

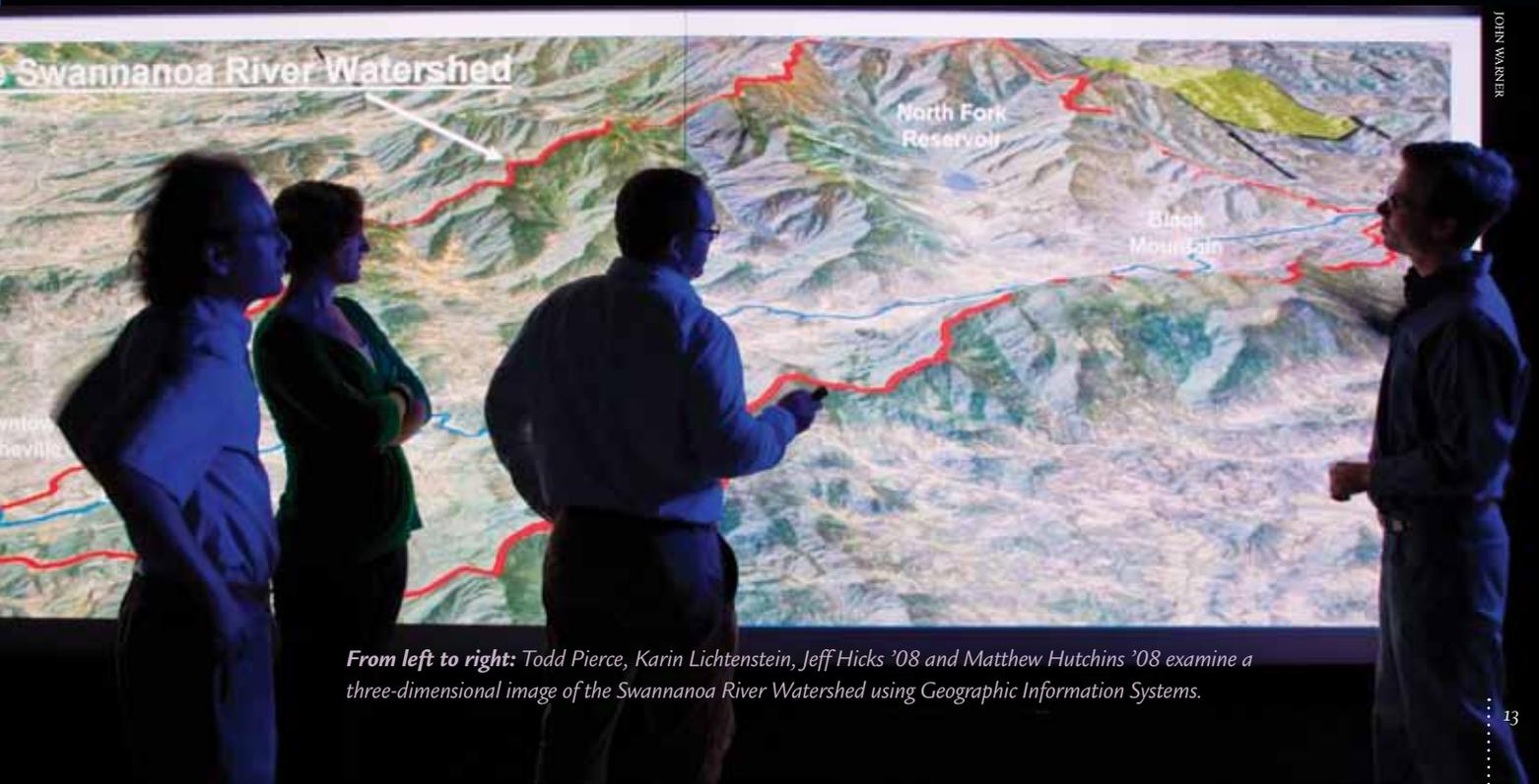
NEMAC

translating data into
meaningful and useful science

Tucked away in a corner of Rhoades-Robinson Hall at UNC Asheville, there's a small group of people making a huge difference in the way communities use data. These people are turning massive amounts of scientific data into electronic visualization and computer models that help community leaders make better decisions on issues as diverse as disaster recovery, climate change and land use planning, energy conservation and water quality.

Founded in 2004, the National Environmental Modeling and Analysis Center (NEMAC) includes more than a dozen staff, scientists, alumni and student interns. They are curious, eager people creating computer animations and other models that help people understand complex concepts quickly. Other projects include research that promotes economic development efforts as well as regional and national environmental issues.

