Mapping rice data to support irrigation performance assessment in the Chokwe irrigation scheme, Mozambique

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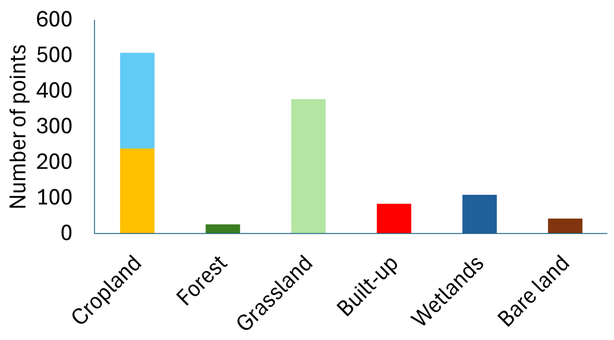
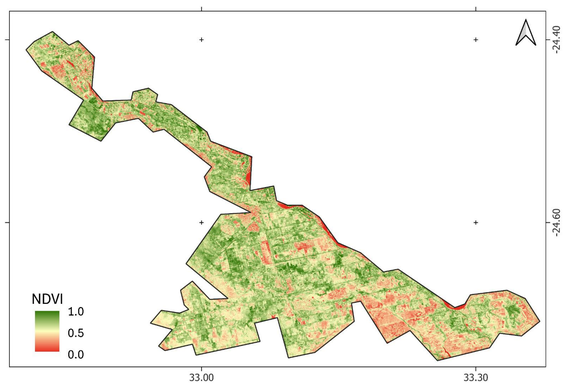
Introduction

Crop mapping is a key step for modeling crop water use and estimating yield through remote sensing. The Food and Agriculture Organization's (FAO) Water Productivity through Open-access of Remotely sensed derived data (WaPOR) database provides evapotranspiration estimates that have been integrated with crop type information in the Chokwe Irrigation Scheme (CIS) to support yield assessment. However, reliable crop maps are important inputs for applying crop-specific parameters and deriving meaningful spatial estimates of agricultural productivity. Within this context, this study focuses on land cover and rice mapping within the CIS, located in Gaza Province (Mozambique) along the Limpopo River. It covers approximately 30 000 hectares and supports numerous smallholder farmers cultivating rice.

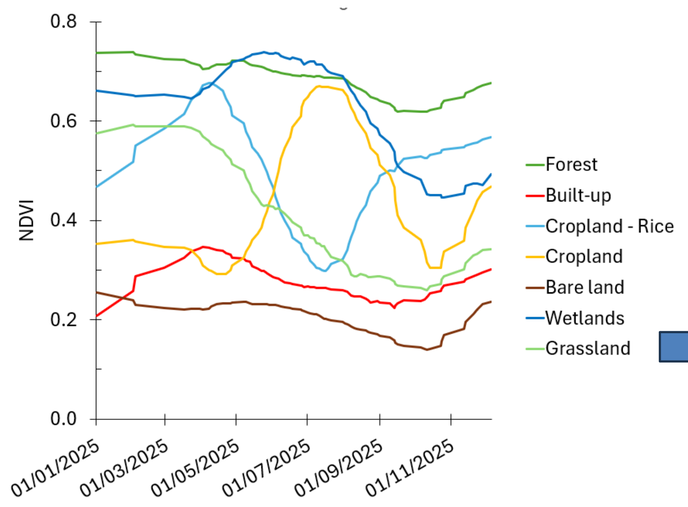
Ground points



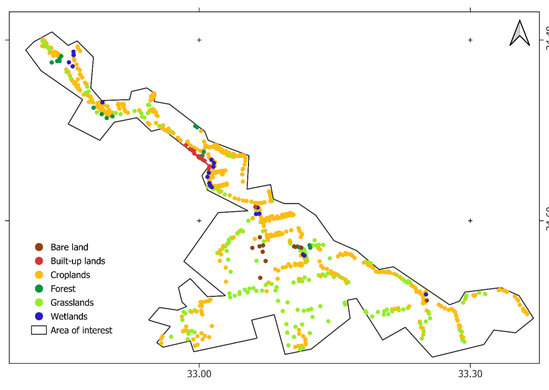
Spectral indices

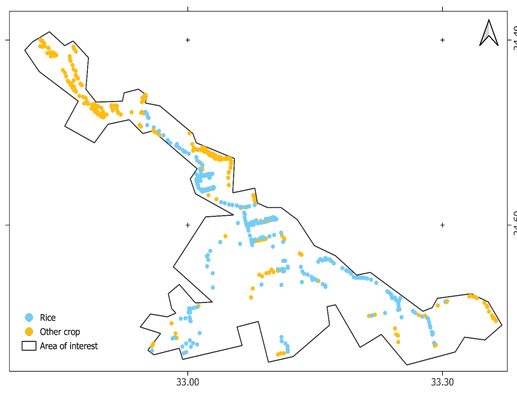


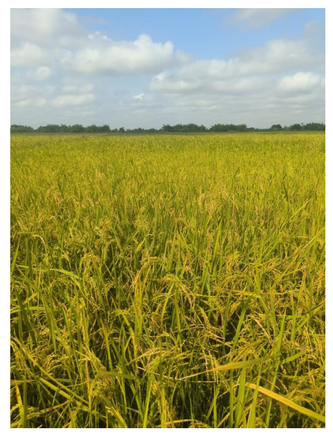
Spectral signatures of land cover classes



