

Report on the Forest Administration of the Republic of Botswana from the 1st April, 1967
to 31st March, 1968

Introduction

The Republic of Botswana has an estimated land area of 300,000 square miles, and is centrally situated in the centre of Southern Africa. It is bounded to the north by the Caprivi Strip and by a very small narrow stretch with the Republic of Zambia to the north-west by Rhodesia, to the south-west and south by the Republic of South Africa, and to the east by Swaziland. The lowest altitude is 2,000 feet above sea level.

The climate is semi-arid with a rainfall which is the south-west part of the country averages 25 inches per annum. There is a considerable variation in the amount of rainfall from year to year, and a few years have been particularly experimental. The population is 1,200,000 and is concentrated in the western part of the country.

REPORT on the FOREST ADMINISTRATION of BOTSWANA

Most of the western part of the country is part of the Kalahari Desert and consists of vast areas of open veld with scattered trees, shrubs, and grassland.

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for the YEAR 1967-1968

The Forest Department was established in 1963, although there was a Forest Officer in the country from 1948. With the cessation of this officer in 1962, forestry matters were looked after by the Department of Agriculture. The Forest Department was re-established as a Division in the Ministry of Agriculture in April, 1963.

Two major steps towards the development of forestry were taken. The first was the creation of the Forest Policy. This indicates the path to be followed for the development of the forest. The second was the enactment of the Forest Act and this provides the legal basis of implementing the Policy. Both have been under consideration for a long period. Now that they are approved the way seems clear for a steady development of forestry affairs.

Report on the Forest Administration of the Republic of Botswana from the 1st April, 1967 to 31st March, 1968

Introduction

The Republic of Botswana has an estimated land area of 220,000 square miles, and is roughly situated in the centre of Southern Africa. It is bounded to the north by the Caprivi Strip and by a very small common frontier with the Republic of Zambia; to the north-east by Rhodesia; to the south-east and south by the Republic of South Africa; and to the west by South-West Africa. The mean altitude is 3,300 feet above sea-level.

The climate is semi-arid with a low average summer rainfall which in the south-east part of the country averages 18 inches a year. In the west it is much lower whilst in the extreme north-east it reaches 29 inches per annum. There is a considerable variation in the actual rainfall from year to year, and a four year long drought was recently experienced. Temperature extremes include annual frosts in the southern part of the country whilst there are generally high summer temperatures.

Much of the western part of the country is part of the Kalahari Desert and consists of undulating sand hills with stretches of grass, scrub, and woodland.

The population in 1964 was 543,105 with an overall population density of 2.5 persons per square mile. The greater part of the population is to be found in the eastern parts of the country.

The Forest Department was established in 1940, although there was a Forest Officer in the country from 1935. With the retirement of this officer in 1952, forestry interests were looked after by the Department of Agriculture. The Forest Department was re-established as a Division in the Ministry of Agriculture in April, 1965.

Two major steps forward were taken during the period under review. The first was the adoption of the Forest Policy. This indicates the guide lines for future development. The second was the enactment of the Forest Act and this provides the legal means of implementing the Policy. Both have been under consideration for a long period. Now that they are approved the way seems clear for a steady development of Forestry affairs.

Chapter I: The Forest Estate (Standard Forms I, IA and II)

At the end of the year no Forest Reserves had been gazetted although the first order constituting the Kasane Forest Reserve was awaiting approval by His Excellency the President. Similarly, the order setting out the privileges of local inhabitants about that reserve was awaiting signature by the Minister of Agriculture.

Within the proposed Baikiaea Plurijuga/*Pterocarpus angolensis* Working Circle demarcation of the boundaries of the proposed Kasane Forest Reserve (53.3 square miles) was completed, whilst demarcation of the boundaries of the proposed Chobe Forest Reserve (520.5 square miles) was in progress. Both proposed reserves adjoin the Chobe National Park and the demarcation of boundaries has been a joint effort, part of the cost being borne by the Game Department. Where possible boundaries are made into motorable tracks which also serve for easy access and as fire-breaks.

South of the Ngwezumba River, but still in the Chobe District, two other areas have been selected for inclusion in the same Working Circle. These are the

Maikaelelo Pan proposed Forest Reserve – approximately 284.6 sq. mls.

Kazuma Pan proposed Forest Reserve – approximately 53.6 sq. mls.

The first of these adjoins the Chobe National Park and, at the end of the year, assistance was given to the Game Department in the demarcation of the boundaries of the Park in this area.

In the South-East part of the country, extensions were made to the few small plantations. Reservation of these areas was not possible during the year because the Forest Act did not receive approval until almost the end of the year. Proposals for the reservation of plantations areas at Gaberones (0.24 sq. mls.) Lobatsi (0.16 sq. mls.), and Good Hope (0.27 sq. mls) were in hand at the end of the year.

No Protection Forest Reserves have yet been selected.

Chapter II: Management (Standard Form omitted)

As recorded in last year's annual report, a notice advertising a forest concession in the proposed Chobe Forest Reserve for 7½ million cubic feet of timber overbark to be worked over a 15 year period was published in March 1967. Two tenders were received and a provisional offer made by one of the tenderer was accepted in January, 1968. However no agreement had been signed by the end of the year and negotiations were still in progress.

