RU College of Science and Technology
Radford University

November 3, 2011

From the Dean's Desk

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Christine Small Collaborates with Business Professors to Promote Land Productivity

Biology associate professor Christine Small will be collaborating with management associate professors Iain Clelland and Gary Fetter on a project to increase land productivity in southwestern Virginia. The study "Terra2B: Development and Scenario Testing of a GIS-based Model of Appalachian Agroecosystems Management" is funded by a $17,700 Radford University Faculty Research Grant.

Christine Small

The project will develop and test a science and technology-based model of Appalachian agroecosystem management on privately-owned lands in southwestern Virginia. "Our goal is to enhance economic growth for land owners and local communities by increasing and generating new avenues for natural resource productivity while also maintaining ecosystem integrity," says Small.

According to Small, about half of the population of the New River Valley (NRV) region live on land classified as rural. Yet more than 700,000 acres of land in the NRV is owned by private citizens who live outside of the state. She says, these tracts are unmanaged and the potential financial productivity is lost.

Non-residents currently have few options to manage their land effectively. Labor is difficult to acquire. Information is difficult to utilize because of its complexity. The support network for private landowners is fractured and severely limited. Another complication is that state and federal employment for advisors, such as agricultural extension officers, is being reduced, leaving a rural workforce that lacks expertise.

As a result, it is quite common for land, the most basic business asset, to be a drain rather than a source of income.

Small adds, private land management practices can have significant impacts on local ecosystems. For example, agricultural land remains the largest contributor of soil erosion and fertilizers and insecticides making their way into streams and other aquatic systems.

Erosion from poorly designed forest roads is also a major problem for freshwater fish populations, rare mussels, and other invertebrates in wetland systems, says Small. Large areas of the rural southwest Virginia landscape are underutilized for various reasons, including labor migration from rural to suburban or urban areas, low soil productivity and landscape constraints such as steep topography, low agricultural commodity margins, and fragmented land ownership patterns.

The Terra2B project is currently in its initial phase. The team will work throughout the 2011-2012 academic year and through the summer on database establishment and model testing. Initial work will focus on expanding a GIS database for a 200 acre farm in Giles County in collaboration with RU geography alumnus David Bradshaw, president of InteractiveGIS in Blacksburg and member of the CSAT Alumni Advisory Council, and Robert Giles, Professor Emeritus of Virginia Tech's College of Natural Resources .

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Upcoming Events:

- CSAT STEM Club Game Night, Nov. 8, 7 p.m., the Bonnie Game Room
- Journey to the Stars, Nov. 8 and Nov. 10, 7:30 p.m., RU Planetarium, Curie Hall.
- Kid's Planetarium Show, Nov. 12, 10:30 a.m., RU Planetarium, Curie Hall

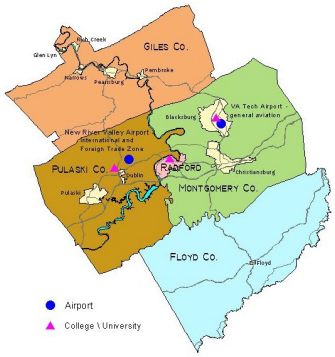
Christine Small Collaborates with Business Professors to Promote Land Productivity (continued)

The team will expand this initial database by adding clusters of absentee land owner tracts and ecosystem, best management practices, and cost and revenue data.

The funded proposal includes a fall 2011 and spring 2012 undergraduate biology student to aid in collection of field and digital data, the development of a GIS database, and more extensive literature review on indicators of ecosystem health and sustainable land use practices. Kiersten Newtoff, an undergraduate biology major with an environmental concentration and geospatial minor will be working with Small on this project throughout the year. The grant also includes a stipend for a graduate assistantship in the College of Business and Economics.

"This project will bring together our best current knowledge for predicting effects of natural and human-induced environmental change resulting from managerial decisions on agroecosystems. We are making use of modern technological advances in remote sensing, GIS, and Multi-Criteria Decision Making (MCDM) to precisely test for optimized agroecosystem outcomes on clusters of private land tracts," adds Small

The research team hopes to create a system that helps absentee and local landowners make the most of their resources in an environmentally responsible way.



New River Valley

New River Valley Planning District Commission

Math Major Interns at Aspen Motion Technologies in Quality Control and Optimization

Senior mathematics major and Charlottesville native Paul Sauer wanted to put his classroom knowledge to the test in an internship with local manufacturing company Aspen Motion Technologies. With a dual concentration in applied math and statistics, Sauer says this experience allows him to get a feel of what might be expected of him in the "real-world."

Math student Paul Sauer with a piece of the motor for the Jacobson lawnmower at Aspen Motions Technologies.

"I think this is a going to be a great experience for me because I am actually applying the knowledge I have learned throughout college to real life problems in industry. My courses in applied mathematics have definitely helped me develop a new way of thinking by allowing me to view a problem from multiple angles and figure out the best way to solve it. My statistics courses however, have absolutely been the most helpful towards my internship as the internship is dealing with statistical experiments," says Sauer.

His internship will conclude at the end of this semester and he is hoping that it will prepare him for a future as a statistician in industry or manufacturing.

Sauer says he is working mainly with quality control and optimization during his internship. Aspen Motions makes small brushless DC motors which go in a variety of products including the water pumps that cool the IBM super computers, Jacobson lawnmowers, industrial fans and data storage devices.

