FACULTY SPOTLIGHT

Erica Smithwick: A Burning Desire to Understand the Effects of Forest Fire on the Landscape

by Joy Drohan

photo credit: National Park Service

The day began before dawn at the University of Wyoming research center at the edge of Jackson Lake. As the sun rose, Erica Smithwick and her research team could see the clear blue of the lake, with Mount Moran in Grand Teton National Park as the backdrop. After completing a final check of field equipment, with coffee in hand and chilled by the cool early morning summer air, they were on the road into Yellowstone National Park by 6:30. Always on the lookout for moose or grizzlies, they wound past dense, scraggly lodgepole pine stands. Then, crossing hills that test any vehicle's brakes, they entered some of the 35 to 40 percent of the park that had burned in 1988. Scattered trees, taller than Smithwick's six-foot field assistant, covered many patches. They drove on, into areas that had burned in 2000.

The goal was to sample soil nitrogen at ten sites across a gradient of fire severity. Smithwick wanted to understand how variation in postfire vegetation recovery affects spatial patterns in soil nutrients. As they toiled in the shadeless sun of the recent burn, the team's clothes quickly blackened with soot. All around, they saw life returning – pinkish fireweed, scattered lupine and snowbrush, and lodgepole pine seedlings. Smithwick, then a postdoctoral researcher and now a Penn State assistant professor of geography, is building a career studying ecosystem-wide impacts of forest fire and other disturbances.

"I call myself a landscape ecologist," says Smithwick, "which means I'm interested in the effect of pattern on process." She uses fieldwork and computer modeling to determine how disturbances such as wildfire, insect infestation, and climate change affect landscapes and their functions. She works at various spatial scales – from that of soil microorganisms to the entirety of Yellowstone National Park.

Since 2003 Smithwick has studied the park's recovery from wildfire, first examining the effects of severe fire on nitrogen cycling. She then coupled field and modeling work to develop a "story" of ecosystem change and the consequences of burn patterns on both carbon and nitrogen cycling in Yellowstone. Long-term observations show that the forest is regenerating well, but there are many differences in rate linked to factors such as fire severity.

In a separate research project Smithwick is examining the intertwining effects of climate change and fire. With funding from the National Institute for Climate Change Research, she is using computer models to understand how fire may affect tree migrations under climate change along the Appalachian Trail, which runs from Georgia to Maine. Northward shifts of southerly tree species such as oak, hickory, and pine are expected in the eastern United States with warmer future temperatures. Southern species are more fire-prone. With Elizabeth Crisfield, Penn State geography graduate student, and Dominique Bachelet, associate professor of agricultural and ecological engineering at, Oregon State University, Smithwick is examining whether wildfires will move north with the presence of more fire-prone species.

Smithwick's interest in the environment blossomed early, fostered by innumerable hours playing outside her family's upstate New York farmhouse. She was particularly impressed by a trip to Iceland where her family took a prop plane within miles of the Arctic Circle and landed on a short runway nestled in a glacially carved fjord. "Seeing nature in the 'raw' like this," Smithwick notes, "certainly made me appreciate the wonders of nature." But, in choosing an undergraduate school, she wanted to ground her wonder in nature in a concrete way. "I didn't want to be an 'advocate' of nature--," she says, "rather I really wanted to understand it first, and from this understanding form a more complete and defensible position of environmental stewardship." This desire drove her to complete dual degrees in geology and environmental studies at Tufts University, followed by a master's in forestry/resource conservation at the University of Montana and a Ph.D. in forest science/ ecology at Oregon State University.

Smithwick is equally passionate about her family, including six-year-old Anna and four-year-old Leighton. She acknowledges that her greatest challenge currently is balancing the demands of work and family. But she had a great mentor and example in her postdoctoral advisor, Monica Turner, at the University of Wisconsin. "I watched her succeed in life and work for five years," Smithwick says, "and it provided me a window into the possible. I saw how efficiently she worked during the day, and how enthusiastically she supported her children in their activities and pursuits." Smithwick aims to follow Turner's example, and do it all with a smile. ■

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For more information please visit the Landscape Ecology at Penn State (LEAPS) website at: http://www.geog.psu.edu/leaps/index.html.