



Lessons from East Africa

Agroforestry research brings new perspectives on sustainable land use

by Bryan Bernart

Agroforestry is a type of land-use system that is at once traditional and forward-looking. In agroforestry systems, trees and crops are planted together in order to increase sustainability and biological diversity. This is particularly important for people living in areas expected to be most affected by the effects of climate change, but it also holds promise for wider use in many different regions, including the Pacific Northwest.

Under the leadership of Professor Badege Bishaw (FES), the College of Forestry is fast becoming a key center for agroforestry research in the United States and beyond. Agroforestry initiatives include the recently established PNW AgroForestry Working Group, which connects participants from agencies, universities, and institutes from Oregon, Washington, and Alaska with collaborators in Nebraska and the USDA National Agroforestry Center in Washington, DC; long-standing collaborations with the World Agroforestry Center (ICRAF) and the Ethiopian Institute of Agricultural Research; and past partnerships between OSU and universities in South Africa and Ethiopia. The College currently offers two agroforestry courses at both the undergrad and graduate level, which can draw as many as 45 students from across campus, and a new graduate certificate in Forests and Climate Change is in development.

These efforts have created opportunities for students and faculty alike to participate in exchanges between OSU and its partners abroad. This spring, international visitors to Corvallis will include the ICRAF Ethiopia Country Representative and the East and Southern Africa Regional Coordinator. These efforts have created opportunities for students and faculty alike to participate in exchanges between OSU and its partners abroad.

Last summer, Jeannette Krampien, a master's student in Forest Ecosystems and Society, spent five months in Ethiopia studying agroforestry systems. In particular, she focused on two plants grown together in a parkland-type agroforestry system: the indigenous *Faidherbia* tree, which fixes nitrogen in the soil, and the "ancient grain" crop known as "teff" (*Eragrostis tef*), a staple food grain in Ethiopia and Eritrea. In a conversation with the *Focus*, Krampien details her work, her experiences in East Africa, and her thoughts on agroforestry and climate change.

What can you tell us about the research you conducted?

My work is related to the effect of environment on the physiology of plants in an agroforestry system. I wanted to examine the effects of tree

pruning and crop distance on various attributes in both species. For the trees, I looked at leaf area index and used sap flow gauges to measure water use, which were then related to environmental conditions. For the crop, I measured growth, leaf area index, and relative chlorophyll content, as well as took samples that will be used for ^{13}C determination—a measure that can be helpful in examining plant metabolism and may also be used in tests that indicate whether a plant has experienced drought stress.

Was there any particular reason you chose to work in Ethiopia?

My goal, initially, was to go somewhere in East Africa. Opportunity just happened to present Ethiopia as a suitable location at the time I wanted to go; equipment, site and advisor availability, and funding, provided by the World Agroforestry Centre, Ethiopian Institute of Agricultural Research, Australian Centre for International Agricultural Research, and OSU, were factors in my decision.

Why have you chosen to study agroforestry, and in your own words, why does agroforestry matter, and to whom?

My first experience with agroforestry was as a Peace Corps volunteer in Niger, where I worked as an Agroforestry extension agent. From my experience, I've learned that agroforestry is a means to sustainable production of agricultural and forest products—but it's not just about production. It's about protecting soils, water, biodiversity, and the atmosphere for future use. Agroforestry is important not only for land owners and managers, but for the general public that ultimately depends on the sustained use of natural resources.

What kinds of ideas and strategies regarding agroforestry implementation that you learned and observed in Ethiopia are applicable to agroforestry in the Pacific Northwest?

I think I came back with a greater appreciation for flexibility in land management. Most farmers in Ethiopia practice smallholder farming (a blend of subsistence and cash crop farming meant to support a single family), and they really try to get the most out of their land by using multiple agroforestry practices. Because, in the Pacific Northwest, so many types of landscapes exist, often blending into each other, farmers here must also be creative and flexible in order to reach production, ecosystem service, and conservation goals. Multiple management practices, including silvopasture, riparian buffers, and windbreaks,



are often employed on a single piece of land, and success depends on using them effectively.

