General topography, location, climate and related features of areas visited:

1. Rietfontein, on southern margin of Etosha Pan
2. Saru; approximately 50 miles South of Runtu (or Irundu) which lies on the Okavango River.
3. Tamsoe: approx. 100 miles S.E. of Runtu, and approx. 50 miles South of Okavango River.
4. ni'Punga Omaramba: approximately 120 miles W.N.W. of Runtu, and some 30-40 miles South of Okavango River.

All lie in approximately the same latitude some 300 miles north of the Tropic of Capricorn and between latitudes 16° and 20° E. Rainfall is in Summer (usually November to April or May), and in the neighbourhood of 15-25 inches p.a.; precipitation usually heavy and of short duration. Summer temperature consistently high (averaging 80-90° F. ?). Winter averaging about 70° F (?), with nights often cold or chilly (with frost ?), and the days warm to hot. Elevation of these areas is in the neighbourhood of 3-4000 ft.; all are flat or slightly undulating. The soils, (which seem to largely determine the nature of the vegetation), darker, and derived from 'limestone' (calcrete ?) at Rietfontein; those of Saru, Tamsoe and ni'Punga Omaramba, very similar to one another, and pale and very sandy. (.. see 'Comparison of areas investigated' *)

[* Note: These soil differences are well reflected in obvious similarly differences in the vegetation of these areas; their conditions of latitude and longitude, rainfall, elevation, general topography are very comparable.]

Omaramba

Types of vegetation in the areas preceding, and adjacent to the areas investigated :

A very rough idea of the distribution of neighbouring vegetation types, (chiefly to the south), might be gained from account of the following very condensed and generalised observations made on the route taken :

Between Windhoek and Otjiwarango and beyond (& proceeding northwards towards Rietfontein) Acacia spp. (occ. with Dichrostachys) dominant, or often mixed with non-thorny spp. (Combretum, Croton, Terminalia sericea ...) in close to open bush and woodland.

Towards Rietfontein, 'Mopane' [Colophosperma mopane (Kirk) J. Leonard ... previously Copaifera mopane Kirk] becomes increasingly evident, and ultimately dominant at Rietfontein, and beyond (towards Namutoni in the East). Where dominant, usually forms an open, to very open woodland with grassland.

From Namutoni - Tsumeb - Grootfontein, and to neighbourhood of Nurugas, vegetation is often similar to that of middle and lower-middle Bushveld of the Transvaal: Scrub, bush and woodland; often close; usually very mixed, and variably predominantly thorny or non-thorny. Certain of the conspicuous (rather numerous) species: Combretum spp. (including C. apiculatum & C. transvaalense ?); Spirostachys africana; Grewia spp.; Ximenia; Rhus spp.; Terminalia prunioides; Sclerocarya caffra; Tarchonanthus camphoratus; Euclea etc...

[Note: Somewhat similar vegetation, though initially discontinuous with grassland and low scattered scrub and shrub, occurs towards West of Grootfontein in direction of Otavi. From neighbourhood of Otavi (and ± S.W.) to Otjiwaranga, Acacia spp. increasingly dominant]

Towards N.E. of Nurugas and in direction of Kavakowise, the vegetation becomes increasingly that of the 'omaramba' (bounded by that of the 'dunes') and continent-continuous with that of Guru, Tamsoe, (Runtu) and M'Punga Omaramba

The list of species given below, probably includes the most important sources of foods, and a number of lesser importance. A great many articles of diet appear to be derived from the indigenous flora; on many, apparently more minor, information was not obtained. Winter conditions, and the almost invariably deciduous nature of the flora + apart from language difficulties in communication + probably accounted for greater difficulty in obtaining specimens and the relevant information. Much of the flora seen was inadequate, either for collection and permanent preservation, or for critical determination. The areas concerned not being botanically well-known, provide more than the usual difficulties in identification + even were more complete material available. Much of the material collected is of very 'composite' nature - various parts, or their portions having been collected on the ground beneath, (or elsewhere) and added.

The list of plant foods is arranged roughly in order of importance. The first four, more especially the first two, are strikingly prominent in the Bushman diet (of the Garu, Tamsoe and M'Puanga omaramba areas. The Bushmen of the Rietfontein area are almost exclusively meat-eating due to the prevalence of wild game there - also, all? of these first four food plants, certainly the first three, are absent in this area.) The comparitive value of the remaining minor foods is difficult to assess..... The distribution and frequency of the plants concerned is difficult to judge without prolonged investigation; information is only obtained somewhat vaguely and with difficulty on the following: The normal amount consumed by an average individual, over any considerable period, e.g. 1 year; whether the food much relished, and especially sought, or whether eaten incidentally, or only eaten to allay hunger or starvation. i the 'availability' of a food - whether perennial or not, and ~~whether~~ extent to which the supply is affected by good or bad seasons

Food plants. The first four, important sources of food:

1. Ricinodendron Rautanenii Schinz. Euphorbiaceae.

Manketti (Ovambo)
(1) Nongongo (Okav.) n!ah (Bush.)

A stoutish-trunked erect tree 20-35 (or more ?) feet high; habit, though more slender, and the foliage, somewhat similar to that of the baobab (Adansonia).

Flesh of fruit eaten raw, or boiled in water, as a beverage (or 'soup'). The apparently nutritious kernel of the hard, bony, nut-like seed eaten — usually raw, sometimes after boiling in preparation of 'soup'.

Absent at Rietfontein. Procurable, (but not common), near Saru and Tamsoe. Frequent near M'Punga Omaramba. Apparently occasional, to fairly common, over large areas of Okavango Territory.

Flowers are unisexual; reputedly monoecious, but often apparently dioecious, and trees then sometimes male, and non-bearing. The crop is often fairly heavy from a single tree, and borne in the summer months. On falling from the tree, the very hard bony-woody endocarp protects the kernel from rotting over long periods; apparently at least during the seasons of one year — a very helpful and important factor in maintaining the supply of this food, which can be drawn on for the greater part of the year within reasonable limits. The Bushmen seldom take more than is required for the next 1-2 days, and will not store the seeds to make provision for any longer period. When the crop is meagre (due to drought eh.) or the available supply exhausted, substitutes must be found.. these are almost invariably less in quantity and of lesser nutritional value.

Preparation for (or manner of) eating:

Fallen fruits are gathered, and apparently eaten either raw, or after boiling in water. When eaten raw, the skin is peeled off by means of knife (or knife-like implement), and the thinnish layer of flesh chewed from the seeds. The seeds are then dexterously cracked open, and the kernel eaten. (Seeds cracked open between metallic implements, or stones) When boiled fruit is eaten, (after ½-1 hr. boiling), peeling is done after boiling.

