

# **SAFARI 2000 Vegetation Cover Characteristics, Kalahari Transect, Wet Season 2000**

## **Abstract**

Vegetation cover and composition, including species types and richness assessments, were measured at four locations along the Kalahari Transect in Botswana (Pandamatenga, Maun, Okwa River, and Tshane) during the SAFARI 2000 wet season field campaign. The sites visited showed interesting degrees of variability despite the apparent homogeneity of the Kalahari sands and predominantly semi-arid savanna shrub-woodlands vegetation cover (Ringrose et al., 2003).

## **Background Information**

### **Investigators:**

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### **Project:** SAFARI 2000

Southern African Validation of EOS (SAVE)

**Data Set Title:** SAFARI 2000 Vegetation Cover Characteristics, Kalahari Transect, Wet Season 2000

### **Site:** Kalahari Transect

**Westernmost Longitude:** 19.17

**Easternmost Longitude:** 25.49

**Northernmost Latitude:** -18.66

**Southernmost Latitude:** -24.17

### **Data Set Citation:**

Ringrose, S. and W. Matheson. 2004. SAFARI 2000 Vegetation Cover Characteristics, Kalahari Transect, Wet Season 2000. Data set. Available on-line [<http://daac.ornl.gov/>] from Oak Ridge National Laboratory Distributed Active Archive Center, Oak Ridge, Tennessee, U.S.A.

## **Data File Information**

The data files associated with this data set are listed below. The data files contain vegetation cover and composition information within ASCII tables in comma-delimited format (.csv) with descriptive header records.

**botswana\_kt\_veg\_sum.csv**

**botswana\_kt\_species.csv**

**File "botswana\_kt\_veg\_sum.csv" description.**

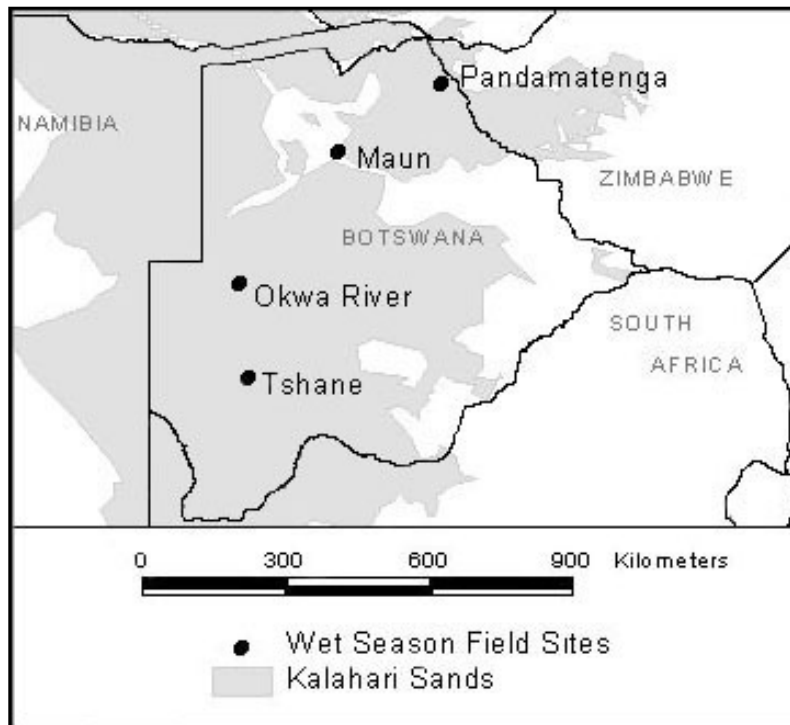
Column	Description	Units/Format
Sites	Site indicator (site names listed in the site summary table below)	ASCII
Latitude	Latitude of the site location	degrees South
Longitude	Longitude of the site location	degrees East
Date	Date of data collection	dd.mm.yy
Total number of species	Total number of species counted along three 90 m transects	count
Species richness	Number of species divided by the transect area	ratio
WVC	Woody vegetation cover along three 90 m transects	percent
AHC (forbs)	Alive herbaceous cover, forbs, along three 90 m transects	percent
AHC (grass)	Alive herbaceous cover, grass, along three 90 m transects	percent
DHC	Dead herbaceous cover, along three 90 m transects	percent
Litter	Plant leaf litter, along three 90 m transects	percent
Bare soil	Bare soil coverage	percent

