

SUGGESTIONS

REGARDING

FOREST ADMINISTRATION

IN THE

NORTH-WESTERN PROVINCES AND OUDH,

BY

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INCLUDING A JOINT REPORT ON THE FORESTS OF THE SCHOOL CIRCLE,

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*WITH FOUR MAPS AND FOUR PLANS.*

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CHAPTER I.

INTRODUCTION.

THE present Report relates to the Oudh, Central, and School Forest Circles of the North-Western Provinces and Oudh.

I left Calcutta on the 28th January 1881. Captain E. S. Wood, the Conservator of the Oudh Circle, met me in the Rámgarh block of the Nawáb-ganj Forest, which I inspected on the 31st. I marched thence, *vid* Gonda, to Ikauna in Bahraich, and examined the forests near that place which form part of the Kapurthala estates in Oudh. A brief account of these forests, with suggestions regarding their management, will be found among the papers\* appended to the present Report. The Bhinga Forest was examined from the 5th to the 8th February, the Charda Forest on the 9th, the Chakia Forest on the 10th, and the Motipur Forest on the 11th and 12th of that month. This closed the inspection of the forests in the Bahraich District, and on the 12th I crossed the Kauriála River and entered the Kheri District. On the 13th February the inspection of the Trans-Sárda Forests of the Kheri District was commenced, which occupied me until the 20th, and on the 21st I crossed the Sárda River to Bhira. The time from the 22nd to the 25th February was devoted to the Bhira Forests of the Kheri District, and to the Púranpur and Pilibhít Forests in the Pilibhít District.

In Oudh I had the privilege of meeting Colonel J. Perkins, the Commissioner of the Fyzabad Division, Mr. H. S. Boys, the Deputy Commissioner of Gonda, and Mr. M. L. Ferrar, the Deputy Commissioner of Bahraich; Colonel I. F. MacAndrew, the Commissioner of the Sitapur Division, and Mr. H. W. Gibson, the Deputy Commissioner of Kheri; as well as the Collector of the Pilibhít District, Mr. P. Whalley, whose forests are included within the Oudh Circle.

After seeing some of the forests in the Tarái District, under Mr. J. C. Macdonald, I joined Mr. G. Greig, the Conservator of the Central Circle, at the edge of the Horái Forest, in Kumaun, on the 5th March, and in company with him examined the Nindhaur Forests and some of the forest tracts outside the East Kumaun Hills, until the 10th March, when we reached Haldwáni. On the 12th I went to Rámnagar in order to see Sir Henry Ramsay, the

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\* Appendix No. III.

Commissioner of Kumaun ; and the time from the 13th to the 18th March was spent in the West Kumaun Forests. On the 18th March I entered the Páti Dún Forest of the Garhwál Division, and examined part of this as well as of the Kohtri Dún Forest until the 27th March, when we reached Saneh, at the foot of the hills. The time from the 28th March to the 1st April was spent in the forests of the new Ganges Division, which comprises the submontane forests of the Garhwál District near the Ganges, as well as the Cháandi Forest in the Bijnor District ; and on the 29th I had the privilege of meeting Mr. H. F. D'O. Moule, the Collector of Bijnor.

On the 1st April I crossed the Ganges to Hardwár, where I commenced my inspection of the School Forests, in company with Dr. W. Schlich, the Conservator of the Punjab, and Major F. Bailey, R.E., the Director of the Forest School. The inspection of the Patri Forest, south of Hardwár, and of the outer Siwálik Forests, in the Saháranpur District, occupied from the 1st to the 6th April. After inspecting the Dehra Dún Forests, and spending some time at Dehra, we reached Chakráta on the 27th, and, after examining the forests of the Jaunsár and Tons Divisions, reached Roru in the Pábar Valley on the 14th May.

2. The Report contains a detailed account of the forests visited. This account is based upon the observations made during the present tour, during an inspection of these forests made by me from December 1874 to March 1875, a tour through the Gorakhpur Forests in November 1864, and a detailed examination of the forests of Oudh and the North-Western Provinces from March to June 1863. Chapters IX to XII relate to the forests of the School Circle, which were inspected jointly by Dr. Schlich and myself as Members of the Board of Inspection appointed by the Government of India ; and these chapters may be regarded as our Joint Report regarding these forests.

#### Forests in the Himalaya.

3. As regards their constitution, the forests described in the present Report belong to two great classes—the forests on the higher hills of the Himalaya, in the Jaunsár and Tons Divisions, and the submontane and Siwálik Forests. Besides the hill forests on the Tons River and its affluents, which are described in the present Report, there are, in the territories under the Government of the North-Western Provinces and Oudh, the following forests in the hills, under the control of the Forest Department :—the forests on the Jumna and Bhágirathi Rivers in the Tiri State, and the forests in the vicinity of the stations of Ránikhet and Naini Tal. The object of undertaking the systematic management of these hill forests is two-fold—to provide a permanent supply of timber, chiefly deodar, to the plains, which is floated down the Jumna and Ganges Rivers, and to furnish a permanent supply of timber and firewood to the stations of Chakráta, Ránikhet, and Naini Tal. There is also the further object of providing for a permanent supply of wood and other forest produce to the agricultural population in the vicinity of the forests. In these hills, however, where population is as a rule scanty, this further object has not yet acquired any great practical importance.

4. For export to the plains deodar is the only wood for which there is a steady demand on a large scale on the rivers mentioned. The demand for chí ( *Pinus longifolia* ) is growing, but is as yet limited.

The local requirements of the three stations mentioned are provided for by a large variety of woods, among which deodar, chí, the spruce, and the silver-fir, and three species of oaks (*Quercus incana*, *dilatata*, and *semecarpifolia*), are the most important. From the Forester's point of view, the study of the growth, habits, and requirements of the species mentioned is a necessity, and the present Report will be found to contain some contributions to our knowledge on these points.

#### Forests on the outer hills and in the plains.

5. The submontane and Siwálik Forests are exceedingly extensive. They constitute a belt 450 miles long, extending from the Jumna to the Ganges,



from the Ganges to the Sárda, and from the Sárda to the Great Gandak River, and their area is as follows :—

		Square miles.
1. Oudh Circle	... {	(1) Gorakhpur Division ... .. 115
		(2) Gonda " " ... .. 143
		(3) Bahraich " " ... .. 257
		(4) Kheri " " ... .. 263
		(5) Bhira " " ... .. 164
		(6) Pilibhít " " ... .. 137
		— 1,079
2. Central Circle	... {	(7) Kumaun " " ... .. 635
		(8) Garhwál " " ... .. 472
		(9) Ganges " " ... .. 173
		— 1,280
3. School Circle	... {	(10) Saháranpur " " ... .. 298
		(11) Dehra Dún " " ... .. 278
		— 576
Total		... 2,935

6. To these must be added the forests in the Tarái District of the Kumaun Division, which, though not under the Forest Department, and not notified as reserved forests under the Forest Act, are yet demarcated and efficiently protected. They consist of eight blocks, with the following area :—

		Square miles.
1. Makonia	... ..	1
2. Kilauli	... ..	10
3. Sarapu	... ..	5
4. Kukrálá	... ..	13
5. Dimri	... ..	9
6. Kilpuri	... ..	32
7. Debipura	... ..	3
8. Bilheri	... ..	63
Total		... 141

#### Forest assigned to the Kumaun Iron Works.

7. The long belt of Government forest at the foot of the Himalaya is not, however, continuous; it is interrupted between Rámnagar and Haldwáni by a large extent of forest, which, though not alienated by Government, can hardly be said to be under its control. These are the forests assigned to the Kumaun Iron Works, commonly known as the Kumaun Iron Company's Grant.

The area of this tract of country is 205 square miles, and a large portion of it is forest. An agreement between the Company and Government is said to be in existence, setting forth the conditions under which certain rights have been assigned in this area to the Kumaun Iron Company. This agreement I have not seen, but, from the information which I have obtained, I gather that the following are its main provisions. The villages situated within the tract are permitted to clear forest land for cultivation under the ordinary rules, and, as a matter of fact, cultivation is steadily extending and the forest area is diminishing. The villagers have also the right to graze cattle and to cut wood for domestic and agricultural purposes within these forests. Subject to these provisions, the Kumaun Iron Company may cut and use wood for iron smelting. They are not permitted to sell the wood, or otherwise to make revenue from the forests.

In 1875 an examination of the forest situated outside the hills was made, and the area of this portion was then estimated at 80 square miles.

#### Forests on the outer hills.

8. As regards elevation, the submontane forests of Oudh and the North-Western Provinces extend from the level of the plains to about 4,500 feet on the outer ranges of the Himalaya. As regards general character and treatment, we must distinguish between the forests on the hills and on level ground.

In both classes sál is the tree for which there is most demand, and which is, therefore, most important. On the hills below 2,000 feet sál not often forms pure forests over any large extent of ground, but is mixed with a great variety of other trees and often with bamboos. The tree is found, though poor and stunted, as high as 5,000 feet, but does not generally form valuable forests at elevations exceeding 3,000 feet. At 2,000 feet and upwards sál often predominates over the other kinds and not rarely forms nearly pure forests. At such elevations, however, sál neither attains any great girth nor great length of bole.

A peculiar feature of these hill forests is that *Buchanania latifolia* (perua) is often gregarious and occupies large areas. Another tree which is common on the hills and rare on level ground is sándan (*Ougeinia dalbergioides*). This also occasionally shows a tendency to be gregarious, but by no means to the same extent as in the forests of Central India.

9. On the inner edge of the hill forests the rock is the shale or slate of the outer Himalaya, while outside there is the broad belt of the soft sandstones and conglomerates of the Siwálíks.

The forest on the hills which belong to the Siwálík formation generally contains less sál than the forest further inland. The crests of these Siwálík Hills are frequently stocked with chír, and the slopes bear a thin and open forest of *Anogeissus latifolia* and other trees. The aggregate area of the forests on hilly ground may be estimated at 1,206 square miles.

#### Forests on level ground.

10. The forests on level ground may be divided into two great classes—those outside the hills in the plains, and those at the foot of the hills and in the dúnas or broad valleys which form so marked a feature in the configuration of this part of the country.

With the exception of a portion of the Gonda Forests at the foot of the Tulsipur Hills, the whole of the forests of the Oudh Circle are out in the plains and entirely away from the hills. Indeed, some outlying forest tracts in Gorakhpur, Gonda, and Kheri are situated on high ground in the midst of the open country, at a distance from the foot of the hills (which are here in Nepal) of from 60 to 70 miles. In the Central Circle and the Tarái District, between the Sárda and the Ganges Rivers, the following forest tracts are situated entirely outside the hills :—

	Square miles.
Tarái District Forests	141
Blocks in East Kumaun, outside the hills	50
Garhi Bulchand Forest	17
Rehar	24

In the Saháranpur District, west of the Ganges, there are only the Patri Forest and a small area outside the Siwálíks, the area of which may be estimated at 50 square miles.

The whole of the submontane forests here mentioned, including those in the Tarái District, may thus be classified as follows :—

	Square miles.
On hilly ground	1,206
On level ground in the dúnas and at the foot of the hills	510
Outside the hills	1,360
Total	<u>3,076</u>

This is put forward merely as a rough estimate. It will be useful to work it out in detail hereafter.

#### Sissoo and Khair forests.

11. On level ground, whether in the dúnas or outside the hills, one class of land merits special attention. These are the broad beds of shingle, sand, and boulders through which the mountain streams make their way, which are found in all valleys, and which extend from the foot of the hills far out into the plains.

The forest in these places is of a character entirely different from the forest on the high ground. The most important trees are sissoo and khair, both gregarious, either together or alone, forming forests, more or less pure, of sissoo and khair. These two species occur in the valleys high up into the hills, and large quantities of their seed, which ripens during the dry season, are washed down by the flood, and are deposited, as the waters subside, on freshly formed islands and banks, where the young plants spring up in large masses together. These belts of shingle and boulders are often several miles wide, and when the ground has remained undisturbed for some time other species settle and give the forest a more mixed character. The most common of these are *Casearia tomentosa*, *Ulmus integrifolia*, and *Moringa pterygosperma*. But these mountain streams shift constantly and change their course, cutting through the forest and throwing down thousands of trees. The result is a natural but irregular system of rotation and successive belts of khair and sissoo, representing a gradation of ages, saplings, poles, and mature trees. The streams cut indiscriminately through the forest, rooting up saplings, poles, or mature trees, as they happen to be in the way. In exceptional cases only do the sissoo or khair trees attain full size in such localities. There are, however, forest tracts with a large number of mature trees of these species, which have not been cut into by the streams for a long time. Such tracts, with mature sissoo timber, are not uncommon in the Oudh Forests, in the vicinity of the Sárda, Suheli, and Kauriála Rivers; and mature khair trees are found in many parts of these submontane forests. But the great mass of the khair and sissoo forests are young, and are constantly cut down by the erratic currents of the streams long before the trees attain maturity.

12. For khair there is a sufficient demand—for sugar-mill pestles and for the manufacture of catechu—throughout the whole length of the forests; indeed, in the forests between the Ganges and Kosi Rivers, which form the Ganges, Garhwál, and part of the Kumaun Divisions, the tree has been overcut and the resources of mature khair timber are nearly exhausted.

For sissoo the demand is equal to the production in Saháranpur and the Dehra Dún, as well as in Oudh and in the forests between the Ganges and Kosi Rivers. In Kumaun, however, between the Kosi and Sárda Rivers, the demand is not at present sufficient to consume the enormous quantities of sissoo timber which are annually uprooted by the changing course of the mountain streams. But here also the demand is increasing steadily.

#### Sal forests on high ground.

13. It now remains to say a few words regarding the large extent of forest which occupies the belts of high ground at the foot of the hills, and between the stretches of khair and sissoo which occupy the low-lying land in the immediate vicinity of the streams.

In this forest sál is the principal tree wherever the soil is suitable—that is, wherever it contains a sufficient admixture of sand or shingle and boulders. Where the soil is binding, and where clay prevails, other species get the upper hand. Under certain circumstances it is sáj (*Terminalia tomentosa*), and in other cases it is tendu (*Diospyros Melanoxyton*). Sáj predominates over a large tract in the north corner of the Motipur Forest, and the Bhinga Forest furnishes a most remarkable instance where tendu predominates. Near the foot of the hills, on rising and somewhat undulating ground, sál is often wanting, and here dhaura (*Anogeissus latifolia*) is\* frequently the chief tree. This is well exemplified in the Tulsipur Forests of the Gonda District.

It should also be mentioned that mixed forest, generally with a large proportion of thorny scrub, is common along the lower edge of the forests in the plains, and often occupies considerable areas; and that stretches of low ground, or, as in the Bhira Forest, of poor sandy soil, are occupied by open grass lands, which form extensive enclosures in the forest.

Broadly speaking, it may be said that on high ground, where the soil is suitable, sál predominates; while on stiff binding soil, on undulating ground and at its lower edge, the forest is generally of a mixed character.

\* In Oudh dhaura is *Anogeissus*, while west of the Sárda River dhaura is *Lagerstrœmia*.

14. Comparing the sál in the dúnns and on the high ground skirting the hills, with the sál in the plains outside the hills, it must be said that in the first named forests the tree attains a larger size, and that the stems are taller and better shaped than outside. Hence it follows that the forests in the dúnns and on the high ground skirting the hills, though less extensive than the forests on the hills or in the plains outside the hills, have a special value. To this class belong the forests in the Nindhaur Valley, part of the Kotah Dún, and the forests on the flats along the Kosi River; the Pátli Dún Forests in the valley and on the flats near the valley, including Shísham Khata; the Jogichaur Forest on the banks of the Ganges; the Lachiwála and Tháno Forests, as well as several others, in the Dehra Dún. These are the tracts in which fire-protection pays best, and where it should be continuously maintained.

There are some forests on the hills which, as regards value, nearly equal those on the flats and in the dúnns. Instances are the Durgadeh Forest in Kumaun, the forest on the north side of the hill range which separates the Adnála from the Haldgadi streams, and part of the Kohtri Dún Forests in Garhwál. But such cases are rare, and the forests on level-ground have always the great advantage of easier export and more complete natural regeneration of the sál.

In the plains it may generally be said that the shape and length of stems and the size of the trees are better the less the distance from the hills. In forests of sál in the open country, at a great distance from the hills, such as the Nawábganj Reserve in the Gonda District, the poles are crooked and badly shaped, and this may most probably, to a great extent, be ascribed to the action of the hot winds, while the absence of the hot winds in the dúnns favours the healthy development of the tree.

#### Trees associated with Sál.

15. A few words should now be said regarding the associates of sál. Referring to what has already been mentioned regarding sáj, tendu, dhaura, and sándan, it may be added that there is great uniformity in the species associated with sál throughout the entire extent of these submontane forests. *Lagerstrœmia parviflora*, *Schleichera trijuga*, *Eugenia operculata*, *Buchanania latifolia*, *Holarrhena antidysenterica*, and *Semecarpus Anacardium* are rarely absent; while of creepers *Spatholobus Roxburghii*, *Bauhinia Vahlia*, and *Millettia auriculata* are common companions of sál. The creepers have fortunately been extirpated over large areas, partly by cutting and partly by the more dense cover overhead, which does not afford light enough for these plants to develop their climbing habits. In certain localities mohwa (*Bassia latifolia*) is common, for instance in the Nawábganj Reserve in Gonda, in several compartments near Dudua in Kheri, and on certain flats on the right bank of the Kosi River below Mohán. *Adina cordifolia* is common locally, as in Bhinga and Motipur.

The only other remark which is called for in regard to the associates of sál in these forests is that certain trees are found in company with sál in the Oudh Forests which are not found further west. Of these the most noteworthy are *Dillenia pentagyna* and *aurea*, *Heynea trijuga*, and *Milusa velutina*, which last is found, though rare, as far west as the Ganges.

#### Demand for timber and forest produce.

16. The submontane forests here described provide grazing for large herds of cattle which come up from the plains, and they supply the open country of the Doáb, Rohilkhand, Oudh, and the Benares Division with timber, wood, bamboos, and other forest produce. Between the Ganges and Sárda Rivers the Government forests are the most important source of supply. In the Dehra Dún there is a considerable forest area in private hands, but these private forests are being worked recklessly and their resources will sooner or later be exhausted. It is different east of the Sárda River. Here the Government forests of Oudh and Gorakhpur are the outskirts only of extensive forests situated in Nepál, which are stocked with an abundance of excellent timber, large and of regular shape. It often happens that timber from Nepál

is brought from across the frontier and is carted through the Trans-Sánda Forests of Kheri, which are among the best in Oudh; and the contrast between the beautifully round and straight logs which are brought from Nepal and the timber produced in Oudh is very remarkable.

Yet, notwithstanding this competition from Nepal and the private forests in the Dehra Dún, there is a great demand for the produce of the Government forests.

#### Sál.

17. The difficulty is the scarcity of large timber, most of which has been cut out during the last fifty years. The proposals of the present Report, if accepted, provide for the export of limited quantities annually of mature timber, which will supply the market sufficiently until the trees of the younger classes have attained maturity. These supplies of large timber will chiefly be drawn from the Bhinga, Motipur, and Kheri Forests in Oudh, from the Nindhaur and Kosi Valley Forests in Kumaun, and from the Pátli Dún Hill Forests in Garhwál.

As regards the management of sál forests, the chief desideratum is an accurate knowledge of the rate of growth of the tree. Annual rings cannot with certainty be distinguished, and nothing therefore remains but to institute a regular system of measuring selected trees annually. A good plan for doing this has been initiated by Captain Wood in Oudh, and suggestions for carrying on these measurements on a systematic plan in all three Circles will be found in the present Report. As far as the observations made in Oudh have gone, they indicate a much more rapid growth of the sál tree than that hitherto assumed. Of this the practical result is that if fire conservancy is extended to all tracts required for the production of timber, and if it is steadily maintained in those tracts so as to ensure the complete regeneration of the forest, it will be possible to cut on a very large scale as soon as the trees of the smaller classes have attained full size. At present the quantity cut is necessarily limited by the quantity of mature timber available, which must be made to last until the smaller classes have attained full size.

#### Timber of other kinds.

18. For khair, sándan, and sissoo a sufficient demand already exists as a rule. For timber of other kinds—such as haldu, sáj, dhaura, and bákli—the demand is limited, but it is increasing steadily. In the vicinity of the Ganges River, especially on the east side, almost any quantity of timber of other kinds can be sold, and there is a large export of such timber from the Kumaun Forests outside the hills to Pilibhít and Bareilly.

#### Bamboo.

19. The bamboo of these forests is all the common Indian bamboo (*Dendrocalamus strictus*). The large thorny bamboo (*Bambusa arundinacea*) is found to a limited extent in Kumaun, outside the hills, and in the Motipur Forest of Oudh. The largest export of bamboos is from the forests between the Ganges and Kosi Rivers, and here special measures have been suggested in the present Report in order to ensure a permanent and sufficient supply of good and large bamboos. These measures are detailed in Chapter VII, which treats of the forests in the Garhwál Division.

In the bamboo forests of the Saháranpur Division a series of experiments has been commenced, in order to determine the effect of fire-protection upon the development of the bamboo, and the effect of cutting out annually a larger or smaller number of stems from a clump.

A remarkable fact is that there is no export of bamboos from the Nepal Forests north of Oudh, although the bamboo is said to be plentiful on the outer hills in Nepal.

#### Bhabar.

20. The export of the grass known as bhabar, bhaib, bankas (*Andropogon involutus*, not, as has often been erroneously stated, *Eriophorum comosum*),

from the Siwálik Hills and from tracts of broken ravy ground outside the hills, is very considerable from nearly all parts of the forests treated in this Report. The grass grows abundantly on dry bare slopes, and no apprehension regarding the sufficiency of the supply need at present be entertained. It is used chiefly for rope-making, and it is by no means impossible that the establishment of paper-mills in North India will eventually lead to the employment of this grass for the manufacture of paper.

#### Grazing and Forest Villages.

21. Large areas of the submontane forests are only fit for pasture, and they are utilized by large herds of cattle which annually come up from the open country, some from the immediate vicinity of the forests and others from great distances. As a rule, the cattle graze in the forests during the cool season, from November until April; but there are some tracts, such as the Bhing Forest, where circumstances are peculiar and where pasture continues throughout the rains. Forests with heavy pasture are, as a rule, fired in the hot season, in order to stimulate the growth of young grass. Hence the proper policy will doubtless be to effect a separation between the areas reserved for the production of timber and those which are to be used chiefly for pasture. All the suggestions of the present Report tend in this direction. This process of separation must be gradual, and it must necessarily go hand in hand with the extension of fire conservancy.\*

Within the limits of the forests here described there are many places which, at one time or other, were cultivated and inhabited, and in many instances such localities are not likely ever to become stocked with valuable forest. As the selection of the areas set apart for the production of timber progresses, it will probably be found possible to lease out the lands suitable for cultivation and to encourage the establishment of villages in the forests. Due precautions must, as a matter of course, be taken to guard against injury to the forest set apart for the production of timber, and this can be assured by assigning to each village a suitable area of forest land in its immediate vicinity for the pasture of cattle and the provision of wood and other forest produce. At first sight this seems a bold measure to propose, and each step in this direction must be taken with the greatest caution. These forest villages must not of course be permitted to degenerate into cattle stations requiring larger areas for pasture than those assigned to them for that purpose. The control of these forest villages in all matters pertaining to land tenure and revenue should remain with the Forest Officers. The greatest attention should be paid to the establishment of a good system of agriculture, and, if this is done, these forest villages may become models to the villages outside the forests, which naturally cannot receive the same share of time and attention by intelligent and well-trained officers.

#### Forest Ranges.

22. It will be useful here to state the Forest Divisions and Ranges into which the forests here described, as far as they are under the Forest Department, are, or should be, divided :—

Forest Division.	Civil District.	Range.	Area, in acres.
OUDH CIRCLE.			
1. Bahraich	Bahraich	(1) Bhing	73,600
		(2) Motipur	90,880
2. Kheri	Kheri	(3) Khairigarh	78,720
		(4) Newalkhar	89,600
3. Pilibhít	Kheri	(5) Bhira	97,891
	Pilibhít	(6) Púranpur	65,361
		(7) Pilibhít	29,434

\* In the Appendix to this Report will be found a letter of the 23rd April last, from Captain Wood, the Conservator of the Oudh Circle, to the Government of the North-Western Provinces and Oudh, bearing upon this subject.

Forest Division.	Civil District.	Range.	Area, in acres.
CENTRAL CIRCLE.			
4. Kumaun	Kumaun	12 Ranges	35,000 (average.)
	Bijnor	(20) Rehar	22,000
		(21) Dháron	37,120
5. Garhwál	Garhwál	(22) Sona Nadi	58,240
		(23) South Pátli Dún	30,080
		(24) North Pátli Dún	58,240
		(25) Palain	40,960
		(26) Kohtri Dún	42,880
6. Ganges	Garhwál	(27) Udepur	34,240
	Bijnor	(28) Gori	56,320
		(29) Cháandi	20,882
SCHOOL CIRCLE.			
	Saháranpur	(30) Eastern	35,085
		(31) Central	80,040
		(32) Western	75,571
7. Saháranpur	Dehra Dún	(33) Eastern Siwálik	42,301
		(34) Eastern Dún	33,231
		(35) Central "	48,096
		(36) Western "	54,151
		(37) Southern	8,314
8. Jaunsár	Dehra Dún	(38) Deoban	35,363
		(39) Bawar	33,063
		(40) Deogar	14,758
9. Tons	Leased Forests	(41) Deota	24,036
		(42) Lambatach	7,075
		(43) Busáhir	.....

Besides the nine divisions described in this Report, there are, in the North-Western Provinces and Oudh, the Jhánsi, Lalitpur, Naini Tal, Ránikhet, Gonda, and Gorakhpur Divisions—total 15 divisions—which, when their organization has been completed, will be divided into, say, 50 forest ranges or executive charges, with areas ranging from 20,000 to 100,000 acres. At present, most of these forest ranges are in charge of Foresters, and this explains why there are at present only nine Forest Rangers on the staff of the North-Western Provinces and Oudh. The monthly cost of the present Rangers is Rs. 540, and, with a more complete gradation, the cost of 50 Rangers would probably amount to Rs. 4,000 a month, or Rs. 48,000 a year. So large an increase in the establishment charges can, as a matter of course, only be effected gradually, as the forest revenue increases; but it is well to keep in mind that eventually a complete staff of Forest Rangers, with pay on a regular graded scale, ranging, within the prescribed limits, from Rs. 50 to Rs. 150 a month, must be established.

The Forest School has now been set on foot with the view of giving a sound professional education to persons who desire to become Forest Rangers, and the next move must be to organize in each Circle a staff of Forest Rangers on rates of pay and prospects of promotion sufficient to induce candidates with good education to enter the Forest School with the view of obtaining the Forest Ranger's certificate.

#### Rest-houses.

23. Proposals for the construction of forest rest-houses in several places have been made in this Report, and it is well to agree upon a uniform pattern. The rest-houses built in Oudh by Captain Wood, the Conservator, are on a good and economical plan, and they are suitable for most of the submontane forest divisions of these provinces. They are of three classes: the first and second classes are double-storied, costing Rs. 3,500 and Rs. 2,625, respectively, while the houses of the third class (Rs. 550) consist of one story, with a large thatched shed built over the tiled roof. Plans, specifications, and abstracts of cost of the three patterns are appended to the present Report, and they may be found useful in other provinces also.

The provision of good shelter and healthy accommodation for officers and subordinates in the forests is a most important work. Good rest-houses do more than anything else to save the time and health of Forest Officers, and fire conservancy particularly is greatly facilitated by the provision of good shelter for Forest Officers during the hot season.

## CHAPTER II.

## NAWABGANJ FOREST.

24. The road from Nawábganj to Utraula passes through a stretch of high ground situated north of a large tract of low land intersected by numerous *jhils*, which probably indicate one of the former courses of the Gogra or Sarju River. This stretch of high ground may be regarded as the western end of an extensive tract of high ground in the district of Basti. The greater portion of this tract of country was originally forest, and at the disposal of Government. About the year 1860 large areas were given out as grants for cultivation. At an earlier period extensive grants of similar land had been made in the adjoining district of Basti. These have been completely cleared and brought under cultivation, while most of the grantees in the adjoining portions of the Gonda District have been unsuccessful. Hence a number of these grants were thrown up or resumed. One of these, the Rámgarh grant, was, in 1870, made over to the Forest Department, and to this were added, in 1880, two other grants north of it, Shámbhunagar and Jaipur; and regarding four others, which are situated east of Rámgarh, a notification has been published, under section 4 of the Indian Forest Act, declaring that it is proposed to constitute them as reserved forest.\* The whole of this area was originally made over to the grantees by Government free of rights of third persons.

## Area.

25. The stretch of reserved forest here described is proposed to be designated the Nawábganj Forest, and its area appears from the following abstract:—

<i>Areas already declared as reserved forest.</i>						Acres.
Rámgarh	..	...	...	...	...	2,447
Jaipur	..	...	..	..	..	954
Shámbhunagar	..	..	..	..	..	795
<i>Areas notified under section 4 of the Indian Forest Act.</i>						
Sajui	..	..	..	..	..	2,071
Moneyपुर	..	..	..	..	..	2,542
Glynn Grant	..	..	..	..	..	826
Jankinagar	..	..	..	..	..	1,278
Total area						10,913

## Importance of the forest.

26. The Nawábganj Reserve, if constituted as now proposed, will be bounded on the south and east by the boundary of the Basti District and the Ladhena grant. The Fyzabad-Utraula road passes through the western portion. Most of the forest land which adjoins the reserve is in progress of being cleared; hence it may be expected that these 10,913 acres of forest will some day be of very great importance for the supply of the adjoining open country and the station of Fyzabad.

## Present condition.

27. The Rámgarh block has been protected since 1870 against grazing, and since 1875 against fire. When the land was taken over by the Forest Department, all the large trees, with the exception of mohwa (*Bassia latifolia*), had been cut down, and even a number of mohwa trees had been felled for building purposes and for sale. The ground was stocked with grass and with young sál 6 to 10 feet high. On the 31st January 1881, I examined the Rámgarh block, and found the forests on high ground in a very satisfactory condition and fairly stocked with poles, chiefly of sál, averaging 30 feet in height. Under these the ground was covered with dry leaves, and the upper part of the poles was smooth and clean, proving that no fires had occurred for some years.

\* The entire Nawábganj Forest has since been declared a reserved forest under the Act.



## Sal poles not straight.

28. These sál poles, however, though they will be exceedingly useful and valuable, are by no means as straight as those of the northern forests in Oudh, near the boundary of Nepál. They have numerous bends and twists, although they have, as stated, grown up on areas protected from fire. In forests which are subject to annual fires, the irregular shape of the sál poles is justly ascribed to the action of the fire, which kills the terminal shoot and lateral branches, and thus causes the formation of knots and bends in the stem, but in the present case the irregular growth must be ascribed to causes other than the action of fires.

The study of the growth of sál poles in this forest, as well as in other forests situated in the open country at a distance from the foot of the hills, and exposed to the full action of the dry westerly winds of the hot season, seems to lead to the conclusion that the action of these hot westerly winds is, in some respects, similar to that of the annual jungle fires. Frost also in some cases causes a knotty and irregular growth of the sál poles. The soil of the high ground in the Rámgarh Forest is a poor sandy loam, and as it improves by means of fire-protection continued for a long series of years, it may be expected that the growth of the poles will improve likewise. A few large sál trees are left, but these are all forked, crooked, or hollow.

## Mohwa.

29. Besides sál, the chief tree is mohwa, of which there is a large number of all sizes, so much so that in places it is now the principal tree. This tree has been spared because its flowers and seed are exceedingly valuable. The stems of the younger trees have been well drawn up by the sál poles surrounding them, and they are likely to grow up and to form well-shaped timber. The remarkable point in this matter is that there are hardly any mohwa seedlings on the ground, while the forests are full of young growth of sál. It is a question for future study whether mohwa seedlings do not come up on account of the shade, or whether the seed is so completely picked that none remains. The flowers of this tree, it will be remembered, fall to the ground after the young seed has commenced to form, so that the collection of the flowers in no way interferes with the development of the seed.

## Other trees.

30. Of the other kinds of trees, the following were noted:—

<i>Dillenia aurea</i>	...	...	...	...	Aggai.
<i>Saccopetalum tomentosum</i>	...	...	...	...	Karri.
<i>Flacourtia sapida</i>	...	..	...	..	Kantái.
<i>Ægle Marmelos</i>	...	...	...	...	Bél.
<i>Zizyphus xylopyra</i>	...	...	...	...	Chitaina.
<i>Schleichera tryuga</i>	...	...	...	...	Kusum (scarce).
<i>Semecarpus Anacardium</i>	...	..	...	..	Bhula.
<i>Buchanania latifolia</i>	...	...	..	...	Perua.
<i>Bauhinia purpurea</i>	...	...	...	...	Koilára.
<i>Bauhinia Vahlíi</i>	...	...	...	...	Mauhrain.
<i>Cassia Fistula</i>	...	..	...	...	Urga.
<i>Terminalia bellerica</i>	...	...	...	...	Bahera.
<i>Terminalia Chebula</i>	...	...	...	...	Harra.
<i>Terminalia tomentosa</i>	...	...	...	...	Asna.
<i>Anogeissus latifolia</i>	...	...	..	...	Banjhi.
<i>Eugenia operculata</i>	...	...	...	...	Dugdúia (scarce).
<i>Lagerstræmia parviflora</i>	...	...	...	...	Assid.
<i>Randia dumetorum</i>	...	...	...	...	Maini.
<i>Randia uliginosa</i>	...	...	...	...	Peirar.
<i>Diospyros Melanoxyton</i>	..	..	...	...	Tendu.
<i>Holarrhena antidysenterica</i>	...	...	...	...	Dudhi.
<i>Stereospermum suaveolens</i>	...	...	...	...	Párar.
<i>Phyllanthus Emblica</i>	...	...	...	...	Aonla.

## Stretches of low ground.

31. The high ground in the Rámgarh grant alternates with large open depressions stocked with grass, the chief of which is in the centre of the forest, stretching from north-west to south-east. Some of these depressions were at one time under rice cultivation, but the ground is poor. The grass on these lands sells readily for thatching, and it is taken out by the people of the

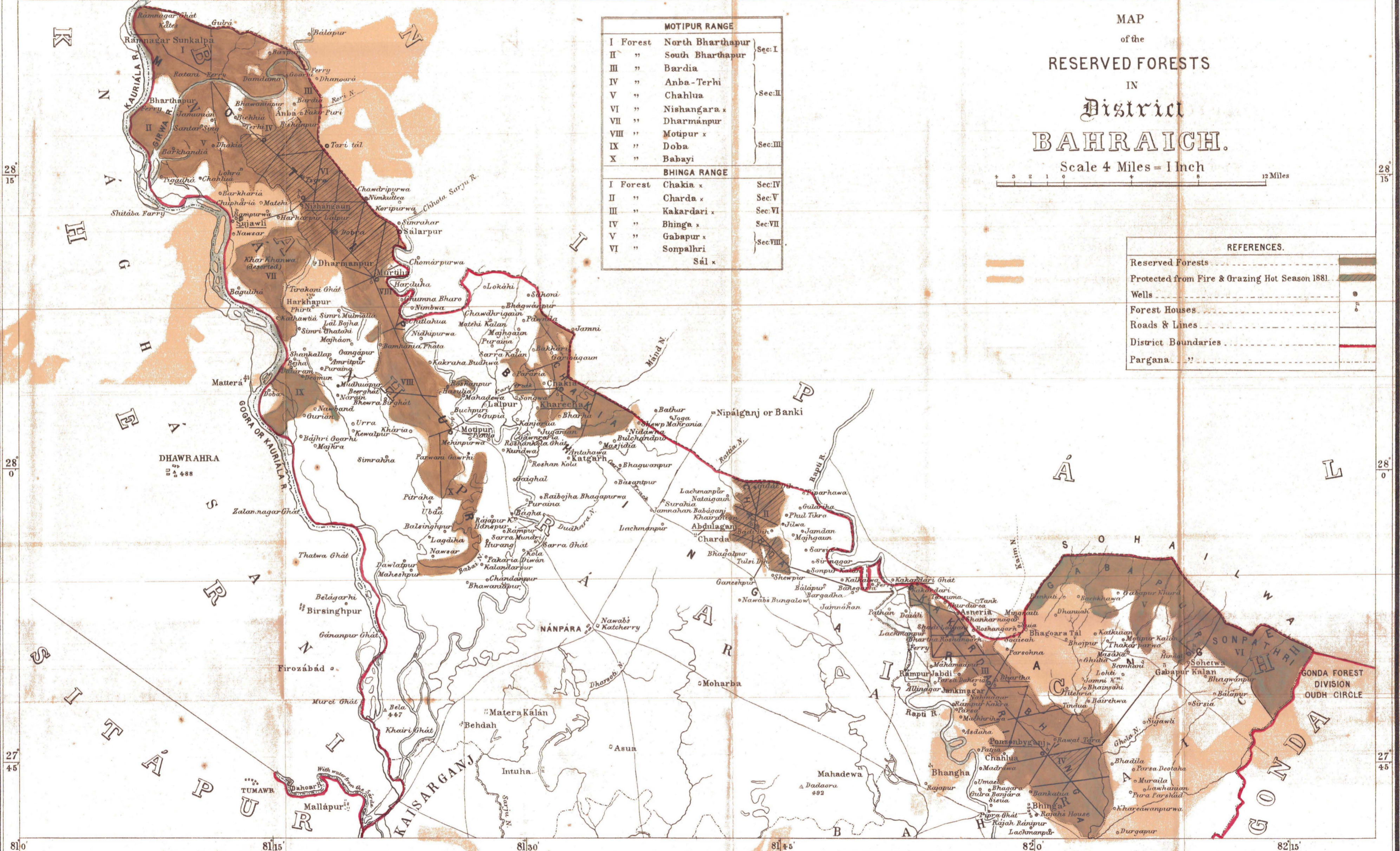
81°0' 81°15' 81°30' 81°45' 82°0' 82°15'

MAP  
of the  
**RESERVED FORESTS**  
IN  
**District**  
**BAHRAICH.**

Scale 4 Miles = 1 Inch  
12 Miles

MOTIPUR RANGE		
I Forest	North Bharthapur	} Sec: I
II "	South Bharthapur	
III "	Bardia	
IV "	Anba - Terhi	} Sec: II
V "	Chahlua	
VI "	Nishangara x	
VII "	Dharmampur	} Sec: III
VIII "	Motipur x	
IX "	Doba	
X "	Babayi	
BHINGA RANGE		
I Forest	Chakia x	Sec: IV
II "	Charda x	Sec: V
III "	Kakardari x	Sec: VI
IV "	Bhinga x	Sec: VII
V "	Gabapur x	} Sec: VIII
VI "	Sonpalhri	
	Sál x	

REFERENCES.	
Reserved Forests	
Protected from Fire & Grazing Hot Season 1881	
Wells	
Forest Houses	
Roads & Lines	
District Boundaries	
Pargana	



Drawn in the Forest Survey office, by Babu Jadunath Nath from a Map supplied by Captain Wood Conservator of Forests Oudh Circle N.W.P. Sep: 1881.

Photocircographed at the Office of the Trigonometrical Branch, Survey of India, Dehra Dun, September 1881.

surrounding villages at the rate of two annas a two-bullock cart-load. I am inclined to think that some of these low lands might with advantage be let out for rice cultivation, due precaution being taken to guard against injury to the forest.

#### Fire-protection.

32. No difficulty has as yet been experienced in fire-protection. The River Chamnai forms a good protection, and on the west and south sides there are private forests, which are burnt annually.

The cutting of lines has just been commenced, and it is intended to cover the whole forest with a network of roads to facilitate fire conservancy and the export of wood and other produce, as has been done in the other forests of Oudh.

The success in fire-protection is chiefly due to the energy of the Forest Guard, Hingun Khan, who has been in charge of the Rámgarh Forest ever since 1870.

#### Revenue and Expenditure.

33. The revenue of the forest during the last three years has been as follows:—

Items.						1877-78.	1878-79.	1879-80.
						Rs. A. P.	Rs. A. P.	Rs. A. P.
Mohwa	...	...	...	...	...	83 12 0	7 12 10	65 11 6
Thatching grass	...	...	...	...	...	63 0 0	83 12 0	168 8 10
Miscellaneous	...	...	...	...	...	11 6 0	16 11 11	89 9 6
				Total	...	158 2 0	108 4 9	323 13 9

The expenditure, besides the pay of the two Forest Guards, which aggregates Rs. 16 per mensem, has hitherto been insignificant. As regards future treatment, protection is the chief thing wanted; and until the forests on the surrounding land have been completely cleared, I do not recommend any extensive fellings. Efforts must be made to increase the revenue from mohwa and thatching grass as much as possible.

## CHAPTER III.

### FORESTS IN THE BAHRAICH DISTRICT.

#### Bhinga Forest.

34. Between the Rápti River on the west and the Kaim Nala, a tributary of the Rápti, on the east, is a stretch of high ground occupied by the Bhinga Forest, the area of which is about 60 square miles. It extends southward, from the Nepal boundary at Kakardari, for a length of 18 miles, with an average width of 3 to 4 miles. This forest is chiefly stocked with sál and tendu, and its peculiar character is that the soil at the surface is generally a stiff loam, and that it is and has been, for many years past, overrun by an immense number of cattle.

## Absence of grass.

35. Except in the blocks now closed against grazing, there is, as a rule, no grass on the ground, and there is hardly any young growth of *sál*. The contrast between the Bhinga Forest and that belonging to Kapurthala near Ikauna\* is very remarkable. In the latter there is a good crop of grass on the ground, and, where the soil is suitable, there is a fair growth of *sál*.

At first sight it is difficult to understand that the grazing should be heavier in the Bhinga than in the Ikauna Forest, the latter being situated more in the open country. The difference is this, that the Ikauna Forest is surrounded by extensive areas of waste land which are used for pasture, while the Bhinga Forest is the only grazing ground available in the immediate vicinity of the villages adjoining it. On the north-east side, between it and the forests at the foot of the Nepál Hills, is a belt of open country, about six miles wide, almost entirely occupied by rice fields. The villages in this tract have no pasture during the rains, and send most of their cattle into the Bhinga Forest. Again, the villages between it and the Rápti River have no grazing grounds except the forest. A remarkable feature regarding the pasture in the Bhinga Forest is that it is frequented during the rains by large herds of cattle. In Khairigarh, Motipur, and other forests of Oudh, the large gaddies are so bad that the cattle have to leave at the first burst of the monsoon. In Bhinga, on the other hand, the forest swarms with cattle during the monsoon.

No young growth of *Sal*.

36. The almost entire absence of young growth of *sál* in this forest is very remarkable. It was noticed as far back as 1864, and must, to a great extent, be attributed to the large number of cattle in this forest during the rains, which eat the seed as it falls in June and destroy any seedlings which may have come up. Besides this, the surface is converted into a hard pan by the tread of the cattle during the rains, and thus the seed, though it may germinate, has no chance of succeeding. Besides the action of the cattle, the nature of the surface soil has doubtless considerable influence in preventing the free growth of young *sál*. Colonel W. Stenhouse, while officiating as Conservator in Oudh, wrote as follows in his Report (paragraph 44) for 1870-71:—

“ It may here be added that it may be necessary, in the lower levels of the section, to cut drains into the Rápti River to prevent the lodgment of water, which is so fatal to the young plants, and to scatter *sál* seed in other places where seed-bearing trees are deficient in number.”

## Soil.

37. The soil of the Bhinga Forest, down to a considerable depth, consists of alternate strata of sand and clay, but near the surface clay or stiff loam predominates. These successive strata were clearly seen in a well recently excavated in the northern part of the forest, at the junction of three roads near the village of Jabdi Kót. The following were the strata noticed from the surface to the bottom of the well:—

Strata.	Thickness of stratum.
Clay and stiff loam	9 feet.
Clay and kankar	3 „
Sand	2 „
Clay and kankar	1 foot 6 inches
Sand	3 feet.
Clay, with a little sand	2 „
Clay and kankar	3 „
Clay	5 „
Sand	4 „ 6 inches.
Total depth of well	33 feet.

\* See Appendix III.

This instance may be taken as a fair specimen of the strata of the subsoil in this forest. It shows that near the surface, and to a depth of 28 feet 6 inches, clay predominates. The only exception is to be found in the vicinity of the Kaim Nala, where large masses of sand have been deposited on the surface. In the rest of the forest the surface soil, as already stated, is a stiff loam, and in this respect it presents a marked contrast to most of the other sál forests of northern Oudh and the Pilibhit District, the soil of which is generally a light sandy loam.

Present stock of Sal.

38. The present stock of old and middle-aged sál in the Bhing Forest, which is considerable, can only have come up at a time when the country in its immediate vicinity was uninhabited, or much less inhabited than it is at present. Since the country has become quiet—that is, chiefly since the Mutiny—cultivation has increased very rapidly, and large areas of grass land in the vicinity of the forest have been brought under the plough within the last ten years.

The sál tree, although it prefers a lighter soil, will nevertheless grow well on stiff loam like that of the Bhing Forest. Under existing circumstances, however, other kinds, which prefer a soil of this description and are less exposed to injury by cattle, get the upper hand. The sál in the Bhing Forest attains a good height.

The following measurements of average-sized trees were taken on the 6th February, north of the closed Ponsonbyganj block :—

No.	Girth.	Total height.
1	3 feet 3 inches ... ..	69 feet.
2	3 " 4 " ... ..	79 "
3	4 " 4 " ... ..	74 "
4	5 " 4 " ... ..	82 "
5	6 " 3 " ... ..	76 "
6	8 " 6 " ... ..	106 " 35 feet to first branch.
7	10 " ... ..	81 "

and near the Asneria closed block, on the 8th February :—

No.	Girth.	Height.
1	3 feet 10 inches .. ...	83 feet.
2	4 " 7 " ... ..	87 "
3	5 " 8 " ... ..	98 "
4	8 " 5 " ... ..	101 "

\* It is, perhaps, not unreasonable to connect the formation of the belts of high ground on which the Oudh sál forests are found with the action of the great rivers which enter this forest belt from the Nepal Himalaya. The Pilibhit, Púranpur, and Bhira Forests, which occupy the long belt of high ground south-west of the Sárda River, as well as that portion of the Trans-Sárda Forests which is on the high ground opposite, are deposits chiefly of sand brought down by the Sárda River, in ages long gone by, from the crystalline rocks of the inner hills. In this part of its course, the Sárda River now chiefly deposits sand, and the clay deposits of that river are not met with until we reach a point much further down its course. The high ground on which the greater part of the Motipur Forest stands probably owes its origin to the action of the Kautiála River in ages gone by. The Rápti, on the other hand, takes its rise in the outer ranges of the Himalaya; its flow is less rapid, and although during the rains the river chiefly deposits sand along its banks, yet it is not unreasonable to suppose that, at the time when the high ground was formed on which the Bhing Forest stands, the deposits of the river in this part of its course chiefly consisted of clay and fine stiff loam.

## Other trees.

39. The tree which thrives best in this forest is the tendu, and of this kind considerable masses of young growth and of poles and trees of all sizes are found. *Asaina* (*Terminalia tomentosa*), which generally affects a stiff soil, provided it is sufficiently moist, is much less common than tendu, probably because the cattle eat young *asaina* greedily, while they do not touch the harder leaf of the tendu. The following is a list of the other chief trees and shrubs noticed in this forest besides *sál*, tendu, and *asaina* :—

<i>Miliusa velutinà</i>	...	...	...	Kariota.
<i>Saccopetalum tomentosum</i>	...	...	..	Karri.
<i>Egle Marmelos</i>	.	..	...	Bél.
<i>Schleichera trijuga</i>	...	...	..	Kusum.
<i>Buchanania latifolia</i>	..	..	.	Perua.
<i>Ougeinia dalbergioides</i>	...	...	.	Pánar.
<i>Dalbergia lanceolaria</i>	.	...	...	Sundra.
<i>Bauhinia racemosa</i>	...	...	...	Amlosa.
<i>Terminalia bellerica</i>	...	...	..	Bahera.
<i>Terminalia Chebula</i>	.	...	..	Harra.
<i>Eugenia operculata</i>	...	.	...	Gurguri.
<i>Casearia tomentosa</i>	.	.	.	Bheri.
<i>Nauclea cordifolia</i>	...	...	...	Tkui or Haldu.
<i>Gardenia turgida</i>	..	...	.	Karhar.
<i>Bassia latifolia</i>	...	.	...	Mohwa.
<i>Holarrhena antidysenterica</i>	...	...	...	Dudhi.
<i>Ulmus integrifolia</i>	..	..	..	Bissainda.
<i>Mallotus phillippinensis</i>	..	...	.	Rohni.

## Thorny scrub.

40. A remarkable feature in this forest is the large area covered with dense thorny scrub on the outskirts, particularly in the south-westerly portion. The chief kinds composing this scrub are the following :—

<i>Zizyphus Enoplia</i>	...	...	...	...	Sitáina.
<i>Zizyphus xylopyra</i>	...	...	...	...	Makua.
<i>Randia dumetorum</i>	...	...	...	...	Maini.
<i>Carissa diffusa</i>	...	...	...	...	Karaunda.

## Protection.

41. With few exceptions, no fires have passed through the Bhinga Forest since 1873. This very satisfactory result has been accomplished by steady vigilance. At the same time it must be remembered that fire-protection has been greatly facilitated by the absence of all grass, which is eaten by the cattle as fast as it springs up. Three blocks have been enclosed and protected against cattle, *viz.*, first (since 1875), the *Kakardari* block, opposite the rest-house of the same name, measuring 22 acres ; second (since 1872), *Asneria*, opposite the village of the same name in the northern portion of the forest, area 5 acres ; third (since 1872), the *Ponsonbyganj* block, a triangular piece between three roads, area 1,440 acres. Two of these blocks are well stocked with grass. In the *Asneria* block cattle got in, and there is less grass than in the others.