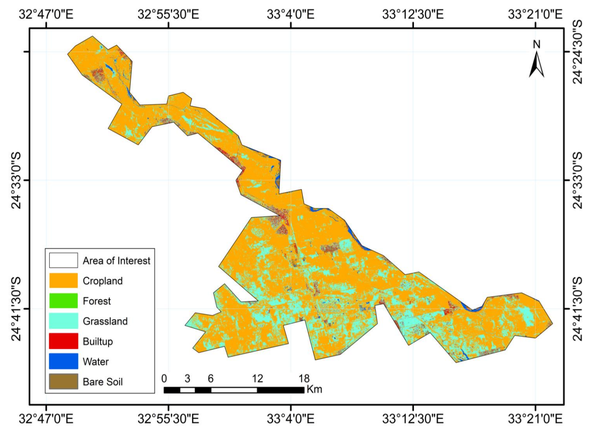
Data Processing & Land cover generation



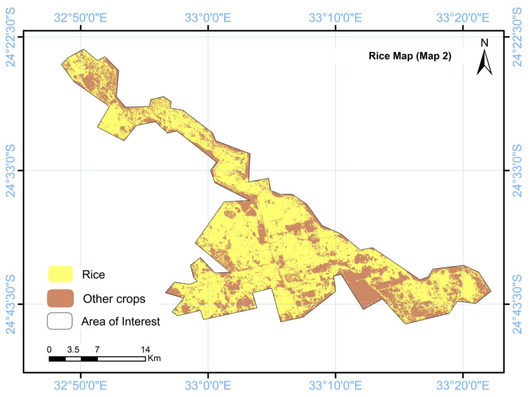


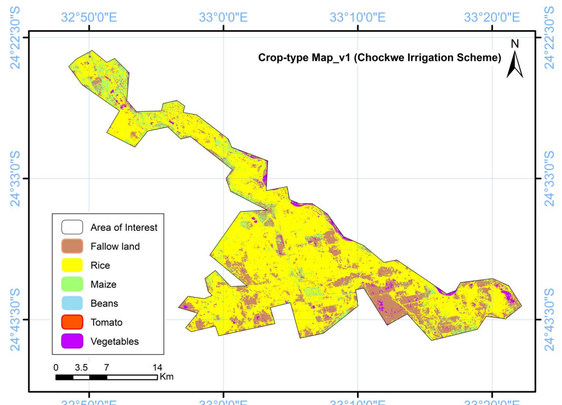


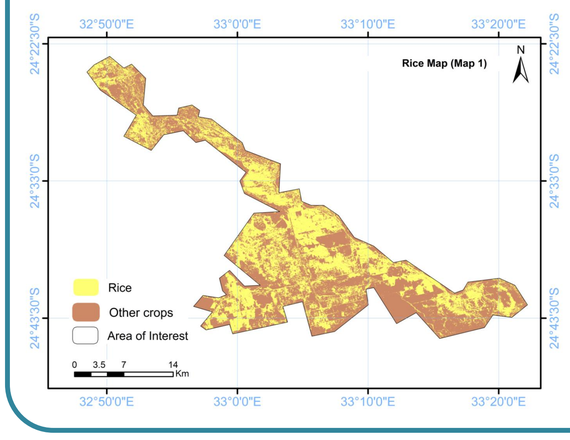
Land cover map

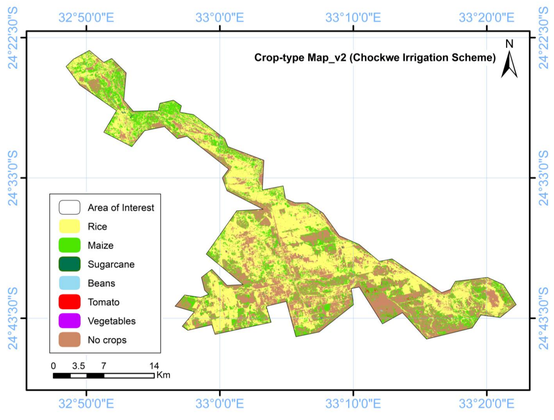


Rice mapping procedure

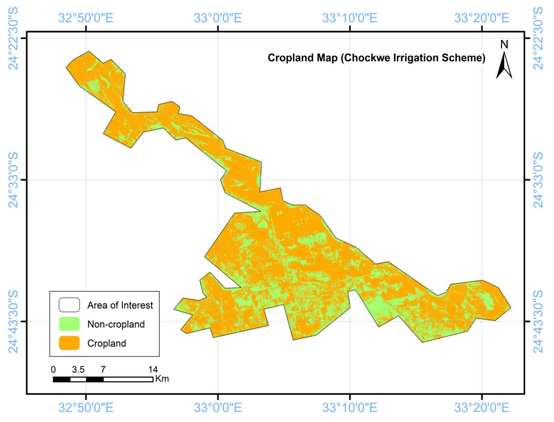




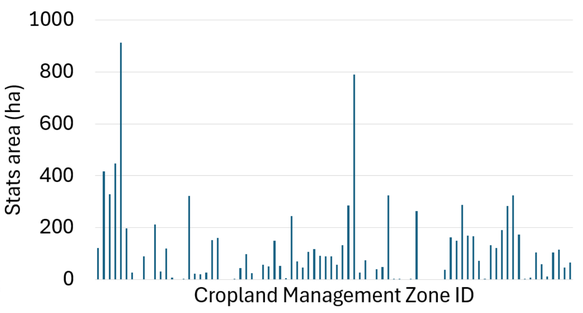




Cropland mask

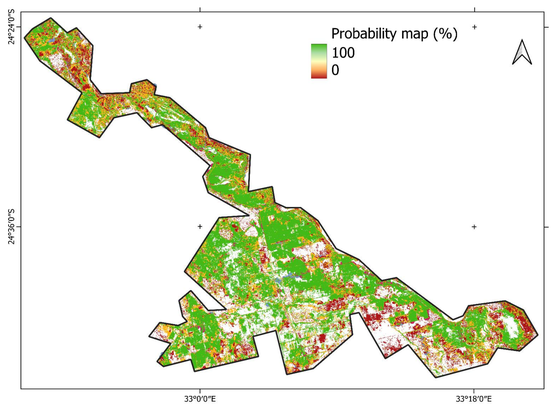


Actual \ Predicted	Classes	Cropland (1)	Forest (2)	Grassland (3)	Built up (4)	Water (5)	Bare land (6)	User accuracy
	Cropland (1)	426	0	15	0	4	1	95.5%
	Forest (2)	0	7	3	0	0	0	70.0%
	Grassland (3)	61	0	46	0	0	1	42.6%
	Built up (4)	1	0	0	28	0	0	96.6%
	Water (5)	9	0	0	0	24	0	72.7%
	Bare land (6)	1	0	0	2	0	6	66.7%
	Producer accuracy	85.5%	100.0%	71.9%	93.3%	85.7%	75.0%	537/635
Overall accuracy								84.6%
Kappa Coefficient								0.603

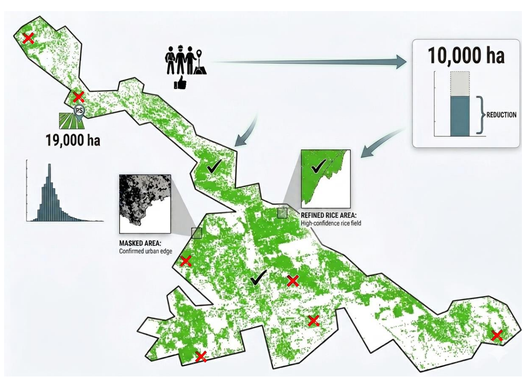


Classification refinement with ancillary local statistics

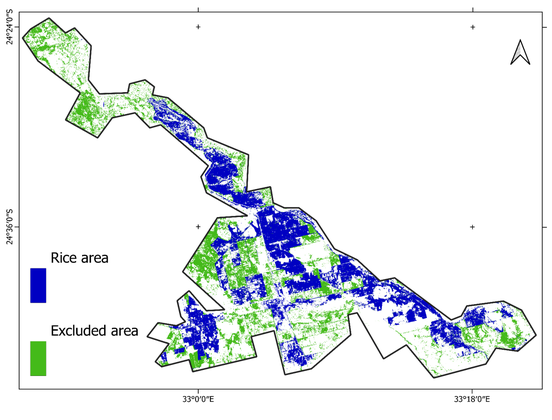
Probability map



STAT driven refinement



Rice map



IPAT dashboard

WaPOR website

Conclusions

- Remote sensing–based classification initially identified 18 000 ha of rice in the Chókwè Irrigation Scheme; however, comparison with official local statistics and consultation with experts led to the exclusion of about 44 % of the area, resulting in a revised estimate of 10 700 ha, more consistent with observed conditions.
- Results show that satellite-based classifications may overestimate crop extent if not evaluated against independent sources; moreover, heterogeneous agronomic and crop growth conditions increased class variability, complicating rice discrimination. The integration of local expertise and *in situ* knowledge was necessary to refine the outputs.
- The final crop map will support the Irrigation Performance Tool (IPAT) for improved yield and water use estimation. Future work will extend the analysis to the second season, include additional crops, strengthen validation with INIR data, and assess the transferability of the methodology to other irrigation schemes in Mozambique.