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WHAT IS THERE TO LOSE?

Lisa Tiemann, a UNH soil biogeochemist, conducts Ugandan cropland fertility study, hoping to help increase agricultural productivity

Along the foothills of the Rwenzori Mountains in Uganda, a woman of the Bakiga tribe is picking weeds beneath a banana tree with her long skirts gathered around her knees. The hill slope is so steep here; she can use both hands and feet to wend her way across the small plantation. Within her view is the clear line between agricultural and conservation land separated by a river. The lush forest that rises beyond is encompassed by Kibale National Park, a biodiversity hotspot within the Albertine Rift Valley that provides a geographically diverse habitat for many endangered species, including chimpanzees and native plants. For farmers in the region, however, this protected forest serves to reduce access to arable cropland even as their own soil is losing fertility at an alarming rate.

It is this woman – and others like her – that Lisa Tiemann is seeking to question for one of the premiere studies conducted on soil fertility loss in Uganda. A post doctoral researcher and soil biogeochemist in the College of Life Sciences and Agriculture at the University of New Hampshire, Tiemann was a 2012 recipient of a prestigious three-year $500,000 fellowship through the National Science Foundation’s Science, Engineering, and Education for Sustainability program. This grant enables her to sample soils from 150 diverse sites around Kibale National Park. She is collaborating with agroecologist Stuart Grandy and geographer Joel Hartter, both professors at UNH, to conduct the research that will lay the foundation for Uganda’s implementation of a sound soil fertility management strategy. It is their hope that such a strategy will help ward off the looming threat of wide scale food insecurity across a country that’s smaller than the state of Oregon and supports a population of nearly 35 million.

“I sought out the women, because they’re the ones who are on the land, planting and harvesting the crops,” says Tiemann who made an initial visit last January, where she took soil samples from under maize fields and banana plantations. “Uganda is known as the Pearl of Africa,” says Tiemann about this tropical land straddling the equator with temperatures not more than 85°F in the day that cool off to the low 60’s at night. And, while the soils look rich and fertile, they’ve been stretched to produce two to three growing seasons a year during the past twenty years of continuous cultivation. “The Bakiga, in particular, used to be migrants. They would till and harvest until they’d begin losing productivity and then they’d move on to let the old fields rest,” says Tiemann, “only they can’t do that now.”
For both the Batoro and Bakiga tribes, tensions ensued after the Ugandan Wildlife Authority pushed people off conservation land in 1993. And for those who farm near the park, crop raiding is a common frustration. Families see no other option than to keep their children home from school in order to guard the bananas and maize from the elephants and baboons that trample across the natural borders and man-made trenches in search of an easy meal. Even though Tiemann’s interpreter makes it clear that she is not associated with the Ugandan Wildlife Authority, the people Tiemann speaks with still want to know what she is going to do about the elephants – revealing their deepest concern. In addition to crop raiding, farmers also cite issues with bad roads as a detriment to getting their goods to market, the lack of farm land, both drought and flooding, and the fact that their children are unable to obtain a consistent education because they are so often needed to stay home to protect the crops.

At a road cut on the way to a sample site, Tiemann’s driver stops the truck so that Tiemann is able to take a closer look at the exposed soil strata. “These are highly weathered oxisols buried under dark silty loams,” she says pointing to the second tier, which appears to have poor fertility and a low phosphorous content due to an abundance of ancient, highly weathered minerals. Tiemann’s guess is that the dark, rich soils of the top layer contain younger volcanic ash deposits mixed with ancient lake sediments. Back in the Grandy Lab at UNH, she’ll dig into the geologic history and determine the composition of each layer down to its most basic elements.

In a country where agriculture is nearly half the GDP, Ugandans rely on soil fertility for their very survival. As she travels, Tiemann frequently fields complaints about the recent crop production loss across a land that has been continually pushed beyond its present capacity to produce subsistence and commercial crops of maize, bananas, rice, groundnuts, squashes, cotton, tea, and more. Adding synthetic fertilizer is not a viable option for the family farmer due to its exorbitant cost and the lack of infrastructure with which it would be transported. Furthermore, only part of the population understands the importance of using mulches, practicing crop rotation, and fallowing fields.

One thing is clear: Ugandans need their cropland soil to be more productive. “They were adamant that I come back to share my results,” says Tiemann of the farmers she visited. “They want to know what the results are going to be and how they will benefit from them.” Tiemann will return to the same sites this summer with UNH Environmental Conservation Studies major and International Research Opportunities Program recipient, Michael Casazza, to continue the study.

~ Contributed by Victoria Cortland