#3

An extract from a Master's thesis by Marjatta Elonheimo

EFFECT OF PHYSICAL-GEOGRAPHIC FACTORS ON THE POPULATION OF THE CENTRAL PARTS OF NORTHERN NAMIBIA

1.1. Plateau without a river outlet

The work deals with the historically old, dense population in northern Namibia, which has traditionally been called Ovamboland (fig. 1). Ovamboland is part of the Namibian plateau, which is more than 1000 meters high. The differences in altitude are small, as is shown by the figures measured in different parts of the plateau (T.P.N. No. 12, 1964):

Engela 1139 m above sea level
Oshigambo 1100 m "
Oshikuku 1050 m "
Ongandjera 1030 m "
Olukonda 1010 m "
Ombalantu 1000 m "

As can be seen from figure 2, isostatic elevation has taken place in the peripheral parts of Namibia since the dissolution of Gondwanaland in the Tertiary period. For this reason the inland depressions, e.g. the large Ovamboland depression (fig. 3), remain without any outlet flow and the ground slopes southward. This has given rise to the large Cuvelai river system with a delta of oshanas, or river beds which flow south during the rainy season (fig. 4). Dense population has sprung up along the oshanas, which means that the map of dense population correlates with the Cuvelai system (figures 1 and 4). In microrelief, the parallel oshanas are separated by sand dunes, which are not cultivated, but are generally covered by wild plants, usually forest.

1.2. Typical soil types

The erosion products in northern Namibia belong to the Kalahari system. Sand and gravel date back to the early Tertiary period in the southeast and the middle Cretaceous period in the north (Barnard 1964, p. 8 and fig. 5).

1.2.1. Mineral soil types

The most common soil types in Namibia are erosion products of Stromberg sandstone. The

increasing aridity of the climate has enhanced wind erosion, which has helped to increase and spread the sand. The soil in northern Namibia also typically contains lime crust accumulations, which have been transported to the top soil by evaporation of capillary water. Since that, most of the crust has been covered by sand (Barnard 1964, p. 9). One area where the lime crust has been re-exposed is on the water-eroded western bank of an oshana at Oshigambo. In Ovamboland, the layer of sand, gravel and lime crust is 50 meters thick on an average, being even thicker in many places.
When drilling for water, sand layers as thick as 300 meters have been found in Ovamboland. It has also turned out that the water flowing out of the drilling holes in central Ovamboland is bitter and very salty and hence unsuited for household use. This means that surface waters, e.g. the water flowing in oshanas during the rainy season, are of notable importance.

A batch of soil samples were examined in the Finnish Soil Research Institute at Tikkurila during 1966 - 1967. The triangular diagram shown in figure 6 was made on the basis of the analyses. In the samples that were analyzed, sand (0.2 - 2.0 mm) accounted for 55 - 60 % of the mineral matter and fine sand (0.02 - 0.2 mm) for 35 - 45 %. There was not much silt (0.002 - 0.02 mm) in the samples. The samples containing silt are shown as vectors instead of spots in the diagram. The clay content of the field soil samples was usually 5 %. In the depressions with the highest clay contents, clay accounted for 50 % of the mineral matter. Clay of this kind is used for making jars. It is most commonly found at Ombalantu and Uukwambi.

The acidity values of the soil samples vary within pH 6.00 - 9.85. Abundant evaporation causes water to move upwards. Water thus transports upwards the potassium, magnesium and sodium salts dissolved in it. When the water evaporates, the dissolved salts accumulate in the top soil. Over long periods, therefore, water causes salts to accumulate in the top soil layers (Ganssen 1963, p. 20). This probably explains many of the blackish grey oshana surfaces without vegetational cover seen in different parts of the country. In the oshanas that grow grass, ground waters flow and the grasses get nutrients, such as potassium, calcium and phosphorus, from the salts.

1.2.2. Organic soil types

In western Ovamboland, marshy depressions favourable for the accumulation of plant debris were present as early as the early Karoon period, which corresponds to the Carboniferous period in the European classification. The drillings made in the Etosha Pan area in 1952 revealed a 13-meter coal layer at a depth of about 316 meters under the mineral soil strata (Interim Report of the Coal Commission of South West Africa, Windhoek 1961, p. 15). Organic soil continuously develops in depressions where the flow of water is either lacking or slow.

Investigation of organic soil types for natural gas and oil was started soon after Namibia became independent, especially in western Ondonga.

1.3. Longitudinal dunes

The constant alternation of elevations and depressions observabe in microrelief is due to sand dunes. At the present, the sand of the Kalahari desert remains stable, but during the late Tertiary and the Quaternary periods it accumulated to form longitudinal dunes. The Omaheke region east of Ovamboland typically consists of high dunes covered by dry forest (Barnard 1964, p. 12). The relict dunes in Ovamboland were only 1/2 - 1 meters high (cf. fig. 7) in the test drillings made by Portuguese investigators. Dune formation is unmistakable everywhere except in Ombalantu, Uukwaludhi and Uukolongadhi, i.e. the westernmost parts of the study area.

The sand at the dune crests is reddish in colour, but greyish white elsewhere. The dunes run from NNW to SSE. Owing to their permanent vegetational cover, the dunes have lost the sharp crest originally created by the wind. They make up a fairly regular pattern of ground elevations. The eastern slope, which is exposed to the prevailing winds, rises slowly and the opposite side falls sharply. A typical relict dune of this kind is shown in the map (fig. 8). As can be seen, stunted mopani forest grows along the crest of the dune. The western side of the dune borders on the Ombafi oshana. Population has spread both along the eastern slope of the dune, where there is a fully grown mopani forest, and west of the dune near the river basin of the rainy season. It is probable that the water flowing down from the sand dune irrigates the peripheral parts quite well, and the fields with their kraals are located like beads in a chain along the dune periphery. An aerial photo map taken during the rainy season in 1963 clearly shows this shuttle-shaped, dune-bound pattern of population to be common in northern Uukwambi.

A similar photo taken during the same rainy season in the Ondangwa area (fig. 9) shows the population to concentrate along the eastern banks of much shorter oshanas, where the eastern slope of the dune is steep, but the dune crest has been flattened out. Where the crest area has not been cleared for use as fields and populated, shrubs and trees typical of sandy soils grow.

In the Ombalantu area (fig. 10 and photo 1) during the same rainy season in 1963, rain water filled the depressions on the open plain. There is no dune formation. The fields with their kraals make up clusters in mopani forests.

During the dry season, wind transports and accumulates the surface sand (photos 2 - 3) in highly eroded areas, such as Odonga. The eastern sides of fences and houses are obvious sites for sand heaps. Minor surface transportation is common even elsewhere, but no new dunes have come

about. Increasing, unplanned deforestation facilitates the transportation of loose soils (photo 4).

1.4. Oshanas

Oshana is a broad, sandy, plant-covered river basin without precisely definable margins (Barnard 1964, p. 54). Oshanas may be as wide as 2 km. Their margins cannot be defined, because they are extremely flat and occasionally covered by water. The amount of water during each rainy season depends on the rainfall and floods.
The oshanas of the Ekuma river belong to the delta of the Cuvelai system, which covers the whole central part of Amboland (fig. 4).

The broadest oshanas are the Ondokoro, Ombafi, Oshuri and Etaka rivers. During the rainy season the oshanas make the scenery reminiscent of extensive lakelands and attract plenty of water fowl to Ovamboland. During the dry season the oshanas are clearly discernible from their surroundings as either green grassland or black alkaline depressions.

Water flows very slowly in all oshanas, and erosion by water is therefore minimal. Silt formation, however, is abundant. The vegetation, which is quite dense in some places, binds the top soil effectively to the underlying layers. Oshanas
make for good and fertile substrate (photo 5).

The bed of the Oshigambo oshana (photo 6) is untypically deeply eroded. It is probable that notably greater masses of water used to pass through it, as is also told by oral tradition. During successive years with less abundant rainfall the vegetation has become deeply rooted in the silt bottom of the river bed. Combrefaceae, Terminalia and Acacia occasionally grow as high 3 - 4 meters (fig. 7).

