SAVANNA CONSERVATION IN THE FACE OF CLIMATE CHANGE AND LAND USE CHANGES: SOUTHERN AFRICA

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In summer 2017 I traveled to Swaziland to conduct field research focused on determining the effects of climate change and land use change on the distribution of the savanna biome. Global climate change is altering the conditions that make savanna systems possible. The climate changes occurring in savannas are moving at rates faster than projected for most of the world's biomes (≤ 1km/year). As a result most protected areas that are currently savannas are expected to lose their ability to maintain most savanna vegetation in less than a hundred years. In response to these projected climate changes plant species will either shift their distribution to match climate conditions, die out, or adapt. Accordingly, there is an urgent need to understand the factors that permit or hinder the distributions of plants under current climatic conditions. My research approach uses a suite of functionally diverse big tree species (Marula, Leadwood and Knobthorn) to investigate the factors that could inhibit or promote the ability of large savanna tree species to move with their suitable climates.

I worked across the entire country including the north-eastern region of Swaziland which is part of the Maputo-Pondoland-Albany hotspot. This is an expanse of land shared by Mozambique, South Africa and Swaziland, covering about 274,136 km² and harboring 1,900 endemic plant species. Swaziland has a wide range of temperatures and rainfall gradients within its bounds thus allowing for different forms of savanna biomes: variations in bushveld and grassland. This makes for an ideal place for a natural experiment looking at how vegetation composition transitions in savannas as climate changes across the landscape.

I identified field sites across the climate and land use gradients of Swaziland and collected data for my research. To understand how land use change affects savanna tree distributions, I set up transect lines in savanna patches bordered by agriculture, rural settlements and within protected areas as these are the dominating land uses in Swaziland's savannas. I divided the climate gradient into fewer categories (six) where I also randomly set up sampling transects. Along the transects I recorded the presence of Marula, Knobthorn and Leadwood tree species. I measured height (cm) and stem diameter (cm) for individuals < 1.5 m. For individuals > 1.5 m I recorded diameter at breast height (DBH). I will use these measurements to infer the age class of individuals and age structure of the populations. The resultant age class distributions of populations will inform us of the health of tree populations across different climates and land uses.

From a conservation standpoint, my research will allow Swaziland and other countries in the region to strategically plan for the rapid changes in climate that will soon transform their savannas. By identifying areas that are vulnerable to climate change we can utilize Africa's limited resources to target conservation efforts in the areas most likely to contain forest savanna system into the next century.

Additionally, I taught a field project for the Organization for Tropical Studies at Kruger National Park in South Africa.

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