## Ponsonbyganj block.

42. In the *Ponsonbyganj* block all large *sál* trees were cut before it was enclosed, and the number of *sál* seedlings that have sprung up is very small indeed. I did not find any, but I am assured that there are some. Instead of *sál*, an immense amount of rohni has come up in dense thickets covering a large portion of the area. In places there is a young growth of dudhi, *asaina*, and tendu. The scarcity of *sál* seedlings in this block must no doubt chiefly

be ascribed to the absence of seed; for although sál seed is carried some distance by high winds, it does not generally travel very far. The soil under the grass, moreover, is hard and baked; but though under the thickets of rohni the soil is loose and soft, yet seedlings are scarce. To some extent the absence of seedlings may be ascribed to the scarcity of sál seed in the spring of 1880. There was, however, a good seed year in the spring of 1878, and there was a good crop in the spring of 1879, but the seed ripened early, before the regular rains set in. It should also be mentioned that this block was fired by shikáris in April 1875, and that the grass and much of the young growth which had sprung up were destroyed. In order to secure the protection from fire of this enclosed block, a strip of grass 100 feet wide is cut every year about February and March. The people who cut it are permitted, in lieu of receiving payment, to take half the grass, the other half being sold on account of Government. In dry years, when grass outside the forest is scarce, the grass in this block finds a ready sale; and I am inclined to suggest, by way of experiment, that in such years the whole of the grass in this block be cut and sold. Some damage, it is true, may be done to sál seedlings in cutting this grass, but some revenue will be realized, and, if a good seed year occurs, the cutting of the grass may facilitate the springing up of seedlings. I have also considered whether it would be advisable to cut down the brushwood of rohni, but am inclined to think it is useful in keeping the ground more loose, and thus facilitating the growing up of young sál, which, it must be remembered, bears a considerable amount of shade.

#### Sal seedlings in Asneria and Kakardari blocks.

43. In the Asneria block 133 sál seedlings were counted, which is at the rate of 27 seedlings per acre; while outside, going from the block to the main road, on a length of 4,356 feet and a breadth of 50 feet, only 15 seedlings were counted, which is at the rate of three seedlings per acre. This shows at a glance the beneficial effect of closing where, as in this case, there is no lack of seed-bearing trees. The seedlings would have been more numerous had the cattle not got into the Asneria block. In the Kakardari block it was not practicable to count seedlings in the whole of the block, but they were counted along the two principal pathways: total length 2,440 feet, with a width of 50 feet, the result being 118 seedlings on an area of 2.8 acres, or 42 seedlings per acre. All the seedlings in these two blocks, which were dug out and examined, had grown up since the blocks were first closed, but nevertheless they had not done so without check. Each plant was found to consist of a thick root, with numerous marks at the top of the shoots which had sprung up annually and which had successively been killed. The appearance of these plants was similar to that of plants which have grown up under the influence of annual fires. But in the present case the cause which cut back the annual shoot must be sought either in the drought of the hot season, or in the excess of water on the ground during the monsoon. This is a subject, the study of which is recommended to all young Forest Officers in Oudh.

#### Extension of closed blocks.

44. As regards the future treatment of the Bhingá Forest, the right thing to do doubtless is to enclose as large a portion as possible and to prevent the ingress of cattle; but the experience gained in the Ponsonbyganj closed block clearly shews that in the areas thus proposed to be closed all seed-bearing trees must be left standing. The most convenient arrangement will be to work gradually towards closing a continuous belt comprising the inner portion of the forest, leaving open for pasture about half the forest, which should as far as practicable be situated on the outer edge. Wherever possible such portions of the forest as are well stocked and have good soil should be included in the closed block. This may necessitate the closing here and there of areas situated near the edge, larger areas of inferior soil being excluded in other places. Thus I would strongly advocate the inclusion of the forest situated east of the Ponsonbyganj closed block. Nevertheless, many valuable pieces of forest, especially on the north-eastern edge, must remain unprotected, as it is not possible to close them; but this cannot be helped.

As already stated, the closing of this area should be gradual, and, as far as practicable, the expenses of fencing should be covered by the sale of the grass, which will generally spring up in abundance during the second season after fencing. The Ponsonbyganj block is on one side bounded by a deep ditch, but experience has shown that, though very effective when new, it is apt to silt up, and requires constant repairs, and the best plan will probably be to surround the closed block with a strong fence of thorns.

**Revenue.**

45. The revenue of the Bhinga Forest has been as follows :—

Items.	1877-78.			1878-79.			1879-80.		
	Rs.	A.	P.	Rs.	A.	P.	Rs.	A.	P.
Timber ... ..	21,000	8	0	6,568	5	6	7,568	8	0
Grazing .. ..	3,342	4	1	2,879	7	6	2,019	12	6
Mohwa ... ..	850	0	0	1,000	0	0	1,860	0	0
Miscellaneous ... ..	1,430	9	2	624	1	0	537	12	6
Total ...	26,623	5	3	11,071	14	0	11,986	1	0

**Free permits.**

46. In this, as in the other Oudh Forests, the practice is that persons who desire to remove thorns from the forests for fencing get a free permit from the Forest Guard. Thorns are used very extensively by the adjoining villages in order to fence their fields, and in many places along the south-western boundary I saw that a substantial and continuous thorn fence had been made along the outer boundary of the forest. The removal of thorns from the forest for this purpose should by all means be encouraged, and I would suggest that during three months—July, August, and September—the inhabitants of the neighbouring villages should be allowed to collect thorns without permit. Persons who take out firewood also obtain permission from the Forest Guard, but instead of a permit a mark is stamped with paint on their leg or arm. Permission to remove unreserved wood is also granted by the Forest Guard.

**Permits on payment.**

47. So far regarding free permits. Permits on payment are granted in the following manner.

In the case of sal and other reserved woods, the permits for dry timber are granted by the Ranger, while the Divisional Officer reserves to himself or to his Assistant the right of giving permission for green sal or other reserved timber. Here, as in the other Oudh Forests, the grazing dues are paid according to two sets of rates—a lower rate for the villages within three miles from the forest, *viz.*, 2 annas a cow or bullock and 6 annas a buffalo; while the villages beyond that limit pay 3 annas for a cow or bullock and 9 annas for a buffalo. Permits are granted by an official specially appointed, the grazing Mohurrir. This official is always on the move, counting the cattle in the villages outside. The average annual number of cattle grazed in this forest during the last three years is reported to have been as follows :—

Cows and bullocks ... ..	12,048
Buffaloes ... ..	1,901
Sheep and goats ... ..	1,403

Herdsmen are not permitted to lop trees, or even to take axes into the forest; and upon the whole I found this rule well observed. I only came across one instance of extensive lopping, and this was in the southernmost part of the forest, near the village of Gokal Sing. Here almost all the large trees had been lopped. This practice must have continued for several months, and it is not



satisfactory that it was permitted to continue so long. I was informed that the offenders had been punished. A glance at that part of the forest where loppings have taken place shews that the herdsmen who did it, although for the moment they got a supply of leaves for their cattle, in reality injured the pasture in the forest by diminishing the cover overhead. Wherever there are no trees, the thicket of thorns covers the ground and becomes quite impassable, thus diminishing the area accessible to cattle.

. Revenue how to be increased.

48. Every effort should be made to increase the revenue from this forest. A considerable quantity of dry sál is brought out annually, in the shape of round logs and scantlings (thunis and thamras) adzed out of hollow logs. The logs are paid for according to quality, at rates from 2 to 12 annas a cubic foot; while the scantlings are sold at the rate of 8 annas to one rupee each, according to size. Green trees have of late years been only given for dug-outs. These are hollowed out in the forest, and paid for at the rate of Rs. 20 a boat.

The export of dry timber is greatly stimulated by the excellent system of roads and wells by which these forests have been made accessible. I examined several depôts on the edge of the forest, where the dry logs and boats are collected to be finally stamped and paid for. Yet there is a great quantity of dry and half-dead timber which might be utilized.

. Cuttings proposed.

49. In order to increase the revenue of this forest, it will be necessary to commence the cutting of green sál. The demand for timber east of the Rápti is considerable. It is expected that all trees selected for cutting can be sold standing, and the local officers entertain the hope, which seems rather sanguine, that they will realize a net revenue of Rs. 35 per tree on an average. These cuttings, however, must be made with great caution, and no green sál trees should be cut in those portions of the forest which it is intended to include within the closed block. Practically, then, the cutting of green sál will be limited to the outskirts of the forest, which will be used chiefly as grazing grounds.

. Growing stock of different classes.

50. On several lines which were cut in the years 1869, 1870, and 1871 in these forests, to a width of 50 and in one case of 100 feet, the trees recorded in the following statement were found growing on an aggregate area of 219.5 acres:—

*Valuation surveys, Bhing Forest (Kakardari and Bhing beats).*

AREA SURVEYED	Acres.	SAL.				TENDU, ASAINA, AND OTHER RESERVED TREES.				MISCELLANEOUS.				REMARKS.
		Over 6 feet in girth.	Over 4½ feet in girth.	Over 3 feet in girth.	Over 1½ feet in girth.	Over 6 feet in girth.	Over 4½ feet in girth.	Over 3 feet in girth.	Over 1½ feet in girth.	Over 6 feet in girth.	Over 4½ feet in girth.	Over 3 feet in girth.	Over 1½ feet in girth.	
Survey 1869. cross line Bhartha to Shabpur—100 feet wide ..	37.09	132	86	80	35	11	34	250	440	11	45	686	1,661	Oudh Forest Report for 1869-70, Appendix No. VI.
2. Survey 1870: line up middle and lines about Ponsoyganj—50 feet wide ..	143.51	420	235	330	451	42	86	534	1,909	45	118	793	3,435	Oudh Forest Report for 1870-71, Appendix No. III.
3. Survey 1871 line from Banpur to ray line No 1, Section 7—50 feet wide ...	13.77	53	32	9	12	7	2	40	144	5	2	18	65	Oudh Forest Report for 1871-72, Appendix No. IV.
Cross line (1871)—50 feet wide. ..	25.13	121	64	6	25	19	12	158	654	3	7	38	169	Oudh Forest Report for 1871-72, Appendix No. IV.
Total ...	219.50	726	417	425	523	79	134	932	3,147	64	172	1,535	5,330	

The results per acre are as follows :—

	Sál.	Other reserved trees.	Miscellaneous.	Total.
First class, in girth 6 feet and upwards ... ..	3 30	0 36	0 29	3 95
Second " " 4 " 6 inches to 6 feet ... ..	1 89	0 61	0 78	3 28
Third " " 3 " to 4 feet 6 inches ... ..	1 93	4 47	6 99	13 39
Fourth " " 1 foot 6 inches to 3 feet ... ..	2 38	14 33	24 28	40 99
Total ... ..	9 50	19 77	32 34	61 61

A comparison of these figures with the results of the valuation surveys made between 1867 and 1871 in the Trans-Sárda Forests, in the Kheri District, as recorded in paragraph 20 of the Report containing suggestions regarding the working of those forests, of August 1880, shows a marked difference, in so far that in the Bhinga Forest the number of sál trees of the three smaller classes is insignificant. The figures placed side by side with those of the Kheri Forests are as follows :—

	Kheri.	Bhinga.
Sál above 6 feet in girth ... ..	3 64	3 30
„ between 18 inches and 6 feet in girth ... ..	46 87	6 20
	50 51	9 50

When the closed block at Ponsonbyganj (1,440 acres) was cut over in 1872, about 2,500 full-sized sál trees of inferior quality, including 115 which were made into boats and a few second class trees, were cut, which amounts to 1.7 trees per acre. These are the only data which we at present have regarding the quantity of timber standing in the Bhinga Forest, but for the present purpose these data are sufficient.

The cuttings of Sal outside the closed block must be spread over forty years.

51. Broadly speaking, the case stands thus :—we propose to close about 30 square miles, and in this area no sál should be cut until the ground has become fairly stocked with young growth. Having regard to the indifferent reproduction in the small blocks hitherto closed, we are not justified in expecting that this will be effected in less than forty years. Hence the cutting of green sál trees outside the closed block must be spread over the next forty years.

Quantity which may be cut annually.

52. The area outside the closed block in which it is proposed to make these cuttings may be estimated at 20,000 acres, and about one-half of this area, along the north-eastern edge, may be assumed to contain two first class sál trees per acre; whereas the other half, along the south-western edge, is not likely to contain more than one tree per acre. This number of first class trees in the outer part of the forest must be regarded merely as a rough guess, which is put forth in the present case more by way of illustration of what is meant than as an estimate of the growing stock standing on the ground.

Of the 30,000 trees assumed to stand on the area which it is proposed not to close, a small proportion only can be expected to be sound. Of the 2,500 trees cut in 1872, only about 6 per cent. were sound. The sole object of the cuttings here proposed is to produce revenue. The removal of the trees will not improve the prospects of reproduction, nor will it improve the pasture in the forest. On the contrary, if the trees are removed, the soil will dry up and

( 40 )

will produce less grass and more thorns. Under these circumstances, it is not advisable to cut more than a portion of these trees. If we limit the annual cuttings outside the blocks proposed to be closed to 300 trees, an aggregate of 12,000 trees will have been cut during the next forty years; and considering that there is a number (though limited) of smaller trees on the ground which will attain the dimensions of first class trees during this period, it may be hoped that the cuttings here proposed will not have the effect of materially injuring the pasture in this part of the forest. These 300 trees proposed to be cut annually cannot of course be all perfectly sound; but revenue being the chief object, the best trees only should be selected for cutting.

#### Arrangement of cuttings.

53. The question now arises, whether these 300 trees should be cut in regular order, beginning at one end of the forest and taking in hand one block a year? If it were possible to divide the forest into compartments, containing each about the same quantity of mature timber, such regular cuttings would be the proper thing; but, under the circumstances of the case, no material advantage would be gained by insisting on a regular order of cuttings, and it is better to make the greatest amount of revenue which these operations are capable of yielding by permitting the purchasers to select the trees to be cut in the most favourable localities. As a matter of course, the present practice must be maintained, under which the selection of all green sál trees requires the approval of the Divisional Officer or his Assistant. The greatest care will have to be taken in determining the boundaries of the area proposed to be included within the closed block, so that no green sál trees may be cut within the limit of that area.

The yield of 300 sál trees a year will, as a matter of course, be supplemented by dry timber and trees half-dead, which should be cut as hitherto.

#### Cutting of other kinds.

54. As regards the cutting of other trees, not sál, I am inclined to advocate that this be limited to the areas proposed to be closed. On the outskirts proposed chiefly to be utilized as pasture lands, it will probably be better to spare such trees. Limited quantities of tendu, asaina, and assid might be cut within the closed area, if there is sufficient demand for these woods to ensure remunerative prices.

#### Lines, rest-houses, and wells.

55. This forest is traversed by an excellent system of lines, aggregating 70 miles, nearly all of which are well used by cart traffic. A large number of additional lines will have to be cut in order to define the interior block proposed to be closed. There are at present two rest-houses—one at Ponsonbyganj, the other at Kakardari. The former, I advocate, should be abandoned, and a good two-storied forest house, on the Belraien (Kheri) pattern, built instead on the outer western edge of the forest, on rising ground in the vicinity of the village of Chahlua. Ponsonbyganj is too confined, and a station in the open country on the edge of the forest, with free circulation of air, will be found to be more healthy than a place in the heart of the forest. Numerous excellent wells have been made in the Bhing Forest.

#### Establishment.

56. The Bhing Forest is at present divided into two beats, each in charge of a Forest Guard assisted by an under Forest Guard; and, as already explained, these men have, in addition to their protective duties, the granting of permits for thorns, firewood, and woods of unreserved kinds, free to the people living within three miles of the forest, and on payment to those living beyond this limit. The result of this arrangement is that the head Forest Guards are too much tied down to their head-quarters, and hence protection is not as it ought to be. Yet arrangements must be made for the people to get permits without loss of time, and it may be desirable, as an experiment, to carry

at a suggestion made by the Conservator to employ a separate Forester for this purpose. If this is done, an arrangement should be made to keep the protective officers informed of all permits issued. I am inclined to think that it would be well to adopt the practice of requiring that each of the numerous cleared lines be gone over by the protective officer at least once a month, and to establish a rule that an abstract report of his visits be submitted to the Divisional Officer once a month.

#### Periodical measurement of standing trees.

57. On the 6th February I examined the quarter-acre plot demarcated in this forest for the periodical measurement of standing sal trees. The total number of trees marked and measured on this plot is 21. The plot is surrounded by a ditch and will be included within the block proposed to be closed. With regard to this plot, and those demarcated for the same purpose in other parts of the Oudh Forests, I have the following suggestions to offer. *First*, the plots should be made larger, and their number should be less. In the case of very small areas, the existence or absence of any large trees standing outside and near the edge must necessarily affect the rate of growth of the trees measured. One lot of two acres in each division is sufficient, and plots of this size may be expected to give reliable results. If the measurement of all trees on two acres gives too much work, we must be satisfied with one-acre plots, but there should not be more than one in each division. No trees should, as a rule, be cut within a belt about 100 feet wide all round the plot. *Second*, the plots should, as much as possible, be selected in a part of the forest where the cover is complete and where there is no grass on the ground. Suppressed and decaying trees, which are not likely to form part of the final crop, should be thinned out before the measurements commence. *Third*, all trees left standing should be marked and measured, whether sal or not; and the measurements should be made at a point where the stem is not slanting, but perfectly straight, round, and regularly shaped, whether that point is at five feet from the ground or at a greater or less height.

The seasons selected by Captain Wood for measurement, about the 1st June, 1st December, and 1st March, are suitable; but, eventually, I think that it will suffice to take measurements twice a year, in December and May.

#### Charda and Chakia Forests.

58. The Charda and Chakia Forests are situated near the Nepal frontier, on the high ground which intervenes between the Rapti and Chhota Sarju Rivers and which extends south as far as Ikauna and the head-waters of the Kohani River.

#### Charda: area, soil, and growing stock.

59. The Charda Forest is five miles long from north to south, and on an average two miles broad; hence its approximate area is 10 square miles. It is traversed by the Rapti Nala and the ground in the northern portion is undulating. The surface soil varies extremely; in some places it is light and sandy, and in others it is a hard and stiff loam. The greater part of the forest is stocked with a dense mass of poles of sal, with a sprinkling of old trees of asaina, tikui, bahera, and, near the Nepal border, a small proportion of dhaura. With the exception of a few old crooked trees, all mature sal was cut out before the forest was taken over by the Forest Department. On low ground there is a number of large trees of sirsa (*Albizzia procera*). On the outskirts, particularly on the south side, there is a large proportion of thorny scrub consisting of the same species as in the Bhinga Forest. Under the sal poles the ground is often covered with a dense underwood of kasranta (*Flemingia strobilifera*), which is extensively used for basket work.

#### Growth of Sal.

60. The most remarkable feature in the forest is the great difference in the growth of sal in the different portions. In some places, particularly in

the north-east corner, the condition of sál is all that could be desired, and the following poles, which were measured near the Sátia line, may be taken as average specimens :—

		Garth.	Height.
No. 1	...	2 feet 5 inches	... 57 feet.
„ 2	...	2 „ 11 „	... 61 „

In other places, again, there is a large number of poles with dry tops, and also of mature trees which have died. I noticed this particularly south of Abdullaganj, and over a large area near the north-western edge of the forest, where the soil was poor and dry. No satisfactory explanation can be given of this remarkable diversity in the growth of sál. In paragraph 48 of the Forest Report for 1878-79, Captain Wood states that “In Charada numbers of saplings have died, owing, I fancy, to the drought and to the poverty of the soil.” The largest number of dead poles and trees was noticed on poor soil near the western edge, where the forest was imperfectly stocked. It is not impossible that the dry westerly winds of the hot weather may have an injurious effect on isolated sál trees. The phenomenon has only been noticed during the last two years, which were seasons of exceptional drought. It should, however, be mentioned that scattered dead sál poles and trees are likewise found in the north-east part of the forest, surrounded by vigorously growing young plants of sál.

#### Protection.

61. The Charada Forest has not been burnt since 1872. Except on the north, where it adjoins the forests in Nepal, it is surrounded by cultivation, which facilitates protection; but a special establishment for fire-protection is entertained during from three to five months, costing about Rs. 100 a month. The progress made by the sál poles since my visit in 1875 has been very remarkable in this forest; they were then on an average from 10 to 15 feet high, and now they are between 30 and 50 feet high.

#### Lines; rest-houses; proposals for closing the forest.

62. The Charada Forest is traversed by an excellent system of 15-foot lines, most of which are used for cart traffic. A rest-house of the old pattern is in the centre of the forest at Abdullaganj. When the time comes for erecting a more permanent building, another site should be selected, not inside the forest, but on the outskirts, which will doubtless be found more healthy than any site in the forest. As in the other Oudh Forests, so in Charada, the cattle of the neighbouring villages graze in the forest on payment of the lower or privileged rates; but Government has not undertaken the obligation to keep the whole forest open for this purpose: hence the Conservator proposes to close against pasture a block of triangular shape in the northern portion, measuring about two square miles. This block includes tracts in which large numbers of young and old trees have died as above described. Experience must show whether the closing of the forest, and the improvement of the vegetation which will result therefrom, will remedy this evil.

#### Revenue.

63. The revenue of the Charada Forest has been as follows :—

Items.	1877-78.			1878-79.			1879-80.		
	Rs.	As.	P.	Rs.	As.	P.	Rs.	As.	P.
Timber	278	4	3	388	8	10	400	0	0
Grazing	1,145	9	3	779	0	0	461	3	3
Mohwa	45	0	0	...			40	0	0
Miscellaneous	157	14	8	71	2	5	49	6	6
Total	1,626	12	2	1,238	11	3	950	9	9

**Chakia: area, soil, and growing stock.**

64. The Chakia Forest forms an irregular belt along the Nepál boundary, about 9 miles long, and the area is given at about 20 square miles. The soil is generally a light sandy loam at the surface, overlying strata of grey micaceous sand. At the Kharecha rest-house a well was lately dug 40 feet deep, of which the upper 35 feet consisted of a light sandy loam, while the lower 5 feet consisted of grey sand, composed of grains of quartz, felspar, and black hornblende, with a great deal of mica. The forest is traversed by the Mánd River, east of which is mixed forest with patches of good sál poles, while west of the river it is well stocked with dense masses of tall and straight poles of sál.

The following average specimens of sál were measured:—

No.	Girth.	Height.
1 ..	2 feet	55 feet
2 ...	2 „ 4½ inches...	66 „
3 ...	2 „ 8 „	63 „
4 ...	2 „ 9 „	68½ „
5 ...	2 „ 11 „	70 „
6 ...	3 „	68 „
7 ...	3 „	76 „
Asaina	4 „ 6 inches	91 „

As regards other trees, it may be noticed that karri (*Saccopetalum tomentosum*) attains a considerable size. A specimen 3 feet 6½ inches in girth was measured.

**Protection: rest-house.**

65. Up to date fires have gone through the Chakia Forest every year, but, as the grass is very light, they do not do much damage. The forest is traversed by a system of roads, which, however, is not completed; and a rest-house is being built in the centre, called Kharecha.

**Revenue.**

66. The revenue has been as follows:—

Items.	1877-78.			1878-79.			1879-80.		
	Rs.	As.	P.	Rs.	As.	P.	Rs.	As.	P.
Timber	1,091	6	3	1,729	4	1	1,698	7	11
Grazing	674	7	0	662	14	3	650	0	0
Mohwa	45	0	0	20	2	6	40	0	0
Miscellaneous	167	4	8	399	7	2	16	0	0
Total	1,978	1	11	2,811	12	0	2,404	7	11

**Motipur Forest.**

67. The area of the Motipur Forest is estimated at 127 square miles, and the forest is divided into ten blocks. Blocks I and II (North and South Bharthapur) occupy the greater part of the land between the Kauriála and Girwa Rivers; it is all low ground, with light sandy soil, stocked with grass and scattered khair and sissou trees. Block VI (Nishángára) and Block VIII (Motipur) occupy the high ground between the Kauriála and Chhota Sarju Rivers. Blocks III, IV, V, VII, and IX comprise stretches of low land, stocked chiefly with grass, and with scattered khair and sissou trees in the vicinity of the Girwa and Kauriála Rivers. Block X (Babayi), situated on low ground south of Motipur, consists chiefly of dhák and scrub. The most valuable portion is the stretch of high ground which extends from Anba Bishanpur to Ainchua village—a length of 24 miles, with an average width of 2½ miles. The northern and western edges of this high land are broken by ravines, and have generally poor and light soil; and on the east it is bounded partly by the Nepál boundary line, partly by the Chhota Sarju and by the land of several villages situated on the banks of that river. On the western boundary, also, there are stretches of low land, not stocked with sál, which are chiefly used as grazing grounds. The sál forest may be estimated to cover an area of 60 square miles, while the forest on low ground, which is chiefly used for pasture, may be estimated at 67 square miles.

**Lines and rest-houses.**

68. The forest on the high ground, or damár, is traversed by a system of roads and cleared lines, of which those running across the breadth of the forest, from Nepál to the villages between the forest and the Kauriála River, are much used for cart traffic. There are also some lines through the Bharthapur block, and one from Kataniaghat to Sujauli, which runs through low-lying forest south of the Girwa River. There is a two-storied rest-house at Nishángára, and two smaller houses at Sujauli, on the bank of the Kauriála River, and at Motipur.

**Grass lands with Khair and Sissoo.**

69. The forests on low ground have yielded revenue chiefly from the following sources :—

- (1.) Grazing.
- (2.) Thatching grass sold to villagers beyond three miles from the forest.
- (3.) Sissoo wood sold to the Ordnance Department.
- (4.) Dues paid by the manufacturers of katha or catechu.

During the last ten years the Ordnance Department has purchased about 20,000 sissoo trees, for which it has paid upwards of Rs. 3,00,000, at the rate of 8 annas per cubic foot. It must, however, be borne in mind that the Ordnance Department picked out the very best trees, and that they left the inferior trees standing. These sissoo trees were chiefly cut in the north-western corner of the Bharthapur block, near the Kauriála River; in the Chahlua block, east of the Girwa River; and in the Dharmánpur block, south-west of the village of the same name. Licenses to manufacture catechu were granted for the first time in 1879-80, payment being levied at the rate of 8 annas for each (earthen) pot, which realized an aggregate revenue of Rs. 1,700.

The operations of the Ordnance Department in this division have been completed, and they have transferred their machinery to the east bank of the Sánda River, in pargana Púradpur, Pilibhit District, on the border of Nepál. Although the best trees have been cut out, there is still a large quantity of sissoo timber standing on the ground, and it is desirable to cut a certain quantity annually, which may either be sold standing to purchasers or sent down to Bahramghat.

**Limit of Khair and Sissoo trees to be cut annually.**

70. It is a matter for serious consideration how much sissoo timber may be cut a year, and how many licenses for the manufacture of catechu may be granted. Regarding the growing stock of khair and sissoo on this area, no definite information is available. The area which contains khair and sissoo trees may be estimated at 50 square miles. Assuming that this area bears on an average two mature khair trees per acre, there would be upwards of 64,000 khair trees on the ground. Sissoo is less abundant, and of the 67 square miles of low ground certainly not more than 30 will, on examination, be found to be stocked with sissoo. Assuming that one mature sissoo tree is found on two acres, there would only be 9,600 mature sissoo trees on this area. These figures are a mere assumption, and are not based upon any definite data (which are not available). The sole object in mentioning them is to make it clear that the supply of neither khair or sissoo is inexhaustible in this area, and that some limit must be fixed for cuttings. Obviously, there are two modes of fixing such a limit—either the whole area of these forests on low ground should be divided into a certain number of compartments, one compartment being assigned to the operations of each year; or a maximum number of sissoo and khair trees should be fixed to be felled annually. The former plan is, I fear, impracticable at present. The manufacturers of catechu have the forests in the whole Nepál Tarái to choose from, and we cannot expect them to confine these operations in the British forests to the compartment which may be assigned to them every year. In the same way with sissoo, we must at present consult the convenience of purchasers.

**Natural reproduction of Khair and Sissoo.**

71. Under existing circumstances, the reproduction of these two trees in the area in question is almost *nil*. The whole ground is traversed by jungle-fires during the hot season, which, owing to the high grass in most places, are exceedingly fierce and consume all young growth which might otherwise spring up. A large portion of the khair and sissoo growing on these lowlands is probably water-sown, the seed having been brought down and deposited on fresh-formed banks. As long as this state of things—that is, the absence of reproduction of these two trees—continues, all data are wanting to determine the proportion of the area which may annually be opened for cutting, or the maximum number of trees to be cut.

**Establishment of closed blocks.**

72. The most important measure, therefore, to take in this respect will be to protect certain suitable areas against cattle and fire, in the hope that this will have the effect of encouraging the growth of young khair and sissoo. As a commencement, I propose that the forest in the north-west corner, on the Nepál boundary, which intervenes between the Kauriála River and the Angarghat Nala, be closed against cattle and fire, and that, if this measure proves successful in increasing natural reproduction, other blocks similarly favourable be closed and strictly protected. At the present time several proposals are under consideration for exchanging portions of the low-lying ground against other plots, so that no further plans regarding the areas which may be closed can be made. As soon, however, as proposals can be framed for plots to be closed, it should be arranged that no trees should be felled in these areas. The circumstances here are analogous to what they are in the Bhinga Forest; hence the proposals submitted are of a similar nature.

**Cuttings to be made only outside the closed blocks.**

73. No trees should be cut in the blocks closed and proposed to be closed, but outside these a certain revenue should be made annually by the cutting of sissoo timber, and by granting licenses for the manufacture of catechu. As regards sissoo nothing can be done but, as a temporary measure, to agree upon an arbitrary limit, which may be fixed at 200 trees a year. As regards catechu, before any limit can be fixed, data must first be collected to show how many trees are required to keep a certain number of pots at work during the season. This should be ascertained by carefully watching the operations of the khairahas, or catechu boilers, and until these data have been collected nothing can be done except to be cautious in granting licenses.

**Experimental plantations of Khair and Sissoo.**

74. In connection with this subject, it should be mentioned that an experimental plantation of khair and sissoo has been established on the low ground immediately below the rest-house of Nishángára. The seeds were sown in nurseries in March and April 1880, and the plants were transplanted about the 15th June of the same year, when they were about two feet high. They have been planted 15 feet apart either way, and the grass has been cleared along lines 15 feet apart. Of khair a large proportion has succeeded. Of sissoo many of the transplants have died. The difficulty in these sissoo plantations in the forests is that the place is too unhealthy during the rains. A number of coolies employed on this work died in June 1880, and transplants made between November and May do not succeed unless watered. Experiments have been made to facilitate the transplanting, by sowing the seed in pots made in two longitudinal pieces; but even with these the plants, except in very moist ground, only succeed if watered. Sowing *in situ* has not succeeded, because it is not practicable to provide for the weeding during the rains. The cultivation of khair and sissoo in the Oudh Forests is still a matter of experiment, which as yet has given no definite results. Whatever new experiments may be made, I strongly advocate that the sowing or planting be made in continuous lines close together within the lines, the expense being diminished by having the lines 30 feet apart. If the ground



in these lines could be so dug up as to prevent the growth of grass and weeds during the first year, thick sowing *in situ* continuously in the lines may be found to succeed. An experiment should be made in running trenches along the lines, and sowing the seed on the soil thrown up alongside the trenches.

#### Forest on high ground.

75. Turning now to the forest on the damár, or high ground, the first thing that should be noticed is that the soil of the sál forest north of the village of Motipur is, upon the whole, far superior to the soil in the Bhingá or Charda Forest. Broadly speaking, it may be said that along the Nepál boundary line, from the Girwa to the Chhota Sarju River, there is a belt, varying in width, in which the surface soil is a stiff loam, and on this belt *asaina* preponderates; but that further south, on both sides of the main longitudinal line, the soil is a light sandy loam, with a great deal of vegetable mould in all depressions, and here sál is the dominant tree.

#### Growth of Sal excellent.

76. This part of the forest is stocked throughout with an excellent growth of sál, where the trees in many places stand so thick that there is no underwood on the ground. The following may be quoted as average-sized trees:—

No.	Girth.	Height.
1	... 2 feet 9 inches ...	... 82 feet.
2	... 2 „ 11 „ ...	... 77 „
3	... 3 „ ...	... 77 „
4	... 3 „ 1 „ ...	... 77 „
5	... 3 „ 3 „ ...	... 98 „
6	... 3 „ 8 „ ...	... 77 „
7	... 3 „ 8 „ ...	... 89 „
8	... 3 „ 11 „ ...	... 96 „
9	... 3 „ 11 „ ...	... 99 „
10	... 6 „ 2 „ ...	... 108 „ (66 ft. to the first branch).
Asaina	... 6 „ 11 „ ...	... 101 „

If these figures are compared with those of the Bhingá Forest, they show at a glance the great superiority of the sál in Motipur.

#### Two different classes of Sal forest.

77. Speaking broadly, it may be said that in this part of the forest a difference may be noted. South of the Motipur line, where the timber was nearer the market and was therefore cut at an earlier date, there are large and continuous belts completely stocked with poles, mostly from 2 feet to 3 feet 6 inches in girth. North of that line, in the Nishángára block, the trees are larger and scattered, the ground being covered with saplings and here and there with groups of younger poles. In this portion trees of other kinds are more numerous than in the forests south of the Motipur line. The last mentioned pole forests are almost pure sál, and the trees of other kinds are not numerous.

#### Future treatment of the pole forests.

78. It must be understood that this magnificent forest of poles and young trees varies considerably in the age and size of the trees, and that they will not all attain maturity at the same time. Nor would it be of any practical value at present to speculate upon the mode of cutting to be followed in this forest after the trees have attained maturity; but it may not be out of place here to mention that the study of the young growth which has sprung up on the Nepál boundary line throws some light upon this question, and is likely to be exceedingly useful when the time comes for determining the system of cutting to be followed in this forest. I examined a consider-

able portion of the Nepál boundary line, between the Chhota Sarju and the Girwa Rivers: the most instructive portion is between the Tára Tál well and the Rori Nala. Here the line was completely cleared in 1873 to a width of 100 feet. On both sides there is high forest of sál and asaina, and in most places the line has become stocked with a dense young forest of coppice-shoots of these two kinds, which were on an average 15 to 20 feet high, with individual saplings rising to 35 feet. It must not, however, be supposed that this young forest is uniformly good throughout the entire length of the line. There are stretches of poor soil where scarcely any young growth has come up, and the same inequality may be noticed on other sections of this boundary line, or on other lines which have been cleared to the same width. Where, however, the soil is favourable, the young growth is complete; and a similar result was noticed along a portion of the Nepál boundary line, on the northern edge of the Charda Forest. The good growth in these places must, in my opinion, be ascribed chiefly to the circumstance that the high forest on both sides of a narrow cleared line affords partial shade and keeps the ground moist. Analogous to this case is the excellent success which has attended the planting up of narrow belts completely cleared of trees and bamboos in the Tharawaddy Forests in Burma. The young growth on the boundary line here mentioned consists of numerous other trees besides sál and asaina. Some of these, such as aonla (*Phyllanthus Emblica*) and pata (*Kydia calycina*), overtop the sál and asaina at present; but the further study of this young forest will doubtless show that the kinds named, and others which do not attain any large size, will gradually be suppressed and that the final forest will consist of sál and asaina, with a small mixture of asidha (*Lagerstræmia parviflora*), bahera, pardah (*Stereospermum suaveolens*), kumbhi (*Careya arborea*), and a few other trees which attain a large size. It is not impossible that, when the present forest of large poles in Motipur attains maturity, some such system of clearances in narrow belts will be adopted in order to secure complete reproduction.

The boundary line north of the Charda Forest, which is remarkably well stocked with young sál, runs east and west, while that section of the Motipur boundary here described runs north and south. These two instances would seem to show that the direction of the cleared lines is of no great importance as regards reproduction of the forest, but this is a matter which requires further investigation. The careful study of the gradual changes which will take place on this and similar cleared lines is recommended to the attention of all Forest Officers in Oudh.

#### Closed blocks.

79. An area of 20 square miles, extending from the Jalia-Sálarpur line to the Chapharia-Rámpurwa line, a length of 8 miles with a width of two to three miles, has been closed against cattle and fires since 1878, and in this area the young growth has become exceedingly thick; but it must be remembered that along the north-eastern edge of this belt, where the soil is stiffer, the saplings and thickets of asaina have the upper hand. This closed area it is proposed to increase by adding to it a considerable portion of the forest between it and the edge of the high ground, so as to bring up the total area to 32 square miles. The forest outside the closed area is grazed over and is overrun by fires almost every year. There is, however, this difference between Motipur and most of the other sál forests in the Oudh Circle, that in Motipur the sál forest consists of a continuous belt of high ground, with no stretches of low ground stocked with grass. The continuity of the sál forest is only interrupted here and there by stretches of more open forest, not sál, formerly occupied by villages; but there are no extensive grass lands as in the Khairigarh and other Oudh Forests. Under the trees also there is much less grass than in Khairigarh and a much denser young growth. However, in a large portion of the Motipur Forest the fires are only partial and do very little damage, and fire-protection is much easier than in the other sál forests. It follows that, where there is marketable timber, cuttings may be made much more freely in Motipur than in the other forests.

## Cutting of green Sal.

80. A limited number of green sál trees are cut annually for boats, and a few hundred are sold standing for timber (200 in 1879-80 and 250 in 1880-81). These cuttings may be continued, and, owing to the absence of grass, it will be possible to cut both in the protected block and outside its limits. No plan of cuttings is called for at present, and it will suffice to say that only 300 trees annually may be sold standing to purchasers, provided they are selected by the Divisional Officer or his Assistant. As already stated, the compact pole forests had better be left alone until they attain maturity. These cuttings may be expected to yield a revenue of Rs. 9,000 a year. Hollow trees for boats may be cut in addition. It will be well to be content with these cuttings on a moderate scale during, say, the next five years, after which period it is probable that the cuttings in this forest can be increased very considerably.

## Cutting of Asaina proposed.

81. It has already been mentioned that in a large portion of this forest, *viz.*, that which adjoins the Nepál boundary line, asaina has the upper hand over sál. The larger trees are more numerous, and the ground is covered with a preponderating young growth of asaina. One of the most important works of improvement in this part of the forest will be to cut out as many asaina trees as possible, in order to give a better chance to sál. An attempt should be made to induce purchasers to come up and cut asaina trees, by fixing a very low rate, say one anna a cubic foot, or even less. In this case the object is not so much to produce revenue as to clear the way for sál. Permission might also be given to remove poles of asaina without payment.

## Cutting of trees of other kinds.

82. There is a considerable number of large trees of tikui and bahera in this forest, and though there is no risk of these kinds getting the upper hand, as is the case with asaina, still it would be well to open a market for them, if possible. They might be sold (standing) at low rates without limit.

It was very satisfactory to notice the large number of kusum trees of all sizes in this forest. These trees, when mature, will have a very great value, as the kusum in the other forests in the vicinity has been cut out. Not being gregarious, the kusum in no way interferes with the sál; and the stock of these trees should not be touched at present, except that a few old trees may, from time to time, be sold.

## Bamboos.

83. South of the gauri or cattle station of Murtiha is a considerable extent of bamboo forest, about 500 acres in area. The bamboo is of the thorny kind (*Bambusa arundinacea*). Some of the clumps seeded last year, and the remainder have seeded in 1881. After seeding, all stems will die down, and no revenue can for some time be derived from this source. At present, this part of the forest is burnt annually, and is overrun by cattle. If this continues, there is no chance of any young growth of the bamboo coming up. In order to prevent the bamboo and this source of revenue being destroyed, it will be necessary to include the area stocked by the old bamboos in the closed block. This area should also be surrounded by a fence of thorns. These bamboos have, I was told, hitherto yielded a revenue of about Rs. 100 a year. It will probably not be necessary to fence in the other portions of the block proposed to be closed. On the south-west edge of the high ground there are some clumps of the common Indian bamboo (*Dendrocalamus strictus*). I was told that they had all seeded, and as far as possible they ought to be included in the closed block, to prevent the extermination of the bamboo. The outer range of hills in Nepál is said to be well stocked with the common Indian bamboo, but it is very remarkable that there is no export into Oudh of bamboos from Nepál, either by the Kauriála or Chhota Sarju Rivers. Nevertheless, if the supply of bamboos in the Motipur Forests could be increased, they would doubtless find a ready market.

## Revenue.

84. The revenue of the Motipur Forest during the last three years has been as follows:—

Items.	1877-78.			1878-79.			1879-80.		
	Rs.	A.	P.	Rs.	A.	P.	Rs.	A.	P.
Timber ... ..	40,527	7	7	16,826	0	10	11,722	0	1
Grazing ... ..	9,925	15	3	7,359	3	6	7,827	1	9
Mohwa ... ..	109	0	0	15	5	4	135	0	0
Miscellaneous ... ..	1,567	3	5	1,088	0	9	2,393	0	2
Total ... ..	52,129	10	3	25,238	10	5	22,077	2	0

It will be noticed that there has been a great falling off in the revenue from timber, and this is due, as explained above, to the diminished sales of sissou trees to the Ordnance Department. Among the other items bankas or bhaib may be mentioned, which is common on the north-western edge of the high ground.

## Measurement of Sal trees.

85. In this forest I examined the two quarter-acre plots demarcated for the periodical measurement of sal trees. Begging reference to the remarks made in regard to the Bhinga Forest, I would here also suggest that, instead of these two small plots, one plot of at least one acre, and if possible of two acres, be selected and demarcated in the midst of a dense and completely stocked forest of sal poles, if possible without any underwood.

The Motipur Forest is divided into three beats, each in charge of two Forest Guards, namely, the Bharthapur beat (Blocks I and II), the Nishangara beat (Blocks III to VII), and the Motipur beat (Blocks VIII to X). There is also a grazing Mohurrir on the temporary establishment, who has special charge of the grazing revenue.

## Expenditure in the Bahraich Division.

86. The expenditure of the forests in the Bahraich Division, which includes, besides Bhinga, Charda, Chakia, and Motipur, also the Sohelwa Forest, has been as follows during the last three years:—

	1877-78.			1878-79.			1879-80.			Total.		
	Rs.	A.	P.	Rs.	A.	P.	Rs.	A.	P.	Rs.	A.	P.
A.—(1) Collection of revenue ... ..	4,806	15	0	4,643	8	1	2,333	13	3	11,784	4	4
(2) Communications and buildings ... ..	7,622	1	10	13,307	4	6	7,055	6	4	27,984	12	8
(3) Demarcation and improvement .. ..	3,754	2	2	2,888	9	1	3,550	4	6	10,192	15	9
(4) Other items .. ..	2,620	6	8	1,392	8	5	3,902	6	7	7,915	5	8
B.—Regular establishment ... ..	10,341	4	6	12,427	11	7	11,992	2	0	34,761	2	1
Total ... ..	29,144	14	2	34,659	9	8	28,834	0	8	92,638	8	6

In 1878-79 more lines were cut than usual; the Nishangara forest-house was built, and materials for the other forest-houses were collected: hence the larger

outlay on communications and buildings. It will be observed that during the three years noted Rs. 38,000, or considerably more than one-third of the total outlay, was for communications and buildings and improvement of the forests in other respects. This is satisfactory.

**Cattle-grazing in the forests of the Bahraich Division.**

87. The following figures exhibit the number of cattle which grazed in the different parts of the Bahraich Division during 1879-80, together with the estimated area of each forest district:—

Forest District.	Area, in square miles.	Cows and bullocks.	Buffaloes.	Sheep and goats.	Total.
Sohelwa ... ..	40	8,705	1,425	...	10,130
Bhinga ... ..	60	7,350	2,099	1,950	11,399
Charda ... ..	10	4,128	666	...	4,794
Chakia ... ..	20	2,500	200	221	2,921
Motipur ... ..	127	10,000	16,000	4,442	30,442
Total ...	257	32,683	20,390	6,613	59,686

These figures are supposed to be correct, but it is not probable that those entered for Bhinga represent the whole number sent for pasture into that forest. The area of the Bhinga Forest is estimated at 38,400 acres, and it is not likely that the pasture of 11,399 head of cattle could have the effect of clearing so large an area of grass. The average grazing revenue in Bhinga during the last three years has been Rs. 2,747 a year; and if the conclusion is correct that a much larger number of cattle actually graze than is reported, it ought to be possible to rectify the returns and in proportion to increase the revenue derived from grazing.

## CHAPTER IV.

### TRANS-SARDA FORESTS, KHERI DISTRICT.

88. The Trans-Sarda Forests in the Kheri District were gazetted as reserved forests, under section 34 of the Indian Forest Act, on the 28th February 1879.

The first steps towards defining the boundaries of these forests were taken in 1861 and 1862, by Mr. F. Read, then Conservator of Forests in Oudh, Mr. H. J. Sparks, B. C. S., then Assistant Commissioner, and Captain (now Colonel) F. C. Anderson, of the Revenue Survey. Their work related to the sal and sissou forests only which are situated between the Mohán River and the high bank which bounds the high ground or damár on the south-west.

The limits of these sál forests were defined by temporary boundary marks, which have long since disappeared. The forests thus defined were surveyed by Captain Anderson in 1861-62, and drawn on a map, scale 2 miles = 1 inch, which was lithographed in the Surveyor General's Office in March 1864, and a copy of which (in the corner of Captain Wood's Forest Map of Oudh) is appended to the Oudh Forest Report of 1867-68.

In 1867 certain areas outside the sál forests, which had been previously demarcated as grants under the Waste Land Rules, but which had not been disposed of by Government, were transferred to the Forest Department. Subsequently, Mr. John Kavanagh, the Boundary Settlement Officer, was appointed to demarcate the boundaries of the village lands adjoining the forests. Mounds of earth 3 feet high, with a post in the centre, were put up, and ditches, one foot wide and one foot deep, were dug connecting these boundary marks. The present boundaries are those laid down by Mr. Kavanagh.

These reserves are situated in parganáas Paliá, Bhúr, and Khairigarh, and the total area is about 265 square miles, stocked as follows:—sál forests, 146 square miles; sissoo and khair, 23 square miles; miscellaneous, 37 square miles; grass lands, 59 square miles.

#### Forest Rules of 1866.

89. The first rules made for these forests were the Oudh Forest Rules under Act VII of 1865. These rules declare eight\* kinds of trees as reserved, *viz.*, sál, sissoo, tún, ebony, dhao, asaina, khair, and haldu. Rule 7 grants permission to all villagers living in the forests, or within three miles of the Government boundary line, to cut such timber as they may require for their own *boná fide* use for domestic and farming purposes, such timber not being any of the eight reserved woods. By Rule 12 grazing in the forests was prohibited. This last rule, however, has never been strictly enforced. The present state of matters in these as in most other forests of Oudh is, that the inhabitants of villages situated within the forests and within three miles from the boundary are permitted to graze their cattle at lower rates than the people beyond that limit, and that they are permitted to take, without payment, unreserved woods for fuel and for domestic and agricultural purposes, as well as thatching grass.

These are the privileges granted by the Forest Rules, and by subsequent orders passed by the Chief Commissioner prior to 1879. In May 1879 the Government of the North-Western Provinces and Oudh ruled that, over and above these privileges, poles for building purposes of ebony, dhao, and asaina, dead, fallen, or standing sál for ploughs, and sál timber for the construction of wells and bridges, should be given free to the people residing in the privileged villages.

#### Protection.

90. Broadly speaking, it may be said that the cutting of green sál, without permission, has been prohibited since 1859, or for the last twenty-two years. Until 1875 fires passed through the whole of the forests every hot season. Attempts were repeatedly made to protect against fire the blocks where fellings had taken place, and a small area in the immediate vicinity of Dudua, but without success. The first successful attempt to exclude fires over a considerable area was made in 1875, when a block measuring about 15 square miles near Dudua was taken in hand. Of this area a small portion has been successfully protected throughout, while the rest was burnt in the hot season of 1879. Arrangements have now been made to extend the protected block, and the total area taken in hand is estimated to aggregate 65 square miles.

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\* The original rules only declared four reserved trees: dhao, asaina, khair, and haldu were subsequently added.

#### Effect of protection.

91. The effect of the protection of sál and the general protection of the forests since 1859 is manifest throughout the whole area; but there is a vast difference in the character of the forest between those portions through which hitherto the fires have passed every year, and those portions which have been more or less protected since 1875, in the vicinity of Dudua. In the forest which is situated between the high bank and the Sathiana line, and through which no fires have passed since the hot season of 1875, there is a dense undergrowth of young sál, asaina, and other kinds, and, except in a few low places, there is very little grass on the ground. A similar improvement is noticed in other parts of the forest near Dudua which have escaped fire. In the rest of the forests, however, the greater portion of the area is stocked with grass under the trees, except here and there where, owing to good soil, good drainage, and conditions otherwise favourable, thickets of coppice-shoots and saplings have sprung up. Such plots, stocked with a satisfactory young growth of poles and saplings, are found scattered throughout these forests; but they alternate with extensive tracts where the ground is covered with grass under the trees. Indications are, however, not wanting, even in such places where the ground is covered with grass, of improvement. Seedlings of sál and coppice-shoots from old underground roots are not uncommon among the grass, and although, under the action of the annual fires, most of them are cut down to the ground year after year, still some have survived, and their tops stand out from the grass. The general result of the observations made on the present examination of the forests is that no general improvement can be expected without protection from fire. Under existing circumstances, it will be necessary to be satisfied with the area taken in hand this year, but it will doubtless be possible eventually to add a considerable area in the northern corner of the Newalkhar Range, which is bounded by Nepál territory on two sides. For the present we must be satisfied with the 65 square miles now taken in hand.

#### Future treatment.

92. As regards the general management of these forests, the total area may most conveniently be divided into three great classes—*first*, forests protected from fire; *second*, forests not protected from fire, but intended chiefly for the production of timber; *third*, grass lands and inferior forests, intended chiefly to furnish pasture. To the last named class belongs the area south-west of the high bank which bounds the sál forests, as well as the extensive grass lands north-east of the high bank and included within forest limits. In this class may also be reckoned the block stocked with miscellaneous forest along the Mohán, between the sál forest and the Kauriála.

#### Management of pasture lands.

93. Under existing arrangements, the Forest Department must provide pasture for the villages adjoining the forests, and for the people from a distance who have hitherto been accustomed to bring up their cattle for pasture. For this purpose the grass lands and miscellaneous forests mentioned should be utilized as much as possible. Of the whole area of low-lying lands situated south-west of the edge of the damár, only one small tract, on both sides of the Suheli, near Dudua, measuring about 500 acres, has been marked off and protected from fire, in order to promote the reproduction of sissoo; the rest of these lands is burnt every year, and, as they are chiefly required for grazing, there is no objection to utilizing the wood standing on them. Accordingly 573 sissoo trees were felled by the Ordnance Department in 1879-80, and arrangements have been made during the last few years to grant licenses to catch-boilers (khairahas). The revenue realized from these two sources is not yet considerable, but will doubtless increase.

Those grass lands which are included within the protected area, or near its limits, are burnt every year early in the season to facilitate fire-protection, and these lands may likewise be used for pasture under proper precautions to prevent the firing of the forest. I may here mention that it would be a good plan to burn as early in the season as possible those grass lands also which are situated in the forests not included within the protected area. In some cases this may have the effect of protecting against fire some of the adjoining forest tracts.