2.1. Dune-bound population

As is shown by the abovementioned aerial photo of the Ogongo area, the fields and the kraals make up a shuttle-shaped formation on the dune. The peripheral parts of the dune are populated, while the central part remains without population.
The central part consists of the dune crest, where the sand is deepest and most difficult to travel. The central part is hot and arid and naturally covered by stunted mopani forest accompanied by thorny acacias. Grasses do not grow there. In the actual mopani forests bordering on the dunes the mopani trees grow to full size and are accompanied by other broad-leaved trees, not by thorny acacia.

The natural vegetation shows that the dune crest is a poor substrate. The traditional way of living requires the kraal to be surrounded by a productive field. The population is therefore concentrated along the dune periphery, where the rain water flows. The slopes are moister, the sand layer is more tightly packed compared with the loose sand of the dune crest, and it is possible to dig wells. The rain water also dissolves plant nutrients from the sand layers of the dune crest and transports them down towards the periphery.

Because the steep slopes of the dunes are on the eastern shores of the oshanas, they are never flooded and are therefore populated. The western banks of the oshanas are very gradually sloping. They level off imperceptibly into the dry plain, as is shown by the field margin oshana (photo 8).

At Ogongo (fig. 8), the dune crest seems to have spread out into a ridge about 2 km wide at Iimyume. Stunted forest grows as far as the oshana bank. There is no population there. Instead there is a highway and a canal, which follow the course of the oshana.

2.2. Benefits of dune population

In an economically self-sufficient society, the population of dunes has several benefits.

In the Cuvelai area the dunes border on the oshanas, the river basinsfilled during the rainy season. Being the only elevations, the dunes attract population and are supplied with water by the oshanas or water-filled depressions. Oshanas prevail at Uukwambi (Appendix 2), while at Ondonga there are numerous small water-filled depressions (fig. 9). When the water evaporates, they grow grass, which is valuable as animal fodder and construction material. As the ground is level and treeless, it is easy to herd cattle there, and pasture land is guaranteed. During the rainy season water is always close at hand. Many of the oshanas have a high ground water level and hence provide good sites for wells. If rainfall and floods are abundant, ground water remains fresh. The inhabitants may also catch fish from the oshanas, even frogs. The fields are fertile, and the water flowing off the dunes keeps them moist. Crops that require a moist soil, such as sorghum, are grown in the low-lying parts of the fields, while millet, which tolerates more arid conditions, is planted in the higher parts.

2.3. Water-bound population

In Ombalantu tribal area the houses unlike in Uukwambi (Fig. 8 and 10) are scatered over the dry areas not in any spesific pattern. The surcafe is extremely flat without any dune formation

(photo 1). The rain water gathers into pools in the very shallow depressed areas. When the water dries up there is rich fertile soil to be cultivated.

3. Summary

The significance of land relief for the location of population is great among people living in economic self-sufficiency. There are three distinct types of relief in the study area: Ondonga (Ondangwa), Uukwambi (Ogongo) and Ombalantu.
Agriculture and cattle raising are common in all three areas. In the first two, fields and kraals tend to concentrate on the dunes. There are no dunes in the Ombalantu area, and the kraals are there scattered with no obvious order. This shows that kraal population in an economically self-sufficient society is dependent primarily on the water supply and secondarily on the relief of the terrain.

Literature

Barnard, W.S., In Kaart van die Klimaatstreke van Suidwes- Afrika; S.W.A. Wetenskaplike Vereniging, Journal Bank XVIII/XIX 1963(64 - 1964/65 Windhoek.

Ganssen, R., 1963, Südwest-Afrika Böden und Bodenkultur.
Berlin.

R.P. N:o 12/1964, Report of The Commission of Enquiry into South West Africa Affairs 1962-63. Pretoria.

Photo 1. Ombalantu

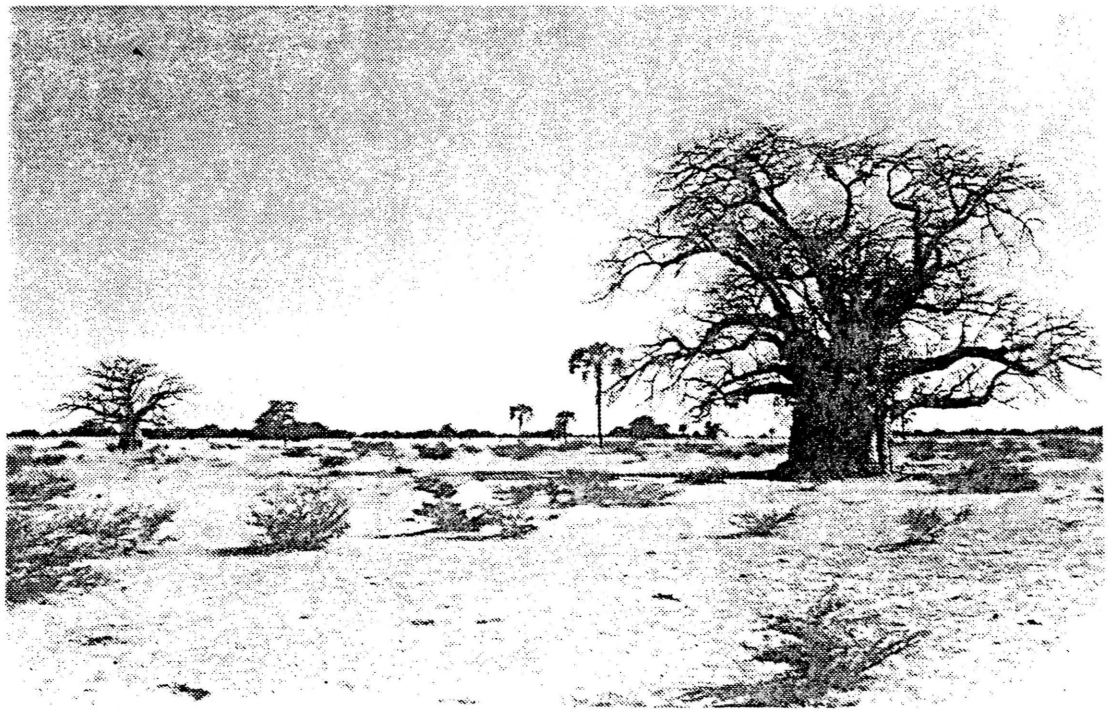


Photo 2. Erosion in Ondonga (Ondangwa). (Both photos)

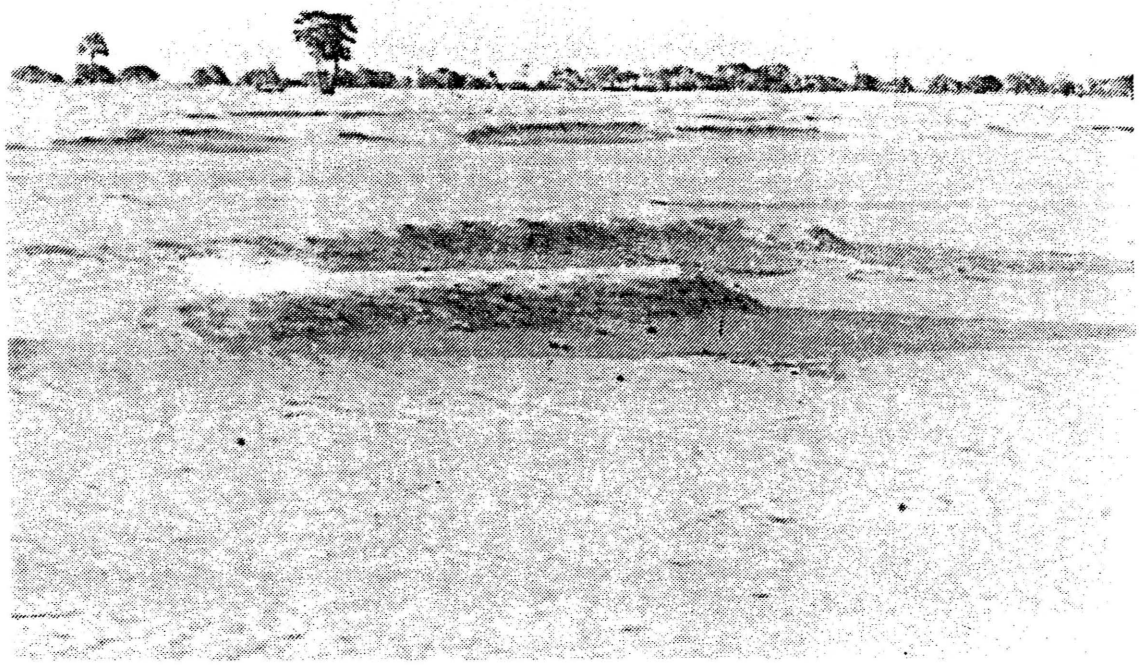


Photo 3.