BY MELISSA STANZ



From left to right: Todd Pierce, Karin Lichtenstein, Jeff Hicks '08 and Matthew Hutchins '08 examine a three-dimensional image of the Swannanoa River Watershed using Geographic Information Systems.

NEMAC and its multitude of partnerships bring smart students, scientific professionals and local decision-makers together to solve problems facing the world—sometimes even before the problems reach a critical state.

A self-supporting entity, NEMAC raises money from grants and contracts for work, mostly for applied research, and builds partnerships with local entrepreneurs, national governmental agencies, city, county and state government leaders and others.

Some of NEMAC's current partners include the U.S. Forest Service, the National Oceanic and Atmospheric Administration's National Climatic Data Center, the Renaissance Computing Institute and ERC Broadband, among others. NEMAC has also worked with The Elumenati, a design and engineering firm in West Asheville founded by UNC Asheville alumnus David McConville '93.

NEMAC is led by Jim Fox, a Western North Carolina native who takes this work personally. "Growing up, I used to take our environment for granted; we had unlimited water, cheap energy and a stable climate. But we have new realities today, realities shaped by urban sprawl, development and climate changes. We're dealing with issues in our own back yard,

and we must provide local toolsets to help," he says.

Students are an integral part of NEMAC. All interns are paid and are involved with applied research projects designed to enhance their learning experience while contributing to the teams' work. They quickly learn about developing products, the importance of deadlines and deliverables. "We rely on our students to carry out their research in a professional way," said Fox. "This provides good training for them as they go out into the real world."

Fox notes that his interns frequently outperform expectations. One example is former intern Jeff Hicks '08, who came to NEMAC through UNC Asheville's Environmental Studies Department. "We enjoy learning from different generations who share their passion for new technologies," said Fox. Hicks is now a geospatial analyst and a full-time NEMAC employee. "I'm very fortunate. I'm doing something meaningful and socially responsible, combining my passions and learning more marketable skills here. Plus, I get to stay in Asheville and at UNC Asheville," Hicks said.

Beth Porter, a junior majoring in Environmental Studies, is a NEMAC intern who worked on the Buncombe County Multi-Hazard Risk Tool project. "I got to do lots of research in the county;

Right: Greg Dobson, NEMAC Geographic Information Systems coordinator, reviews elevation models he created in his Rhoades-Robinson Hall office.



ASHVILLE CITIZEN-TIMES

**NEMAC CLEAR
RENCI EFETAC
alphabet
soup**

ALL ORGANIZATIONS have their own language—shorthand acronyms that facilitate communication. But unless you belong to that organization, these terms sound like alphabet soup. Here's a guide to demystify the work that NEMAC is doing.

NEMAC National Environmental Modeling and Analysis Center at UNC Asheville, a university center for projects that focus on climate change, forests, land use, water and energy.

RENCI Renaissance Computing Institute, a NEMAC partner. UNC Asheville now has a downtown RENCi Engagement Site and is using multimedia technologies to help people and organizations understand the effects of weather. Other RENCi engagement sites are located across the state.

NCDC National Climatic Data Center, part of NOAA (National Oceanic and Atmospheric Administration), a NEMAC partner.

EFETAC Eastern Forest Environmental Threat Assessment Center, part of the U.S. Forest Service, a NEMAC partner. These two groups collaborated to develop a Threat Summary Viewer online tool.

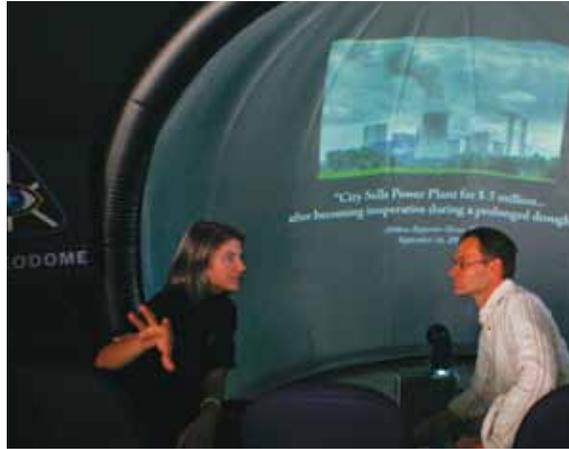
CRAFT Comparative Risk Assessment Framework Tools, a decision process created by the U.S. Forest Service that

includes a user-friendly, Web-based support system that helps natural resource managers address uncertainties inherent in land management decisions.