**Management of the Sal forests: dry timber: hollow trees for canoes.**

94. Regarding the management of the areas stocked with sál, the most important point is to determine the arrangement of fellings:—

As regards dry timber and trees which are half-dead, no special remarks are needed. Such trees, as well as cut and dead timber lying on the ground, are removed from the forests on permits, which are granted up to ten trees in each case by the Forest Ranger and for larger quantities by the Divisional Officer. Large hollow trees also are cut, hollowed out with the aid of fire, and made into canoes. Of these canoes about 150 a year are made for Government, to be used for rafting timber to Bahramghat; others are made by private persons. Trees sold for this purpose are marked by the Forest Guards, and cut and removed by the purchasers on their paying Rs. 25 for each boat. It may here be mentioned that the cost to Government of such a canoe is, for felling, hollowing out, and preparing, Rs. 17; for carting to the ghát on the Suheli River, Rs. 5; for filling in ends and caulking, Rs. 3: total, Rs. 25. These boats are, however, larger than those made ordinarily by purchasers, which sell for Rs. 60 on the Kauriála River.

The revenue realized from dry timber and the cutting of boats during the last three years has been as follows:—

				1877-78.	1878-79.	1879-80.
				Rs.	Rs.	Rs.
Dry timber	...	...	...	14,419	18,407	11,735
Boats	...	...	...	1,445	730	2,255
			Total	15,864	19,137	13,990

The rule is, and this rule should be strictly enforced, that no boats are cut and no dry timber is removed from the forests protected against fire after the 1st March of each year. With this precaution, there is no ground for stopping the collection of dry timber and the cutting of hollow trees for boats in the block marked for fire-protection.

**Selection fellings.**

95. The annual selection fellings have yielded 49,687 trees, chiefly sál, during the twenty years from 1862 to 1881, or, on an average, 2,500 trees a year. During the last two years, however, only 2,000 trees a year have been felled.

It is believed that the working of the saw-mill at Bahramghat, and the sales at the depôt at that place, would give more satisfactory results if the annual quantity of timber sent to that place could be somewhat increased, so as to enable the saw-mill to turn out a larger quantity of scantlings. Two questions, therefore, arise—whether the annual fellings may be increased at the present time, and how they should be arranged to secure the greatest possible revenue and, simultaneously, the improvement of the forest?

**Natural reproduction of Sal on clearings.**

96. In para. 78 of this Report a remarkable instance of complete reproduction of young sál on the Nepál boundary line has been described; and



there are other instances in which compact forests of sál poles have grown up on ground which had been completely or nearly cleared of all large trees. Some instances of good reproduction of sál occur on the lines which were originally cut through these Trans-Sárda Forests to a width, in some cases of 50, in others of 100 feet, while only a road, generally 15 feet wide, in the middle of the line was kept open; but in all these cases the growth of young sál and other trees is unequal. Patches of compact young forest alternate with stretches in which there is no young growth. In the Dehra Dún Forests large areas stocked with compact masses of well grown poles occupy the places from which thirty or more years ago most large trees were cut out, and the same thing has taken place in the Bhira Forests and in part of Motipur. At first sight these instances might seem to justify the conclusion that the most appropriate treatment of the Khairigarh Forest would be to cut down every tree, so as to allow the forest to reproduce itself, as the Dehra Dún, Bhira, and Motipur Forests have done; but side by side with masses of poles in the forests named are extensive stretches in which the old forests have entirely disappeared and have been replaced by grass.

The result of my observations of the development of sál forests in different districts and provinces, extending over a period of eighteen years, is that on good well drained soil, and under otherwise favourable circumstances, young sál forest springs up if fairly protected against cutting, although most large trees had been cut out, and in spite of the annual fires; but that where the conditions are not favourable, the result of such treatment is the destruction of the forest.

Result of clearances at Dudua.

97. A systematic experiment to determine the result of natural reproduction of sál in forests where all large trees are cut down, was made by Captain Wood near Dudua in 1875 and 1876. On 80 acres all large trees, sál and others, were cut, only young vigorous trees, that would hereafter make good timber, and well shaped poles being left standing. In the 40 acres first cut these poles stand single, while in the area cut subsequently they were, at the suggestion of the writer of this Report, left standing in groups. About one-half of this area was successfully protected against fire, while the other half was burnt two years ago. The result of this experiment is exactly the same as what has been noticed on the cleared lines. Where circumstances were favourable, there are masses of poles and saplings; while elsewhere the ground is covered with high grass and with isolated trees of asidha and other kinds. It must, however, be said that, in that portion which has been protected from fire, there is a large number of coppice-shoots and seedlings of sál of all ages on the ground. On several sample plots stocked with grass on this area, the following numbers of young sál were counted :—

Year.	Area.	Number of young sál counted.	Per acre.
March 1879	Square yards.		
	605	306	
	605	483	
	605	437	
	605	303	
	605	292	
	605	209	
	605	255	
	1 Acre	2,647	2,647
February 1881	291 square yards.	93	1,547

There seems every reason to hope that over the greater part of this area the young sál will eventually get the upper hand of the grass.

\* Whenever a complete clearance is made, the first result is always to increase the quantity of grass on the ground, and thus to augment the risk from fires and to increase their violence. This is the chief reason why it is not advisable to clear away all large trees before the grass has been killed out and the ground has become stocked with young growth.

**Principles to be followed in fellings.**

98. The instances quoted of young sál forests which have come up where all large trees have been cut down, show that the growth of young sál is promoted by an abundance of light, but the risk through the increase of grass is too great to render complete clearances advisable. A safer plan certainly is to kill out the grass as much as possible, by increasing the cover overhead and by continued fire-protection; and the excellent results attained in the blocks protected from fire since 1875 clearly point to this course as the most appropriate in these forests.

As soon as any blocks or compartments are completely filled up with young growth, all trees which are marketable should be cut, and other trees which cannot be sold, such as asaina, should be killed by girdling. When this is done, after all grass has been previously killed out, it will be seen that poles of sál and other trees will shoot up with extreme rapidity, while at the same time the absence of grass will make fire-protection easy. In forests thus treated the chief difficulty will be that the proportion of asaina will in most cases be very large. To some extent this may be remedied by permitting villagers in the vicinity of the forests to cut poles of asaina for their requirements, and in some cases it may be an advantage to cut out the asaina poles on account of Government, though this may cause some expense.

The success obtained in the compartments continuously protected since 1875 justifies the expectation that five years hence the cutting out of all large trees in the protected area may commence, and may then be steadily continued throughout the whole area protected from fire.

**Selection fellings to be continued outside the protected area only.**

99. The plan, therefore, which I submit for adoption is this—to continue the present selection fellings outside the area demarcated for protection until fellings can commence in the protected area.

Assuming that the total area of the sál forests, Trans-Sárda, amounts to 150\* square miles, the present proposals are to continue the selection fellings over 90 square miles, and to permit no cuttings of green timber, except for boats, in the 65 square miles of fire-protected forest.

It has been stated above that the selection fellings during the last twenty years have given about 50,000 mature trees; these fellings have extended over the whole northern part of the forest (including a portion of the protected area), or, say, over about 70 square miles. The southern part of the forest outside the area proposed to be protected may be estimated at about 40 square miles; but while 70 square miles in the northern forests have yielded at the rate of 714 trees per square mile, the southern portion, which was worked out much more in former years before it was taken charge of by the Forest Department, cannot be expected to yield more than, say, 350 trees per square mile. Thus the stock of mature trees available for the selection fellings outside the fire-protected area, under these proposals, is not more than 14,000 marketable trees. These estimates are based upon the figures furnished me by the Conservator, and they are necessarily extremely rough and uncertain. The error, however,

\* In his letter to the Government of the North-Western Provinces and Oudh of the 27th August 1879, Captain Wood stated that these forests contained 180 square miles of sál: he now informs me that the area is only 150 square miles.

will be found to be on the safe side; and I am inclined to think that, if these suggestions are agreed to, we may venture upon cutting 2,500 green sál trees per annum, during the next five years, in the southern part of the forest outside the protected area; and that, if such should be required before commencing cuttings in the protected area, a few years' more yield may be taken from the northernmost blocks, where selection fellings were made about ten years ago, and where it may be expected that a number of second class trees have since that time attained to a marketable size. In this manner the needful annual outturn from the forests outside the area protected from fire has been provided for a period of, say, eight years, commencing with 1881-82.

The principles which have hitherto guided the selection fellings should continue to be maintained. These principles are to cut every marketable sál tree in girth above 6 feet, except such as are on the edge of blanks or in places where no other seed-bearing sál trees are near. It is further essential that the fellings should proceed progressively and in due order, no new compartment or other sub-division being taken in hand until the cuttings in that previously worked have been completed. It is most desirable here, as well as in the other forests of Oudh, to dispose of as much timber of asaina and other kinds as possible; and perhaps it will be found practicable to sell a certain quantity of such timber standing in those compartments in which selection fellings are proposed to be made during the next five years, as these compartments are at no great distance from the Kauriála River. The work of the Bahramghat saw-mill cannot, unfortunately, be increased by sending down asaina on Government account. The wood would, I am told, not sell readily in scantling; but, as an experiment, small quantities might be sent down and sold in the log.

#### Cuttings within the protected area.

100. So far regarding the cuttings outside the fire-protected area during the next eight years. Within the protected blocks it will be necessary to work in a different manner. But, as the cuttings within the protected blocks will not take place for some time to come, it will suffice here to submit a few general remarks, which should be kept in view. Outside the protected blocks the selection fellings proposed for the next five years cannot conveniently be regulated by area, but a maximum annual number of trees to be felled must be fixed instead; whereas within the protected blocks it will be necessary to regulate the work chiefly by area. In those compartments in which the young growth has advanced sufficiently to justify this operation, the whole of the marketable trees may be cut out, unless, indeed, it should be deemed advisable to allow groups of vigorous growing trees to stand, in order to increase their size and value. In no case is it likely that entire compartments all over should be completely stocked with young growth, and in such cases the cuttings must entirely be regulated with due regard for the development of the young growth.

As a special case, a limited number of trees may be felled annually in the area protected from fire, in anticipation of the regular fellings here proposed. It appears most desirable to open out an additional market for the timber of the Trans-Sárda Forests in the Sháhjahánpur District; and, in order to bring this about, I suggest that a few hundred pieces of sál timber, of first-class quality, be sent annually across to a depôt to be established at Máiláni or elsewhere near the western edge of the Bhira Forests, to be sold there by periodical auction sales, or otherwise, as may be found most advantageous. I am inclined to believe that this measure will lead to the revenue from the Trans-Sárda Forests being increased considerably, and that it will eventually lead to the re-establishment of a bridge of boats over the Sárda River, between Dudua and Bhira, to facilitate the carriage of the timber which may, as a special case, be cut in the protected block near Dudua.

## Summary descriptive account of compartments.

101. As soon as protection has been fairly established over the whole area here proposed, I would suggest that a summary descriptive account of each compartment be drawn up.

It will be convenient to designate as compartments all plots which are separated from each other by cleared lines, of which a perfect and admirable system has been laid through the whole of these forests. There is no object in making these compartments all of one size, but in some cases, where the compartments are inconveniently large, it will be well to sub-divide them by cutting additional lines. By way of illustration of what is intended, I may mention the seven compartments situated between the main Guarighat line, the high bank, and the Suheli line No. 3. Of these the two which are situated between Dudua and the Domuhani depôt line are much smaller than the others, but this is no disadvantage. These compartments are necessarily artificial subdivisions, and the forest growth in one compartment cannot in all cases be expected to be uniform.

The descriptive account of compartments here suggested should be brief and summary. It should state the area of grass lands and the area stocked with forest, and it should give a brief statement of the young growth, whether complete or otherwise, and of the larger trees over-topping it. In order to form some idea regarding the proportion of trees of different classes, of sál and other kinds, it would be well if linear valuation surveys were made to determine the number of trees of the first three classes, *viz.*, above 6 feet in girth, from 4 feet 6 inches to 6 feet, and from 18 inches to 4 feet 6 inches. It will suffice to count separately (1) sál, (2) asaina, (3) trees of other kinds. At present I do not advocate that complete countings be made of entire compartments, and I do not believe that in these forests any practical object would be gained by counting the trees in small sample areas, as the character of the forests varies too much. The best plan will probably be to make two linear surveys through the whole breadth of each compartment. For this purpose it will suffice to count the trees of the kinds and classes mentioned on a width of 50 feet on either side of the line followed, or on a total width of 100 feet. Two counting officers on an elephant, each furnished with bamboo tallies, as used in Burma, can do all the counting; and the establishment required will consist of the men to chain the length of the line, two men with a 50-foot rope to assist in determining whether any particular tree is within or outside the 100-foot belt, and one man with a shorter rope, six feet long, with knots at 18 inches and 4 feet 6 inches, to assist the counting officers in gauging the girth of the trees counted.

The line should as much as possible be laid straight through the forest, avoiding large grassy plains, which should be deducted from the area of the compartments. Before cuttings are commenced in any compartment, a detailed examination of it should be made, in order to determine whether the forest is fit for the cutting out of the large trees.

It would be an advantage if this summary descriptive account of all protected compartments could be completed before cuttings commence, as this would make it possible to frame a sketch working-plan, and to form some idea regarding the annual yield that may be expected from the area protected against fire.

## Periodical measurement of Sal trees.

102. In order to determine the rate of growth of sál, Captain Wood has in this, as in the other forests of the Oudh Circle, commenced an excellent system of periodical measurements of trees of different sizes. The great difficulty in determining the annual ring in the wood of sál, makes these periodical measurements a necessity; and if the system initiated by Captain Wood is steadily continued, it will probably, within the next five years, give results sufficiently reliable to be used in framing a preliminary working-plan

of these forests. These measurements were commenced early in May 1880, and the mean increase in girth, within the six months between that date and the beginning of December, has been as follows:—

25 trees near Dudua, standing more or less isolated, in girth between 3½ feet and 6½ feet, gave a mean increase in girth of 1·48 inches.

Sample plot No. 1, area ¼ acre, 24 trees, in girth between 1½ feet and 5½ feet, gave a mean increase in girth of 0·86 inches.

Sample plot No. 2, area ¼ acre, 20 trees, in girth between 1½ feet and 7 feet, gave a mean increase in girth of 0·94 inches.

Sample plot No. 3, area ¼ acre, 32 trees, in girth between 1½ feet and 6½ feet, gave a mean increase in girth of 0·64 inches.

Sample plot No. 4, area ¼ acre, 35 trees, in girth between 1½ feet and 3½ feet, gave a mean increase in girth of 0·91 inches.

In order to ascertain the increase during the dry season and the monsoon, it is intended, here as in the other forests, to make measurements in future about the 1st June, 1st December, and 1st March. Besides the general remarks submitted in regard to the sample plots in Bhinga and Motipur, I have only to suggest, in the present case, that a larger number of trees on the partially cleared ground near Dudua be measured, including some of the larger sizes, and that, instead of the four quarter-acre plots, one plot of two acres be selected in a locality as completely stocked with trees as possible. On this two-acre plot all suppressed trees, and others not likely to form part of the final crop, should be thinned out, and all the remaining trees, whether sal or other kinds, should be measured. The advantages of selecting one larger block are obvious, the chief being that the disturbing influence of blanks, or large trees standing outside near the edge of the plot, is eliminated. If arranged in the manner here indicated, these measurements will not only give the increasing girth of individual trees, but will also furnish some data for estimating the annual production of timber per acre; and eventually these plots may be used to ascertain the accelerating effect of heavy thinnings upon the growth of the remaining trees.

#### Revenue and Expenditure.

103. The revenue and expenditure on account of the Khairigarh Forests cannot be completely stated, as the sales of the timber extracted on account of Government appear in the accounts of the Bahramghat Division. The following figures, therefore, do not give a correct view of the financial results:—

#### Revenue.

Items.	1877-78.	1878-79.	1879-80.
	Rs.	Rs.	Rs.
Sale of Sissoo ... ..	174	150	140
Canoes ... ..	1,445	730	2,255
Dry timber ... ..	14,419	18,407	11,735
Depôt „ ... ..	8,122	4,648	29,906
Dead „ ... ..	100	195	304
Catechu ... ..	...	...	3,665
Grazing ... ..	12,738	11,359	15,502
Other item ... ..	2,324	1,823	2,512
Total ... ..	39,322	37,312	66,019

*Expenditure.*

Items.	1877-78.	1878-79.	1879-80.
	Rs.	Rs.	Rs.
Timber expenses ... ..	41,376	56,297	55,342
Other revenue charges ... ..	777	852	882
Live and dead stock ... ..	5,899	5,185	5,264
Communications and buildings ... ..	10,536	8,023	12,472
Demarcation and improvement ... ..	2,125	3,803	3,171
Miscellaneous charges .. ..	848	529	480
Establishment „ ... ..	17,045	19,677	19,376
Total ...	78,606	94,371	96,987

**Local establishment and cost of protection from fire.**

104. The present Trans-Sárda Forests are divided into two ranges, the Northern or Newalkhar Range, and the Southern or Khairigarh Range, each in charge of a Forest Ranger. Each range is divided into four beats, each beat being in charge of two Forest Guards.

To assist in fire-protection, additional men are entertained, and the number hitherto employed for this purpose on the Dudua home block has been as follows:—

1 Darogah, at Rs. 20 per mensem, for 5 months.
1 Jemadar, at „ 10 „ for 5 „
44 Watchers, at „ 5 „ for 5 „
14 „ at „ 4 „ for 5 „

The total cost of the fire conservancy establishment for the last three years has been—

	Rs.
1877-78 ... ..	1,033
1878-79 ... ..	1,968
1879-80 ... ..	2,721

**CHAPTER V.****BHIRA AND PILIBHIT FORESTS.**

105. West of the high bank which runs parallel with the Sárda River extends a long stretch of high ground stocked chiefly with sál. The northern part, an extensive sál forest, is situated in the Tarái District, where it is known as the Bilheri Forest, and in pargana Púranpur of the Pilibhit District; while the southern part, commonly known as the Bhira Forest, is in pargana Bhúr of the Kheri District in Oudh.

The forests of the Pilibhít District consist of two belts, like the arms of a horse-shoe, enclosing a belt of open country, from 12 to 18 miles wide, in which are situated the large villages of Mádho Tándá and Púranpur.

The forests of pargana Púranpur occupy the inside of the western branch, as well as the top and eastern branch, of the horse-shoe; while the forests of pargana Pilibhít occupy the west side of the western branch, being separated from those of Púranpur by the Mála swamp. The Bhira Forests are a continuation of the Púranpur Forests. The area of the Government forests west of the Sárda River in the Pilibhít and Kheri Districts is as follows:—

						Acres.
Pilibhít	{	Pargana Pilibhít	...	...	...	29,434
		" Púranpur	...	...	...	65,361
Kheri	{	" Bhúr	...	...	...	90,051
		" Mahamdi	...	...	...	7,840
Total						192,686

In charge of the Forest Department are also a few blocks of waste land in the Hardoi District, chiefly stocked with dhák (*Butea frondosa*) and thorns.

#### Open glades with stunted Sál.

106. Of the total forest area in Pilibhít and Kheri, by far the greater portion is stocked with sál, but there are also extensive stretches of grass land and open glades of stunted sál. These open glades, with grass and stunted sál, are a feature peculiar to the sál forests in Pilibhít and Kheri west of the Sárda River. I have not noticed them east of the Sárda. At the time of our visit in February, they presented a peculiar appearance—the dark brown leaves of the sál, burnt by the frost, standing out from the dry grass, mingled with the foliage of the yellowish-green dwarf date-palm, which is exceedingly common in such places. After the rains, before the night frosts of January have set in, the bright green of the sál leaves gives these glades a very pleasing appearance, and at that time they look like promising saplings, likely to grow up into a most valuable forest.

These sál shoots are killed down to the ground by the frost of every successive year, and the fires of the hot season, which have hitherto occurred regularly, sweep away both the dry grass and whatever may have been left of the young sál coppice. The underground roots, however, survive and send forth fresh coppice-shoots during March and April, which continue to grow for nine months, until the next frost cuts them down. Where the soil is at all good these coppice-shoots frequently attain a sufficient size to resist the frost, but on poor sandy soil the shoots of one season are only 4 to 5 feet long, and are therefore cut down by the night frosts of winter. These glades, which, as observed, form a characteristic feature of these forests, are always found on poor sandy soil, occupying stretches both of high and of low ground. Where fire conservancy has commenced there is no doubt that the soil will gradually improve by the decay of grass and leaves, and it may be confidently expected that then the coppice-shoots of spring will attain a sufficient height in one season to raise their tops above the frost level. The gnarled underground root-stocks, which send forth the coppice-shoots year after year, are of great age. They attain a large size and a remarkably irregular shape, but are generally hollow.

#### Forests in the Kheri District known as the Bhira Grants.

107. As regards past history and treatment in future, the forests may be conveniently divided into three portions, *viz.*, those of the Kheri District and those of the Púranpur and Pilibhít parganas of the Pilibhít District.

The forests in the Kheri District west of the Sárda, which are generally known as the Bhira Grants, were granted under the Waste Land Rules of 1860,

and were subsequently resumed, either because the grantees failed to clear the proportion of the land which had been stipulated, or because they failed to pay the revenue for which they were liable.

The grantees had possession of these lands without any obligation to provide the people of the neighbouring villages with wood, grass, or other forest produce, or to permit their cattle to graze in the forests. The lands were transferred to the Forest Department, after having been resumed, between the years 1870 and 1875, and they were held free of all forest rights or privileges, no produce of any kind being removed without payment.\* In June 1879 the Government of the North-Western Provinces and Oudh directed that all villages situated within three miles of the boundary of these grants should receive free, for their own requirements, wood (not of the reserved kinds), grass, and other forest produce. The grantees had been under the obligation of paying road and other cesses on account of their grants, and, when passing the orders adverted to, the Government directed that no cesses should be paid on account of those grants which had been transferred to the Forest Department, in consideration of their providing forest produce free to the adjoining villages.

**Proposed exchange of certain lands.**

108. Two exchanges of land have been proposed to be made, in order to consolidate the forest property in these districts, but they had not been finally sanctioned at the time of my visit.

Five blocks in the Hardoi District, aggregating 3,160 acres, and two blocks in the Kheri District, measuring 1,128 acres—total 4,288 acres—in exchange for two pieces of sál forest, the one situated at the southern end of the Barauncha Forest, and the other (part of Allenganj) situated in the most northerly corner of the Kheri District, on the border of the Pilibhít District, aggregating 4,206 acres; and 2,618 acres of grass land near the Sárda, east of the villages of Kamp and Kishanpur, against 2,939 acres of sál forest adjoining Allenganj and generally known as Grant Harripur. These exchanges, if effected, will much facilitate the organization and consolidation of these forests.

**Boundaries how defined.**

109. The boundaries in these forests are marked by the old masonry pillars by which the grants were originally demarcated. A shallow ditch, 12" × 6", was dug from pillar to pillar, but these ditches have, where the soil is sandy, become obliterated. A commencement has now been made to mark the boundaries in a more permanent manner by a ditch 3' × 3', and this has been completed over a length of 21 miles on the western side. The forest boundaries adjoin cultivated land on the east side, south of Bhira. In all other places the forests are surrounded by private forest lands, the property of grantees or of zamindars in the districts of Kheri and Sháhjahánpur.

**Protection.**

110. These forests have now been protected against miscellaneous cutting during a period of from six to eleven years. In the extensive stretches of poor sandy soil, which occupies a large portion of the area, no great improvement is noticeable, but wherever the soil is good the forests have filled up, and in many places there is a considerable stock of well grown sál poles on the ground. The forest has been well protected against indiscriminate cutting since it was taken charge of by the Forest Department. The annual fires have, however, swept through it, with the exception of those plots in which the forest growth had become so thick as to kill the grass. Instances are the Katayia block, north of Kishanpur, the forest south of that village, and the forest east of the Ul outside the fire-protected block.

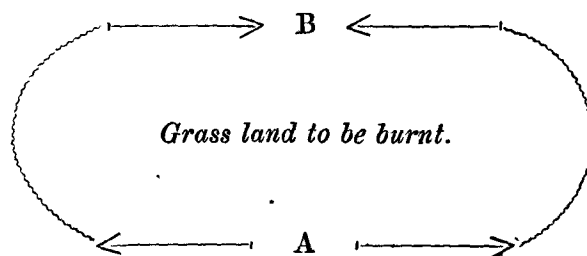
\* In 1871, when Colonel Stenhouse was officiating as Conservator, he attempted to introduce a system of commutation for the villages in the vicinity of the forest, each household paying one rupee per annum for the right of providing themselves with forest produce for their own requirements. This plan, however, was only partially carried out.



## Fire conservancy.

111. The first special measures to exclude fires were taken in 1878, and the forest south-east of Mádha was protected during the hot season of that year. The protected block has been extended gradually every year, and the area proposed to be protected during the hot season of 1881 may be estimated to measure 21,000 acres. This block is bounded on the east by the wide stretch of grass land through which the Ul River runs, and extends westward to the open country near Mailáni and the high road from Kukra to Mailáni. Protection is effected chiefly by burning the whole of the forest outside the boundary, and by setting fire to all enclosures of grass land in the reserved block and on its edge. In carrying out this latter operation great care has to be taken. Two consecutive seasons are seldom similar, and require entirely different treatment. Thus in some years the grass is very green and will not burn until late in the season. In other years the whole forest burns readily as early as December. The grass often obstinately refuses to burn without a good breeze, when the fire is as likely as not to get completely out of hand, and the whole reserved block will be endangered. Experience has shown that in unfavourable seasons the best plan is to burn at night in February and March, after the frosts of winter have been succeeded by a warm sun. After the successive action of intense cold and heat the grass burns readily.

Burning at night is carried out in the following manner. A still and clear night is chosen (moonlight if possible), and burning commences along the edge of the forest against the direction of any slight breeze that may spring up. Two gangs, of about 30 coolies each, are placed under an intelligent Ranger or Forester, and they burn the grass in opposite directions, starting from point A in the diagram below—



One gang burns to the right, the other to the left, extinguishing the edge burning towards the position desired to be protected. These gangs work round until they meet at B, on the opposite side of the area stocked with grass proposed to be burnt, thus leaving a burning mass in the centre. This practice has been adopted with success by Mr. C. J. Ponsonby, Deputy Conservator of Forests. Here, as in the other Oudh Forests, it is of the utmost importance that all grass lands included in the forest and on its edge should be burnt as early in the season as possible, when the grass under the shade of the forest is as yet too green to burn. At the outset all extensive grass lands must be sacrificed in order to protect the forest. Protection is further facilitated by the complete system of roads laid through the forests. These roads and the watch-towers built of wood enable the fire-watchers to discover any distant fire, and enable them to isolate the blocks by counter-fires. For the protection of the 21,000 acres taken in hand, 30 fire-watchers under one Forester are required in addition to the regular protective establishment. These men are all natives of the villages in the vicinity, and receive pay at the rate of Rs. 4 per mensem. They are entertained during a period of from four to six months. The total cost of protecting this area of 21,000 acres is Rs. 1,200 a year, which is at the rate of about Rs. 60 per 1,000 acres. In future it is expected that the cost of fire-protection will be much less. In the block selected for fire conservancy are included considerable stretches of poor sandy soil, the protection of which is difficult, owing to the open nature of the forest and the abundance of grass on the ground. In such places results will be very slow in

showing themselves. A large portion, however, of the area under protection is good soil, and this portion has already greatly improved, the undergrowth being a thick mass of young *sál* and other trees. In considering the further extension of the fire-protected area, such blocks with good soil should always be selected in preference. I would specially draw attention to that portion south-west of the Mailáni-Kukra road, and to the forests south of Kishanpur. Other things being equal, it is preferable to select for fire-protection as large an area as possible near the western edge of the reserve which is nearest to the market.

#### Cuttings.

. 112. In the fire-protected block no cutting or thinning will be advisable for many years to come: here the great aim must be to make the forest grow up as thick as possible, so as to kill the grass and make fire-protection in the future easier and more economical. Outside the area, however, that is likely to be included in the fire-protected block, it will be most desirable every year to cut a certain quantity of poles and trees, in order to supply the adjoining open country in the Sháhjahánpur District.

In para. 100 of the present Report it has been proposed to establish a depôt outside the eastern edge of these forests, and to stock this depôt with wood brought across from the Trans-Sánda Forests. This depôt will probably be somewhere west of Mailáni. At present, while the large area of forest in private hands on that edge of the Bhira Reserve has not yet been cleared, it would be premature to cut any poles in the Government forests to supply this depôt, although eventually it is probable that the establishment of such a depôt will secure fair prices for such material.

There are, however, several outlying blocks further south, along the Kathna River, which it would be inconvenient to take in hand on account of their distance from the main Bhira block, and which are mainly required to furnish pasture. The wood standing on these blocks might gradually be cleared, and there would probably be no difficulty in selling it at remunerative rates, one compartment after another being taken in hand in succession. This suggestion is made on the assumption that the restriction on the cutting of wood in the forests near the Kathna River, which has been imposed in view of carrying out the Kathna reclamation scheme, will be removed.

#### Roads, rest-houses, and wells.

113. In the centre of the system of roads and lines by which this forest has been made accessible is the double-storied forest-house at Madha, situated on the high ground at the edge of a wide and long belt of grassy plain, on the site of an old deserted village, with two old brick wells that have been repaired and built up by the Forest Department. From this point lines radiate in all directions, and a continuous forest road *viâ* Kishanpur to Jatpura and the Pilibhít Forests is under construction. A peculiar feature in the system of lines and roads in this division are roads which follow the edge of the high ground and forest along the open glades of the Ul and Barauncha Rivers. These roads follow the edge of the high ground, and are known as the Ul and Barauncha "serpentine." All roads are 15 feet wide, excepting the main road from Bhira to Mailáni, which has a width of 20 feet. Altogether there are 60 miles of road; and besides the rest-house at Madha already mentioned, there is one of the same class at Gola in the open country, and smaller one-storied houses are in course of construction at Kishanpur, Bhira, Kukra, and Ambara. These smaller houses are on a very good pattern for the hot season, with a tiled inner roof and a large projecting thatch roof over it, with a space of six feet between the two roofs. There is a well near each rest-house, and altogether there are eleven good wells in the Bhira Forest, some of which are quite new; and a tank, 100 feet square, has been excavated at Madha. Most of the roads are extensively used for cart traffic, and they replace the numerous meandering cart-tracks which formerly connected the villages near the Sánda River with those on the west side of the forest. There is not sufficient dry wood

for export, but eventually, when cuttings can be commenced in the fire-protected block, these roads will facilitate the disposal of the wood cut, and they have already stimulated the export of grass and other produce from the forest. Altogether a great deal has been done to open out these forests in the last two seasons, and this will not only increase the revenue and facilitate protection, but will also have the effect of making them more healthy.

Periodical measurements of trees.

114. There are three quarter-acre plots which have been marked off for the periodical measurements, *viz.*, one at Kishanpur, one at Madha, and one at the Bargad fire-chauki on the Bhira-Mailani road. It will be preferable to substitute one plot, measuring at least one acre, for these three separate small plots; and this plot should be selected with as large a proportion of sal poles as is possible, and all mis-shapen trees, or trees that are suppressed and will not eventually form a portion of the final crop, should be thinned out and all the remaining trees should be measured. The plot selected should be well stocked with trees and without any grass.

Revenue and Expenditure.

115. The revenue during the last three years has been as follows:—

Items.	1877-78.	1878-79.	1879-80.
	Rs. A. P.	Rs. A. P.	Rs. A. P.
Wood, including fuel .. .. .	727 6 3	1,138 7 3	354 9 1
Grazing .. .. .	3,739 4 0	5,849 12 0	3,234 14 9
Thatching grass .. .. .	100 8 4	189 4 0	290 12 3
Mohwa .. .. .	22 0 0	105 0 0	70 0 0
Baib .. .. .	314 13 6	549 11 10	387 15 6
Other sources .. .. .	678 3 0	401 1 9	623 12 5
Total .. .. .	5,582 3 1	8,233 4 10	4,962 0 0

All produce is removed by purchasers. The most important items of expenditure during the same period have been as follows:—

Items.	1877-78.	1878-79.	1879-80.
	Rs. A. P.	Rs. A. P.	Rs. A. P.
Revenue charges .. .. .	391 0 0	392 0 4	655 15 9
Live and dead stock .. .. .	920 13 7	743 5 0	815 8 0
Communications and buildings .. .. .	2,575 14 6	2,156 8 7	3,509 14 8
Demarcation and improvement... .. .	1,042 7 2	948 3 4	1,804 5 6
Establishments .. .. .	2,491 9 7	4,128 9 2	9,435 3 9
Total .. .. .	7,421 12 10	8,368 10 5	16,220 15 8

The local permanent establishment consists of one Ranger on Rs. 50 and 8 Guards on Rs. 10, Rs. 8, and Rs. 6 per mensem: this is certainly a very small establishment for the management and protection of 102,000 acres. As a matter of fact, it has been found to be quite insufficient, and I am informed that it has been found necessary to supplement it by entertaining a large temporary establishment regularly year after year.

## Forests in the Pilibhit District.

116. The Government forests of the Púranpur pargana, which were gazetted as reserved forests in February 1879, are in an extremely poor and unsatisfactory condition. They are nothing else but waste grass lands, with stunted trees and bushes, chiefly of sál, devastated annually by the fires of the hot season and subject to almost unrestricted cutting. The sál poles which are not cut, and which survive the frosts of winter and the fires of the hot season, generally attain a height of from 10 to 15 feet within three years, and when at that size they are cut for rafters, which are used in the neighbouring villages.

Condition of the Púranpur Forests contrasts with that of the adjoining forests.

117. The contrast between the Government forests of the Púranpur and those of the Tarái District which adjoin them, as well as the private forests which are the property of zamindars, is exceedingly marked. It afforded me great satisfaction to see the southern edge of the closed block in the Tarái, which has during the last few years been protected against fire by Mr. Macdonald, the Superintendent of the District, and against indiscriminate cutting during a much longer period. Since 1875, when I first visited this portion of the Tarái Forest, the sál poles have increased in height, and the ground is well stocked with young sál and other trees. Adjoining the Tarái is the fire-protected block of the reserved forest in pargana Pilibhit, which has been protected against fire and cutting during the hot season of 1880, and here some improvement is already visible. The forest of the zamindar of Maina Kót, north of that village, which has been carefully protected by the proprietor for some time, is also in good condition, and contrasts in a marked manner with the surrounding Government forest. These are on the northern edge of the Púranpur Forest. The southernmost end adjoins the forests of the Sherpur zamindar in the Sháhjahánpur District, which are likewise carefully preserved and are in very good condition.

Púranpur Forests used without restriction, and without payment, by the adjoining villages.

118. The difference in the condition of the Púranpur Forests and those which surround them is not due to any difference of soil or climate. The reason why the Government forests of the Púranpur pargana are in such an unsatisfactory condition is that, as a matter of fact, they are burnt every year, and are open to grazing and to indiscriminate cutting and removal of forest produce required by any village in pargana Púranpur. All this pasture and forest produce is furnished free and without payment. Besides the Maina Kót and Sherpur Forests already mentioned, there is, on the outside of the Government forests, a fringe of forest, varying in width, which belongs to zamindars. The wood on these lands is also cut indiscriminately, but the zamindars exact payment for all produce taken from them. The origin of the existing state of things was an order by the Commissioner of Rohilkhand, of the 10th January 1850, which conferred on all Púranpur villages extensive rights in all the waste lands. In the Appendix to the present Report will be found an extract from a letter from the Deputy Collector of Pilibhit, to the Collector of Bareilly, explaining the status of the waste lands in Púranpur.\*

Forests divided into allotments called grants.

119. In 1848-49 the waste lands in Púranpur, about 75,000 acres, were mapped out and divided into 22 allotments of 3,000 or 4,000 acres each. One of these allotments was a small mouzah, Mustafabad; the remaining 21 were termed grants, and were apart from the málguzári area. A number of these grants were made in 1853-54 to grantees under certain conditions,† the chief of which was that a certain proportion of the area was to be cleared and cultivated within a fixed time; a further condition being that the grant should convey a right

\* Appendix No. IV.

† For copy of grant see Appendix V. to the present Report.

to the land for the purpose of cultivation and to all the products of the cultivated land, but should not give a right of property in the spontaneous products of the land. It was provided that whenever any persons had been accustomed to use or consume these products, the grantee should not interfere with them, and that "where no customary right to such products exists, the Government, if it does not require the products itself, permits the grantee to use or to consume them, subject to such conditions as it may impose".

**Resumed grants declared reserved forests.**

120. In three cases only (No. 1, Carew and Company; No. 8, Mustafabad; and No. 21, Dhakkai Chát) were the grantees supposed to have fulfilled the conditions required from them,\* and the lands comprised within these grants are now in the possession of grantees or their successors. Of others a small proportion only was brought under cultivation; and the balance not cleared and cultivated, as well as the grants not taken up at all, have been included within the area declared reserved forest, in March 1879, under Section 34 of the Indian Forest Act. That section provides that if any rights of the Government or private persons in or over any land or forest produce, in any forest declared a reserved forest under that section, have not been enquired into, settled, and recorded in a manner which the Local Government thinks sufficient, the same shall be enquired into, settled, and recorded in the manner provided by the Act for reserved forests, and until such enquiry, settlement, and record have been completed, the declaration of Section 34 shall not abridge or affect any such rights.

If, therefore, the grant made in 1850 is held to constitute a right, the proprietary rights of Government in the Púranpur Forests are limited by and subject to such rights.

**Record of rights at settlement.**

121. Paragraph 64 of the Report on the settlement of Pilibhít by Mr. Elliot Colvin, C. S., of March 1872, which relates to Púranpur, is as follows:—

"Subsequent to the last settlement, the forest tracts were marked off into grants, and a few lots were in various ways disposed of to private individuals. The remainder are managed as forests. They, in common with the Pilibhít Forests, are immediately under the local civil officers, in subordination to the Forest Department. Their income and expenditure have been included when writing of the Pilibhít Forests. While so many acres remain uncultivated in the pargana, there seems no need to uproot these forests, though they are of little value. They consist of stunted sál, dhák, simal, haldu, and other inferior woods. The cultivators resident in the pargana may graze their cattle free of cost in them. The spontaneous products of the Tarái portion of the pargana are the property of the landlords, who derive not an inconsiderable income from the trees, grass, hides, grazing fees, &c."

The following is an abstract of the register of rights in the Púranpur Forests prepared by the Assistant Collector, Mr. W. Lambe, in 1876:—

"*Register of rights.*—The rights of third parties, being villagers residing in the pargana, are as follows:—fuel, wood for ploughs, koron, thúnee, bandelis, saintha, and narkul, wood for sugar-mills, pula grass, grazing cattle, bagelu, twigs of trees. The inhabitants enjoy these rights without payment.

"*Rights of way.*—Only one road, that between Pilibhít and Púranpur, passes through this forest."

It will be for Government to decide whether the settlement and record here quoted are considered sufficient for the purposes of the Act, or whether it will be necessary to institute a new enquiry and make a new settlement and record.

**Control of these forests by Government.**

122. It must, however, be borne in mind that, whether the grant of 1850 conferred a right or only a privilege, Government has retained the control over

\* It is doubtful whether these grantees did fulfil the conditions as regards bringing a certain area under cultivation; but, as a matter of fact, they are in possession.

these forests. Government has always let the right to cut wood, to collect minor forest produce, and to pasture cattle, to contractors who, during the time of their contract, became invested with the residuary rights of Government in these lands. It must also be remembered that the rights or privileges of the agricultural population are restricted to the produce required by themselves, and that they are not permitted to sell any of the produce thus obtained. Cases have occurred in which large quantities of wood have been brought from the Government forest by the right-holders and sold or used for other purposes, such as sugar manufactories; and in such cases it is not easy to prove that the conditions under which the forest rights may be exercised had been violated. Such cases and the apprehension that, if the forest continues to deteriorate as at present, a time must come when the area of Government forest will no longer be equal to supplying the people in pargana Púranpur, have induced the local officers to consider how the management of these forests can be placed upon a more satisfactory footing.

**Formation of Village Forests not feasible.**

123. The chief object of a conservancy management of these forests is to provide for the permanent supply of forest produce to the villages of the Púranpur pargana, and the question may be asked whether it would not be feasible to constitute these areas Village Forests under the Act. The reply is that there are no village communities to whom the care of these forests could properly be entrusted. Under the existing conditions of the settlement, these lands must either be managed by Government or they will fall into the hands of the zamindars, and in the latter case the permanent interests of the villages will in no way be benefited.

**Proposal to require free passes to be taken out by the holders of rights or privileges.**

124. Two measures have been proposed—*first*, to require right-holders to take out free permits for the produce removed by them from the forests; and, *second*, to close certain selected blocks. As already stated, it has not yet been fully established whether the user of these forests is exercised by the people of Púranpur as a right or only by permission; and under these circumstances it is probable that either measure—the issue of free permits by Government, or the closing of selected blocks—is justified, provided the requirements of the people are adequately supplied. The system of requiring the people to take out passes or free permits was commenced in May 1879. It was arranged that passes to enable the inhabitants of the Púranpur pargana to take out forest produce should be granted by zamindars, patwaris, and chaukidars of villages, and that a record of these passes should be kept by zamindars and sent to the Forest Department. This system, however, has not worked satisfactorily, and it has now been proposed by the local Forest Officers to entrust the granting of these passes to the Government Forest Guards.

There is little doubt that, if such a system can be thoroughly carried out, its effect would be to diminish the waste which has hitherto gone on in these forests. But the task which Government would undertake would be exceedingly difficult, and would give rise to illegal exactions on the part of forest subordinates and to complaints on the part of the people. The only consideration which can justify the adoption of such a system is this, that, unless some steps are taken to diminish the present waste, the forests must sooner or later prove unequal to the demands made upon them by the inhabitants of the pargana.

**Proposal to close certain blocks.**

125. A much better plan, and one less open to objections, is the proposal to close certain selected blocks and to protect them against fire, grazing, and

cutting. Even on the assumption that the grant made in 1850 conferred legal rights, this proposal is not open to objection, provided a sufficient area conveniently situated remains available to supply the requirements of the people. The Conservator proposes, in the first instance, to close that portion of the forests which forms, as it were, the head of the horse-shoe, and which measures 12,800 acres, an outer fringe being left on the south side for the supply of the people north of Madho Tándá. This closed block will thus be bounded on the south by a belt of forest proposed to be left open, on the north-west by the forests of the Tarái District, and on the north-east by a few villages near the Sárda, which are otherwise well supplied with forest produce. After the protection of this block has taken effect, it is for consideration whether a second block on the eastern edge further south, near Dhanauraghat, should not be taken in hand also.

#### Measures proposed.

126. Under existing circumstances, the demands by the people upon the Púranpur Forests are so great that any attempt to conserve and to improve the whole of the forests must be regarded as hopeless. Under the operation of frost, fire, and unrestricted cutting and grazing, these forests must go on deteriorating until at last they are reduced to the condition of grass lands, with here and there a few bushes of sál and other kinds.

The only practicable remedy that I can suggest is to demarcate and close permanently as large an area as possible, and to improve its condition steadily by fire-protection and planting. Under the Indian Forest Act it will probably be possible to withdraw this closed area entirely from the exercise of rights and privileges; and when it has improved sufficiently to be worked, cuttings must then be made departmentally, and no produce must be removed without payment. In order to facilitate this measure, it will be good policy to abandon the system of free passes; and it is for consideration whether, in order to obtain complete control over the closed blocks, Government should not also abandon the right, which it has hitherto exercised, of letting contractors cut wood and timber and collect forest produce.

The aim in the management of the Púranpur Forests should be, instead of attempting to control the user by the villagers over the whole area, to close certain selected blocks with the view of improving their condition, so as to make it possible eventually, when the resources of the open forest are exhausted, to provide the requirements of the people of Púranpur from the closed portion. The user of the open forests will remain free as heretofore, but for all produce removed from the closed and improved blocks due payment should be made. What is here suggested amounts to this, that a separation of the forest lands be made, selected blocks being set apart to be permanently maintained as forest; while the rest is thrown open to the people of the pargana, no attempt being made to secure its protection.

#### Forests in pargana Pilibhit.

127. As already stated, the forests of the Pilibhit pargana form a belt on the west of the Málá swamp, extending from the Tarái District in the north to the road from Pilibhit to Púranpur in the south. From these forests the inhabitants of the adjoining villages\* are not permitted to take out any produce free, and the forests may be considered as being at the entire disposal of Government.

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\* As a temporary measure, certain privileges were granted to and enjoyed by the village of Máhof, but the order granting these privileges no longer holds good. Another privileged village was Barachanda, but it is deserted, and the land has been included in the forests.

## Settlement Report.

128. The following is an extract (paragraph 42) from the Report on the settlement of Pilibhít, by Mr. Elliot Colvin, C. S., of March 1872 :—

“The area of forest land belonging to Government consists of 28,361 acres\* in pargana Pilibhít. This tract is situated on its eastern boundary. It runs north and south, fringing the Mála. It consists of stunted sál, haldu, and other inferior woods. The land on which it is situated is, it is true, comparatively high, but still the spring-level is so soon reached by the roots that it is impossible for the trees to become ever really valuable. It is managed by the local authorities, in subordination to the Forest Department. Duties on exports are levied according to a fixed schedule. The average income for the last five years has been, including Púranpur, Rs. 6,104; the main sources whence it is derived are grazing dues, duties on grass, firewood, charcoal, &c. The average expenditure for five years has been, in establishment and contingencies, Rs. 1,190 per annum, and Rs. 1,860 have been spent on forest roads.”

## Register of rights.

129. The entries in the Register of the Pilibhít Forest, drawn up by Mr. W. Lambe, Assistant Collector, in 1876, are as follows :—

“*Rights of Government and third parties.*—In the Pilibhít Forest all rights belong to Government, except that the villagers of Máhof enjoy the privilege of using the grass, wood, &c., from the forest for their own consumption, and grazing dues are also not taken from them or from the inhabitants of Barachanda.

“*Rights of way.*—There is no authorized right of way, except on the Pilibhít and Mádhó Tándá road.”

## Condition and protection.

130. It is not easy to explain how this belt of forest remained unoccupied by cultivation, except that the soil in many parts is poor and sandy, and that the vicinity of the Mála, a sluggish stream running through a broad and swampy belt of low ground, renders the country in its immediate vicinity very unhealthy. The northern portion of this forest, adjoining the Tarái District, has been protected against fire during the hot season of 1880. Portions of the protected area have good soil, and will doubtless repay the cost of fire-protection. The boundaries of the Pilibhít Forest are demarcated by a continuous ditch, 3 feet by 3 feet, which also runs along the Mála “serpentine” as far as the fire-protected block extends. There is also a ditch, 4 feet by 4 feet, along the Tarái boundary.

## Communications in the forests of the Pilibhít District.

131. The system of lines and roads projected and partly made in the forests of the Pilibhít District has its starting point at the village of Máhof, on the north-western end of the Pilibhít Forest. From this point lines radiate in different directions; one of these lines approximately follows the western boundary at a distance varying from half-a-mile to three miles from village land, and extends to the southern edge of the forest. One line runs due east to Maina Kót, and is continued from there till it joins the line which forms the through communication with Bhira.

The Pilibhít fire-protected block is bounded on the east side by the Mála “serpentine,” a winding road skirting the Mála swamp. The road which will give through communication from Máhof to Bhira runs more or less along the western boundary of the Púranpur Forests, and it is intended to substitute a system of straight lines for the present meandering cart-roads which connect the villages on either side of this belt. Eventually it is proposed to build a double-storied forest-house at Maina Kót, and eight single-storied rest-houses in different parts of the forest are in course of construction or completed, with wells at each; and, besides these, there are eight good masonry wells in the forests.

\* Some deserted village land has since been added, and the area is now 29,434 acres.



## Financial results, Pilibhit District.

132. The financial results have been as follows :—

*Revenue.*

Items.						1879-80.	1880-81.
						Rs. A. P.	Rs. A. P.
Charcoal	...	...	...	...	...	2,421 4 3	2,078 9 0
Firewood	...	...	...	...	...	2,682 3 9	2,185 4 6
Poles and other wood	...	...	...	...	...	1,039 4 2	1,488 4 6
Grazing	...	...	...	...	...	857 1 9	720 11 5
Grass for thatching	...	...	...	...	...	40 0 0	67 2 0
Baib	...	...	...	...	...	94 6 3	324 5 0
Other items	...	...	...	...	...	1,581 14 8	2,160 2 3
Total						8,716 2 10	9,024 6 8

*Expenditure.*

Items.						1879-80.	1880-81.
						Rs. A. P.	Rs. A. P.
Revenue collection	...	...	...	...	...	1,636 12 11	1,817 6 11
Live and dead stock	...	...	...	...	...	383 5 11	905 0 7
Communications and buildings	...	...	...	...	...	3,059 0 6	7,106 5 9
Boundaries, fire-protection, and works of improvement, &c.	...	...	...	...	...	1,692 1 3	1,941 2 3
Establishment	...	...	...	...	...	1,404 6 5	3,177 0 4
Total						8,175 11 0	14,946 15 10

Most of the produce is removed from these forests on payment by means of permits, which are issued by the Ranger, Forester, or Forest Guard. I recommend for consideration, in the case of this as well as other forests in Oudh, whether it would not be expedient to adopt the system, which prevails in most districts of the Central Provinces, of using permits of different shapes and colours, each kind designating a certain quantity of forest produce and its money value. On such tickets nothing is required to be entered in writing except the date of issue.

*Establishment.*

133. The only permanent Forest Establishment sanctioned for the Pilibhit Forests is a clerk on Rs. 25, a munshi on Rs. 14, and three peons at Rs. 4 each (Rs. 12), and, besides these, the services of an Apprentice on Rs. 40 per mensem have been placed at the disposal of the Divisional Officer. The local protective establishment, consisting of 2 Foresters and 13 Forest Guards, is entertained as a temporary establishment. This is not as it ought to be, and a suitable permanent protective establishment should be provided for these forests. This, I understand, can be managed by effecting reductions in the protective establishment of the Gorakhpur Forests.

## CHAPTER VI.

## SUBMONTANE FORESTS IN KUMAUN.

134. The two great sub-divisions of the Kumaun forest belt, the Eastern and Western Divisions, are separated by the forests which are generally known under the name of the Kumaun Iron Company's Grant. All the timber extracted from Western Kumaun, is brought to Rámnagar, except that from the Garhi Bulchand Forest below the foot of the hills, and from the outer hills west of Rámnagar. In the eastern forests, that portion which is situated between the Iron Company's Grant and the water-shed between the Sukhi and Nindhaur streams, is required to supply the timber (200 trees a year) to which the Nawab of Rámpur is entitled. The timber from the remaining forests of Eastern Kumaun finds its way chiefly to Pilibhít and Bareilly.

## Three Working Circles to be established.

135. There is a demand for bamboos and woods of other kinds from the Kumaun Forests, but the only species the cutting of which requires to be regulated by a working-plan is sál. And for the purpose of regulating the cutting of this timber on a large scale, it will be convenient to consider the forests in the outer hills of Western Kumaun, which send most of their timber to Rámnagar, as forming one working circle; while in Eastern Kumaun, after excluding the forests required to supply the Nawab of Rámpur, it will be convenient for the present to establish two working circles—one comprising the hills drained by the Nindhaur and Kalauni and smaller streams between the Nindhaur and Sárda Rivers, and the other the forests outside the hills.

