Use of remotely sensed derived metrics to assess wetland vegetation responses to climate variability induced drought at the Soetendalsvlei wetland system in the Western Cape province of South Africa

by

Noluthando Ndlala

Email: 3970879@myuwc.ac.za

Degree: Environmental & water sciences

Institution: University of the Western Cape

Supervisor: Prof Timothy Dube

INTRODUCTION

- The importance of wetland ecosystems to planet Earth
- Wetland vegetation productivity and climate variability induced drought

INTRODUCTION (cont'd)

Physical methods

Remote Sensing

AIM AND OBJECTIVES

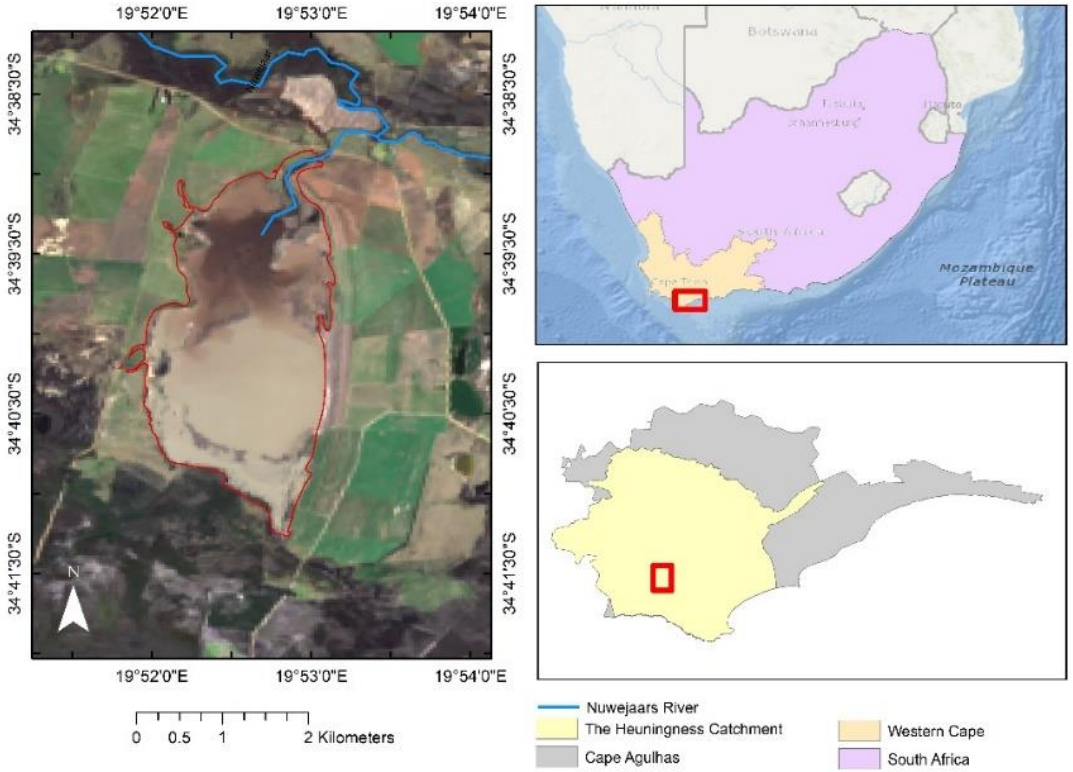
- The **aim** of this study was to investigate the response of wetland vegetation productivity to the 2015-2017 drought at the Soetendalsvlei wetland system

The **objectives** were therefore to:

- Map and assess wetland vegetation changes between the years 2014-2018, in the study area
- Examine the relationship between wetland vegetation productivity and rainfall variability

