

Sugar Cane Modelling Using GIS and Remote Sensing Techniques

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1. Introduction

With a current and fast growing population of some 170 million, Nigeria has a critical need to secure access to increased agricultural production. Nigeria is a major food importer, with an annual food import bill of about USD11 billion. This has spurred the need to develop domestic production of sugar by Dangote Sugar Refinery to meet the nation's demand. GIS and Remote Sensing techniques were deployed to assess land qualities to accomplish this research.

2. Aim:

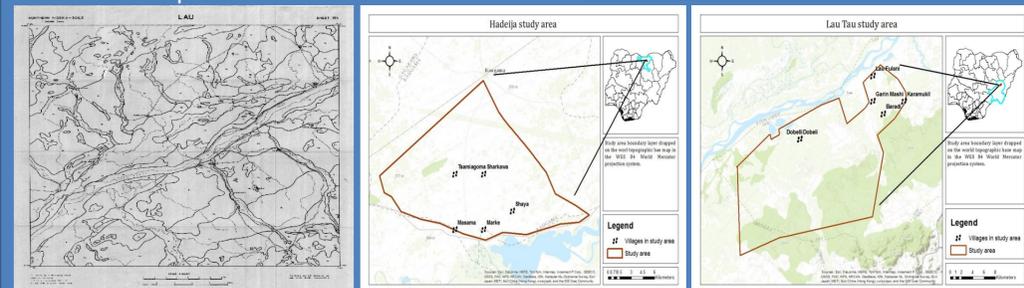
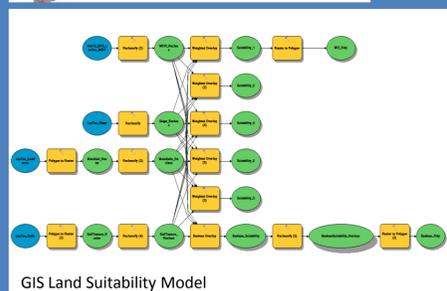
- A case study based investigation into the development of a crop suitability geodatabase and modelling system for sugar cane in Nigeria, drawing on both contemporary environmental data and legacy thematic information.

Objectives:

- Identification of suitable sites for sugar cane
- Compilation of environmental, satellite and historical environmental data
- Development of landuse suitability modelling framework
- Application of model to selected case study areas

3. Methodology

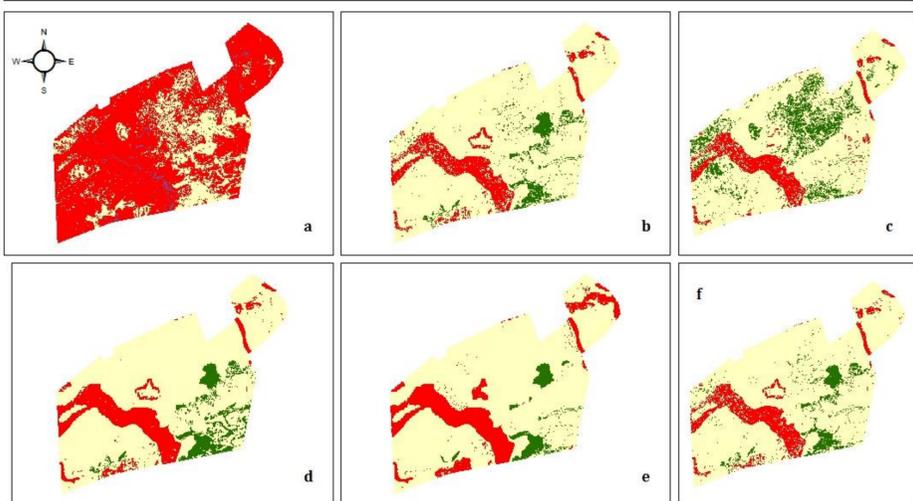
Several datasets have been assembled for this project, ranging from historical 'legacy' cartographic data (www.wossac.com) and satellite data (Landsat & SRTM). A GIS platform allowed manipulation of these data to classify the thematic layers produced to meet sugar cane requirements.



Data layers were incorporated in a GIS and model weightings applied to identify portions of land with potential for sugar cane farming.

4. Results and Findings

Sugar Cane suitability maps for Lau Tau study area



Classes	% of suitability classes					
	a	b	c	d	e	f
NS	1.5	0	0	0	0	0
MA	74.5	11.5	11.5	13.7	16.2	16.5
MO	23.8	82.4	74.6	78.9	79.7	74.8
HS	0.1	5.9	14	7.3	3.9	8.5

Map a shows traditional boolean method map; Maps b to f show trial model parameter weightings

- Traditional boolean approach (a) comparatively underestimate both moderate and highly suitable areas. Weighted approaches (b-f) match local knowledge, with 75-83% of the study area estimated as moderately suitable for growing Sugar Cane.

5. Conclusion and Recommendations

The weighted overlay suitability method was found advantageous over traditional boolean modelling, with potential to extend the approach to other locations. It is recommended that:

- The methodology be extended to assess wider sites
- The methodology be utilised as an initial screening for guiding future field survey activity
- Local expertise be incorporated with semi-automated processes to lead to more robust outcomes
- Land suitability methods be used for future analysis to aid rational decision making in Nigeria