AN INTEGRATED MODELING APPROACH TO MAP WETLANDS IN KRUGER NATIONAL PARK

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INTRODUCTION

The Kruger National Park is located in the Lowveld of South Africa. The park spans a variety of ecozones contributing to its well known and documented biodiversity. However, the nature and distribution of wetlands in the park are poorly documented. Wetlands occur in different hydro-geomorphic settings, have different hydrological regimes, different soil wetness factors and support different flora and fauna in different ecozones. The existing South African National Wetland Inventory (SANWI) layer for Kruger needs to be improved. The integrated modeling approach of the SANWI was only applied to grasslands and not to wood- or shrublands.

METHODS

The first phase of the Savanna SANPARKS Wetland Project focuses on one test area (240 000 ha, from Tshokwane to Satara) (Figure 1) to develop a method to accurately delineate wetlands based on an integrated modeling approach that combines spectrally-defined potential wetland areas mapped from Landsat TM imagery, with a DEM-defined landscape wetness potential model. Elevation data from the Shuttle Radar Topographic Mission System (SRTM) are used to create the DEM (Figure 1). The test area covers four ecozones characterized by moderately dense bush and tree savanna to open shrub savanna on foot slopes.

Test Site in Kruger National Park

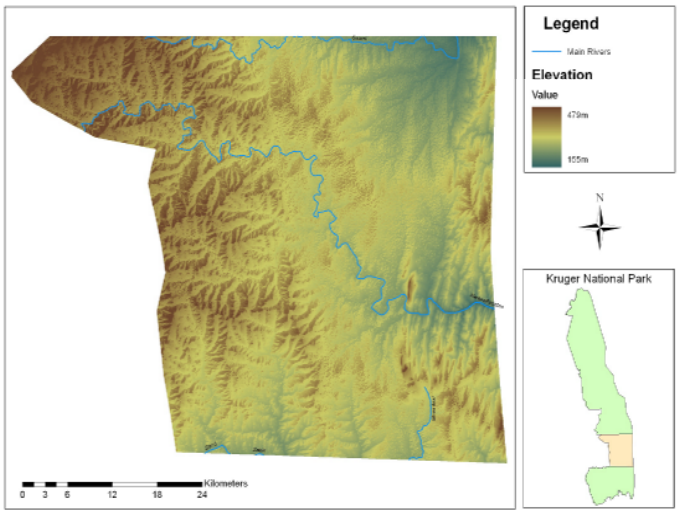

Figure 1 : Location of the Test Site in the southern part of the Kruger National Park .

Approach

SRTM 3 data of which the positional correction of 45 m was done was used to create the DEM. The 3 ARC second data was interpolated to a 1 ARC second (roughly 30m cell size) to improve the resolution and was combined with a classified Landsat TM image.

The Landsat TM (168077) image, acquired on 24 October 2005, was used to classify active growing vegetation or lush vegetation that could possibly be wetlands. Reference sites were identified in the field and with Google Earth™ and used as "regions of interest" to run a Maximum Likelihood Classification. Vegetation with a high growth activity was enhanced by NDVI and Tasseled Cap indices on the Landsat data. Burn scar areas are problematic and should not be included in the processing area.

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SAVANNA SANPARKS WETLAND PROJECT OBJECTIVES

General objectives:
To compile an inventory of the wetlands of the Kruger, Mapungubwe and Marakele National Parks.

Specific objectives:

1. Characterize the wetlands in Kruger, Mapungubwe and Marakele National Parks in terms of the different ecozones they occur in, their geology, geomorphology, hydrology, soils and vegetation;
2. Development of a wetland classification system in terms of the identified wetland's hydro-geomorphic setting, vegetation cover and habitat type, and
3. Determine the ecological status in terms of erosion impacts of the wetlands
4. Compile an inventory on a 1:50 000 scale.

PRELIMINARY RESULTS

A variety of wetlands occur in the study area including seasonal to semi-permanent wet valley bottom and seepage wetlands. However, the preliminary classification of the Landsat TM image could distinguish valley bottom wetlands (Figure 2 and 3) but had difficulty distinguishing the seepage wetlands.

Preliminary Classification of Valley Bottom Wetlands

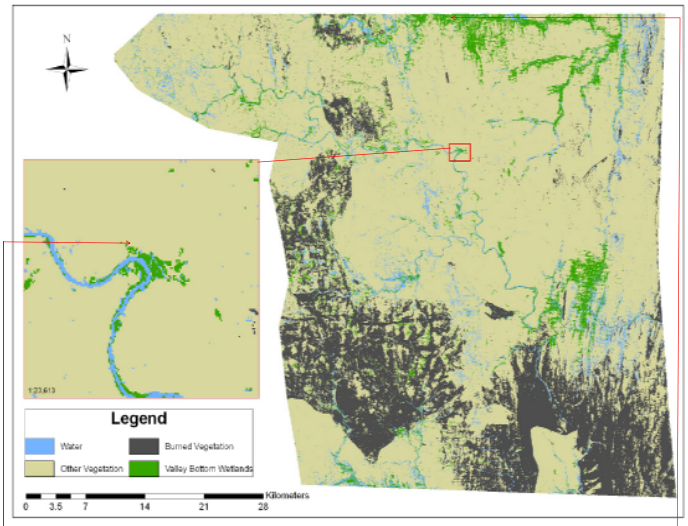

Figure 2 : Preliminary Classification highlighting an oxbow valley bottom wetland.

Figure 3 : Photo of the oxbow wetland in Figure 2.

Figure 4 : Permanently wet valley bottom channeled system.

PROPOSED FUTURE STEPS

1. Verify the classified valley bottom wetlands in the field to determine the accuracy level of the classification.
2. Re-classify the valley bottom wetlands and combine the product with DEM-defined landscape wetness areas.
3. Acquire additional Landsat TM imagery to compare wet and dry seasons to identify seepage wetlands.

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