A landscape analysis of rangeland ecosystem productivity along the West Coast of South Africa

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Introduction

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Rangeland ecosystems are the drivers of many rural communities that depend on agricultural services to sustain their livelihoods. The community of Ebenaezer is greatly reliant on the livestock industry for meat, fibre and trade, therefore creating an indispensable need to understand livestock-vegetation dynamics in the area. Using net primary productivity data as an indicator of the production value of the area, suitable management of the resources can be proposed . Presently, grazing dynamics of the area is unknown and socially influenced, classifying Ebenaezer as a vulnerable socio-ecological system and thus generating a need to promote sustainable rangeland use.

Research objective

To understand and discuss the relationship between net primary productivity (NPP) using MODIS imagery and canopy cover estimates and annual production fraction of the standing green biomass of the Ebenaezer communal area.

Research questions

1. What is the current production potential of the rangelands that support the livestock associated with these villages?
2. Are current production values influenced by the management of rangeland use as grazing fodder?
3. Can sustainable management of rangeland use improve productivity?

Study area

Ebenaezer (18000 ha) is situated along the West Coast of southern Africa.
Characteristic vegetation: Namaqualand Strandveld Fynbos and Spinescent Grassland.
Grazing area for livestock of traditional Griqua people.
Department of Agriculture has divided the land into 24 grazing camps, production values of these camps are not known.
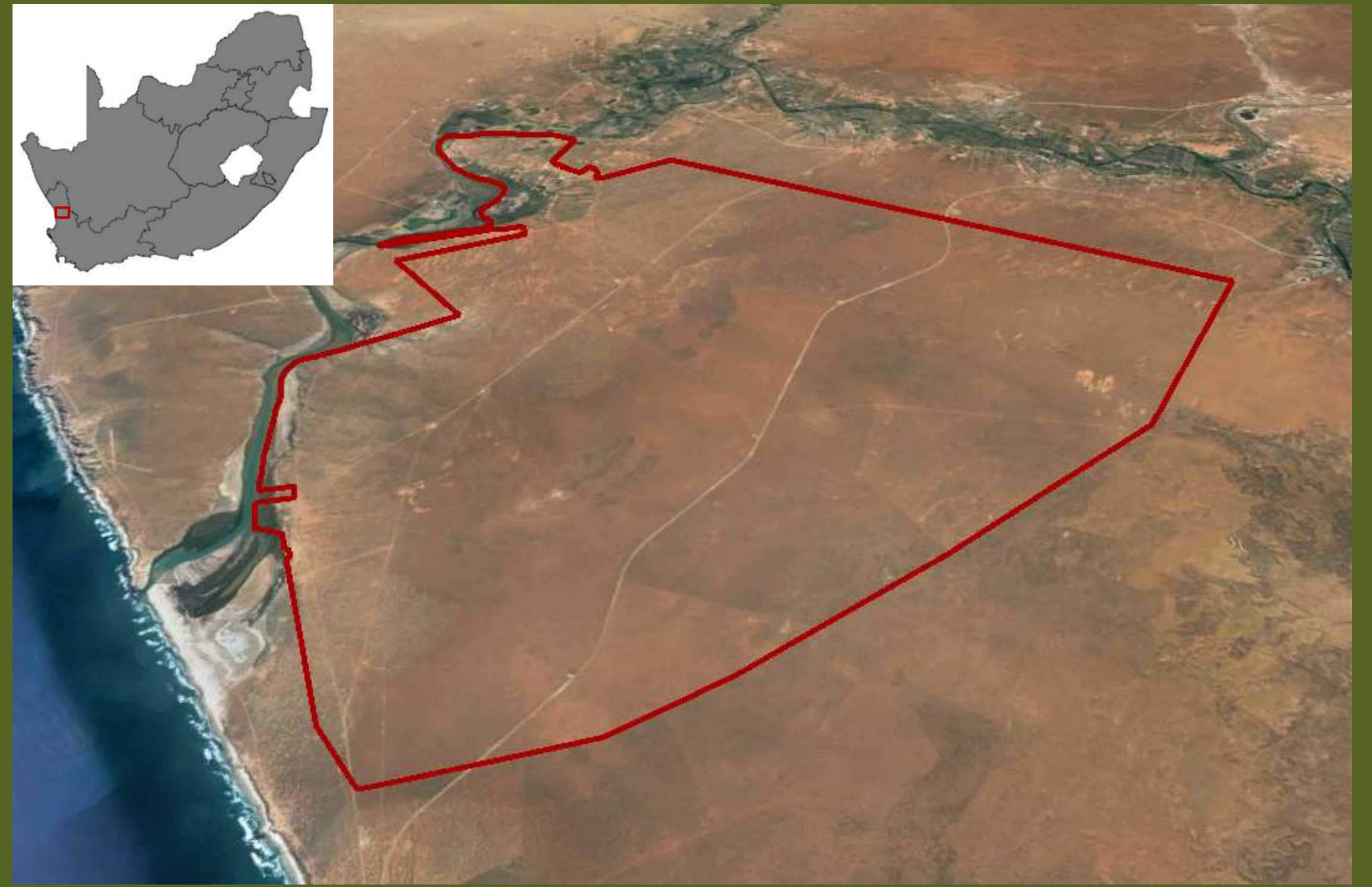

Figure 1: Study area, Ebenaezer, South Africa (Google Earth).

Possible study implications

- No data is currently available on the primary production patterns of the Ebenaezer rangelands.
- Provide guidelines for stocking densities based on data obtained.
- Provide an understanding of the role that this plant community plays in rural livelihoods.

Proposed methodology

- NPP measurements from the MODIS imagery will be obtained from www.earthexplorer.com .
- IDRISI will be used to digitise data.
- Cover will be determined using a line intersect method.
- Biomass will be collected using 100 x 20 cm quadrats.
- Collection will be done during August and September for new growth.
- Biomass of new growth will be sorted into growth forms.
- Biomass samples will be dried and weighed to determine dry mass.
- Biomass dry mass data will be correlated to the NPP values obtained from MODIS imagery.
- Regression models will be created with data collected

Figure 2: Biomass data collection will be carried out as described in Flombaum and Sala (2007).