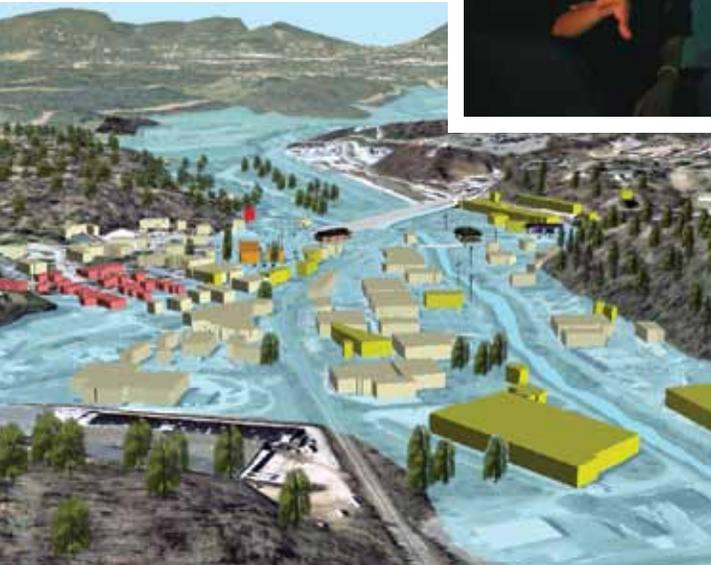
CLEAR Climate Literacy, Education and Research project, a collaboration between NEMAC and NCDC to find new ways to organize and deliver the data that is relevant to climate change and local decision making to professionals in transportation, water resources and town planning.

Right: Bridget O’Hara, NEMAC science delivery specialist, and U.S. Forest Service Ecologist Steve Norman use the GeoDome.

Below: Computer models developed by NEMAC show the potential for flooding along the Swannanoa River near Biltmore Village in Asheville.



MATT ROSE



great connections for future employment.”

Five years ago, Asheville experienced severe flooding in the wake of two hurricanes. A Flood Damage Reduction Task Force was developed and challenged with finding ways to mitigate the devastating effects of the flood and to avoid the problem in the future. The data collected about the flooding was formidable,

and the Task Force needed to translate it into understandable tools. The Task Force turned to NEMAC for help.

Recognizing that this work fit well with its mission of disaster mitigation and economic development, the

Renaissance Computing Institute (RENCI) chose NEMAC as one of the first RENCI Engagement Sites. RENCI’s funding and technology allowed NEMAC to create a 3D watershed tool that shows the location of flood-prone areas, impervious surfaces and the effect of future building in the watershed.

In October, RENCI and NEMAC relocated its Engagement Site to the Grove Arcade in downtown Asheville. The visible and convenient location features a number of high-tech visualization tools, including a 3D GeoDome and a Visualization Wall to present complex data to local leaders and non-technical constituents. The visualization tools provide ways to explain complex topics and help scientists tell the story of what massive amounts of data mean.

From watershed models to multi-hazard risk tools to forest threat analyses, the projects under way at NEMAC will help bring clarity to varied issues including climate change, land and energy use and water quality and management. NEMAC and its multitude of partnerships bring smart students, scientific professionals and local decision-makers together to solve problems facing the world—sometimes even before the problems reach a critical state.

I looked up fire stations and post offices and logged all that data to create one layer for this database. It feels good to know I’m helping people,” she said. “This internship is amazing; I’m in contact with so many scientists, researchers, and community institutions, and I’m making

computer geek *extraordinaire*



RAY HILL is a proud geek. A native of Hendersonville, the May 2009 UNC Asheville graduate was a former NEMAC intern. As a student, he served for more than a year as NEMAC’s information technology support person, repairing paper jams in printers, figuring out why servers went down and getting them back online, doing updates, backups, and troubleshooting. He also conducted research on client projects, learning about GIS (geographic information systems) software and more, broadening his knowledge and improving his critical thinking skills.

That knowledge paid off. When GIS industry leader ESRI in California started looking for

interns, they noticed Hill’s application and his GIS knowledge. Following an interview, Hill was selected as one of just 34 interns across the nation from a candidate pool of more than 1,300.

In the GIS world, ESRI is as big as Microsoft or Google, and Hill is thrilled to work there. He is currently working as a systems administration intern supporting analysts as they troubleshoot for their customers. Recently, Hill’s internship was extended, and his prospects for full-time employment look good. Eventually, Hill hopes to travel internationally with ESRI, making a difference worldwide.

