifying our programs and approaches to best meet the needs of our community.

This issue of *Engagement Matters* will cover a breadth of student and faculty engagement activities. Our extension team discusses the importance of landowner education and how all citizens benefit from wise land management practices. Some of our northern Virginia graduate students share how they are making an impact to slow deforestation in Brazil. One of our fisheries classes helped our veterans manage their fish ponds to improve angling opportunities, and our faculty worked with communities on urban street tree assessment and geospatial issues for high school teachers and community leaders.

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ENGAGEMENT matters

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Partnering for Sustainable Solutions

The College of Natural Resources and Environment's Engagement Program partners with landowners and communities to provide science-based solutions to natural resources and the environmental issues facing the world. Its goal is to improve the lives of the citizens of Virginia and beyond by providing information to make better decisions to sustainability manage and utilize natural resources.

FEATURE

“Great Work,” But So What?

Adam Downing and Jennifer Gagnon
Virginia Cooperative Extension and
College of Natural Resources and Environment

The Natural Resources Extension Team is a hard-working group. We often hear words of affirmation from landowners like “Great meeting!,” “Thanks for all this useful information!,” and “I’m going to put this information to work on my land right away!” Loggers may not be so expressive, but even they say things like “Useful class,” “Good information,” and “Thanks for the credits.” We know our programs help woodland owners manage their land better and help loggers better manage their businesses. This is good, very good.

However, in the case of public servants like us, every taxpayer in Virginia is our boss. What kind of report would we give to taxpayers throughout Virginia who don’t attend our programs? Does our work do any good for the single mother living in Richmond? How about the senior citizen in assisted living in Fairfax? To be quite honest, until recently we hadn’t given this much thought. Why should we? We are foresters hired to work within the realm of forestry and natural resources. Other Extension colleagues, like the Family and Consumer Science Agents, work closely with these other audiences. But in the interest of accountability, *do* our programs provide value to these other taxpayers?

The short answer is *yes*. Every Virginian who drinks water and breathes air receives value from our programs. For every tree our programs help a homeowner plant for energy conservation, for every acre of woodland our programs equip landowners to manage for continued growth of trees, and for every

municipality we partner with for healthy urban forests, the public sees improvements related to air and water quality.

According the 2012 State of the Forest report from the Virginia Department of Forestry, Virginia’s forests (63% of which are privately owned) remove from the air and store 6.42 million metric tons of carbon dioxide, a gas believed to negatively impact many aspects of our global environment. In addition, our rural forests and urban trees remove air pollutants, such as ozone, sulfur dioxide, and carbon monoxide. Trees that are strategically placed to help cool parking lots and

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Demonstration of a fjord stream crossing installation for loggers in Louisa County. Photo courtesy of Jim Kuykendall.

Great Work, continued from page 2

structures not only provide comfort, but also reduce energy consumption, thereby reducing pollution from energy generation.

The public benefits also flow to another essential element of human existence – water. Our partners in the Virginia Department of Forestry are leading the way with a new federal initiative called “Forests to Faucets.” This program is an effort to more tangibly link the connection between our forests and the water we drink. Water and woods are inseparable, and forested watersheds are the most economical source for clean water. A forested watershed slows and filters rainwater, releasing it in nearby streams, springs, and rivers. Human settlements have tapped this benefit for many years. Virginia’s own Harrisonburg acquired 27 acres in the late 1800’s, in what is now called Riven Rock Park. This forested property is 10 miles from City Center but is strategically adjacent to the George Washington National Forest, a managed forested watershed for clean water. An impoundment was built, and 10 miles of 10” pipe was laid by hand to carry the water to town. Until the Clean Water Act amendments of 1972 required treatment, it was untreated and completely potable.

A recent study commissioned by the Piedmont Environmental Council quantified the value of different land-cover types throughout Virginia. Over 100 articles and policy papers were studied to arrive at values for various natural benefits. The most conservative value of water filtration services from forests was \$233.41 per acre!

View this Youtube video to discover one “So What” story about trees and water:
<http://www.youtube.com/watch?v=qPaUEtOjeCg>



Learning tree identification at Ivy Creek in Charlottesville. Photo courtesy of Adam Downing.

Many of our logger programs focus on Best Management Practices that reduce the risk of erosion and sedimentation. Our landowner programs enable landowners to productively and profitably manage their lands so they can keep them forested. They also prepare landowners for intergenerational transfer so their heirs won’t have to develop the land to afford to pay inheritance taxes. Every acre of increased productivity, every family with an estate plan, and every landowner excited about making the most of their woods can result in cleaner water.