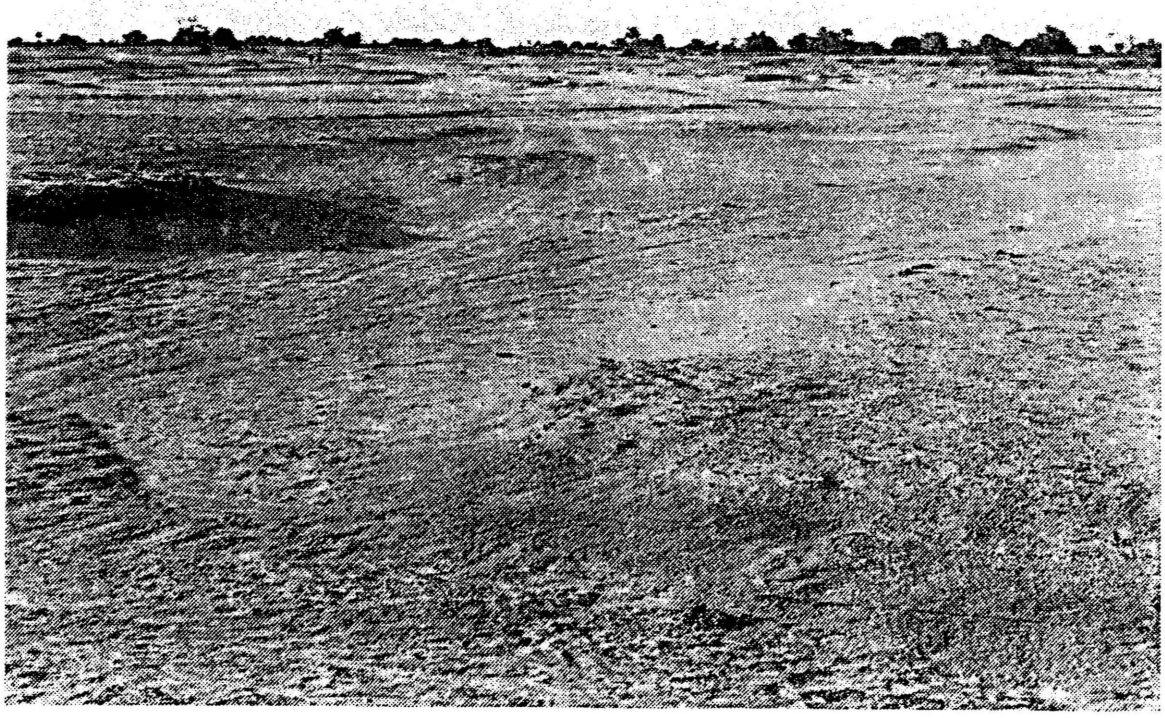


Photo 4. Deforestation.

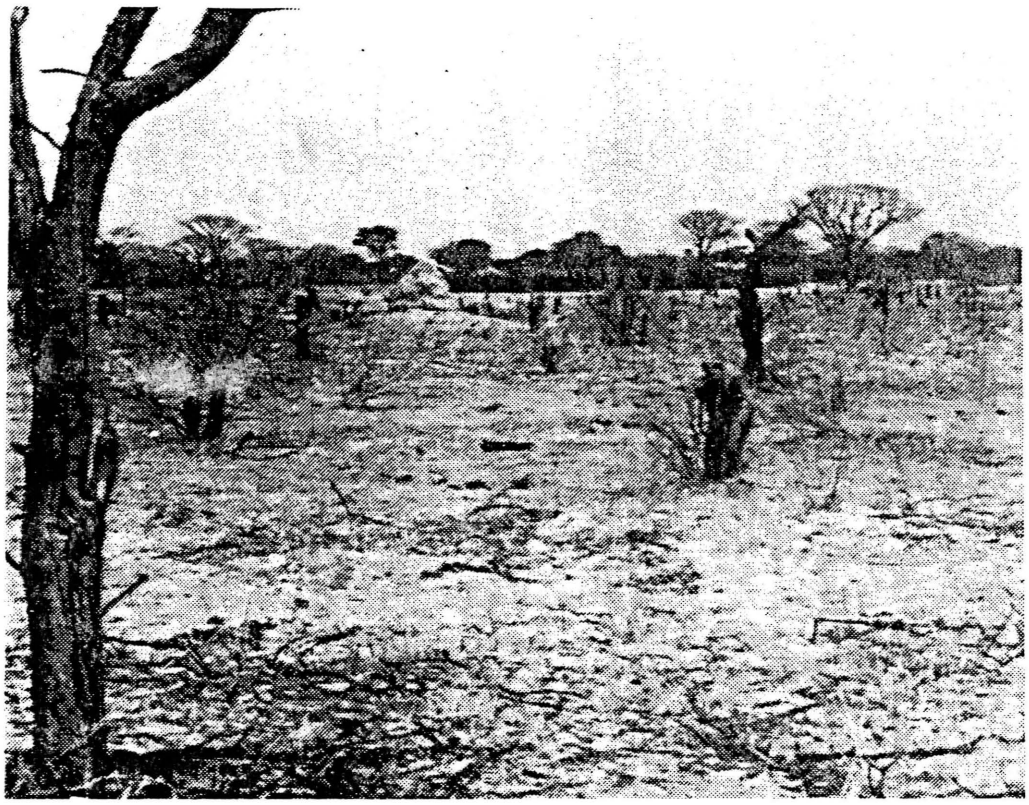


Photo 5. Vegetation in an oshana, Oshigambo.

