THE VEGETATION AND WILDLIFE HABITATS OF THE SAVUTI-MABABE-LINYANTI ECOSYSTEM, NORTHERN BOTSWANA

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Introduction

❖ Spatial heterogeneity is strongly associated with vegetation heterogeneity and detailed vegetation maps derived from remote-sensed spectral variation is likely to represent a large proportion of spatial heterogeneity (MacFayden *et al*. 2016).

❖Plant community variation on environmental gradients is associated with complex combinations of environmental factors and associated plant species composition, richness and physiognomy, leading to distinct habitat attributes for animals (Hopcraft *et al*. 2010; Fynn *et al*. 2014).

❖ A key region for wildlife in northern Botswana is the regional scale contrast of extensive floodplains of the Okavango Delta and the Linyanti Swamps with the vast woodland systems adjacent these wetland systems.

❖The Savuti-Mababe-Linyanti ecosystem (SMLE) with its extensive wetlands and woodlands and the open grasslands of the Mababe Depression has excellent functional habitat heterogeneity for wildlife (Fynn *et al*. 2014).

❖ The SMLE is a region of key conservation importance being one of the few remaining relatively unfragmented ecosystems supporting a diversity of wildlife species (Sianga 2014; Fynn *et al*. 2014).

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Objectives

❖ To classify the vegetation of the SMLE (northern Botswana)

❖ To develop a detailed vegetation map that provides a reliable habitat template of the SMLE for wildlife habitat use studies and for future studies.

Study site

The study was conducted in the Savuti-Mababe-Linyanti Ecosystem (Fig 1)

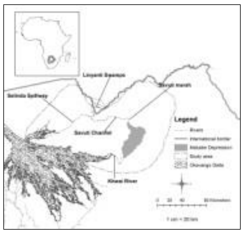


Fig 1: Savuti-Mababe-Linyanti Ecosystem

Materials & methods

❖ The major vegetation units of the SMLE were determined from satellite imagery and field visits and then mapped using Landsat 8 and RapidEye imagery and Maximum Likelihood Classifier.

❖These units were sampled using 40 x 20 m (800 m^2) plots in which cover of all plant species was estimated.

❖Non Metric Multidimensional Scaling (NMS) was used to determine key gradients influencing the plant communities.

Results

❖ The first axis of the NMS1 appears to be a gradient of soil texture and fertility,

- communities on the most sandy contents having the most negative values,
- communities on loam soils having intermediate values and
- communities on extremely high-clay contents having the most positive values on NMS1 (Fig 2).

❖The second NMS axis (NMS2) appears to be a weak gradient of wetness with communities having the most positive values on NMS2 being communities that receive some seasonal flooding from the annual flood pulse into the Okavango and Linyanti systems (*Setaria sphacelata - Gomphocarpus fruticosus* community) or seasonal rainfall (*Setaria incrassata - Dichanthium annulatum* community) or occur near permanent water with perhaps a shallow water table (Fig 2).

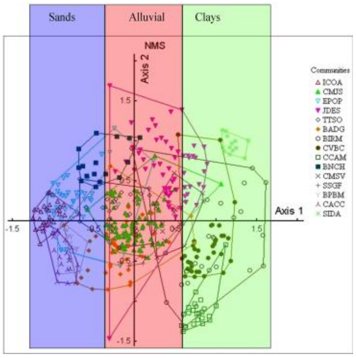
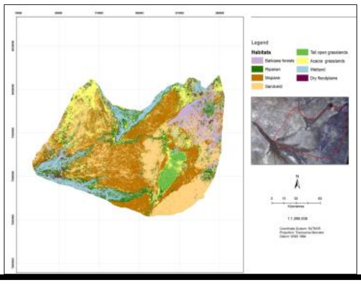


Fig 2. Plant communities against soil particle sizes and soil nutrients. ICOA - *Ipomoea chloroneura - Oxygonum alatum*; CMJS - *Colophospermum mopane - Jasminum stenolobum*; EPOP - *Eragrostis pallens - Ochna pulchra*; CACC - *Commiphora angolensis - Combretum collinum*; SIDA - *Setaria incrassata - Dichanthium annulatum*; CVBC - *Chloris virgata - Boerhavia coccinea*; CCAM - *Cenchrus ciliaris - Acacia mellifera*; BIRM - *Bothriochloa insculpta - Rhynchosia minima*; BNCH - *Brachiaria nigropedata - Combretum hereroense*; TTSO - *Tribulus terrestris - Senna obtusifolia*; CMSV - *Croton megalobotrys - Setaria verticillata*; SSGF - *Setaria sphacelata - Gomphocarpus fruticosus*; JDES - *Justicea divaricata - Eragrostis superba*; BADG – *Boscia albitrunca - Dactyloctenium giganteum*; BPBM - *Baikiaea plurijuga - Baphia massaiensis*

For mapping purposes, functionally similar classes were grouped together (which, in addition, were generally difficult to distinguish from each other through remote sensing and thus difficult to map as separate communities) described by the cluster analysis (Fig 3).



Discussion

❖This study demonstrated that large heterogeneity of plant communities driven by gradients in soil texture/fertility and wetness plays a key role in providing critical functional resource and habitat heterogeneity that allows (i) herbivores to adapt to seasonal variation in resources and (ii) allows niche diversity to support a diverse guild of herbivores.

❖ Floodplains and seasonally flooded grasslands provide a reliable source of green forage during the dry season for herbivores, while the vast woodland mosaic of mopane and sandveld on alluvial soils and Kalahari sands provide cover, low predation risk and medium height leafy grasses for rare herbivores all year round and for buffalo and elephant during the wet season.

❖The fertile heavy-clay soils of the MD provide additional functional resource heterogeneity in an ecosystem otherwise largely dominated by sandy soils, where elevated levels of minerals such as Ca and P in grasses on the MD enable pregnant and lactating females to meet their elevated requirements for these resources.

Acknowledgements

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