CLASSIFYING AND MAPPING VEGETATION TYPES IN EAST ANGOLA: A SOCIO-ECOLOGICAL APPROACH

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INTRODUCTION

It has been claimed that the highlands of the Moxico province in southeast Angola (fig. 1a) contain the largest contiguous and relatively intact miombo woodland in Africa (NGOWP, 2017). Previous spatial analysis indicate vast extensions of somewhat homogeneous miombo (a vegetation formation that spreads across 7 countries in Africa which is essential for local livelihoods; Ribeiro *et al*, 2020). After understanding local land perceptions, we learnt that the characteristics of some of the vegetation formations in the area might not be representative of miombo. Specifically, locals reported a dense forest dominated by *Cryptosepalum spp.*, which is of high economic importance to them. Through this study we aim to integrate local ecological knowledge and scientific ecological survey methods to improve current vegetation maps of the region and hope these can help to inform management and conservation plans in the area.

METHODS

Qualitative data: socio-ecology of woodlands

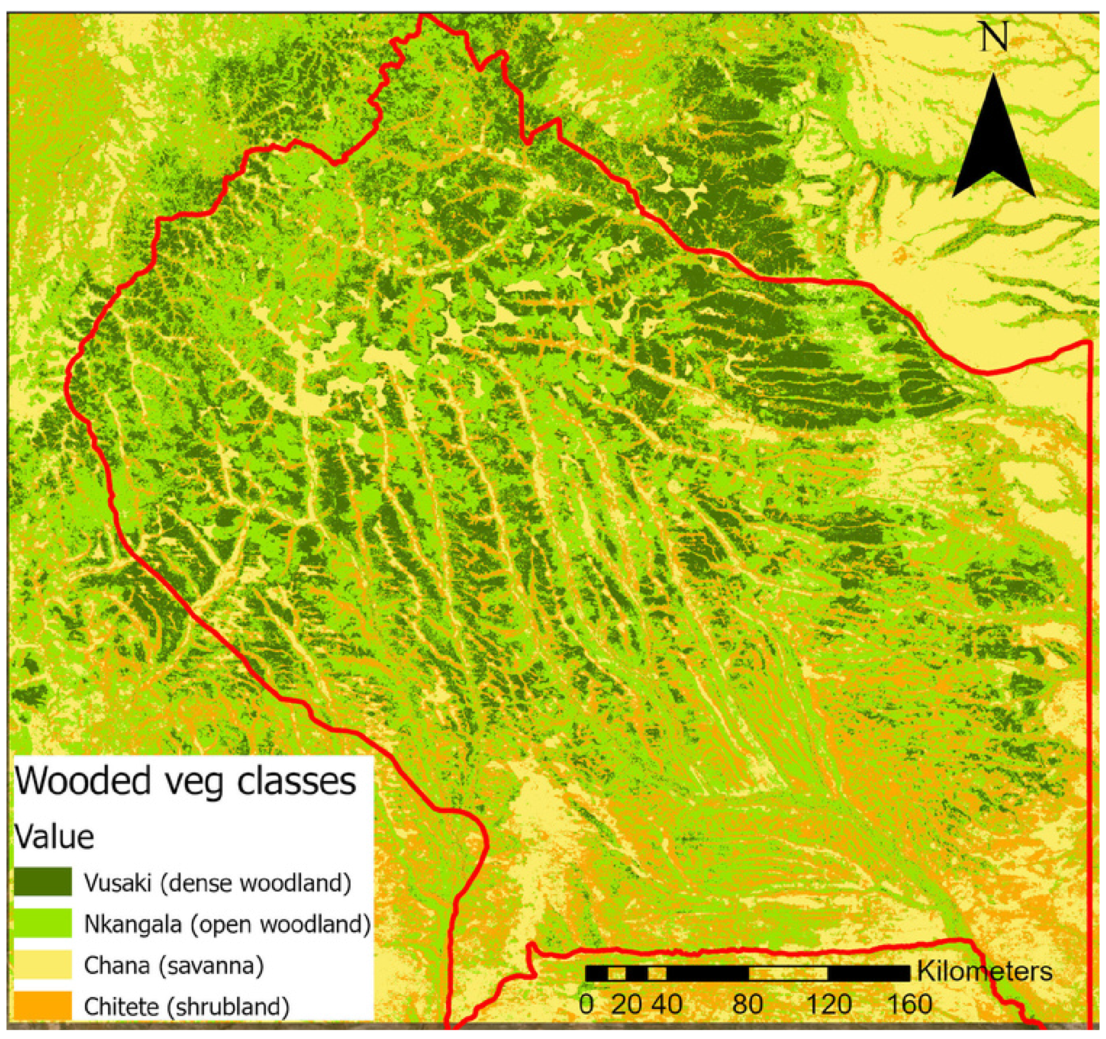
- Participatory mapping & discussion groups
- Transect walks
- Household surveys