A 'soup' or beverage is made by adding an excess of water, and then boiling for about one half hour. The thin skins are then removed, and the fruit crushed and squeezed into the same water; the resulting 'soup' may be eaten by both adults and children. The seeds are allowed to dry, and then cracked open and the kernel eaten. (most usually uncooked seeds are eaten.). The raw flesh of the thin-skinned fruit is reported to taste like apple; the kernel similar to peanut.

[Note: the Okavango natives, but not the Bushmen, retain the skins of the fruit - whether boiled or not - and dry them out. They are then crushed or ground into a meal, and added to their porridge. (of 'Mahango', ~~ie.~~ Pennisetum typhoideum, a cultivated cereal)

Nutritional attributes: 'manketti' is regarded as the most strengthening of the plant foods, and most sought after. Together with 'Chivi' (Guibourtia coleosperma), the only? available winter foods. From report: 'Together with water, a Bushman can live 3 months on a supply of 'manketti' nuts ..... probably even a year, with (or without?) slight additions to this diet.

A family may eat approximately 2 orange-pockets full in one day; when of only 2 individuals this amount would last two days. Journeys to obtain nuts (at Saru e.g.) made every 1-2 days

2. Guibourtia coleosperma (Benth.) J. Léonard.
(Copaifera coleosperma. Benth.)

Chivi or shivi (Okav.)
also um chivi, um sivi
!qui or !ghwee (Bush.)

Leguminosae
(Sub-family Caesalpiniaceae)

An evergreen, usually leafy erect tree 35-60 (or more ?) feet high. Fruit a small broad pod ± 1" long; almost invariably 1-seeded. The seed enveloped in a conspicuous red aril (aril thinnish and skin-like covering the hard seed).

Aril and seed eaten.

Absent at Rietfontein. Frequent and one of the dominant trees at Garu and Tamsoe. At M'pungu omaramba apparently absent over considerable areas; when appearing between M'pungu O. and N'kuru kuru (Kuringkuru), seeming somewhat sporadic.

Preparation for eating:

The aril-covered seeds are apparently collected from the ground, either free or still enclosed in the feebly dehiscing pod. (The pods seem somewhat deciduous, and rarely remain more than 1-2 years on the tree.... ??). These are placed in hot (not boiling?) water for about 1 hour. The aril is then eaten off the hard seeds, and the seeds temporarily rejected.

Seeds (from which aril has been eaten) are collected and placed in hot ashes for a short while (a few minutes?), or in a receptacle over fire, until dark-coloured. Then crushed between stones (very coarsely? i.e. hardly not a meal) and the product* placed in hot (not boiling?) water for a few hours, and then eaten plain. This coarse 'porridge' eaten by Okovango natives as well as Bushmen.

* Nonkandi (Okav.)

Nutritional attributes : Chivi, together with 'Manketti', apparently the most valuable and nourishing foods of the Bushmen. The beans persist in eatable condition for a considerable time, after falling onto the ground. They ultimately rot due to the summer rains, but many probably persist well into the winter months in condition suitable for food-making.

The aril seems to be the most highly prized part of this food, and apparently more relished than products derived from the seed alone.

Fruit-bearing is independable; sometimes heavy, sometimes scanty or even absent. This seems partly dependent on the area concerned, as well as on the nature of the season. In the Saru area where the tree is often fairly common, crops are reported to be poor, and often more abundant 'elsewhere'. A possible average obtainable for each individual in the neighbourhood of '¼ orange-pocket-full' per week. This amount over a considerable part of the year?

Reported: 'A man (Bushman) would without difficulty live 3 months on Chivi alone & provided with water.' 'Provided with very little meat in addition, prob. 6-12 months'

3. Diospyros chamae thamnus . Dinter. Ebenaceae.

Makwewu* (Okav.;) Tschagha (Bush.)

(variously*: Makwewo
Makwevu
Maghwewu..)

A several-stemmed shrublet, with erect 1-2 ft. high stems; evergreen; often forming apparent communities of up to many dozens of individuals, and a few to several or many yards across. The great majority, or all, (at least certain) of the apparent individuals arise from a common subterranean woody rootstock (rootstock usu. shallow and horizontal) Plants appear to be always 1-sexual.

Flesh of fruit eaten; the skin eaten or rejected. Absent at Rietfontein. Common, or fairly common, at Garu and Tamsoe.; occuring at M'Punga Omaramba, but probably distinctly less frequent than at latter two localities. Ripe fruits up to size of a tennis-ball or somewhat smaller, containing 2-6 (or more) large inedible seeds. Available only during the summer months, and soon rotting (after ripening) in the rains. A fairly constant supply seems to be available for about 3-4 months of the summer. 'A man and his wife may gather and consume 2 orange-pockets-full per day'... possibly an average consumption by an individual. (during a normal season) over a period of 3-4 months, would be in neighbourhood of ½ pocket-full every 1-2 days.

Method of eating or preparation of food:

The raw fruit (including the skin) eaten, the seeds being rejected. Sometimes (but only by Okavango natives?) the seeds together with the semi-adherent flesh squashed out of the skin into the mouth; the empty skin thrown away, and seeds rejected after chewing.

A 'milk-like' 'soup' is prepared by adding the pulped flesh of the fruit to cold water. This beverage is consumed by all individuals, and suitable for consumption by babies.
Exact method of preparation doubtful.

The apparent method is by lightly pounding the fruit between stones, so as not to break the seeds ... (not pounded or softly crushed while in water ?) ... the soft fleshy ('milky' ?!) product, when seeds are removed and discarded, is added to cold water.

The Okavango natives (not the Bushmen?) squeeze the flesh and seeds, out of the skin and into a receptacle. Cold water is added (to just cover), and the contents squashed and stirred by means of a stick. Seeds are then removed, and the resulting 'soup' is ready for drinking.

[Note: the apparently unsubstantial 'flesh' which comes away fairly easily from the seeds, is said to be sweetish but with little flavour.]

Nutritional attributes:

Makwewu (and 'nousansie' – following ..) are apparently very important plant foods. (though of rather less value than the Chivi and Mankettí (?).) They are both, however, different from the latter two foods, in being fleshy fresh fruits.

Makwewu alone, provided that water is obtainable, is reputed to be sufficient for a man to live on for a period of 3 months.

4. Parinari capensis. Harv. Rosaceae
(Parinarium capense Harv.)

Nonsansie (Okav.) !nahani (Bush.)
or Nosansie

Low woody shrublet usu ± 6" high; forming communities, or apparent communities, up to several or many yards across; underground stem woody and extensive (plant hence able to withstand extreme drought conditions). several, or many, apparent individuals, may be derived from a single 'root stock'.

Flesh of fruit eaten raw; kernel-like contents of the seeds eaten raw.