"I currently am working on a design of an experiment dealing with the potting of silicone in the motor for the Jacobson lawnmower," says Sauer. "When the lawnmower reaches an operating temperature of 150 degrees Celsius, the silicone begins to bubble and seep into the internal diameter of the motor resulting in poor performance. My experiment deals with how the silicone is originally potted. I am trying various combinations of factors that are involved in the process to try and find the combination that produces no bubbling in the silicone," says Sauer.

Mathematics and statistics department chair Jill Stewart helped Sauer find this internship experience. "I have been working with Dan Snuffer, the Quality Engineer at Aspen, for several years now placing interns. Dan serves as the site supervisor and I serve as the faculty supervisor for interns at Aspen. I procured the internship for Paul last spring when I learned that Paul needed the course," adds Stewart.

Stewart says an internship is an invaluable experience. "There is a chasm of difference between the college experience and the experience of a real job. Internships bridge that gap. Students learn about the origination of problems, the process of teamwork, ways to research solutions, etc. when they spend time on a factory floor or in a business office. Through the internship experience a student gets a jump on collegiality, a positive attitude, good work ethic, and professional behavior," says Stewart.

"To students debating on whether or not to do an internship before graduation, I would say go for it. It has been one of the best learning experiences for me and has really given me a glimpse of what I will possibly be doing in the future. It is a lot of work, but the payoff is humongous," adds Sauer.

Maymester Study Abroad to Ecuador

Guayaquil, Ecuador's main port

The RU international Education Center and the geospatial science program will give students an opportunity to spend 16 days experiencing first-hand

the different ecological and physiographical regions of Ecuador from May 10—26, 2012.

Students will learn about global business influences to convert tropical forests to oil-palm plantations, early colonization and exploitation of populations, the political realities in a developing nation, establishment of rural cooperatives and their benefit to the affected populations, and the problems associated with economic development and preservation of natural systems.

All participants must have a passport. Geospatial Science course GEOG 280 South America will be offered in the spring semester. Participants are encouraged to take that class for an introduction to the region of the international travel.

Fees for the Maymester study abroad program depend upon the course in which participants are registered. First fee deposit deadline is December 1, 2011.

For more information, contact Bernd Kuennecke in the geospatial science program at bkuennec@radford.edu.

Quito, capital of Ecuador

Wojdak Receives Seed Grant for Science Education Study

Biology associate professor Jeremy Wojdak received a $19,958 Radford University Seed Grant for his project to collect preliminary data, develop example learning modules, and demonstrate the viability of the proposal he will submit to the National Science Foundation Transforming Undergraduate Education in the Sciences program. The focal idea of the major project is to use still and video images set in rich, biological contexts as a gateway to get students interested in learning quantitative skills necessary for science careers.

Science is by its nature quantitative, says Wojdak. "Some progressive educators have started to include more hands-on, quantitative training for their students. A multitude of approaches have been developed, but many rely on getting students more engaged in the science, the 'story' as it were, and then capitalizing on that to focus students on why quantitative skills are necessary to answer the questions they now care about," he adds.

Wojdak's planned proposal to NSF hinges on the argument that pictures are inherently interesting.

Students who can see animal behavior or medical diagnostic images for themselves will be more invested and absorbed in the process of data collection and subsequent analysis, he says.

One objective of this SEED grant project is to assess student interest in exercises using images versus assignments with similar learning objectives but without images. "I believe students will understand and identify with the data in more meaningful ways than with 'pre-collected' data from stats texts or problem sets. In my experience, students start nodding off after about five to 10 minutes of lessons on summary statistics. However, calculating the mean number of leaf-cutting ants passing a point per minute will be more meaningful and appealing if the students have watched the ants themselves," he adds.

Besides using images to engage students, image analysis is itself an ever-growing set of tools used across many disciplines in science to collect data from still or moving pictures. It is used in medicine, engineering, biology, chemistry, and beyond. Thus, students will gain practical skills that can be used in diverse settings after their university studies.

A tortoise beetle from Panama

CSAT STEM Club News

From the Dean's Desk

Davis Hall, Room 127
PO Box 6936
Radford University
Radford, VA 24142

(540) 831-5958
(540) 831-5957 (Fax)
abrown238@radford.edu

Innovation Inspired

www.radford.edu/csat

The can food drive sponsored by the CSAT STEM Club is still in progress, the club will accept either can food or monetary donations from both students and professors. If possible please donate some food. All food and money will go to the Fairlawn Daily Bread.

On Tuesday, October 25, the CSAT STEM Club went to the Linda Mitchell Exhibition in the Covington Center instead of a normal club meeting.

On Sunday, October 30 the CSAT STEM Club volunteered for RU Scared. During this event, we wrapped children in toilet paper to be mummies, invited the little ghouls and goblins to try out our trivia board, and we gave out candy.

Tuesday, November 8 will be the club game night in the Bonnie Game Room from 7-9 p.m. There is a 75 cent fee for the bowling shoes, snacks and other games are free.

Tuesday, November 15 will be another game night; however, it will be in the Stuart Hall Lounge at 6 p.m. The club will offer games and activities so that our members will have a nice, enjoyable and fun-filled evening before Thanksgiving Break.

Right: CSAT STEM Club president Erin Fowler wraps up a mummy.

Left: Trick or treating all around! The science trivia board was quite popular.

Bottom: CSAT STEM Club visited the Covington Center for the art exhibition.