

HIGHLIGHTS and INITIATIVES



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The EERC conducts unbiased,
analytical, and multidisciplinary
research designed to promote real-
world solutions to problems in the
fields of energy, environment, tech-
nology, and economic development.

WORKSHOPS. EERC's Water Resources Research Center (WRRC), led by Assistant Director **Tim Gangaware**, has collaborated with UT Assistant Professor **John Buchanan (Biosystems Engineering and Environmental Science)** and the Tennessee Department of Environment and Conservation (TDEC) to develop a two-tier training program on erosion prevention and sediment control for the construction industry. Construction-site erosion and sedimentation are the leading causes of water quality impairment in Tennessee. This fundamentals course, introduced in June 2001, targets construction-site managers and brings Tennessee into compliance with EPA's National Pollution Discharge Elimination System, which is administered by TDEC. WRRC also created a second-level, more-intensive curriculum for engineers, landscape architects, and site inspectors. TDEC will begin offering the second-level course early in 2003.

PUBLICATIONS. EERC recently released the fall/winter edition of *Sightline*, a publication that addresses resource issues in Great Smoky Mountains National Park. The current edition features stories on land-use controversies, re-introduction of the otter, the health of the native brook trout, management of Southern balds, control of the hemlock woolly adelgid, and the effects of ozone on hiker health. *Sightline*, which has a circulation of 10,000, is sponsored by EERC, Friends of Great Smoky Mountains National Park, and Great Smoky Mountains Natural History Association. EERC Communications Director **David Brill** serves as *Sightline's* editor in chief.

Brill's third book, *Desire and Ice: Searching for Perspective atop Denali* (National Geographic Society [NGS] Adventure Press) was released in November. The book recounts the author's ascent of 20,320-foot Mount McKinley, North America's highest peak. **Brill** will speak at NGS headquarters in February as part of National Geographic's "Quest for Adventure" lecture series.

PRESENTATIONS. In November, Faculty Associate **Mary Rogge (Social Work)** presented "Big Problems for Small Packages: Environmental Sustainability and Children" at Anna Maria College in Paxton, Massachusetts. **Rogge** stressed the social, scientific, political, and economic dimensions of environmental equity and their related impacts on social justice. **Rogge** spoke by invitation at the inaugural D'Mour Seminar on Environmental Equity, sponsored by the Springfield-based *Fides et Ratio* Foundation.

Also in November, Senior Research Scientist **David Feldman** presented "Water Disputes in the Southeast: What We Know about Them and What We Can Do to Address Them" in the Special Interest Session of *Business Opportunities 2003*, an East Tennessee Environmental Business Association conference held at the Knoxville Airport Hilton. **Feldman**, who directs the University of Tennessee's Southeast Water Policy Initiative, also serves as an adjunct professor in UT's Department of **Political Science**.

Modeling Ecosystem Health



Each *Highlights and Initiatives* back page presents a closer look at one of EERC's projects or activities. This edition focuses on efforts to develop aquatic and terrestrial ecosystem models that will help the National Park Service measure ecological health.

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Modeling Ecosystem Health

Aquatic and terrestrial ecosystem models will help the National Park Service predict ecological health and change. • BY KRIS CHRISTEN

“Just as...doctors [use vital signs to] diagnose medical problems, vital signs for ecological health might indicate something going wrong in the environment.”

HOW DO YOU KNOW when a particular ecosystem has been so altered that some communities of organisms have been pushed to the brink? And what kinds of indicators might give you the best clues about the overall health of such an ecosystem?

Researchers are grappling with these and other questions under a National Park Service (NPS) initiative to develop long-term ecological monitoring programs for each of the 270 parks nationwide that fall under the agency’s jurisdiction. This program, dubbed Vital Signs, is an attempt to identify key indicators of ecosystem health, which in turn will help develop easy and inexpensive monitoring techniques.

Just as a patient’s temperature and blood pressure readings help doctors diagnose medical problems, vital signs for ecological health might indicate something going wrong in the environment, says **Jack Ranney**, an ecologist with the University of Tennessee’s Energy, Environment and Resources Center.

The Vital Signs program zeros in on an ecosystem in a three-step process—identifying critical stressors that cause change, determining the responses in key ecological attributes, and establishing good protocols for sampling—says Ranney, whose specialties encompass systems ecology and monitoring methods. He is currently assisting two NPS networks (the Cumberland Piedmont and the Appalachian Highlands) in the first phase, developing models for their terrestrial and aquatic ecosystems.

According to Ranney, some of the primary ecosystem stressors include climate

change, severely impaired air quality, major changes in land use adjacent to the parks, degraded water quality and altered water quantity, rapidly increasing numbers of invasive plants and pathogens, and inappropriate recreational activity. These stressors, in turn, may induce any number of changes, ranging from declining biodiversity or functional changes in ecosystems to changes in stream hydrology.

Once stressors have been mapped against ecosystem responses, “we’ll identify various indicators of such changes, and how we might go about monitoring these,” Ranney says. Ultimately, because of limited funds and personnel, the parks will pare the list to a dozen or so indicators. After modeling is complete, the next step is to overlay the models with management issues and concerns specific to various parks. Managers would use the resulting information to make decisions on how to manage the park, as well as to assess management efforts and ecosystem health.

After identifying *what* to monitor, the park service will figure out *how* to do it—namely by developing protocols that will yield cost efficient, reliable, and consistent information—and finally, will implement the monitoring stage. The Cumberland Piedmont and Appalachian Highlands networks expect to reach the monitoring stage by April 2004.

Researchers hope the modeling exercise will eventually offer a more systematic approach to monitoring, providing them with more trends data as well as more leverage in dealing with policy questions at the local, state, regional, and perhaps federal levels. ●

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