

**A BRIEF SURVEY ON CAPRIVI SOIL/ VEGETATION CORRELATION FOR
AGRICULTURAL PURPOSES**

AND

**THE MAIN VEGETATION TYPES OF KAOKOLAND, NORTHERN
DAMARALAND AND A DESCRIPTION OF SOME TRANSECTS OF
OWAMBO, ETOSHA AND WESTERN SOUTH WESTAFRICA**

BY

RUI ILDEGARIO DE SOUSA CORREISA

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General

The soil/vegetation correlation of Eastern Caprivi looks to be included in whole Kalahari country eco-system.

As it is usually in Kalahari country, the inland areas have a deficient free drainage system and the most common feature is that only endorreic drainage does occur.

In such a situation waterlogging can occur here and there temporarily and, as a consequence of the fast evaporation, chemical precipitation of calcium carbonate does occur forming a calcrete layer at variable depth, which sometimes can be a limiting factor for agricultural purposes. This endorreic drainage is more conspicuous at the western area than in the eastern one in the Eastern Caprivi, and on the other hand the deep sands formation of Kalahari origin are more evident as well in the Western country.

These ^{sandy} areas, usually more raised, have a very high internal drainage, by its sandy condition, and so the water holding capacity is very low.

Thus in a general way a slightly examination of soils can be done as follows:

PHYSICAL CONDITIONS

Psamic soils - Very sandy soils, from white to yellow. Very well drained - clay content very low. Surface ground somewhat darkened due to organic matter and veld fires.

Psamitic soils ^(Aridics) - sandy soils, from light grey ^{and brownish} to dark grey and blackish. Fair drainage except from very small localized plots in depressions. Clay content poor but better than the psamic ones. Organic matter better conserved in natural vegetation conditions. (Probably related with Solometz, but soft.)

Fertility conditions - Fertility examination on a basis of clay content for agricultural purposes shows the very poor condition of the white/yellow soils which are constituted by almost pure sands (usually aeolian Kalahari sands). The amount of organic matter from the wood cover and grass mulch is very high but its conservation and the changing to the humus stage is difficult due to the lacking of water and very high temperatures during the summer.

On the grey to dark grey and almost black soils the sands are very fine and the clay content is better. Organic matter in natural conditions of vegetal cover, is better conserved.

RELATION OF SOILS WITH TOPOGRAPHY AND VEGETATION; PLANT INDICATORS SPECIES.

Kalahari sands, as aeolian deposits, are raised comparing with the basical ground surface. Their occurrence in Caprivi and specially at the area concerned, occurs as very flat and shallow dunes at ^{places} or as flat and shallow extensive areas of plateau. They are usually covered by the trees Baikiaea plurijuga which is accompanied by Guibourtia coleosperma ("Mwivi"), Ricinodendron Rautanenii ("Manketi"), Pterocarpus angolensis, Combretum collinum. Here and there Burkea africana and Acacia erioloba (=A. giraffae) "Kamel thorn" can occur scattered, the conspicuous feature is the absolutely lacking of Colophospermum mopane in these sandy areas.

The plateau feature of this Kalahari sands deposit is very evident from Massida to Tjoi and from Katima to Kasheshe. In the strip proposed for the agricultural project, only between Kasheshe and Kaenda the plateau feature is evident, and small dunes does occur between Saalibi and Sakubi and Sibinda and between Sibinda and Makanga.

The basic ground, not ^{deeply} covered by sands, is almost all occupied by Colophospermum mopane and so it appears as depressions or flat areas at a lower level than the areas covered by yellow sands.

Variations within this type does occur according to drainage factors and human action. Thus some plots can occur which are covered by a park vegetation feature specially by Acacia erioloba (Kamel thorn) and by Terminalia sericea or by Combretum imberbe. The conspicuous feature here according to the soil/vegetation relation is the absolutely absence of Baikiaea plurijuga (Rhodesian teak). Ricinodendron, Guibourtia and Pterocarpus only very seldom can occur and it is so, is always at the more sandy places, and so, more well drained, which are as well the more light in colour (of soil). ^{at 6}

An intermediate stage which occur mostly along the strip between Bukalo and Ngoma does occur. It is characterized by its shallow deposits of sands which are light grey in colour and from which the both extreme conditions are absent as well as the respective indicator species: Nor Baikiaea nor Mopane are present and drainage conditions and of course its sandy condition is meddian. Not so strongly drained as the yellow soils of almost pure sands, not so efficient in the water holding ability as the dark ones.

This type is covered by a savanna of Burkea with Combretum collinum and Terminalia sericea.