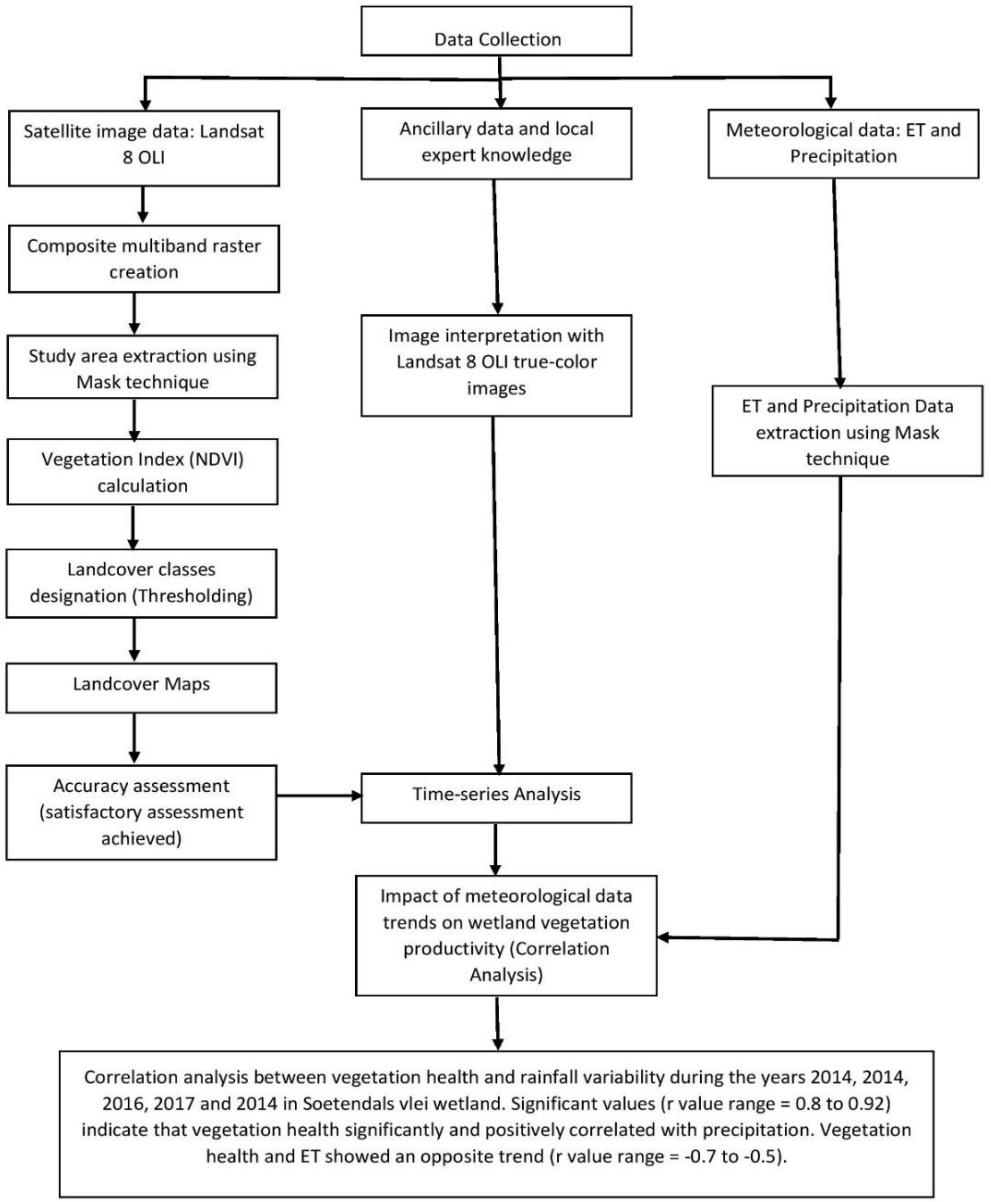
MATERIALS & METHODS

Study area



- Landsat 8 from https://earthexplorer.usgs.gov/
- Evapotranspiration (ET) and Precipitation from https://wapor.apps.fao.org/catalog/1

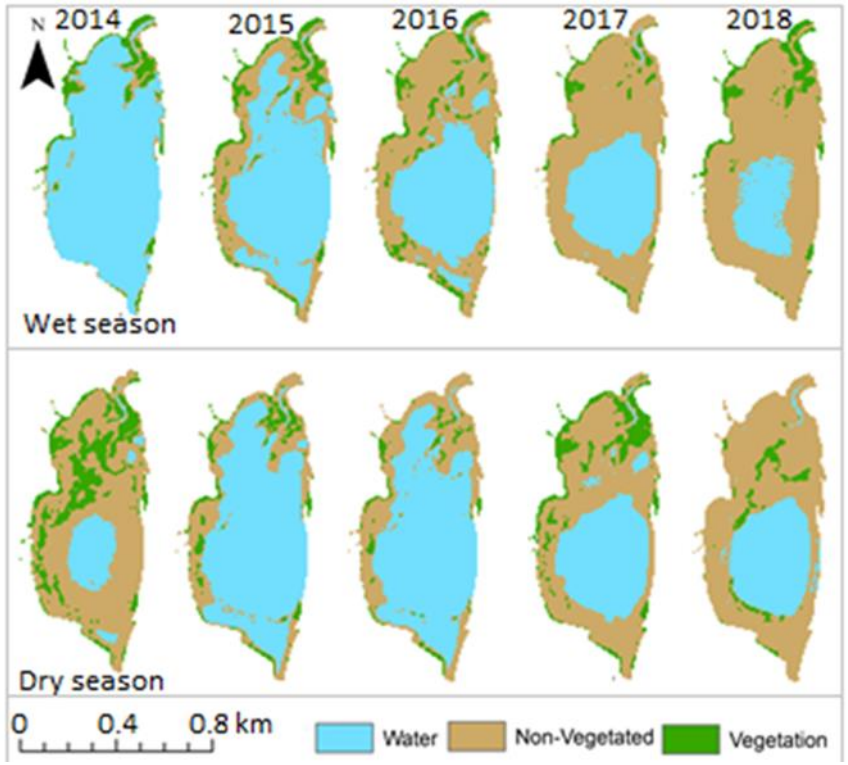
Methodological workflow used for wetland vegetation mapping and assessment of 2014-2018 drought impact



