

AGRICULTURAL INTENSIFICATION AND THE ENVIRONMENT: A RESEARCH TUTORIAL ABROAD PROGRAM TO LAIKIPIA, KENYA

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In June 2018, a group of UF students and faculty went to Kenya as part of a Research Tutorial Abroad Program funded by the Center for African Studies. The UF team was hosted by the Mpala Research Center in Laikipia, Kenya, where Dino Martins serves as director. The MRC invited University of Florida to collaborate on agriculture projects in this area of central Kenya, taking advantage of UF's expertise in agriculture research and extension. The area is experiencing rapid expansion of horticulture by small and large scale farmers, some of which is degrading soils, water quality and expanding into the wildlife conservation areas. MRC research has traditionally have been geared towards conservation and wildlife research, partnering with UF adds new dimensions to their research. Headed by Cheryl Palm, the three UF undergraduate students, Victoria Steinnecker, Sienna Turner, and Ethan Weinrich were joined by two African students, David Mubiro from Makerere University and Joseph Omagwa from Kenyatta University. The

UF International Center provided funds for additional faculty (Pedro Sanchez, Rafael Muñoz-Carpena, Greg Kiker, Gabriel Maltais-Landry), and two graduate students (Enrique Orozco López and Julio C. Pachón) to join the group.

Laikipia County on the slopes of Mt Kenya. It is home to vast iconic wildlife including the "big five" and the threatened Grevy zebra, reticulated giraffe, and white rhinoceros. Stress has increased in the water-dependent ecosystem of sub-Saharan Africa due to climatic changes, population increases, and the growing disparity between supply and demand for natural resources. Smallholder farms along the northern reaches of the Ewaso Ng'iro River are expanding, threatening the environment through unsustainable practices. Yet, these farmers' livelihoods are under threat as well.

The students spent two weeks doing research on smallholder farms looking at a diverse range of agricultural topics. They began with interviews and surveys of local farmers to understand their agricultural

practices, including crops grown, fertilizers used, pesticide applications, and irrigation. Specific studies included the following:

1) Ethan and David measured soil and plant nutrients from over 40 farm fields using a portable field test kit, SoilDoc. They found that the farmers are applying too much phosphorus and potassium to their crops including French beans, which they export to the UK. These results and preliminary recommendations were presented to the farmers, who had never had their soils tested before.

2) Victoria measured the water quality of streams and rivers and found excess amounts of P in the water. This could be a result of the excessive fertilizer applications or from the contamination by livestock and/or sewage from the growing urban population.

3) Sienna and Joseph examined pests on corn, tomatoes and cabbage. Corn in the area is being devastated by the Fall Army Worm (that originates from Florida). They took samples of the larvae that were sent to local laboratories for identification.

4) Enrique looked at potential sources of water flow from the farm fields to the river, using a unique set of moisture sensors.

5) Julio estimated soil aggregation and particle size distribution in the soils in the farms.

Additionally, the team spent a week on a workshop to explore partnerships with established researchers and farmer groups. The team is now developing proposals to continue research and extension activities in the area. A study abroad program has also been developed by Dr. Palm to take UF students back to the area during summer 2019.

Cheryl Palm is research professor in the Department of Agricultural and Biological Engineering and core faculty at the Institute for Sustainable Food Systems.