It is proposed that management of the Baikiaea plurijuga/*Pterocarpus angolensis* Working Circle will be on the basis of a 40 year felling cycle but, for reasons outlined in last year's report, the yield will be an intermittent one. The Working Circle includes the proposed Kasane, Maikaelelo Pan, and Kazuma Pan Forest Reserves as well as the proposed Timber Concession area (the proposed Chobe Forest Reserve). All of these areas have been enumerated in recent years, the surveys of the Maikaelelo and Kazuma Pan areas having been completed in 1966/67. The proposed Kasane Forest Reserve was previously exploited during the period 1935–1938.

During the year reconnaissance surveys were carried out in the northern part of the Bakgatla Tribal area and in the adjacent parts of the Bamangwato Tribal area. A reconnaissance survey was also made somewhat further to the north in the Bamangwato Tribal

area in the Mahalapye area. The object of these surveys was to determine the distribution and stocking of *Spirostachys africana*. This species yields a timber of high quality and a concession to cut it had been requested by an individual in the Bamangwato Tribal area (Central District).

Print Lay Downs on a scale of 140,000 were supplied by the Directorate of Overseas Surveys and were used extensively in the surveys. Fortunately it was found that *Spirostachys africana* could be distinguished on the Print Lay Downs when it occurred in groups and sometimes even as individual tress. However a similar appearance was also given by groups of *Acacia gillettiae* and ground reconnaissance was necessary to distinguish between the two. To some extent the two could also be distinguished by their occurrence on somewhat different topographical localities.

The results of the survey were disappointing. Reported "forests" melted into fringes of very small depth on the sides of ridges of brown sand. In general, the species was found to occur in small gregarious pockets usually growing on the lower and middle slopes of former dunes. These groups varied from a few trees to pockets up to 20 acres area. The species was usually in mixture with *Boscia rehmanniana* whilst *Croton gratissimus* was a common species on the edges of these groups. Many of the groups were found to have little or no merchantable timber content either due to past cutting for the purpose of house poles or due to fire. Only one area at Budungwane was found to be rather more extensive and might be considered for possible reservation and management. However this area contains cattle posts and unless stock are excluded it is unlikely that the species can be successfully regenerated. It was noted that more regeneration was visible under groups of this species on the Veterinary Department Quarantine Station at Debeeti than under similar groups elsewhere. It is considered that this is largely due to the control of small stock, particularly goats on the station.

Because of its low merchantable volume per acre and the comparatively small total acreage available it is doubtful whether there is sufficient timber available to sustain a local furniture industry. The timber is recognised to be of high value, and, for that reason, it is considered that a timber concession should not be granted for the exploitation of this species. Such a concession would merely result in the virtual extinction of the species in a very short time because of the small total volume available, and the difficulty of providing protection to the young regeneration in the scattered groups. The returns in terms of the National economy would be comparatively small for the bulk of the timber would probably be exported in the round. In this connection most of the available stands are reasonably close to the line of rail.

It is suggested that a better alternative would be for the species to be legally protected as a Protected Tree under Section XI of the Forest Act. The species could then be utilised locally under paid permit for local carpentry. Possibly a co-operative of wood-workers could be formed with the object of making wooden curics to serve the tourist market. This should result in fairly steady employment for a small group of people and should show a better return per cubic foot of timber utilised.

During the year a simple fire control plan was completed for the Baikiaea plurijuga - *Pterocarpus angolensis* Working Circle (approximately 900 square miles). In effect this is only being applied todate in the proposed Forest Reserves which have been demarcated (proposed Kasane Forest Reserve), or are in the course of demarcation (proposed Chobe Forest Reserve). These Reserves total approximately 570 square miles.

The plans lay down a basic programme of operations involving early burning, the harrowing of stumped brakes, and the controlled burning of wider fire - brakes. To date the only area which has been divided into comparatively small units is the Kasane Forest Reserve where there are 15 demarcated blocks. Further sub-division of the other proposed Forest Reserves will also be necessary.

Chapter III - Communications, Transport and Buildings (Standard Form IV)

In the Baikiaea - Pterocarpus Working Circle a further 40½ miles of motorable fire-brakes and boundaries were completed during the year. Of this total, 37 miles were parts of the new boundaries (Southern) of the proposed Chobe Forest Reserve. The total length of fire-brake within the Working Circle at the end of the year was 172½ miles. These brakes vary in width from 4 to 8 yards, and are harrowed annually by M35 Massey Ferguson tractor towing an offset disc harrow. Some of the brakes are paralalled and are about 40 yards apart. The intervening area is control burnt as a burnt fire-brake. Other brakes are used as bases from which to carry out early burning.

A new Bedford 5-ton lorry was received in the New Year. This was one of the new models with a cab over the engine and an extra long carrying platform. It has proved to be quite useful for the movement of plants from the nursery to the plantation. However, the design is such that effective screening of the radiator against grass seed, etc., is rather difficult. The older type of model would appear to be more suitable for travel over rough unmade roads.

The oldest Bedford 5-ton lorry (BPX 831) was put off the road and boarded during the year. Permission was obtained to remove its engine to BPX 367 which had suffered damage to its pistons and block. This vehicle has given persistent trouble with its diesel engine and fuel system. The Land Rover (BPX 337) became unserviceable at the end of the year and was replaced by a 30 cwt Bedford truck formerly with the Relief and Rehabilitation Unit.

As mentioned in last years Report, vehicle maintainence and repair is a major problem in the Chobe District. The proposal to establish a Government Mechanical Maintenance Unit in the District had not ~~not~~ come to fruition at the end of the year.