Air and water quality are only two of the benefits all Virginians receive as a result of our programming. Virginia’s forests are an integral part of outdoor recreation.

Most of the views from the Blue Ridge Parkway and Skyline Drive are of private land, much of which is owned by people who attend our programs. Our forests create jobs. Our wildlife brings hunters and birders, who purchase goods and services, to Virginia. Many of our pollinators, essential for food production, live in managed forestland.

So to experience the benefits of Virginia Cooperative Extension’s Forestry and Natural Resources programming and partnerships, one simply needs to take a deep breath of fresh air, get a glass of clean water, and think about the wonder of a tree or forest in your view. Our programs are indeed “great work.”

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Partnerships for Sustainability in Brazil

Courtney Kimmel

Center for Leadership in Global Sustainability
College of Natural Resources and Environment

In the next few decades, the global population is expected to reach nine billion people, with a large middle class and high levels of consumer demand. It is an exciting time that could close poverty gaps, improve health and quality of life, and provide development options not currently available. It is also a decisive time for ensuring the environmental sustainability of resource management and economic development – a challenge that requires unprecedented leadership and partnership. Environmental sustainability is an active process that requires innovative thinkers, managers, and leaders who have the ability to adopt a trans-disciplinary perspective, to create a vision of the desired future, and to work across the boundaries that so readily divide us.

CNRE's Center for Leadership in Global Sustainability (CLiGS) is dedicated to building leadership for this rapidly changing future by actively engaging with educational, non-governmental, corporate, and public institutional

partners to explore sustainability challenges, to research strategies being developed to address these challenges, and to integrate this process and knowledge into our educational programs.

An exciting new graduate course offered through CLiGS is the Global Sustainability Initiative (GSI) series. GSI courses are professionally oriented and project-based courses exploring sustainable development challenges and solutions first-hand in rapidly developing regions of the world.

In January 2013, the GSI Brazil Project focused on sustainable soy production in the Amazonia region of Brazil. The project team, comprised of CLiGS fellows and graduate students from various Virginia Tech colleges and departments, spent two months investigating an innovative cross-sector partnership brokered among The Nature Conservancy (TNC), Cargill, the state of Pará, and local soy producers to expand soy production in the region, while halting illegal deforestation in the Amazon.

As the lead faculty for the Amazon Program, CLiGS Fellow and faculty member Barbara McCutchan worked closely with leaders in TNC's Amazon Program to provide a real-world situation and audience for students. The project co-defined by TNC and CLiGS was to update a 2007 case study of the situation, given the significant developments and changes in recent years. Students in the GSI Brazil course conducted background research into the situation and partnership for a month before traveling to Brazil.

During the 10 days in Brazil, the team met and talked with major stakeholders, including several high-ranking



GSI Brazil team members examining a map of the Amazon and Tapajós River basins. Photo courtesy of Courtney Kimmel.



GSI Brazil 2013 team at the base of a Samaúma tree at Floresta Nacional do Tapajós. Photo courtesy of Courtney Kimmel.

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Virginia's Street Trees

Eric Wiseman
Virginia Cooperative Extension and
College of Natural Resources and Environment

As Virginia's population grows and urban areas expand, Virginia's urban forests are the subjects of increasing interest around the state. Urban forests comprise an assortment of trees and green spaces that help mitigate many of the negative consequences of urbanization, including stormwater runoff, air pollution, and heat-island effects. Urban forests also create outdoor recreation and leisure opportunities for citizens. Some of the hardest-working trees in the urban forest are street trees. Commonly planted by municipalities within the public street right-of-way, street trees have an enduring legacy of shading sidewalks and beautifying neighborhoods.

Street trees are often a primary focus of municipal forestry operations and civic tree-planting programs. With proper planning and maintenance, street trees can be a tremendous asset to a community. But when they are neglected or abused, they can also be a tremendous liability – disrupting utility lines, obstructing traffic flow, and creating hazards. Moreover, street trees are vulnerable to an assortment of threats: soil compaction, deicing salts, machinery damage, and invasive pests. Concerns about a particular invasive pest – the emerald ash borer – instigated a four-year study by Virginia Tech urban forestry specialist Eric Wiseman.

Through grant support from the U.S. Forest Service and Virginia Department of Forestry, Wiseman and his students conducted inventories of municipal street trees in 22 localities around Virginia from 2008 to 2012. For their study, they used street tree assessment software developed by the U.S. Forest Service called i-Tree Streets. The software not only allowed the researchers to tally the number, size, and type of street trees, but also to calculate the benefits provided by street trees.