It will be understood that the limits of these three working circles cannot be very sharply defined, and that the whole arrangement must be regarded as purely temporary, the object being to regulate the cuttings to be made during the next few years.

## East Kumaun. Valuation Survey of the Nindhaur Forests.

136. A detailed valuation survey of the forests on the hills drained by the Nindhaur River was commenced in January 1881, and the following is a summary of the results obtained.

The survey has only been completed in the lower or western part of the valley as far as Aonla Khera. This portion has been divided into eleven blocks, two of which, for reasons which will be explained further on, will be excluded from the valuation. It has also been decided to exclude the upper slopes on the north side of the valley, which are burdened with the rights exercised by the adjoining villages, as well as a large tract of bare slopes below the Lobchula Peak.

## Summary of Valuation Surveys.

Serial Numbers.	BLOCKS. Names.	AREA, IN ACRES	SAL TREES IN GIRTH	
			Above 6 feet.	Between 4 feet 6 inches and 6 feet.
I.	Sunkheri ... ..	1,018	Not valued.	Not valued.
II.	Balot, South ... ..	1,068	1,115	2,792
III.	Balot, North ... ..	1,917	1,071	2,469
IV.	Ráta Báu ... ..	811	866	2,149
V.	Khonáni, North ... ..	1,511	2,074	4,360
VI.	Bhalsani ... ..	1,265	1,613	4,139
VII.	Aonla Khera, North ... ..	1,690	2,523	5,272
VIII.	Maswári ... ..	3,200	Not valued.	Not valued.
IX.	Siláni ... ..	1,810	3,048	6,347
X.	Khonáni, South ... ..	1,532	3,450	6,882
XI.	Aonla Khera, South ... ..	1,485	2,812	5,041
	Total ... ..	17,307	18,572	39,451
	Deduct areas not valued ... ..	4,218	.....	.....
	Area valued ... ..	13,089	.....	.....

## Method followed.

137. The valuation has been made by dividing the area into plots, according to natural features, chiefly ridges. Eighty-three plots have been formed in the total area of 13,089 acres, so that each plot averages about 157 acres.

The examination has been effected in the following manner. Nine survey parties are employed, each consisting of one recorder and four measurers. The party proceeds from the river to the upper limit of the plot along one boundary, the boundary trees having been marked. Each measurer is provided with an axe, with which he marks each tree measured by him on the bark, and a diameter gauge, on which the diameters of the different classes are indicated by colours. The size classes used are as follows:—

\	Diameter of 24 inches and upwards	...	...	Green.
	" 18 " to 24 inches.	...	...	Yellow.
	" 12 " " 18 "	...	...	Black.
	" 6 " " 12 "	...	...	Red.

The measurers call out the colour of each class, which is noted by the recorder according to the system of notation used by Forest Officers in France. Besides sál, sáj (*Terminalia tomentosa*) and chír (*Pinus longifolia*) are measured and noted separately.

This system, which has been developed by Mr. E. P. Dansey, Assistant Conservator of Forests, on the ground of his experience in Jaunsár and in the Pátli Dún, appears to answer very well. The only point I have to suggest is that the trees along the boundary of adjoining plots should be marked in a conspicuous manner with white paint.

## Work how checked.

138. The work of the parties is checked in the following manner. The counting of the plot selected for check is repeated by the party which had been engaged on its survey, under the personal superintendence of the officer responsible for the survey, who is expected to complete the counting himself. In the time from the 20th January to the 31st March 1881, 13,089 acres were surveyed, being at the rate of about 20 acres per party per day, inclusive of Sundays and other holidays and several rainy days, on which no work was done.

## Rate of growth of Sal unknown.

139. This valuation survey furnishes a portion of the data required for framing a working-plan. Regarding the rate of growth of sál in this and other forests, we are as yet in complete ignorance, all attempts to determine the age of the sál tree by counting the annual rings in the wood having failed.

Under these circumstances, it will be necessary to establish a system of periodical measurements of sál trees of different sizes, and for this purpose two sample plots of half-an-acre each have been selected in the Chorgalia Forest, outside the Nindhaur Valley. These measurements, if steadily continued for five years, ought to furnish the requisite information, with such approximation as is necessary for present purposes. Meanwhile no more can be attempted than to establish a regular order of cuttings, and to agree upon the principles which should be followed in the selection of the trees to be cut, the chief aim being to promote as much as possible the development of the young growth of sál.

Quantity cut annually ought to be considerably less than the possible yield of the forest.

140. This plan must, as a matter of course, be so arranged that the quantity to be felled during this period shall remain considerably below the quantity which the forest is capable of yielding if treated according to correct principles.

It is considered desirable, in order to keep the market sufficiently supplied with timber from this source, that about 50,000 cubic feet of sál timber per annum should be extracted from the Nindhaur Forests; and it will be shown, in the following remarks, that this quantity is considerably below the possible yield of these forests.

## General results of Valuation Survey.

141. As already explained, the valuation survey has only extended over a small portion of the valley, and hence we have nothing but the area to guide us in forming an estimate of the quantity of timber which the entire forest is capable of yielding annually. The forests which I am disposed to advocate should be included within the Nindhaur Hills Working Circle, may be estimated to measure 300 square miles, of which probably one-half, or 96,000 acres, may be regarded as workable sal forest.

As stated above, the valuation survey of nine blocks, aggregating 13,089 acres, in the lower part of the Nindhaur Valley, has given the following results :—

First class trees, above 6 feet in girth	...	...	18,572
Second class trees, from 4 feet 6 inches to 6 feet in girth	...	...	39,451

And, considering what is known regarding the extent and character of the forests in the hills between the Nindhaur Valley on the west and the Sárda River on the east, the available material in the Nindhaur Hills Working Circle may be estimated as follows :—

First class trees, above 6 feet in girth	...	...	60,000*
Second class trees, from 4 feet 6 inches to 6 feet in girth	..	..	120,000

The first class trees that will be felled in these hills may be expected to yield 40 cubic feet of timber each, and it will therefore be necessary to cut 1,250 trees annually, in order to obtain 50,000 cubic feet of timber. These, it should be remembered, must all be sound trees, because, in a forest freshly taken in hand like the Nindhaur, in which a new system of roads must be made and all arrangements for working are new, it will be expedient at first to confine operations chiefly to the extraction of sound timber. Nothing very definite can be said regarding the number of trees that should be felled annually, as there will be a good many trees of the second class which have attained maturity, and which should be felled together with the first class trees. So much, however, may be regarded as probable, that, at the rate of 50,000 cubic feet a year, the material at present in the forest will furnish an equal annual yield during a very long period, which will be more than sufficient to bring up the requisite number of trees of the smaller classes to first class size. Hence we are justified in assuming that the hill forests between the Nindhaur and Sárda Rivers can yield 50,000 cubic feet of timber annually, and this limit it will be convenient to fix for the cuttings of the next five years.

## Proposals submitted.

142. I now proceed to submit proposals—*first*, regarding the order of the cuttings during the next five years; *second*, regarding the principles which should guide the selection of the trees; *third*, regarding the measures which should be taken to protect the forest from fire; and *fourth*, regarding the continuation of the valuation survey commenced.

Regarding the first point, it seems expedient to confine cuttings during this period to the lower part of the valley, as far as it is free of rights and has not yet been worked.

Of *Sunkheri*, the outer block on the right bank, that portion which adjoins the river is rocky and precipitous; and although the back portion is stocked with good forest, we do not propose to include it in the area to be worked during the next five years.

The *Maswari* block, on the left bank, is excluded because it is open to pasture and cannot at present be protected from fire.

The two blocks on both sides of the *Balot* River have been worked in former years, and should also be put back for the present if possible.

The *Ráta Ráu* block would require a separate road up the valley, and may also be excluded for the present.

\* Such estimates, it must be understood, have no value in themselves, but, in the absence of definite data, assumptions must be made.

Blocks in which cuttings should be made.

143. The block assigned for the cuttings of the first year, 1882-83, is the *Siláni* block, on the left bank above the great bend of the river, containing 1,810 acres with 3,048 first class trees. Making allowance for the proportion of unsound trees and of trees that must be left standing on the ground, it is probable that this block will be found more than sufficient to furnish one year's supply. The protection from fire of this block should be taken in hand at once. The forest has mostly a northerly aspect, and is moist and shady, and fire-protection will probably not be found difficult.

After completing operations in this block, that on the opposite side of the river, called *Khonáni North*, and the adjoining block of *Bhalsáni* may be taken in hand. These two blocks aggregate 2,776 acres, with 3,687 first class trees. The upper part of *Bhalsáni* will be very difficult to work; the stream draining the larger portion of it, passing through a long narrow gorge, with precipitous sides and water-falls. It is possible that a road could be made opening up this block from the east; but it is for consideration whether, on account of these difficulties, felling in this block ought not to be postponed.

After completing the work thus far, the block called *Khonáni South*, on the left bank, should be taken in hand, measuring 1,532 acres, with 3,450 first class trees; and subsequently the two blocks, *Aonla Khera North*, 1,690 acres with 2,523 trees, and *Aonla Khera South*, 1,485 acres with 2,812 trees.

These six blocks contain a total of 15,520 trees of the first class, and they should be sufficient to furnish the supply of five years at the rate of 1,250 trees per annum. In case it should be found necessary to exclude *Bhalsáni*, or otherwise to change the plan here sketched, it may become necessary to commence fellings either in the Balot Valley or in the Ráta Ráu block. But it should be clearly understood that, as far as practicable, cuttings in one block should be completed before work in a fresh block is commenced.

As the cuttings proceed, so the area protected against fire should be extended; and it should be distinctly understood that the boundaries of the blocks may be modified as the work progresses, so as to fit in best with the arrangements for the working of the forest and for protecting it from fire.

Principles which should guide the selection of trees.

144. The next point to consider is the selection of the trees to be cut. The remarks in this respect relate only to the lower part of the forest here adverted to, and do not refer to the extensive tracts in the upper Nindhaur Valley, which, to a great extent, are stocked with chir.

At the outset, it will be convenient to distinguish between those slopes which have a northerly and those which have a southerly aspect. The slopes with a northerly aspect are mostly moist and shady, so much so as to affect injuriously the growth of young sál. In a plot, numbered 47 and extending from the river half way up the ridge, which I examined on the 7th March, I found a large number of seedlings of sál, with last rains' leaves and the whole shoot above ground killed, not by frost or other injury, but apparently by an excess of moisture. It is probable that these plants will shoot up again, and that eventually they will grow into seedlings; but the general appearance of young sál on that slope showed that the conditions for the natural reproduction of that tree were much less favourable than on the warmer and drier slopes with a northerly aspect. Young shoots of sál which had suffered in a similar manner were noticed by me on a moist northerly slope in one of the valleys of the North Pátli Dún Hills. As a matter of fact, seedlings in the Nindhaur Valley are, as a rule, much more numerous on the southerly than on the northerly aspects, and this consideration must be carefully taken into account in arranging fellings. As soon as fire-protection has been firmly established in this forest, the slopes with northerly aspect would greatly benefit by the removal of other trees in addition to the sál trees, so as to diminish the shade. If this cannot be done, sál must be cut more cautiously than on the warmer and drier slopes with a southerly aspect.

With this reservation, I am of opinion that all marketable trees above 6 feet in girth, and a proportion of the smaller trees which have attained maturity, may be cut, with the following exceptions:—trees standing on narrow

spurs and ridges and on precipitous slopes should be spared; also sál trees standing isolated near blanks, or in a forest of other trees and bamboos. Where the ground is already stocked with young growth, it will be understood that trees may be cut much more freely than where this is not the case.

#### Fire conservancy.

145. As regards fire-protection, it will suffice to say that the needful measures should be taken at once to keep out fires from the six blocks assigned for the cuttings of the next five years. On this condition alone will it be advisable to make the cuttings here proposed. Had fires been excluded from these blocks at an earlier date, the satisfactory regeneration of the areas on which cuttings will be made might be depended upon with certainty, and it would be possible to cut a much larger proportion of the marketable trees.

#### Continuation of Valuation Surveys.

146. The last point to be considered in this respect is the continuation of the valuation surveys. As soon as the detailed topographical survey of this forest has been completed, these valuation surveys should, provided officers and men are available, be extended to the more important blocks which contain sál forest in the Nindhaur Hills Working Circle. There are, however, large areas which are open to grazing and which cannot be protected against fire, mostly along the northern boundary of the forest, of which it would be waste of time to make any valuation surveys. It is also doubtful whether it will be necessary to make a complete valuation survey of the outer or southern slopes of the hills, and of that part of the Nindhaur Forest which is chiefly stocked with chir. We must not overdo these valuation surveys, or extend them to areas stocked with forest which is not likely to require cutting in the immediate future.

In many cases it will probably be found sufficient to examine each block or compartment and to draw up a brief descriptive account of it, indicating the principal features in the growing stock and otherwise, as far as they affect the working of the forests.

#### Forests outside the hills.

147. So far regarding the Nindhaur Hills Working Circle. The forests outside the hills consist of the following great blocks :—

I.—The *Horái* block, about 6,000 acres, south-west of Chorgalia, on nearly level ground, and on both sides of the Sitarganj-Haldwáni road. The fire-protection of the portion north-east of this road has been attempted with varying success since 1877. A great part of this forest is covered with high grass and scattered groups of poles, and a few large hollow trees. Successful fire-protection will change the character of this forest, and, until this has been accomplished, no trees of any kind should be cut in it. The forest extends to the boundary of the Tarái District, but the southern part, near the Tarái boundary, is not at present under the control of the Forest Department. Here the ground is undulating, with numerous streams and springs, and the growth of sál in this portion which has been excluded from the reserve is excellent.

II.—The *Chorgalia* block, about 2,000 acres on level ground, partly above, partly below, a high bank. This is an almost pure forest of sál poles and young trees, and is in many parts completely stocked. It is grazed over and burnt every year, but, as there is scarcely any grass, the fires do very little harm. Nevertheless, I am of opinion that the ground will improve considerably by fire-protection, and I would therefore recommend that the eastern portion, which is well stocked, should be closed entirely. It will be instructive to watch the effect of closing on both portions, above and below the bank. The sub-soil in the portion below the high bank is probably inferior. On both the upper and lower portions, half-acre

sample plots have been marked off, on which all trees should be measured periodically twice a year—once in the beginning of December and once in the beginning of May. In the Chorgalia Forest I do not recommend that any cuttings should be made at present. It is possible that when fire-protection has been firmly established, thinnings may be made, but this operation had better be deferred for the present.

III to VI.—A large extent of forest between the Dewa (Nindhaur) and Kalauni Rivers and below the foot of the hills. The whole consists of four blocks. *First*, the western corner near Chorgalia, chiefly in branches and former beds of the Nindhaur and its feeders coming from the outer hills, stocked with great masses of khair and sissoo, mostly young, which are periodically swept away by the changes in the course of these streams. *Second*, further east, *Jaunlasál*; stretches of good forest of sál poles, alternating with open grass lands and extending to the Birgot Sot, which is called the Gumti River lower down, a portion of which was protected from fire during the hot season of 1880, attempts, partially successful, having been made since 1877. *Third*, the *Gangápur* Forest, a large extent of dry raviny ground extending to the Laibar River, and stocked with a mixed growth, in which sál predominates. *Fourth*, the *Lower Kalaunia*, a mixed forest with bamboos, but without sál, with a large area stocked with khair and sissoo near the Kalauni River. In this block, near the Tarái boundary, where water is plentiful, there are detached clumps of the thorny bamboo (*Bambusa arundinacea*).

East of the Kalauni are four more blocks as follows:—

VII.—The *Galiapáni* block, below the road and between the Kalauni and Chini Nadis; a little sál near the road, otherwise mixed forest with a large area of bamboos (*Bambusa arundinacea*).

VIII.—The *Barmdeo* block, above the road extending from the Chini Nadi to Barmdeo. The greater part of this block is well stocked with sál poles, with khair and sissoo near the Káli Gadh.

IX.—The *Sárda* block, consisting of numerous islands in the Sárda River, extending over a length of eight miles; stocked with sissoo and khair in all stages of growth, which are periodically washed away by the floods of the river.

X.—The *Chandni* block, which is the upper end of the Bilheri Forest in the Tarái District, about 2,500 acres, the greater part well stocked with sál poles of great height and good growth. Of this block a small portion only has been notified as a reserved forest under the Act, and, according to information received lately, it is probable that the remainder will not be included within reserved forests.

It must be left for future consideration whether the north boundary of these blocks near the hills (II—VI and VIII) should run along the foot of the hills, or should not rather follow the line of water-shed of the outer range.

#### Cuttings in the forests outside the hills.

148. It seems desirable, and I understand it to be the wish of the local officers, that any timber which may be felled in these forests should be cut and exported by purchasers. Hitherto considerable quantities of timber have been sold to and exported by purchasers in the forests cleared for cultivation outside the reserved forests; and while at Pilibhít I examined a large private depôt, chiefly sál and haldu, near that town, which is almost entirely supplied by the timber thus extracted. As regards sál, this source is now coming to an end, but of other kinds there will still be a large supply.

For some time to come it will probably not be possible to cut any very large quantities of sal timber in the reserved forests outside the hills; and it should be distinctly understood that no trees must be cut in any block which is not protected against fire. But a commencement should be made in those blocks which have thus been protected, and where the young growth is sufficiently advanced to justify such cuttings. For this purpose I suggest that the ten forest blocks here enumerated should each be divided into suitable compartments, and that one compartment a year be taken in hand, the sal trees to be cut being marked by a responsible officer. I would recommend that the division of these blocks into compartments be made by an Officer of the Working-Plans Branch in consultation with the Divisional Officer, and that at the same time a summary descriptive account of each compartment be drawn up, indicating the treatment which it requires and the extent to which cuttings may be made in it.

West Kumaun.

149. The Western Kumaun Forests consist of the following ranges :—

- (1) *Garhi Bulchand*: area 10,937 acres; outside the hills, near the Garhwál boundary; partly on level, partly on undulating ground; stocked with good forest of sal poles, except on stretches of dry and high ground and where the forest is open. The area is divided into ten compartments, and a great part of it has been partially protected against fire since 1876, though the greater part was burnt in 1878.
- (2) *Chilkia Forest*: comprising the hills between the Rámanga and Kosi Rivers, east of the Garhwál District boundary; area 80,467 acres.
- (3) *West Kotah Forest*: bounded by the Kosi River, the foot of the hills, and the Iron Company's Grant; area 35,200 acres.

Blocks of the Chilkia and West Kotah Forests protected from fire.

150. The following remarks will chiefly refer to that portion of the Chilkia and West Kotah Forests which is protected against fire. This area has been divided into six blocks, which are as follows :—

<i>Chilkia Forest.</i>					Acres.
I.—Mohán	Block	...	...	...	7,489
II.—Dúngalgarh	„	...	...	...	10,400
III.—Dúlwa	„	...	...	...	15,710
IV.—Meláni	„	...	...	...	15,543
Total					49,142

The Mohán and Dúngalgarh blocks are separated by the main road from Mohán to Chaknakal, which follows the valleys of the Sasnah and Timlapani, which come down from the water-shed at Durgadeh. The Dúngalgarh and Dúlwa blocks are separated by the Dangari and Sangri streams, which flow down from the water-shed at Sultánchaor. The Dúlwa and Meláni blocks are separated by the range which runs from Barsoti to the Kosi at Dhekuli.

<i>West Kotah Forest.</i>					Acres.
I.—Kosi	Block	...	...	...	13,066
II.—Sitabani	„	...	...	...	20,485
Total					33,551



These are separated by the Kotahia Sot, a branch of the Bándarpani. Of the above area, two compartments in the Sitabani block, aggregating 3,020 acres, are not protected against fire.

The Chilkia and Kotah Forests have been divided into 65 and 37 compartments respectively, total 102; the smallest measuring 288 acres and the largest 1,592 acres, the average area being 811 acres. The boundaries between compartments are formed either by prominent geographical features, or by paths, or by fire-lines.

Portions of these forests were protected before 1875, but in the hot season of 1874 they were mostly burnt. Since 1875, however, the success has been very good. In that year the whole area was not taken in hand at once, but the work was extended gradually, and it is now in excellent order, so that the protection of the whole of this area may be confidently expected.

#### Method followed in fire-protection.

151. The plan followed by Major J. E. Campbell, the Divisional Officer, and which has gradually been developed by actual experience, is to maintain a system of cleared fire-lines, along which run foot-paths practicable for walking and in most cases for riding. These forests are all on hilly and exceedingly broken ground, the highest point being Dúngalgarh, with an elevation of 3,500 feet; while the lowest point is on the Kosi River, above Rámnagar, at about 1,200 feet. Hence it is clear that straight lines are not possible, and that special arrangements are required to make these fire-lines accessible. The plan developed with great success by Major Campbell is to establish a network of paths, three to four feet wide, which are built up with dry walls where necessary. Along these paths lines, generally 50 feet wide, are cleared by completely cutting all trees, and these lines are burnt every year. Some of the main lines, such as that along the Dúlwa Range, are 100 feet wide.

Since the system has been in force in a perfect manner very few important fires have occurred, and meanwhile the young growth of sál and other trees has, where the circumstances were otherwise favourable, made such wonderful progress that, unless any unusual accident occurs, the protection of the forest may be regarded as assured.

#### Beneficial effect of fire-protection.

152. The change for the better in the condition of these forests, as compared with their condition on my two previous visits in 1863 and 1875, is most markable and exceedingly satisfactory. On my visit in April 1863 the whole the forest was covered with the ashes of burnt grass, and with the leaves, tops, and branches of the trees felled. Heavy cuttings had been made in many places previous to my visit, and here trees felled and timber which had not been removed, as well as dry trees, were burning or smouldering. The whole place was black and desolate, and no trace of young growth was to be seen. In 1875 some improvement had taken place, because fellings had been carried out more cautiously, but nevertheless reproduction was scanty. On my present visit every thing was green; and, instead of heavy grass under the trees, the ground in many cases was covered with thickets of young growth, with a large proportion of sál.

One great advantage of continued fire conservancy in these forests has been that it has made the continuance of protection easier, and after a few years more it is probable that the risk from fires will be greatly diminished.

## Timber cut since 1868-69.

153. The following statements give an abstract of the timber extracted from the Chilikia and West Kotah Forests during the last thirteen years, *i. e.*, since 1868-69 :—

*Chilikia Forest.*

YEAR.	NUMBER OF TREES.	CUBIC CONTENTS IN CUBIC FEET				AVERAGE CONTENTS PER TREE.
		Of Logs.	Of Scantlings cut by		Total.	
			Government.	Merchants.		
1868-69 ...	...	...	...	...	...	Cubic feet.
1869-70 ...	...	...	...	...	...	...
1870-71 ...	...	...	...	...	...	...
1871-72 ...	3,140	128,000	...	...	128,000	40
1872-73 ...	3,895	...	67,372	...	67,372	17
1873-74 ...	...	...	...	...	...	...
1874-75 ...	6,082	16,840	98,372	...	115,212	19
1875-76 ...	915	23,200	7,755	...	30,955	34
1876-77 ...	...	...	...	...	...	...
1877-78 ...	2,500	20,000	35,310	...	55,310	22
1878-79 ...	2,318	6,000	15,207	681	21,888	9
1879-80 ...	2,469	...	21,993	6,340	28,333	11
1880-81 ...	3,760	...	30,525	9,684	40,209	10
Total ...	25,079	194,040	276,534	16,705	487,279	19
Average per annum for 13 years ...	1,929	14,926	21,272	1,285	37,483	...

*West Kotah Forest.*

YEAR.	NUMBER OF TREES.	CUBIC CONTENTS IN CUBIC FEET				AVERAGE CONTENTS PER TREE.
		Of Logs.	Of Scantlings cut by		Total.	
			Government.	Merchants.		
1868-69 ...	522	23,720	...	...	23,720	45
1869-70 ...	...	...	...	...	...	...
1870-71 ...	...	...	...	...	...	...
1871-72 ...	1,889	...	28,775	...	28,775	15
1872-73 ...	3,464	...	83,316	...	83,316	24
1873-74 ...	996	...	18,245	...	18,245	18
1874-75 ...	...	...	...	...	...	...
1875-76 ...	...	...	...	...	...	...
1876-77 ...	32	...	2,362	...	2,362	74
1877-78 ...	290	13,062	379	...	13,441	46
1878-79 ...	...	...	...	...	...	...
1879-80 ...	647	6,225	2,512	...	8,737	13
1880-81 ...	340	17,862	...	...	17,862	52
Total ...	8,180	60,869	135,589	...	196,458	24
Average per annum for 13 years ...	629	4,682	10,430	...	15,112	...

These statements were prepared for me by the Divisional Officer, and I am informed that the figures may be regarded as correct, except that in some cases it is probable that a smaller number of trees than that stated were cut. It will be noticed that in the Chilkia Forest 25,079 trees, containing 487,279 cubic feet of timber, were cut during this period; while the West Kotah Forest yielded 8,180 trees, containing 196,458 cubic feet of timber. The average annual outturn during this period will be seen from the following figures:—

Forest.							Number of trees.	Cubic feet of timber.	
Chilkia	...	...	...	...	...	...	1,929	87,483	
West Kotah	...	...	...	...	...	...	629	15,112	
Total							...	2,558	52,595

Outturn in cubic feet per tree.

154. It will also be noticed that the timber was brought out partly in log, partly in scantling. In those years in which logs only were cut, the cubic contents of the trees were generally largest. Thus in 1880-81, in West Kotah, the trees averaged 52 cubic feet, and in 1871-72, in Chilkia, they averaged 40 cubic feet.

The scantlings exported from these forests are chiefly karris, from 6 to 15 feet long and from 4 by 4 to 5 by 6 inches. The practice is generally that the better trees are cut up on Government account, and of late years it has been found expedient, after the Government operations had been completed, to allow purchasers to cut up the trees previously marked, but not found sufficiently good to be cut up and brought to depôt on Government account. It will be noticed that in those years when timber was chiefly cut up into scantlings, the outturn was very small; thus the yield per tree from 1878-79 to 1880-81 in the Chilkia Forest was only 10 cubic feet.

It should, however, be mentioned that, besides the outturn per tree shown in these statements, a great deal of the refuse timber, which is not exported at the time, is subsequently utilized and exported as dry timber by purchasers. Hence the outturn per tree given in the preceding statements is less than it actually has been.

Localities where fellings were made.

155. In the Chilkia Forest the chief fellings during this period were made—

(I.)—In the forests situated on the water-shed between the Timlapani and the Paniali streams, the chief of which is the Durgadeh Forest—

			Trees.
1871-72	...	...	3,140
1872-73	...	...	3,800
1880-81	...	...	3,054
Total			9,994

(II.)—On the left bank of the Rámanga, below the mouth of the Timla-pani Sot—

		Trees.
1872-73	...	95
1874-75	...	400
1875-76	...	540
1878-79	...	42
Total	...	1,077

(III.)—On both sides of the Rámanga, near the Marchula bridge—

		Trees.
1874-75	...	563
1875-76	..	375
1877-78	...	2,500
1878-79	...	481
Total	...	3,919

(IV.)—On the flats on the right bank of the Kosi River, below the Dangari Sot—

		Trees.
1878-79	..	1,775
1879-80	...	2,469
1880-81	...	706
Total	...	4,950

(V.)—At the head-waters of the Ratapani Sot, a stream running southwards from the Dúlwa Range through the Meláni block—

1874-75	...	2,900 trees.
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In the West Kotah Forest the fellings have all been on the hills in the bend of the Kosi River, in what we call the Kosi block, with the exception of the Duli Sot, in the northern part of the Sitabani block, where 680 trees were cut in 1878-79 and 1879-80.

Most cuttings were made in forest not previously touched.

156. All these cuttings were in forest not previously touched, except the fellings of 1880-81, in the Durgadeh Forest, and those of 1878-79, 1879-80, and 1880-81, in the flats on the lower part of the Kosi River. The Durgadeh Forest was an untouched forest in 1863, well stocked with magnificent trees. It was cut heavily from 1870 to 1873, and it has been found possible to make a second cutting this year. In the forests on the flats near the Kosi River the first cutting was made many years ago, and the second cuttings made there during the last few years were justified by the fact that the ground is well stocked with young growth of saplings and poles of sál.

No forest is now left in West Kumaun which has not been felled previously, nor is there any area which contains sufficient timber to justify Government timber operations on a scale similar to those hitherto undertaken. But in most of the forests visited by me on the present occasion it will be possible, without in any way endangering reproduction, to make a

second cutting, and some such second cutting will greatly benefit the development of the young growth. It will, however, be necessary to arrange these second cuttings in a very methodical manner, and always to keep in mind that the chief aim must be to secure the regeneration of the forest by means of a complete growth of young sál.

**Ramnagar the chief outlet.**

157. All the timber exported from Western Kumaun is brought to and sold at Rámnnagar. I am not of course here speaking of the dry timber brought out by purchasers, which finds its way to many places in the plains, but of the green sál trees marked for felling. Rámnnagar is an old outlet for the timber of these forests. Government have an excellent depôt there, and a large timber shed for the storage of scantlings. Merchants from Meerut, and even from the Punjab, come to Rámnnagar to purchase this timber, and it is most desirable that the importance of the place as a timber depôt should be maintained. After fully discussing the subject with the local officers, we have come to the conclusion that, in order to secure this object, it will suffice for the present to bring to Rámnnagar annually 30,000 cubic feet of timber. The total area of the forests protected from fire is, as already stated, nearly 80,000 acres. The only block in which there is a considerable extent of forest without sál is the Meláni block, outside the Dúlwa Range. Making allowance for this, the total area of sál-producing forest may be estimated to cover 70,000 acres; and considering that the greater part of this area is well stocked, either with young growth, or with saplings under 18 inches in girth, or with poles from 18 inches to 4 feet 6 inches, or with young trees between 4 feet 6 inches and 6 feet, and that it contains a large number of trees of more than 6 feet in girth, an annual yield of 30,000 cubic feet is an extremely small quantity, which, if it were necessary, might be increased ten-fold without any injury to the forest.

However, it is better, until the forest may be regarded as absolutely safe against fire, to keep on the safe side and to cut sparingly, leaving it open to increase the cuttings largely in case any necessity for doing so should arise.

**Plan of cuttings.**

158. No useful object would be gained by making a valuation survey of these forests, such as has been made and is proposed to be made for forests which contain large quantities of mature timber, and hence the cuttings in these forests should be regulated by area and not by quantity. As already stated, the forests have been divided into 102 compartments, two of which are not included in the protected area, the average size of these compartments being 811 acres. There are also 19 compartments in the Meláni block, which, although they contain large areas well stocked with excellent sál poles, have not sufficient large timber in them to justify their inclusion in the present arrangement. There thus remain 81 compartments in the other blocks; and the plan which I propose for adoption is that two compartments be assigned to the operations of each year, with the provision that, should it be desirable in any one year to cut a larger quantity than the two compartments selected will furnish, the cuttings may be extended to three compartments. If this suggestion is adopted, the cuttings now proposed to be made will extend over a period of from thirty to forty years. These cuttings should proceed in regular order, and, as far as such may be feasible, the work in one of the six blocks should be completed before it is commenced in a second block. Whenever practicable, the compartments worked in successive seasons should be contiguous to each other.

**Selection of trees to be cut.**

159. It will now be necessary to define as far as possible the principles by which the selection of the trees to be cut should be governed.

Before entering upon this question, which in the present case is one of great difficulty, it will be useful briefly to note the main classes of forest which I have observed in this area. As already mentioned, I have had the advantage of

examining these forests on three successive occasions : in April 1863, when no protection had been attempted, when large fellings had been made over extensive areas, and when the annual fires were fed by great masses of tops, branches, and rejected timber which had been left on the ground after the fellings ; I again visited the forests in February 1875, when they had for upwards of ten years been protected against indiscriminate cutting, and when some (though not very successful) attempts had been made to keep out fires. My present visit was the third, and on this occasion I have seen the beneficial effect of six years of more or less complete fire-protection. I am thus in a position, with the aid of the information given me by the local officers, to form some conclusions regarding their treatment.

*Forests in which cuttings were made more than twenty years ago.*

160. A very important class of forests is that in which heavy fellings were made more than twenty years ago, and which now consist of old trees, mostly hollow or otherwise of little value, left standing at the time that the cuttings were made, and young trees which have grown up out of the groups of saplings and poles which were on the ground at the time the forests were cut. In forests of this description the ground in 1875 was mostly covered with high grass, which has now to some extent given place to thickets of saplings. Forests of this description are found on the flats along the Kosi River and in other accessible parts of the forests, as well as on the plateau between the Kosi and the dún of West Kotah. In such forests young growth is found of all ages, from one year's seedlings to saplings and poles ; older as a rule in the more accessible, and younger in the more remote, localities, according to the time when the cuttings took place. In forests of this description there are two classes of marketable trees—*first*, old trees, which were rejected at the former cutting, but which can be utilized by sawing the timber into scantling ; *second*, young trees, which have attained maturity since the first cutting was made.

Where the ground is sufficiently stocked with young growth, there can be no doubt that all old and hollow trees should be cut out as far as they can be converted into money. As regards the younger trees, the advantage of allowing them to increase in size and value must be carefully weighed against the present profit to be realized by cutting them and the benefit to be expected for the young crop from their removal. Each forest plot must be treated on its own merits, and in cases of doubt the regard for the young crop should prevail over other considerations. In the flats on the right bank of the Kosi River cuttings similar to those here recommended have already been partially carried out, all marketable, old, and defective *sál* trees having been cut between 1878 and 1881.

*Forests which have grown up on deserted fields and grazing grounds.*

161. A class of forests different in their origin, and also, as a rule, in their constitution, are those which have sprung up at different times on deserted fields and grazing grounds. Such forests generally consist of dense masses of saplings or young poles, and in some cases the terraces of the old fields can still be distinguished. Instances are the forest on Rudra Chaor, a series of gentle slopes extending from Kuskundli to the Rám-ganga River at Chaknakal. Here a regular succession of ages exists on a considerable area, the young forest of saplings occupying the lower slopes, while the higher slopes are stocked with compact forests of poles. The pole forest of Amtanulla, above Mohán, belongs to the same class, but is older and the trees are larger ; and east of it, on another flat, is a large extent of dense saplings, from 20 to 40 feet high and up to 15 inches in girth. The Durgadeh Forest had also originally sprung up on deserted fields, and in places the retaining walls of the old terraces are still visible. The same may be said of the dense forests of poles and stunted trees at the head of the Kotlia Sot, on the left bank of the Kosi River.

The forests of this class frequently contain mature trees of different ages, and, as before said, where the ground is well stocked with young growth, most of this may with advantage be cut. Some of the forests of this class have sprung up, not actually upon deserted fields, but on village grazing grounds. Thus, near the village of Leti and other villages at the edge of the West Kotah Forest, there are large areas of open sál forest, consisting of old, girdled, and stunted trees; the ground underneath being the favourite grazing ground of the village cattle, with a bare surface trodden down by the feet of the cattle, and with no undergrowth whatsoever. If the village to which such a forest belongs were suddenly thrown out of cultivation, and the forest left to itself, the latter would in course of time doubtless get stocked with dense masses of saplings, and the same would be the case with the extensive blanks in its vicinity.

Forests in which cuttings were made within the last twenty years.

162. A third, but not very extensive, class of forests are those in which fellings have taken place within the last twenty years, and where the young growth has not yet had time to cover the ground completely. An instance is the forest on the flats on the left bank of the Rám-ganga, near the Timplapani Sot, where fellings were made between 1872 and 1879. Here a luxuriant growth of small-sized trees—such as *Mallotus philippinensis* (rohni), *Tetranthera monopetala*, and *Phyllanthus nepalensis*—has taken possession of the ground. But sál is also coming up, and will doubtless get the upper hand. Similar forests may be seen all the way up the Timplapani Valley to Durgadeh, and this last named forest belongs to the same class.

Durgadeh Forest.

163. Regarding the Durgadeh Forest, the following is an extract from the notes embodying the results of my visit in February 1875:—

“When I examined this forest in 1863, Durgadeh was a completely stocked forest of mature trees, with an average height in the better parts of 100 feet, and without any grass or underwood. Between 1869 and 1873 the greater part of the sound trees were cut, and its present appearance is that of a regularly, but incompletely, stocked forest of tall middle-aged trees. Many of the stems are bent and crooked, and there are other indications that the majority of the trees now on the ground are not in reality middle-aged trees, but are trees which have attained maturity, the remains of the old crop, and mostly those which were suppressed and bent aside by their more vigorous companions. The ground is covered with khajúr (*Phoenix farinifera*), and with grass and ganj (*Milletia*), but with very little young sál.”

Up to that time the forest had been burnt annually, and this sufficiently accounts for the absence of sál seedlings in 1875. But since 1875 the forest has been protected from fire; yet there is very little young growth of sál, and what there is consists almost entirely of one or two years' seedlings. Extensive fellings of defective trees, and of some fine and tall trees for bridges, have lately been made in this forest. It is possible that these cuttings will have a beneficial effect in stimulating young growth by giving more light. And indeed, in 1875, I stated in my notes that if the exclusion of fire should not within a few years increase the growth of young sál, then another cutting should be made so as to give more light.

The case is by no means clear, and it will be obvious that in this and similar instances, where the ground is not stocked with young growth, the greatest caution must be used in cutting. In the Durgadeh Forest, katbhiláwa (*Buchanania latifolia*) and sándan (*Ougeinia dalbergioides*) have sprung up in large numbers since the forest was first cut, and it is remarkable that in blanks also no sál has come up.

The variety of the conditions of soil, aspect, and elevation in the Chilikia and West Kotah Forests is so great, that it would be quite impossible to give an exhaustive account of all the different classes and descriptions of forest. The classes here described are mentioned merely by way of illustrating some of the more common features in these forests.

**Cuttings must be most carefully regulated.**

164. The cuttings here proposed to be made are selection fellings, which have the double object of utilising as much of the marketable timber now standing in the forest as possible and of promoting the growth of young sál.

In some of the compact forests of saplings and poles, successive cuttings by compartments or clearances in 100-foot lines may perhaps eventually be found to be the best plan of treatment. No cuttings are admissible except selection fellings, in the manner here suggested. Under these circumstances, it is obvious that the selection and marking of the trees to be cut must be done by intelligent and responsible officers, who must in each case judge for themselves.

One of the most remarkable features in the Chilkia Forest is the great increase in the number of bamboos which has taken place within the last ten years. There is now an underwood of bamboos under the sál in many parts of the forest, which promises to be of great value hereafter. This species of bamboo (*Dendrocalamus strictus*), as is well known, seeds sporadically. In the vicinity of Mohán large areas seeded in 1872 and 1873, and the young plants which then grew up from the seed are now nearly full grown.

**Summary descriptive account of compartments.**

165. In order to place the working of this forest on a satisfactory footing, I am disposed to suggest that the compartments be examined, at an early date, by an officer of the Working-Plans Branch, who should, with the aid of the local officers, draw up a brief and summary descriptive account of each.

The headings under which this descriptive account should be drawn up are those prescribed in the Forest Department Code. Special attention should be paid to the marketable trees which are fit for cutting, and to the effect which their cutting may be expected to have on the young growth of sál. The boundaries of these compartments may, if necessary, be modified, but upon the whole they seem to be well selected. They should be entered on a copy of the large scale map prepared by the Forest Survey, and copies of this map, without hill shading, reduced to half scale if necessary, and with the boundaries of blocks and compartments and the names and numbers of blocks and the numbers of compartments, should be printed for the convenient use of the local officers.

**Record of cuttings.**

•166. It is essential that a complete and accurate record be kept of the cuttings made in each compartment. Besides the entries in the prescribed registers, I recommend in the present instance that for convenient reference the chief data be entered by hand on the compartment map, *viz.*, year of cutting, number of trees cut, cubic feet of timber extracted. It will be understood that these entries are only intended to show the cutting of green sál trees. The object of these entries is to make the information readily available for inspecting officers.

**Timber how exported.**

167. The cuttings here proposed will probably result in the extraction of considerable quantities of timber, which it may be worth while to export in log. Defective trees will as hitherto be cut up and brought to depôt in scantling. I was much pleased to see the present arrangements for the export of such timber, which briefly are as follows:—The trees are cut and sawn up by the sawyers working under contractors, who are paid at certain rates per score or hundred pieces, according to the class of scantling. The pieces are carried by buffaloes, two or four pieces (according to size) by one animal, to a convenient place on the Mohán-Rám Nagar road, from whence they are carted to



Rámnagar. The people who undertake the carrying and the carting of the scantlings are generally Mussulmans from Káshipur or Moradabad. Separate contracts are made for the carting and for the dragging by buffaloes; and on rough and steep ground, if the scantlings have to be carried by men on to the road, a separate contract for this is made with people who come down from the hills for this work.

It is estimated that the payments made for the cutting and carriage of scantlings to Rámnagar aggregate 6 to 8 annas per cubic foot, while the amounts realized range from 8 annas to Re. 1-12 per cubic foot. Much better profits are generally made by the Forest Department on the extraction of timber in the shape of logs, the rates paid aggregating 8 to 12 annas, while the prices realized range from Re. 1 to Rs. 2-4 per cubic foot.

After the departmental operations, whether extraction of logs or of scantlings, have been completed, persons desiring to export timber are permitted to enter the forest, and they cut up and remove any trees previously marked, which were found not to be sufficiently good to justify extraction by Government agency. Purchasers are, as a rule, not allowed to enter the compartments for this purpose until after the completion of the forest operations, and it thus happens that the successive working of a compartment by Government and contractors extends over two or three seasons.

#### Works of improvement.

168. It now remains to say a few words regarding the work which has been commenced, and which is further required, for the general improvement of the forest. Creepers have been cut in the Garhi Bulchand Forest, outside at the foot of the hills; and trees of the less valuable kinds have been cut in a series of compartments on the right bank of the Kosi River, below the Dangari stream. These last named operations were commenced in 1878, and have since been continued annually. The following kinds were spared:—haldu (*Adina cordifolia*), jáman (*Eugenia Jambolana*), sain (*Terminalia tomentosa*), bákli (*Anogeissus latifolia*), dhaura (*Lagerstræmia parviflora*), dhamin (*Grewia vestita*), sándan (*Ougeinia dalbergioides*), amaltás (*Cassia Fistula*), gosham (*Schleichera trijuga*), genti (*Boehmeria rugulosa*), and harra (*Terminalia Chebula*). Mohwa (*Bassia latifolia*) was not spared. When these operations were first commenced, the trees taken out were not felled but girdled; but it was found that the girdling was insufficiently done and was difficult to control, so that the plan at present followed is to cut down the trees. In this operation it should be borne in mind that trees which habitually remain small—like *Phyllanthus Emblica*, *Tetranthera monopetala*, *Casearia*, *Antidesma*, *Grewia*, *Randia*, *Gardenia*—do not interfere in the least with the growth of sál, the latter going ahead of them and gradually suppressing them without any difficulty. Some of the trees which have been cut, such as the dhúdi (*Holarrhena dysenterica*), had perhaps better be spared. The wood of this and other allied trees is used largely for carving, and it is impossible to say whether it will not prove an important article of export. When trees of other kinds do not interfere with the healthy development of sál, their admixture is rather beneficial, as they will tend to counteract the development of caterpillars and other insects which are injurious to sál.

#### Other trees associated with Sal.

169. Upon the whole it must be said that in the West Kumaun Forests, as far as they are included within the fire-protected area, the trees of other kinds in sál forests are not very numerous, although there are large tracts of precipitous ground where bákli, sain, and dhaura prevail; and on stiff soil, especially near the bottom of valleys, there is a large proportion of sain. In the Meláni block also there is a large extent of mixed forest with little sál. But, speaking broadly, the cases are not numerous in which other trees are likely to interfere with the development of young sál, the chief exception being katbhiláwa (*Buchanania latifolia*), which is gregarious

and often covers large extents of ground to the detriment of sál. Yet, in the flats west of the Kosi, where this operation has been carried on, its effect upon the growth of sál will be beneficial, provided fire-protection continues to be successful in the areas in which these improvement cuttings have been made. There is no doubt, however, that the large mass of dry wood on the ground, which is the result of this operation, greatly increases the risk from fire. I would strongly urge, therefore, that in these compartments additional precautions be taken to guard against the inroads of fires, which, if admitted, would at the present time be extremely destructive. Fortunately, most of these woods will decay rapidly, but until the great\* mass of the wood now lying on the ground in these compartments has disappeared, I do not recommend the resumption of these operations, except in special cases simultaneously with the timber operations here proposed. The fact is that although the effect of these operations will doubtless be beneficial, yet they are not so urgent as to justify the increased risk from fire which they entail.

#### Plantations.

170. Experimental sowings of sál and other trees have been made on blanks stocked with grass in West Kotah. The plan pursued is to plough and sow a crop of grain, and, after cutting the crop, to plough in lines 15 feet apart, throwing up ridges along the lines. Unfortunately, the supply of sál seed was deficient in 1879 and 1880, so that the ridges were only sparingly sown and to a great extent with seed of other kinds. The result is that the plants in the lines are scattered, and it has been necessary to protect them with hoods of grass against frost and the sun of the hot season. The sowing in lines is correct, but in a case like the present I would strongly urge that along the lines a belt at least 12 to 18 inches wide be sown thickly with sál. It must be remembered that of the seed thus sown a small portion only survives, and the closer the young plants stand in the belts the more will they be able to protect each other.

#### The planting of Sal on a large scale not called for.

171. In a forest like Western Kumaun, where sál thrives so vigorously and where there is so large an area of sál forest, there is no necessity for sowing the tree artificially on a large scale. As an experiment, and with the view of improving our knowledge regarding the treatment of sál, it will be well to continue its cultivation on a small scale.

Blanks in the forest may, where the soil is rich and suitable, be utilized by cultivating tún; but, as a rule, I am disposed to advocate that all extensive blanks in this, as well as in the other forests of Kumaun and Garhwál, be utilized, either as grazing grounds, or by permitting cultivation on short leases. For this purpose it will be necessary to make very definite agreements with the cultivators regarding the pasture of cattle and the use of forest produce, so as to guard against injury to the adjoining forest and against encroachment. Eventually, I am of opinion that some of the forest land in West Kotah may, with great advantage, be let on long leases for the cultivation of tea. Tea plantations in the Darjeeling District, Bengal, are excellent customers to the forests, and consume large quantities of wood which would otherwise not readily find a market. These, however, are suggestions which cannot be taken up at the present time, but which will doubtless be acted upon at a future period.

#### Communications.

172. Besides the paths constructed along the fire-lines, there is an excellent system of cart-roads throughout these forests. Some of these roads are of a temporary nature, and have only been constructed to facilitate timber operations. Such is the system of cart-roads by which the Kojlia Forest has

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\* In Mowha-Ar and the adjoining flats a large number of mohwa (*Bassia latifolia*) trees have been cut, and it will probably be found that the wood of these trees will not decay for a long time to come.

been opened out, in which 300 trees were felled in 1880-81, most of which have been exported in the shape of logs. But the majority of the export roads are permanent, and, although they may not always be maintained in a condition fit for cart traffic, they can easily be converted into cart-roads when required, and they will always continue to be used for the export of scantling and wood of other kinds. The systematic arrangement of the cuttings here proposed will serve further to develop this system of export roads.

As an instructive instance of the system of export roads in these hill forests, I give below a brief account of the Kotlia Valley road and its feeders, built by Major Campbell, in 1879-80 and 1880-81, for the export of the timber cut in this forest.

The main road was 12 feet and the branch roads 10 feet wide, and the length and cost were as follows :—

	Rs.	A.	P.
Main Kotlia Sot road, length 4 miles 65 chains, breadth 12 feet, made in 1879-80 ... ..	1,155	15	0
The six branch roads, aggregate length 1 mile 18 chains, breadth 10 feet, made in 1880-81 ... ..	500	1	0
Total cost of construction ... ..	1,656	0	0
Cost of repair of the Kotlia Sot road in 1880-81 ... ..	165	10	0
<b>GRAND TOTAL</b> ... ..	<b>1,821</b>	<b>10</b>	<b>0</b>

315 trees were cut, yielding 13,600 cubic feet in the shape of logs. More trees will be cut and exported in the shape of scantling. The sketch-map appended illustrates the position of the work.

#### Rest-houses.

173. In the Kumaun Forests it is a matter of great importance to build a larger number of rest-houses, and the following is a list of the houses which, in accordance with the suggestions of Mr. Greig, the Conservator, I recommend should be built within the next ten years. It will be convenient to follow the plan adopted in Oudh, and to establish three classes of rest-houses :—

	Rs.
First class, two rooms in the upper story ... ..	3,500
Second class, one room in the upper story ... ..	2,600
Third class, ground floor only ... ..	550

#### *Rest-houses proposed to be built in the Kumaun Division.*

##### West Kumaun—

- 1 first class house at Rámnagar.
- 3 second class houses at Mohán, Leti, and Kalu Shahid.
- 10 third class houses at different places.

Abstract of cost.	Rs.
1 first class house ... ..	3,500
3 second class houses, at Rs. 2,600 each ... ..	7,800
10 third class houses, at Rs. 550 each ... ..	5,500
<b>Total</b> ... ..	<b>16,800</b>

##### East Kumaun—

- 1 first class house at Chorgalia.
- 2 second class houses at Barmdeo and Dandaki Toti.
- 12 third class houses at different places.

Abstract of cost.	Rs.
1 first class house ... ..	3,500
2 second class houses, at Rs. 2,600 each ... ..	5,200
12 third class houses, at Rs. 550 each ... ..	6,600
<b>Total</b> ... ..	<b>15,300</b>

The total cost of the rest-houses proposed for Eastern and Western Kumaun is thus estimated at Rs. 32,100, which, if spread over a period of ten years, will entail an annual outlay of Rs. 3,210.

#### Bamboos.

174. The export of bamboos from the forests of the Kumaun Division is as yet insignificant, as compared with the export of bamboos from the Garhwál Forests. Appended to this Report is a statement,\* drawn up by the local officers, showing the bamboos exported from each revenue station between Laldhang and Barmdeo, and the following are the total exports, in scores, during ten successive years :—

1871-72	...	...	...	...	...	119,000
1872-73	...	...	...	...	...	205,000
1873-74	...	...	...	...	...	223,000
1874-75	...	...	...	...	...	131,000
1875-76	...	...	...	...	...	157,000
1876-77	...	...	...	...	...	174,500
1877-78	...	...	...	...	...	122,000
1878-79	...	...	...	...	...	116,000
1879-80	...	...	...	...	...	77,000
1880-81	...	...	...	...	...	122,000

These figures give no indication of any increased export, although during this period the extensive bamboo resources of the Nindhaur Forests have been opened out.

