

EXAMINING VEGETATION TRENDS IN EASTERN ZAMBIA SAVANNA LANDSCAPES FROM 2000-2016: AN INTEGRATED APPROACH

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During the summer semester 2018, two doctoral students—Hannah Herrero and Carly Muir—along with their adviser, Jane Southworth, spent ten days in the field in eastern Zambia. This field session was to verify products created from data we collected on our first trip to South Luangwa National Park (SLNP). Our initial site visit to SLNP occurred in the summer of 2016 as a collaboration on a United Nations Development Programme/Global Environment Facility grant through Brian Child (UF Geography and Center for African Studies). Hannah Herrero, coordinated logistics for the large team of researchers that participated in this project. While the majority of the research carried out was related to the socioeconomics of communities surrounding the park, we also took this opportunity to head up a team of researchers to collect valuable vegetation data. At this time we also trained several

people from local agencies on how to collect vegetation data to be used as remote sensing inputs via tablets.

Southern African savannas are an important dryland ecosystem, as they account for up to 54% of the landscape and support a rich variety of biodiversity, as well as being the socioeconomic engines of the region. These are also areas of key landscape change. Discretely classifying land cover in savannas is notoriously difficult because vegetation species and structural groups may be very similar, so we wanted to address this highly gradient landscape with a grass–shrub–tree continuum. Collecting high densities of information from the field led to the development of novel remote sensing products that were used for creating more accurate land cover classifications. From the field data collected, we extracted vegetation health data (NDVI - Normalized Difference Vegetation Index)

and Blackbody Surface Temperature data, which have an inverse relationship. This data was then used to create a rule-based classification and separate out our land cover spatially in the park. This technique was compared to a more traditional classifier, a Support Vector Machine (SVM).

After creating a research support system in/around SLNP, we were able to access this protected area again during the summer 2018 in order to verify the products we had made. We traveled extensively through the park this summer, collecting field data continuously as we went. While in the field, we also met with several stakeholders to discuss the products we had created, as people on the ground know the landscape well. When we used this high concentration of field data to test our classifications, we found that the RBC (79.31% overall accuracy) performed significantly better than the SVM (34.48% overall accuracy). The rule-based classification (RBC) was then used to extract data from a Moderate Resolution Imaging Spectroradiometer NDVI time series from 2000-2016, which found a decline in vegetation biomass in all three land cover classes across time. Creating this novel remote sensing product and being able to go back into the field this summer to test it contributed to the fields of remote sensing, savanna systems science, and protected area conservation. These interesting findings may be applied through time in the future, and can be of great use to managers and other stakeholders.

Jane Southworth is a professor and chair of the Department of Geography. She used chair funding to support this field session in Zambia.