Departmental housing at Kasane and at Kanye was maintained throughout the year. A two roomed rondavel which had been without a roof for some years at Phareng Nursery was rethatched and fitted with new doors and windows. This building now serves as the office for the Forester at Kanye. A telephone was installed at the Nursery.

A hot and cold pole treatment plant (creosote) was in the course of construction at Lobatsi Plantation at the end of the year. The tanks (16ft long) were manufactured by the Mechanical Workshops at Gaberones. Unfortunately the removal of the tanks from Gaberones to Lobatsi was delayed for lack of suitable transport. The intention is that plantation produce shall all be treated prior to sale.

Chapter IV - Forest Protection (Standard Form Omitted)

The Forest Act 1968 came into force on the 10th March 1968. As recorded above, the Kasane Forest Reserve Order awaited signature by H.E. the President at the end of the year. Other Reserve Orders were in draft whilst notices declaring Protected Trees under Section XI of Forest Act were under consideration.

As recorded in last years Annual Report, fire is the major hazard in the Baikiaea - Pterocarpus woodland. The new Forest Act besides making it an offence to light unauthorised fires in Forest Reserves gives certain powers to the Forest Officer and other Departmental personnel concerning the fighting of fires within one mile of the boundary of a Forest Reserve. Any able bodied person present at or near such a fire may be called upon to fight the fire as a civil duty.

The Herbage Preservation Proclamation also applies to the Chobe District and until the Forest Act was passed, was the only legal instrument for fire control.

Within the proposed Kasane and proposed Chobe Forest Reserves fire prevention measures adopted included:-

1. The annual discharring of the fire-brakes (now 172½ miles)
2. The early burning of the woodland adjacent to the brakes and of the controlled fire-brakes and
3. A fire look-out warning system with a standby fire fighting gang (who were also employed on the clearing of woodland for a planting trial of various Eucalyptus species).

There was one large fire in the proposed Kasane Forest Reserve, besides four smaller fires during the year. Within the proposed Chobe Forest Reserve there was three major outbreaks of fire. All of these fires were believed to have been of man made origin. Two of the smaller outbreaks arose from fires which jumped during the making of controlled fire breaks and were of very limited extent.

Responsibility for fire fighting within the Chobe National Park now rests with the Game Department. There was a major fire in the Chobe National Park, and this started at much the same point as in the previous year and is believed to have been of malicious origin. This fire spread through a large part of the Northern part of the Park.

An arrangement was made to hand over the fire look-out tower at Serondela (within the Chobe National Park) to the Game Department on a replacement basis. It is intended that the new tower when received will be erected at Ngoma within the proposed Chobe Forest Reserve.

It was noted that *Bidens pilosa* (Black Jack) appears to be much commoner within the Northern part of the Chobe District. Although no accurate records are available it appears to have extended its spread to the westward so that it is now common within the herbaceous layer of the Baikiaea - Pterocarpus woodland even to the west of Kachikau. Some years ago it was noted that it occurred from the Rhodesian border to a point beyond Serondela. Generally it grows gregariously and tends to swamp out other species. Once established it is a major fire hazard for it cannot be early burnt because it stands upright and is sappy until about September. There-after it dries and is highly combustible. It seems possible that later fires have contributed to the spread of this species.

There was some theft of plantation produce within the old Gaberones Plantation. It is intended to post a Forest Guard to this Plantation and he will be responsible for the old stands and for the newly planted areas.

D.D.T. was used in the nursery for protection of seed boxes against termite attack, whilst an aqueous solution of Dieldrex 15 was used for the protection of plants in the

field. In general Dioldrex 15 was applied at the time of planting and again about four months later.

A disturbing feature noted during the *Spirostachys africana* survey in the Bakgatla Tribal area was the effect of a fire which had occurred a few years previously. It was noted that virtually all of the trees over a quite extensive area of open Acacia-Burkea woodland had been killed in this fire. Normally these species are comparatively fire resistant, and it is presumed that the deaths were due to the combined effect of the fire and of the four year period of drought. This fire had also affected some of the groups of *Spirostachys Africana*. In general fires in the southern part of the country have not been as troublesome as in the north. However the effect of this fire does illustrate the hazard which they represent to woodland vegetation when combined with a long period of drought. It is considered that active steps for protection of vegetation are necessary in the south central parts of the country.

Chapter V – Silviculture (Standard Form omitted)

The total production of plants at Phareng Nursery at Kanye was 115,909. The majority of the plants – both for plantation work and for sale as ornamental and hedging plants – were produced in polythene sleeves. However, some 6,432 hedging plants were produced in trays.

Some 101,078 plants were used in new plantation areas and for beating up, whilst 7,008 ornamental and hedging plants in polythene sleeves were either sold or were issued on R.I.R. to other Government Departments. In addition, 6,640 plants in trays were sold or issued on R.I.R. (this includes a small balance brought forward from 1966-67).

Unfortunately some of the sleeves were filled with an unsuitable potting mixture and growth was poor in these cases. It is believed that this defect has been overcome and should not recur. Filling of sleeves with potting mixture was done on a piece work basis.

The water supply at Phareng Nursery became a problem during the year for the yield from the borehole dropped. An auxiliary supply was arranged from the Bathoen Dam during this period.

The 1967-68 planting area (P68) was as follows:–

<i>Plantation</i>	<i>Area Planted</i>
Gaberones	20.43 acres
Lobatsi (old plantation replanting)	0.83 acres
Lobatsi (new plantation)	10.09 acres
Good Hope (old plantation)	2.35 acres
Good Hope (new plantation)	29.89 acres
Kanye Phareng Extension	8.56 acres
Kanye Soil Conservation Area Plantation	4.04
Total:	76.19 acres

This was lower than the target. Considerable beating-up was required in the 1967 planting areas because of deaths through frost and flooding.

