Monitoring the impact of deforestation on an aquatic ecosystem using remote sensing : Case study of the mngazana mangrove forest in the Eastern Cape Province.

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Introduction

Mngazana estuary has the third largest mangrove forest in South Africa, about 118ha and consists of three types of mangrove species Bruguiera gymnorrhiza, Avicennia marina and Rhizphora mucronata. About 50% of the total mangrove cover along the east coast occurs in this system. (Hoppe-Speer, Adams & Bailey, 2015)

The mangrove species are decreasing due to anthropogenic events. This study aims at studying the impact of deforestation that is happening at Mngazana using satellite remote sensing, whereby satellite images of Mngazana will reveal the areas that are affected viewed.

Hypothesis

Mngazana mangrove forest has declined in the past decade and the rate of change is acceleration exponentially.

Objectives

a. Monitor deforestation of Mngazana mangrove forest
b. Identify changes of Mngazana mangrove forest extent
c. Map the rate of change in the mangrove forest from 2008 - 2018

Significance

Mangroves have a great environmental importance, more so to the ecosystem at which it exists. They not only important for mangrove crab Aratus Pisonii, but also as shoreline stabilization, reduction of coastal erosion, sediment and nutrient retention, storm protection, flood and flow control and water quality (Rajkaran. & Adams. 2007).

Mangrove ecosystems occur in protected and sheltered environments in tropical and temperate regions and are important because of their global extent, high productivity and numerous ecosystem services. These forests are dominated by a small group of tree species that evolved special adaptations to survive in intertidal environment (Naidoo, 2016).
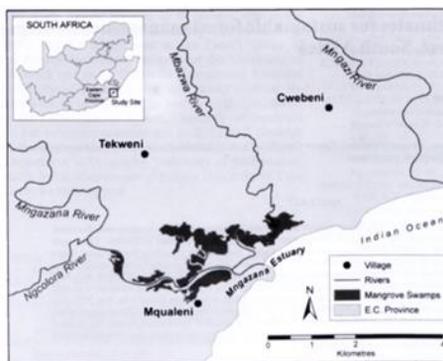
Study Area

figure 1: Mngazana Estuary and mangrove forest(study Area (adapted from Hoppe-Speer 2012)

Problem statement

Deforestation causes greenhouse gas emissions, disruption of water cycles, and increased soil erosion.

In South Africa and globally, anthropogenic impacts on mangrove forests are of great concern, and overutilization and development coupled with natural changes (Gilman et al. 2008), could result in decreased resilience and adaptive capacity of these forests.

Methodology
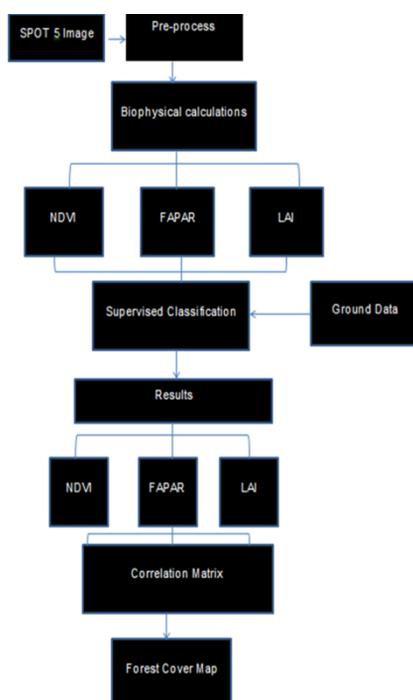
Data Collection

Sensor: SPOT	Sensor: Landsat 6,7, 8
Has a Spatial resolution of 2.5 -5m and Temporal resolution of 2-3days	Has a Spatial resolution of 30m and Temporal resolution of 8days
SPOT images will be obtained from SANSA(freely available for academic use)	Landsat images have been available for many years, and are freely available online
Acquired images will be from period of 10 years(2008-2018)	

Expected Outcome
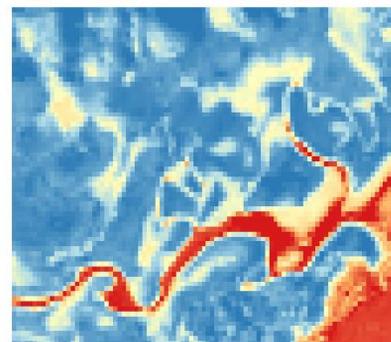
The above images were taken in 2013 and 2017 both in winter, are showing the Normalised Difference Vegetative Index(NDVI) of Mngazana mangrove forest.

The results from NDVI, FAPAR, LAI, will be interpreted to investigate whether deforestation has taken place or not. Statistical analyses will be performed using studioR software to extract relevant pixels.

References

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