Possibly occuring at Rietfontein, but probably not, and none seen ... a plant of sandy areas. Frequent or fairly frequent at Caru and Tamsoe ... most frequent at M'Pungu omaramba?
The fruits ripen during the summer months, at about the same time as those of Makwewwa. Apparently usually obtainable, & for a similar period (3-4 months). Apparently eaten more incidentally than the 3 other major foods; provided there be sufficient of the latter three, does not seem to be consistently gathered. (or eaten.)

'Preparation': No particular preparation.
The walnut-sized (sub-globose or somewhat oblong [illegible] such fruits) are chewed, and the seeds ejected; i.e. flesh only is eaten. Either shortly after, or some considerable time after, the seeds are cracked open (when dry) usu. between wood and the kernel-like contents eaten. The seeds dry out prob. within the day ... should they not be eaten (& the kernel) at this stage, then probably during winter when food is scarce.
Reported to be sufficiently sustaining

enough, to keep a man in reasonable health for about 3 months, should other articles of food be unprocurable. (Water, however, essential!)

5. Dialium guineense. Willd. ? Leguminosae

Subfamily:
Caesalpiniaceae.

Information incomplete (& determination doubtful and not confirmed.)

Erect tree from 15 - 30 (or more ?) ft. high.
Fruits eaten*. Fruit a small compressed pod ± 3/4" long; apparently with rather fragile exocarp and probably pulpy endocarp. .. only fragments seen.

Fruit apparently eaten with degree of relish. A sporadic ? or possibly occ. abundant ? tree of 'dune country' ... reported, and prob. occuring near/or at Garu, Tamsoe and M'Pungu Omaramba (Not at Rietfontein)

* Fruit almost certainly eaten raw.

6. Annona sp. ?
(Anona)

Annonaceae.
(Anonaceae)

Maroro (Okav.)

Dee-i (Bush.)

Few-several stemmed woody shrublet, ± 2 ft. high.
Fruits eaten. (Raw)
Apparently occasional in omarambas. Occurs at Garu and M'Pungu omaramba. Not seen at Tamsoe, but possibly occuring .. isolated plant noticed between Andara and Sambio Mission (neighbourhood of Tamsoe). Possibly easily overlooked (in winter) being leafless. (Two old, certainly anonaceous ? fruits only, seen)

The fleshy fruit apparently eaten with some relish. (Possibly fairly nutritious if occuring in some abundance. A 'wild custard-apple')

7. * Dichapetalum sp. ? (Chailletia) — Dichapetalaceae (Chailletiaceae)

Nonkuguru (Okav.) / Nokuguru — !nah (Bush.) or ? !ah

Woody few- or several-stemmed shrublet, 1½ - 3 (or more ?) feet high. [fallen & young leaves only seen ; no flowers or fruits].

Fruits eaten ; apparently raw.

Occurs (apparently fairly frequent) at M'Pungu Omaramba ; occasional (to fairly frequent ?) at Tamsoe ? Garu. Not seen, but possibly occuring at Garu ? Tamsoe. Seems to be an 'Omaramba plant'.

The apparently fairly fleshy fruit eaten raw. (± 1 " diam. and subglobose ?) ... information somewhat vague.

* Note : Possibly Dichapetalum rhodesicum. Hutch. and Sprague.

Has very much the general appearance of a smaller Annona sp. Stipules, are however fairly conspicuous (stipules always absent in Annonaceae ?) No description seen (as yet) ; appears identical to plant (so-named at Kew) in collection of Bolus Herbarium.

8. Lannea . (sp. nov?) (Odina) — Anacardiaceae.

Marowarowa . (Okav.) — !o!om (o as in for) (Bush.)

Rigid woody (not. or little-branched) shrublet 4 " – 1½ ft (or more ?) high.

Fruits eaten raw. (Fruit laterally compressed ; when ripe ± ½ " long ?)

Lannea (Odina) sp. nov.? — continued)

Occurs, seemingly fairly common, at Garu, Tamsoe, and M' Pungu Omaramba. Apparently most frequent in the omarambas, but certainly also in parts of the dunes.

9. Undetermined (as yet) genus.* Leguminosae.
Subfamily: Papilionaceae.

Vigna Dinter.

Mohimbo (Okav..) T'kshah ? (Bush..)
not Mohimba ? possibly : ! = T'k- in above?

A low, or fairly extensive herbaceous (or subwoody ?) climber. Roots enlarged and tuberous at irregular intervals... the swellings prob. up to ± 6" x 1"-2"

Tubers eaten raw (after peeling).
Or placed (for 15 min - 30 min. ?) on hot coals or in hot ashes until cooked. Then eaten without peeling or paring... and reported to taste like a potato.

Apparently quite often eaten. It occurs somewhat occasionally (hardly frequently) at M' Pungu Omaramba (in vegetation intermediate between that of 'omaramba' and that of 'dune'.'). Probably occurs at Garu. Occurs at Tamsoe; but not seen, and no inform.

* note: Plant seen in dried condition; tubers obtained; few old legumes present. Much the appearance of Vigna sp. ... but flowers reported to be yellowish!

10. Ochna (spp?) Ochnaceae

Probably two species occur. No fls. or fruits seen, and if two spp. occur, then hardly distinguishable vegetatively. Old inflorescences sometimes seen .... probably belonging to Ochna pulchra Hook.f.... and probably this sp. common, (sometimes one of the dominant trees) on the 'dunes' at Caru and Tamsoe. Seemingly fairly common at M'pungu Omaramba. The following vernacular appear to be to this sp.

Caru: M'uzwe(e) (Okav.,) Kadzwi (Bush.)
(possibly !adzwi ?
[i as in file.]

Tree 10-25- (or more) ft high; erect.
Fruit eaten (raw? or cooked?)
Reported: 'fattening, but little eaten.'

M'pungu Omaramba: Mzui (Okav.,) !way (Bush.)

Tree ± 15 ft. high.; erect.
Ripe fruits (black) cooked without water; pulped and crushed with wooden stick. Fat is skimmed off and eaten with other foods... porridge of Mahango (Pennisetum typhoideum)..? The Bushmen in this area obtain certain quantities of Mahango from the local (or overseer?) natives.

Seeds are removed, dried, and after cracking open between the teeth, kernels are eaten.

11. Cucurbitaceous undetermined genus.

Corallocarpus.

? (Okav.,)
no name?

Cucurbitaceae.

!orro (Bush.)
(o as in port)

Elongate (-10-15-? feet long) unbranched? soft-woody climber. Stem closely and finely wasted, and climbing into trees and shrubs assisted by short tendrils. Tuberously swollen rootstock... (only one tuberous root, or several?) Seen only at Runtu.