Research technician John Pancake collects street tree inventory data in Lynchburg, Va. Photo courtesy of Eric Wiseman.

Last summer, Wiseman and his graduate students conducted three day-long workshops around the state in collaboration with the Virginia Urban Forest Council and Extension agents Adam Downing, Neil Clark, and Jason Fisher. The workshops in Culpeper, Virginia Beach, and Lynchburg attracted over 120 attendees eager to learn about the research findings and their implications for managing Virginia's street trees. Attendees included arborists, foresters, volunteer tree planters, civil engineers, and local decision makers.

In his presentations, Wiseman reported that there are over 230,000 street trees in the localities assessed; these trees provide nearly \$19 million in annual benefits.

Native ash species (which are the preferred hosts of the invasive emerald ash borer) accounted for an average of only 2% of street trees. This is welcome news because the pest has killed millions of ash trees in midwestern states, where ash trees are more common.

However, Wiseman warned that Virginia's communities need to temper their enthusiasm for maple species, which were among the most abundant species in nearly every locality, accounting for as much as 30% of the street trees in some areas. This high abundance of maples worries Wiseman, since it could increase the risk of devastation by pests or diseases. Wiseman also asked the attendees to plant large-maturing trees wherever site uses and constraints would permit. In many localities, there was a trend toward small trees, such as crepe myrtle and dogwood, and an absence of shade trees, such as elms and oaks. While large trees are not ideal in every situation, they have a much greater impact on energy conservation and stormwater abatement than small ornamental trees do.

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TNC staff members involved with the Amazon Program, the secretariat of Pará's environmental agency, the manager of Cargill's Santarem shipping terminal, the manager of the local farmers' union, and a major landholder and soy producer in the region. The team also visited several sites important to the case, including the shipping terminal, a local soy farm, a state forest within the Amazon rainforest, and the confluence of the Tapajos and Amazon Rivers.

"It is important for students in natural resources to know about cross-sector partnerships because, particularly in dealing with natural resources, no one sector has full control of how resources are managed, used, or regulated," explained McCutchan. "The case offered by TNC and Cargill's Responsible Soy Partnership illustrates the contributions and impacts a partnership between a major multinational corporation and an international non-profit organization can have for local leaders and action. Participation in this project helped students realize that working across sectors, tools, and systems can be created to both protect biodiversity and promote economic development."

CLiGS will be offering GSI courses focusing on sustainable infrastructure in China and urban greening in Russia in Summer 2013. To learn more and to read the GSI Brazil team's final report, visit <http://gsi.cnre.vt.edu>.

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CLiGS Fellow Barbara McCutchan (right) shares the CNRE Newsletter with Katiane Jesus (center), the community relations manager for Cargill's Santarem terminal. Photo courtesy of Courtney Kimmel.

Street Trees, continued from page 5

Eric Wiseman addresses street tree workshop attendees in Culpeper, Va.

Wiseman and his Cooperative Extension colleagues are hopeful that workshop attendees will put this research into practice in their communities to increase awareness of the vital role that street trees play in creating sustainable communities. With statewide interest in urban forestry increasing, they see this workshop as the first of many future educational programs. Further information on this project is available at <http://urbanforestry.frec.vt.edu/streets>.

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Geospatial Workshops for Virginia Educators

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During July 2012, CNRE's Geospatial Extension Program, in partnership with VirginiaView, conducted three workshops to promote geospatial content and STEM education in Virginia's K-12 curriculum. These geospatial workshops were provided for precollege teachers and other educators; the workshops were funded jointly by VirginiaView, the National Science Foundation, and three partnering community colleges. The workshops were held at Virginia Western Community College in Roanoke, Southwest Virginia Community College in Richlands, and Thomas Nelson Community College in Williamsburg. Each two-day workshop introduced participants to Global Positioning System (GPS), Geographic Information Systems (GIS), and remote sensing. The workshops presented approaches to integrating geospatial technologies into community college and K-12 classrooms and provided applicability to the Virginia Standards of Learning.

The workshops were conducted by Tammy Parece, a Ph.D. student in CNRE's Geospatial and Environmental Analysis Program, and Alison Goforth, a high school science teacher from Montgomery County, Va. The workshop program was developed by Tammy, Alison, John McGee (Virginia's Geospatial Extension Specialist), and James Campbell (professor in the Department of Geography). The workshops were supported by professionals at each community college.



Examining landcover change using Landsat imagery. Photo courtesy of Jim Campbell.