Plantation areas under Forest Department control are now as follows:–

Plantation	Older Planting Area (1940-1952)	New Planting (1967 & 1968)	Total	Remarks
Gaberones	9.93 acres	26.43 acres	36.36 acres	
Lobatse (old plantation)	57.41 acres		57.41 acres	9.39 acres replanted 1967 & 1968
Lobatse (new plantation)		17.98 acres	17.98 acres	
Gaberones Prison Plantation		0.50 acres	0.50 acres	Prison Dept control.
Good Hope (old plantation)		13.20 acres	13.20 acres	
Good Hope (new plantation)		29.89 acres	29.89 acres	
Kanye Letlhakane		5.10 acres	5.10 acres	
Kanye Phareng Nursery		2.80 acres	2.80 acres	
Kanye Phareng Nursery Extension		8.68 acres	8.68 acres	
Kanye S.C.A.		6.27 acres	6.27 acres	
Molepolole		2.0 acres	2.0 acres	
Total:	67.34 acres	112.85 acres	180.19 acres	

(9.39 acres replanted in addition at

The main species planted were *Eucalyptus camaldulensis*, *E.sideroxylon*, *E.paniculata*, *E.melliadora*, *E.punctata*, *E.resinifera*, and *E.polyathemos*. Smaller areas were planted with *E.citriodora*, *E.maculata*, *E.bridgesiana*, *E.cladocalyx*, *E.cinerea*, *Callitris robusta*, *Melia azedarach* and *Grevillea robusta*. The 1967-68 rainy season was late (February) and it was necessary to water plants for three to four weeks. This also limited the area which could be planted. In general the *E.resinifera* did not do well and this area was beaten up with *E.punctata*. The *E.grandis* was planted in a site adjacent to the Bathoen Dam.

Some of the best growth in the P67 planting areas was that at Phareng Nursery (2.35 acres). The bulk of this was a mixture of *Eucalyptus camaldulensis* and *E.paniculata*. This was planted under a partially opened overwood of *Acacia* species. The latter were girdled in mid 1967. The girdled overwood gave protection during the heavy frost which occurred later in June and July 1967. Some damage occurred when the overwood was removed in early 1968, and this operation was more costly than a straight forward clearing operation. By March 1968 the trees were up to 10ft. high. It would appear that there may well be advantages in using an opened girdled overwood particularly where the frost is likely to occur, and where there is a possibility that drought conditions may develop at different times of the year.

There were heavy frosts in June - July 1967 and severe mortality took place amongst the P67 *Eucalyptus maculata*, *E.citriodora* and *Acacia cyanophylla*. There were also some deaths amongst the *E.paniculata*, but this was considerably more resistant than the *E.maculata*. The *E.camaldulensis* and *E.sideroxylon* were the most resistant species. There was even leaf scorch due to frost up to 30ft. high on older *E.citriodora* in the Lobatse Old Plantation. The worst hit areas were Letlhakane, and Lobatse New and Old Plantations where promising stands of *E.maculata* were completely cut back.

Good growth was achieved in the areas replanted with P67 *E.paniculata*, *E.punctata*, and *E.melliadora* in the Lobatse Old Plantation whilst the same applied within the Good Hope Old Plantation area where *E.camaldulensis* was planted in 1967. P67 *Callitris*

calcarata at Lobatse also appeared promising. P67 *E.cinerea* at Kanye was slow growing but appeared to be remarkably termite resistant.

In general the most suitable species for plantation work in the South-East part of the country appeared to be *E.camaldulensis* and *E.sideroxylon*. These appear to be fairly drought and frost resistant.

As recorded in Chapter VII, 6.9 acres of Eucalyptus trial plantations were made in *Baikiaea-Pterocarpus* woodland near Kasane in the Chobe District.

At Good-Hope where the plantations are on old farmland, there was a considerable development of *Stramonium daturum*, and this was brought under control with a disc harrow combined with hand weeding about the plants.

Chapter VI – Production and Trade (Standard Form omitted)

Natural Woodland

As in previous years there is little to record under this section as virtually all forest produce is at present taken free. The only restriction imposed on the taking of major forest produce was that in the Chobe District where restrictions were imposed on the taking of 5 principle timber species by notices published under Section 24 (4) (iii) of Cap. 67, the African Administration Proclamation. New notices under the Forest Act were under consideration at the end of the year.

Free permits were issued in the Chobe District to local residents wishing to make sledges from *Baikiaea plurijuga*, or to saw rough timber from dried fallen logs of *Pterocarpus angolensis* (Mukwa). 13 trees were taken on paid permit for the manufacture of of canoes.

Firewood is taken free except in the case of two commercial organisations – the Mines Labour Organisation (Wenela) and the Chobe Safari Lodge. Both organisations pay an annual permit fee to take firewood. It is anticipated that the declaration of the proposed Kasane Forest Reserve will result in an increase in revenue arising from firewood sales, particularly when the proposed Kasane Township is developed.

As in previous years poles of *Colophospermum mopane* have been cut and sold as opportunity arose. Some 116 poles were sold during the year and yielded a small revenue of R19.00.