Tuberous rootstock eaten after placing on fire (probably coals) for short time. Not peeled or pared prior to eating.

[Note: Specimen obtained for growing purposes at N. B. Gardens.]

12. Bauhinia spp.

(a). Bauhinia urbaniana. Schinz? (Subfamily Caesalpiniaceae.)

Leguminosae

Mohusi (Okav.)

n!gwa (Bush.)
(possibly !gwa?)

Erect, or sub-erect small shrub.
Very probably the above sp. widespread in 'dune' country of Baru, Tamsoe, M'puagu Omaramba (and Runtu). Some nearly unidentifiable? material may belong to another sp. (e.g. B. macrantha. Oliv.?) As occuring at M'puagu Omaramba, very dwarfed.. sometimes only 1-1½ ft. high (instead of the normal ± 3-5 ft.?)... but somewhat typical of much of vegetation in this area which is stunted by fires.

The small flat seeds are removed from the ± 6"-10" long pod, and the hard thin seed-coat peeled or chipped off them. The cotyledons only, are eaten. (At M'puagu Omaramba this food eaten: but not at Baru or Tamsoe?). Preparation appears laborious, the return small.

See 1954 Marshall-Harvard-Peabody Report ii

(b). Bauhinia esculenta Burch. ?

(Afrikaans name) : Elandsboontjie.

[The name Elandsboontjie is more usually ? applied to the mimosaceous shrublet Elephantorrhiza elephantina (Burch.,) Skeels. in the Transvaal.]

Almost certainly this sp.

Stems elongate (several - many feet) ; slender; subwoody ? ; prostrate.

None seen growing in areas investigated. Fragments collected between Grootfontein and Karakuwise. might occur however in any ?

Note : Mentioned as a 'Bushman food' by several european officials. (S.W.A.) excluding testa! — 16/11

Apparently the whole seed is eaten ! and a well-known native food .. Burchell in Brett Davy's 'Flowering plants and Ferns of the Tvl .... ' vol II. .. recorded .. 'much eaten by Bathlapins'

13. Strychnos. Loganiaceae.

(Possibly S. spinosa. Lam.)

Ugoni (Okav..) !no !anga (Bush.)
(the fruit itself, Magoni ?) (the fruit itself Ngho) (or !ngho ?)

Erect small tree bearing globose fruits up to ± 4" diam. A woody rind encloses the somewhat pasty flesh in which the numerous seeds are imbedded.

The pasty 'flesh' alone is eaten (.. Raw).

It is possibly the above species which occurs occasionally in the dune vegetation of Sarusas. Possibly occurs at M'Punga Omaramba ; probably at Tamsoe . (seen at Runtu .. this sp. ?)

14. Eulophia sp. ? Orchidaceae.

Inkangi (Okav..) !go (Bush..)
Inkange (o as in port)

Narrow leafed, terrestrial (apparently Orchidaceous plant); flowers reported to be red, axly arranged in a spicate-raceme of prob. ± 20 fls.; arising from a swollen-jointed rhizome.

Rhizome cooked by placing on hot coals or in hot ash, and eaten.

Reported to be fairly frequent in the Garu neighbouring 'thorn country' at ~~Tamsoe~~. 'Not occuring in the non-thorny ('dune') vegetation of Burkea - Ochna - Combretum - Guibourtia - '.

Not uported or seen at Tamsoe and M'pungu Omaramba, but might occur in both these areas.?

15. Pygmaeothamnus Zeyheri (Sond.) Robyns. (Vangueria Zeyheri. Sond.) Rubiaceae

Nombumbu (Okav..) Bambo (Bush.) (o as in for)

Woody low shrublet ± 6"-10" high, with extensive woody subterranean rootstock.

Fruits ± 3/4" long, somewhat globose and brownish-yellow when ripe; fleshy but somewhat dry; eaten raw.

Appears fairly common at M'pungu Omaramba. Very probably occurs at Garu and Tamsoe.

16. Zizyphus mucronata. Willd. Rhamnaceae.

M'keketh(a): (Okav..) N!nga (?) (Bush.)

spiny tree or large shrub; up to 40-ft high - usually less. Fruits dry, hard, globose, up to 1/2"-3/4" diam. The sweet mealy mesocarp chewed and eaten.

(cont'd

Zizyphus mucronata . Willd.) ctnd.

Occurs at Rietfontein ; especially in or near patches of more mixed vegetation within (or adjacent to) the mopane open woodland.
Occurs at Garu , Tamsoe , and M'pungu Omaramba , but never common ? ..
(usually a tree of 'omaramba' ? or margin of 'dune vegetation' ?)

17. Grewia spp. Tiliaceae.

1 to several species occur in all the areas visited.
All shrubby ; 1½ - 4 - 7 ft. high .
Fruits small , (± ¼" diam.) , dryish , usu. sweetish when chewed ... the seeds apparently rejected ; the amount of 'flesh' surrounding the seeds ± negligible ... of very little nutritional value ?

Note: Grewia spp. (except one) not identified (as yet)
At least the following occur .

Rietfontein : Grewia villosa . Willd. & at least one other sp.

Garu : At least 2 spp. ; prob 3 (or more ?).

(i) Makoppa (Okav.) Zava (Bush.)
Zawa

(ii) Nomaka (Okav.) !goy(a) (Bush.)
!goy

(iii) Almost certainly Grewia sp. ; fruits only:
Numpundu (Okav.) !wah (Bush.)
incorrectly (?) :
!oma (o as in port)

Tamsoe : At least one sp.
Nomaka (Okav.) !goy(a) (Bush.)
or !goy

M'pungu omaramba :
1 sp. seen ; v. prob. more occur.

18. Dichapetalum cymosum Engl. ? Dichapetalaceae.
(Chailletia) (Chailletiaceae)

Mobetti (Okav..) Miya (Bush..)
(i as in pine)

Woody shrublet 6" - 12" - 18" high, with very extensive woody underground stems. Fruit 3/4" diam; flesh of fruit eaten. Seed very carefully avoided and (correctly ?) reputed to be very poisonous.

Occuring with Burkea - Guibourtia - Ochna - Baphia - Bauhinia (urbaniana . Schinz ?) dune 'forest'-woodland at Tamsoe. Not seen, but very probably occuring at Caru and M'Punga Omaramba, in sandy soil.

Apparently fruit is not pleasant tasting, and eaten only when hungry; eating of more than a small quantity is not recommended ... app. forms negligible part of diet.

Note: Plants seen with neither flowers nor fruits. Though rather more robust (in the aerial parts) than is typical, almost certainly the above sp... a plant well-known to be highly toxic to live-stock.

In the plant at Tamsoe, the flesh of fruit (from account) appears to be non-toxic (or nearly so ?) .... very great care is taken to avoid the seed when eating the flesh from it .... seed reputed to be 'very poisonous'.

