Abstract

Most of the conservation issues which ecologists are called on to help resolve are essentially about ecological communities. Camera trapping technology has led to a surge in the collection of large ecological datasets, which provides an unmissable opportunity to attain deeper knowledge of animal community assembly and structure. Using extensive camera trap data, this thesis examines whether camera traps can be used as sensor networks for a space-time monitoring of the terrestrial mammal community that occurs in the Little Karoo of South Africa.

In Chapter 1, the species-habitat relationship along a ruggedness gradient was studied. Using resource selection functions and multivariate statistics, this chapter showed that the strength of affinities, which mammals developed with specific terrain roughness, varied among species. It also enabled the recognition of subtle and continuous nuances in the spectrum of habitat preferences, providing a novel tool to explore the forces driving species coexistence in local animal communities.

The theme of Chapter 2 was to consider patterns of seasonal occurrence within species circadian rhythms. Using kernel density functions with descriptive and multivariate statistics, this chapter showed that most mammal species responded to the ecological variability brought about by seasonality by adjusting their diel activity rhythms between winter and summer, resulting in a reduction of time exposure to a physiologically stressful environment caused by high temperatures in summer. It also highlighted that while some shifts only result from photoperiodism alignment, most are driven by other factors too.

Chapter 3 examined temporal-partitioning as a mechanism driving sympatry. Using kernel density functions and mutivariate statistical analyses, this chapter enabled subtle nuances in the spectrum of diel activity rhythms to be visualised, highlighting the variety of temporal niche breadths and of

activity onset/offset timings, which allowed diel activity rhythms to diversify and the mammal community to partition the temporal resources.

Finally, in Chapter 4, topics dealing with leopard habitat preferences and leopard population density were explored. Using spatially explicit capture-recapture models, this chapter showed that leopard density remained low but varied with topographic relief; it increased with ruggedness of the terrain up to an optimum, and followed a reversed trend as the terrain roughness kept increasing. The population was composed of two groups of individuals with significantly different home range sizes, potentially explained by gender duality in movement. The chapter provided leopard density estimates ranging from 0.49 to 0.82 individual per 100 km^2.

Local communities, such as that of the mammal species of the Little Karoo, are neither closed nor isolated. Therefore, it would be insightful if future studies were to embrace the metacommunity concept and explain these patterns of species distribution, abundance and interaction at multiple scales of spatio-temporal organisation.