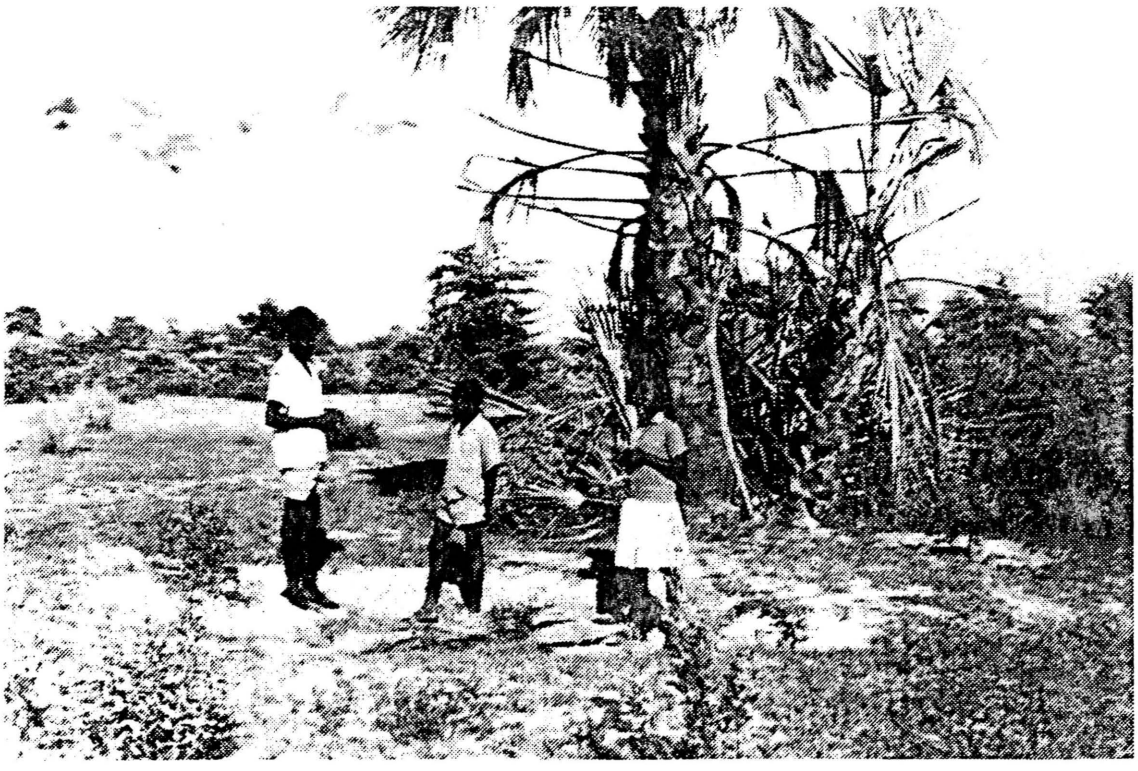
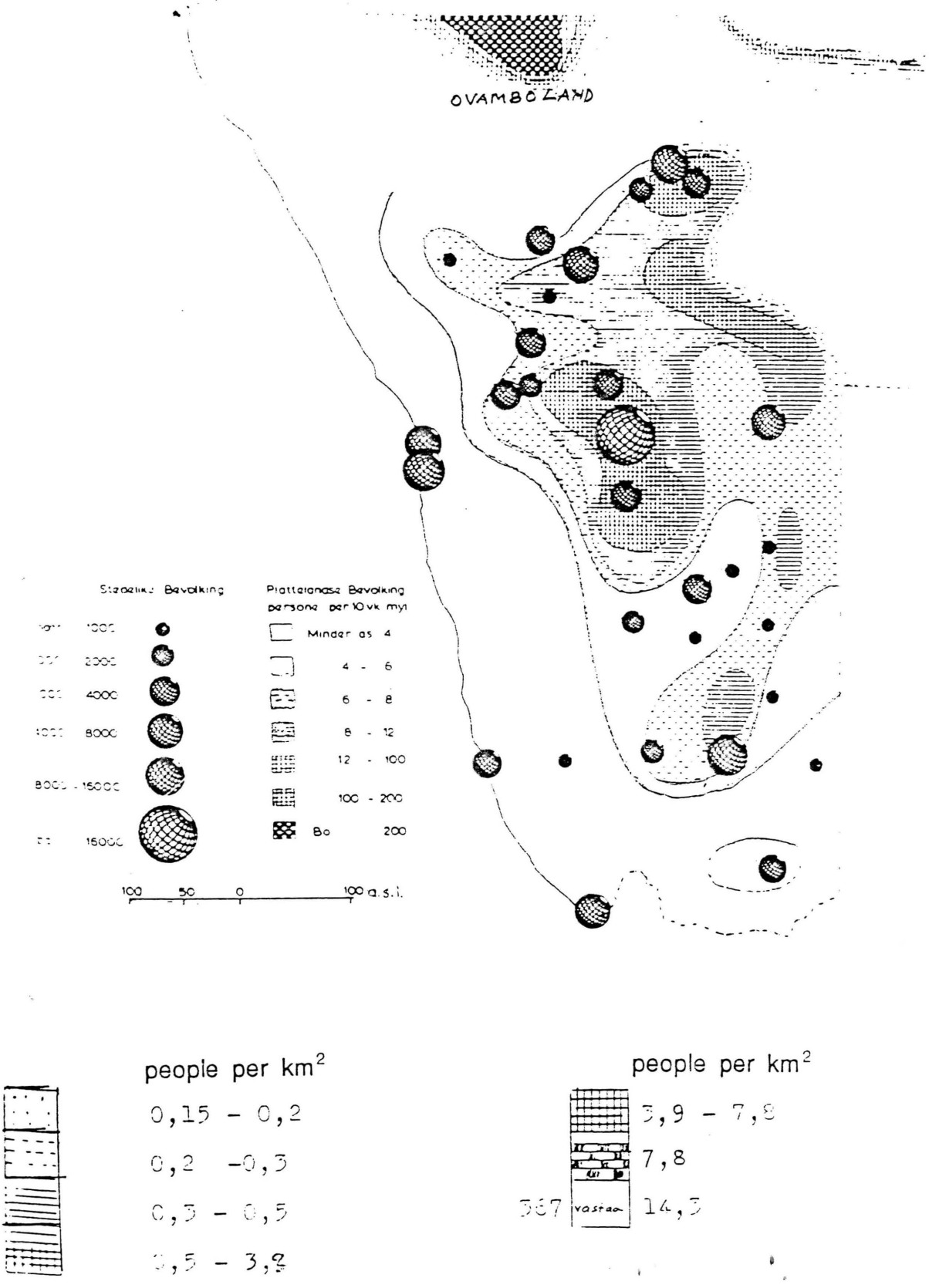


Photo 6. Oshigambo river basin.

Photo 7. Combretum imperbe in Oshigambo river basin.

Photo 8. Cultivated field next to an oshana.

Fig. 1. Population density in 1960.