19. Rhus spp. Anacardiaceae.

A large widespread genus, it's 'species' apparently often hybridising ... very variable and difficult to determine. Species (S. African) all very similar, in approx. size (& nature?) of the v. small fruits. Fruits usually drying brownish. often compressed, and in 'species' below ± 3-4 mm. long; sweetish.

* Rhus commiphoroides Engl. & Silg. ?

M'kuku (Okav.,) ! gorro (Bush.)
! ghorro

Shrub ± 3-7 ft. high; somewhat bushy. Fairly common at M'punga Omaramba.

The dry fruits are rubbed between the hands, and the thin outer coats of the fruits (which are rubbed off). blown off the hand, and remainder eaten.
(* = R. kwebensis N.E. Br.)

Rhus Marlothii. Engl. (or 'form'!)
occurs at Rietfontein; with other shrubs and trees (usu. forming mixed smaller or larger patches within the general mopane woodland)

20. Cyperus sp. ? (not yet determined) Cyperaceae.

Nohewa (Okav.,) ! gow (Bush.)
Nohaywa ! ghaww

Small grass-like plant (withered); leaves prob. up to 6"-8" long. Bearing small underground marble-sized corm-like 'bulbs'.

Occurs at M'punga Omaramba somewhat sheltered by Acacia spp. and other spp. close scrub. An Omaramba plant.?
(Possibly occurs at Saru & Tamsoe.; not seen.)

The (± astringent) bitter-sweetish 'bulbs' divested of the outer loose sheaths and the inner part eaten either raw or slightly roasted.

21. Ximenia caffra. Sond. Olacaceae

Nompekke (Okav..) ! ghui (Bush..)
! wee

Shrub 4 - 6 ft. high. (rarely more in these areas?) usu. somewhat thorny. Ellipsoid fruits; 1-seeded; about 1" long; fleshy and rather prune-like (but pink when ripe; initially sweetish, but extremely bitter- or sour-astringent about the seed ... acid ? ..)

Not seen at Rietfontein or Garu, but reported to occur in these areas (v. prob.) Occurs at Tamsoe and M'Punga Omaramba.

Fruit eaten raw; apparently in all areas.

22. Ximenia americana Linn. Olacaceae.
var. microphylla Welw. & Oliver.
(X. Rogersii Burtt Davy.)

Kakukuru (Okav..) ! ungu (Bush.,)
[! ghorro ??]

Similar in aspect (and fruit) to the above. (partly distinguished from the above, by the pale-green foliage, and slenderer greenish and smoother branchlets).

Occurs at Rietfontein, M'Punga Omaramba. v. probably at Garu and Tamsoe.

Note: Fruits of this sp. are usually sweeter and more palatable than those of the above sp. but not eaten at Rietfontein (which those of X. caffra reported to be eaten !). At Rietfontein an oil is expressed from the seeds, and used for rubbing into the hair.
Eaten at Garu, Tamsoe & M'Punga Omaramba

23. Undetermined genus. Asclepiadaceae
(Caralluma ? Stapelia ? Huernia ?
or nearly allied genus)

Ettatema (Okav.). !a!a (Bush.)
(e as in red) (!gah !gah)

Succulent fleshy plant with tooked angular stems.
Stems (i.e. all vegetative parts ?) eaten.
The plant placed in hot ash and coals of fire, and 'baked' ... lightly ? 'Eaten only with Manketti with which it is mixed and pounded. and salt (?) added.'
Eaten only when hungry (possibly the flavour disagreeable ?).

24. Hyphaene ventricosa. Kirk. Palmae.

N'gone. (Okav.) !ahba (Bush.)
N'goni. (or !ahpa ?)

Erect, unbranched palm up to 30-50 ft. high.
.. information vague & incomplete ... certain parts of the fruits provide a (very poor ?) food. [Fruits up to tennis-ball in size; slightly oblique].

A plant providing source of water :-

Raphionacme sp. ? Asclepiadaceae ?

Gurukaka (Okav.) ! ai

also, or more correctly ?

! ay ! ay (Bush.)

Plant (almost certainly asclepiadaceous ; very prob. ? the above genus) with slenderish stems in several ? feet long. The usually shallow, enlarged rootstock, somewhat globose and usu. from 6" – ± 12" diam.

A valuable source of water when other supplies unavailable. Water obtained from rootstock.

Distribution of plant not known. Occurs occasionally at Garu. Possibly widespread, and occasional to sporadic over all areas, except at Rietfontein, where v. prob. absent.

Extraction of water :

Rootstock dug up (usually easy in the often loosish sand). An area of rootstock is peeled by means of knife or sharp-edged tool ; the exposed surface is scraped by using the knife- (or tool-) edge, until a suitable-sized small pile of fine shavings results. A handful of these shavings is taken, and the 'water' expressed (by means of squeezing the hand) into the upturned mouth. The thumb is directed towards, or into, the open mouth. The 'water' that is then expressed by pressure of the fingers, runs down the thumb into the mouth.

This sap-water is apparently not agreeable-tasting ; but often an important and essential asset.

The women and younger boys, probably seldom drink this water ; the men probably fairly frequently in the course of hunting. [In the case of men, sufficient may be taken to affect their health ... should the expressed water be possibly slightly toxic ??]

(cont'd)

Note: This plant is almost certainly the: 'non-toxic fibrous root, Kung !ayi !ayi' mentioned in 'The Medicinal and Poisonous Plants of Southern Africa': Watt & Breyer-Brandwijk: pp. 69-70. The 'Swartzia' mentioned in connection with the above plant (both constituents forming an 'arrow-poison' of the Bushmen..) and referred to as: !anghwa, is undoubtedly? the species which occurs fairly commonly at Varu (see 'Comparison of the areas...') and Tamsoe, and referred to as '!angwa'*. This sp. seems to be Swartzia madagascariensis Desv. (or form of this sp.)

* Mutengura (Okav.)

Supplementary notes on various articles of Bushman diet :-

(a) Leaves:* The leaves of Aerva leucura. Moq.* are eaten — as a 'spinach' ? after boiling ? ... at Tamsoe.

* see after (e)]

(b) Gums : The gums (usually exuding from trunks and branches) of prob. many trees and shrubs, are generally ? eaten.

of Terminalia sericea. Burch. ..at Garu

v. prob. of Acacia spp. (e.g. Acacia sp. at Rietfontein .. general aspect of A. karroo. ... prob. A. nebrownii. Burtt Davy. ?)

v prob. of other spp. (in all areas)

(c) Caterpillars : From report : Burkea africana Hook. is food plant of 3"-4"- long larva (lepidopterous ?) .... eaten after boiling in water or roasting on fire. Apparently quite frequent (in Summer time ?).

