

ELEPHANT-INDUCED CHANGES TO SAVANNA VEGETATION & SMALL MAMMALS

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I spent 4 months in Swaziland and South Africa this past summer for my master's research looking at how savanna vegetation influences small mammal communities and foraging behavior.

Elephants change the vegetative structure of savannas and at high densities they can substantially reduce woody cover. The absence of elephants alternatively leads to an increase in tree and shrub cover. Throughout southern Africa, savannas are shifting in two different directions, toward grass-dominated systems and dense shrub-encroached habitats. These shifts in vegetation likely have major impacts on biodiversity and wildlife communities, including small mammals. As small mammals are critical components of savannas, my overall objective is to understand how they respond to these vegetation changes and what conditions are optimal for biodiversity to ultimately support management strategies.

Comparing study sites in Kruger National Park (elephant presence) and Swaziland reserves (elephant absence), I assessed how variation in vegetation structure

influences the composition of small mammal communities. I first used 2 years of small mammal trapping and vegetation sampling data from my collaborators. Our study grids in Kruger were open with limited shrub and tree canopy cover, high grass biomass, and low small mammal species richness and evenness. Swaziland grids had higher levels of woody cover, lower grass biomass, and higher species richness and evenness.

I used multi-species occupancy modeling to examine how vegetation structure shapes small mammal communities across this woody cover gradient. I found species-specific responses to changing cover and grass biomass that likely scale to community-level shifts. The dominant species in Kruger had a strong positive relationship with grass biomass, and a negative relationship with shrub cover, matching Kruger's vegetation. However, most species were positively associated with both grass biomass and woody cover, suggesting more diverse habitat requirements.

Once in the field, I tested whether the fear of predation may explain why fewer species are present in open savanna landscapes. Prey live in a landscape of fear, where intimidation by predators can influence habitat use as much as direct effects of mortality. By reducing the available cover, elephants may indirectly heighten perceived predation risks in open savannas, with behavioral avoidance strategies causing small mammals to seek habitats with more cover.

To test how different rodent species respond to cover at a fine-scale, I placed feeding trays across the shrub cover gradient: inside a bush, at the bush's edge, then up to 3m away from cover. Optimal foragers feed in a resource patch until the nutritional benefits of feeding no longer outweigh the possible risks of predation. Because rodents in my sites consumed far more seeds under bushes than at any tray further from shrub cover, they likely

perceived predation risk out in the open and safety in the shrubs.

I used camera traps to monitor each species' foraging behavior and activity patterns. Most species primarily foraged in the bushes, although the most common species in Kruger Park foraged in all trays in both Swaziland and Kruger. Possibly this species does not perceive open landscapes as risky, allowing it to thrive in elephant-impacted landscapes while other species are restricted to small patches of woody cover.

I was excited to present my preliminary results at the first annual Swaziland Ecological Symposium in July and I look forward to analyzing these data further to better understand how wildlife respond to changing savanna vegetation.

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