Apart from any trade development arising from the proposed timber concession in the *Baikiaea/Pterocarpus* Working Circle, it is considered that there is need to control the cutting of produce in Northern State Lands. At present the supply of firewood to the urban centre of Francistown is increasing. When the projected mining development takes place this will increase considerably. Cutting of mining timber will then be a major industry in this area, and control and management of this will be essential.

Production from Plantations

Cutting in the Lobatse Old Plantation was restricted to an area of 3.6 acres of 6 year old coppice (*Eucalyptus camaldulensis*). Revenue from sales in the plantation was lower than usual (R.94-71) as poles were stock piled. It was hoped that the pole treatment plant would have been completed in time to treat these poles. Part of the pole crop was sold and this represented a running footage of 3,486 feet (estimated to be about 340 cu.ft. on the basis of 10 running feet to a cubic foot).

Chapter VII

Investigation and Research

Herbarium

During the year a further 115 herbarium specimens were collected and added to the herbarium at Kasane. Identification of these was carried out by the Branch of Botany in the Ministry of Agriculture, Salisbury, Rhodesia to whom our debt is gratefully acknowledged. The triplicate copies of each of these specimens were sent to the herbarium of the Department of Agriculture at Mahalapye.

Elephant Damage

As mentioned in last year's report, an investigation into possible causes of elephant damage to the bark of different tree species has been undertaken in collaboration with Professor W. Elder of the University of Missouri. Chemical Analyses of bark specimens from 17 different tree species were made by the Department of Chemistry of the University College of Rhodesia and Nyasaland to whom our debt is gratefully acknowledged. The analyses recorded the percentage crude Protein, Phosphorus, Calcium, Sodium and Potassium in addition to the percentage Moisture.

The tree species were selected so as to include species commonly barked by elephants and other species which were either not attacked or attacked very infrequently. The species selected in the Kalahari Woodland (Baikiaea/Pterocarpus Association) numbered 7, and, of these 4 were commonly attacked, whilst 2 were never attacked and another was attacked infrequently. Table I records these species in their general order of frequency of attack. The other columns give the order of these species in the various analyses in the dry season and in the wet season

TABLE I
Baikiaea/Pterocarpus Association

Elephant damage to Tree Species and Results of analyses in decreasing order of magnitude.

Species	Incidence of attack	Dry Season Analyses					Wet Season Analyses						
		Moisture	Crude Protein	Ca	Na	P	K	Moisture	Crude Protein	Ca	Na	P	K
<i>Pterocarpus angolensis</i>	Very Common	2	3	7	7	7	2-3	1	3	7	7	5-6	1
<i>Kirkia acuminata</i>	Common	1	6	1	1-2	2-3	4	5	6	2	1	1	5
<i>Ricinodendron rautanenii</i>	Common	3	7	6	4-6	4-6	1	2	7	4	3-4	5-6	2
<i>Afzelia quanzensis</i>	Common	7	5	2	1-2	2-3	5	6	5	1	2	4	4
<i>Burkea africana</i>	Infrequent	4	1	5	4-6	4-6	7	3	1	6	5-6	7	7
<i>Baikiaea plurijuga</i>	Very Rare	5-6	4	3	3	4-6	6	4	4	3	3-4	2-3	6
<i>Croton gratissimus</i>	None	5-6	2	4	4-6	1	2-3	7	2	5	5-6	2-3	3

Most of the damage takes place in the dry season. It will be noted that there appears to be no single common factor amongst those analysed which determine why certain species are more attacked than others. It seems possible however that the moisture content of the bark may be an important factor for the trees with high bark moisture content appear to be more easily stripped of their bark. The bark structure of the last three species which are not so frequently attacked is harder and is of a more crumbly nature and does not strip off so easily. The same applies to the bark of *Azelia quanzensis*. Possibly the high content of sodium salts in this species may be a factor influencing its attack.

The most commonly attacked species is *Pterocarpus angolensis*. The bark of this species contains a copious blood red juice with rather astringent qualities. Possibly this may also be particularly palatable to elephants.

The other eight species were selected from trees in the riverine strip along the Chobe River where elephant damage to trees has been particularly severe. These species are listed in Table II in the order of frequency of attack. The first five species have been subject to attack over a long period but it is only in recent years that damage has been noted to the bark of *Sterculia africana* and to that of *Adansonia digitata*. Possibly the considerable increase in the size of the local population of elephant is a factor influencing the widening of the range of tree species subject to damage.

TABLE II
Acacia/Berchemia Association

Elephant damage to tree species and result of analyses in decreasing order of magnitude.

Species	Incidence of attack	Dry Season Analyses: % of					Wet Season Analyses: % of						
		Moisture	Crude Protein	Ca	Na	P	K	Moisture	Crude Protein	Ca	Na	P	K
<i>Acacia nigrescens</i>	V. common	3	3	9	9	7-8	3	2	4	9	7-8	8-9	3
<i>A. giraffae</i>	V. common	10	1	7	7-8	9	10	10	2	8	9	10	10
<i>Berchemia discolor</i>	V. common	8	4	2	3-5	3-4	8	9	3	5	4	5-7	7
<i>Lannea stuhlmannii</i>	V. common	1-2.	8	1	1	3-4	5	6	9	2	1	2-3	4
<i>Ac. tortilis</i>	Common	7	6	6	6	10	9	8	5	6	6	8-9	9
<i>Sterculia africana</i>	Recent and increasing	6	10	4	3-5	7-8	2	5	10	4	5	4	1
<i>Capassa violacea</i>	Slight	4	2	8	7-8	1-2	4	3	1	7	7-8	1	5
<i>Adansonia digitata</i>	Rare	1-2	9	5	3-5	5-6	6	1	8	1	3	5-7	6
<i>Kigelia pinnata</i>	None	5	7	10	10	1-2	7	7	7	10	10	2-3	8
<i>Trichilia roka</i>	None	9	5	3	2	5-6	1	4	6	3	2	5-7	2

Most of the damage in this association also takes place in the dry season although trees like *Leanea stuhlmannii* are subject to attack throughout the year. Browsing on the leaves of the fallen trees is a major factor in this species although the high sodium salt percentage in this species must also be noted.