(d) Cereal food occasionally obtained from native guards or overseers. Natives cultivate the cereal Pennisetum typhoideum Rich. known in these areas as Mahango (or mahangho). ... according to Stapf many forms of this grass are cultivated for similar purposes in Tropical Africa and India.

A doubtful amount is obtained by certain Bushmen; probably relatively very little, and irregularly.

(e) Grass seeds (fruits) obtained from termitaria in times of acute food shortage:

In times of extreme food shortage, underground stores of grass 'seeds' are removed from termitaria. [Information incomplete and vague. The seeds so obtained are apparently made into a gruel or porridge — or added to other foods. The 'seeds' concerned possibly belong to an Eragrostis or Panicum sp.]

Note (see (a) Leaves !)

There might possibly be a number of 'spinach-like' (green) foods. These would probably be derived from more delicate annual (or bi-annual) plants. Especially if annual, these would be hardly evident at this time of year (July). .. and possibly not easily recalled by informants. ...

[The plant mentioned, Aerva lenecura. Moq. (Amarantaceae) is a robust (sub-woody?) or rigidly herbaceous, branching herb; 3-5 ft. long stems more spreading and somewhat clambering, than erect.]

Note that true bulbs do not occur in the above list; 1 rhizome only (Eulophia?); few tubers, or enlarged underground parts. Possibly a number more such foods do occur; but probably not many .... partly based on information obtained, and from nature of the areas observed.

Brief comparison of the areas investigated (especial reference to nature of occurence of major food plants)

The flora of Rietfontein (chiefly close to open 'mopane' woodland is unlike that of the other three areas — Garu, Tamsoe and M'Pungu Omaramba. These latter three have very similar floras, as well as similar soils; these soils are distinctly different from that of Rietfontein.

1. Rietfontein:

Flat country, with usually pebbley-gravelly, relatively darkish soil — derived from calcrete? Open to fairly close woodland of usually distinctly dominant mopane [Colophosperma mopane (Kirk) J Léon., previously Copaifera mopane Kirk.]; together with grassland (fairly close cover) of Aristida (gracilior, Pilger?) .. dominant.. with fairly frequent Eragrostis echinochloidea Stapf. and Enneapogon mollis Lehm. and occasional Triraphis ramosissima Hack., Aristida (sp.?), Fingerhuthia africana. Lehm. and Enneapogon (brachystachys Stapf.?).

Mopane as medium-sized or small tree or sometimes somewhat shrubby (fire?), -10-20-(25) feet high. Acacia detinens Burch. occasional (and then usu. somewhat gregarious) together with other Acacia spp. (A. nebrownii Burtt Davy? + sp. nr., A. detinens Sim.?) Also occasional: Rhus marlothii. Engl., Helinus mystacinus. E. Mey (barely different from H. ovatus E. Mey.?), Pluchea leubnitziae O. Hoffm., Geigeria odontoptera O. Hoffm.?, Monechma genistifolium C. B. Cl.? Petalidium englerianum C. B. Cl. .. Maerua spp.

In certain areas the woody vegetation more mixed, the following occurring: Combretum imberbe (Wawra) var Petersii Engl.; Zizyphus mucronata. Willd.; Salvadora persica Garcin. ?; Symaosporia buxifolia. Szyszs.; Grewia spp.

A large bog-like fountain (water-hole) in the area ... from whence its name is derived? .... provides water for the very plentiful game which occurs here, and also the Bushmen inhabitants. This fountain is much over-grown by a reed-like grass — Phragmites communis Trin. ?

2. Garu: → Antelopes of area are: Duiker, Oribi, wildebees, hartebees gemsbok, kudu, eland.

The botanical make-up, also topography and soils of this area, similar to that of Tamsoe and M'Pungu Omarambas.

They all occur in a region of shallowly undulating, flat, or very nearly flat country; the soil almost invariably very sandy, and of pale to almost white-coloured.

The undulating nature of the region is ascribed to the presence of numerous ancient river beds and streams, called 'omarambas' (omuramba) by the inhabitants. The slightly more elevated areas occuring between these shallow ancient riverbeds, are called 'dunes'. Both omarambas and dunes vary greatly in size, from very narrow up to several or many miles across. The theory of the origin of the omarambas, seems well supported by presence of large sub-terranean peat deposits said to occur in them and also skeletal remains of hippopotamus and crocodiles.

Vegetation of the typical omaramba

is generally distinctly different from that of the dunes: usually with thorny dominant members, and with a different grassland. Vegetation of the dunes — at least the dominant species — is usually non-thorny.

Dune vegetation:

A closish open-woodland with sub-continuous thinnish (to fairly close) grassland. Might be termed 'dry forest.' Nearly all members deciduous

Dominant trees: Burkea africana Hook. 20-35-(50) ft high. Ochna (O. pulchra Hook. f. ? and perhaps another sp.) Combretum spp.

Sub-dominant: Guibourtia coleosperma (Benth.) J. Léonard (Chivi) .. one of the few evergreens .. and usu. the largest tree present (up to 50 or more ft high, and trunk diam ± 1½-4½ ft. at 5 ft.) Swartzia madagascariensis. Desv. (a form) Diplorhynchus (mossambicensis ?)

Occasional: Strychnos (spinosa Lam. ? - form); Terminalia sericea Burch.; Pterocarpus angolensis DC. ... Dialium guineense Willd.?

Conspicuous shrubs and subshrubs:-

Baphia (obovata Schinz ?) Bauhinia (urbaniana Schinz?). Diospyros chamaethamnus Dinter. (ie. 'makwewe') Grewia spp.

Lannea (Odina) sp. nov. ?

Grassland:

Grassland with tall 3-5 ft. high Aristida app. dominant (A. meridionalis Henrard ?.. certainly of § Arthratherum (Beauv.) Reichb. ?)

Frequent: Tall (3-5½ ft. high) Pentameris-like grass. (not yet identified)

Occasional: Monocymbium ceresiiforme Stapf. Schizachyrium sp. nov. ? and a tall Hyparrhenia (poss. H. grallata Stapf ?)

Omaramba vegetation :

Often fairly closish grassland with scattered trees and shrubs; or these latter gregarious and patchy in small or longer sub-continuous communities. The grass spp. many (Dune to more exposed conditions, and winter season, mostly ± unidentifiable and unsuitable for collection). Aristida sp(p). seeming absent — at least the tall sp. of the dunes (ie. A. meridionalis Henrard?) Grasses present most probably Eragrostis spp (including E. echinochloidea Stapf. ? ...) , Panicum .. and Hyparrhenia (or other Andropogon ally.)