But it must be pointed out that drainage conditions are different as from the western (Kasheshe-Massida) strip and the eastern one (Bukalo-Ngoma).

The first area lies in a country of complete endorreic drainage without nor at least true (deep) mulapos and the second have a net of "mulapo" which are carrying on an incipient drainage, which looks to be in some connection with the Lyniandi drainage system. Thus some special feature does occur here. The tree Colophospermum mopane in pure stands here usually can show deficient internal drainage that means it occurs at the edge of the pan or in very shallow soils, which are unsuitable for agriculture purposes. (At the Western strip (Masheshe - Massida mopane occurs in almost pure stands in still good drainage conditions).

(Bukalo-Ngong)

Here the more suitable soils for agricultural purposes are covered by a savanna where mopane is mixed with Burkea, Acacia erioloba and Combretum, in fair condition of drainage.

But the more extensive areas here are these of Burkea savanna with Pterocarpus and usually without Mopane and it indicates its more sandy condition and more internal drainage.

A KEY OF INDICATOR PLANT SPECIES FOR CAPRIVI

Baikiaea plurijuga "Rhodesia teak" - Infallibly states a pure sand condition of soil as well as its dry condition that is, strong internal drainage. Clay content use to be less than 5%.

(Ricīnodendran Rautanenii, Guibourtia coleosperma, Pterocarpus angolensis are the species that follows these conditions in a decreasing grading of sandy).

Colophospermum mopane - usually states less sandy conditions as well as a less strong internal drainage to a step of deficient drainage.

Acacia erioloba ("Kamel thorn") - where in pure stands of usually young trees states a place ploughed many years ago, (old lands)

Terminalia sericea - Sometimes it can occur the same that occurs with Acacia erioloba but usually it denotes a more sandy situation and frequently of strong ^{leached} washed sands.

Burkea africana - denotes usually intermediate conditions between that of Baikiaea and "Mopane".

THE MAIN SOIL SERIES OF THE STUDIED AREAS

Psamic - almost pure sands of Kalahari origin.

Cromopsamic - yellow sands. White sands

Psamitic - sandy of the basic complex. In depressions, and hidromorphism can occur. Light grey, dark grey to blackish. Probably from partial fluvial origin. (Aridics)

Calcareous - Here and there where the top soil is influenced by underlying calcrete. Depression places, bed of "Mulapos" and similar Waterlogged conditions.

Nor alluvium nor colluvials ^{proper} soils does occur in the proposed areas, as well no litolic or lateritic ones. But the aridics could be of fluvial origin.

FINAL NOTES

As This survey was done as transects, the complete extension of the different types of soil is not showed.

The occurrence of these types are very closely related with topographical variations and so does occur as well with drainage conditions.

Thus the boundaries showed at the attached sketch-transact are true only for a linear way along the road. Their wide is not showed as had not been surveyed.

It can occur that next to the road the soils may be suitable for agricultural purposes but not so only five hundred meters further. In Kasheshe area, at the road the soil is too sandy, but going further south, only for 300 meters, they are more suitable.

The strip between Bukalo and Ngoma along the road is mostly of a sandy condition. But it looks as, by the analise of the map, west of the actual road about 3 km far apart, a depression is running from North to South, starting from about 5 km south of Bukalo, ~~which~~ looks to be of more hard soils. Next Bukalo mulapo, transversaly to the main road, a strip of 1 km wide, along the mulapo looks to be good. This is a first aproximation survey. * Later on, after topographical maps have been studied, a second aproximation will be present.

