

# CONSERVING WILDLIFE IN THE RAPIDLY CHANGING LANDSCAPES OF SOUTHERN AFRICA

ROBERT McCLEERY

I have been working to conserve wildlife in Southern Africa since 1994 when I served as an ecologist in Swaziland for the United States Peace Corps. Currently, I have three major research efforts in the region that are all focused on areas of high endemism and rapid human growth (biological hotspots). Along with four of my PhD students we are working with group of colleagues from the University of Swaziland, the University of Venda, the Organization for Tropical Studies and UF to improve our understanding of how land-use changes (agriculture, settlement, urbanization, etc.) alter wildlife communities and ultimately impact human wellbeing. Taking an interdisciplinary approach, this National Science Foundation funded research aims to understand: 1) what are the drivers of land-use changes; 2) how does land-use change influence biodiversity; 3) how do changes in biodiversity alter ecosystem services (e.g. pollination, pest control, disease resistance, seed dispersal); and 4) what is relationship between human well-being and ecosystem services. This work is critically important to developing regions of the world where landscapes are rapidly altered without an understanding of the actual consequences.

We are also working to address an apparent African elephant conservation paradox in southern Africa. The conservation of elephants is essential for the health and functioning of savannas, but successful conservation and protection of elephants can lead to declines in the health and functioning of African savannas. This paradox has led to a contentious debate on the best way to manage African elephants that are declining in some regions of Africa and locally over abundant in others. Africa's savanna elephants are well studied but ecological data are rarely used to shape policies for their management and conservation. We are collecting data to understand how different level of elephant activity change the



biodiversity and ecosystem functions within the savanna system. Our goal is to use this work to create a consensus among ecologists and to insure ecological data is used to find the proper balance between elephant populations and the health of diminishing African savannas. Our research will be used to help inform the management of elephants in Kruger Park and Swaziland.

In Swaziland we have placed a considerable amount of time and effort into establishing a research and monitoring program throughout protected areas in the Kingdom. These protected areas are some of the last refuges for endemic wildlife and plants found throughout the region. Working with a local NGO (All Out Africa, Inc.), we developed a research and monitoring plan that allows Swazi researchers and land managers to detect changes in the plant and animal communities as they respond to pressure from development, poaching, climate change and different management practices.

Finally, we are working to understand what causes the outbreaks of human diseases that are harbored in wild animals in some areas of Africa but not others. Some of the world's deadliest diseases and greatest global health challenges include bat-hosted viruses in the family Filoviridae, such as Ebola (*Ebolavirus* spp.) and Marburg (*Marburg marburgvirus*). There is an urgent need to understand what conditions lead to the "spill-over" of these bat-hosted pathogens to human populations and where these events are likely to occur in the future. The bat species that host these filoviruses have large geographic distributions, but spill-over does not occur evenly throughout their ranges. Biodiversity, human population density, and anthropogenic disturbance are broadly considered the primary drivers of zoonotic spill-over events, yet the influence of these factors has not been tested for filoviruses across regions of recent outbreaks. Along with my graduate student we are making good progress toward identifying understand which factors have the greatest influence on these spillover events

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