#### Produce removed by purchasers.

175. The following statement exhibits the revenue realized on produce removed by purchasers from the Kumaun Forests during the last four years. It will be noted that the export of khair has increased from Rs. 4,400 to Rs. 10,200, and that of sissoo from Rs. 444 to Rs. 2,083.

*Revenue realized on produce removed by purchasers from the Kumaun Division from 1877-78 to 1880-81.*

Produce.	1877-78.			1878-79.			1879-80.			1880-81.		
	Rs.	As.	P.	Rs.	As.	P.	Rs.	As.	P.	Rs.	As.	P.
<b>a.—Timber—</b>												
1. Sál, dry or fallen...	36,981	2	11	33,974	14	6	28,680	12	8	46,484	8	8
2. Khair	4,425	2	3	6,235	15	6	2,509	12	9	10,219	8	5
3. Sissoo	444	6	11	358	13	8	673	15	10	2,082	14	2
4. Other timber	8,193	8	2	7,800	8	0	5,087	15	8	6,205	4	5
<b>b.—Firewood and charcoal</b>	3,664	6	8	2,223	6	6	3,488	13	10	5,786	6	4
<b>c.—Bamboos</b>	12,047	8	11	10,473	2	7	6,390	14	10	11,290	8	10
<b>d.—Grazing</b>	8,392	2	10	9,220	14	9	9,875	9	2	10,266	6	0
<b>e.—Other minor produce—</b>												
1. Grass, including bhabar	2,184	9	6	2,555	14	9	2,375	9	2	3,241	6	0
2. Other items	9,263	4	11	14,537	7	0	12,837	1	11	13,391	0	1
<b>Total</b>	<b>85,596</b>	<b>5</b>	<b>1</b>	<b>87,381</b>	<b>1</b>	<b>3</b>	<b>71,920</b>	<b>9</b>	<b>10</b>	<b>1,08,967</b>	<b>14</b>	<b>11</b>

#### System of collecting revenue on forest produce exported.

176. The following is a brief account of the system, commonly known as the Kham Táhsil system, under which revenue on forest produce exported by purchasers is collected. This system was organised by Sir H. Ramsay when in charge of the forests as Commissioner of Kumaun.

\* Appendix VI.

The usual practice is that certain tracts of the forests are, by a notification, declared open for the removal of certain classes of produce, such as firewood and charcoal, bamboos, grass, dry sál, &c. Any one who wishes to avail himself of this permission may enter the forests and extract these articles without a special license. But if any one wishes to export special articles, such as pieces of kúsam for sugar-mills, he applies for permission. Such permits are only granted by the Divisional Officer. It is considered to be an advantage, and to facilitate control, not to open the whole of the forest, but only certain tracts at a time. But, as a matter of fact, the whole forest area has always been open for the export of bamboos, grass (including bhabar), firewood, and most articles of minor forest produce.

Exporters are obliged to pay the dues for the produce and to take out a pass at the revenue station nearest the road by which they leave the forest. There are about twenty-two revenue stations in Kumaun, of which Rámnagar, Haldwáni, Chorgalia, and Barmdeo are the most important. The pass contains a full account of the produce paid for, and must be delivered up by the exporter at one of the check stations, most of which are on the lower road which runs near the boundary of the Tarái District. The original passes are all collected by the Foresters, who are in charge of the line of check chaukis, and who send the passes to the divisional office, where they are compared with the daily returns sent from the revenue stations.

At the head of the Kham Táhsil is a Forest Ranger, who is expected to travel continually along the line. A few of the revenue and check stations—such as Haldwáni, Káladhúngí, and Rámnagar—are kept open throughout the year, but the majority are generally closed from about the end of June to the beginning of November. During this period the Kham Táhsil establishments at the stations which are closed are on leave on half-pay or on smaller allowances.

Receipts and Charges. Local Staff.

177. The receipts and charges of the Kumaun Division during the last three years have been as follows:—

					1878-79.	1879-80.	1880-81.
					Rs.	Rs.	Rs.
Receipts	...	...	...	...	1,70,856	1,65,574	1,85,371
Charges	...	...	...	...	70,862	73,649	72,140

Mr. Greig, the Conservator, recommends the following staff of Rangers and Foresters for this division:—

Rangers.	Foresters.	Remarks.
1 on Rs. 150, Western Kumaun.	1 on Rs. 40	Rangers sanctioned— 1 permanent on Rs. 70. 1 temporary on Rs. 120.
1 „ 60, Eastern „	2 „ 30	
„ 80, Superintendent, Kham Táhsil.	5 „ 20	Foresters sanctioned— Permanent—1 on Rs. 40, 1 on Rs. 35, 1 on Rs. 30, 1 on Rs. 25, 3 on Rs. 25, 4 on Rs. 20, 3 on Rs. 15. Temporary—1 on Rs. 20 for eight months and on Rs. 10 for four months, 7 on Rs. 15 for eight months and on Rs. 4 for four months, 3 on Rs. 15 for twelve months.
1 „ 50, for Roads?	4 „ 15	
	1 „ 30, Timber operations.	
	1 „ 30, Depôt.	
	2 „ 30, Deputy Superintendents, Kham Táhsil.	
	1 „ 15 { Writer with Superintendent, Kham Táhsil.	

## CHAPTER VII.

## SUBMONTANE FORESTS IN GARHWÁL.

## Ganges Division separated from Garhwal Division.

178. The forests which occupy the outer hills of the Himalaya, between the open country at the foot of the hills and the open country on the higher hills in the Garhwál District, and which is bounded by the Phika River on the east and the Ganges on the west, supply Western Rohilkhand and a large portion of the Doáb with timber, firewood, and bamboos. A belt, varying in width on the northern edge, has been set apart to provide for the residents of the adjoining villages in the hills; and on the lower edge also a considerable area has been excluded from forest limits, to suit the convenience of the villages at the foot of the hills in the Garhwál and Bijnor Districts.

The area of these forests, arranged according to civil districts and to forest divisions, is as follows :—

Forest Divisions.					In Bijnor District.	In Garhwál District.	Total area of Forest Divisions.
					Acres.	Acres.	Acres.
Garhwál	...	...	...	...	15,719*	268,320	284,039
Ganges	...	...	...	...	20,882	90,560	111,442
			Total	...	36,601	358,880	395,481

The boundary between the Garhwál and Ganges Divisions is the valley of the Koh River, near Kotdwára.

## Garhwal Division, Behar Forest.

179. The Garhwál Forest Division, as at present constituted, comprises 268,320 acres in the Garhwál District, and the Behar Forest, measuring 15,719 acres, in the Bijnor District. The Behar Forest is a stretch of high ground, about nine miles long and on an average three miles wide. The upper portion of this forest is reported to be stocked with sal poles of smaller dimensions and less densely grown than those in the adjoining forest of Garhi Bulchand in Kumaun; while the lower portion consists of broken ground stocked with kathhiláwa (*Buchanania latifolia*), thorns, and grass. This forest furnishes, for export, timber, firewood, grass, and other minor produce. It was formerly under the Collector of Bijnor, and was transferred to the Forest Department in November 1879. It has been worked under the Kham Táhsil system since the autumn of 1880. There are no grazing rights in the forest, but the north-eastern corner has been left open for the pasture of cattle belonging to three villages on the submontane road, and the low-lying land (khádar), which is flooded every year by the Phika Nadi, is annually let out for grazing. With these two exceptions, the whole area is under protection against fire, the arrangements for which were commenced in the autumn of 1880.

## Forests in the hills of the Garhwal District.

180. The large area of forest in the outer hills of the Garhwál District is drained by the Kohtri River, a tributary of the Koh, and by the Rámghanga and

\* Besides this area, there is the southern part of the Chánda Forest, under the Collector of Bijnor, measuring 18,497 acres; hence the figures entered in the Report for 1880-81 are :—Bijnor District 34,216 acres, Garhwál District 268,320 acres; total 302,536 acres.

its feeders, the chief of which are the Sona Nadi and the Palain\* and Mundál Rivers. The Mundál River forms the northern boundary of the forest, if two blocks be excepted, the one called Gui, opposite to Banjadeh, the other Kalakhan, near the junction of the Mundál and Rám-ganga Rivers.

For administrative purposes and for working, the hill forests of the Garhwál Division may most conveniently be divided into the following six ranges:—Dháron, Sona Nadi, South Pátli Dún, North Pátli Dún, Palain, and Kohtri Dún.†

#### Dháron and Sona Nadi Ranges.

181. Two of these ranges are situated in the outer Siwálik portion of the hills, viz., the Dháron and the Sona Nadi Ranges, and they are separated by the Rám-ganga River. The northern boundary of the Dháron Range is formed by a fire-line, which runs from Boksár to Jamnágár on the Kothiráo, near the Kumáun boundary. The northern boundary of the Sona Nadi Range is the crest of the high ridge which separates that valley from the valley of the Mandálti River.

The land included in these two ranges consists chiefly of irregularly broken ground, alternating with a considerable extent of flats in the principal valleys.

The forest is irregularly and very imperfectly stocked, mostly poor and open, the most valuable trees being bambóo and scattered patches of sál, nowhere of considerable extent, in the valleys and on the flats. Sissoo and khair of small dimensions are found along the beds of rivers.

#### Shishamkhata Forest.

182. The only portion of these outer Siwálik ranges that is protected against fire is the sál forest of Shishamkhata, below the hills west of the Rám-ganga River. The most valuable portion of this forest consists of about 2,000 acres of nearly level ground, forming two distinct terraces. The whole area must at one time have been one of the finest pure sál forests in these hills. The soil is a deep loam, and very well suited to the growth of sál. But this forest, being easily accessible, was cleared of all marketable timber probably before 1858. The tops and branches, and in many cases entire trees which were cut, but not removed, remained on the ground and increased the violence of the annual fires, thus preventing most effectually the growth of young sál.

At present the ground is stocked with scattered, large, hollow trees, and with groups and patches of tall and vigorous poles. Save along the ravines, there is hardly any kind of tree besides sál. Between the trees the ground is covered with grass, which is more than 6 feet high on the lower terrace and about 3 feet high on the upper. Above the upper terrace the sál forest extends for a considerable distance up the slope of the hills.

Successful fire-protection commenced in 1878, and the upper portion has been saved during the three successive hot seasons of 1878, 1879, and 1880. During 1880 the whole of the forest was protected. The result of this protection is seen in a large number of seedlings and coppice-shoots among the grass, which, if protection is successfully continued for a few years longer, will develop and kill out the grass. Thenceforward fire-protection will be easy, and the satisfactory progress of the forest will be secured.

\* Called Peláni on the accompanying Map.

† The following is the estimated total area and the area of sál forest, in acres:—

Ranges.	Total area.	Area of sál forest.
Rehar ...	22,000	20,000
Dháron ..	37,120	10,000
Sona Nadi	58,240	20,000
South Pátli Dún	30,080	15,000
North Pátli Dún	58,240	50,000
Palain ...	40,960	30,000
Kohtri Dún	42,880	30,000
Total ..	289,520	175,000

## Young growth of Singrau.

188. The second point is the large quantity of young growth of singrau (*Tetranthera monopetala*), both on the lines and in the forest. This species, as is well known, does not, save in exceptionally rich soil (as at Ruhni), attain any large size. It is a soft wood, which bears seed while a shrub, and it will probably not in any way injuriously affect the growth of sál in this forest.

## Cutting of Sandan and Sal.

189. In this range the large quantity of sándan is remarkable. I understand that there is a considerable demand for this wood. At present only dry sándan is allowed to be cut. As a rule, it will at present be more convenient to cut sándan in the North Pátli Dún Range, where, as will be explained further on, regular cuttings of sál are recommended. However, I see no objection to the occasional cutting of a small number of mature sándan trees in the South Pátli Dún Forests.

As regards sál, all that I can say at present is that the effect of continued fire-protection must be watched. After the young growth has progressed sufficiently, a certain (though not a very large) quantity of marketable timber will be available in this range. But in the greater part of it, it will be necessary to cut, simultaneously with sál, trees of other kinds.

## Roads: cutting of creepers.

190. With the exception of the two roads previously mentioned, and of the Boksár-Barsoti and Boksár-Rámnagar roads, which are both used for traffic, very few of the fire-lines have as yet been used for the export of dry wood from the forests. I am disposed to advocate that some of the transverse lines be made fit for cart traffic, and it should be noted whether the effect of the measure will be to increase the export of dry wood.

A measure of a different kind, which is urgently required for the improvement of this forest, is the cutting of creepers, which are very common and very destructive.

## North Patli Dun Range.

191. The North Pátli Dún Forest is bounded by the Rám-ganga River on the east and south, by the Palain on the west, and by the northern boundary of the forest and the road from Palain to Jharrat on the north.

The Taria ridge, which forms the line of water-shed between the Mundál and the Haldgadi Rivers on the north and the Rám-ganga on the south, runs within a distance of less than one mile from the valleys of the Mundál and the Haldgadi, while its distance from the Rám-ganga averages four miles. The average elevation of the Mundál Valley is 2,000 feet, while the Rám-ganga Valley at Taulia is only 1,200 feet high, the highest point of the ridge which divides the waters of these two streams being 3,850 feet.

With the exception of one-and-a-half miles from the mouth and half-a-mile at the west end, the northern slope of the hills towards the Mundál is open to the exercise of recorded rights, the chief of which are pasture of cattle and the cutting of timber, including sál, for their own requirements, on free permits granted by the Divisional Officer.

Protection from fire has not yet been attempted in a regular manner in this portion of the range, but it should be mentioned that the villagers



themselves have protected the forest during the hot season of 1880, and it is intended, with their assistance, to make an attempt to protect this portion also permanently.

The hills which compose the North Pátli Dún block are drained by numerous feeders of the Rám-ganga and Palain Rivers, of which the following are the most important :—

(1) The Adnála : the forests in the basin of this stream have, with few exceptions, never been worked. (2) The Baila Nala, which drains a large area of undulating ground that has been most heavily worked. These two streams are feeders of the Palain River, and the following join the Rám-ganga direct :—(3) the Gaujera, (4) the Phulai, (5) the Keláni, which joins the Rám-ganga at Taulia, (6) the Boksagadi, (7) the Bilot, (8) the Maulia, (9) the Khakasgadi.

#### Valuation survey why made.

192. Owing to the difficulty of carriage, the forest near the head-waters of these streams, and the whole forest drained by the Adnála, the Khakasgadi, and the Maulia Rivers, have been worked either not at all or only to a small extent; and it was therefore decided in 1877 to make a regular valuation of the forests which have now been included in this block, with the view of basing thereon a regular plan of working. As a matter of fact, these forests are, with few exceptions, the only ones in Garhwál where any large quantities of mature sál timber remain, and where consequently cuttings on a large scale can now be made.

Mr. Dansey was employed during the open seasons of 1877-78, 1878-79, and part of 1879-80 in making the valuation survey of this forest, in dividing it into compartments, and in drawing up the outlines of a working-plan. It will suffice in the present pages to refer to Mr. Dansey's Report, and briefly to state the conclusions which, after examining a portion of the ground, I have formed with regard to the future treatment of this area.

#### Slope towards the Mundal excluded

193. That portion of the northern slope towards the Mundál River which is open to village rights has been excluded from the Report, but a separate valuation survey of it has been made.

As might be expected, this slope, which has hitherto been subject not only to the annual fires, but also to constant grazing of cattle, shows very poor reproduction; and, although there is a large quantity of mature timber on the ground, cuttings cannot be contemplated until protection from fire has been established and has been continued for a considerable period.

#### Three large blocks.

194. The area to which Mr. Dansey's proposals relate comprises 50,781 acres. It has very properly been divided by him into three great divisions or groups of compartments, which differ in the character of the forest and in the degree to which the forest has been worked. The term "division" in this case is likely to cause confusion, and I prefer to regard these groups of compartments as blocks for the present, and to designate them as the Rám-ganga, Taria, and Adnála blocks. The whole of these three blocks, excepting the south-western portion, has been divided into compartments, and the trees of the

Regarding the future treatment of this extremely valuable forest, it will suffice to say that no effort must be spared to ensure continued protection from fire, and that after the ground has become completely stocked with young growth, and after that young growth has sufficiently advanced to be safe from frost—which is unusually severe, particularly in the lower portion—large quantities of marketable timber may be cut. In selecting the trees to be felled, due regard should be paid to the circumstance that in this rich soil young scattered trees will rapidly increase in size and value, and that therefore it may in some cases be profitable to leave groups of vigorous young trees standing.

#### Sal in the rest of the Dharon and Sona Nadi Ranges.

183. In the rest of these two outer Siwálik ranges, there is nowhere any sál forest to be compared to that of Shishamkháta. Groups and patches of poles and old trees, as already stated, are found here and there, but there are no forests which, for the sake of the sál, seem at present to require special protection.

As regards the extraction of bamboo and khair from these outer hills, existing arrangements must continue for the present. The forests in the inner ranges require special protection more urgently, and hence I do not at present advocate any change in the management of the Dháron and Sona Nadi Ranges.

#### South Pátli Dún Range.

184. The hills to the north of these two outer ranges may most conveniently be divided into three ranges, the South Pátli Dún, the North Pátli Dún, and the Palain Ranges.

The South Pátli Dún Range comprises the hills south and east of the Rám-ganga River and the level ground on the left bank of that stream. It is traversed by two roads leading from Dháron, at the foot of the hills, to the country north of the Mundál River. The western road is called the Sirakiráo road, and the eastern the Taulia road. It is also traversed from west to east by the forest road from Boksár to Barsoti. Partly through the southern part of the range runs the road from Boksár to Rámnagar.

#### Fire-protection.

185. Along the crest of the ridge which bounds the Rám-ganga Valley on the south, and which it will be convenient to call the Dánapáni ridge, a fire-line has been cleared and a bridle-path made. An intermediate fire-line has been cleared between the crest and the Boksár-Barsoti road. There are also a number of intermediate fire-lines from the northern edge of the forest to the crest, and some from the crest to the outer fire-line.

Between the lower edge of the forest and the Rám-ganga River intervenes, from Boksár to Sarapduli, a continuous stretch of grass land about ten miles long and on an average one mile wide. A great portion of this land was formerly cultivated, and near Dhikani there are the remains of old temples, with carvings, and of an old fort. The present practice is to burn these grass lands early in the season, and the whole of the forest above them is protected against fire.

The first attempt to protect this portion of the forest was made in 1864 by Mr. R. Thompson, then Assistant Conservator under the Commissioner, but it failed, because the fire-lines made by him were too narrow. Fresh attempts

were made in 1873, and in 1874 six square miles between the ridge and the Rámanga River were saved. The protection of that portion was attempted annually, but not with uniform success.

South of the range protection was commenced in 1877, but here also success was only partial. The first time when the whole forest escaped from fire was the hot season of 1880.

#### Character of forest.

186. Regarding the general character of the forest in this range, it will suffice to say that the slopes south of the ridge are similar in character to the Dháron Range, with a large amount of chr; but in the lower part there is a considerable area under sál similar to; but not so extensive as, the sál forests in the lower Ratapani tract in the Meláni block of Western Kumaun. Cuttings were made near the Gaujpani in 1880, yielding 70,000 cubic feet of timber. There are other tracts south of Dánápani which will yield mature timber after fire-protection has made some progress; but no operations are recommended at present in this part of the range.

North of the Dánápani ridge the character of the forest differs widely, according to the nature of the ground. On broken ground and near the crest of the ridge the forest is more mixed and open, and creepers are exceedingly numerous. On gentle slopes and on level ground near the northern end of the forest, the growing stock consists chiefly of large hollow or irregularly shaped trees, the ground being covered with grass or with irregular young growth, in which in many places dhaura (*Lagerstræmia parviflora*) preponderates. Here, as elsewhere, it is evident that in good deep soil this species thrives in spite of the fires, just as on hilly ground katbhláwa (*Buchanania latifolia*) seems to resist the fires, and is here, as elsewhere, often seen covering considerable tracts on the slopes.

Protection from fire will doubtless have the effect of stocking the ground with a satisfactory young growth of sál; but the young forest which will grow up in the South Pátli Dún Range will, in most cases, be of a very mixed character.

An exception must, however, be made in regard to that part of the South Pátli Dún Forest which is on level ground near the river. This is in every respect similar to Shishamkháta, and will, if protected from fire, probably grow up into a nearly pure sál-forest.

In the western part of the South Pátli Dún Range, north of the Dánápani ridge, are considerable areas of forest of sál poles, which would seem to indicate that the forest in these places was cut, possibly for the sake of cultivation, at a period previous to the time when the Pátli Dún Forest was worked by Captain Read.

#### Young growth on abandoned fire-lines.

187. A few points of special interest should here be mentioned. In 1873 and 1874 a large number of transverse fire-lines, 60 feet wide, were cut running from the crest of the hills to the Boksár-Barsoti road, some of which have not been maintained and have not been cleared since they were cut. Here and there, but only on very favourable soil, have these lines become stocked with young growth of sál. In most cases they are imperfectly stocked with young growth of other trees, among which *Lagerstræmia* is prominent, although the number of seed-bearing sál trees in the vicinity of these lines is generally considerable.

different classes have been counted. The following is an abstract of the area of these three blocks :—

Blocks.	Area.	Number of compartments.	Average area of compartments.
	Acres.		Acres.
I.—Rámganga ... ..	27,551	51	347
II.—Taria ... ..	14,336	44	326
III.—Adnála ... ..	8,894	19	468
Total ... ..	50,781	114	

\* These 51 compartments only comprise an area of 17,687 acres, the rest not having been divided into compartments or surveyed.

#### Rámganga block.

195. The Rámganga block (Mr. Dansey's first division) comprises the entire basin of the Baila Nala and of several other streams in its vicinity which fall into the Rámganga, as well as the lower course of the Gaujera basin, nearly the whole basin of the Phulai, and the lower two-thirds of the Kelani and Boksagadi Valleys. This block, as pointed out in the Report, is very accessible, and has therefore been worked to such an extent that it contains little beyond isolated and mostly unsound old sal trees, with small poles and groups of saplings.

Mr. Dansey correctly recommends that this block must be left undisturbed and carefully protected from fire for a period of eight or ten years, when it may be expected that a uniform young forest of sal will occupy most of the ground, and will permit the removal of the remaining old trees as far as they are marketable.

In this block the soil is generally deep, and the conditions for reproduction are exceedingly favourable. It has another advantage, that its elevation is less than that of the other blocks. The elevation is estimated by Mr. Dansey at 1,800 feet on an average.

#### Taria block.

196. Taria block (Mr. Dansey's second division) comprises the hills drained by the Khakasgadi and Maulia streams, and the upper portions of the Gaujera, Kelani, and Boksagadi basins. It also comprises the upper part of the hills and that portion which faces the Rámganga, where this river forms the boundary between Kumaun and Garhwál. Regarding this block I cannot do better than give the following extract from Mr. Dansey's Report :—

*Constitution.*—This division comprises 44 compartments, the average area of each of which is 326 acres. If we except a very slight and partial working of compartments 1, 2, 3, 4, 12, 13, 14, 17, 19, 27, 28, 29, 38, this portion of the working circle has never been felled over for timber purposes. The reason of this lies apparently in the distance of the region, the greater difficulties of transport, and the steeper and more rugged nature of the ground. As a general rule, the compartments are here separated by very distinct natural features, and present within themselves a condition of vegetation that is apparently different in the case of every compartment.

*Configuration of the ground.*—About two-thirds of the area of this division are included in the upper extremities of the basins which go in great part to form division I. The water-shed of the Rámganga and Mundál forms the highest point of this region. As might be expected, the several large streams already known to the reader have greatly narrowed themselves here, while the ground has become decidedly hilly, steep, and difficult when compared with that of division I. With few exceptions, an alternation of steep, stony slopes and narrow, deep gorges distinguishes all this region. Again, the ground is always prominently exposed at some aspect or another. The low, undulating, ill-defined features

which so largely characterise division I have here quite disappeared. The remaining third or more of this division, comprising all the easterly extremity of the working circle, has, in every respect, the same general features as the above. Although here, as elsewhere, cold and warm expositions alternate with one another, even in the case of the same compartment, the proportion of ground with aspects favourable to good sal vegetation is considerable. The average altitude of all this tract can be put down at 2,000 feet above the sea and 800 feet above the river. The average angle of slope can be roughly estimated at 25 degrees.

*The soil and underlying rock.*—In this division, extreme qualities as regards the soil recur at very short intervals in the case of every compartment. The general steepness of the ground and its indefinite division by ravines, running in a great variety of directions, are the corresponding causes of great changes over small areas in the aspect, and hence in the soil itself. There are but few compartments in this division which cannot be said to include both extremely good soil and extremely bad soil, and the proportion of the one to the other varies according to the situation of each compartment. The soil at warm aspects is, outside the ravines, hollows, or depressions (situations not only protected, but in which the soil has accumulated from the higher regions), extremely stony, dry, thin, and barren. It is here mainly gravel with larger stones intermixed, both produced by the disintegration of the underlying shales and sandstones, the more clayey or sandy particles of which have been washed down to lower levels. At cold aspects, and in enclosed localities, the soil is deep, fresh, and rich in mould, or thin and stony (or even rocky), according as the ground is very steep or the reverse. The elements in the soil are much the same here as at other aspects, sandy or clayey loam being prevalent in bottoms and gravel or a gravelly loam on the slopes.

*Condition of the forest.*—As we might expect from what has already been said touching the sudden and constantly recurring changes in the aspect of the steep slopes characterising this division, there are great corresponding differences in the vegetation. Pure forest of sal on one side of a ravine is opposed to very mixed forest on the other. In the former we often see superb trees, in the latter almost always miserable specimens of all species. In this division the ground is generally well covered, in which it differs from division I, which has been, as I have already said, worked over at repeated intervals. In consequence, trees of all ages, and sound and unsound trees, recur here in more just proportion, or, at any rate, the relation in which they are found is more natural than in the case of division I. But even here the proportion of old trees is disproportionate in the majority of the compartments. \* \* \* Fires have hitherto been an annual occurrence in this as in the other divisions, and the success of the young seedling is only ensured after a long course of years, during which it can be said to have lived in a continuous fashion underground only, the shoots sent forth by the root each year having been subject to annual destruction by fires. To this fact may be partly due the present scarcity of young trees. To it is certainly due the gnarled and sickly appearances of so many of them. Although, from the absence of young growth, the old trees are often more apart on the ground than they should be, there is apparently a rich supply of sal timber immediately available in this division, as also of sain. Bamboos are particularly abundant and fine throughout the division."

#### Adnala block.

197. The Adnala block (Mr. Dansey's third division) comprises the basin of the Adnala, which, as already stated, has never been worked, and which, as Mr. Dansey correctly observes, presents certain marked differences, in the vegetation, the ground, and other important particulars, from the second block. This block consists of two unequal portions, which are separated by the high ridge of water-shed between the Haldgadi and Adnala streams, which is a continuation of the Taria range of hills. This narrow steep slope, which faces the Haldgadi and its feeder the Shivalia, west of the Haldgadi Pass, as well as the Nauni Nala, a feeder of the Mundal, east of the pass, is stocked with one of the finest sal forests in Garhwál, consisting of trees and poles of all ages, with a considerable quantity of well grown mature timber. The cover in many parts is so dense that it has protected itself against fire, and the ground is covered with the dry leaves of several seasons. The rest of the block comprising the Adnala Valley may most conveniently be divided into three portions—the right bank, the greater part of which faces south; the head of the valley; and the left bank, consisting mostly of northerly slopes, many of which are as well stocked and as valuable as the slopes facing the Haldgadi Valley.

One characteristic feature of this block is the scarcity of bamboos, and another is the large extent of poor clayey soil, stocked at present with forest more or less open and stunted, in which the trees do not grow to any large size, and attain maturity with a girth of 4 or 5 feet. This portion of the forest resembles many tracts of eng forest (*Dipterocarpus*) on poor soil and broken ground in Burma. But even this part of the block, which is the least promising, will certainly improve if continuously protected against fire. Upon the whole, the Adnala block is an exceedingly valuable portion of the Garhwál Forests.

Annual maximum yield as regards Sal.

198. As regards working, Mr. Dansey correctly advocates that cuttings during the next period should be limited entirely to the Taria and Adnala blocks (Mr. Dansey's 2nd and 3rd divisions). Although we have a complete knowledge of the growing stock of different sizes in this working circle, we are here, as in the Nindhaur Forests, under the great disadvantage that we know very little regarding the rate of growth of sal. Based on the data which are at present available, Mr. Dansey has estimated the annual yield of the forest, if worked according to strict conservancy principles, at 3,626 trees above 4 feet 6 inches in girth, of which he expects that 2,568 trees will be sound.

I have no reason to doubt the correctness of his conclusions, but it seems to me prudent in this case, as in that of the Nindhaur Forests, to limit the cuttings during the next few years to a figure considerably below the possible annual yield of the forest. When we are as yet in uncertainty regarding one of the two great factors upon which the provisions of the working-plan must depend, this is undoubtedly the proper course to follow. Assuming that the average yield of the trees which will be felled in these forests will be 30 cubic feet each, an annual outturn of 50,000 cubic feet may be obtained by the felling of 1,667 trees. And I am of opinion that for the present we ought to be satisfied with an annual outturn of 50,000 cubic feet.

Two classes of cuttings (of Sal) proposed.

199. Considering the general character of the forest, it is evident that two classes of cuttings may be made—*first*, in those portions where it is necessary to cut out the larger trees, in order to give sufficient light to enable the young growth of sal to spring up and to develop vigorously; *second*, the cutting out of the marketable timber on ground which is already stocked with young growth. Before, however, discussing the principles which should guide these cuttings, it will be necessary to consider the present condition of these forests in regard to fire-protection.

Fire-protection in this block was commenced in 1877, but without success; and it did not succeed until 1880, when the whole area east of the Keláni Valley was protected. Steps have been taken this season to extend protection to the Gaujera Nadi, and it is most desirable that, as soon as possible, the whole of the forest included in this area should be protected. As regards the Adnala basin, there ought to be no difficulty, as it is at present quite inaccessible and not visited by anybody. The greatest difficulty will probably be experienced in the south-west corner, comprising the Baila Nala and adjoining basins, but no efforts should be spared to overcome this difficulty.

Cuttings (of Sal) at present only admissible in forests hitherto untouched.

200. From these remarks it will be understood that no part of the forest is sufficiently advanced to justify cuttings of the second class as defined above.

It must be remembered that matters here are in a position quite different from what they are in West Kumaun, where fire-protection has been continuously successful for the last five years, and where over large areas the young growth is sufficiently advanced to enable us to cut out the old timber standing over a well-stocked forest of saplings and young poles. Hence the only cuttings which are admissible, and will be admissible for a long time to come, are those in forests not yet touched, where it is necessary to remove a portion of the larger trees in order to give light for the young growth to come up.

#### Sketch of arrangements proposed.

201. The following is a sketch of the arrangements under which I suggest that the annual cuttings during the next twelve years at least, but probably during a longer period, should be made.

In framing any arrangement of cuttings in these forests, the main point to be kept in view is that, in a forest in which fire-protection has only just been commenced, cuttings must be made with the greatest caution. It has already been explained that in this respect the conditions are widely different from what they are in the West Kumaun Forests, which have been successfully protected from fire during the last five years, and where in consequence the young growth has made considerable progress. Until this point has been attained, cuttings are admissible only in selected localities, where the cover overhead is so dense that unless light is given the young growth cannot come up.

#### Limitation of cuttings (Sal).

202. Mr. Dansey's proposals, which have been carefully considered, amount to this, that during the next ten years 3,626 mature sal trees, down to 18 inches in diameter, may be cut annually, the cuttings being confined to the Taria and Adnala blocks (divisions II and III). As already explained, I am of opinion that, considering the backward state of protection of this area, the annual cuttings during the next period must be confined to a much smaller quantity, and that these cuttings should only be made in selected localities, where the forest consists mainly of mature timber.

#### Order of cuttings.

203. As regards the order in which these cuttings should be made, two points must chiefly be taken into consideration—the condition of the forest, and the convenience of working.

Cuttings have been commenced this year (1880-81) in compartment No. 15, Ramganga block (division I), on the left side of the Gaujera Valley, where 237 trees, in girth above 4 feet 6 inches, were marked in 1880, most of which have been cut and exported in the shape of scantling. Operations having thus already been commenced in this basin, which is readily accessible and which does not require much immediate outlay for roads, &c., it will, in the opinion of the local officers, be convenient to continue them here; and although there are other portions of the range which are further advanced as regards fire-protection, and where the condition of the forest is otherwise more ready for immediate cuttings, there is no objection to the continuance of cuttings in this basin at present.

The following statement shows the compartments in which cuttings are proposed to be made, and the order in which they are proposed to be taken up, with the area of each compartment, and the number of trees, in diameter above 18 inches, counted in them by Mr. Dansey :-

Abstract of compartments in the North Pálli Dán Range in which fellings are proposed to be made during the twelve years from 1881-82 to 1892-93.

Year of fellings.	LOCALITY OF FELLINGS.		Area, in acres.	NUMBER OF SAL TREES COUNTED.			REMARKS.			
	Name of basin.	Number of block and compartments.		First class, above 3 feet in diameter.	Second class, from 18 inches to 3 feet in diameter.	Above 18 inches in diameter, per acre.				
1881-82	Gaujara.	I 15	624	1,601	2,245	6 16	Left bank of Gaujara.			
		" 17	460	1,634	1,797	7 63				
		" 13	379	908	1,431	6 19				
		" 19	290	568	1,037	5 55				
		" 14	340	532	1,311	5 42				
			2,091	5,243	7,821	6 28				
1882-83	Gaujara.	II 3	429	786	1,596	5 64	Right bank of Gaujara (lower portion).			
		" 4	252	416	913	5 27				
		" 5	479	1,339	2,473	7 74				
		" 10	333	654	1,559	6 69				
		" 11	337	829	1,671	6 46				
			1,870	3,934	8,202	6 49				
1883-84	Gaujara.	II 1	204	340	582	4 56	Right bank of Gaujara (upper portion).			
		" 2	479	896	2,064	6 16				
		" 6	436	1,548	2,782	9 93				
		" 7	347	654	1,773	7 00				
		" 8	440	534	1,814	5 33				
			2,180	4,322	10,325	6 72				
1884-85	Khakagadl.	II 38	649	2,591	3,518	9 42	Left bank of Mundál.			
		" 39	233	896	1,346	6 63				
		" 40	342	524	1,468	5 91				
		" 41	267	608	1,163	6 62				
		" 42	223	363	606	4 33				
		" 43	163	169	616	4 61				
		" 44	385	870	3,017	10 10				
					2,261	6,021		11,762	7 67	
1885-86	Haldgadl.	III 1	942	2,202	6,962	9 72	Left bank of Haldgad, Bhiyaha, and Naun streams.			
		" 2	169	152	533	4 04				
		" 3	96	76	342	4 35				
		" 4	184	178	704	4 79				
		" 5	406	1,009	2,188	7 66				
			1,797	5,617	10,724	7 98				
1886-87	Adnála.	III 15	456	1,888	3,091	10 91	Left bank of Adnála (lower end).			
		" 16	252	1,137	1,899	12 03				
		" 17	123	914	884	9 79				
		" 18	130	249	820	8 22				
		" 19	265	325	1,261	5 98				
			1,225	3,913	7,955	9 68				
1887-88	Adnála.	III 12	209	712	1,557	10 66	Left bank of Adnála (middle portion).			
		" 13	810	882	1,886	9 24				
		" 14	739	2,943	4,880	10 59				
					1,268	4,537		8,423	10 30	
1888-89	Adnála.	III 9	824	1,435	4,022	6 62	Sources of Adnála.			
		" 10	413	884	1,949	6 84				
		" 11	478	1,904	3,496	11 30				
			1,715	4,220	9,468	7 98				
1889-90	Adnála.	III 6	631	1,530	3,565	9 59	Right bank of Adnála.			
		" 7	763	1,323	3,977	6 55				
		" 8	1,603	3,111	7,890	6 55				
					2,896	5,964		15,422	7 39	
1890-91	Kelani-Boksagadl.	I 29	438	998	1,730	6 23	Head of the Keláni and Boksagadl streams.			
		II 17	241	347	765	4 57				
		" 18	410	648	1,867	6 11				
		" 19	471	852	1,894	5 40				
		" 20	261	213	662	3 36				
		" 21	347	206	942	3 32				
		" 22	337	557	1,964	6 00				
		" 23	345	353	1,048	4 08				
					2,850	4,181		10,162	5 03	
1891-92	Bilot.	II 24	343	491	1,175	4 35	Head of the Bilot Valley.			
		" 25	517	393	913	4 12				
		" 26	197	347	1,161	7 46				
		" 27	369	791	1,282	5 62				
		" 28	428	810	1,487	5 36				
			165	803	607	9 09				
			1,809	3,635	6,625	5 67				
1892-93	Maulia.	II 30	466	1,443	2,441	8 52	Right bank of the Rámanga, near the mouth of the Mundál.			
		" 31	415	616	1,415	4 89				
		" 32	275	180	682	2 76				
		" 33	150	450	665	7 21				
		" 34	387	507	1,055	3 99				
		" 35	90	103	310	4 57				
		" 36	251	429	951	5 49				
		" 37	186	333	945	6 87				
					2,210	4,036		8,344	5 60	
					24,152	53,623		115,223	6 99	



## Gaujera basin

204. It will be noticed that that portion of the Gadjera basin in which cuttings are proposed to be made comprises 16 compartments, two of which (15 and 17) belong to the Rámanga block (division I), while the remainder are in the Taria block (division II). All these compartments contain patches of well-stocked forest, in which the removal of a proportion of the larger trees is necessary, in order to promote the reproduction of sál.

To 1881-82 I would assign the remaining compartments on the left side of this valley, two of which, though situated in the Rámanga block (division I), may be included, as they contain a sufficient area of well-stocked forest. From the figures of this statement it will be noticed that the total area assigned to this year is 2,081 acres, on which 5,243 trees of 2 feet diameter and upwards, and 7,821 trees between 18 inches and 2 feet in diameter, have been counted.

The existing practice in timber operations in Garhwál is to measure the girth and not the diameter, and there is no reason why, for the present purpose, we ought to insist on a change of this practice. As a rule, I think it will be well to lay down that no trees under 6 feet in girth should be cut, but that exceptions be made in localities where, owing to poor soil or other circumstances, trees attain maturity at a smaller size, and where they are not likely to increase considerably in girth. If this is agreed to, then, besides the trees 6 feet in girth and upwards, a certain proportion of smaller trees will be cut. On the assumption made in a previous paragraph, that the trees cut will, on an average, yield 30 cubic feet each, the annual outturn of 50,000 cubic feet which it is proposed at present to fix as the limit will require the felling of only 1,667 trees. It is therefore evident that the compartments assigned to the first year will be ample, even under the most rigid system of selecting the trees to be cut, to furnish this timber. Indeed, it is most probable that, as the cuttings progress, it will be found that a small portion of the area assigned to each year will, as a rule, furnish the necessary quantity.

In that case, what I recommend is that cuttings on the system prescribed be continued, in the area assigned to the first year, during the second and, if necessary, also during the third year. In this manner the arrangement will be elastic, and will readily adapt itself to the practical requirements of these operations.

From the statement recorded in paragraph 203, it will be seen that two years have been assigned to the cuttings in the compartments on the right bank of the Gaujera, which are all situated in the Taria block (division II), and that, according to this assignment, the cuttings at present contemplated in the Gaujera basin will be completed within a period of three years. It will, however, also be understood from the preceding remarks that this basin will most probably furnish material for successive cuttings during a much longer period than three years.

## Khakasgadi basin.

205. After the completion of the work in the Gaujera basin, I recommend that the forest near the mouth of the Mundál River and in the Khakasgadi Valley be taken in hand. From the statement it will be seen that the compartments assigned to that year contain a large number of trees of the first and second classes. In fact, they are regarded by Mr. Dansey as the best stocked forests of the whole range. This area, which has been designated as the Khakasgadi basin, will doubtless furnish material for the operations of more than one year.

## Gaujera why placed before the Khakasgadi basin.

206. Up to this point the whole area assigned is included within the forest either already protected from fire, or the protection of which is about to be undertaken. At present the western limit of fire-protection is the road

which follows the Gaujera valley, and it should be distinctly understood that the cuttings must not extend to the right bank of that stream until the protection of that part of the forest against fire is assured.

In some respects it would have been preferable to commence operations in the Khakasgadi basin, and this was the plan recommended in Mr. Dansey's Report. The chief reason for taking the Gaujera basin first was that the arrangements for the export of timber from the Gaujera basin are in a sufficiently advanced state to justify the continuance there of timber operations, whereas it will require some time to open up the forests near the mouth of the Mundál and in the Khakasgadi basin. I may mention that the timber from the last named forests will be exported not *viá* Kálágarh, but *viá* Rámnnagar. In this case, therefore, the convenience of working has been allowed to prevail over other considerations.

#### Haldgadi basin.

207. After operations in the Khakasgadi basin have been completed, I am of opinion that the northern face of the range which divides the Haldgadi from the Adnála should be taken in hand. A large portion of this area is comparatively young forest, well stocked with poles and with a proportion of mature trees. It is an extremely valuable part of the forest, in places almost pure sál, and the selection of the mature trees to be cut here will require special care. I do not propose at present to enter into the question how the first cutting should be made in a forest like this, which is nearly complete in many parts, except where the slopes are precipitous and the soil poor. It is possible that in these compartments it may be found desirable to adopt a regular succession of cuttings—the *first* to give light for the seed to germinate, the *second* to enable the seedlings to grow up into thickets of saplings, and the *third* for the gradual removal of the old trees. This, however, will be a matter for special consideration when the time arrives for commencing cuttings in this part of the forest. By that time more experience than we possess at present will have been gained regarding the effect of fire-protection upon forests of this description.

The present condition of this forest is similar to what a great part of the Durgadeh Forest was in 1863, and it is to be hoped that, as regards the regeneration of the forest, its treatment will be more successful than that of the Durgadeh Forest has been hitherto. It must of course be understood that, long before operations are commenced in the Haldgadi basin, fire-protection must have been firmly established over the whole of the North Pátlí Dún Range, as far as it is included in the present proposals.

#### Forest on the right bank of the Haldgadi.

208. I may here mention that the forest on the right bank of the Haldgadi is exceedingly valuable. East of the Haldgadi Pass the forest is open to the exercise of rights, but west of it there is at the entire disposal of Government a large area of well-stocked forest, chiefly mixed sál and sain in the upper part, and principally sál in the lower. This forest may, as far as the extraction of timber is concerned, be regarded as part of the Haldgadi basin. I am strongly of opinion that it should be included in the fire-protected area; and if this can be managed, it may perhaps be possible to cut some timber at the same time that the compartments on the south side of the Haldgadi and Shivalia Ráo are worked.

#### Adnála basin.

209. After the work in the Haldgadi basin has been completed, I propose that the Adnála basin should be taken in hand, and to this basin the operations of four years have at present been assigned. In this forest, a large portion of which, as already stated, is on poor soil, it will be best to limit operations to the better stocked areas on good soil, until it is seen what may be the effect of fire-protection upon the poorer and more or less stunted forests which occupy a large part of the middle slopes of this valley.

**Minor basins east of the Gaujera Valley.**

210. After operations in the Adnála basin have been completed, there remain the basins of several streams which join the Rámanga above the Gaujera—the head-waters of the Kelani and Bokságadi, the upper part of the Bilot basin, and the whole of the Maulia basin. These three basins have been placed last because, though they have been one year under protection from fire, the general character of the forest is not yet sufficiently advanced to justify cuttings at an earlier period.

**The arrangement here proposed is elastic.**

211. The above remarks will explain that the operations here assigned to a period of twelve years will probably extend over a much longer period. At the same time the arrangement is elastic also, in so far that if a large demand for timber at remunerative rates should arise, or if circumstances should make it desirable to increase fellings, the quantity cut annually may be largely increased within the limits fixed in Mr. Dansey's Report, which, for the present and until we obtain a better knowledge of the forest, should be accepted as the outside limit of the possible yield.

**Selection of the trees to be cut.**

212. It will now be necessary briefly to recapitulate the chief points which should be borne in mind in the selection of the trees to be cut. In all main points I agree with the proposals made in the concluding portion of Mr. Dansey's Report, from which the following is an extract:—

“No tree must be extracted, however well advanced in years, if its removal would be prejudicial for reasons of reproduction, ground, or other important particulars. Isolated trees, and trees growing on precipitous ground and narrow ridges, must not be felled on any account. An abundant reproduction of sál underneath can alone, in the generality of cases, warrant us in removing a sál tree, and then only if more light is actually required by the young growth. The danger of exposing the young saplings or undergrowth to frosts will also here be fully borne in mind.”

The suggestions submitted in the present Report may be summarised as follows:—

The trees to be cut must be selected solely with reference to the reproduction of sál and to the protection of the soil on narrow ridges and precipitous slopes. As a rule, no trees below 6 feet in girth should be cut, smaller trees being cut in exceptional cases, when the reproduction of sál will be promoted by their removal and when there is ground to believe that such trees have attained their maturity and will not increase further.

**Review of results.**

213. It will now be well briefly to review the result of the present proposals, and to compare with them the proposals which have been submitted in another part of this Report regarding the timber operations in East and West Kumaun.

The total area of sál forest in all the forest blocks of the present Garhwál Division may be estimated at 175,000 acres. A large portion of this area is not protected against fire, nor is any special protection of it contemplated. Only about 70,000 acres are proposed to be thus protected, and to this area has at present been assigned a yield of 50,000 cubic feet per annum. The area of the sál forests of Western Kumaun has been estimated at 80,000 acres, nearly the whole of which has been under fire-protection for the last five years, and the yield of this area during the next period has been assumed at only 30,000 cubic feet. At first sight the yield proposed for the Western Kumaun Forests appears out of all proportion small, but it must be remembered that this area contains hardly any forests of mature timber, such as those in the North Pátli Dún Range. The sál forests in the valleys of Eastern Kumaun are estimated to comprise 96,000 acres, and from these it is at present proposed to extract 50,000 cubic feet annually. Compared with Western Kumaun, and considering that fire-protection has not even been commenced in the Nindhaur

Forests, this appears a large quantity; but it must be remembered that the Nindhaur is an almost untouched forest, with considerable quantities of large-sized sál trees on the lower slopes of the valley.

All these proposals, however, are made on the distinct understanding that the whole of the areas named will be effectually protected against fire. At the same time it should be said that on this understanding the yield now proposed to be taken from these forests is much below the quantity which they will eventually be able to furnish without injury to their future prospects.

The total area of sál forests in the Garhwál and Kumaun Divisions which it is proposed to protect against fire amounts to 236,000 acres\*; and the total yield expected from this large area during the next period is only 130,000 cubic feet per annum. After these forests have been brought into a complete state of productiveness, they ought to be capable of yielding at the rate of at least five cubic feet per acre per annum on an average, taking into account that a large portion of the area has poor soil, is badly stocked, and cannot be expected to produce valuable timber, while a large portion of the area will yield a much larger quantity.

Nevertheless, it is, in my opinion, absolutely necessary, for the first few years at least and until fire-protection has become completely established, so that the risk from fire in future is reduced to a minimum, to maintain the very low rate of annual yield proposed in the present Report.

#### Cutting of other trees.

214. Simultaneously with the cutting of green sál on the areas assigned to each year's operations, I recommend that sain and sándan, and such other kinds as are associated with sál and are marketable, be cut.

Under existing circumstances the wood of these trees, except that of sándan, has hardly any market value in the hills of the North Pátli Dún. Operations on account of Government are now being carried on in the Kohtri Dún to supply about 25,000 cubic feet of sain timber in scantling, from 10 to 15 feet in length, to be delivered at Saneh at rates varying from 10 annas 10 pies to 12 annas per cubic foot. Similar operations have been made in former years, on a smaller scale and with varying success, in the Kohtri Dún and in the forests west of Kotdwára. But there are indications of a larger demand arising for sain and other kinds; and, based upon these indications, I submit the proposal that, simultaneously with the cuttings of sál in the areas assigned to each year's operations, purchasers be permitted to cut and remove trees of sain and other kinds marked by Government officers. The rate to be paid per cubic foot should be fixed, as an experiment and for these limited areas only, sufficiently low to make it worth while for purchasers to come forward.

#### Required in certain cases to make room for Sal.

215. With regard to this subject, it must be borne in mind that, in the better class of sál forests, the sál tree predominates, and that as a rule in such forests there is very little risk of the ground being taken up by the young growth of other kinds to the exclusion of sál.

	Area, in acres.	Annual yield of sál, in cubic feet.
* Kumaun, East—		
Sál forest	96,000	50,000
Kumaun, West—		
Sál forest, protected from fire	70,000	30,000
Garhwál—		
Sál forest, proposed to be protected from fir	70,000	50,000
	Total	
	236,000	130,000

This is the general rule, but there are notable and very important exceptions to this rule. Along the banks of streams on clayey soil, and on moist slopes with a northerly aspect, sáin often predominates, and in such places the reproduction of sál will certainly be favoured by cutting a portion of the large sáin trees.

No special rules regarding the selection of sáin for cutting, beyond what has here been stated, seem to be required. Should hereafter the demand for this and other timber in the North Pátli Dún Forest increase very largely, it will be time enough to consider such rules. For the present it will be sufficient, as suggested in this Report, to subordinate all other considerations to the question whether the growth of young sál will be promoted by the cutting of other trees or not.

**Cutting out of trees of other kinds in the South Patli Dun.**

216. As soon as experience has shown that sáin and trees of other kinds find a market, although at low rates, it will be time to commence felling them for export in the lower and better portions of the South Pátli Dún Forest, the necessity for which operation strongly impressed itself on my mind during my visit in 1875. In those portions of the South Pátli Dún Forest where saplings and young poles of sál are abundant, there are numerous trees of other kinds, with irregularly shaped and spreading crowns, which impede the development of the young forest of sál poles. As soon as there is a prospect of getting purchasers to take such wood, I would advocate their removal; and I have mentioned this subject in this place, because the carrying out of this suggestion must depend upon the success obtained in the disposal of wood of other kinds, simultaneously with the cuttings of sál in the North Pátli Dún Forest. The experimental sale of these woods, at low rates, should be confined to certain localities, and we should guard against committing ourselves to the continuance of these low rates for the whole area of the Garhwál Forests.

Sándan, as already remarked, has a considerable market value, and I see no objection to the cutting of a certain number of marketable sándan trees within the area assigned to each year's operations at the same time that the cuttings of sál are made.