Quantitative data: forest ecology

- Establishment of 26 50 x 50 m vegetation plots in 5 vegetation types
  - Measurement of DBH, height, species ID
- Recording of canopy, grass and shrub cover
- Collection of soil samples

Data analysis

- Thematic coding to identify features that differentiate vegetation classes
- Supervised vegetation classification based on georeferenced points where community members identified different vegetation types
- Statistical analysis of woodland structure and species composition
- Analysis of local vegetation classes as a function of fire, elevation/topographic position and density of vegetation



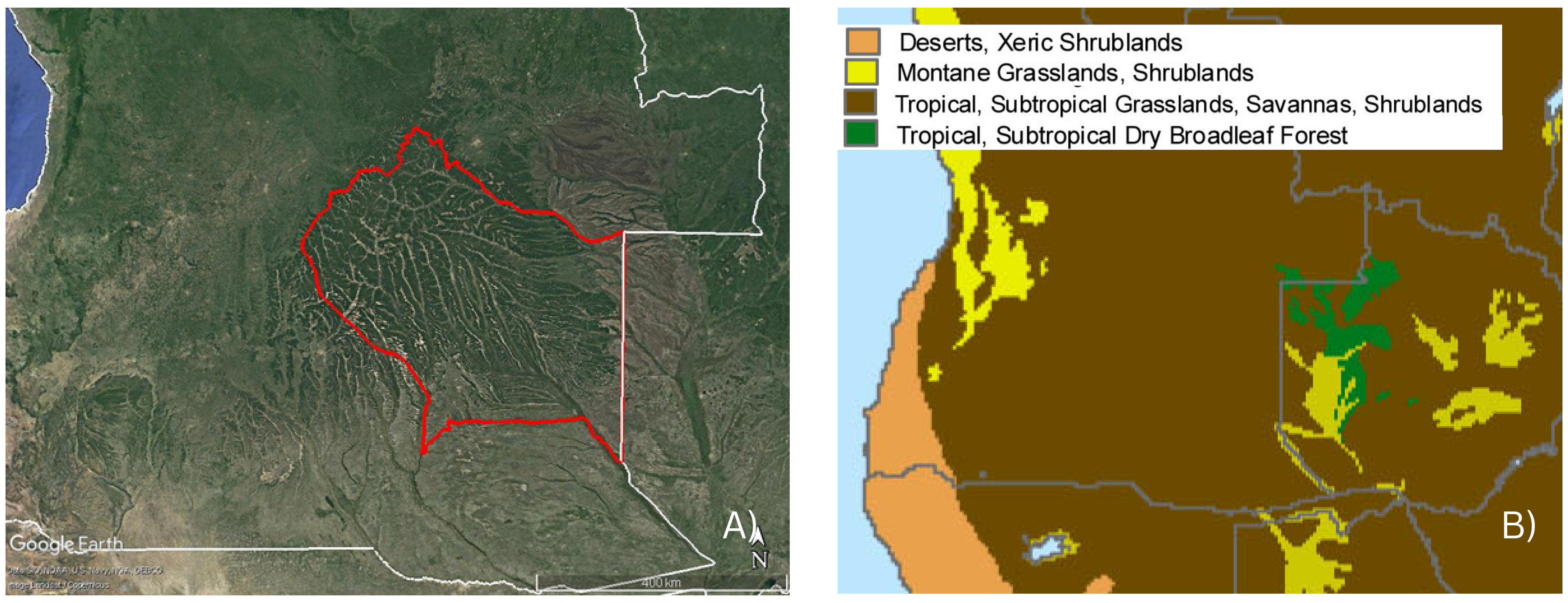


Figure 1. A) Hihglands of Moxico province, region of study in red (www.google.com/maps). B) Vegetation classification by WWF, (2007, east Angola classified as savanna, shrubland and woodland (http://worldwildlife.org/science/ecoregions/terrestrial.cfm).

