GIS at Washington College: The Next Big Thing

From a cramped computer laboratory on campus, Stewart Bruce is directing a team of staff and student employees feeding an insatiable appetite for Geographic Information Systems technology. Grant money in hand, businesses, governments and schools are all clamoring for GIS. By Ray Noll

Is it possible to be so successful during the worst economic downturn since the Great Depression that a primary challenge is managing the program's exponential growth and keeping trained employees from being overwhelmed?

Welcome to the Center for Environment & Society's GIS Program, where students map out the past and the future, as well as municipal infrastructure, criminal activity and environmental solutions. Students trained in the new technology are fulfilling grants for government, business and education.

"The application between classroom learning and real-world usage is seamless for students gaining practical on-the-job training with GIS. There is no disconnect here," says Stewart Bruce, the GIS program coordinator.

GIS is a computerized mapping system that stores, displays and analyzes multiple forms of data that are based on geographic locations. It then takes the data and creates a map, interpreting the information spatially. Since the data can be drawn from many sources, the information is displayed in layers over a given map. MapQuest and Google Earth both use GIS technology. Academia, businesses and government agencies use advanced software systems, like ArcView, to manage large datasets of spatially-linked information which provide users with powerful analytic tools.

The explosion in the use of Geographic Information Systems at Washington College sprang from the collaborative vision in 2000 of Wayne Bell, inaugural director of the Center for Environment & Society, and John Seidel, an associate professor of archaeology at the time. Both had experience using GIS and could foresee its potential in diverse academic fields.

John Seidel, who now directs the CES, recalls, "Together, we conceived the idea of bringing GIS to campus in a much more ambitious way. We were concerned that as other faculty discovered the power of GIS (or as new faculty with GIS training were hired), we'd see a proliferation of systems and redundancy across campus. We thought it would be most effective if we could develop a central GIS lab that could provide more cost-effective software licensing across the college, provide support and training to faculty, staff and students, set up protocols for data quality and make geospatial data available to all WC users from a central server system."

Proposing a cross-disciplinary program, they approached the Andrew W. Mellon Foundation for funding. Mellon supported the initiative with a $123,000 grant; an anonymous donor contributed another $100,000. In its infancy, the GIS lab conducted several small pro bono jobs for the community, as well as expansion of the archaeological GIS predictive model to five counties on

the Upper Eastern Shore. The technology was also employed to manage data from marine archaeology surveys on the Chester River, to interpret bird and biodiversity surveys, and to develop a five-county heritage tourism map of the Upper Shore.

In 2009, the demand for GIS and its multiple applications has created a tremendous need for highly skilled people to develop new data for these applications. The U.S. Department of Labor has identified geospatial technology as one of the top ten high-growth career fields in America. One of the Department of Labor's goals is to increase the number of young people entering the field. With more than two dozen students acquiring on-the-job training each semester, Washington College is doing its part to graduate the technically skilled analysts required for one of the few growth industries in an economic recession.

The man hired to manage the expanding GIS presence at Washington College is Stewart Bruce. He appears remarkably calm for the number of balls he is juggling. "Stew has taken the program to the next level," says Seidel. "He has been hugely successful in attracting students to the lab, as well as bringing in grant dollars." Two full-time grant-funded staff assistants support Bruce's position as GIS program coordinator: Caryn Thomas '05 is responsible for Crime Mapping and schedules 24 part-time students on six computers; Denise Hakanson '96 is in charge of Educational Outreach and runs three summer youth and teacher GIS Camps on campus. Multiple grants support the wages of each student employee.

Bruce is constantly looking for the next wave of young talent to join the GIS staff. He actively recruits freshmen, putting them through his introductory GIS course and then hiring them to work on specific projects where they immediately put classroom theory into practice, honing their GIS skills on the job. Likewise, the summer camps for seventh- to twelfth- graders are intended to capture teen curiosity in GIS as well as pique their interest in Washington College. To facilitate teenage involvement with GIS, two teachers' camps will be offered this summer. The camps help serve another need recognized by the Maryland Higher Education Commission—the national shortage of students interested in science, technology, engineering and mathematics, known as STEM. As a STEM discipline, GIS introduces students to other fields such as business, communication, education, environmental management, health and human services, natural resources and transportation, to name a few.