**Removal of dry and fallen Sal timber.**

217. A few words should here be said regarding the arrangements under which dry and fallen sál timber should be removed from the North Pátli Dún Forest. A suggestion has been made in Mr. Dansey's Report to localise the extraction of dry sál, by confining it to certain blocks which should be worked in rotation. The arguments in favour of this proposal deserve careful consideration. Mr. Dansey urges that by limiting the area which will be opened each year for the removal of dry timber, exporters will be induced to economise the wood and to abandon the present practice, which in many cases leads to waste. He also urges that exporters who have the run of the whole forests only take out the best pieces, and that trees are often cut up without due regard to economy of timber; hence he concludes that if the dry timber operations were confined to a limited area, it might be possible to permit their continuance in fire-protected blocks beyond the limit of time at present fixed, which is at the commencement of the hot season.

During the safe season the whole of the forest should, as a rule, be open for the extraction of dry fallen timber.

218. I am of opinion that this must be left an open question. In forests protected from fire it may, in some cases, be found convenient to confine these operations to a limited area, and to extend them to the whole of the dry season; but I do not advocate to open one block only at a time, as a rule, for the extraction of dry timber. I am strongly of opinion that the operations of the exporters of dry timber serve in many cases as an excellent preparation for the Government timber operations. The people

who search the forests for dry timber are the pioneers of larger timber operations; they explore the forests, and contribute much towards opening them out. As a rule, therefore, I advocate that the present system be continued, under which the whole of the forest is open to the extraction of dry timber.

**Creepers to be cut simultaneously with timber operations.**

219. In those areas which have been assigned to each year's operations, I am of opinion that, besides protection from fire, it will be well, simultaneously with the timber operations, to arrange for the cutting of all creepers—an operation most necessary in many places, which will doubtless be attended with great benefit. Arrangements should also be made, if possible, for the gradual cutting of creepers in those compartments to which the timber operations of the next period are not expected to extend.

**Palain Range.**

220. The Palain Range occupies an area of 40,960 acres, of which it is supposed that about 30,000 acres contain *sál*. It comprises the west side of the Palain River, below its junction with the Haldgadi, part of the valley of the last named river, the head-waters of the Palain, the Kansúr, and the Mandálti; and is bounded on the south by the high ridge which separates the valleys of the Sona Nadi and the Mandálti. Of the north edge of this block a strip, on an average two miles wide, is open to pasture and the exercise of other rights of the adjoining villages in the hills.

The Mandálti Valley has quite the character of a valley in the Siwálik Hills. The rock is mostly a soft sandstone, and the soil is very loose and suitable for the growth of *sál*. The lower part of this valley is exceedingly valuable; it consists of a succession of flats and terraces, with groups of tall well grown poles of *sál*, and although at present the reproduction of that tree is impeded by the annual fires, it will, if fires are excluded, be extremely valuable. A peculiar feature of the Mandálti is the large number of *tún* trees of all ages, and this tree wherever found in this district should be most carefully protected.

The Haldgadi has already been mentioned, and it has been explained that the whole of this valley will probably be eventually annexed to the North Pátli Dún Range.

The Kansúr is different in character from the Mandálti; there are terraces and large and extensive flats along the lower part of its course, with numerous middle-sized and large *sál* trees and a considerable area of pole forest. In the upper part of the valley the forest is more mixed. On the north face of the Siddhká Dánda (the ridge which separates the Kansúr from the Mandálti Valley) there is a considerable area of *sál* forest at the heads of the side valleys, but the trees are not of large size. The head of the Palain Valley is chiefly of importance for the large extent of bamboo forest, and there are numerous *tún* trees along one of its eastern feeders.

As far as the growth of *sál* is concerned, it must be borne in mind that frost is extremely severe in the Kansúr Valley. This is the chief drawback. Otherwise these forests are most valuable, and the lower part of this valley, as well as the lower part of the Mandálti and the whole of the Haldgadi basin, merits early consideration in the matter of fire-protection. There is a large extent of gentle slope and level ground with good deep soil in the lower part of these valleys, which will benefit much more rapidly by fire-protection than the hills of the North Pátli Dún Range.

**Kohtri Dun Range.**

221. This range occupies an area of 42,880 acres, of which it is estimated that 30,000 acres contain *sál*.

The head-waters of the Kohtri River rise in the same hills as the head-waters of the Kansúr. The head-waters of the Chokhamb meet those of the

Mandálti, while another feeder, the Gagás, takes its rise from a point near the head-waters of the Sona Nadi. On the north side of the valley there are several other large feeders, the most important of which is the Ganjgád.

The lower part of this range is situated in the outer Siwáliks, while the upper part extends to the higher hills. The Kohtri Dún Range has yielded a very large quantity of sál timber, and is easily accessible by a good cart-road up to the head of the valley. At the head-waters of the Kohtri River are large areas of nearly pure sál forests, at an elevation of from 2,500 to 4,000 feet—the highest point within forest limits.\* The sál growing on these hills is mostly stunted, and never attains any great diameter; but it has nevertheless yielded large quantities of timber in the shape of scantling and sleepers. The lower part of the valley and its feeders, however, have produced timber of very large size, and a remarkable place is the Chokhamb Dún, an undulating plateau, above 2,000 feet, containing the remains of excellent forests which formerly covered it. I am informed that a great part of the Chokhamb Forest is now so well stocked as to be safe from fire without special protection, and that the natural reproduction of sál in this place is very good. In his Report for 1865-66, Mr. B. Thompson mentions a very large number of mature trees at the head-waters of the Ganjgád, but most of these trees have since been cut.

Export of green Sal timber.

222. The following statement gives an account of the green sál timber cut and exported from the Garhwál Forest Division during the ten years ending with 1880-81. It will be noticed that by far the greater proportion of this timber was exported in scantling, and that a small quantity only was exported in the shape of logs. It will also be noticed that the great majority of this timber was exported by Government, and a small quantity only, in 1880-81, by merchants.

Statement of green Sál timber cut and exported from the Garhwál Forest Division from 1871-72 to 1880-81.

YEARS.	COMPARTMENTS.	TIMBER CUT.			SCANTLINGS CUT AND EXPORTED.		REMARKS.
		Trees.	Logs.		No.	Cubic contents.	
			No.	Cubic contents.			
1871-72 ...	Mandálti ...	1,098	227	2,965	*30,137	15,046	* The cubic contents of 18,852 pieces not known. † Ditto of 37,803 ditto. ‡ Ditto of 8,686 ditto. § Ditto of 2,513 ditto. Exported by Government.
1872-73 ...	Ditto' ...	2,540	...	...	†51,859	18,075	
1873-74 ...	Basikhand ...	278	...	...	‡45,023	59,611	
1874-75 ...	Kuribari and Burkhet. ...	345	...	...	§12,130	14,297	
1875-76 ...	Bhakwa ... 147 } Dhikala ... 5,152 }	5,299	...	...	76,238	150,557	
1876-77 ...	Mainagari ...	214	3	36	6,824	11,683	
1877-78 ...	...	...	...	...	...	...	
1878-79 ...	Goujpani ... 630 } Pipalsati ... 700 } Jalikhhand ... 221 }	1,551	...	...	17,387	25,983	
1879-80 ...	Domunda ...	16	...	...	...	...	
1880-81 ...	Gaujera ...	161	46	1,281	2,759	2,947	

\* Sál is found, although poor and stunted, up to an elevation of 5,200 feet in the Garhwál Hills.

## Bamboos.

223. The bamboo (*Dendrocalamus strictus*) forms one of the most important articles of export from the Garhwál Forests. The quantity exported annually during the last ten years appears from the statement appended to this Report as Appendix VII, drawn up by the local officers. But although the bamboo forests which furnish this yield are very extensive, there is good ground for believing that the supply is deteriorating. The great mass of the bamboos brought to the depôts at the present time are exceedingly small, and have been so for several years past. In this respect I have noticed a considerable difference on my three successive visits to these forests. In 1863 the bamboos extracted were, as a rule, larger than those which I saw on my visit in 1875, and on the occasion of my present visit I have again noticed a marked deterioration. And apparently there has also been a decrease in quantity. The following abstract shows that during the five years ending with 1875-76 the quantity exported averaged 1,000,000 scores, while during the five years ending with 1880-81 it was only 650,000 scores:—

						BAMBOOS EXPORTED FROM THE GARHWAL FORESTS SINCE 1871-72.		
						Scores.	Revenue realized.	Rate per 100 scores.
							Rs.	Rs.
1871-72	...	...	...	...	...	914,000	59,000	65
1872-73	...	...	...	...	...	1,298,000	83,000	64
1873-74	...	...	...	...	...	997,000	64,000	64
1874-75	...	...	...	...	...	823,000	53,000	64
1875-76	...	...	...	...	...	1,072,000	68,000	63
					Average of 5 years	1,020,800	65,400	
1876-77	...	...	...	...	...	855,000	55,000	64
1877-78	...	...	...	...	...	717,000	47,000	65
1878-79	...	...	...	...	...	317,000	22,000	69
1879-80	...	...	...	...	...	630,000	45,000	71
1880-81	...	...	...	...	...	725,000	51,000	70
					Average of 5 years	648,800	44,000	

The bamboo clumps are overcut.

224. The point is this, that if bamboo clumps are cut moderately the young shoots, which are produced in July, August, and September, attain their full size. But if a clump is overcut, that is, if a sufficient number of old stems are not left standing, the fresh shoots produced are short and thin. The conclusion to which my long experience of bamboos has led me is that, unless there are a large number of vigorous stems with full foliage in a clump, the plant as a rule has not sufficient strength to produce a crop of full-sized young stems. Indeed, if too many of the old stems are cut out, the young growth consists of masses of thin slender branches similar to grass.

## Bamboo forests in the more remote valleys.

225. In 1875 I came to the conclusion that in all the more accessible valleys the bamboos have been much overcut, and to this circumstance I then chiefly ascribed the small size of the bamboos exported, which on that visit attracted my attention. Only in remote valleys, such as the Kansúr and Haldgadi, did I see bamboo clumps with stems of the full size ordinarily attained by this species in North-Western India. In such places the bamboo forests consisted of well stocked clumps, with stems 40 feet long and 3 inches



in girth. On my present visit I found that in the Kansúr Valley also the bamboo forests had been overcut. The unfavourable appearance of these forests on the occasion of my present visit must, to some extent, be ascribed to the circumstance that the bamboos had flowered to a very large extent. As is well known, this species does not generally flower gregariously. A few stems in a clump, or a few clumps in a forest, flower and seed. Since 1870, however, the bamboos over large areas have seeded, and there was an extensive flowering in 1877-78 in the Palain and Kansúr Valleys; hence the numerous clumps which have not yet attained full size. Apart from this, however, most of the older clumps, in the different parts of the forest visited by me had been overcut, and the shoots produced during last rains had not attained the size which I should have expected to see.

**Conservator's opinion.**

226. I ought, however, to mention that the Conservator, Mr. Greig, is of opinion that the bamboos in Garhwál have not been overcut, and that they have not deteriorated since he has known these forests. Mr. Greig thinks that in out-of-the-way places and at the heads of ravines and valleys there is still a very large number of vigorous clumps, and that there is no likelihood of the supply of good bamboos being insufficient to meet the demand. I have also been assured by the local officers that the fluctuations in the demand from year to year are so great, that the decrease in the quantity exported during years when the demand is slack is sufficient to establish a kind of rotation, the bamboo clumps enjoying comparative rest during those years of diminished demand.

**The North Patli Dun Forest to be closed against the cutting of bamboos.**

227. Mr. Greig concurs, however, in my suggestion to close the North Pátli Dún Range, as far as it was included in Mr. Dansey's valuation surveys, against the cutting of bamboos for a number of years, as an experiment. The closing of the bamboo forests outside the Siwálik, in the Saháranpur District, has had most beneficial results; and I feel convinced that the protection against cutting of these forests will have the effect of greatly improving the quality of the bamboos produced, and that, if this measure is duly carried out, the North Pátli Dún Range will prove to be a most important bamboo reserve. After the bamboos in this range have had sufficient rest, the working should be arranged in rotation by blocks, so as to guard against excessive cutting. In this range then the bamboos will profit both by protection from fire and by protection against cutting.

**Large proportion of young shoots extracted.**

228. A remarkable feature in the bamboo export trade from these forests is that a large proportion of the bamboos extracted consists of young shoots less than one year old. For certain purposes, such as the manufacture of mats and baskets, young stems are necessary. But for building purposes they are much less durable than stems which have fully matured and hardened; and I am disposed to think that the reason why so large a proportion of young shoots are cut is that no old ones of good quality are available, and that when, after a few years' rest, the closed forests are opened for cutting, a much larger proportion of old, properly matured, and hardened stems will be available for export.

**Revenue on produce removed by purchasers.**

229. The following statement exhibits the revenue realized on produce removed from the old Garhwál Division, including the forests now comprised within the Ganges Division. Two points merit notice in this statement. The export of khair timber shows a tendency to decrease, and this is in accordance with what is known regarding the state of the growing stock of khair timber in the forests. The export of other timber (not sál), on the other hand, has increased largely, and this is a satisfactory indication of the increasing demand for such woods.

Revenue realized on produce removed by purchasers from the (old) Garhwál Division in 1877-78, 1878-79, 1879-80, and 1880-81.

Budget heads.	Old Garhwál, 1877-78.	Old Garhwál, 1878-79.	OLD GARHWAL, 1879-80.			OLD GARHWAL, 1880-81.		
			Garhwál	Ganges.	Total, old Garhwál.	Garhwál.	Ganges.	Total, old Garhwál.
	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.
<b>A.—Timber—</b>								
1. Sál, dry or fallen ... ..	24,791 2 2	17,345 6 9	19,833 0 0	1,081 9 0	20,914 9 0	32,319 3 11	5,640 15 6	37,960 3 5
2. Khair ... ..	684 12 0	11,232 0 0	4,330 0 0	38 10 4	4,368 10 4	2,835 8 6	18 10 0	2,854 2 6
3. Sissoo ... ..	302 8 8	253 2 10	265 0 0	22 9 2	287 9 2	230 11 3	229 9 7	460 4 10
4. Other timber ... ..	3,060 8 3	2,907 7 5	2,514 15 0	2,723 11 11	5,237 10 11	4,035 10 2	7,019 9 0	11,055 3 2
<b>B.—Firewood and Charcoal ... ..</b>	<b>543 13 10</b>	<b>954 12 5</b>	<b>259 11 9</b>	<b>211 15 6</b>	<b>471 11 3</b>	<b>322 0 0</b>	<b>339 3 9</b>	<b>661 3 9</b>
<b>C.—Bamboos ... ..</b>	<b>47,295 5 9</b>	<b>21,634 12 5</b>	<b>33,162 4 11</b>	<b>11,501 5 11</b>	<b>44,663 10 10</b>	<b>25,511 12 10</b>	<b>25,496 8 2</b>	<b>51,008 5 0</b>
<b>D.—Grazing ... ..</b>	<b>2,546 2 8</b>	<b>2,324 9 6</b>	<b>1,591 6 0</b>	<b>641 14 4</b>	<b>2,233 4 4</b>	<b>2,265 4 8</b>	<b>998 5 7</b>	<b>3,263 10 3</b>
<b>E.—Other minor produce—</b>								
1. Grass, including bhabar ... ..	1,236 4 7	1,803 1 3	1,905 5 2	105 11 6	2,011 0 8	2,591 6 11	225 6 6	2,816 13 5
2. Other items ... ..	4,310 11 8	2,542 12 5	2,510 10 4	991 6 1	3,502 0 5	1,990 7 4	1,914 4 1	3,904 11 5
	<b>84,776 5 7</b>	<b>60,998 1 0</b>	<b>66,372 5 2</b>	<b>17,317 13 9</b>	<b>83,690 2 11</b>	<b>72,102 1 7</b>	<b>41,882 8 2</b>	<b>1,13,984 9 9</b>

## Receipts and Charges. Local Staff.

230. The following figures show the receipts and charges on account of the (old) Garhwál Division, including the forests of the Ganges Division, during the last three years, during which period the receipts have increased from Rs. 1,32,000 to Rs. 1,70,000:—

*Statement showing the total Receipts and Charges of the (old) Garhwáli Division, during the years 1878-79, 1879-80, and 1880-81.*

Particulars.	1878-79.			1879-80.			1880-81.														
				Garhwál.	Ganges.	Total, old Garhwál.	Garhwál.	Ganges.	Total, old Garhwál.												
	Rs.	A.	P.	Rs.	A.	P.	Rs.	A.	P.												
Receipts ... ..	1,31,875	4	6	1,01,224	12	0	42,888	0	0	1,45,112	12	0	1,12,057	11	7	57,869	0	0	1,69,926	11	7
Charges ... ..	56,549	2	11	66,057	2	7	5,768	0	0	71,825	2	7	46,723	8	6	15,109	0	0	61,532	8	6

The Conservator recommends the following establishment of Rangers and Foresters for the present Garhwál Division:—

Rangers.	Foresters.	Remarks.
1 on Rs. 100. Whole forest.	2 on Rs. 30	Rangers sanctioned—1 permanent on Rs. 70. Foresters sanctioned—3 on Rs. 25, 3 on Rs. 20, 1 on Rs. 17, and 5 on Rs. 15; 1 temporary on Rs. 25 with Forest Treasurer.
1 " 50. Roads.	3 " 20	
1 " 60. Superintendent, Kham Táhsil.	2 " 15	
	1 " 30 Timber.	
	1 " 20 Depót.	
	2 " 30 Deputy Superintendents, Kham Táhsil.	
	1 " 15 Writer with Head Ranger.	
	1 " 15 " with Superintendent, Kham Táhsil.	

## Retrospect.

231. Taking a brief retrospect of the different ranges which constitute the Garhwál Forest Division, it will be noticed that it is contemplated to protect against fire three of them, *viz.*, the Rehar, South Pátli Dún, and North Pátli Dún Ranges, together with a small portion, the Shishamkhata tract, of the Sona Nadi Range, and that for the present no special protection is contemplated in the Dháron and the remainder of the Sona Nadi Ranges. In the two remaining ranges, the Palain and Kohtri Dún, there are large areas of forest which would well repay special protection, and this work should be undertaken as soon as fire-protection in the ranges first taken in hand has been firmly established.

## Grass lands how to be utilized.

232. After fire-protection has thus been extended over all the really valuable portions of the division, it will then be time to consider how the large areas of grass-land, which can never produce sál, may best be utilized. Some of these lands might be planted up with khair and sissoo, but I am disposed to think that it would be better whenever practicable to lease them out for cultivation on short terms. I do not advocate that immediate steps be taken for the establishment of villages in the Pátli Dún. This must be attempted after the forests adjoining it have so changed in character that the work of fire-protection is no longer exposed to those risks to which it is subject at present. But eventually I feel assured that it will in every way be a good plan to assign defined areas in the Pátli Dún and in other suitable localities

to cultivation. The establishment of villages in these forests will enable the local forest officers to live on the spot with greater comfort, and it will be very desirable that the local officers themselves should eventually have fields assigned to them in order to give them a greater interest in the locality. The fact that the whole of the Garhwál Forests, except a narrow strip on the inner edge, are now without any villages in them, has to a great extent facilitated protection, although in the matter of fire-protection the efforts made have not hitherto been attended with much success. When the time comes to establish fields again on those lands which are unfit for the growth of timber, and which were formerly occupied by cultivation, the greatest care must be taken to assign to them well defined grazing grounds, and to prevent encroachment and the growth of rights, which may interfere with the protection of the forest.

As soon as fire-protection is firmly established, these forests will furnish an immense quantity of wood and timber, and give employment to large and steadily increasing numbers of men and cattle. The local officers assure me that at the present time the chief obstacle to increasing the export of dry sal and of other timber on a large scale consists in the small number of people who engage in the business of extracting timber from these wild forests. As soon as fields have been established, with a settled population, the number of people ready to engage in timber operations will doubtless increase largely.

#### Forest Rest-houses.

233. A most important point remains, and this is the provision of substantial rest-houses for officers and subordinates employed in these forests. The progress made in their condition, which is due almost entirely to the protection against promiscuous cutting, gives me the assurance that this progress will be very considerable as soon as fire-protection is begun in earnest, and that the revenue will increase largely. And it seems to be time now to establish permanent head-quarters for the Divisional Officer and for the Rangers in these forests.

The most central position is Dhikálá, on the Boksár-Barsoti road, a quarter of a mile distant from the Rámganga River, and this has been selected as the best place for erecting a first class (double-storied) rest-house. A second class house is proposed to be built at Kálágarh, a timber depôt and the largest revenue station in the division, situated at the point where the Rámganga leaves the hills.

Besides these, third class rest-houses are proposed to be built in the following ranges :—

Dháron	...	...	...	...	3	third class rest-houses.
Sona Nadi	...	...	...	...	2	” ”
South Pátli Dún...	...	...	...	...	1	” ”
North ” ”	...	...	...	...	2	” ”
Palain	...	...	...	...	2	” ”
Kohtri Dún	...	...	...	...	2	” ”
					<hr/>	
				Total	12	” ”
					<hr/>	

The following is an abstract of the cost of these buildings :—

				Rs.
1 first class rest-house, at Rs. 3,500	...	...	...	3,500
1 second ” ” ” 2,600	...	...	...	2,600
12 third ” ” ” 550	...	...	...	6,600
			Total	<hr/> 12,700

Spread over ten years, as in Kumaun, this would amount to an annual outlay of Rs. 1,270. If funds can be made available, I would recommend that this work be completed sooner, as it is of the utmost importance to afford good accommodation to officers and subordinates in the Garhwál Forests.

## CHAPTER VIII.

## GANGES DIVISION.

234. This division comprises, besides the leased Bhágirathi Forests of the Tiri State and 90,560 acres at the foot of the hills in Garhwál, extending from Kotdwára to the Hiul River above Lachman-jhula, an area in the Bijnor District, called the Chandi Forest, on the left bank of the Ganges, measuring 20,882 acres. In this area is not included the southern part of the Chandi Forest (18,497 acres), which is at present in charge of the Collector of Bijnor, whose accounts for these forests are not rendered to the Ganges, but to the Garhwál Division.

## Chandi Forest.

235. The Chandi Forest is an outlying stretch of hills of the outer Siwálik formation, the highest point of which rises to 1,913 feet.

In 1867 this forest was made over to the Roorkee Workshops for the supply of timber, wood, and charcoal. The arrangement stipulated that the workshops might sell minor forest produce, but no wood or charcoal. Since that time the cuttings, chiefly for charcoal, have been continued, except in the north-west corner, where a certain area has been left uncut. The cuttings have generally extended up the valleys and ravines, and have nowhere reached the higher slopes of the hills. The result is that the lower portions of the Chandi Hills, as far as cuttings have extended, are almost bare.

Fires have never been kept out, and hence, where cuttings have been made, the ground is now chiefly stocked with grass. There are, however, stumps and coppice-shoots, and probably a large number of root-stocks in the ground; so that, if the forest were protected from fire, it is probable that a large portion would get restocked with trees and brushwood, but, except in the valleys and on some flats, no large timber can ever be expected to grow in these forests.

The tops of the hills, however, and the higher ranges were not cut over at all, and here the forest, such as it is, is still in its original condition; the chief trees on the ridges and higher slopes being katbhiláwa (*Buchanania latifolia*) and bákli (*Anogeissus latifolia*), with a varying proportion of sál. The soil is gravelly, full of large boulders, and generally dry and very poor.

## Management transferred to Forest Department.

236. No complete information is available regarding the quantity of wood and charcoal which the Chandi Forest has yielded during the period it was held by the Roorkee Workshops. On representations by the Conservator to the effect that the forest was being destroyed and no proper measures taken for its conservancy, its management was, in November 1880, transferred to the Forest Department, and the area was included in the Ganges Division.

## Hazara Bagh.

237. The most valuable part of the Chandi Forest is the Hazara Bagh, a flat measuring about 2,000 acres, of which about 1,500 acres are stocked with miscellaneous forest, mixed with scattered sál and bamboo, and enclosing some grass lands. At present the young growth of sál is only in patches, but the place will produce a large crop of small poles, which will find a ready sale for the Ganges Canal Works. The soil of this flat is, however, extremely poor, and the trees are short and stunted. Fire-protection will doubtless improve the surface-soil, but cannot be expected to change the sub-soil, which will probably be found to consist of a mass of boulders.

**Hills above Hardwar more denuded than Chandi.**

238. A glance at the Chandi Forest and the hills opposite, on the right bank of the river above Hardwar, shows that the latter have been much more heavily worked and are nearly denuded, the reason being that these hills are easily accessible from Hardwar and have thus been more largely drawn upon to supply local requirements.

The charcoal for the workshops from the northern part of Chandi is at present carted round *via* Peli, so as to cross the river by the bridge of boats at Shishamghat. This is done in order to allow the charcoal to go without break of bulk to Roorkee, but the produce of the Hazara flat and the adjoining part of the Chandi Forest might equally well be exported by the Ganges Canal.

**Protection from fire.**

239. Arrangements for protecting the Hazara flat from fire during the present hot season have been made, and it will perhaps be possible, after protection has here been successfully continued, to extend the protected area over a portion of the hills at the back of the flat. I myself should be disposed to advocate the protection of the upper part of the Chandi Forest north of the Chandi Temple. The annual fires must eventually destroy a large proportion of the vegetable growth, which still remains in and on the ground in those places to which the charcoal operations of the Roorkee Workshops have extended. It may be urged that the forest is of an inferior character, and that it will never repay conservancy. This, however, can hardly be the case: the ravines and many of the slopes are full of bamboos, which yield a considerable revenue; and although the *sál*, which is common over a great part of the northern portion, will never attain a very large size, yet small *sál* poles will always command a ready market at this place. I have no doubt that the bamboos, which are not very large at present, would greatly increase in size if fires were kept out.

Under these circumstances, I would recommend that a few years hence, but not too late, the fire conservancy of the northern part be taken in hand. It would probably also be a good plan, simultaneously with fire-protection, to close this portion against the cutting of bamboos for two or three years, to enable the bamboo clumps to derive the full benefit from immunity from fire.

**Gori Range.**

240. This range comprises the forests between the Rawásan River, which leaves the hills at Láldhang, and the Ganges. Near the inner and upper boundary the hills rise to an elevation of 4,500 feet, and send down to the Ganges spurs with precipitous sides, which are separated by steep, narrow valleys and gorges. At the foot of the hills, near the Ganges, there are limited areas of more gentle slopes, with good soil, and there are a few valleys of flat ground stocked with grass and shisham, of which the Mundál is one of the largest.

**Sal forest.**

241. The most valuable portions of this range are five *sál* forests of limited area, viz.—

- (1.) The Koria Forest, about 600 acres, well stocked with saplings and poles, chiefly *sál*, and with a few large hollow trees.
- (2.) Patirána, near the head-waters of the Dogadda Sot in the hills, 1,500 acres, with a good deal of young *sál* coming up on the sites of deserted fields, and some mature trees in the ravines.
- (3.) The Jogichaur Forest, between Gháziram Sot and the Mundál Valley, 1,500 acres,

- (4.) The Luni Forest, on a flat between the Luni and Sarkara Sots, estimated to cover 300 acres, on good soil, stocked with tall, well grown poles.
- (5.) The Láldhang Forest, on undulating ground at the foot of the hills, between the Rawásan and Luni Sots, of about the same extent.

There are numerous other sál forests of small extent; and generally it may be said that sál occurs wherever dry open slopes are found. I am inclined to ascribe the absence of extensive sál forests in this part of the outer hills to the fact that there is a high range, rising to 4,000 feet, which, in a straight line, is not more than five miles distant from the foot of the hills. Hence the valleys are mostly deep, narrow, and moist, and hence the scarcity of sál.

Although these sál forests do not contain many large trees at present, the growth of the poles in them is very good, and there is no reason to believe but that many of them will attain to large timber. In no other sál forests have I seen such extensive damage done by wild elephants as in these isolated stretches of sál forest in the Ganges Division. Large numbers of poles, up to three feet in girth, are thrown down by them every year.

#### Other trees.

242. Besides sál, khair, sándan, tún, kúsamb, and shisham are found, but nowhere in large quantities. Some very extensive tracts of shisham poles, near the Ganges, were washed away in the flood of September 1880.

These, however, are not the only marketable woods, there being a great demand for many other kinds—sain, jáman, haldu, kaim,\* amaltás, dhaura, bákli, bahera, jigna. There is also a demand for simal floats for heavier woods on the banks of the Ganges; indeed, this year (1881) I was informed that there was a demand for every kind of wood, provided it is large enough to be sawn up into karris. It is quite possible that this demand may continue, and in this respect the forests near the Ganges are in an entirely different and much more favourable position than those of the Kumaun and Garhwál Divisions.

#### Fire-protection.

243. In the Gori Range arrangements have been made to protect from fire the following areas:—

*First.*—The Koria Forest, comprising the lower slopes of the hills between the Dogadda and Bhinj Rivers, estimated to measure 3,000 acres, of which 600 acres are stocked with poles of sál. The protection of this forest was attempted some seven or eight years ago, but failed.

*Second.*—The Jogichaur Forest, a flat on the Ganges between the Mundál and the Gháziram Sots, estimated to measure 1,500 acres, which are stocked with sál. This flat has excellent soil, a deep light loam. The forest has been worked very heavily in former years, and only hollow and useless trees remain, in addition to groups of poles; but the poles are tall and straight, and the ground under grass is in most places well stocked with young growth. The difference in the character of this and the adjoining forest of Hazara Bagh is exceedingly remarkable, and it will, if fire-protection be continued, grow into an extremely valuable forest. Considering that there is a certain demand for woods of other kinds, it is of course important to extend fire-protection over a larger area, and the Conservator is of opinion that the whole area which faces the Ganges north of the Mundál Valley can gradually be brought under protection without causing either hardship or discontent. The Mundál and Dogadda Valleys would probably be left open as grazing grounds. Regarding

\* Haldu and kaim are, however, much less common here than further east.

the line which should be chosen as the inner or eastern boundary of this protected block, nothing can be said at present; this must chiefly depend on the possibility of making a bridle-path across the hills from north to south. The areas along the upper boundary which are open to the exercise of village rights may be excluded. If fire-protection is extended so far, it will probably be necessary, here as in other divisions, to close the forests against exporters at the beginning of the hot season; but it is hoped that this will not sensibly affect the revenue.

**Certain bamboo forests to be closed.**

244. In order to improve the size of the bamboos exported from these forests, I recommend that for a period of two or three years, or as long as may be found necessary, a limited area of bamboo forest, say the basin of one valley, be closed against bamboo cutting. Here, as in the bamboo reserve of the Pátli Dún, this measure must be regarded as an experiment, the effect of which must be watched from year to year.

**Udepur Range.**

245. This range extends from the Kho to the Rawásan River, and comprises the outer hills and a narrow belt on level ground between the Séli Sot and Lál-dhang. On the inner or northern boundary the hills attain an elevation of nearly 4,000 feet. The greater part of the ground is precipitous, the valleys and ravines very narrow, and the best forest is in flats and on more gentle slopes near the base of the hills. Sál is found scattered wherever the slope is more gentle in the outer hills of the range, but the only area of considerable extent is the Sakhrao sál forest, which is estimated to measure about 600 acres. There is a great deal of bamboo, and in the hills bákli is the principal tree, and there is a considerable amount of sain in the valleys and ravines.

The belt of level ground outside the hills is chiefly grass land, with scattered trees of haldu, bahera, chila, and khair in places. Bael (*Ægle Marmelos*) and rohni are also common. The well known bamboo forest in the plain north-west of Haldukháta is not included in forest limits.

The demand for other kinds of timber is not so great as in the Gori Range, on account of the greater distance of the Ganges; but the local officers believe that there would be no difficulty in selling whatever timber might be cut of sain, jáman, and haldu.

**Papidanda protected block.**

246. South of the Sigadi Sot, near the revenue station of Pápidánda, an area of about 500 acres on level ground outside the hills has been protected against fire during the hot season of 1880, the attempts to protect it in previous years having been unsuccessful. The grass is now very heavy, and among it here and there is a considerable quantity of khair. The other kinds of trees are, however, short and rather stunted, and I am not sure that the soil is favourable. The idea in closing this piece was, I understand, to increase the supply of khair. Natural reproduction of khair will not suffice to secure this object, and hence it will be necessary to plant and sow this tree. For this purpose I recommend that lines 30 feet apart be taken in hand. Along the lines the ground should be dug and heaped up in a flat continuous ridge, about 18 inches broad at the base, and this ridge should be thickly sown with khair seed, so as to ensure continuous lines of this tree. This operation must only be regarded as an experiment, to be made on a limited scale.

The expense of protecting this small area is, as a matter of course, out of all proportion to the advantage expected to be obtained thereby, and it is most desirable that at this place the fire-protected area be extended, for it would not be right to recede from the position taken up and to abandon this small plot. The level ground to the north-west of the Sigadi Sot is occupied by large numbers of cattle, and it is believed that no extension in that direction is at



present feasible; but it should be considered whether the area may be extended to the east and into the outer hills, which are here fairly well stocked with forest of miscellaneous growth.

Yield of Ganges Division.

247. In this; as in the Kumaun and Garhwál Divisions, the rule obtains that no green timber is to be cut and removed, by purchasers (except khair for pestles), save in special cases on special permission. In this division there is a good deal of khair on high ground which is not liable to be washed away; and, with a view to its protection, the cutting of khair has very properly been stopped during the present season. There is no doubt that the cutting and digging up by the roots of immature khair is an exceedingly wasteful process, and where, as here, khair grows on high ground, some endeavour should be made to protect it.

Regarding the quantity of dry timber removed from the Ganges Division by purchasers, information is only available for part of 1879-80 and for 1880-81—

	1879-80 (4 months). Cubic feet.	1880-81 (12 months). Cubic feet.
Sál	2,922	15,487*
Other kinds	7,431	31,115*

Most of the dry timber is removed in the shape of tors and blocks of sándan and shisham for cart building.

Green timber extracted by Government agency.

248. The following statement gives an abstract of the green timber extracted by Government agency since 1872-73 from the forests which now constitute the Ganges Division:—

Year.	Range.	Kind of tree.	Number of trees.	Cubic feet.	Remarks.
1872-73	Gori	Bácli	23	180	Sold in logs.
		Sain	103	800	Ditto.
		Diferent kinds	5,746	14,248	For canal works.
1873-74	Udepur	Shisham	6,497	9,528	Ditto.
		Diferent kinds	938	20,920	Sent to depôt in the plains.
1875-76	Gori	Sain	502	10,892	Sold in logs.
		Bácli	100	2,359	Ditto.
		Diferent kinds	14,479	40,000	For canal works.
1876-77	" "	" "	7,911	12,726	On indents from timber merchants sawn into karris.
		Sain	2,072	65,675	Ditto ditto.
		Diferent kinds	17,830	45,000	For canal works.
1877-78	" "	Sain	200	9,654	On indents from timber merchants.
		Diferent kinds	9,496	27,126	For canal works.
1878-79	" "	Sain	1,461	38,984	On indents from timber merchants.
		Diferent kinds	6,593	19,929	For canal works.
1879-80	" "	" "	4,533	17,848	Ditto.
1880-81	" "	Sain	830	16,135	On indents from timber merchants.
		Diferent kinds	170	8,038	Ditto ditto.
		" "	13,628	41,423	For canal works.
Total			93,112	401,465	

\* Includes the yield of Chandí since the 1st November 1880.

## Supply of timber to Ganges Canal.

249. It will be noticed that a large item in the annual yield of this division is the wood supplied to the Canal works. This wood is used for the construction of the temporary head-works, for which none but straight poles, from 10 to 30 feet in length, can be employed, but they may be of any kind of wood. After fire-protection has been successfully continued for some time, there ought to be no difficulty in supplying the quantity required for this purpose, which fluctuates between 5,000 and 20,000 pieces a year. Each piece is a young tree, and only well grown poles are used for this purpose.

The cutting out of the best shaped, and in many cases of the largest poles in the forest is not in accordance with rational Forestry; but the quantity is so small in regard to the area from which these pieces can be extracted that, under careful management, the supply of these poles should cause no inconvenience.

The forests from which the poles for the Canal may be supplied at the present rates are those situated north of the Hazara Sot, the Gháziram Valley, and the Dehlightati Range. Of the total area, however, within these limits, which is approximately 30,000 acres, a portion only is sufficiently accessible to furnish these poles at rates remunerative to the contractor who undertakes the work.

I am of opinion that if fire conservancy is extended at an early date over the greater part of the Gori Range in the manner here suggested, it will be possible, without injury to the forests, to continue this supply; but the matter requires most careful consideration, and these operations should not be made at hap-hazard, but in accordance with a regular and carefully considered plan. So much is clear, that the protection of these forests against fire is a necessity. A point which has not here been adverted to, in regard to the timber required for the Canal works, is whether the price paid by the Canal should not be raised considerably, because at the present rates it would probably be much more profitable to allow the timber to attain a large size and then to saw it up.

## Supply of timber for the Ganges Canal from the Dehra Dun Forests.

250. A considerable quantity of timber for the Canal bunds has also been supplied from the Dehra Dún Division of the School Circle, and it probably suits the convenience of the Canal Department to obtain the wood for certain of the bunds from the Dehra Dún side. But I am informed that, in consequence of the rates charged in the Ganges Division being lower than those demanded in the Dún, the Canal Officers are endeavouring to arrange for future supplies almost entirely from the left bank of the river. There is a large extent of forest on the Dehra Dún side from which timber of the required sizes could be extracted; and it is very desirable that the Conservators of the two Circles should so arrange the rates that there should be no appearance of competition between the two divisions, and that they should come to an understanding regarding the quantity of timber that should be supplied from each division. As a matter of course, in a case of this kind, the officers of the two forest divisions should act in concert, and the prices charged for the various classes of wood should be the same on both sides of the river.

## Demand for other kinds of timber, not Sal.

251. As an instance of the demand which exists for timber of other kinds, I may mention that an arrangement has lately been made with some timber merchants from Meerut for the sale of 40,000 cubic feet of timber of different kinds, in scantlings of from 8 to 15 feet long, cut and delivered by the Forest Department.

The statement given above shows that as yet the annual yield of green timber has not exceeded 50,000 cubic feet from the whole of the Ganges Division, which is a small quantity considering the total area (90,560 acres); but there seems good ground for believing that the demand for all kinds of timber is increasing and may increase very largely. It is of course most desirable that these forests should meet this demand to the fullest extent which their condition permits, but of the total area a very large proportion is precipitous ground, or, for other reasons, unavailable for export; and, on considering the matter in detail, it will probably be found that the area available to supply this demand is very limited.

A plan must be drawn up to regulate fire-protection and the working of the forests.

252. The practical conclusion of these remarks is that, *first*, the existing stock of trees of marketable size must be carefully husbanded, that cuttings, not for the Canal only but generally, must in future be regulated by a regular plan of working; and that, *secondly*, in order to secure the best possible regeneration of the forest, fire-protection must be extended into all parts of this division, excluding only those portions which are required as grazing grounds, or the higher hills which are either open to the exercise of recorded rights or not available for the extraction of timber.

The plan according to which fire-protection must be gradually extended in this division will require the most careful consideration by the local officers.

#### Local Staff.

253. The Conservator recommends the following staff of Rangers and Foresters for this division:—

Rangers.	Foresters.	Remarks.
1 on Rs. 60—Whole forest	1 on Rs. 30	Rangers sanctioned.—None.
	1 „ 20	Foresters sanctioned—3 permanent on Rs. 30, Rs. 25, Rs. 20: 1 temporary on Rs. 15.
	1 „ 15	
	1 „ 40 Superintendent, Kham Táhal.	
	1 „ 30 Timber and roads.	
	1 „ 15 Writer with Ranger.	

## CHAPTER IX.

### FORESTS IN THE SAHARANPUR DISTRICT.

#### Organization.

254. The Saháranpur Division comprises the forests on the outer slope of the Siwálik Hills, and on ground immediately below in the eastern half of them. For administrative purposes, these forests, comprising an area of 190,696 acres, have been divided into three ranges, which for the present have been styled the Western, Central, and Eastern Ranges.

#### Western Range.

255. The *Western* Range, which extends from the Jumna River to the ridge west of Sukh Ráu, comprises an area of about 75,571 acres, which, with the exception of a narrow fringe along the submontane road, is all in the hills. In this range the only special work of fire-protection attempted has been to exclude fires from the Daula tract, in the Khára block, which is on the banks of the Jumna. This area (about 600 acres) is chiefly stocked with sál, growing mainly on level and gently sloping ground. Protection was commenced in 1878, and has been hitherto successful; it is effected by a broad cleared fire-line all round the area.

## Central Range.

256. The *Central Range*, area about 80,040 acres, comprises the hills between the ridge west of Sukh Ráu and that west of Harnoul Ráu, together with a large extent of forest outside the hills. In this range the chief works of improvement have been commenced, *viz.*, the protection against fire of the Lakarkot and Ganjarban blocks, outside the hills and on both sides of the submontane road; and the protection of the hills drained by the feeders of the Rátmáu Nadi, which crosses the Ganges Canal at Dhanauri.

The protection of Lakarkot and Ganjarban is secured by broad exterior fire-lines, burnt to a width of 200 feet, the central portion, 20 feet wide, being entirely cleared; and by a system of interior roads, cleared completely to a width of 10 feet, the roads running downwards from the hills being so laid as to follow the configuration of the ground in order that they may be used as export lines. The submontane road is also used as an interior fire-line, a strip on either side of it being burnt annually. Lakarkot was first protected during the hot season of 1879, while the protection of Ganjarban was commenced a year later.

257. Of the hills drained by the feeders of the Rátmáu, a portion only has yet been taken in hand, the broad stony ráus being chiefly used as fire-lines. It is intended that the protected area shall extend across the Siwálik Range to the upper edge of the Bulawála protected area in Dehra Dún, but the arrangements to effect this have not been quite completed. With regard to the fire-protection of the area in the hills, we recommend that, whenever fire-lines are made, great care be taken to make these fire-lines accessible by making foot-paths alongside of them, which should, as far as possible, be made practicable for a led pony. This arrangement has been found to answer admirably in the Western Kumaun Forests. Whenever fire-lines run over difficult ground, it is found that they can only be kept clear if such foot-paths are made along them.

258. The protection of the Rátmáu basin against fire, if continued sufficiently long, will have a most beneficial effect in improving the character of the Rátmáu Nadi and preventing injury to the Ganges Canal. It may reasonably be expected that the current in this stream, which, under existing circumstances, comes down in occasional sudden flows during the monsoon, will be more uniform if the sides of the hills become more completely clothed with forest, and that the present monsoon torrent will gradually be converted into a steadily flowing stream, with a regular current during, say, six months of the year. An essential point in this arrangement is that, in order to increase the cover and to make the protection of the soil more efficient, no green timber whatsoever should be cut in any part of the Rátmáu basin during the first years of fire conservancy.

## Sowings of Khair.

259. In the Central Range 25 acres were sown up with khair during the rains of 1879 and 1880. The seed was sown in land stocked with grass three to five feet high, in continuous lines ten feet apart. These lines were in some cases made with a plough, in others they were dug up with the hoe. A fair proportion of the plants is alive, but we recommend that in future the seed should be sown much more thickly. The high grass has protected the plants against sun and frost, but it has also had the effect of drawing them up, and the stems are long and slender. This, however, is probably no great disadvantage, and there seems every probability of the plants surviving. It will, however, be desirable to beat down the grass along the lines at the commencement of the rains, so as to enable the plants to make better progress during the wet season. Khair is indigenous in these blocks, and we recommend that this very instructive experiment be regularly extended by additions made every year.

In this block the Conservator proposes, as an experiment, to sow sál seed in patches, the patches being arranged in lines, and the ends of the lines being marked by piles of stones. Simultaneously with this experiment, a contiguous plot should be planted up with sál seedlings dug out in the forests—a plan which has succeeded well at the southern end of the Buxa Reserve in Bengal.

## Eastern Range.

260. The Eastern Range, area about 35,085 acres, comprises the hills between the ridge west of Harnoul Ráu and the Ganges River, and includes also the islands in that river stocked with sissou, as well as the Patri Forest.

## Patri Forest.

261. On the 4th April we examined the Patri Forest, which consists of five blocks. The ground is covered with grass, with scattered groups of dhák, and a few other trees, khair being found here and there. The whole forest is at present grazed over, and as a rule it is burnt every year. A plantation was commenced by Mr. A. Campbell at Ferozepur in the northern part of the main block (No. 1) about the year 1871. The surface soil in the plantation is a light loam, with a considerable proportion of vegetable mould. This has usually been successfully protected from fire. The watering of the plants was effected by means of an irrigation cut from the Ganges Canal, and there is a well, the water in which was standing at about 14 feet from the surface at the time of our visit. At first a large variety of seeds were sown, of which sissou only succeeded on a large scale, and the result is now a young forest of sissou, with a small proportion of other kinds, of which may be mentioned the tallow tree (*Excæcaria sebifera*), *Acacia Farnesiana*, *Albizia procera*, and *Acacia Lebbek*. There is also a small patch of tún and a plantation of *Albizia stipulata* near the forest house. Sál, sain, jáman, bahera, kihar, khair, teak, and farás were also tried. The shoots of sál are cut down annually by the frost, but a number of the plants are alive.

262. The area planted consists of 18 plots, aggregating 80 acres. The seed had been sown in trenches five or six feet apart, and the canal water was led through these trenches. It will suffice to give a brief account of the dimensions of the sissou trees in two blocks of five and ten years old, respectively.

In the plot five years old (No. 17) the number of trees on a length of 25 feet was 9 (nearly 3 feet apart), the height was from 18 to 20 feet, and the average girth of the dominant trees was 7 inches. The grass was not entirely killed out; indeed, it is in places very heavy, although the trees have full and healthy foliage.

In the older plot (No. 1), the number of trees on a line of 25 feet was 7 (nearly 4 feet apart), height about 30 feet, and average girth of dominant trees 12 inches. In a portion of this plot alternate lines had been thinned out, leaving the lines of trees at a distance of 12 feet. The trees look healthy, the foliage is full, and the ground underneath is nearly covered. The remarkable point is that these trees, regarding the age of which there seems no doubt, should not have attained a much larger size, and the only explanation which occurred to us was that fire had on several occasions entered this plantation. The gardener declared that the plot had only been burnt once in the last nine years, *viz.*, in 1878. We found a number of dead trees, but no dry tops or branches, and no indication whatever which showed that the trees are not healthy and vigorous. There may be, and very probably is, a stratum of boulders in the sub-soil, which would explain the slow growth, but no explanation of this remarkably slow growth can be given until the younger plots have attained a greater age.

Hitherto all the younger plants have been regularly watered during the dry season, and water is available for any extension of these operations.

263. The not very rapid growth of sissou suggests the trial of other trees, and as khair is indigenous here it will be well to try it. In two plots, Nos. 19 and 20, the trenches have been dug, and these should be sown with sissou, khair, and mulberry. The different kinds should be sown in alternate lines, and, if seed can be got, one or two lines may be sown with mohwa. Bábul has failed, but it should be tried again, and some neem and *Ailanthus excelsa* should also be tried. The seed should be sown thick in the trenches, and it is hoped that three years' watering will suffice to establish the plants.

264. If this forest is to be maintained as such, its condition generally should be improved, and this can only be done by protecting it against fire. As a commencement, we recommend that one plot should be protected in the

northern and one in the southern part of the main block. At first it would be necessary to exclude cattle, but hereafter it will probably be possible to make special arrangements for pasture in the protected blocks, admitting certain villages only in each block, and making them responsible for the protection. It is not likely that the grass in the fire-protected blocks would find a ready market. As regards the future management of this area, we must await the effect which fire-protection will have on the spontaneous growth and the result of the sowings here recommended.

**Kalushahid bamboo forest.**

265. An area of 1,000 acres east of the Ráni Ráu has been protected against fire and cutting since 1879, *i. e.*, for nearly three years. The bamboo here (*Dendrocalamus strictus*) is chiefly found on the outer slope, and at the foot of the hills. The ground is exceedingly dry and stony, and the conditions for the experiment are not favourable: nevertheless the result has been most remarkable. The young shoots of 1880 are exceedingly numerous, tall, and of much greater girth than the old stems among which they have grown up. The experiment should be continued. There is of course the risk that some of the clumps may flower and die. On this poor soil and in this place, which is exposed to the hot winds, we cannot expect to produce bamboos as fine as those grown in the inner valleys of the Himalaya; but a considerable improvement has already taken place, and it should be ascertained to what extent the size and quality of the bamboos in this locality can be improved.

By way of experiment, a number of clumps have been partially cut over. This experiment should be continued in the following manner. In 10 clumps one-half of the stems should be cut; in 10 others all stems, with the exception of six in each clump, should be cut; and 10 others should be cut over entirely. The 30 clumps operated on should all be in the same locality, and as much as possible on level ground.

An experiment has also been made, with partial success, in planting up the flat ground below the forest with bamboos. We do not advocate the extension of the bamboo forest on a large scale on ground which can be used for cultivation, and which has actually been thus used. We are strongly of opinion that we should keep in view the necessity for establishing villages, under proper precautions, in those portions of our forests which were formerly under cultivation. It is most desirable, however, to plant bamboos as an experiment, and for this purpose an area has been fenced in, which seems to be suitable and which will be very instructive.

From what has here been stated it will be seen that the Central and Eastern Ranges are at present the most important as far as works of improvement are concerned. Eventually, when such works can be undertaken in the Western Range, it may be desirable to sub-divide it, but for the present the existing organization should be maintained.

**Revenue and Working.**

266. The Saháranpur Forests, excluding Patri, have been divided into 39 blocks, both for administrative and revenue purposes. In the hills each block consists of the basin drained by a stream which rises in the main Siwálik Hills, and of these basins there are 12 in the Western, 9 in the Central, and 5 in the Eastern Range. The islands in the Ganges River form one block, and the forests outside the hills in the Central Range comprise 12 blocks. In the Patri Forest the blocks have not yet been finally formed.

This organization is to the point; it is in accordance with what was recommended in paragraph 93 of the Report of 1878, and it should be maintained. For administrative purposes it has been arranged to combine several adjoining blocks into one beat, and in accordance with this principle there are 9 beats in the Western, 9 beats in the Central, and 6 beats in the Eastern Range. The head-quarters of each beat during the working season are, as a rule, the revenue stations along the submontane road, and the total number of Forest Guards in charge of these beats is 51. These Forest Guards

have revenue work in addition to the protective charge of the forests, and hence it is found necessary to place several Guards at each of the more important revenue stations.

267. Regarding the system pursued in collecting revenue from these forests, reference may be invited to paragraphs 93 to 96 of the Report of 1878; the suggestions made in those paragraphs have for the most part been carried out, and it will suffice to state that in some blocks the revenue on dry fuel, bamboos, grass, and minor forest produce is leased to contractors, while in other blocks this revenue is collected departmentally. For the extraction of bamboos a regular system of rotation has been established, some blocks being closed while others are open.