RESULTS & DISCUSSION

6 vegetation classes were identified (5 containing trees and 1 containing only grasses) with the input from local knowledge. Only 4 of them were mapped due to lack of enough ground data points (fig. 2).
Locals identified fire regimes, vegetation density, and species composition as the differentiating factors among the vegetation classes.
Dense woodlands had 400-700 stems (> 5 cm DBH per 0.25 ha), with *Cryptosepalum spp.* dominating in all of them. These plots were also the highest in species richness with 25-30 tree species per plot.
60% of all trees measured were representative of only 5 tree species (table 1).
Dense woodlands might be representative of *Cryptosepalum* evergreen dry forests, currently reported as endemic to West Lunga in Zambia (figure 1b), an area also known as the Zambezian dry evergreen forest dominated by *Cryptosepalum exfoliatum pseudotaxus* (WLCP, 2023).
The characteristic miombo species: *Brachystegia spp.*, and *Julbernardia spp.*, were present but did not dominate all the vegetation types (table 1).

Table 1. 5 most dominant tree species in plots

Tree spp	% of all trees measured
Cryptosepalum exfoliatum	33.5
Erythrophleum africanum	8.5
Burkea africana	7.3
Diplorhynchus condylocarpon	5.4
Julbernardia paniculata	4.5

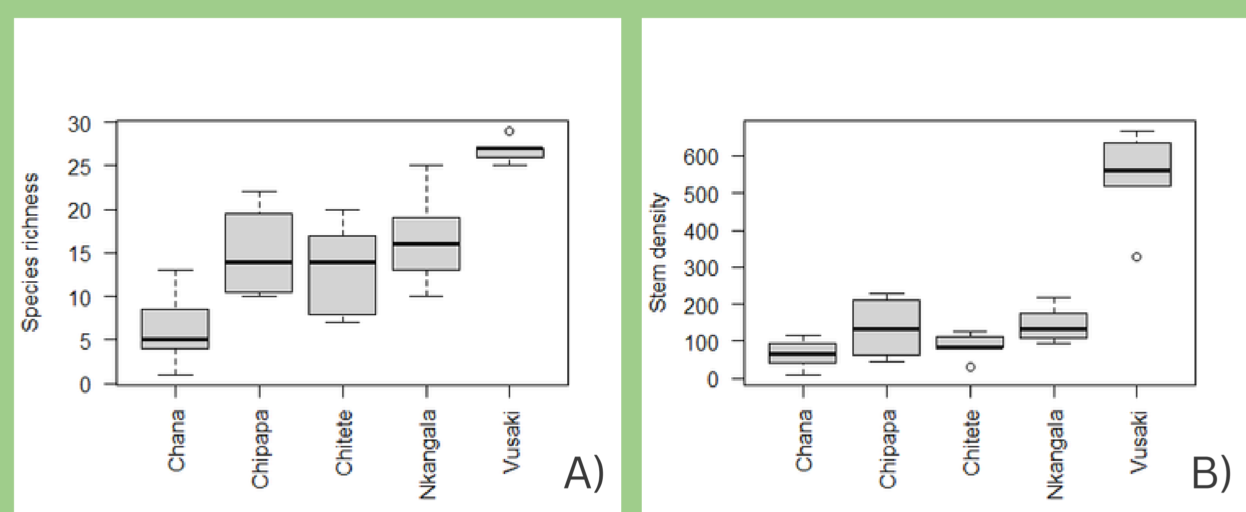


Figure 2. A) Species richness on each plot. Dense woodlands tend to have the highest number of species and savannas the lowest. B) Stem density on each plot. Dense woodlands tend to have the highest stem density. C) Different vegetation types according to local classification, from left to right: Savanna (Chana in local language), dense woodland (Vusaki), shrubland (Chitete), open woodland (Nkangala) and open woodland (Chipapa).

CONCLUSIONS

- Considering this whole area as miombo can result in uniform management strategies and the possible loss of diversity of vegetation types which in turn can affect local livelihoods.
- Classifying vegetation with participatory methods can expand our understanding of ecological patterns and dynamics across time and space —a common limitation of scientific research—, which in turn can inform the design and implementation of conservation plans.
- Mapping the complexity of the vegetation in this area —including the unique African evergreen *Cryptosepalum* dry forests— through the integration of different knowledge systems can result in an improved description of socio-cultural values, perceptions, uses, and management of the land, and of the peculiarities of human-woodland interactions in this place.

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