#### File "botswana\_kt\_species.csv" description.

Column	Description	Units/Format
Site	Site Designation (Panda, Maun, Okwa, Tshane)	ASCII
Species	Genus species name of vegetation	ASCII
Total	Total Number of given species counted	numeric

## Site Descriptions

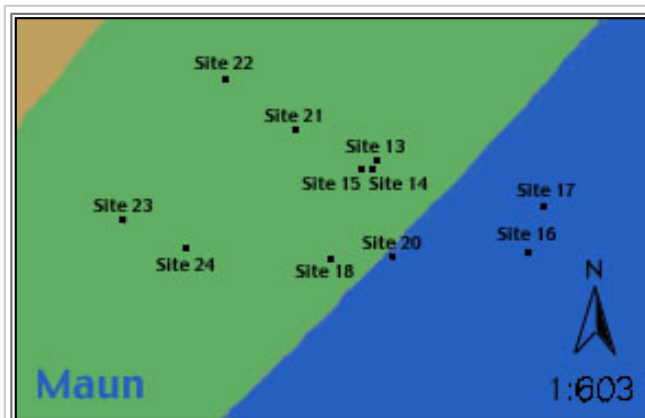
The study area focuses on the 1000 km south-west to north-east transect across Botswana within which specific site data are drawn from four locations, referred to as Pandamatenga, Maun, Okwa River, and Tshane (Fig. 1). The Kalahari Transect within Botswana extends from semi-arid/arid in the south to semi-arid/subtropical vegetation zones in the north. Rainfall along the gradient varies from less than 200 mm in the south-west (CV = 45%) to over 650 mm in the north-east (CV = 35%). This rainfall occurs during the summer months of October-March and is mostly localized in extent with frequent droughts (Bhalotra, 1987). Potential evapotranspiration rates vary from greater than 2000 mm/yr in the southwest to between 1000-1500 mm/yr in the northeast (Hulme, 1996). Fires are known to be widespread, especially in the dry season following a season of heavy rains, when the fuel load is highest.



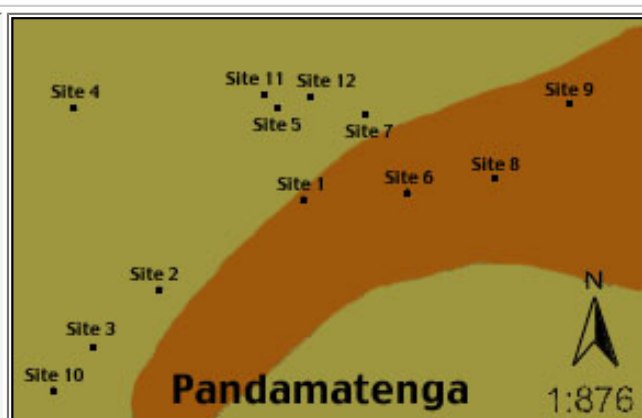
**Site Summary Table**

Location Name	Site Names	Latitude	Longitude	Description	Mean Precipitation (mm/yr)
Pandamatenga	KTP 1-12	-18.660° S	25.494° E	Chobe dry deciduous forest	698
Maun	KTM 13-24	-19.913° S	23.560° E	Mopane Woodlands	460
Okwa River	KTO 25-36	-22.413° S	21.709° E	Central Kalahari Bush Savanna	407
Tshane	KTT 37-48	-24.127° S	21.881° E	Southern Kalahari Bush Savanna	365