Trees & shrubs : Acacia spp. (including A. giraffae. Burch.) ; Terminalia sericea Burch., (variably from a shrub, to smallish. medium sized tree. Occasionally Grymnosporia senegalensis Loesen. Rogena sp. (form of R. pallens) and low-growing Dichrostachys. A whippily-virgate-stemmed Combretum with very conspicuous crimson flowers occurs sporadically or occasionally ($2\frac{1}{2}$-5 ft. high.) — Combretum Zastrowii Dinter ? ....app. more frequent towards Karakuwise. The food plant Deeji (Bushman) is apparently an omaramba plant; an Annona sp.?

3. Tamsoa

Dunes :- A closish open woodland (or 'dry forest'

Dominant and sub-dominant trees :

Burkea africana Hook. Guibourtia coleosperma Oehna. (O. pulchra. Hook.f. ?) ; Combretum spp.

Shrubs :

Bauhinia urbaniana. Schinz. (?) Baphia (obovata Schinz.?) ; Grewia sp(p) ; Diospyros chamaethamnus Dinter. ('Makwewwa') ; Dichapetalum

(ctnd.

cymosum. Engl. — often somewhat diffusely gregarious & sometimes not evident over smaller areas. Terminalia sericea Burch. — apparently little.

Grassland: Sub-continuous sparsish to moderately closish cover throughout all? this woodland ('forest'). Aristida (A. meridionalis Henrard ?) 3-5 ft. tall; a 'larger' Eragrostis sp.; Brachiaria ? (B. nigropedata ....? i.s. Panicum nigropedatum. Munro, Fl. Capensis); a 3-5½ ft. high Pentameris-like grass, with somewhat the aspect of robust Tristachya Rehmanni. These all in varying, often somewhat equal, proportions.

'Omaramba':-

Varying from somewhat open grassland to grassland with scattered or fairly close (often gregarious) trees and shrubs. Acacia spp., (A. giraffae. Burch. locally absent?) and Terminalia sericea usu. dominant or conspicuous. Conspicuous (sporadic or in various-sized, closish or diffuse, grove-like communities.) Hyphaene Ventricosa. Kirk. unbranched, up to 30-50 ft. high.

4. M'Punque Omaramba

Dunes: This area appears to have been greatly disturbed by fires (frequent!). The nature of the communities has probably been altered. Certain species (e.g. Bauhinia and Terminalia) appear much dwarfed, and certain species have probably disappeared. Possibly due to this factor, or climatic and geological factors having given rise to soils neither typical of 'dunes' nor of the 'omaramba', the communities appear mixed and ill-defined....

especially so near the 'camp', where additional disturbance occurs due to the (fairly condensed ?) Bushmen etc. population.

About the camp, the first four given below. (but with frequent variation):

(1) Scattered Burkea africana, Terminalia sericea, Baikiaea (plurijuga Harms. ?)* the following shrubs (often close): Baphia (obovata Schinz ?); Bauhinia (urbaniana Schinz ?); occ. to fairly freq.; a ± whippy-stemmed Heeria (Anaphreuium); stunted Terminalia sericea.

(* 'Ohaghi' / Okaraaso ?)

(2) 'Forest. woodland' up to ± 30 ft. high, of dominant Baikiaea (plurijuga Harms ?) with comparatively little: Commiphora (sp.?); Combretum; Burkea; and Bauhinia.

(3) Mixed (lowish) medium-open woodland with scrub-shrub: Dominant trees: Combretum, Burkea, Terminalia together with shrubs (usually low and scrubby - due to firing ?): Ochna (sp ?); Baphia (obovata Schinz. ?); Bauhinia.

Occasional (trees): Acacia spp. ... including A. giraffae Burch. ? Pterocarpus angolensis DC. ('Kiaat', a good timber)

Occ. shrub: Grewia. (sp ?).

Grasses forming sparsish to closish cover. 3-5 ft. high, tall Aristida (A meridionalis Henrard ?) apparently distinctly dominant; together with at least 3 Eragrostis spp (one tall & 3-5 ft. high); Digitaria (ar/or D. eriantha); occ. Pogonarthria sp.

(4) Sparse open woodland with closish shrubs and scrub: Combretum (10-15 ft. high); occ. (and then usu. subgregarious ?) Acacia spp. ... (these as trees)

Chd.

[Near Kuringkuru (N'kurukuru) - on the Okavango River - the above vegetation disappears, and is replaced by Acacia spp. (A. giraffae, A. heteracantha. Burch. ? ....) .. sometimes frequent (often gregarious) ; Combretum imberbe Wawra. var. petersii Engl. ; Zizyphus mucronata ; Grewia ..

& towards Runtu these spp. with shrubby Royena (pallens ? - form?) ; Ficus sp. (epiphytic on & ultimately 'straagling' Combretum imberbe) ; Acacia (hebeclada DC. ? or the conspecific ? A. stolonifera Burch.) in addition to other Acacia spp. ; Terminalia (variably absent to dominant); Combretum spp. ; occ. Hyphaene ventricosa Kirk e.g. ± 40 miles W-N.Westish of Runtu.

Soil of the Kuringkuru - Runtu area - adjacent to the Okavango River - mostly distinctly darker than that of the 'duaes and 'omarambas'.]

Omarambas.

Near camp apparently much disturbed. Mostly scattered (occ. close or gregarious) trees and shrubs. Terminalia ; Acacia giraffae (& other spp.) ; Combretum spp. (including C. transvaalense ?) ; Zizyphus ; Rhus. Fairly common subshrubs:

Parinari capensis. Harv. (Parinarium); Pygmaeothamnus zeyheri (Sond.) Robyns ; Diospyros chamaethamnus Dinter ('Makwewu'); Lannea (Odina) sp. nov. ? * ; the food-plant No(n)kuguru ... 'Dichapetalum rhodesicum Sprague & Hutch' ? ; & occasional ? Annona sp. ? ... almost certainly ! ... 'Deesi'.

* food plant Marowarowa (Okav.)

much, fairly close, shrubby (or scrubby) Terminalia (4-7 ft. high.) ; Baphia ; Bauhinia ; Ochna ; occ. Grewia ....

The large Aristida. (± 5 ft. high) (A. meridionalis Henrard ?) appearing the distinctly dominant grass.

(5). Between camp [and in direction of N'kurukuru (or Kuringkuru)]

Some miles (10-15 ?) from the camp, the dune vegetation seems less disturbed by fires. Communities however, often apparently ill-defined, variable, and confluent. Very broadly much close (to somewhat open) woodland (or 'dry forest') ; average height variably 'low' (± 20 ft.) to often distinctly higher (-30-40 ft).