people per km²

0,15 - 0,2

0,2 -0,3

0,3 - 0,5

0,5 - 3,9

people per km²

3,9 - 7,8

7,8

14,3

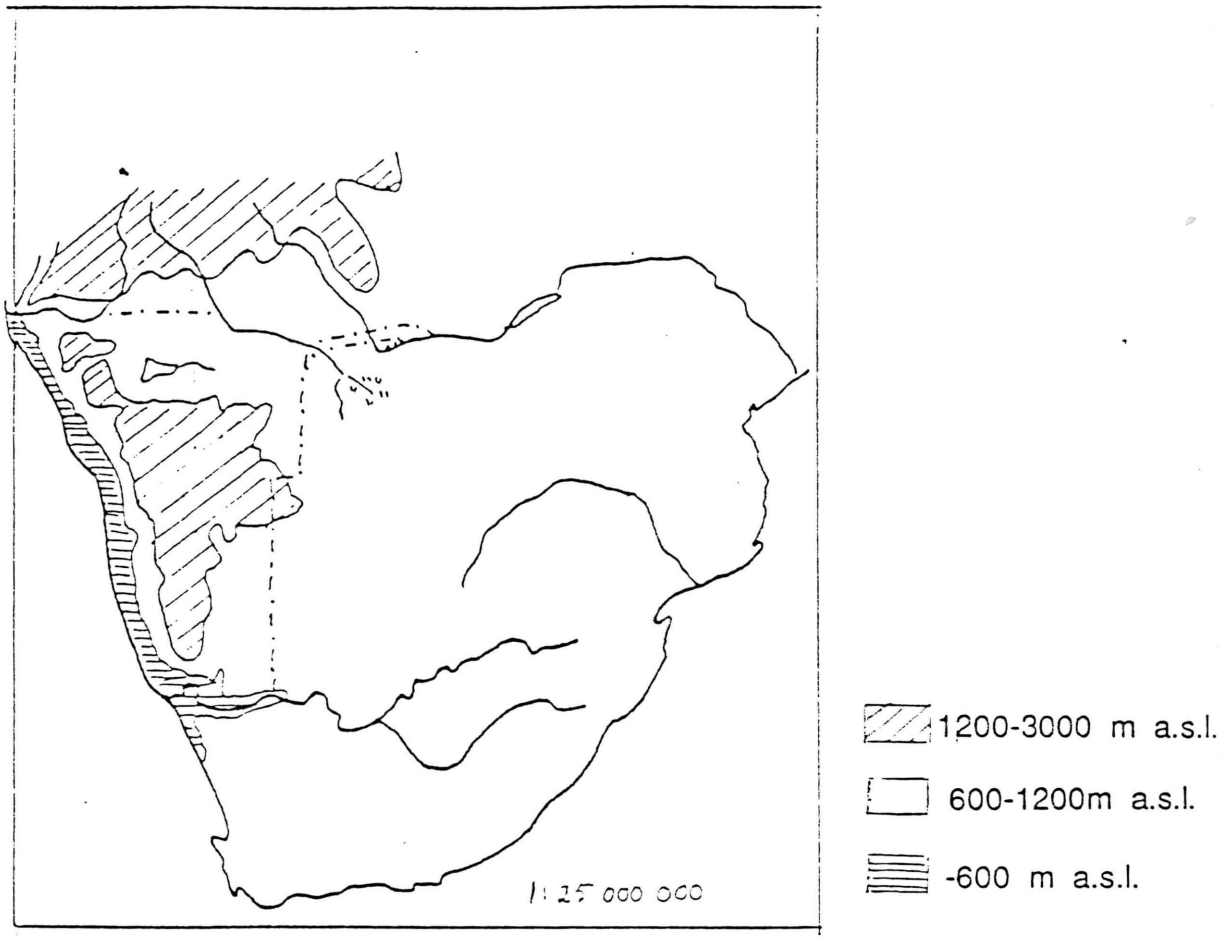
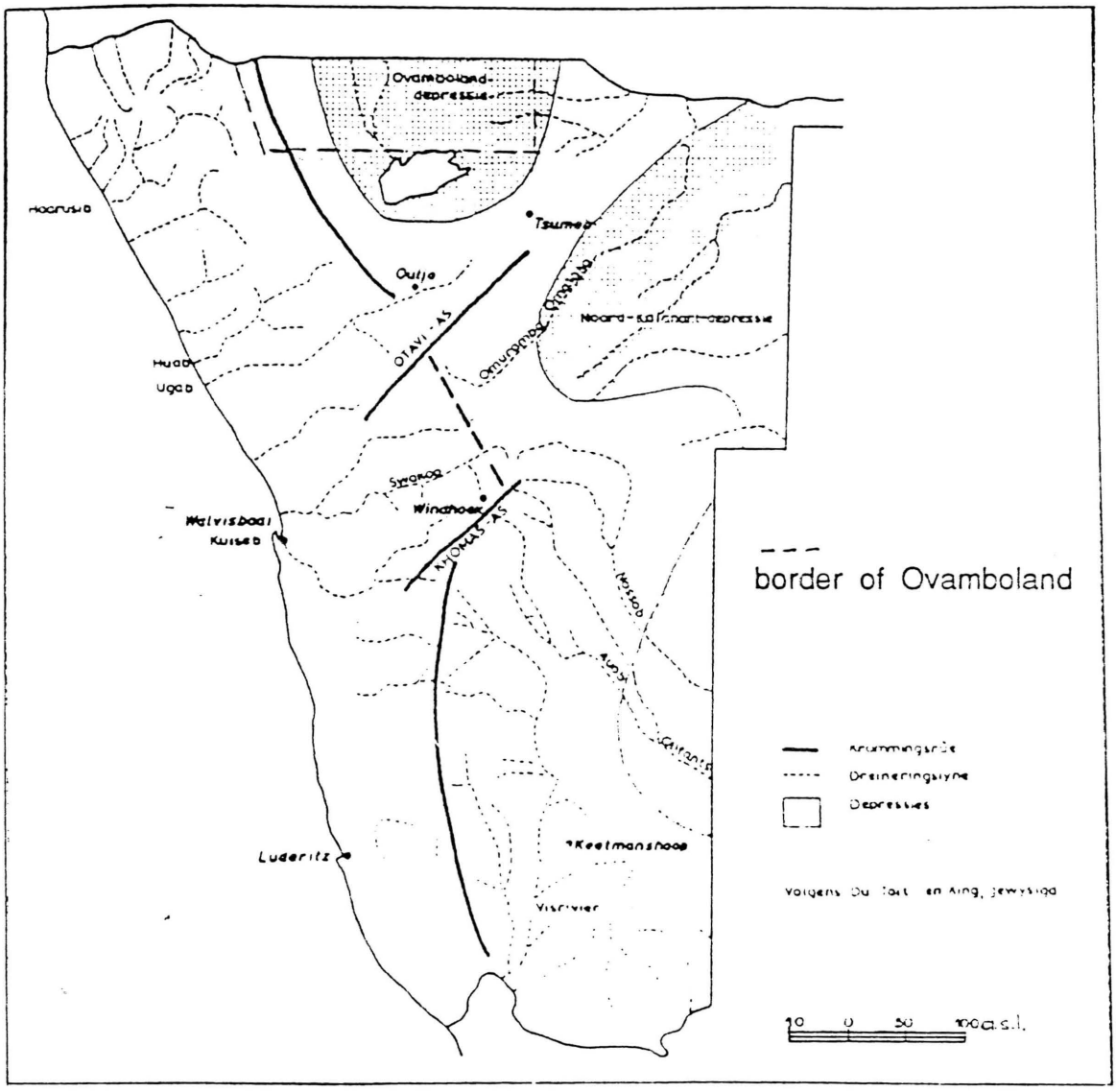


Fig. 2. Ovamboland and southern Angola make up a uniform plateau projection at 600-1200 meters above sea level.

Fig. 3. Depression areas in Ovamboland and northern Kalahari. (Barnard 1964, fig. 3.)



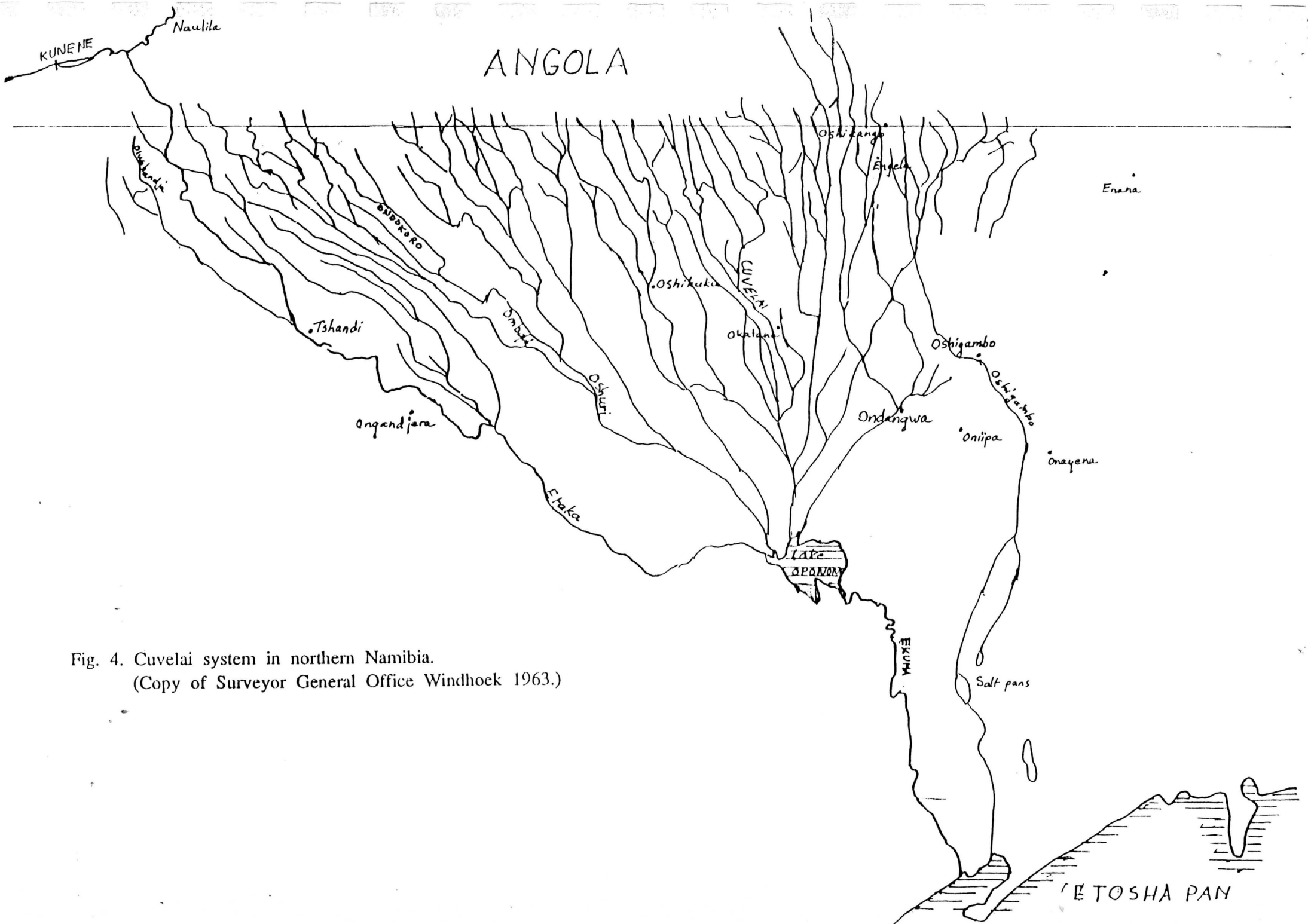


Fig. 4. Cuvelai system in northern Namibia.
(Copy of Surveyor General Office Windhoek 1963.)