Again there seems to be no single common factor affecting the incidence of damage to these species and again one is left with the impression that the ease of stripping of the bark may be a major factor in the incidence of attack. For the same expenditure of energy a considerably greater bulk of food can be obtained from tree species where the bark strips easily than is the case with tree species where only small patches of bark can be tusked off. Of the first 6 species five are easily stripped whilst it is only in the case of *Berchemia discolor* that small pieces of bark have to be individually tusked off.

Species Trials

A 10 acre plot was cleared in exploited Baikiaea/Pterocarpus woodland approximately 8 mile from Kasane and trial plots of *Eucalyptus camaldulensis*, *E.grandis* and *E.resinifera* were planted. The planting distance was 8' on the square whilst planting took place at the end of November. Shortly after planting each young plant was fertilised with 4oz of Compound G (15K 20P), 3 oz of Ammonium Sulphate and 1¼ oz. Boron. The total area planted was 6.9 acres.

Table III

Plot No.	Species	Area acres	Survival	Max. Ht.	Min. Ht.	Mean Av. Ht.	Remarks
1	<i>E. camaldulensis</i>	1.09	95%	8' 0"	6"	4' 5"	
2	<i>E. camaldulensis</i>	0.45	84%	6' 6"	7"	2' 9"	Includes some late planting in February
3	<i>E. grandis</i>	1.13	93%	5' 9"	3"	2' 5"	
4	<i>E. grandis</i>	1.13	75%	3' 10"	3"	1' 11"	Much smaller transplants used and some planted in January
5	<i>E. resinifera</i>	0.88	59%	4' 6"	9"	2' 5"	

The *E.camaldulensis* looked particularly healthy whilst the *E.grandis* was also promising. Early planting is obviously desirable with both species in these very sandy soils. The *E.resinifera* has proved rather disappointing in so far as there has been a very high percentage failure.

If extensive areas of this woodland are to be cleared for planting purposes then some means of writing off the capital cost of clearing of the woodland is desirable (approximately R30-00 per acre). Direct labour cost can probably be reduced to about R19-00 per acre. A trial was therefore made of cotton as inter-row cash crop. This species was chosen because the area is close to the boundary of a Game Reserve and good crops are liable to be damaged or destroyed. As a cash crop cotton proved a failure on this site even though there was a good rainy season. Further trials using possibly groundnuts as a cash crop are desirable. Similarly it is hoped that further trials using different fertilizer application will be made during 1968/69.

A 5 acre area was cleared for the trial planting of *Populus deltoides* near the flood plain of the Chobe River at Kazungula and it will be planted up in July 1968. A good

crop of cotton was produced on this site during the 1967/68 rainy season although yield would have been heavier had the seed been sown earlier.

A small trial with *Dendrocalamus strictus* at Kazungula was not very successful.

Chapter VIII - Finance (Standard Form X)

Although the revenue in 1967-68 was more than double that in 1966-67, the unfavourable balance between expenditure and revenue widened.

The increase in revenue arose mainly from increased sales of plants from the nursery at Phareng. At present the plants from this nursery are sold at a figure well below the normal trade cost. The bulk of the ornamental plants and hedging are sold in the Gaberones area where there has been considerable housing development, and the low sale price of plants has been maintained so as to encourage planting in the new Township. Revenue could be raised if current market prices for plants were charged.

Other sources of revenue during 1967-68 were for the sale of produce from Lobatse Plantation, and from firewood and other permits in the Chobe District. It is likely that revenue from the latter source will rise in 1968-69. However a major rise in revenue is unlikely to take place until the proposed timber concession is in operation in the Chobe District.

Expenditure on personal emoluments fell due to various staff vacancies.

The transport and travelling item includes the wages of daily-paid staff (drivers and lorry assistants) besides expenditure on vehicle running and maintenance; it also includes travelling subsistence, motor mileage and expense claims. Fuel costs have risen whilst more expenditure was incurred on motor mileage during the year than in the previous year. Expenditure on equipment was reduced in so far as a large part of the equipment required for the nursery and plantation schemes has now been obtained.

The research item includes expenditure on the nursery at Kasane, and on the experimental plots at Kasane (10 acres) and at Kazungula (5 acres).

Protection costs include the cost of fire protection in the Baikiaea/Pterocarpus Working Circle, and expenditure on fencing and insecticide in the plantation areas. The increase in expenditure here and under silviculture reflects the increase in the area newly planted and that under maintenance.

Special expenditure includes the cost of a new 5 ton Bedford lorry, a 2 furrow disc plough, water tanks and expenditure on the pole treatment plant at Lobatse.

No figures are shown for Local Authority expenditure and revenue. The only area where there is a Local Authority plantation is at Mogobane Irrigation Scheme where the plantation area is considered to be an integral part of the irrigation scheme.