#### Cutting of green timber.

268. Permission for the cutting of green timber for export on a large scale must always be obtained from the head-quarters office, and the plan followed has been to grant such permission in certain blocks only. The amount of green timber exported under this system has been as follows:—

Year.	Name of Block.	Description of timber.	Quantity, in cubic feet.	Revenue realized.
				Rs.
1878-79	<i>Nil.</i>	<i>Nil.</i>	<i>Nil.</i>	<i>Nil.</i>
1879-80	Morkota	Sál	1,952	641
	Ditto	Other kinds	46	9
	Lakarkot	Sál	277	104
	Andheri	Sál	1,083	406
	Ditto	Other kinds	141	35
	Dholkhand	Sál	1,219	457
	Ditto	Other kinds	318	73
	Khajnáwar	Sál	663	248
	Ditto	Other kinds	112	28
	Beri Bára	Ditto	58	14
	Gáj	Ditto	2,348	429
		Total	8,217	2,444
1880-81	Khajnáwar	Sál	2,754	1,067
	Ditto	Other kinds	488	122
	Morkota	Sál	535	201
	Andheri	Sál	1,788	671
	Ditto	Other kinds	2,295	536
	Dholkhand	Sál	288	108
	Ditto	Other kinds	86	7
	Sukh	Sál	1,017	381
	Beri Bára	Other kinds	202	51
		Total	9,403	3,144
		Grand Total	17,620	5,588

269. Hitherto permits have been granted for certain quantities of timber to be exported from certain blocks within a certain time, and nothing was stipulated regarding the number of trees, or the minimum size of the trees to be felled, the only stipulation made being that no trees should be cut on narrow ridges and on steep hill sides. Under this system it is not impossible that a certain quantity of young trees may have been cut, and to guard against this in future it is intended that all trees to be cut shall be marked by responsible Forest Officers. As a preparatory measure, the quantity of mature timber standing in several hill blocks has been approximately determined in the Gáj, Betban, and Andheri blocks.

Passes for green timber required by the villagers for their domestic and agricultural requirements are under certain rules granted by the Officers in charge of the ranges and the Guards in charge of beats, the powers of Forest Guards and Range Officers being clearly defined.

#### Grazing dues.

270. The collection of the grazing dues for the cattle belonging to the villages adjoining the forests is at present made by the village revenue officials under the control of the Collector, and in order to enable the Guards in charge of beats to control the herds sent for grazing, a system of tickets has lately

been established. Cattle brought to the forest to graze from a distance are taken by the graziers to certain established stations, where they are counted, tickets being granted by the Forest Guard in charge of the beat.

**Future cuttings.**

271. The chief point to which we desire to draw attention in the working of the Saháranpur Forests relates to the cutting of green trees of sál and other kinds. It is most desirable to develop a steady demand for such wood, but, as already stated, no green trees, except on a small scale for the domestic and agricultural requirements of the adjoining villages, should be cut in any of the hill blocks protected against fire; and as regards the hill blocks not specially protected, every effort should be made to avoid felling in them to any large extent, and to induce purchasers to export the timber which they may require from the Dehra Dún Forests, which are much better stocked than those of the Saháranpur District.

Eventually, after fire-protection has been firmly established in the selected hill blocks, it will doubtless be possible, under competent supervision in detail, to cut old trees in localities where the forest is thick, without unduly increasing the risk of fires, and with the view of promoting a development of young growth. Subject to these general considerations, every effort should, as a matter of course, be made to develop a steady demand for timber from the Saháranpur Forests and to increase the revenue.

In order to determine the rate of growth of the sál tree outside the Siwálíks, it will be well to mark off a plot of about one acre in a position easily accessible, and periodically to measure all trees standing on it in the manner described in detail under this head in the Dehra Dún Division.

**Rest-houses.**

272. The following are the existing arrangements for accommodation of officers in the forests of this division. They have a share of a rest-house at Khára, on the Jumna, in the Western Range, a rest-house at Beri Bára in the Central Range, and a share of a rest-house at Maiapur in the Eastern Range. Two more rest-houses should be built, one in the centre of the Western Range at Kasumri Ráu, and another at Dholkhand in the Central Range.

**Employment of Probationers and Apprentices.**

273. Besides the charge of the three ranges in this division, the following may be noted as special work suitable for the employment of students at the Forest School:—plantation work in Patri and in Lakarkot, the periodical measurement of sál trees, and the examination of the mature timber standing in the hill blocks. Suitable subjects to be studied by the students will be the average height of sál poles in girth between 2 and 3 feet in the valleys and outside at different distances from the foot of the hills, and the circumstances which affect the growth in girth and in height of these trees. The study of the protected and unprotected bamboo forests, the examination of the mode of flowering and seeding, and the effect of cutting upon the development of the bamboos, may also be mentioned.

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**CHAPTER X.**

**DEHRA DÚN FORESTS.**

**Organization.**

274. The forests of the Dehra Dún Division are at present divided into four ranges as follows:—

1st.—The *Western Range*, area 54,151 acres, comprising, besides the northern slopes of the Western Siwálíks, the detached blocks of Ambári, Cháandpur, and Dholkot. Under existing arrangements all these forests are open to grazing, and are burnt as far as they are not self-protected.



2nd.—The *Central Range*, area 48,096 acres, comprising the closed and fire-protected forests on both sides of the Mohan road, from the Khajnaor Ráu to Jhabrawála, and including Nágsidh Hill and Lachiwála, which are open to grazing and are not protected against fire.

3rd.—The *Eastern Dún Range*, area 33,231 acres, comprising the closed and protected forest of Tháno, and the open forests of Málkot, Song, Tirsál, and Sainkot. Within it is the closed and protected Dáluwála plot, area 1,630 acres. To this range will be attached that portion of the leased Garhwál Forests which adjoins the Dehra Dún.

4th.—The *Eastern Siwálik Range*, area 42,301 acres, which extends from Jhabrawála to the Ganges, and is open to grazing and is not protected from fire.

**Area protected against fire.**

275. Of the total area of the Dehra Dún Forests, 27,664 acres are closed against grazing and protected from fire, while the remainder, 150,115 acres, is open and as a rule is burnt annually. In regard to fire-protection the Central Range is the most important. As explained in the Report of 1878, protection against fire was first commenced in the Bulawála Forests in 1872, and has been gradually extended over the entire Siwálik slope of this range. The protection against fire is secured by burning the grass and forest outside the lower edge of the closed area; and, towards the Siwálik Hills in the Bulawála Forests, by burning the forest outside a 200-foot line which was cleared about ten years ago. In the forests west of Bulawála the line towards the hills is a cleared road ten feet wide, not cut straight through the forest, but following the configuration of the ground so as to be useful as a bridle-path. The forest above the road towards the hills is burnt annually so far as is practicable. Regarding these exterior lines in the protected portions of the Central Range, we desire to submit the following suggestions.

**Open grass lands on the edge how to be treated.**

276. Along the lower edge there are large extents of grass lands within the closed area, which at present are a source of considerable danger, especially in the portion west of Assarori, where villages adjoin the forests. In some cases these grass lands will gradually get stocked with forest growth, if we succeed in protecting them continuously against fire, but in others they are not on ground suitable for the growth of sál. The risk from fire might be diminished, either by burning the grass entirely off them, or by isolating the plots by means of fire-traces between them and the forests. The circumstances of each case should be taken into consideration in choosing between these two methods, but it should always be borne in mind that a spark which falls upon grass land sets the whole ablaze, while a spark which falls into sál forests will in most cases be intercepted by the green foliage of the trees and will do no harm.

**Boundary towards the hills.**

277. As regards the inner lines towards the hills, we are disposed to advocate the adoption throughout of the plan followed west of Bulawála. The upper bridle road, which follows the old elephant track, may with great advantage be continued eastward as far as the Jhabrawála boundary line; and if the forest outside this path is burnt, there ought to be no risk on that side. As explained in the chapter on the Saháranpur Division, it is intended eventually to include the whole Siwálik Range at the head of the Rátmau basin within the fire-protected area down to the upper boundary of the Bulawála Forest: this plan, however, has not yet been carried out.

**Interior lines.**

278. The inner and outer fire-lines are joined by a number of more or less parallel lines, which, in accordance with the recommendations contained in paragraph 77 of the Report of 1878, have been laid so as to follow the configuration of the ground and to serve as export lines. These export roads are ten

feet wide, and are completely cleared, some of them being actually used by carts. A cart-road has also been made from Assarory to Bulawála, in order to facilitate the export of timber by the Mohan road. In the Bulawála Forest there was originally a system of straight lines at right angles to one another, one of which, the horizontal line known as Colvin's line, is still maintained; but experience has shewn the great difficulty of keeping these lines clear, as they do not follow the configuration of the ground and are never used for traffic.

The line known as Colvin's line will probably have to be maintained with a less width, but the straight transverse lines should be abandoned, and in their place a number of export roads following the configuration of the ground should be cleared.

Regarding the clearing of these 10-foot roads, which are of importance as interior fire-lines and to facilitate the export of timber, we desire to recommend that in the extraction of stumps the system now generally adopted in the Oudh Forests be followed, under which the chief roots are cut and the stem is used as a lever to extract the stump.

In the sál forests of Oudh, where the system of roads through the forests has been developed with greater success than in any other province, experience has shown fifteen feet to be the most convenient width of roads which are to serve as fire-lines and for the export of produce; and it has also been found that the maintenance of these roads is greatly facilitated by digging drains on the sides, and by forming a slightly raised road in the middle. On slopes and on broken hilly ground, like that of the Dehra Dún Forests, these conclusions may not in all cases hold good; but they are mentioned here for the consideration of the local officers, and for adoption wherever this may be feasible. Two traces are cut parallel with the existing export roads in the Central Range, and the grass between the traces and the road is cut, the grass being burnt in the hot season. If 15-foot roads are generally adopted and kept clear, the dry leaves being swept up during the most dangerous part of the hot season, it will probably not be necessary to maintain the traces, nor will it be necessary to burn the grass and brushwood on both sides of the roads. It will be found in course of time that the forest on the sides of these roads will grow up densely and that the road will be overshadowed by it, and this is one of the chief advantages of roads of this description.

#### Thinnings.

279. In paragraph 79 of the Report of 1878 the thinnings made from 1876 to 1878 have been described. The late examination of this area, 1,920 acres, has confirmed the apprehensions there expressed: the ground is still covered with a dense mass of grass, which has only in a very few localities been replaced by the coppice-shoots of the pre-existing growth. These coppice-shoots have suffered severely from frost, and in many cases from the attack of a black fungus. Very few seedlings were found in the grass, although fortunately it has been possible to protect this part of the forest against fire; and the ground is still covered with logs, tops, and branches, so that should, by any misfortune, fire enter the forest the damage would be incalculable.

At first sight these thinned compartments have a regular and neat appearance, but on closer examination they are found to be exceedingly unpromising and unsatisfactory.

280. In paragraph 80 of the Report of 1878 suggestions were submitted regarding the cutting out of mis-shapen trees: the thinnings then recommended have been carried out over an area of 640 acres; the sál trees selected to be thinned out were girdled, but this operation has not been successful, as explained in paragraph 40 of the Annual Report for 1879-80. It seems clear that sál trees killed by girdling are much more exposed to injury by the attacks of insects, than trees which die and dry up naturally. In future it will be necessary to abandon the plan of girdling the sál trees before felling. The area from which the trees thinned out under this plan have been removed shows a much heavier growth of grass than is desirable, and the question was raised, while we were engaged in examining these compartments, whether the trees marked for thinning out in 1880, but not cut, should be felled. We have come to the

conclusion that it will be best to complete the experiment as originally contemplated: there will then be 1,280 acres thinned on the new plan, the progress of which may be compared with the 1,920 acres thinned out in 1876-78.

281. After this area has been completed it will not, however, be desirable to continue these operations in the Bulawála Forests, where the soil is poor, sandy, and full of boulders; and we recommend that, instead thereof, thinnings be undertaken on both sides of Assarori, where the soil is more binding, richer, and much moister. In these localities the leading principles should be to cut out mis-shapen trees of all kinds where the forest is otherwise sufficiently thick, the more valuable kinds mentioned in paragraph 80 of the Report of 1878 being spared. In that part of the forest a considerable number of well shaped sál trees of marketable size are found, and these may be cut whenever they stand over sufficient thickets of advance growth.\* It will be understood that these operations must proceed in regular order by compartments; the area to be taken in hand annually may be settled hereafter, with due consideration of the demand for timber and the quantity of timber obtained from the areas treated in this manner.

Regarding the experimental cultivation of sál, the same course should be pursued here as has been suggested for the protected area of the Saháranpur Division.

#### Treatment of the open forests.

282. The improvement in the condition of the forests not specially protected from fire is, as far as we had an opportunity of seeing it, very considerable wherever the soil is favourable. We have agreed that, besides the areas already mentioned, no extension of the area regularly protected from fire shall be attempted for the present; but we desire to submit that it is a good plan to make roads throughout the forests, whether specially protected or not, in order to prepare the way for regular fire-protection hereafter, and also to stimulate the export of dry wood and of such green timber as it may be possible to cut.

A good commencement in this respect has already been made by the construction of a fair-weather cart-road through the Lachiwála Forest, from Bulawála to the Hardwár-Dehra road. Similar roads, we submit, might be made to connect the Eastern Siwálik Forests with the Dehra-Hardwár road, and the forests on both sides of the Timli Pass with the Saháranpur-Chakráta road. These roads should be constructed on the same principles as the export lines in the Central Range, and eventually a system of such roads may with great advantage be laid through the whole of the open forests of the division.

283. The thinnings proposed to be made in the Central Range, on both sides of Assarori, will furnish a considerable annual supply of timber to be exported by the Mohan road, but it is desirable to stimulate the export of timber by other lines also. Of these the most important are the Jumna River, the Timli Pass road, the Khánsrao Pass, and the Hardwár road. The area of the sál forests in this division is so large, and the quantity of wood which is annually added to the growing stock is so considerable, that we shall be justified in recommending regular annual cuttings on a moderate scale in the vicinity of each of these main export lines.

#### Export of timber from private forests.

284. But before making more definite suggestions in this direction, it will be well briefly to advert to the export of wood from private forests in the Dehra Dún. This export is very considerable, and it is not sál only but chír and other woods also which are exported on a large scale. We visited two private forests on the west side of the Government forest at Ambári: one estimated to cover about 5,000 acres, leased to a native merchant at Saháranpur, who is said to have paid the sum of Rs. 17,000 for the right of cutting timber during a period of seven years; and a second forest estimated to contain 2,500 acres, leased under the same conditions, and for an equal period, on the payment of a sum of Rs. 11,000. The timber from these forests is exported in the shape of karris and other scantlings, which are partly floated

\* We have agreed to use the term "advance growth" for what Foresters in Germany call *Vorwüchse*, that is, young growth found in old forest before regeneration cuttings have commenced.

down the Jumna and partly carted out by the Timli Pass road. The remaining wood is converted into charcoal, which we were informed is sent to Roorkee. There seems good reason to believe that during the last five years the export of timber from the private forests of the Dún has increased considerably; and there is no ground to apprehend that timber felled in the neighbourhood of the lines of export already mentioned will not find a ready sale. If the localities where the cuttings here proposed to be made are judiciously selected, the demand for timber in the Saháranpur District may perhaps to some extent be supplied by the cuttings suggested in the Dehra Dún Forests.

Regarding the localities where these cuttings should be made, it will suffice to suggest that a commencement should now be made to select those areas which will be chiefly valuable as grazing grounds for the adjoining villages, and to separate them from the areas which it is intended permanently to maintain as forest. Obviously it is of much greater importance to maintain a complete forest growth on those lands which are to be devoted to the production of timber, than on those which are to be used as grazing grounds. Wherever such a separation can be made, it will be well to spare the forest and to make cuttings in preference on the lands in the vicinity of villages.

285. A better plan would be to demarcate areas for protection against fire and grazing in the vicinity of the great lines of export mentioned, and only to cut within them. If this were feasible, and if the protection from fire could be made perfectly certain, it would be possible to cut the quantity required in areas protected from fire. Should this plan be found practicable, it should as a matter of course be adopted, but until these new areas have been placed under protection against fire it will be unavoidable to cut a certain quantity of timber outside the protected areas. Under these circumstances, the question arises how these cuttings should be arranged with the least possible injury to the permanent interest of the forests; and this can, in our opinion, only be solved by making the cuttings in those areas which it is not intended to maintain permanently as forests.

#### Periodical measurement of trees.

286. The fenced sample plots in the Bulawála Forest, in which the periodical measurement of sál trees has hitherto been made, are not very suitable for this purpose, and it will be necessary to select plots in other places. The object of these periodical measurements is two-fold, *viz.*, to determine the rate of growth of individual trees, and to ascertain the annual timber production per acre. In a preliminary manner, we have selected suitable localities in the Phandawála and Lachiwála blocks; and in each of these two localities plots of about one acre in extent should be marked off by ditches. On these plots the forest should be as well stocked as possible, and the first operation will be to thin out all suppressed trees and all shrubs and irregularly shaped trees which are not likely to form part of the final crop.

All the remaining trees should be measured twice a year—once as soon after the rains as possible, and once during the hot season before the monsoon commences. The most convenient times for these measurements would probably be the beginning of November and June. It is essential that each tree should be always measured at the same point, and the experience gained in Oudh shows that a ring of zinc paint lasts sufficiently well to be used to mark the point where the measurement should be made. It is also essential that the measurement should be made at a point where the stem is round and regularly shaped and if possible perpendicular; but it is not necessary that all trees should be measured at the same height above the ground. It will be well to set aside one measuring tape for this work only, and to divide it into tenths of an inch. It will be understood that all trees standing on the selected plots, not the sál trees only, will be measured, and that the plots should, as a matter of course, be protected from fire.

#### Instructive work for Probationers and Apprentices.

287. Besides the charge of the ranges and sub-divisions of ranges, the plantations, and the periodical measurement of trees, the most instructive work in the Dehra Dún Division on which the students of the Forest School

may be employed will be the selection of the trees to be thinned out in the blocks protected from fire and the arrangement of the cuttings, if any should become necessary in the open forests. It will be possible in this division to produce a considerable amount of revenue by such thinnings and cuttings in different places, without any injury whatsoever to the forests, provided the trees cut are selected with due care in detail and with full consideration of all circumstances. This is a work which is both instructive and useful, and no pains should be spared to make a suitable selection of every tree to be cut; and the students employed on such work should be required to record a detailed account of their proceedings in this respect.

288. The extensive sissou and khair forests along the Song River and elsewhere in this division will afford much interesting work. Very little is as yet known regarding the circumstances under which the natural reproduction of sissou and khair takes place, and this subject should be systematically studied in those portions of the low-lying forests which can be protected against fire. An interesting branch of forest industry in this division merits further study than has yet been given to it; this is the extraction of gum from the semla tree (*Bauhinia retusa*). The tree is not uncommon, and the export of the gum is considerable, so that it is well worth while to make experiments regarding the yield of gum at different seasons and under different modes of treatment. The avenues of tûn and other trees along the canals in the Dún are also a most interesting subject of study. The age of most of these avenues is well known, and it would be a task of considerable interest to determine the rate of growth and timber production of the trees planted along these canals. This is a work which should be taken in hand at an early date.

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## CHAPTER XI.

### FORESTS IN JAUNSAH.

#### Organization.

289. The forests of the Jaunsa Division have been divided into three ranges, each range has been divided into forests, and each forest into a number of blocks.

The ranges are as follows:—

1st.—The *Southern Range*, area 8,314 acres, comprising a number of scattered plots, viz., the Kálsi, Bairát, and Amláwa Forests, two strips along the Tons and Jumna, and three deodar forests in the Jumna Valley in pargana Rawai of Tiri-Garhwál.

2nd.—The *Deoban Range*, area 35,363 acres, comprising the Lokandí, Deoban, Ekra, Karámba, and Konain Forests.

3rd.—The *Báwar Range*, area 33,063 acres, comprising the forests in the valleys of the Riknár, Dháragádh, and Dharmigádh, and those near the Tons in the vicinity of Bástil.

290. The Southern Range comprises only second class reserved and leased forests, none of which are protected against cattle, but the greater portion of which are protected against fire.

The Deoban Range comprises the first class reserves of Bodyár, Kanásar, and Konain, aggregating 2,200 acres, while the aggregate area of the second class reserves is 33,200 acres. Of the second class reserves in the Deoban Range, however, a portion, aggregating 5,423 acres, is closed against fire and grazing.

The Báwar Range includes the first class reserves of Tutwa, Lakhau, Katián, and Koti, aggregating 2,968 acres; while the second class reserves comprise an area of 30,095 acres, of which about 5,123 are protected against grazing and fires, and 3,378 acres against fire only.

In addition to these, the division includes the forest garden at Chakráta, as well as two blocks, aggregating 500 acres, which have been demarcated

within cantonment boundaries, and have been handed over to the charge of the Forest Department.

291. The permanent establishment entertained for the care of these forests consists of three Foresters and eighteen Forest Guards. It will be noticed that there are no Rangers, and an insufficient number of Foresters. The idea is that Probationers and Apprentices shall be employed to have charge from time to time of the more important ranges or forests in which instructive work is going on.

292. It may be as well here to mention that during the next five years such works will chiefly be carried on in the following forests :—

The *Lokandi Forest*, where the planting up of the Bódvár first class reserve must be completed and considerable fellings made.

The *Deoban Forest*, where the planting up of Mátkángra, with the land in cantonments, the planting up of the blank slopes in Mohna, and the proposed cuttings in Mohna and Thona, will require supervision in detail.

The *Ekra Forest*, where the cuttings in Hajáwa must be attended to.

The *Dhárágádh Forest*, where the protection and working of the rich deodar forests of Maura and Lakhau, and the arrangements for the carriage of timber to the Tons, will require the services of a skilled officer.

Thus there will be instructive and useful work for the students at the Forest School while under practical training. For a considerable number of students the division will furnish work for eight months in the year, from the 15th April to the 15th December. During the four winter months the work on which they might be employed is usually limited to planting in cantonments, and to such works as clearing out of streams, building roads and slides at low levels in the Dhárágádh or elsewhere.

During these four winter months, therefore, the majority of the Probationers and Apprentices must be employed in other divisions.

#### Maps.

293. For the forests of the Jaunsár Division, the following maps are available :—

1st.—Maps of the Deoban Working Circle, including Bódvár and Hajáwa, on the scale of 4 inches to the mile, surveyed and published by the Forest Survey.

2nd.—Maps of the remaining forests on the scale of 2 inches to the mile, surveyed by the Forest Survey, but published by the Great Trigonometrical Survey.

These maps are excellent and sufficient for all present purposes. In the case of the Mohna block only it is proposed to have a larger scale map, with some additional topographical details; and the same may perhaps eventually be necessary for the blocks placed in charge of the Forest Department within cantonments.

It would be a great advantage, in the more important forests, to determine the elevation of a larger number of points than those entered in the maps; and, if at any time the services of a competent officer should be available for such work, it would be well to enter on any large scale maps that may hereafter be required contour lines at vertical distances of, say, 500 feet.

#### Fuel supply to Chakrata.

294. The circumstances under which Chakrata is supplied with fuel from the forests of the Deoban Range have not materially changed since the Report of 1878 was written, and it will therefore suffice in this respect to refer to paragraphs 33 to 35 of that Report.

The annual consumption of firewood was at that time assumed to be 200,000 cubic feet of solid wood; this, however, has been far in excess of the actual annual requirements during the last three years, because the station was only occupied during a part of the time.

The actual consumption of the last eleven years, expressed in solid cubic feet, has been as follows :—

Year.	Oak.	Fir.	Total.
1870-71			177,620
1871-72			147,860
1872-73			213,350
1873-74	No record distinguishing between oak and fir during these years.		129,390
1874-75			151,964
1875-76			No record available for this year.
1876-77			235,068
1877-78	40,921	45,457	86,378
1878-79	30,236	73,604	103,840
1879-80	39,626	48,073	87,699
1880-81	23,305	67,612	90,917
Average for ten years = 142,408 solid cubic feet.			

The period to which these figures relate was, however, quite exceptional, and for the future it will be safest to provide for an annual consumption of 200,000 cubic feet of solid wood, although there may be years when the whole of this quantity may not be required.

#### Area available.

295.	In order to furnish this quantity, we have under our control 5,423 acres within moderate distance from Chakráta, which are at present protected against grazing and fire. The details are entered on the margin. In addition to this area, we have 12,000 acres, also within moderate distance, protected against fire, but not against grazing; and 5,800 acres more, mostly at a lower level in the valleys, which are grazed over and burnt annually. The most valuable portion of this aggregate area of 23,200 acres is the 5,400 acres protected against grazing and fires.
	Acres.
Bodyár	1,463
Kanásar	173
Konain	374
Thona	466
Kanjatra	665
Matkángra	405
Mohna	865
Kophtí	217
Hajáwra	400
Bájámára	325
Leguna	52
Siári	18
Total	5,423

It will, however, be remembered that of this area only a small portion (2,173 acres) is first class reserved forest, and that only 2,010 acres are actually closed and under strict protection permanently. As regards the rest, it may be necessary to effect exchanges, opening blocks hitherto closed and adding others to the closed area. In this respect it will be well here to state that, in making such exchanges, the aim should be as much as possible to open to pasture lands situated at high elevations, where the growth is slow and the reproduction more uncertain and difficult than at lower levels. Moreover, there is more demand for high level grazing on the part of the surrounding villages than for pasture at lower levels. On the other hand, the consideration that it is cheaper to carry wood down-hill than up-hill will receive due weight whenever occasion should arise for modifying present arrangements regarding grazing.

Of the 5,400 acres of forest completely protected, it may be said that 3,000 acres are at present stocked with forest, while 2,400 acres are blank; and of the stocked area again about one-half, or 1,500 acres, is situated above 8,000 feet, where reproduction is more uncertain, and where fellings must be made more cautiously than in areas situated at a lower level.

296. Taking all these circumstances into consideration, we are justified in saying that the area (5,400 acres) of completely protected forest land will not be equal to furnish in their present condition an annual yield of 200,000 cubic feet of solid wood permanently. We have, therefore, come to the conclusion that, until the area protected against fire and grazing has been completely planted up and brought into a perfect and uniform state of protection, it will be unavoidable to draw a considerable portion of the annual supply from the 12,000 acres which are protected against fire, although they are not protected against grazing. Of this area also, a portion only, probably not more than

one-third, is stocked; so that, for the present, the forest which is to yield the wood for Chakráta consists of 3,000 acres stocked in the area completely protected, and 4,000 acres in the area open to grazing.

297. The proposals regarding cutting submitted in the present Report will be confined to the next five years, and for this period, and indeed for a much longer period, it will not be difficult to satisfy the annual demand by making in the completely protected area the cuttings which are necessary for the improvement of the forest. The question, therefore, of cutting in the area open to grazing does not press at present, and it will suffice to say that such cuttings are only admissible in localities where young growth already exists on the ground.

We are of opinion that during the next five years, that is to say, from 1881-82 to 1885-86, the cuttings which it is desirable to make for silvicultural reasons in the Mohna, Hajáwa, Thona, and Bodyár blocks, together with the dry wood which will be collected from the whole of the area, will suffice to furnish the requirements of Chakráta.

It should here be mentioned that this relates to wood-fuel only, and that the charcoal required for the station is mostly supplied from private forests near Ambári and from the Government forests near Kálsi. All this charcoal—nearly the whole consumption at Chakráta—is brought up by carts from low-level forests.

#### Cuttings in Mohna block.

298. The Mohna block, as explained in paragraph 40 of the Report of 1878, now includes the upper part of the Kanjátra and Jádi blocks.

The total area of the Mohna block is 1,315 acres. Of this area, 865 acres are protected against grazing and fire; the stocked area in the protected portion is 600 acres, of which 500 acres are above 8,000 feet and 100 acres below 8,000 feet in elevation.

We have agreed to divide the protected portion of this block into fourteen compartments, as follows:—

Top of Deoban Hill	...	{	(1) Gona Kai.
			(2) Chakráta View.
			(3) Snow View, west.
			(4) Ditto, east.
Kua basin	...	{	(5) Kua head.
			(6) Kua, south.
			(7) Do., north.
Rangai basin	...	{	(8) Rangai, south.
			(9) Do., north.
Katbau basin	...	{	(10) Katbau, south.
			(11) Do., north.
Agar basin	...	{	(12) Deothát.
			(13) Agar, south.
			(14) Do., north.

Compartment No. 1, Gona Kai, comprises that portion of the block which is nearest Chakráta; it is a well stocked forest of bán and moru, at an elevation of 7,500 feet, with a north-easterly aspect.

The boundaries of these compartments are well defined by roads and natural features, and in a few instances only will it be necessary to make additional paths as boundary lines. Pillars, with compartment numbers, should be placed wherever a path crosses a compartment boundary and at other suitable places. In 1876 Mr. Dansey divided the Mohna block into 39 compartments, partly according to the configuration of the ground, partly according to the character of the forest. The arrangement now proposed seems to us more simple and useful. To prevent confusion it will be necessary to remove the compartment pillars erected by Mr. Dansey.

299. In order to facilitate a precise record of the progress of the cuttings and cultural operations, it will be necessary to prepare a map of the Mohna block on a larger scale; and we recommend that, as an experiment, a map be prepared on a scale of 16 inches to the mile, containing all details of the



existing map, except hill shading, all paths and compartment boundaries being shown. Eventually, whenever practicable, 500 feet contour lines should be added, and an area statement of compartments should be prepared.

**Former cuttings, Mohna block.**

300. The portion of Mohna to which these remarks relate has been continuously protected since 1871, and the effect of this protection is clearly visible in the very heavy grass with which the blanks are stocked, as well as in the deep layers of decaying leaves and needles which cover the surface of the ground. The beneficial effect of ten years' protection is also seen in a large number of seedlings which have come up during this period near the edge of the forest, and in the case of the two oaks (karshu and moru) also in the forest. As regards the pines, the seedlings which have come up since protection commenced are not very numerous, except on the edge of blanks. It should, however, be mentioned that numerous seedlings of the blue pine, of a less age than ten years, are found scattered on nearly all blank slopes.

301. The cuttings which have been made since protection commenced have been as follows. Between 1875 and 1877 cuttings were made over 311 acres, chiefly in the Rangai, Katbau, and Agar basins. These cuttings have yielded 252,000 cubic feet stacked wood of oak and 282,000 cubic feet stacked wood of fir—total 534,000 cubic feet of stacked, or 356,000 cubic feet of solid, wood, which is at the rate of 1,145 cubic feet of solid wood per acre. These cuttings were made partly by Mr. Bagshawe, partly by Mr. Dansey, and the object was to afford sufficient light for the young growth to come up, and at the same time to leave a sufficient number of trees for shelter and to shed seed.

The selection of the trees cut has evidently been made with great care; the forest thus treated presents a very regular appearance, and at first sight the operation would seem to leave nothing to be desired.

**Natural reproduction since cuttings were made.**

302. As regards natural reproduction, however, the result has by no means been satisfactory. Oak seedlings of less than five years' growth are numerous in places, but the young growth of spruce and silver fir, which form the great mass of the forest in these cuttings, is almost entirely limited to the advance growth, which was on the ground before the cuttings were made. This advance growth was fortunately abundant in places, and it has greatly profited by the light given it. There are exceptions, but as a rule these exceptions are only found along paths, or in other places where the firm surface soil has been exposed. On the deep layer of decaying rubbish, leaves, needles, and herbs, scarcely any young seedlings of the spruce and silver fir were found.

It is true that at this elevation the spruce and silver fir do not seed regularly, and since these cuttings were made, there has been only one good seed year (in 1878). As a rule, abundant seed does not form on these trees oftener than once in three or four years. The two oaks, karshu in particular, seed more regularly than the pines.

**Suggestions for the future.**

303. The conclusion which a careful examination of this area has forced upon us is that the acorns of both moru and karshu germinate readily, and produce young plants on the loose and soft layer of needles, leaves, and rubbish; while the lighter seeds of the pines, although they may germinate, dry up again before their roots reach the solid ground. Clearly, therefore, some other arrangement of cuttings must be made in order to ensure the natural reproduction of these forests; but whatever arrangement may be devised, it will be necessary to wound the soil and thus to expose a firm surface to the roots.

Fellings of a similar character were made in 1880 in the basin of the Kua stream, where 57 fir and 77 oak trees were cut. These trees were cut chiefly over advance growth. In the same year cuttings were made on a small scale in the karshu forest of the Snow View compartment, in order to give light for the seedlings of karshu to spring up.

## Coppicing of Karshu.

304. The two plots of karshu which were cut over in April 1874, in order to test the coppicing power of that tree, adverted to in paragraphs 22 and 23 of the Report of 1875 and in paragraph 53 of the Report of 1878, should here be mentioned. The result of this operation has so far been unfavourable, that many stumps, particularly of the older trees, have not thrown out any coppice-shoots at all. But it should be remembered that the manner in which this cutting was made did not give the trees a good chance; the stems were cut at different heights above the ground, and in no case was the cutting so made as to promote the growth of the coppice-shoots. On our present visit the average length of ten shoots of last season (1880) was found to be  $8\frac{1}{2}$  inches, which, considering all circumstances and the high elevation (9,100 feet), is not unfavourable.

## Former cultural operations.

305. The most important and successful attempt at planting in the Mohna block was made during the rains of 1873 by Mr. Whittall; it is referred to in paragraph 23 of the Report of 1875. The result of this operation is now visible over a large extent of blank grassy slopes in the Rangai, Katbau, and Agar basins, where the ground is fairly stocked with young plants of karshu, the height of which varies from two to three feet. Wherever neighbouring trees afforded a little shelter, the plants have grown more vigorously and have attained a greater height. About the same time a large number of spruce plants were raised in nurseries and planted out in 1876, and of these also a considerable number survive, which have attained about the same size as the karshu.

The soil on the blank grassy slopes which were thus operated upon is favourable, and the matting of grass is by no means as thick as in Bodyár, but the appearance of the karshu and spruce plants mentioned shews at a glance that some shelter is required in order to induce them to grow up more vigorously.

## Blue pine self-sown on blank slopes.

306. Over the whole of these slopes we noticed a large number of vigorous plants of the blue pine, many of which, although of younger age, had attained a height of from 6 to 8 feet, with the shoots of 1880 up to 24 inches in length. It is well known that the blue pine thrives while exposed to the full power of the sun on blank slopes, and its cultivation on a large scale in this locality, with the view of affording shelter to the oak and spruce, is clearly indicated.

It is a remarkable fact that this tree is not common anywhere in the Deoban Range, except on the north-east face of Moila Hill, on the northern slope below the Kophti Peak, and on the northern slope of the Konain first class forest; and it is probable that all the blue pine which we find in this part of Jaunsár belong, not to the original, but, so to say, to a secondary forest growth.

307. As far as we know, the blue pine in the Mohna block does not thrive after it has passed a certain age. A stem in Katbau south, on a moderate slope, north-east aspect, at an elevation of 8,400 feet, had in forty years attained a diameter of 15 inches only.

It is quite possible that the blue pine which we propose to plant in this block may not grow to any considerable size, or attain any great age; but provided its growth is (as we have noticed it to be) rapid while young, the tree will serve the object of affording shelter to the young spruce and oak.

## Other trees planted.

308. A large nursery, chiefly of horse-chestnut, maple (*Acer casium*), and bird-cherry (*Prunus Padus*), was made about 1873 in a hollow near the bungalow, and the plants raised were planted out all over the blank slopes in the lower part of this block. Of these a large number of horse-chestnuts remain, but they have grown very slowly, which is not surprising, considering

that they were not planted in moist places, which are the natural habitat of this tree, but on dry sunny slopes, where the tree cannot be expected to thrive. We were unable to find any plants of the bird-cherry or maple.

Another nursery was formed about the same time at Deothát, and, in accordance with a recommendation made in paragraph 63 of the Report of 1878, a forest garden was established at Deothát, at an elevation of about 8,400 feet, where 8,000 deodar plants and a small number of the blue pine and the spruce are at present available for planting out.

#### Proposals for future treatment.

309. As regards future treatment, it will be convenient to discuss separately the area stocked and the blank slopes. As regards the cuttings to be made within the next five years, the general principle may be laid down that old trees must be cut only where sufficient advance growth already exists on the ground, or where it is intended to make experimental cuttings with a definite object. To begin with the former class of cuttings, a considerable quantity of timber may be obtained by cutting trees over advance growth in those compartments where no cuttings have as yet been undertaken, particularly in Snow View west and in the Kua basin. Here and there it will also be necessary to cut out trees standing over advance growth, where previous cuttings have already been made. But, as a rule, we have decided that no cuttings should be made in those localities where the first cuttings were made in 1876-77, until more experience has been gained regarding the natural reproduction after cutting.

#### Cutting proposed in Snow View.

310. As regards experimental fellings, it is proposed to make a heavy cutting in the karshu forest of Snow View east. As explained at page 29 of the Report of 1875, the ground under the old karshu forest is covered with a large number of seedlings, most of which for want of light come to nothing. We have decided, as an experiment, to recommend a heavy cutting in a portion of this compartment, leaving on the ground only groups and belts of vigorous and comparatively young trees. In making these clearances, care should be taken not to clear entire stretches from the top to the bottom, and thus to prevent the formation of gullies, in which the snow accumulates and, sliding downwards, destroys all young growth. The clearances should be made in patches of a considerable size, but these patches should be interrupted by belts of standing trees and should nowhere be continuous. This forest contains a small proportion of old spruce, which, if healthy and vigorous, should be spared.

We have considered whether this cutting should be made in spring or in autumn. The flowers of this oak appear, together with the young leaves (at this elevation), in June; but the acorns require a little more than a year to ripen, and are so small in early spring that it cannot readily be determined whether there will be a full seed year or not. Under these circumstances, we have decided to recommend that the cutting here proposed should be made in the autumn succeeding an abundant fall of seed. The wood should all be cut up and stacked on the road side before winter, so as to cause the least possible injury to the young plants. The greatest enemy of the young plants of the karshu will doubtless be the heavy growth of *Strobilanthes*,\* balsams, and other herbs, which will cover the ground after cutting, for even under the dense shade of the old forest there is a thicket, chiefly of *Strobilanthes*, more than two feet high.

\* Two species of *Strobilanthes*, with blue flowers, are common in the forests of the Deoban Range, between 8,000 and 9,300 feet. *Strobilanthes Wallichii*, N. ab E., is a remarkably gregarious plant, covering extensive areas to the exclusion of other plants under the deep shade of the karshu forest of Snow View. In Hajáwa and elsewhere it is found under spruce and silver fir. It is an undershrub, the stems sub-divided into numberless branches, which are jointed and break off readily at the nodes. In spring the tufts of this plant are two to three feet high, and present a mass of short stiff twigs, half woody, with small cordate, nearly glabrous leaves. At the commencement of the rains these tufts shoot forth the long herbaceous branches bearing lax panicles of blue flowers.

The other species, *Strobilanthes attenuatus*, Jacq., is found on more sunny slopes, and is common in the warmer part of the Mohna block, while it is almost unknown on the cooler slopes of Hajáwa. The plant is perennial, but the stems and branches are herbaceous; the leaves are larger, long-acuminate, and very hairy, with glandular hairs.

## Cutting proposed in Katbau.

311. In another part of the block, at a lower elevation, in the compartment which we have designated South Katbau, it is proposed to make a heavy cutting on a limited area similar to that suggested for the karshu forest of Snow View. The forest here consists of moru and spruce, with a little silver fir in moist ravines. Where the cuttings of 1875 to 1877 had been made, the ground is covered with the cones of 1879 and 1880, which would lead us to conclude that a large quantity of seed must have fallen; but, with the exception of the edges of roads, seedlings of the spruce are exceedingly scanty, though there are numerous seedlings of moru. The cutting should be similar to that proposed for Snow View, groups and belts of vigorous trees of all species being left standing.

## Wounding of the soil.

312. So far we have treated of the cuttings proposed to be made in this block. Over the whole of the stocked area, wherever cuttings have been made previously, or are now proposed to be made, and elsewhere in suitable places, we consider it necessary that the firm soil should as much as possible be exposed, so as to facilitate the growth of seedlings. It will now be well to establish a regular system of wounding the soil for this purpose in patches and interrupted lines. The work must be done rapidly, and it will probably be as well to assign a limited area to each labourer. A light and suitable instrument will eventually have to be devised for this operation, which will doubtless become a matter of great importance hereafter. In order to ensure full success, the surface soil should be wounded shortly before the seed of the two coniferous trees falls, and obviously the operation must only be undertaken in good seed years.

## Treatment of blank slopes.

313. It has already been explained that, in order to afford shelter to the numerous plants of karshu and spruce on these slopes, blue pine should be planted largely. For this purpose it will be necessary to extend the Deothát nursery, and to raise plants of this tree on a large scale. It would not, however, be right to confine these operations to the blue pine; for although this tree shows a more rapid growth on open and dry slopes, yet in suitable localities, where there is moisture and partial shelter, the progress made by young plants of the spruce and silver fir is almost equally rapid. We therefore recommend that the Deothát nursery should be employed to raise strong plants of all the coniferous trees which constitute the forest in the Mohna block, *viz.*, blue pine, deodar, spruce, and silver fir.

314. As regards the localities where the different kinds should be sown or planted out, it will suffice to say that the most suitable place for deodar is above the lower boundary road, whence carriage to Chakráta will be easy; that spruce and silver fir should be planted out wherever there is moisture and shelter; and that all dry slopes, as far as they will not be planted with deodar, should be chiefly sown and planted with blue pine. The general practice should be the same for all these four kinds, *viz.*, to sow in lines of patches, the distance between the lines being, according to circumstances, fifteen feet or more. As regards the preparation of the patches, we recommend that they should not be dug up too deep, and that the soil should not be made too loose; they should be longer in the direction of the lines, and a large quantity of seed should be sown in each patch. Every good seed year should be utilized in order to raise a large number of plants in nurseries, which alone will make it possible to continue these cultural operations without interruption. Where trees of different kinds are sown on the same slope they should be sown in alternate lines. As a rule, all patches where the seed has failed should, in the year following, be planted up from the nursery. The whole of the arrangements should be so made as to guard against failures on a large scale. It would be well to let these operations progress on a definite plan, commencing at the northern end of the Mohna block and proceeding in regular order southwards.

## Hajawa Forest.

315. Reference may be made to the description of the Hajawa block given in paragraph 30 of the Report of 1875. 400 acres of that portion which is situated between Hajawa ridge and the stream of that name have been protected against grazing since the spring of 1880. Of this area it may be estimated that 350 acres are stocked, 230 acres being above and 120 acres below the level of 8,000 feet. Inspection paths and fuel-carrying roads have been made; the forest has been divided into four compartments; and, in the place of the former slide, a fuel-carrying road has been made connecting it with the lower Mohna road above Kandál. Fellings were commenced in May 1880, and altogether 500 trees have been cut. The trees have been selected, partly where advance growth was on the ground (chiefly in compartment No. 1); but cuttings have also been made in other places where it seemed desirable to give light in order to favour the development of young growth. These cuttings were made chiefly in compartments Nos. 2 and 3.

316. For silvicultural reasons, cuttings in this block do not press, but as they have been commenced, and as roads have been made for the purpose, it seems for practical reasons expedient to continue them simultaneously with the cuttings proposed in Mohna, the object being to develop the system of working of this block, which is rather distant from Chakráta, and the working of which can only be made cheaper by steadily continuing it on a moderate scale.

These circumstances make it desirable to continue the cuttings for the present, and we suggest that all mature trees standing over advance growth be cut, and that the other cuttings be confined to compartment No. 3. The system will be the same as that recommended for Mohna, that is, the cuttings are to be made in interrupted belts, groups and belts of younger trees being left standing.

The soil in the Hajawa Forest is probably in a somewhat more favourable condition for the development of young growth than that in Mohna, the forest consisting chiefly of spruce and silver fir, and the ground being more firm through pasture having been continued until quite lately.

It is, however, not impossible that, in spite of the greatest care in the arrangement of these cuttings, natural reproduction may fail, and that it may be necessary to assist it by planting and sowing.

## Thona.

317. After the cuttings here sketched have been completed in the Mohna and Hajawa blocks, the Thona block should be taken in hand. The total area of the block is 466 acres, the whole of which has been protected against fire and grazing since the spring of 1877. Of this area 300 acres are estimated to be stocked, namely, 120 above and 180 below 8,000 feet. In the higher portion of this block, along the high level road from Deoban to Bodyár, no young growth is as yet visible, and the protection against grazing has not as yet had any effect; but on lower levels reproduction is exceedingly satisfactory along the edge of the forest and on blank slopes, some of which are well stocked with young plants of blue pine, spruce, and here and there of deodar. At these levels in the forest there is a considerable amount of advance growth and extensive thickets of ringal; but the cover is too dense to admit of any seedlings springing up. In the lower part of this block heavy cuttings may be made wherever there is advance growth on the ground. In order to ensure a proper system in the cuttings, it will be necessary to establish compartments before operations commence.

## Bodyar.

318. It is impossible to foretell the quantity of wood which the cuttings here recommended for Mohna, Hajawa, and Thona will yield, but it does not seem impossible that they will, together with the dry wood collected in the forests, furnish the requirements of Chakráta during the next five years. Should this expectation not be fulfilled, it will be necessary to cut in the Bodyár block in the manner suggested in paragraph 37 of the Report of 1878. The cuttings which will be made in this block will yield a certain quantity of deodar, which may either be used at Chakráta or exported *viá* the Tons

River; and they will yield a larger quantity of spruce, which will be cut in places where the ground is stocked with poles or with younger advance growth. It will be an advantage, at an early date and sometime before these cuttings are made, to count all large deodar and spruce, say down to 6 feet in girth, available for cutting.

The distance from Chakráta is between 10 and 12 miles, and the working of this forest for Chakráta will necessitate the construction of fuel-carrying paths, which it may not be considered worth while to make unless the number of trees available is sufficiently large to justify the outlay. The timber from this forest, both deodar and spruce, might, in case it should be decided not to undertake any extensive cuttings on Government account, be utilized by allowing it to be cut gradually by the villagers who are entitled to receive such timber.

319. The area of this block is 1,463 acres, the whole of which has been protected against cattle and fires since 1869. Of this area 500 acres are estimated to be stocked, *viz.*, 250 above and 250 below 8,000 feet.

In dividing this block into compartments it will be well to keep separate the three main basins, *viz.*, Bodyár, Remuwa, and Thowa, and to sub-divide each basin chiefly in accordance with the aspect of the slopes.

320. Natural reproduction of deodar in Bodyár is limited to the vicinity of the numerous belts and groups of forest, where the number of young plants is exceedingly satisfactory; they spread in all directions over the blank grassy slopes. On the left side of the Rikáni Valley, south of the Bodyár stream, a large slope, with an easterly aspect, is stocked with a dense thicket of deodar, seven feet high. These plants date back to the time before protection commenced, but their growth has doubtless greatly benefited by it.

The effect of protection in Bodyár has been an extremely heavy matting of grass, owing probably to the warm aspect, the exceptional moisture of its climate, and the rich soil (limestone mixed with shale). The grass attains a greater height here than in any of the other hill forests, and, being pressed down by the heavy snow in winter, forms a thick layer on the ground, which is almost impenetrable for the seeds of coniferous trees. This heavy matting of grass probably impedes natural reproduction; and as it will not be possible to undertake sowing and planting here on a large scale while the works in Mohna and elsewhere are going on, we recommend that a system of wounding the soil in the vicinity of all belts and patches of forest and in all other suitable localities be commenced in this block. This operation should be undertaken early in autumn, when a heavy crop of young cones is visible on the trees and before the deodar seed falls on the ground.

321. In the Bodyár block considerable progress has been made in the artificial cultivation of deodar, as explained in paragraphs 57 and 58 of the Report of 1878. A detailed examination of the localities where these operations were carried on has given the following results.

*Mr. Whittall's sowings of 1872.*—The plants have not made that progress which might have been expected; they are mostly yellow; the shoots of 1880 are not more than 2 to 6 inches long, and the total height of the plants does not generally exceed 3 feet. No doubt their growth might be improved by the planting of fast-growing trees, such as the blue pine, as nurses; and fortunately here and there self-sown seedlings of this tree are found among the deodar plants. But we do not consider it advisable to recommend any extensive cultural operations in this block as long as the heavy work in Mohna is in progress.

The sowings of 1875, made in patches 10 feet apart by Mr. Rind, on the south side of the Bodyár stream, present upon the whole a very favourable appearance. There are numerous plants in the patches, and the plants are about 12 inches high.

The sowings of 1877 and 1878 have succeeded well in favourable places.

A large area was planted up in 1878-79, the plants having been raised in nurseries from seed sown in 1874. Upon the whole the success of this operation has been good, but numerous plants have died, and those which survive have not made rapid progress. It is believed that the roots of these plants

were much damaged in the process of transplanting, and this experience has led to the proposal advocated in paragraph 59 of the Report of 1878, to bed out the plants in beds laid on a hard bottom, so as to prevent the formation of long tap-roots. Nurseries on this principle have been established in a well selected locality below the forest rest-house.

322. Upon the whole, the conclusion to which the examination of the sown and planted areas in Bodyár has led us is that the deodar tree, though indigenous in this forest, does not thrive while young with any vigour on the blank grassy slopes which have been operated upon. As already mentioned in the Report of 1878, there is a great difference between the hot and dry south-westerly slopes and those with a north-easterly aspect. The best plan to ensure more satisfactory progress with these plants would be to raise blue pine as nurses; but, as long as the operations in Mohna demand the attention of the Divisional Officer, it does not appear to us advisable to undertake any cultural operations in Bodyár. The progress of the plants on the ground must be watched, and, by the time that the sowing and planting have been completed in Mohna, a better system of raising deodar in Bodyár may perhaps be devised.

In the nurseries in this block about 4,000 plants, raised from seed of 1878, are available. These should be planted out next rains in lines 15 feet apart and at a distance of 3 feet within the lines, on favourable slopes with a north-easterly aspect, care being taken to keep the plants bedded on a hard bottom distinct from the others.

#### Choli.

323. The clearing in the Siari block, known as Choli, which was made in 1875, and is adverted to in paragraphs 38 and 61 of the Report of 1878, was visited by us on the 4th May, and we found the state of the natural reproduction as unsatisfactory as it was in 1878; here and there a few seedlings of spruce were found in places where the mineral soil had been exposed, but even these were few in number. The deodar planted out in this place in 1877 is upon the whole indifferent; many of the plants have died, and those which remain have not made much progress. The slope is moist, with a northerly aspect, and an elevation of probably about 8,500 feet; and we should hesitate to press the suggestion made in the Report of 1878 to sow it up with deodar, were it not that deodar grows immediately above the clearing, and that the patches sown in lines near the lower edge in 1877 have succeeded very well, the plants being numerous, healthy, and about 12 inches high.

We recommend that, as soon as deodar seed is available, the whole area be sown in patches, with the precaution to remove from the proposed patches all the vegetable mould, decayed leaves, herbs, and refuse wood. This should be collected in heaps and burnt, and the deodar should be sown in the ashes, which may be mixed with the soil. These patches should be made in the usual way in lines, the lines being 15 feet apart. Natural plants growing in the paths and elsewhere may be utilized by putting them out in beds and then planting them out.