Initially chiefly Burkea ; Pterocarpus angolensis DC. ; Baikiaea (plurijuga Harms!) Combretum ; Terminalia

later, Ricinodendron ('Mankettii') appearing, and often conspicuously present. seemingly plentiful over greater part of distance to N'kurukuru ; probably subcontinuous on typical 'dune country' to Runtu ; from Runtu more sporadically S-eastwards, to at least between Sambio Mission and Andara (... it is recorded in British Bechuanaland !) ; occasional ? Southish of Runtu, to beyond Kavakowise (on dunes !). Probably most abundant in areas west and N-westish of Runtu (not seen.)

Guibourtia ('Chivi') appears to be a relatively uncommon constituent. When present, usually with dominant Burkea (and occasional Ochna, Combretum & v. occasional Diplorhynchus)

The (slightly more elevated) 'edges', towards the 'Dune' (or 'intermediate'?) vegetation, often with fairly dense, mostly low Acacia spp.; Commiphora (occ.?); Rhus (R. commiphoroides Engl. & Gilg. ?); Ximenia caffra; Ximenia americana L. var. microphylla, Welw. & Oliver.; a low whippy-stemmed Heeria sp. (Anaphrenium).

Towards N'Kuru Kuru, vegetation of the Omaramba mostly less open, with growth sometimes close, to thicket-like; but sometimes taller [when A. giraffae present and the dominant (or nearly dominant) tree]. Present are Acacia spp. Terminalia, Boscia, Croton, Grewia, Zizyphus .. occasionally Baphia (obovata Schinz?)

(Summary) note on comparitive abundance of the main Bushman foods in the areas investigated ... dependence on climatic and human factors. etc...

appelblaar
Lonchocarpus
Bauh. macrantha?
Grootfontein
→ Kanakuwit ?

The more important foods only, are mentioned... These (or certain of them), apparently occur in sufficient quantity * to keep the inhabitants from starvation (especially when supplemented by obtainable minor foods). and in a fair? state of good health. However, in times of drought, considerable hardship (and impairment of health - temporary? permanent?) probably results.

* I. At Rietfontein wild game is plentiful, and the diet of the Bushmen seems to consist almost solely of meat. Game is hunted and trapped - esp. in the neighbourhood of the large water-hole there, and when coming to drink.

Apart from the apparent scarcity of food plants in this area, the inhabitants seem satisfied with the

almost purely meat diet, and do not trouble greatly to supplement it in any way.

'Manketti' (Ricinodendron), 'Chivi' (Guibourtia) & 'Makwewu' (Diospyros) are quite absent.

'Nonsansie' (Parinari) ... none seen & prob. absent (Soil conditions not? suitable)

Available plant foods few: the small (eaten when dry) fruits of Zizyphus, Grewia spp. (incl. G. villosa Willd.) & Rhus sp(p).

The ± small fleshy fruits of a Maerua sp.? (none seen.) (and Ximenia caffra Sond.? which reported here, & V. prob. occurs here)

Ximenia americana L. var. microphylla Welw. & Oliver occurs here; eaten in other areas, but not here. (Although the less palatable? X. caffra is reported eaten.) ... the seeds only are used for expression of an oil for hair-dressing!

Note: Game is scarce in the following (3) areas, and the Bushmen almost entirely? dependant on plant foods:

II. Garu: Chivi, Makwewu, Nonsansie available. Manketti absent just here, but reported not distant. Certainly seen (but app. uncommon?) ± 25 miles to North.

III Tamsoe: Chivi, Makwewu, Nonsansie available. Manketti occurs in the vicinity (certainly seen ± 21 miles to ± North; but prob. occurs closer); app. uncommon.

IV M'Pungu omaramba: Manketti best represented in this area; not at 'camp', but not distant from it. Makwewu, Nonsansie available. Chivi uncommon? & 'distant'? .. mostly towards N'kuru kuru; inform. incomplete

Dependence of supply ('obtainability') of plant foods, on (soil), climatic and human factors : (Ref. to Garu, Tamsoe & M'Pungu Omaramba.)

As with cultivated plants, the flora (indigenous) is affected by periods of drought. Usually to a less noticeable degree, but often sufficiently to inhibit or prevent flower- (and fruit-) formation. The indigenous flora apparently provides the Bushmen of these areas with sufficient to maintain a fair degree of health — at least during the summer months, when the supply of food is sufficient and more 'varied'. The winter months are always a period of comparitive hardship? When, however, drought (summer) causes scanty food supply, during the months concerned, all available sources are 'tapped', and depleted. Certain foods ('Mankettii' notably) can persist many months on the ground — and normally are of great assistance to the winter diet. Should these sources be depleted during summer months, the winter (normally a period of hardship?) probably results in permanent damage to health.?

Bush fires appear to very markedly affect the sources of food (plant) on which these Bushmen are dependent. The adverse effects of fire are almost immediately felt, and usually persist semi-permanently. Especially in the case of the 'Chivi', the effects of previous fires is usually very noticeable... the young flower- (& fruit-) -bearing branches are scorched, (or burnt), and fruit cannot mature or be produced. Such burn-effects are

seen towards even the tops of tall trees. When extreme heat has destroyed the younger branches and branchlets, more closely compacted abnormal branching has arisen from the older parts below them. These are (certainly in their younger stages) less fruitful, than the ones destroyed. Fires probably account for the fact that in 'some years the trees bear no fruit at all' ... (Garu.) In this latter area, and especially towards Karakowise, much-damaged Chivi trees seen (over many miles).

Generally: The fires which affect the more immediate food supply (adversely!) may ultimately cause conditions to come into being, when these sources may be entirely lost, or too scarce to be of any significance.

At the same time, great and irreparable damage is being done to the valuable timber trees in the Okavango Territory. These assets are being depleted throughout the extensive areas of 'dry forest' in which they occur. Unfortunately their nature makes them much more vulnerable than would be the case in Evergreen Forest ... Sub-continuous grassland occurs almost invariably throughout these forests, offering easy access to fires ... the papery pods of Pterocarpus angolensis may be carried long distances (in wind) in smouldering or burning condition; hence re-starting, or spreading fires, and making active or preventive measures often difficult.

Older trees usually survive fires - which are apparently very hot.... the younger trees however are often badly distorted or killed (together with seedlings), and cannot 'normally' replace the older.

This form of secondary succession will almost certainly result in the ultimate loss of all, or the greater part, of these timber resources: valuable trees will probably be replaced by scrubby Terminalia, or Ochna etc., and the formation of areas of useless thicket*... should regeneration be possible, a period of perhaps several hundreds of years might be necessary, to restore these forests to their present (or now ± past!) state. At M'Pungu Omaramba several communities were observed which were appearing to lose their identity — and adversely so economically....

* 'False grassland' with a stunted usu. quick-growing Acacia or Terminalia, or... ??