M.Sc. Project Advert 2022

Call for Applications

Exploring the role of large mammal ecosystem engineers in a high-elevation wetland

The Highveld of South Africa was once visited by large herds of mammal herbivores (ungulates) that followed seasonal migration paths along the Eastern Escarpment and lower lying areas of the Central Plateau. These mixed herds comprised species such as Black Wildebeest, Blesbok, Springbok, and Plains Zebra, before populations were decimated by colonial hunting. Since then, the landscape has been fragmented by anthropogenic barriers making migration along these historic migratory paths impossible. It is thought that these herds were vital to creating and maintaining processes that drive grassland structure and functionality. Roving herds would remove most of the top layer of grass biomass, churn soil with hoof activity, and add nutrients to the system through defecation. However, uncertainty remains about the role that these ecosystem engineers played in the wetlands of the Grassland Biome. High-elevation wetlands would have been visited by large semi-aquatic mammals such as the Hippopotamus and African Buffalo. Whilst the natural densities of these species would have been lower than pure grassland species, their role in driving ecosystem processes may have been just as substantial given the sensitivity of wetland substrate and vegetation. Seekoeivlei Nature Reserve offers a natural experiment to investigate the role of large mammals in structuring wetland faunal communities. Seekoeivlei is a large floodplain (25km², 20km long, 200-1000m wide) divided transversely by an electric fence. Hippopotamus and African Buffalo are kept in the northern section of the reserve, whilst only smaller antelope are kept in the southern section of the reserve. The large mammals are provided supplementary feed during the winter months by reserve staff. Two acoustic devices were deployed in the floodplain of Seekoeivlei Nature Reserve during December 2020, one on either side of the electric fence. The devices were deployed in herbaceous wetland vegetation communities. The acoustic devices recorded all sounds in the morning (3 hours), at midday (1 hour) and in the evening (3 hours) for four days. The devices were then shifted >100m from the previous deployment site and left to record for another four days. This was repeated a second time to provide full survey coverage of the herbaceous wetland community of Seekoeivlei Nature Reserve. At each deployment site, several environmental variables were collected such as vegetation cover, vegetation height, vegetation diversity, seed diversity, invertebrate diversity and abundance, water depth, and clay depth.

The objectives of the project are to explore and compare the wetland faunal communities in areas with and without large mammals using bioacoustic data. The results of this project will be used to inform best practise guidelines for wetland management by assessing the historical role of natural ecosystem engineers. The faunal communities recorded by the acoustic devices include invertebrates, amphibians, birds and mammals. Bioacoustics can be used to identify individual species and derive various community-level biodiversity indices. The student will have freedom to refine these overarching objectives as they explore the provided dataset. No further fieldwork is envisioned, but additional fieldwork can be arranged if Covid regulations allow. The ideal student for this project has good numerical skills, experience analysing large data sets in R, a willingness to learn new analytical programmes, and familiarity with the African soundscape. The project will be co-supervised by Dr Ralph Clark (University of the Free State, Afromontane Research Unit), Dr Kyle Lloyd (BirdLife South Africa, Rockjumper Fellow of White-winged Flufftail Conservation) and A/Prof. Res Altwegg (University of Cape Town, Statistical Sciences).

Applicants are to send the following information to vincentralph.clark@gmail.com, kyle.lloyd@birdlife.org.za, and res.altwegg@gmail.com by 15 October 2021:

- One-page cover letter detailing why the applicant is interested in this project

- One-page CV highlighting the experiences of the applicant