FIG. 5.

Fig. 5. Area covered by Kalahari sand and gravel.
(Barnard 1964, fig. 30.)

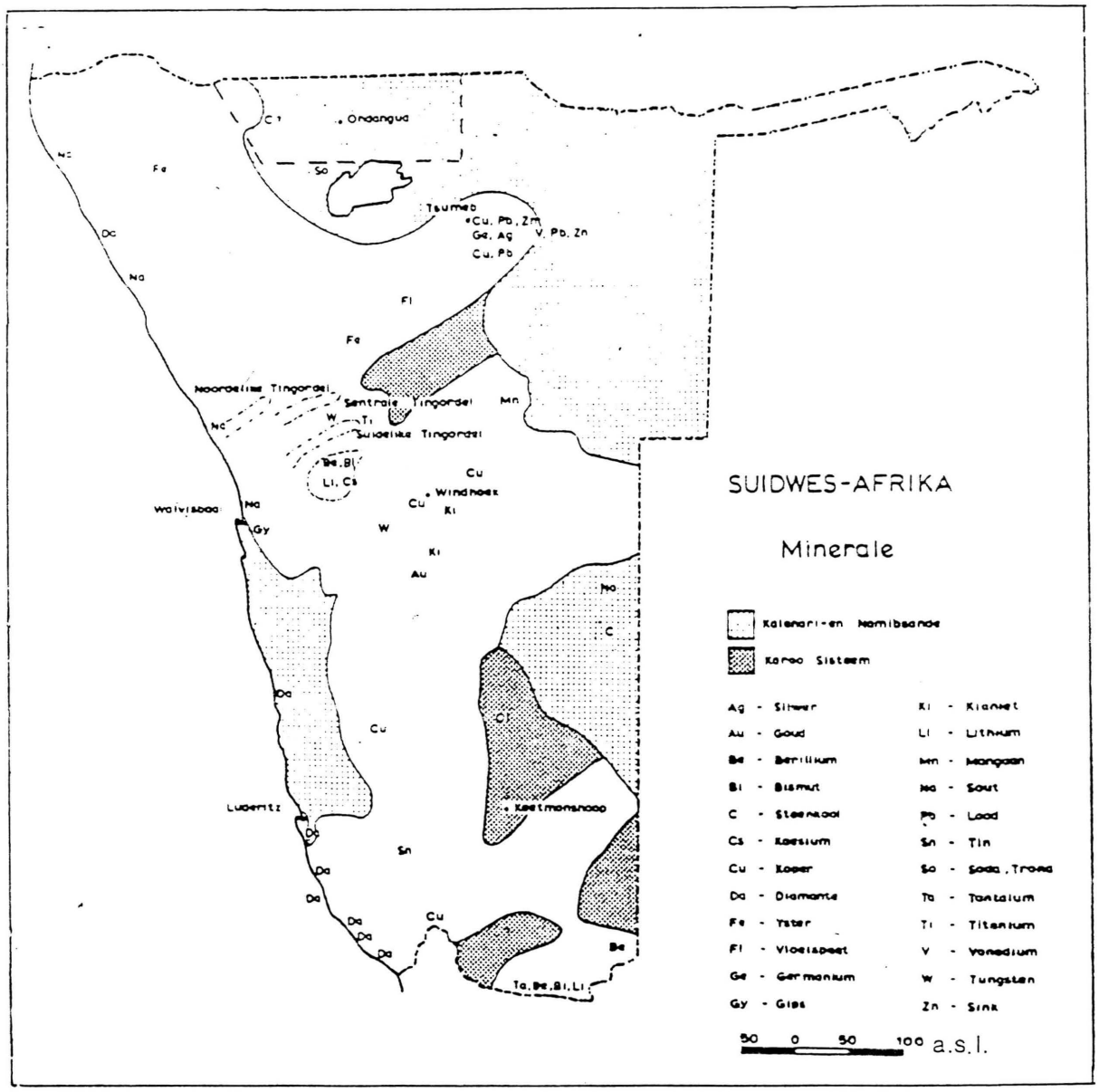


Fig. 6. Diagram of soil type composition

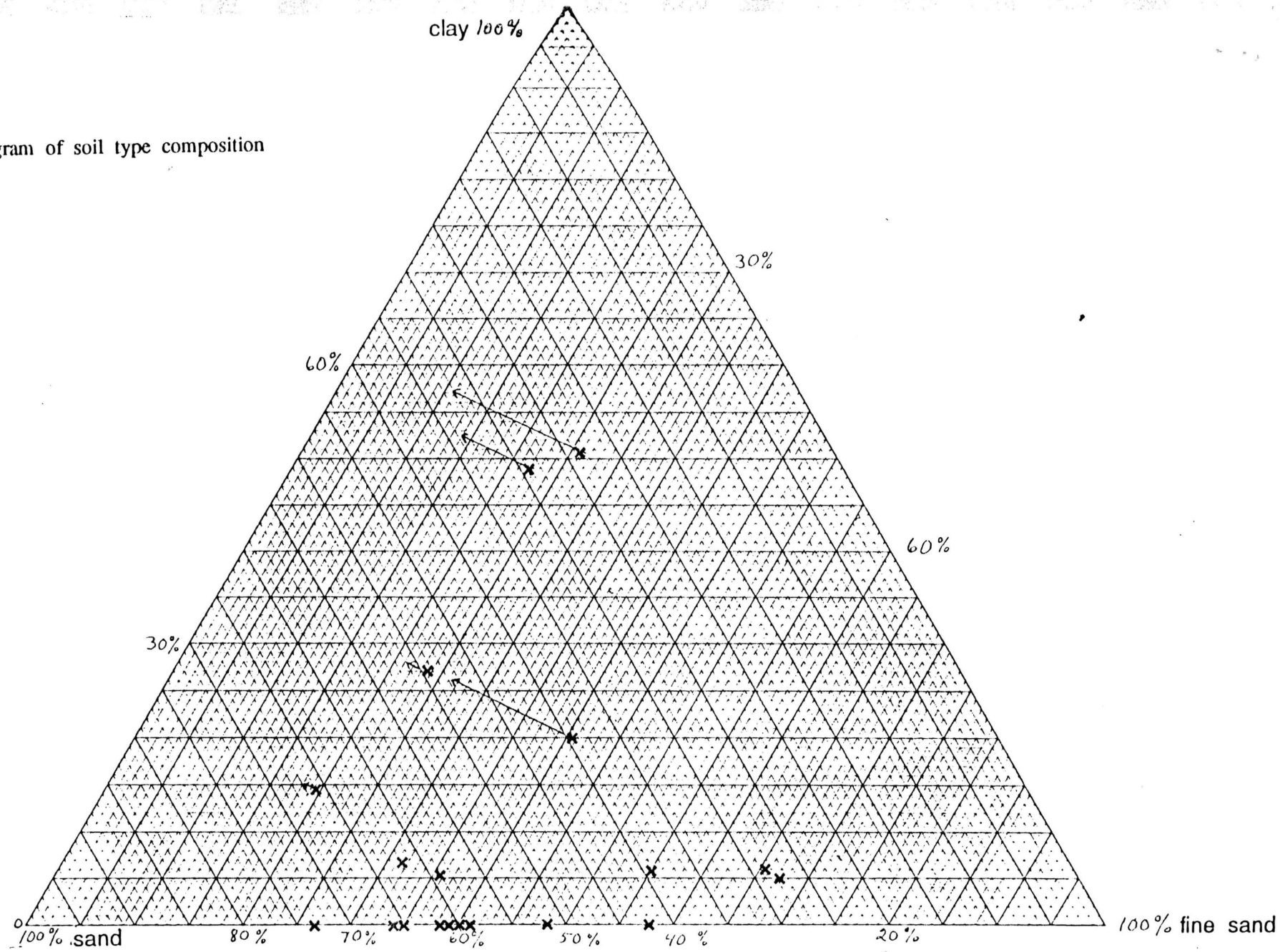
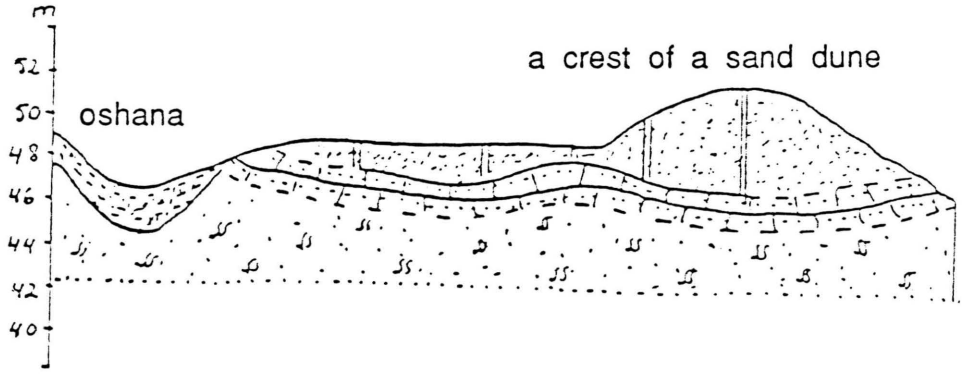