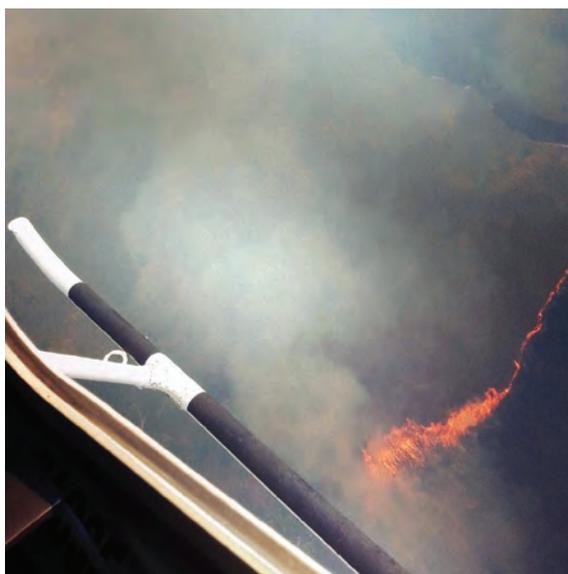
Do you see agroforestry as an issue that should be addressed at a global scale? How could worldwide implementation of agroforestry affect communities ecologically and economically?

Sustainable agriculture, sustainable forestry, improved ecosystem services, and biodiversity conservation are issues that need to be addressed at a global scale. I see agroforestry as a possible means to those ends, along with other strategies undertaken at the global level. Agroforestry systems can protect soils, sequester carbon, improve water quality, and increase biological and economic diversity, leading to greater resiliency of communities

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Photos: (clockwise, from top left page) “teff” (*Eragrostis tef*) panicle; research plots along a tree; Jeannette Krampien (right), with friends Atika, Abdu, and Hawi.



your department. This young man displayed clear thinking in an emergency situation, has displayed a clear ability to act decisively without delays, [and] has an innate understanding of others' needs in critical situations."

For someone whose career goal is a high-risk occupation, where every decision requires critical thinking under pressure, the letter is one more indication that Vermaas is well on the way toward his chosen destination.

Note: As this issue was going to press, Vermaas shared some good news: he has been offered a position as a smokejumper in Idaho and will begin training in May. He writes, "This is the career I have dreamed of, and with a little hard work, patience, commitment, and determination good things can happen. I am beyond thrilled to have this opportunity!"

treated, Vermaas looked after the man's service dog, and then gave the pair a ride back home.

A short while after the experience, Vermaas had something to help him remember it: a letter of appreciation for his actions and service written to the Director of the Idaho Department of Lands. It reads, in part: "You are fortunate to have an individual of such caliber working in

Photos taken by Erik Vermaas while working on fire crews in Idaho. From left: Bingham Ridge fire in the Snake River Breaks, where he was conducting the air-to-ground communications directing SEAT aircraft retardant drops. On the Wapshilla fire in the Salmon River Breaks with the Craig Mountain Helitack Crew; Vermaas was the lead sawyer eliminating hazard trees ahead of the line dig crew, who were Canadians from the Yukon. Initial attack situation on the Camas fire as seen from the helicopter—once on the ground, Vermaas assumed the role of Incident Commander.

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that depend on natural resources. However, due to the diversity of environments in which agroforestry may be practiced, regional and local-level knowledge and support will be needed in order to implement any global strategies.

Do you believe agroforestry could help developing nations adapt to or mitigate the effects of climate change? If so, how?

Yes, I do. Beyond sequestering carbon in woody vegetation, the ability to adapt to or mitigate the effects of climate change comes from the diversity of species and functions in agroforestry systems. In any given year, there's a chance that some monocultures will be wiped out as a result of abnormal climate conditions—a situation that leaves landowners with no source of income, and potentially, their soils with no cover. A system that has multiple plant and animal species is more likely to retain some economic value if one of the components fails due to extreme drought or flooding. As we've seen even recently, here in the United States, crop diversification should be a priority for developed as well as developing nations.



Atika's coffee stand (photo credit: Jeannette Krampien)

How did you spend your non-research time? What would you like to communicate about your cultural experiences in Ethiopia, a country to which relatively few in the United States travel?

My take-away from Ethiopia is that it is a really diverse country, both culturally and ecologically. I spent my time reading, grading, walking, enjoying the company of my friends Abdu and Atika, and on many coffee socials. I saw warthogs in the beautiful and cold Bale Mountains and a tornado-swarm of storks in the semi-arid Rift Valley. I'd also like to add that *kitfo* (raw beef, marinated in chili powder and clarified butter) is delicious—that alone would make a visit worthwhile.