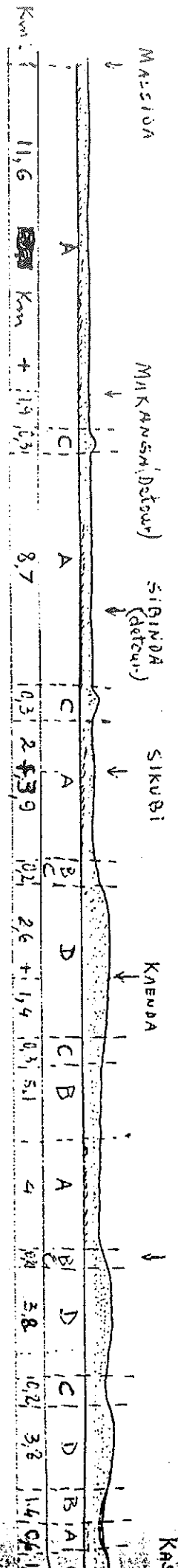

RUK CORREIA

KATIMA MULILO
12 July 1977

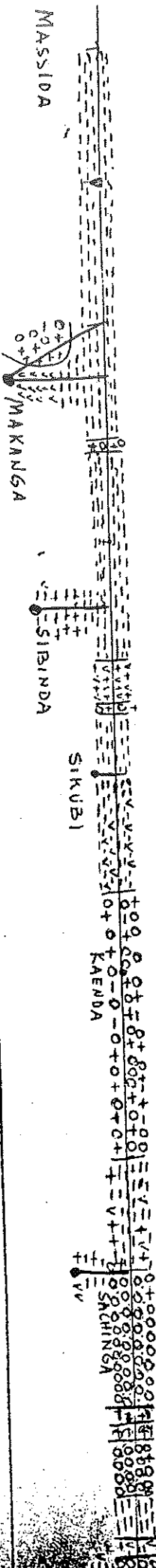
* - The present survey was done in two days time.

OF THE STRIP ALONG THE ROAD IN THE SECTION MASHESHE - MASSIDA

Cut transect showing presumed topography and relative soil depth and texture.



Flat transect showing boundaries of different vegetation types



VEGETATION - Dominant taxa

Colophospermum mopane

vvvvv - *Acacia erioloba* (= *A. giraffae*) with or not *Combretum imberbe*, *Albizzia harveyi* and "Mopane"

++++ - *Burkea africana* (with or not *Terminalia sericea* and *Pterocarpus angolensis* and *Ricinodendron*)

ooooo - *Baikiaa plumbaga* with or not *subaurita* *colospermum*, *Pterocarpus*.

TOPOGRAPHY: depth of soil and drainage

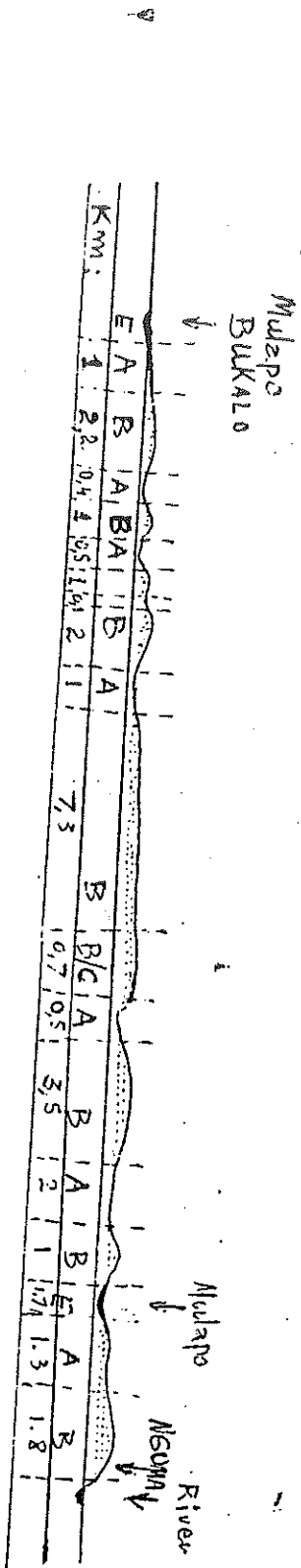
- A - Flat depression, soil hydrophilic, sandy with aluvial and colluvial materials plus organic matter, wet in summer but not overlogged. Dark grey (probably a fluvial type)
- B - Slopes or flats of sandy deposits of median depth, well drained, soils sandy to sandy/loamy, light grey/brownish.
- C - Sandy deposits, fine to coarse, steeply similar to B, previous one but probably dominated by scars of acolian origin (Kakani)
- D - Sands, very more deep, yellowish to reddish Kalahari aeolians sands