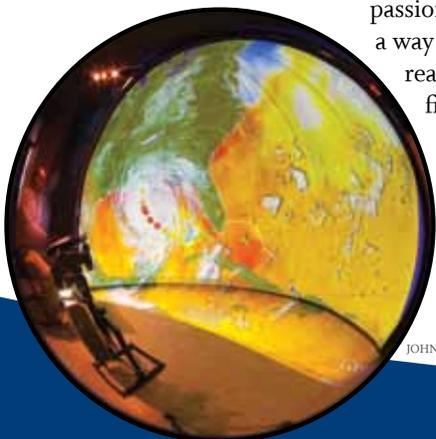


Jim Fox: A man with a plan

Above: Working closely with students in the office and out in the field, NEMAC Director Jim Fox (right) looks at computer visualizations of flooding from a French Broad River vantage point.

click it:

For more information about NEMAC visit orgs.unca.edu/nemac



JOHN WARNER

A Western North Carolina native, NEMAC Director Jim Fox did not settle permanently in North Carolina until a few years ago. He was an Army brat, and so far he's moved 30 times. But his heart and extended family always were in the mountains, and he spent his childhood summers near Lenoir and Cruso.

Fox has a classic entrepreneurial formula for career planning, one he is accomplishing at NEMAC and also passing along to his staff and students. "Find something you love to do and have a passion for doing," he says. "Then find a way to do that in light of your current reality, as in get paid for it, and then find ways to continue to get paid for it in the future."

Fox's plan has worked for him throughout his career. Graduating from the University of Missouri at Rolla with a degree

in geophysics, he embarked on a career in oil exploration, working for Phillips Petroleum worldwide. After several years, he started his own company with partners doing international deep-water oil exploration. That company succeeded, discovering oil off the coasts of U.S. and Israel. With a buyout of his company in 2001 came a three-year non-compete agreement. He took a breath, evaluated his options and moved to Asheville.

Fox then went back to school online, achieving a degree in education using information technologies. He wrote a grant for and created a history of mining exhibit for the Colburn Earth Science Museum in Asheville. That project got the attention of UNC Asheville's provost, who invited him to come to the university to work and write grant applications. That work led to NEMAC.

Commitment to the community

The recent opening of the Renaissance Computing Institute (RENCI) Engagement Site in downtown Asheville marked a new chapter in the university's ongoing commitment serving the needs of the greater community.

Previously located nearly 10 miles outside of town, the Engagement Site in the Grove Arcade puts RENCI and NEMAC researchers closer to community leaders, who will use leading-edge technology and high-performance computing power to understand complex data. Those leaders will then be better equipped to make decisions about issues including environmental sustainability, disaster preparedness and public safety.



The City of Asheville is the perfect location for the RENCI at UNC Asheville Engagement Site, said NEMAC Director Jim Fox, at the dedication ceremony on October 1 in the city-owned Grove Arcade. Fox was joined at the dedication by Chancellor Anne Ponder, Asheville Mayor Terry Bellamy and UNC President Erskine Bowles.

The City of Asheville and NEMAC began working together after the widespread flooding in the region that occurred in the wake of a series of hurricanes in 2004. With technological assistance from RENCI at UNC Asheville, which is part of NEMAC, the group developed a 3D watershed tool that shows the location of flood-prone areas, impervious surfaces and the effect of future building in the watershed. This set of tools is being used to create a new plan to mitigate the effects of floods and

to avoid flooding in the future. RENCI at UNC Asheville is also at work on building visualization models for the City's Downtown Master Plan.

As a part of the opening celebration, Asheville Mayor Bellamy and Chancellor Ponder signed a formal agreement for the city and university to work together on common issues of environmental sustainability, health and wellness, culture and recreation, economic development and technology, and public safety.

Chancellor Ponder noted that the partnership agreement aligns with the university's Strategic Plan, the city's goals, and UNC Tomorrow, the UNC system's plan for responding to the needs of North Carolina.

President Bowles agreed. "I think the real benefit of the signing of the Memorandum of Understanding is that it will enable us to leverage the fabulous resources and people we bring together as a group. More will come forward from it and benefit the people of this region."



Above: Chancellor Ponder (foreground) and UNC President Erskine Bowles view data visualization on NEMAC's 20-foot VisWall at the opening of the new Engagement Site.

PHOTOGRAPHS BY MATT ROSE

Below: Asheville Mayor Terry Bellamy (left) and Chancellor Anne Ponder sign the Memorandum of Understanding as officials from the university and city and state government look on.