Chapter IX - Organisation and Staff

The Department continued to form a Division within the Ministry of Agriculture. The headquarters are at Kasane in the Chobe District in the north-east part of the country. There are two forester charges which come under the direction of the Forest Officer. The Forester North is stationed in the Chobe District where the main duties in his charge are currently fire protection within the Baikiaea plurijuga/Pterocarpus angolensis Working

Circle. When timber exploitation commences in this Working Circle it will also be under the charge of the Forester (North). The Forester (South) is in charge of plantation work in the south-east part of the country and is based at Kanye.

During the year leave was taken by the following officers:—

P.W.T. Henry, Forest Officer	16. 5.67 – 26. 5.67
	14.12.67 – 29.12.67
F.L. Ledeboer, Forester	3. 8.67 – 9. 8.67
	3.12.67 – 10. 1.68
S.D. Ramahobo, Clerical Officer	1.12.67 – 26.12.67
T. Sinvula, Messenger/Interpreter	25. 4.67 – 27. 4.67
C.M. Kalaluka, Forest Assistant	5. 7.67 – 7. 7.67
	17.11.67 – 31.12.67
G.B. Mosikiri, Forest Assistant	3. 4.67 – 5. 5.67
M.L. Mutakela, Forest Assistant	19.10.67 – 17.11.67
S. Samunzala, Forest Guard	6. 4.67 – 5. 5.67
S. Mafumba, Driver	1. 5.67 – 22. 6.67
N. Mogobe, Forest Guard	1. 6.67 – 30. 6.67

Mr. G.R. Maphane, Forest Assistant and Mr. N. Mogobe, Forest Assistant were nominated to fill bursaries generously given by the Government of the Republic of Zambia at the Zambia Forestry College, Mwekera. They left for Zambia in early January, 1968 and are currently attending the two year training course for Forest Rangers.

Mr. F.S. Alidi was appointed as a Trainee Forester on 6th November, 1967. The appointment comes under the Training Officer, Central Establishment. He has been nominated for a two year course leading to a Diploma in Forestry.

Mr. G.R. Maphane, Forest Assistant and Mr. M.L. Mutakela, Forest Assistant were sent on a Drivers Course at the Botswana Training Centre from 7th June, 1967 to 21st July, 1967. Both successfully completed the course.

Mr. R.A. Nickerson of the International Volunteer Service joined the Department for a short period from 28th September, 1967 to 7th December, 1967 after serving for a year with the Ipelegeng (Food for Work) Programme. Mr. Nickerson holds a Forestry Diploma and in the short time he was with the Department carried out useful survey work on the plantation areas in the south-east.

Chapter X – Policy Legislation

The amended forest policy given in last year's annual report was accepted in 1967. A copy of the policy is given in Appendix A.

The long drawn out history of the revision of the Forest Act was brought to a successful conclusion with the enactment of the new Forest Act (No. 23 of 1968) which was published on 8th March, 1968. This replaces the earlier Forest Proclamation (Cap. 138

- Proclamation No. 62 of 1948) which was considered to be unsatisfactory in many respects and which had never been enforced or applied since its enactment. Revision was commenced in September, 1963.

During the year there were in fact further delays in the submission of the Act to the legislature. A draft bill was given first and second reading by the House of Chiefs in July, 1967. This draft was to have been submitted to the House of Assembly in July, 1967 but was withdrawn at the last minute when it was found that in fact it would have only applied to State Lands and for practical purposes, would have had little application in respect of Tribal Lands.

The new Forest Act provides for the creation of forest reserves on State Lands, Tribal Lands and Local Authority Lands. It also makes provision for specified privileges to be enjoyed by communities in forest reserves where this is considered desirable. A lower degree of protection may also be afforded to certain tree species in both State and Tribal Lands whilst the Act also precludes the taking of any forest produce on State Lands for the purposes of profit unless this is covered by a licence.

Application of the new Act will be directed firstly to the creation of the production Forest Reserves. In addition it is hoped that the small areas of plantation in the south-east will also be created as Forest Reserves.

Draft Forestry Regulations were under consideration at the end of the year, whilst draft orders in respect of the proposed Kasane Reserve and an order declaring certain species as protected trees in the Chobe District were awaiting approval and signature at the end of the year.

CONCLUSION

The writer again wishes to thank all the staff of the Department for their efforts throughout the year. Thanks are also due to the Administrative Officers and officers of other Government Department who have assisted the Department in its work throughout the same period.

P.W.T. HENRY,
Forest Officer

BOTSWANA,
2nd August, 1968.

Appendix A

FOREST POLICY

The declared Forest Policy for the Republic of Botswana is as follows:-

- (a) to establish a permanent Forest Estate composed of protection and production Forest Reserve for the benefit of present and future inhabitants of the country on forest and other land sufficient in size or distribution for:-
 - (i) the maintenance of the climatic and physical conditions of the country, the safeguarding of water supplies and soil fertility, and the prevention of damage to rivers and agricultural land by flooding and all forms of erosion;
 - (ii) the supply in perpetuity at reasonable rates of all forms of forest produce required by the people for domestic, agricultural and industrial needs;
 - (iii) the encouragement of an export trade to utilize any balance of forest produce which may be available subject to fulfilment of the two primary objects set out above.
- (b) to manage the Forest Estate with the object of obtaining the highest revenue in so far as this is consistent with the protective and productive function of the Forest Estate.
- (c) to obtain maximum exploitation of the other Forest Resources which may remain outside the designated Forest Estate, such exploitation to be carried out with the object of obtaining the highest revenue and to be qualified by the proviso that it will not take place in areas where its effect would be detrimental to the maintenance of the climatic and physical conditions of the country.
- (d) to train and provide adequate numbers of professional, technical and other local staff for the management of the Forest Estate, for revenue collection, and for research into such problems as can be investigated locally.
- (e) to support and co-operate with all appropriate schemes of regional forest research.
- (f) to foster, by education and propoganda, a real understanding among the people of Botswana of the value of forest to them and their descendants.