Probable suitable dry crops

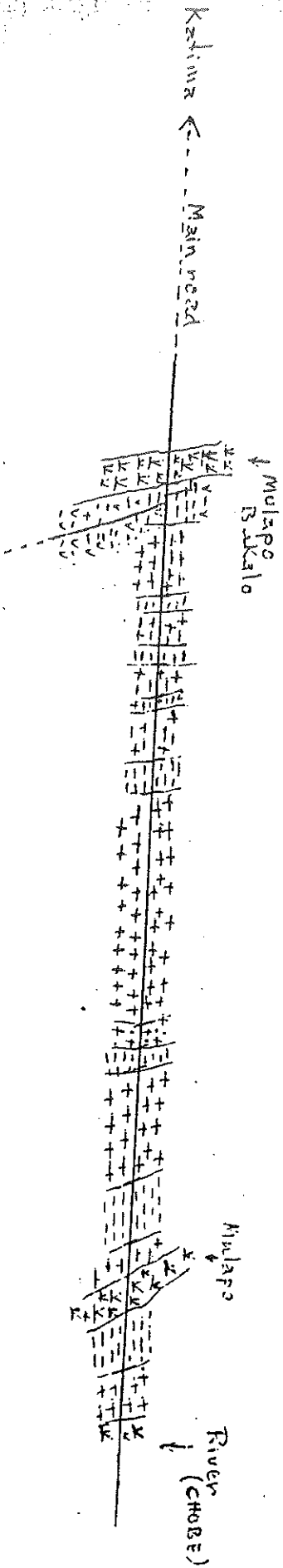
- A - Maize, Sorghum, Pumpkins
- B - Maize, sorghum, Mungo, Cassava, Bean Vigna
- C - Cassava, Peanuts, Vigna, Sorghum, Mungo, Squash, water melon
- D - Grazing or wood (local species)

TRANSECTS SHOWING CORRELATION OF TOPOGRAPHY / SOILS / VEGETATION
OF THE STRIP ALONG THE ROAD IN THE SECTION BUKALO - NGOMA

Cut transect showing presumed
topography and relative soil depth and texture



Flat transect showing boundaries
of different vegetation types



See following table I: Key...

Basic tree species indicator: *Colophospermum mopane* and *Baikiea plurijuga*

Special scattered indicator species for good soils: *Louibeacarpus capensis*, *Albizia harveyi*, *Acacia nigrescens*

VEGETATION: Veld type and dominance of tree species		SOILS		PLANT COMMUNITY		TOPOGRAPHY		CROPS	
		COLOR	Sand content	Clay content	Water/Drainage	Place of occurrence	Topography/Soil erosion	Probably suitable dry crops	
E	Only grasses and needs.	Blackish	Poor	High plus organic matter	Wet waterlogged	Eastern strip only = Bukalo and Nema	"Muleppa" Hydromorphic and organic	Water crops Rice (if not problems of salt)	
A	<i>Colophospermum mopane</i> alone or with a complex mixture including <i>Combretum collinum</i> , <i>Okra</i> , <i>Commiphora</i> .	White/Grey surface/white washed sands, next milkpots (specific conditions)	Washed sands at surface layer	good to fair	Poor to fair drainage; balance to layer probably at ± 100 cm	Western and eastern strips	Flats or shallow depression alluvial/kolluvial	Maize, Sunflower, Sorghum, Cotton	
A	<i>Colophospermum mopane</i> and/or <i>Acacia erioloba</i> , <i>Combretum imberbe</i> , <i>Louibeacarpus</i> and <i>Albizia harveyi</i>	Dark grey	NOT so much sandy	fair	Poor to fair drainage. Colored layer at more or less 100 cm	"	"Aluvial/kolluvial"	Same, plus Cotton, Tobacco	
A	"Mopane"/ <i>Burkea africana</i> associated, with others	Grey	Sandy	fair to poor	Fair drainage	"	Base of gentle slope or slightly raised plateau	Maize (fertilised), Sorghum, Mahango, Vigna catjang, Peanuts, cassava	
B	<i>Burkea africana</i> , with <i>Terminalia sericea</i> and <i>Combretum collinum</i> without "Mopane"	Light grey?	More Sandy	Poor	Fair to high	"	Upper portions of slopes of slightly raised plateau	Sorghum, Mahango, Peanuts, Vigna, Cassava	
B	<i>Burkea</i> , with <i>Pterocarpus angolensis</i> and <i>Quibouria leucosperma</i> .	Light grey/brownish	Very Sandy	Very poor	High	"	Shallow dunes or plateau of <i>Kalahari Sands</i>	Pea nuts, Vigna, Cassava, <i>Eleusine coracana</i> , Mahango	
C	<i>Burkea/Pterocarpus/Quibouria</i> plus <i>Baikiea plurijuga</i>	White/Grey to yellowish except for superficial layer	Too much sandy	skill more poor	Too muddy high	Only western strip, = Kasheshe to Nassida	Dune or plateau of <i>Kalahari Sands</i> (shallow)	Pea nuts, Vigna, Cassava, <i>Eleusine</i> , Squash	
D	<i>Baikiea</i> with <i>Pterocarpus</i> and <i>Quibouria</i>	Yellowish to reddish, darkened at top by organic matter	Almost pure loose sands	Almost no clay, probably less than 5%	Washed dry soils poor water retention	"	Same but more deep	Wild wood species	