REMOTE SENSING SOLUTIONS FOR CONSERVATION CHALLENGES: DEALING WITH HETEROGENEITY

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Biodiversity is a complex subject, and its many facets are dealt with differently by different end users and interested parties. Noss' (1990) definition distinguishes between structural, functional and compositional diversity at levels of organisation ranging from genes, to species and populations, to communities, ecosystems and landscapes. This conceptual framework helps to be explicit about what biodiversity entity is being prioritised for conservation action.

Conservation is concerned with ensuring the persistence of biodiversity elements of interest in defined priority areas. One of the main challenges for the conservation manager is to disentangle natural variation in abundances and densities from real declining trends, which may affect long term persistence. Traditional field studies can detect such changes but typically over shorter time scales and smaller spatial extents. However, many of the external driving factors that may affect long term persistence, causes change over longer temporal scales and broader spatial extents. This means that there is a fundamental mismatch between the scales of available field data and the phenomena that need to be detected.

Archived remotely sensed imagery presents an opportunity to quantify patterns of change, in time and space, to improve understanding of systems dynamics. In this talk, we discuss case studies of using remotely sensed imagery at different spatial and temporal resolutions to address specific conservation issues.

Sodic sites are nutrient hotspots in semi-arid savannas. The total area covered by sodic sites has not been mapped with a known accuracy in the Kruger Park, even though it is of key importance from a herbivore management point of view. Using a variety of multispectral satellite images, we use an object-orientated classification to combine spectral featues and landscape context to map sodic sites.

Rainfall events are highly localised in arid savannas, and therefore vegetation greenness exhibit extreme patchiness in time and space, especially at the beginning and end of the rainy season. We subject MODIS NDVI data to a spatio-temporal clustering technique to quantify patterns of greenness in time and space. Since vegetation greenness is related to forage quality, this will help explain animal movement patterns, which is also of concern to conservation managers.

Herbaceous biomass determines the available forage for grazers but there has not been a comprehensive study to quantify the error in measuring such available biomass from multispectral satellites. We present data on the errors in matching field data with remotely sensed data, and discuss implications for a remote-sensing monitoring plan.

Finally, we use time series aerial photography of heavily utilised vegetation to measure the impact, and long term trends, of elephants on riparian vegetation communities. We show the pattern of woodland cover loss, and relate that to long-term persistence of riparian vegetation which is considered important forecotourism.

In summary, these case studies show that remotely sensed imagery provide the opportunity for analyses of spatiotemporal trends in functional, structural and compositional diversity that are vital for conservation planning, but which are not easily measureable by conventional field methods.