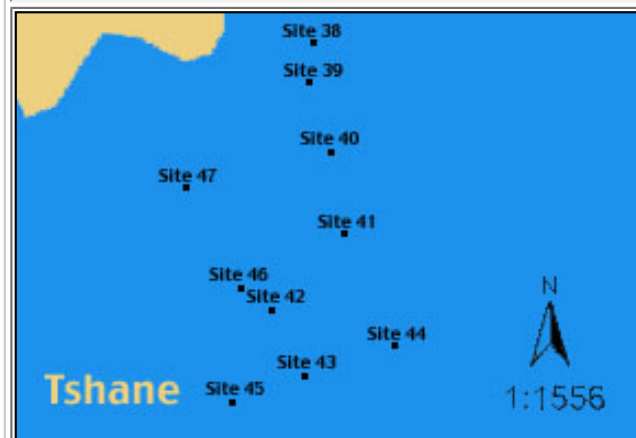
**Relative field site locations and vegetation types within each of the four study areas.**



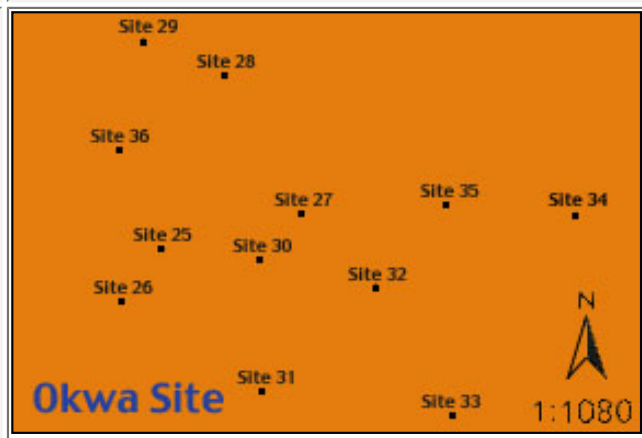
Tan - *Imperata cylindrical*, *Setaria sphacelata*, *Hyparrhenia rufa*. Green - *Colophospermum mopane*, *Terminalia sericea*/*Lonchocarpus nelsii*. Blue - *Terminalia sericea*, *Lonchocarpus nelsii*/*Combretum* spp.



Olive - *Colophospermum mopane*, *Acacia nilotica*, *Combretum* spp.  
Brown - *F Pterocarpus angolensis*, *Baikiaea plurijuga*



Yellow - *Terminalia sericea*, *Lonchocarpus nelsii*/*Acacia eriloba*. Blue - *Acacia mellifera*, *Acacia leuderitzii*, *Boscia albitrunca*



Orange - *Terminalia sericea*, *Lonchocarpus nelsii*/*Acacia eriloba*

## Methodology

Fieldwork took place in the wet season (March) of 2000 at four locations that were considered to be representative of vegetation zones in the Kalahari region. Specific locations were based on access, a low level of disturbance, and how representative they were. Twelve individual sites, based on differences in topography, soils, and known disturbance, were chosen by random stratified techniques within a 30 km radius at each location to help determine local variability (Huenneke et al., 2001). Each site was located using a Garmin 75 Global Positioning System. The same information (e.g., Ringrose et al., 1996; 1998; 2003) was collected from all sites:

1. The identification of all species along 3 x 90-m transects, spaced 45-m apart.
2. Visual estimation (tape measure and pacing) of canopy diameter along all 3 x 90-m transects.
3. Visual estimation of percent live and dead herbaceous cover, litter, and bare soil using 3 x 50 m<sup>2</sup> quadrats spaced at 30-m intervals along each transect.