RESULTS

Mapping of wetland vegetation

Remotely sensed derived wetland vegetation for the Sondentalsvlei in the Heuningnes catchment, South Africa

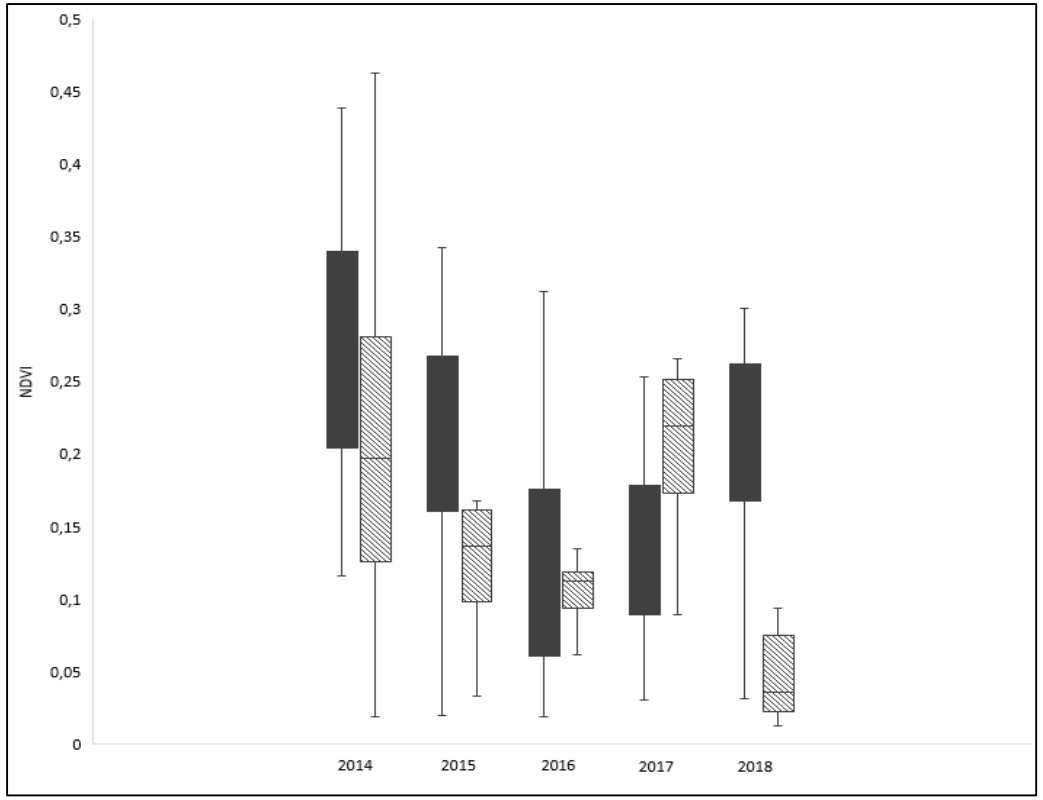


Accuracy assessment of Landsat 8 images captured in the years 2014 to 2018 in Soetendalsvlei

	Class	PA (%)	UA (%)	OA (%)	Kappa
	Vegetation	79.3	88.5		
	Non-vegetated	100	100		
2015	Water	97	94.1	91.0	0.9
	Vegetation	95.9	85.5		
	Non-vegetated	93.5	95.6		
2016	Water	93.8	93.8	88.4	0.82
	Vegetation	89.8	90.1		
	Non-vegetated	81.3	100		
2017	Water	79.5	90.6	87.5	0.8
	Vegetation	99.2	77.7		
	Non-vegetated	83.6	98.3		
2018	Water	68.7	100	89.5	0.83
	Vegetation	77.1	100		
	Non-vegetated	95.8	86.5		

RESULTS (cont'd)

- NDVI seasonal and inter-annual variations of wetland vegetation



RESULTS (cont'd)

- Relationships between derived NDVI and climate data

NDVI vs. Climate data statistical relationships

Year	NDVI vs. Precipitation	NDVI vs. ET
2014	0.8*	-0.70
2015	0.9*	-0.50
2016	0.92*	-0.70
2017	0.8*	-0.60
2018	0.8*	Insignificant association at r = 0.06

DISCUSSION

- Wetland vegetation growth dynamics between the years 2014, 2015, 2016, 2017 and 2018
- Impact of meteorological data trends on wetland vegetation productivity
- Remote sensing spatial and seasonal variations of wetland vegetation

CONCLUSION

- Results showed that vegetation and water decreased significantly over the monitoring period, while the extent of bare surface increased rapidly.
- Wetland extent mapping was achieved with an average overall accuracies (85–90%) in this study.
- Further, Vegetation productivity significantly and positively correlated with precipitation over the past five years.
- From the observation of the whole study period, healthy vegetation has deteriorated due to drought that occurred in the study area between the monitoring periods.


Thank
you