Workshop participants included high school teachers of human geography, science, and math. The workshops also attracted middle school teachers, elementary school teachers, 4-H coordinators, a master naturalist, a Red Cross volunteer, and a nursing instructor.

The two-day workshops were divided into sessions covering a range of topics. The first day started with a history of GPS, how to use a GPS receiver, how to use data in Google Earth®, and a geocaching "treasure hunt." On the second day, participants were introduced to GIS, where they manipulated online GIS data and explored lesson plans on the topic. Finally, workshop participants explored the field of remote sensing, analyzing stereoscopic photos, aerial photography, and satellite imagery.

By end of the workshop, participants realized that they weren't being introduced to three completely independent technologies. Although GPS, GIS, and remote sensing technologies can be used separately, they are much more powerful when used jointly.

The Geospatial Extension Program and VirginiaView anticipate providing additional workshops for educators across the state, including a seven-day intensive workshop for community college faculty and high school educators during the summer of 2013. For additional information, please contact John McGee (jmcg@vt.edu).



An outside activity creating waypoints with GPS to add into Google Earth. Photo courtesy of Jim Campbell.

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Students Evaluate Fish Ponds at Salem Veteran's Affairs Medical Center

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One of the ponds at the Salem Veteran's Affairs Medical Center that was evaluated by Fisheries Management students.

Senior undergraduates in Fisheries Science are at an exciting (and sometimes terrifying) point in their lives. They have amassed an impressive amount of knowledge and skills related fish, ecology, and the natural world, but they are often unsure about how that information applies to problems in the real world. In Fisheries Management (FIW 4714), they are given the chance to apply what they have learned. This capstone course focuses on developing problem-solving and critical-thinking skills to solve real-world fisheries issues. In the Spring 2012 semester, students in the class had the opportunity to use their skills to help others, specifically veterans and staff at the Salem Veteran's Affairs Medical Center (VAMC). The Salem VAMC provides services to more than 112,500 veterans living in 26 counties in southwestern Virginia.

The VAMC facility in Salem has two small fishing ponds for residents, staff, and guests. The ponds are being managed by Blue Ridge Wildlife Management and overseen by Cedric Short ('09), who provided information and guidance to the students throughout the project. This pond management project provided an opportunity for students to go through the entire process of fisheries science, from developing objectives and designing a research study to analyzing data and presenting recommendations.

After meeting with Cedric to discuss the VAMC's objectives for the ponds, the students designed a field sampling plan to collect information on the fish, vegetation, and water quality. Students usually identify field sampling as their favorite part of the process – no matter how many times you use a shock boat, it is always fun and

interesting. In electrofishing, a low-level electrical current passes through the water, temporarily stunning the fish that swim through the electrical field. With the guidance of graduate students Nate Adkins and Matt Weberg, the students in the boat used nets to collect the fish and move them into a livewell on the boat, where the fish quickly recovered from the shock. Students then measured and weighed each fish; they used those data to evaluate the condition of each individual.

It is also important to know how quickly the fish are growing and the age structure of the fish populations, so students evaluated the age of some of the fish. Like trees, a fish's age can be estimated by looking at annual growth rings. In fish, those growth rings are found in ear bones, known as otoliths. By using a microscope to count the number of rings on the tiny otoliths, the students were able to estimate the age of each fish, allowing them to calculate how fast the fish in the pond were growing.



An otolith is a fish's ear bone that is used to estimate the fish's age; each ring shows one year of growth.

The students found that both ponds were quite healthy, with a range of age- and size-classes of large-mouth bass and bluegill. The students were not satisfied with just maintaining the status quo – they provided recommendations to further improve the ponds, depending

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Fish Ponds, continued from page 8

on the VAMC's specific goals. To create opportunities to catch larger bass, the students recommended a protected slot limit, where fish larger than 15 inches and smaller than 12 inches are kept to reduce competition among fish. Catching the occasional big bass is fun, but the students recognized that the VAMC might be interested in providing recreational fishing opportunities for other groups, like the families of patients or staff. Therefore, they also provided recommendations for catch-and-release fisheries to increase the frequency of catching fish (a definite requirement of young anglers!). Furthermore, many of the patients have limited mobility, so the students recommended placing underwater habitat structures near accessible fishing spots to



Students sampled fish using an electrofisher, which uses an electrical current to stun fish.

concentrate the fish. They also recommended stocking channel catfish, which can be caught effectively with bobbers, requiring less casting.

Throughout the project, the students managed to keep the "big picture" in view – providing fun angling opportunities, while also maintaining healthy pond ecosystems. By offering a service learning opportunity

in a capstone fisheries course, the students and the community both benefitted from the experience.

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