Fig. 7. Profiles of an oshana and the crest of a sand dune.



Test drillings by Portuguese investigators in the oshana region in northern Ovamboland. The curves indicate the typical profiles of oshanas and sand dunes. The top and bottom sand layers are separated by a layer impermeable to water(Stengel 1963, p. 221.)

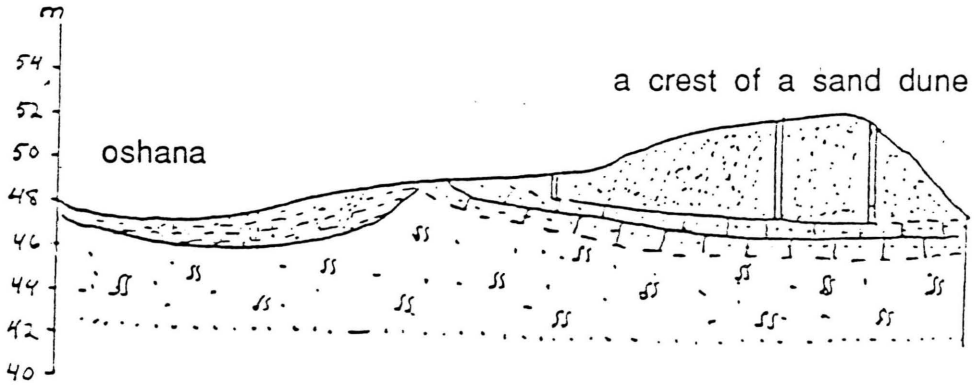
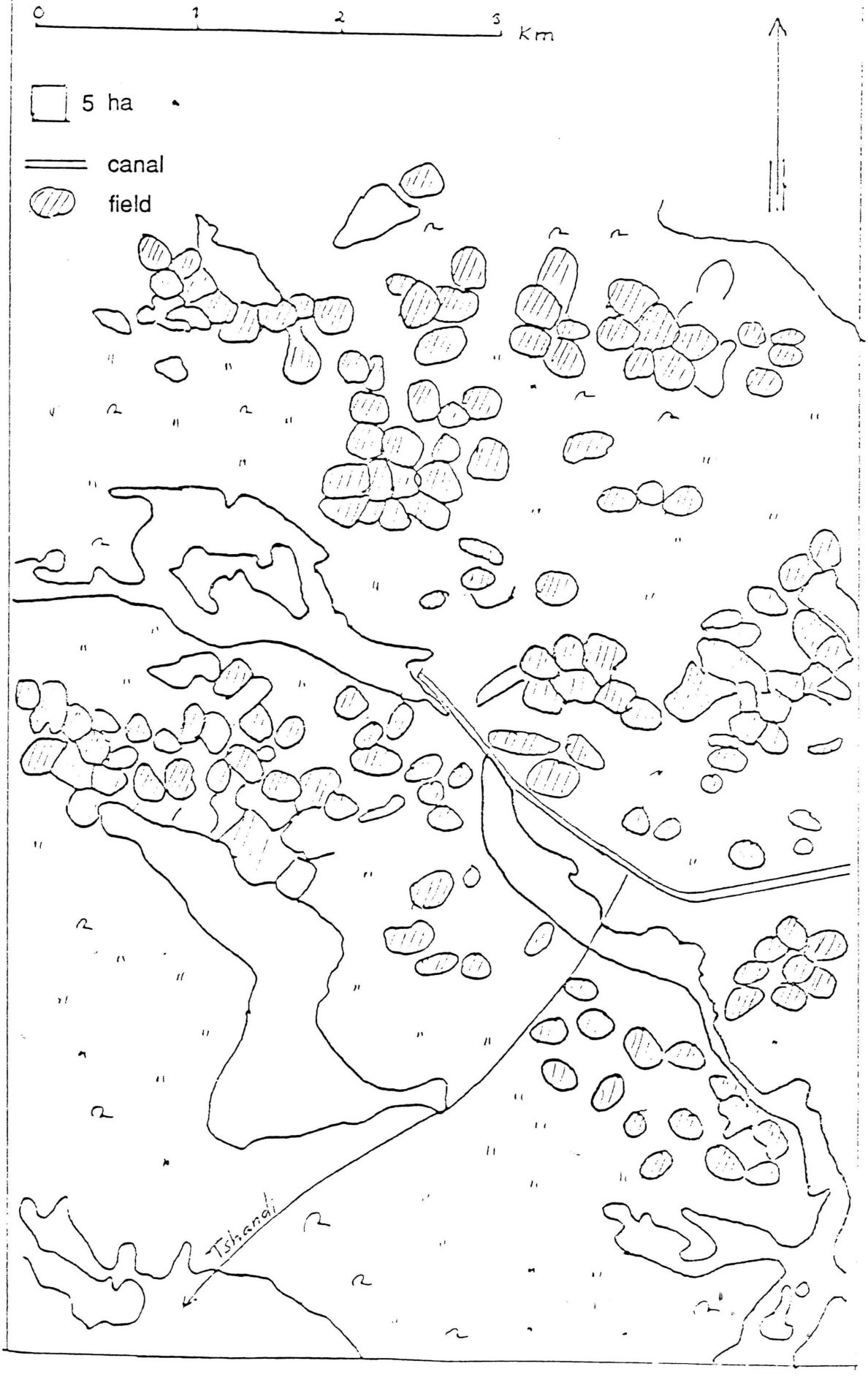