In addition to comprehensive species lists, vegetation components were calculated for each site

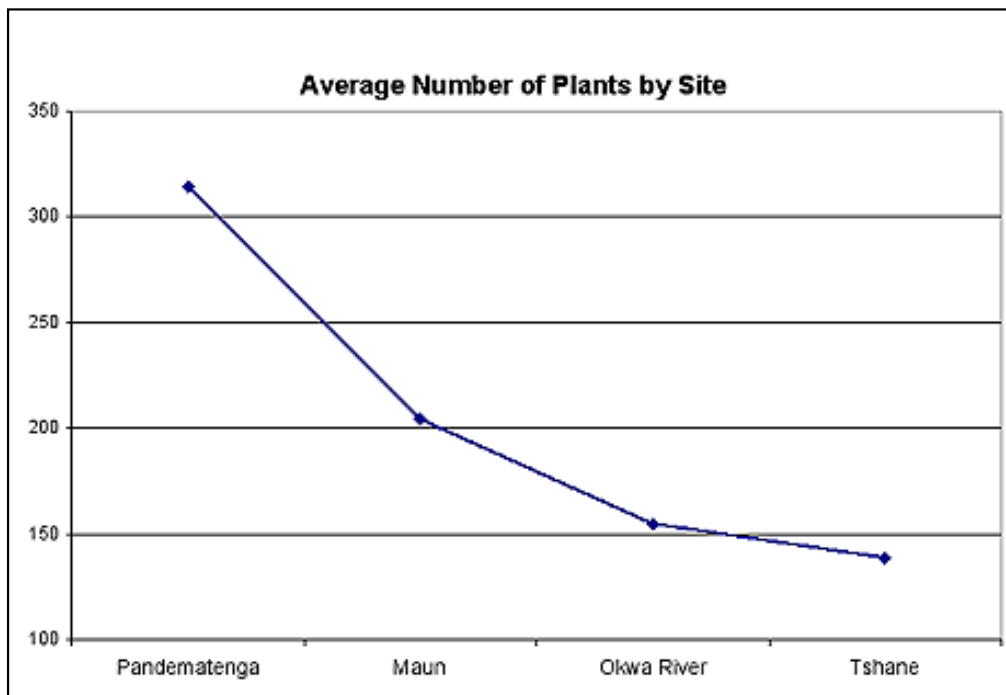
comprising woody vegetation cover, green herbaceous cover in terms of grass and forbs, dead herbaceous cover, plant litter, and bare soil. Species richness was calculated as the actual number of species per three transects (270 m<sup>2</sup>) at each site (Kent and Coker, 1996).

### **Vegetation Species Characteristics**

Woody vegetation cover and forb species were recorded for all sites, in addition to a listing of standing and recently fallen dead cover. In terms of canopy extent, the most extensive species in Pandametanga are *Schinziophyton rautanenii*, *Baiea plurijuga*, and *Kirkia acuminata* trees. At Maun *Colophospherum mopane* forms almost mono-specific stands along with less dominant Kalahari species, *Grewia flava* and *Terminalia* spp. This changes southwards at Okwa with *Grewia flava* and *Acacia mellifera* shrubs becoming most prevalent. At Tshane the *Acacia* species are most prevalent in tree and shrub species comprising mainly *Acacia mellifera* and *Acacia erioloba*. A listing of all species recorded and their frequencies is given in the file **botswana\_kt\_species.csv**.

The average total numbers of plants recorded in the KT transect indicates a noticeable decrease along the transect gradient (see figure below). In absolute terms, this varies from a total of 2482 individuals counted in the 12 sites at Pandametanga, 2110 in the 12 Maun sites, 1766 in the 12 Okwa sites and 1475 in the 12 Tshane sites. In terms of total numbers of different species, this varied little from the wetter to the drier end of the KT from 20 species identified at the Pandametanga sites, 29 species at the Maun sites, 24 species at the Okwa sites, and 20 different species at the Tshane sites.

### **Decrease in the total number of plants along the Kalahari Transect in Botswana, north to south.**



### **Additional Sources of Information**

Additional related data sets collected during the Kalahari Transect Wet Season Field Campaign are

archived by ORNL DAAC. A list of these data sets is available at: <http://www.daac.ornl.gov/S2K/safari.html>.

## **References**

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- Huenneke, L. F., D. Clason, and E. Muldavin. 2001. Spatial heterogeneity in Chihuahuan Desert vegetation: implications for sampling methods in semi-arid ecosystems. *Journal of Arid Environments*, 47: 257-270.
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