STANDARD FORM I

Areas in Square Miles of Forest Land (a) on 31st March, 1968

Status of Land (1)	Total Area of Unit (2)	State Forest Reserves				Local Authority Forest			Private Forest Areas	Total Forest Areas (12)	Percentage of whole area	
		Production Reserves (3)	Protection Reserves (4)	Unre-served (5)	Total State Forest (6)	Production Reserves (7)	Protection Reserves (8)	Unre-served (9)			Total Local Authority (10)	Forest Reserves (Cols. 3, 4, 7 & 8)
State Lands	102,714	-	-	-	-	-	-	-	-	31,830	-	31
Tribal Lands	107,603	-	-	-	-	-	-	-	-	84,367	-	78
Freehold	9,682	-	-	-	-	-	-	-	-	9,682	-	100
Totals	220,000	-	-	-	-	-	-	-	-	125,879	-	57

Notes: -

(a) These figures refer not to forest but to deciduous woodland of height and density.

(b) The figures are estimates of land which should carry a cover of such woodland and do not take into account areas cleared for cultivation (about 1,500 square miles).

(c) 1966-67 Report amended in respect of total land area which is now given as 220,000 square miles and which includes water and swamp.

STANDARD FORM II

**Statement in Square Miles of Progress made in Forest Reservation and Demarcation
During the Year Ended 31st March, 1968**

Reserves (1)	Proposed reserves but not legally constituted		Reserves gazetted but Boundaries not completely Demarcated				Reserves constituted and Demarcated			
	On 1.4.68	Added during the year 31.3.68	On 1.4.67	New Reserves gazetted during the year	Demarcated and transferred to Column 10	On 31.3.68	On 1.4.67	Added during year	Excluded during the year	On 31.3.68
(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Production Reserves										
State Lands	635	277	912	-	-	-	-	-	-	-
Tribal Lans	-	-	-	-	-	-	-	-	-	-
Freehold	-	-	-	-	-	-	-	-	-	-
Totals	635	277	912							
Production Reserves										
State Lands	-	-	-	-	-	-	-	-	-	-
Tribal Lands	-	-	-	-	-	-	-	-	-	-
Freehold	-	-	-	-	-	-	-	-	-	-
Totals										
Grand Totals	635	277	912							

Including proposed Kasane F.R.

Chobe F.R.

Maikaelelo Pan F.R.

Kazuma Pan F.R.

Plantation areas not included

53.3 sq mis.

520.5 sq mis

284.6 sq mis.

52.6 sq mis.

STANDARD FORM IV

Record in Miles of Forest Department Fire Traces/Motor Tracks
For the Year Ended 31st March, 1968

Territorial Unit and Name of Working Circle or Reserve	Forest Department Motor Tracks/Fire Traces					
	Government			Local Government		
	Added	Abandoned	Total at end of year	Added	Abandoned	Total at end of year
<i>Baikiaea/ Pterocarpus W.C.</i>						
Kasane F.R.	3	—	78	—	—	—
Chobe F.R.	49½	—	94½	—	—	—
Totals	52½	—	172½	—	—	—

STANDARD FORM X

Summary in Rand of Revenue and Expenditure for the Years 1966/67 and 1967/68

	1966/67			1967/68		
	Government	Local Authority	Total	Government	Local Authority	Total
	Revenue					
2. Timber and Fuel	290.90		290.90	145.71		145.71
3. Minor Forest Produce	—		—	—		—
4. Miscellaneous	341.17		341.17	1,214.15*		1,214.15
5. Total Revenue	632.07		632.07	1,359.86		1,359.86
Expenditure						
6. Personal Emoluments	17,219.42		17,219.42	16,347.44		16,347.44
7. Transport & Travelling	4,682.75		4,682.75	7,740.04		7,740.04
8. Other Administrative Charges	360.26		360.26	226.21		226.31
9. Maintenance of Buildings	232.65		232.65	201.17		201.17
10. Equipment	1,204.95		1,204.67	809.67		809.67
11. Research & Education	—		—	688.83		688.83
12. Protection	1,787.50		1,787.50	2,126.94		2,126.94
13. Silviculture	3,736.30		3,736.30	5,113.85		5,113.85
14. Other Forest Improvements	1,584.91		1,584.91	871.50		871.50
15. Exploitation	—		—	17.25		17.25
16. Miscellaneous	113.00		113.00	440.54		440.54
17. Total Annual Recurrent	30,921.74		30,921.74	34,523.54		34,523.54
18. Special	3,829.49		3,829.49	3,161.59		3,161.59
19. Total Expenditure	34,751.23		34,751.23	34,751.23		37,685.13
20. Surplus/Deficit	34,119.16		34,119.16	36,325.27		36,325.27

*Includes Adjustment Vouchers for R17.50 not brought to account in respect of plant supplied to another Government Department and R40.50 which was subject of a misappropriation in the Sub-Treasury at Gaborones.