

## Drivers of compositional turnover of invasive alien plants in Kruger National Park

Biological invasions are a primary cause of biodiversity loss and ecosystem transition in many protected areas globally and across the continent. Although management targeting highly invasive species can effectively contain the spread and impact of targeted species, it is still necessary to monitor the composition and spatial distributions of broad suite of alien species. These assemblage-level monitoring efforts can help identify key drivers and pathways of invasion, devise site-based management plans, and facilitate effective control strategies. However, a large-scale monitoring programme is costly to maintain a steady data capturing rate for multiple years, making inference prone to statistical biases. We tackle this challenge using a portion of data captured by the CyberTracker system that allows field rangers to report the location of invasive alien plants and other features of interest encountered on routine patrols. The CyberTracker system consists of a user-friendly interface for mobile android devices with geographical positioning systems. It was introduced to Kruger National Park in 2003 to help achieve management goals and provide high-precision data for management and research. We used data from 2004 to 2007, which comprised 2,360,419 data points, including 27,777 presence records of 167 invasive alien plant species and 2,332,642 other features, including timer points/waypoints. We transformed these data into species lists associated with specific geographic coordinates and time. Together with selected environmental and ecological variables of the park, we used these species lists to run generalised dissimilarity modelling of zeta diversity and explore the spatial and temporal patterns of species composition and their drivers. We found that, besides the natural spread facilitated by biotic and abiotic vectors, the role of park boundaries and road systems, as well as rainfall and temperature gradients, jointly steer the spread of invasion. Consequently, climate change, ecotourism and infrastructure development/maintenance within the park will likely drive the future expansion of invasive alien plants in Kruger.