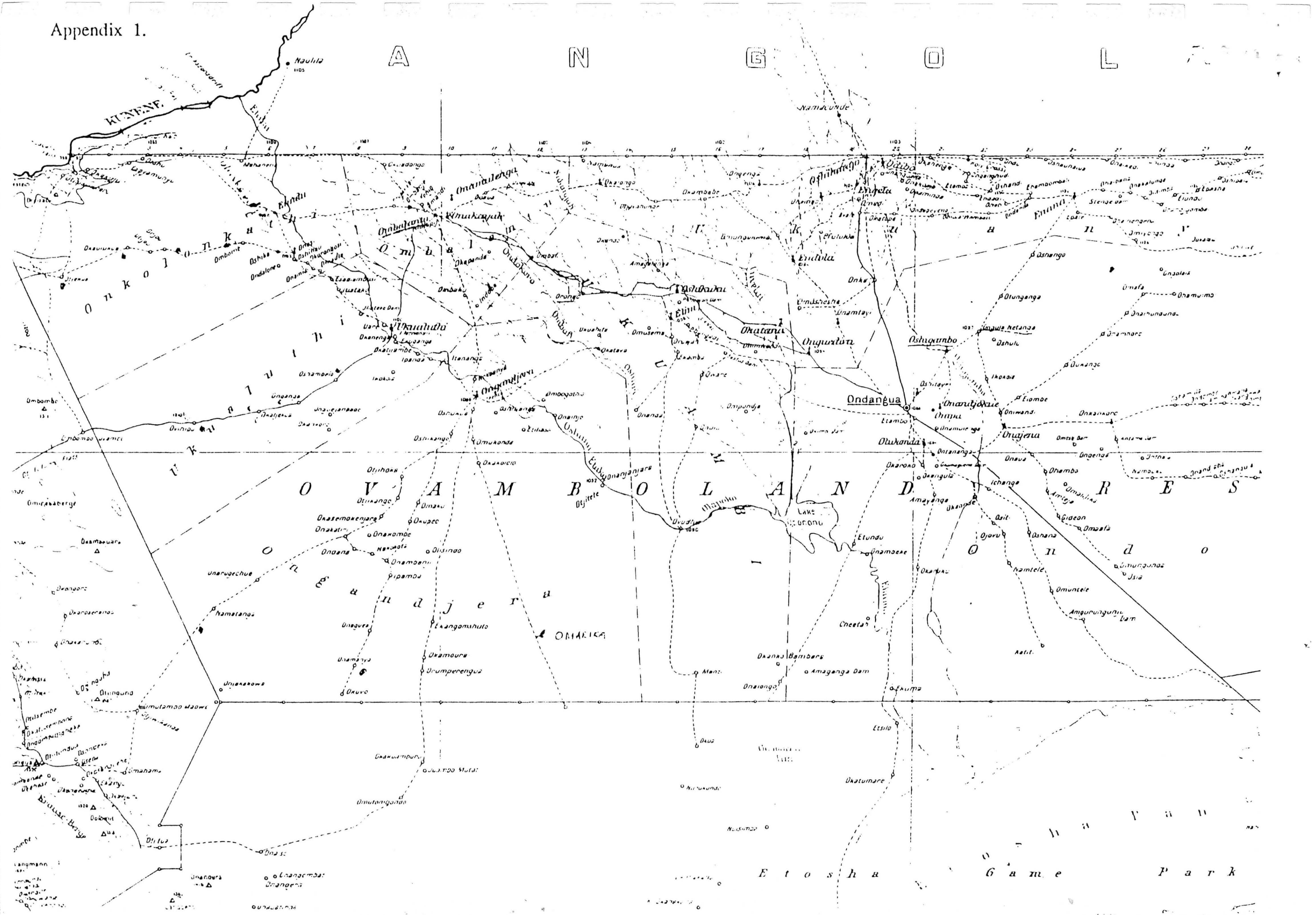
Fig. 8. Aerial photo map, Ogondo, Uukwambi.

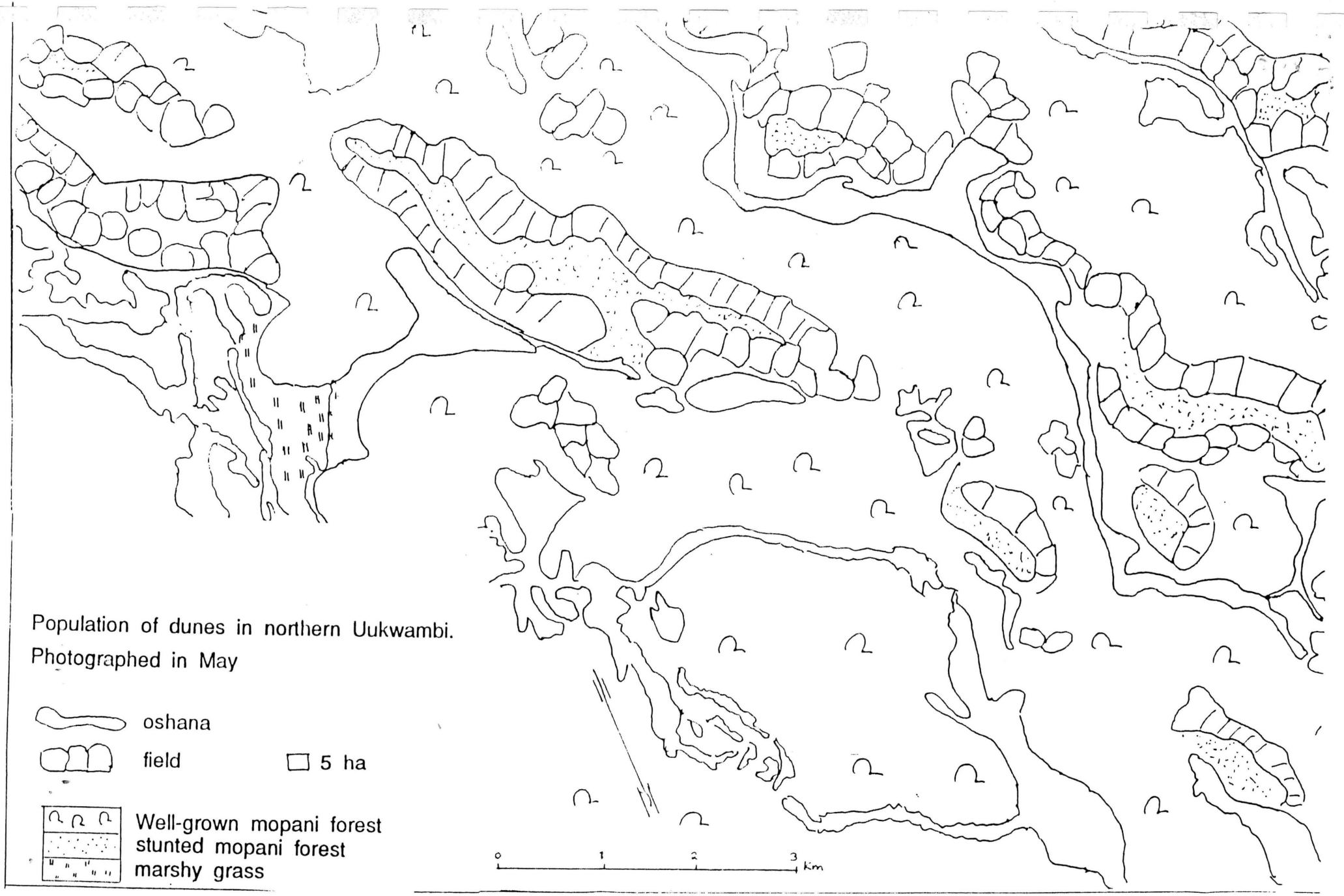
Fig. 9. Aerial photo map, Ondagua, Ondonga.

Fig. 10. Aerial photo map, Ombalantu in 1963.



Appendix 1.


A N G O L A
KUNENE
Ondangua
Lake Oponono
O V A M B O L A N D
Ondonga
Ongandjera
Ombalantu
Onkolonkathi
Ukwaluthi
Uukwambi
OMAKISA
Etosha Game Park


Population of dunes in northern Uukwambi.
Photographed in May
oshana
field
5 ha
Well-grown mopani forest
stunted mopani forest
marshy grass
0
1
2
3
km

Appendix 2.