In a synopsis of the three-prong GIS mission at Washington College, education is the lynchpin. The educational component includes introductory and intermediate GIS courses taught at the College, the support of student, faculty and staff projects in GIS, and community projects. Seidel's vision for the integration of new data management and analytical technologies into college coursework continues to grow with six departments incorporating GIS into their programs. These include anthropology, environmental studies, sociology, political science, information systems and education. As an example, Jessica Gerrity, assistant professor of political science, is using GIS for her students' demographic research, analyzing 2008 election data to determine voting patterns between rural and urban areas in America. Andrea Lange,

associate professor of sociology, has students use GIS for mapping crime patterns in her criminology course. Anthropology mapping and crime mapping courses are in development.

Students have incorporated GIS into their Senior Capstone Experience. One archaeology major used the technology to map shoreline erosion along local rivers and to identify archaeological sites that are in danger of being wiped out.

On campus, Public Safety has several GIS projects in the works, including digitizing the floor plans of every building on campus, mapping "paths of light" across campus, and utilizing crime maps of the Chestertown community.

Beyond the student/faculty/staff mission, the GIS program has six focus areas—the environment, youth education, municipal infrastructure, history and archaeology, crime mapping and community visualization. All are equally important but not all are equally funded, with youth education and crime mapping capturing the lion's share of grant funding. Maryland Governor Martin O'Malley has made crime prevention a priority in his administration, providing a total of $285,000 to the College's GIS program to map crime in Maryland counties and to provide technical assistance to law enforcement agencies.

"Crime mapping has mushroomed this past year," Bruce says. "The demand for work has created the need to hire another full-time staff person to assist Caryn and to hire additional student interns who do a substantial amount of work."

Under youth education, Washington College has been awarded $201,450 from the U.S. Department of Agriculture (USDA) and the Tuscarora Intermediate Unit (TIU) to provide GIS curriculum and training for teachers and students in seven school districts in rural central Pennsylvania. Bruce has seven students helping to design a K-12 curriculum package, which includes lesson plans, teacher aids, power points, lecture notes and lab manuals. This package is being expanded to an additional eight school districts in Maryland and Pennsylvania. "The ultimate goal is to design a free, open source curriculum posted on the Internet using Moodle, which would be available to the world," Bruce says proudly, adding, "Our GIS educator, Denise, is playing an essential role in this goal by helping develop the Moodle and by assisting the team of students assigned to this project." By offering the curriculum to a broad audience, the College's GIS Progam is well positioned to leverage new sources of external funding.

Complementing the USDA/TIU grants, the Maryland Higher Education Commission recently awarded Washington College $164,511 to provide GIS technology training to members of the state's work force affected by Base Realignment and Closure (BRAC). As part of the BRAC Higher Education Grant, Washington College has partnered with Chesapeake College, the Upper Shore Workforce Investment Board and the Regional Higher Education Center to deliver GIS training to members of the adult workforce in the region to help prepare them for possible BRAC employment. The training also supports a National Defense priority for increased employment in the Geospatial Intelligence industry.

In keeping with the George Goes Green initiative, another GIS project involves mapping the tree canopy of Chestertown. This project is now being expanded to Rock Hall, Betterton and

Millington. The objective is to determine tree species and the health of those trees. Tree mapping also measures canopy size in order to analyze carbon removal from the atmosphere, the tree's potential watershed filtration ability and its contribution to urban greening.

John Seidel conclusively stipulates the program's purpose, "We want the GIS lab to continue to be interdisciplinary in its focus. It is extremely important we do this in order to give undergraduates actual experience, and that requires close and careful supervision."

Ray Noll first encountered the forestry applications of GIS in 2001 during his work with the Sustainable Forestry Initiative of Pennsylvania. The subsequent use of GIS on his family's 600-acre tree farm in central PA determined accurate boundary lines and species composition to detect shifting patterns of sustainability.