#### Planting in Cantonments.

324. The various proposals submitted in the Reports of 1875 and 1878 for the planting up of the waste lands in the Chakráta Cantonment have resulted in the formation of a forest garden, about 30 acres in extent, on one of the easterly spurs, at an elevation of about 6,000 feet; and in the demarcation of two blocks, one opposite the forest rest-house and the other to the east of Kailána neck, aggregating 500 acres. Hence the Forest Officer's work in Chakráta will chiefly be to plant up these two blocks and to attend to the garden. The block at the north-end of Chakráta, which adjoins Mátkangra, is stocked on all northerly slopes with an incomplete forest of the grey oak, with its usual associates, *Rhododendron* and *Andromeda*, and a little moru. A commencement was made this year to sow in lines of patches, the lines being 30 feet apart. The patches were sown with acorns of the grey oak and seed of blue pine, this being the only seed available at the time.

These operations should be vigorously continued, and we recommend that, wherever there are trees on the ground sufficient to yield partial shelter, deodar should be sown, while the blank slopes with a southerly aspect should be sown up with *Pinus longifolia* and the grey oak. The soil in this block is exceedingly rich, but loose; and we recommend that particular care be paid to making the soil in the patches firm by treading it down or otherwise, so as to prevent the young plants being dried up. In order to guard against failure, it will be necessary to establish nurseries, in which deodar and *Pinus longifolia* should be raised; the plants to be used to fill up patches where the sowing has failed.

The block on the east side (Sri Toli) may be treated in a similar manner.

The chief object of the forest garden is to raise trees to be planted out in cantonments, and to test the seeds of exotic trees, so as to ascertain whether any of them will be suitable to be grown on a large scale in the station. If such can be done without interfering with the other arrangements, fruit trees may also be grown for distribution in the station and to villagers in the district.

#### Supply of Deodar for Chakrata.

325. Under existing arrangements, all the deodar timber required for Chakrata is brought from Konain; and this may continue, unless it should be found expedient to cut deodar in Bodyár or to cut out the old trees in Kanásar, an operation which will probably be very beneficial in promoting the development of younger trees.

The reproduction of deodar in Kanásar is exceedingly satisfactory, which may justly be ascribed to the low elevation and to the fact that the general aspect is towards the north. This forest, it will be remembered, is 1,000 feet lower than Bodyár; hence the difference in the growth of young deodar in these two places, where otherwise the conditions of soil are similar. It is probable that deodar may also be cut in the protected portion of Bájamára.

#### Bawar Range.

326. Under existing circumstances, the only kind of timber which is likely to find a sale to any extent in the Bawar Range is deodar. The chír forests of the northern part of the Bawar pargana, near the Tons and Pábar, are included in the Tons Division.

The most important deodar localities in this range are the Katián, Riknargádh, and Dháragádh Forests.

#### Katian Forest.

327. This forest stretches from Katián and Chajár village to the outlying deodar forest of Koti, comprising the head-waters of the Bastargádh. It is situated on quartzose schists and argillaceous shales; its elevation is between 5,500 and 8,000 feet, and natural reproduction is throughout very satisfactory. In this area two blocks are protected against grazing—namely, Katián, 608 acres, and Koti, 100 acres—and a much larger area against fire. The deodar planted out near Katián in 1876 from nurseries established in 1873, and adverted to in paragraph 70 of the Report of 1878, has made excellent progress since that year; the colour and general appearance are good, and the average length of the shoots of 1880 was found to be 7 inches in the upper and 11½ inches in the lower part of the plantations. In the Report of 1878 it was stated that the success of the plants at this place was less marked than at Bodyár. This no longer holds good, for during the last few years their progress has been very satisfactory. At the same time, the ground at Katián has in many places covered itself with young seedlings of deodar, mostly due to the good seed year of 1878; and it is remarkable that these plants are found not only along roads and where the soil has been exposed, but also on grassy slopes.

The elevation of Katián is 7,000 feet, the general aspect northerly; and upon the whole the state of the natural growth of deodar is similar to that noticed in the Kanásar Forest under similar conditions, except that in Kanásar



the rock is limestone, and in Katián it is shale and schist, which is generally more favourable for the growth of young deodar.

No work is required, and none is proposed to be done in this area of deodar forest. In that portion of the Katián Forest which overhangs the village of Chajár, a large number of the old dead trees, killed by *khil* cultivation, before protection commenced are still standing. These should be utilized by supplying the wants of the villagers.

Attention is invited to the description given of these forests on pages 70 and 71 of the Busáhir Report of 1864.

Riknargadh Forest.

328. The forests on the Riknargádh are partly in British territory, partly in Tiri-Garhwál; the upper part of those on the right bank, which are situated in British territory, is protected against fire and grazing, and the natural reproduction of deodar is exceptionally good. Of the four blocks into which the Riknár Forest is divided, deodar is found in three, viz., Riknár (1,256 acres), Bomnai (2,428 acres), and Májbira (1,171 acres). The larger portion of these blocks is closed against grazing and fires, but it is not possible at present to form an idea of the deodar-producing area in this forest; but, including the portion of Tiri-Garhwál situated on the left bank of the river, it doubtless amounts to several thousand acres, and it may some day become of very great importance. Protection should be continued, and on the first available opportunity it should be made the special duty of a competent Probationer to examine these forests, to prepare a descriptive account of them, and at the same time to lay through them a system of inspection paths. It may here be mentioned that whenever a new forest is opened out by a system of inspection paths, these paths should as much as possible, in the first instance, follow existing cattle or village tracks, and these may subsequently be joined by new roads following more or less the horizontal contour lines of the hills.

Dharagadh Forests.

329. The forests drained by the Dháragádh stream consist of the wide bay at the head, the greater part of which contains deodar, and of several blocks lower down, which are chiefly stocked with chír. The total area of the blocks in this forest is 13,518 acres, of which Tutwa and Lakhau (2,260 acres) are first class forests. The total deodar-producing area cannot yet be exactly estimated, but it probably exceeds 4,000 acres. Of the deodar forests in the basin of the Dháragádh, those in the north-east corner, called Hariánta and Jáko, are on rocky precipitous ground, and are so remote that they are not likely to be of much value at present. It is different with the forests in the southern half of this large basin. Here there is a compact area of deodar forest, comprising the following blocks:—

	Acres.
Tutwa ... ..	825
Maura .. .. .	714
Lakhau ... ..	1,435
Lakwa ... ..	757
Total	3,731

330. The general character of these blocks is this. Near the crest of the main ridge is a succession of gentle slopes, stocked with an open forest of maple, bird-cherry, and groups of the silver fir; and these slopes often extend a long way down the ravines, where, besides the trees mentioned, the mountain-birch, the walnut, and the horse-chestnut are also commonly found. Below this zone, which comprises the favourite high-level grazing grounds of sheep and goats in the pargana, and on the spurs the forest consists of a dense mass of tall trees; in the upper part, and in moist ravines and valleys, of silver fir and spruce; while the drier ridges and the lower slopes are occupied by almost pure deodar forest, which, in the southern part of the basin, particularly in Maura and Lakhau, is completely stocked with trees of large size and great height.

The following measurements will serve to illustrate the stature and dimensions of the trees in this forest :—

<i>Maura Block.</i>					
Aspect westerly ; altitude 8,000 feet—					
			Height. Feet.	Girth. Feet. Inches.	
Deodar	...	...	162	...	
"	..	..	144	6	2
"	..	..	158	8	6
"	...	...	127	7	4
"	...	...	167	11	0
Altitude 8,400 feet—					
Silver fir	...	..	151	Gentle slope.	
"	...	...	183	13	0
Spruce fir	...	..	200	25	4
"	...	..	146	14	8
"	...	...	147	14	8

331. On the right bank of the Dogragádh there is a considerable extent of fine deodar forest, on slopes varying from 30° to 40°, with a westerly aspect. The trees are not of very great girth, but most mature trees are 150 feet high and higher. The Dogragádh takes its rise from a point on the ridge dividing the waters of the Banál and Dháragádh, about a mile west of the Karámba Peak. In other parts of the forest the gradient is steeper, and the ground is rocky and precipitous; but everywhere the forest is compact and completely stocked. Of these deodar forests an area of about 2,460 acres is closed against fire and grazing, and inspection paths have been made through a portion.

332. These forests are exceedingly valuable, because they are exceptionally well stocked, and a plan should be framed for working them economically. The timber can probably only be exported *viá* the Tons River, and the total distance down the valley of the Dháragádh to the main river is about 12 miles. It is believed that the lower course of this stream may be made fit for floating; but, considering the small area drained by it, this will probably demand very heavy outlay for regulating the channel, so as to admit of floating during the floods of the monsoon. The question, however, should be carefully studied by a competent officer, and plans and estimates for the needful works for regulating the channel and making the slides and roads should be prepared before any final conclusion is come to on that subject. Meanwhile the protection of the forest should be continued; it should be carefully examined, and inspection paths connecting the different parts of it with the main road should be laid through it.

#### General. Cultural operations.

333. Planting and sowing in this division should be concentrated in as few localities as possible; nevertheless it will not be practicable to adhere rigidly to this principle during the next five years.

During this period heavy work in this respect has been proposed in the Mohna block, where it will be necessary to treat upwards of 300 acres of blank slopes by sowing and planting, and a great portion of the stocked area by systematic wounding of the soil. Simultaneously with the work in Mohna, upwards of 150 acres in the Lurli block in cantonments are proposed to be sown and planted with chí ( *Pinus lohgifolia* ) and deodar. To some extent the operations in these two blocks may be made so as to fit into each other, the work in Mohna being at elevations above 7,500 feet, while the work at Lurli block is all below 7,000 feet, and much of it at so low an elevation that it can be done during winter.

Besides these two main pieces of work, operations on a smaller scale are necessary in three other localities, *viz.*, in Bodyár, where 4,000 deodar plants are to be planted out in July 1881; in Choli, where an area of about seven acres is to be sown in December 1881; and, finally, in Jádi, where six acres below the Chakráta road, which were cut about ten years ago, and have owing to excessive grazing not reproduced, are to be sown and planted up with spruce in autumn of the first year in which sufficient seed may be available.

The work will thus be scattered over several localities, but this is unavoidable, and arrangements must be made to fit the different pieces of work into each other as much as possible.

#### Coppicing of Oak.

334. In paragraph 304 of the present Report, the experiments made in the Mohna block to determine the coppicing powers of the karshu oak have been adverted to, and it has been explained that those experiments cannot be expected to give any conclusive result. It is most desirable to determine exactly how far the three oaks which form important constituents of these forests, *viz.*, karshu, moru, and bán, have the power of reproducing by coppice-shoots.

It is not likely that it will ever be found advantageous to grow either of these oaks in pure coppice woods; but it is quite possible that, in case they should be found to coppice freely, it might be found desirable to maintain the ground under coniferous trees stocked with oak coppice, and that the existence of such coppice growth would greatly facilitate the regeneration by self-sown seedlings of the coniferous forest. Instances where such has been the case are not rare in the hills of the North-West Himalaya. Thus, near Simla, the growth of deodar and chír has in several places been greatly favoured by the existence of thickets of young oak. Broadly speaking, it is probable that the oaks have much too slow a rate of growth to justify their maintenance as component parts of the high forest. But it is quite possible that oak coppice will be found exceedingly useful to nurse and foster a young growth of silver fir, spruce, and deodar.

The localities selected for these experiments should be so chosen as to contain a large proportion of poles and young trees of oak; and the cutting of these should be made with great care, so as to favour the development of coppice-shoots near the ground and of a separate system of roots. As regards the time when these cuttings should be made, it will be borne in mind that this must be done before the young foliage appears in spring, and it will be remembered that moru and bán sprout much earlier than karshu.

The selection of the plots to be thus cut over must be left to the local officer; and in order to eliminate any disturbing cause of an accidental character, it will be well to select two plots in different localities for each of the three species. These plots must of course be selected in localities protected against cattle and fire. Regarding the size of the plots, it will suffice to say that they should be large enough to give trustworthy results, and the larger the better.

#### Rate of growth of Oaks to be determined.

335. It has been said that the growth of these three oaks is slower than that of the coniferous trees, but this assertion is based upon incomplete data; and considering that we have not yet succeeded in distinguishing the annual rings of any of these evergreen oaks, it will now be necessary to mark off plots on which the girth of a number of oak trees of different sizes shall be periodically measured. These plots should be selected as much as possible at a medium elevation within the zone in which these oaks are indigenous, and they should contain trees as different in size as possible. Regarding other matters it will suffice to request a reference to what has been said under this head in the chapter relating to the Dehra Dún Division.

#### Reducing factor and annual rings.

336. Wherever fellings are made in the Jaunsár Division the opportunity should be used to determine the reducing factor of trees of different kinds and sizes. The form given in paragraphs 45 and 46 of the Report of 1875 should be adhered to.

In order to determine the rate of growth of coniferous trees by the counting of annual rings, it will be well now to adopt a uniform plan, which was first carried out in the survey of the Busáhir Forests in 1864, and which has proved to be both rapid and satisfactory. On the section of the tree on which the rings are to be counted, the first step is to find an average radius corresponding as nearly as possible to the mean arithmetical radius of the

section, and also fairly representing the differences in the rate of growth of the tree at different ages.

In trees regularly shaped it will never be difficult to select such a mean radius, and there is as a rule no object in counting the annual rings of stems which have an irregular shape. Having found a mean radius, the next step is to draw a line along it, and to mark every two inches on that line, beginning from the centre. The record should be kept in the following manner :—

Block	...	...	..	Mohna.
Compartment	...	..	...	Snow View.
Aspect	...	...	...	North-East.
Slope	...	...	...	Gentle.
Rock	...	.	...	Limestone.
Soil	...	...	...	Fair, but somewhat rocky.
Elevation	...	...	...	8,800 feet.
Species	...	...	...	Silver fir.
Total diameter	...	...	..	36 inches.
Bark	...	..	...	$\frac{3}{4}$ inches.
Inches.				Rings.
2	..	...	..	11
4	...	...	...	8
6	...	...	..	10
8	...	...	...	10
10	...	...	...	18
12	...	...	...	18
14	...	..	...	19
16	...	...	.	19
18	...	...	...	14
			Total	... <u>127 years.</u>

The number of rings from 2 to 2 inches will afford all the information that may be required.

The remarks here made in regard to the determination of the reducing factor and the counting of the annual rings apply equally to the forests of the Tons Division.

#### Specially instructive work for Probationers and Apprentices.

337. The current work in the Jaunsár Division, as suggested in this Report, will be of an exceedingly varied and instructive character, and it will not be difficult to employ in a useful manner, under the control of the Divisional Officer, a number of Probationers and Apprentices at the same time. We recommend that the cultural operations, including the wounding of the soil in each locality, be invariably placed in charge of an advanced student of the Forest School, and that such works as planting up small areas, as in Bodyár, Choli, and Jádi, be made the special duty of one man for each work, from beginning to end as far as practicable.

Under the supervision and, where necessary, in the presence of the Divisional Officer, students may also be employed in counting annual rings and in determining the reducing factor where cuttings are made.

It will be well to place competent students for an entire season in charge of forests or blocks in which heavy work is going on (such as the Mohna and Hájawa blocks), or in charge of the special works proposed in the Dháragádh and Riknár Forests.

A very instructive employment in this division for competent students at the Forest School will be to set certain well-defined subjects for study, such as to determine the rate of growth of the coniferous trees in different localities in one block, and to give an explanation of the causes of any differences in the rate which may be observed; or to examine the condition of the natural young growth of different species in one block, and to explain the circumstances which have favoured such growth in some cases and which have hindered it in others.

## CHAPTER XII.

## TONS FOREST DIVISION.

## Organization.

338. The Tons Division comprises the Kunigádh chír forest on the left bank of the Tons, the Deogár Forest in Jaunsár, the Dádi and Raiengarh Forests in British territory, under the control of the Lieutenant-Governor of the Punjab (leased from the Jághirdárs), the forests on the Tons River leased from the Tiri-Garhwál State, and the forests on the Pábar leased from Busáhir, the latter being under the political control of the Punjab Government. No ranges have as yet been formed, but the forests are divided into the following protective charges, which may eventually be formed into ranges :—

- 1st.—Deogár Forests, including Mandhol, with Dádi and Raiengarh—in charge of a Forester.
- 2nd.—Deota, with Bámsu, Surárs, and Dátmir, also the chír forests both in British and Native territory on the left bank of the Tons—in charge of a Forester.
- 3rd.—The Lambatách and Kotigádh Forests—in charge of a Forester.
- 4th.—The leased forests on the Pábar and Rupin Rivers in Busáhir—in charge of two Forest Guards.

339. The maps available for these forests are as follows :—for the Deota, Lambatách, Kotigádh, Surárs, and Bámsu Forests, maps on the scale of 4 inches to the mile by the Forest Survey Department; for the Deogár and Kunigádh Forests, maps on the scale of 2 inches to the mile; and for the remaining forests, the atlas sheets on the scale of 1 inch to 4 miles.

For a general account of the Deota and Lambatách Forests, reference is invited to paragraphs 4 to 30 of the Report of 1878. It will now suffice to mention that the total extent of the deodar-producing area in these two forests stands as follows :—

Forest.	Deodar-producing area.		Total area.
	Acres.		Acres.
Lambatách	...	1,800	2,963
Deota	...	2,500	5,087

## Former cuttings.

340. The cuttings of deodar in Lambatách were made about ten years ago, and the total number of trees felled in all blocks was 3,600, or about two trees per acre on an average.

In Deota cuttings were made until the end of 1878 in the Partil and Temple blocks, an aggregate of 3,897 dry trees and 2,067 green trees having been felled. The proposals for the annual cuttings of the two years 1879-80 and 1880-81 were 750 trees a year, estimated to yield 52,000 cubic feet of timber. It was arranged that the fellings for these two years should be made in the Dopta and Katatách blocks, where it was expected that 1,500 trees would be available, while 70 trees more were to be felled in the Temple block.

It has, however, been found that the quantity of timber which it was considered expedient to export was obtained by cutting a much smaller number of trees, and the trees marked for felling, but not actually cut, stand as follows :—

Dopta block	...	...	...	846
Katatách ditto	...	...	...	21
Temple ditto	...	...	...	70

It is considered that no more trees should be cut at present in Dopta.

The cuttings have been confined to the easier slopes, and all precipitous ground has been spared; hence the difference between the number actually cut and the number estimated to be available. In Katatách fellings have only just been commenced, and it is impossible to estimate how many trees this block will yield at the present cutting.

Suggestions for the future.

341. Before submitting suggestions regarding the order in which cuttings should be made, we desire to place on record our present views regarding the principles on which the fellings of deodar should be conducted.

In Lambatách no further cuttings are contemplated. In Deota we have to deal with two classes of forest: *first*, pure deodar forest, which generally occupies all precipitous ground in the deodar zone, as well as all easier slopes with a south or south-easterly aspect; *second*, mixed deodar forest, in which the deodar is associated with spruce and silver fir, or with the moru and karshu oaks. In the pure deodar forests we have come to the conclusion that the present cutting must, as a rule, be limited to those places where young growth is on the ground, and to their immediate vicinity. Fortunately, advance growth is abundant in the deodar forests of Deota; and, as it is increasing steadily by the springing up of seedlings, we do not venture at present to recommend any but very limited cuttings of deodar where advance growth is wanting. The only other point which requires to be mentioned is that care should be taken not to clear continuous gullies and ravines, down which the snow may glide and thus destroy all young growth.

342. This method would of course be inadvisable if we had forest completely stocked with mature trees; but although the whole of the Deota Forests are exceedingly valuable, they are incompletely stocked. The treatment of mixed deodar forests must be different. The successful treatment of this class of forest will chiefly depend upon the extent to which iron-making can be carried on, so as to convert the wood of the other species into charcoal and thus utilize it. When this is not possible, no alternative remains but to kill the oaks, spruce, and silver fir by ringing or girdling. The procedure which we would advocate in this respect is to cut or kill the trees of other kinds a considerable time before the cuttings of deodar are undertaken. The object is to throw light upon the ground, and thus to cause the soil to become somewhat drier, so that when a favourable seed-year occurs the place may be speedily covered with seedlings of deodar. After this object has been attained, and after the ground is stocked with advance growth, the mature and marketable deodar trees may then be cut. In advocating the previous removal of the other kinds of trees, we do not wish to recommend that all spruce, silver fir, or oaks be cut or killed. It will suffice to remove the larger trees, leaving a proportion of poles and saplings on the ground.

These proposals, it should be distinctly understood, relate only to forests which contain a sufficient proportion of deodar. Pure forests of oak, spruce, and silver fir should in all cases be left untouched, and must remain in their present condition until iron-making has made much greater progress, or until a demand for these woods arises.

343. It will now be understood that if we recommend cuttings to be made in any particular block, this refers at present only to the forests of pure deodar, and that those portions stocked with mixed forest must wait until the procedure now suggested has been carried out. After the cuttings in Katatách have been completed, Jaurási, Kánga, and Patángni may be taken in hand in the manner here suggested. No attempt will be made to estimate the quantity of timber which may be cut in these blocks, or the number of years during which they will furnish the requisite yield of timber. As regards the quantity to be exported annually, we adhere to the conclusion arrived at in paragraph 21 of the Report of 1878, and we believe that it will be expedient to limit this quantity to from 50,000 to 65,000 cubic feet of timber per annum.

344. As regards the fellings in mixed forests, it is not expedient to lay down any fixed order in which the preparatory removal of other kinds should be undertaken. Where there is a demand for these woods for iron-making

or otherwise, it will be expedient to undertake such preparatory cuttings at once. Where there is no such demand, and where therefore the trees must be killed by girdling, such compartments must be taken in hand when it is otherwise convenient. We believe that the four blocks above mentioned will furnish the annual supply during a period of about six years. The existing slide may be expected, with the usual repairs of wood-work, to last during this period.

**Natural reproduction and cultural operations.**

**Deota.**

345. In the Partil block, where the earliest cuttings were made, the natural reproduction of deodar is on the whole exceedingly satisfactory, the only exception being a portion of compartment No. 3, where the forest was mixed and where apparently the ground has been too moist and the shade too dense. In all other compartments of this block there is not only a great mass of advance growth, but also a large number of seedlings which have sprung up, particularly after the heavy seed-year of 1878. The only places not stocked in a satisfactory manner are the moist ravines coming down from Leositách, and a number of grassy slopes with a south-westerly aspect.

In these ravines a large proportion of spruce was killed by ringing after the fellings had been made. The operation has so far been successful that the advance growth of deodar has benefited, and that the ground has become more dry; but the number of deodar seedlings which have subsequently sprung up is very small. In order to plant up at an early date those portions of the Partil block which have no deodar at present, it will be necessary to utilize the large number of plants found on the paths and elsewhere where the soil has been exposed. In many cases this can be done by simply taking out the plants and planting them during next rains. In other cases it will be desirable, in the first instance, to bed out the plants in beds prepared for the purpose, and to plant them out after they have been in these beds. The plan last named will doubtless be found most effective, and it is very satisfactory that Mr. E. McA. Moir, Deputy Conservator of Forests, the Officer in charge of the Division, had already, before the time of our visit, prepared a number of beds in suitable localities and filled them with plants taken from the forest, with a view to planting them out next rains. It is hoped that by extending these operations the whole of the blank spaces in the Partil block may be planted up in a few years.

In the moist ravines adverted to it will be necessary to clear large patches of brushwood, burning whatever can be burnt, and in these patches to plant groups of strong and large plants. The same plan may be adopted to plant up suitable places in the more open parts of the mixed forest in compartment No. 3.

346. In the Temple block cuttings were made at a later date than in Partil, and although there is a large quantity of advance growth, the number of younger seedlings is much less than in that block. This, as well as the greater part of compartment No. 3 of Partil, must be treated in the manner suggested for the mixed forests. In the four blocks in which cuttings are proposed to be made there are more grassy slopes with insufficient growth of deodar, which should be sown up as soon as a good seed-year occurs, nurseries being prepared at the same time to furnish plants to fill up failures. It should, however, be mentioned that on several of these slopes the growth of deodar seedlings is steadily progressing. We would specially draw attention to those in the Jaurási block with south-westerly aspect, which are stocked with *Rhododendron*, *Andromeda*, and grey oak, and where an abundant crop of deodar is coming up, as on the slopes of Jáko at Simla. The presence of these trees is necessary to enable the deodar to spring up, and in such places the trees of other kinds should not be touched. This remark, it is hoped, will make it clear that the treatment of mixed forest in Deota is a most delicate matter, requiring the most skilful treatment. It may here be mentioned that in the Bámsu Forest, of which we visited the western part on the 9th May 1881, the reproduction of deodar is exceedingly good. Protection from fire was commenced here in 1877, and grazing has been excluded since 1879. We are inclined to

think that this satisfactory state of things is due to the circumstance that the commencement of protection was immediately followed by the abundant seed-year of 1878.

#### Lambatach.

347. In Lambatách the state of reproduction of deodar is very much as was described in the Report of 1878. In the compartments at a moderate elevation, whether of a westerly or north-westerly aspect, such as Lohásu, Chakora, Garásna, and Thanwár, the slopes are covered with extensive thickets of blue pine, generally from 5 to 12 years old and up to 10 feet high. Here and there a proportion of deodar is mixed with the blue pine, particularly in the vicinity of old deodar trees; but this proportion of deodar is by no means sufficient, and unless thinnings are made, the forest will chiefly consist of the blue pine, which is without value in this locality. The terminal shoots of this tree are very long, in some places exceeding two feet.

The thinnings proposed in paragraph 10 of the Report of 1878 have not yet been commenced; they are, however, very necessary and should be carried on systematically over the whole area, wherever it is desirable to favour the growth of deodar. It should be distinctly understood that it is not intended to cut down thickets of the blue pine where there is no deodar, but only to make thinnings where it is desirable to favour the growth of the more valuable species where this is in danger of being suppressed by the blue pine. In the remainder of Lambatách the young growth of deodar is not satisfactory; there is a large extent of advance growth, which existed on the ground before the cuttings were made and protection was commenced; but, with few exceptions, there are no seedlings of younger age. The older young growth has greatly benefited by the protection against fires and grazing, but it would appear that partly owing to the heavy growth of grass or brushwood, and partly owing to the accumulation of dead leaves and rubbish, but few seedlings have come up since that time. In the two ravines of Bunárpáni and Garásna, near Durrington, spruce and silver fir have been killed by ringing over a large area. The result has been to make the ground more dry and to favour the advance growth of deodar; but there is no sign of young seedlings of this tree. The light given by this operation has produced an extraordinary growth of shrubs and brambles, which cover the ground completely. In other places extensive slopes are covered with brushwood consisting of *Indigofera* and *Desmodium*. These slopes are by no means too moist for deodar, but there is no appearance of seedlings in them. On examining the slopes covered with this kind of brushwood, one is inclined to expect to see a good crop of seedlings under the shrubs, as there is no grass and the soil is loose and open; and it is probably the heavy cover of these shrubs during and after the rains which prevents the growth of seedlings.

A third description of land which shows no reproduction of deodar is formed by the extensive grassy slopes, chiefly in the Ghoria, Dhámti, and Nonitách blocks. On these slopes hardly any trace of seedlings was to be found. In the Dhámti block a large extent of slopes was burnt in November 1878, and in places the ground is completely bare; but even here there are no seedlings. In other places numerous young trees of the blue pine were killed by the fire, the grass among them having recovered and being as thick as ever.

#### Operations proposed.

348. These remarks will explain that we must distinguish between three different classes of localities where cultural operations are necessary to promote the growth of deodar:—moist ravines in which the spruce has been killed by ringing; drier slopes stocked with *Indigofera*; and the vast extent of blank grassy slopes in the Dhámti and adjoining blocks.

Lambatách has been protected more or less successfully from fire and grazing since the cuttings were completed in 1873; there has, therefore, been ample time for young growth of deodar to spring up, and it would not be right to wait any longer for natural reproduction. It seems very doubtful whether, in this forest, wounding the soil alone would do much good. The experience of



the Dhámti block, where a large extent of ground has been laid bare by fire, is not encouraging in this respect; and in our opinion nothing now remains but to set on foot a regular system of sowing and planting on a very large scale. There is a fair crop of young cones on the deodar this year (1881) in this and the adjoining forests, and with care a considerable quantity of seed may be collected. Whatever amount may be available should, in our opinion, be used to stock a large central nursery, which should be established at Durrington, and the plants of which should, after having been bedded out, be used, when large enough, chiefly to plant up the moist valleys where spruce has been killed. It is not likely that there will be seed enough this year to make sowings in patches on a large scale.

Fortunately there is an abundance of seedlings available on paths and elsewhere at lower elevations in several blocks. These should be planted out in prepared nurseries, several of which should be established near the middle level road from Durrington to Thanwár. If this operation is taken in hand at once, a supply of plants may be available for planting out during the rains of 1882 and 1883, and it will then have to be decided which localities should be taken in hand first.

349. As regards the previous preparation of the ground for planting, we must distinguish between the three classes of localities. On *grassy slopes* it will suffice to follow the usual procedure and to dig plant holes in horizontal lines, the lines being 10 or 15 feet apart and the holes being 3 to 5 feet from each other in the lines, according to the condition of the young growth on the ground. On *slopes stocked with Indigofera* it will be necessary to clear large patches between the bushes, and we recommend that in these patches groups of from 3 to 8 plants be planted. The treatment of *the moist valleys* adverted to should be similar, but the patches should be larger, and it is probable that it will be necessary to heap up the cut brushwood and dry leaves on these patches and burn them before planting. In these localities it will be necessary to use only the largest and strongest plants available, and they should never be planted singly, but in groups, as already explained.

The present condition of Lambatách is not very satisfactory, the point being that, since the cuttings were made and protection commenced, a comparatively small number of seedlings has come up. Nothing but a regular system of planting on a large scale can, in our opinion, remedy this state of things.

#### Chir forests on the Tons.

350. The chir forests from Hanol to Kunigadh have been demarcated and protected from fire and grazing since 1878, and the other chir forests near the Tons as far as Gaichrán have been examined and reported upon. No timber has been cut in these forests since 1871, when a quantity was exported on Government account; but offers have been received for the purchase of timber, and it is probable that it will be possible to sell a certain number of standing trees in this locality. Under these circumstances, the question arises whether this timber should be cut within the protected area or outside of it. We recommend that for the present, in the small area which has been placed under protection, the experiment be continued without interference, in order to ascertain how far the condition of the forests, and particularly the young growth of chir, will improve if protected against cattle and fires; hence it will be better not to make any cuttings in the protected blocks for the present, except in those cases in which trees stand over advance growth. Outside the protected area there is no objection to more extensive cuttings. The area stocked with this description of forest is very large, and it is not heavily grazed over. It is not likely that the demand will be heavy, and for some time to come limited cuttings may be made wherever the timber may be most handy for export.

#### General.

351. The principal work in the Tons Division will for some time to come be limited to the arrangements for the carriage of timber and the cultivation of deodar. As regards the first point, it is most desirable that, by way of

experiment, wire-rope tramways and tramways with timber carts be used, and that the system of temporary slides be perfected.

As regards the cultivation of deodar, it will be well here to state the general conclusions at which we have arrived regarding the arrangement of sowings and plantings. In planting these hill sides we propose at present to follow two different systems, *viz.*, to plant in groups in large cleared patches where the ground is covered with brushwood, and to make plant holes in horizontal lines in the usual manner on grassy slopes.

As regards sowing, we have decided to adopt the plan of vertical lines, each line consisting of separate patches at a distance of about 4 to 5 feet from each other. This arrangement has the advantage that, while the upper patch is being prepared, the ground of the lower one, on which the labourer stands, is trodden down and is thus made more suitable for the reception of seed.

In cases where neither sowing nor planting is intended, but only the wounding of the soil in anticipation of a good seed-year, we have decided to recommend the system of horizontal lines, 15 feet apart, lightly dug up.

#### Forests leased from Busahir.

352. The Busáhir Forests on the Pábar and Rupin Rivers, over which Government has control under the lease, were placed in charge of the Government of the North-Western Provinces by an order of the Government of India of 1869; but the first action taken by the Forest Department of the North-Western Provinces, for their control and better management, was in August 1880, when two Forest Guards were appointed. The following remarks embody the conclusions at which we have arrived on the present occasion, and the result of the observations made by the Inspector General of Forests on previous visits.

In this portion of Busáhir the lower slopes of the hills, particularly in the valley of the Pábar, are extremely bare of trees, but the surface of the hill sides is remarkably firm and well protected by a dense matting of grass. It does not seem necessary at present to take any special measures with the view of protecting the soil on the hill sides, or preventing the formation of ravines and torrents, or otherwise to guard against excessive denudation.

The country is thinly populated, and there is sufficient forest on the higher ranges and in the side valleys to furnish wood to the people for the construction of their houses and for their other requirements. There seems to be no necessity for taking special measures at present to ensure a larger supply of wood to the people of the country. Under these circumstances, it seems to us that the responsibilities of Government under the lease may be limited at present to the care of the more valuable forests, and particularly of those which produce deodar; and to making provision for the supply of wood in special cases, such as the requirements of the iron-manufacturing districts in the vicinity of Shiel.

353. These considerations point, in the first instance, to the necessity for demarcating the more valuable tracts; and outside these demarcated tracts we do not deem it advisable to enforce any restriction in forest matters, except as regards the cutting of deodar. In that part of Busáhir which is situated on the Sutlej and its feeders, *koralí* cultivation and the burning of the forests have been restricted for many years past, and the effect has been beneficial. In the valleys of the Pábar and Rupin no restrictions have hitherto been enforced, and it does not seem advisable to introduce them at present. It seems preferable, in this instance, at once to undertake demarcation, and this work should be commenced at an early date. In the Sutlej—Busáhir Forests it has, in a late Report, been proposed to defer demarcation at present. But circumstances are different in those forests which are situated on the Pábar and Rupin Rivers.

The system of *koralí* cultivation, *i. e.*, the practice of cutting and burning brushwood and forest for the purpose of temporary cultivation, has cleared away a large part of the lower forests; but a considerable area still remains, and a portion of this will probably be found to contain deodar. In selecting the deodar forests for demarcation and protection, it will be well not to confine the

selection to those areas which actually contain deodar, but to include within them a belt of land, especially below the forest, which may be expected eventually to get stocked with deodar.

354. Besides the demarcation of the deodar forests and of those in their immediate vicinity, we would recommend that special attention be paid to the provision of a permanent supply of fuel for the iron-manufacturing districts mentioned. We do not, however, advocate the introduction of any general restrictions in regard to the use of fuel for iron smelting at present. All we recommend is that an area of forest land in that vicinity be demarcated and placed under special protection, with a view to furnishing in the future a reserve of fuel available for the purposes of iron manufacture.

355. In other respects the only restriction to the cutting of timber by the inhabitants of these valleys outside the demarcated reserves, which we recommend at present, is that no deodar trees be cut without the permission of the Forest Officer. Great liberality should be shown in providing an ample supply of deodar timber for the construction of bridges, which, in these mountains, are essential for the maintenance of traffic.

We deprecate the introduction of any other restrictions outside the reserves, and we recommend that the local Forest Guards in charge of these forests be selected in preference from among the natives of the country. In order to facilitate the work of demarcation, we recommend that a skeleton-map be prepared on a large scale from the quarter-inch atlas sheet. The value of the skeleton-map would be greatly enhanced if the elevation of a number of places not entered on the atlas sheet could be determined and entered. Before the work of demarcation can be commenced, each deodar forest and each forest in the iron-making districts should be examined, in a preliminary manner, by a competent officer; and the preliminary report should contain an approximate statement of the area and the number of deodar trees of the larger classes in the forest.

*Work on which the students at the Forest School may be employed.*

356. There is less variety of instructive work for the employment of students in the Tons than in the other divisions of the School Circle, and the greater distance from Dehra Dún will make it impossible to do more than send a few of the more promising and advanced students to this division.

For these the cultural operations and thinnings suggested in the present Report, as well as the carriage of timber and the preliminary examination previous to demarcation of the forests in Busáhir, will furnish instructive employment. During the winter months much less work can be done in the Tons than in the Jaunsár Division, and it would be a good plan, whenever such may be otherwise convenient, to employ the officer in charge of the Tons Division during the slack season—that is, from the 15th December to the 15th March—to pay annual visits of inspection to the reserves of Ajmere, which are attached to the School Circle.

# APPENDICES.

## I.

### SEPARATION OF GRAZING GROUNDS FROM TIMBER-PRODUCING AREA IN OUDH.

No. 353, dated the 7th May 1881.

From—The Secretary to the Government of the North-Western Provinces and Oudh, in the Revenue Department (Forest Branch).

To—The Secretary to the Government of India, Home, Revenue, and Agricultural Department.

In reply to paragraph 3 of your letter No. 370 F., dated the 18th June 1880, I am directed to submit, for the information of the Government of India, copy of a letter\* from the Conservator of Forests, Oudh Circle, in regard to the progress made in the closing of selected blocks of forest against grazing, with a view of excluding fires.

2. Captain Wood will be informed that the principle advocated in his 8th paragraph is, in His Honour's opinion, a good one, but that the proposal, as it stands, is too general; and that he should consult the District Officers in respect of the forests in each district, and then, if he thinks proper, propose a limit for each district, arranging, of course, that none of the cattle of privileged villages are excluded.

No. 14, dated the 23rd April 1881.

From—The Conservator of Forests, Oudh Circle, North-Western Provinces and Oudh

To—The Secretary to the Government of the North-Western Provinces and Oudh, in the Revenue Department (Forest Branch).

With reference to your No. 190 of 23rd March 1881, and previous correspondence, I have the honour to report as below.

2. Accompanying is a table showing the amounts protected from fire and closed from grazing in the year 1879-80, and which have been protected in 1880-81, and which are now being protected. In all areas protected from fire cattle are excluded, except in the Charda Forest, where a small isolated portion in the northern part, 1,440 acres, and which is the furthest away from the villages, is being closed against grazing this year for the first time.

*Area closed against cattle and protected from fire.*

Forest Divisions.	1879-80.	1880-81.	REMARKS.
	Acres.	Acres.	
Pilibhit Division ... ..	17,017	17,017	
Bhira Sub-Division ... ..	10,637	16,734	Addition No. 7, Bhira-Mailani road W of the waste land adjoining the former closed block.
Kheri (Trans-Sarda) Division ..	22,080	42,080	Addition E of the Dudua home block and adjoining it. The new block will be the Kusumbha home block.
Bahraich Division ... ..	22,115	27,153	Increase principally on three sides of the Nishargarh home block, which is thus increased
Gonda ditto .. ..	.....	.. ..	
Gorakhpur ditto .. ..	73,540	73,540	
TOTAL ..	145,389	176,524	Increase 31,135 acres, or nearly 50 square miles

3. All the additional areas protected have been approved of by the District Officers.

4. In order to inconvenience the people as little as possible, the fire conservancy blocks have been selected as far away from villages as possible; and the blocks have not been made too large, so as not to take up too great a percentage of the forest and to allow of grazing in the vicinity of the villages adjoining. All the large blocks are, when possible, looked after by a European Officer, who remains till the rains set in and makes every thing safe against fire. The areas given are only those where a regular fire conservancy establishment is kept

\* Portion of Nawabganj Forest, Gonda. up, but the Rambagh\* block, area 2,447 acres, has been closed against grazing and fire since it was taken over by the Forest Department.

5. In the Chakia and Sohelwa Forests (Section VIII.) lines have been made, and rest-houses and wells are being made, and the same is being done in the eastern sal forests of the Gonda Division; and when all preliminary arrangements have been made, considerable areas will be proposed to be closed against grazing and fires. In the Gorakhpur Division the whole of the reserved forests are protected from fire, and gradually the little grazing that is allowed will be confined to grass areas in the forests, but these forests differ from the forest of Oudh and Purnapur, inasmuch as when they were demarcated nearly all the grass

forests were made over to the district authorities, and the people in the vicinity have no privileges.

6. I trust that in process of time we may gradually mark off the natural grazing grounds by ditches separating them from the regular tree forests, which it is desirable to keep for the reproduction of timber; and by improving the facilities of watering, &c., we may enable a larger number of cattle to be kept on the natural grazing grounds, and thus free the tree forest from their presence. This, however, cannot be done where there are no natural grazing grounds, but only tree forest in the vicinity of villages.

7. The Inspector General of Forests has lately been over the greater part of the forests of the Oudh Circle, and has generally approved of the blocks closed against grazing and the plan taken for their extension; the subject will be dealt with in his Report on the forests of the Oudh Circle, and in two maps attached to the report will be shown the areas protected, as given in paragraph 2 of this letter. He has only recommended the increase of two small blocks: one of a few acres near Salarpur, where there is a patch of bamboos, which are either now flowering or have seeded last year, and if the ground be not protected there will be no reproduction; and one block of about two square miles in the N. W. corner of the North Bharthapur Forest, with the Augur Ghat Nala, the Kauriala, and the Nepal border as boundaries. The Deputy Commissioner is being arranged with for the closing of these two blocks.

8. I think it might be considered whether it might not be advisable to limit the number per annum: thus for a certain number of years the grazing dues amounted at the three annas rate to some Rs. 30,000 a year; at this rate the number of cattle would be 160,000 per annum: buffaloes paid a higher fee, nine annas, so that the number would be under this figure; but I think the number might be put down as 150,000, of which a certain percentage might be buffaloes. This number might be fixed till the grazing grounds had been fully demarcated, when it would be our interest to feed as many cattle as the regular grazing grounds would support, limiting only the number of cattle in the adjoining villages that grazed in tree forest.

## II.

### REST-HOUSES, OUDH.

#### *Specification of 1st class double-storied Rest-house.*

*General description.*—The building to be 54½' long by 34½' broad in the clear on the ground floor, and to have an upper story as delineated in the drawings.

The level of the ground floor to be two feet above that of the surrounding country, and the first floor to be 10 feet high from the ground floor to the ceiling, the upper rooms to be 16 feet from floor to ceiling. The accommodation on the ground floor to be as follows, *viz.*, two main rooms each 14' x 14', two side rooms each 14' x 8½', verandahs on the east and west sides, with two bathrooms, each 8½' x 7', at the ends of the western verandah, and a pantry 8½' x 7' at one end of the eastern verandah, the corner on the other end being occupied by the stair case and store-room. The accommodation on the first floor to consist of two rooms, each 14½' x 14½', with verandah all round. The upper story is provided in order to afford sleeping accommodation during the unhealthy part of the year, and to shade the lower story from the sun. There are to be four fire-places, one in each of the largest rooms.

*Foundations.*—The earth to be excavated to a depth of 2' and a breadth 6" greater than that of the walls. When the trenches have been properly dressed off, the bottom to be evenly covered with a layer of vitrified bricks, which is to be well rammed down into the ground. The concrete (total depth 1' 0½") to be composed of half-burnt kankar from the lime kiln, or, if this is not procurable, of well burnt (crooked or vitrified) bricks broken small and mixed with mortar (equal parts of kankar-lime and surkhi); after the first layer of vitrified bricks has been well rammed into the bottom of the trenches, the concrete to be thrown in successive layers of 6" and rammed down to 4½", or less if possible; the concrete to be constantly watered during the process of ramming. The bricks to be manufactured of the best clay procurable, and to be well burnt (pila bricks being used for out-offices, &c.), the masonry to be pucca, flush pointed with lime. The mortar to be two parts kankar-lime to one of surkhi; the surkhi to be made from well burnt bricks only.

*Superstructure.*—Ground floor walls 2' thick when they carry upper story walls; otherwise they and the upper story walls to be 1½' thick; to be of pucca bricks and katcha mortar, except the first layer of bricks over the plinth, the pillars, the flat and relieving arches, masonry near wood work for two feet, and the cornices and mouldings, which are all to be laid in lime mortar. The whole of the masonry above the plinth to be pucca, plastered both inside and outside; this not to be done in very hot dry weather. Plaster two parts kankar-lime to one part surkhi. The doors to be as shown in the drawing, in addition a window in each side room, sill 8" from the ground, height 4½', width 3'; in the upper rooms, windows of the same size, one in each room at the north and south ends. In the bathrooms, pantry, and store-room, windows same pattern as ventilating windows in up-stair rooms, sills at 5' from the ground; recesses for shelves to be made in all rooms 3' wide 4' high, with addition of space formed by semi-circular arch, depth one foot.

Over the openings for doors, windows, and recesses there are to be single brick arches, in doors and windows raised 3" above the middle of the chaukhats and meeting the wall flush with the tops of the chaukhats; but over the doors from the main room on the ground floor to the two side rooms there are to be wooden lintels, because the beams come directly over them. The same in the doorway between the two main rooms on the ground floor. Over the openings for doors and windows of the upper rooms there are to be flat and relieving arches, but over the small ventilating windows near the roof there are to be wooden lintels, the beams of the roof running at right angles to the beams of the ground floor ceiling. The staircase to be of pucca masonry on arches, the arches to furnish recesses in the store-room.

*Flooring and terrace roof*—If the clay be good, the flooring should be of 1' square tiles, one inch thick, on the ground floor; the flooring should be of 9" concrete well rammed with a layer of tiles set diagonally above it; where no tiles are used, there should be an upper coating of one inch of mortar well beaten down and smoothed.

The floor of the upper rooms and roof to be supported on sál beams 6" x 9", three feet from centre to centre, with barghás 3" x 3", one foot from centre to centre; that of the verandah on karris 3" x 4½" at one foot from centre to centre, corner karris being 6" x 7". The floor of the upper rooms, verandah, and roof over two upper rooms to be terraced, 1" of mortar or one inch tiles laid on 3" of concrete (if square tiles are used next the barghás and karris the concrete will be 5") over two bricks laid flat, and so placed that each upper brick or tile will break the joints of four lower ones. The upper terraced roof to have a slope of 6" from the centre towards the north and south ends. The verandah to have a slope outwards of 1" in 6'.

*Roofing of upper verandah*.—The upper verandah to have a roof of single tiles as per pattern laid on battens 1½" x 1½", rafters 3" x 4½", two feet from centre to centre, hip rafters being 5" x 7", breast summers being 6" x 6", the roof to project so that the water from it will fall 1½' away from the plinth of the building.

The outer edge of the roof to be supported on sál posts, the corner posts to be 8" x 8", and the intermediate ones 6" x 6".

The verandah to be enclosed by a railing of sál wood 3' 6" high.

*White-washing*.—The white-wash to be made from the best stone lime procurable, and to be of a good consistency. The whole of the masonry above the plinth to have two coats of white wash.

*Beams and rafters*.—To be of good sound sál timber well dressed and fitted, to be cleaned with water and coated with oil after the building has been completed.

The dimensions of some of the scantlings not before given are now given below: lintels 5" thick, wall plates 4" x 3"; pillar plates 2" thick, chaukhats for doors 4" x 4½", and windows 3" x 4½"; eave boards 1½" thick, planking for shelves 1½" thick, railings 3" x 3".

*Doors and windows*.—The frames to be of shisham 1½" thick, and panels of haldu 2" thick, to be washed with water and coated with oil after they are fixed. Nine doors 3' 7" x 6' 5", two doors 3' 1" x 6' 5", five doors 2' 7" x 6' ½", one door 2' 3" x 6' 2", four windows 2' 7" x 4' 1", eight windows 2' 7" x 1' 6".

*Painting*.—The verandah railings, posts, and breast summers to be painted green.

*Abstract of cost of 1st class double-storied Rest-house.*

Quantity.	Items,	Rate.		Cost.		Total.	
		Rs.	As.	Rs.	As.	P.	
1,966 c. ft.	Excavating and ramming foundations ..	5	0	per 1000	9	13	3
737 "	Concrete .. ..	10	0	100	73	11	2
2,923 "	Pucca masonry .. ..	16	0	"	467	10	10
7,356 "	Kutch-pucca masonry .. ..	13	0	"	956	4	5
1,252 s. ft.	Terrace flooring .. ..	10	0	"	125	3	2
1,708 "	Do. roofing .. ..	13	0	"	221	6	2
638 "	Do. 6" sloped .. ..	13	0	"	82	15	0
1,692 "	Tiled roofing, single .. ..	5	0	"	84	9	7
9,120 "	Pucca plastering .. ..	2	8	"	228	0	0
1,744 "	Painting ceilings .. ..	1	8	"	26	2	6
10,864 "	White-washing .. ..	0	6	"	40	11	10
68 r. ft.	Hip tiling .. ..	20	0	"	13	9	7
625.05 c. ft.	Timbering of sál wood in position ..	1	0	per c. ft.	625	0	9
396.55 s. ft.	Wood-work of shisham and haldu in doors and windows in position.	0	8	per s. ft.	198	4	4
17½ No.	Sál wood railings in position .. ..	4	0	each	70	0	0
	Windows and door shades ditto .. ..	4	0	"	32	0	0
	Pankhas ditto .. ..	5	0	"	30	0	0
	Clearing timber and doors with water and oiling them.			.....	10	0	0
	Green painting railing and posts of verandahs.			.....	30	0	0
	Nails, hooks, screws, &c. .. ..			.....	9	9	5
	TOTAL .. ..				3,335	0	0
	Contingencies at 5 per cent. .. ..				165	0	0
	GRAND TOTAL .. ..						3,500 0 0

*Specification of 2nd class double-storied Rest-house.*

*General description.*—The building to be 38½' long and 38½' wide in the clear, and double storied as shewn in the drawing. The accommodation on the ground floor to be, one main room 14' x 14', one side room 14' x 8½', one bathroom 8½' x 9', a small godown underneath the stair case, and verandahs 8½' wide on three sides; the accommodation on the upper floor to be one room (14½' x 14½'), with a verandah all round. There is to be a fire-place in each of the two large rooms. Materials and construction to be similar in every way to the 1st class double-storied rest-house. There will be four doors 3' 7" x 6' 5", one 3' 1" x 6' 5", and four 2' 7" x 6' 5",—total nine doors; four windows 2' 7" x 4' 1", and four 2' 4" x 1' 6",—total 8 windows.

*Abstract of cost of 2nd class double-storied Rest-house.*

Quantity.	Items.	Rate.	Cost	Total.
		Rs. As.	Rs. As. P.	Rs. As. P.
1,491 c. ft.	Excavating and ramming foundations	10 0 per 1000	14 14 6	
559 "	Concrete	10 0 100	55 14 6	
2,743 "	Pucca masonry	16 0 "	438 14 0	
2,593 "	Kutch-pucca masonry	13 0 "	597 1 5	
981 s. ft.	Tiled flooring, ground floor	10 0 "	98 1 7	
1,425 "	Ditto, upper floor	13 0 "	185 4 0	
342 "	Terrace roofing	13 0 "	44 7 4	
1,222 "	Tiled roofing single	5 0 "	61 1 7	
68 r. ft.	Hip tiling	20 0 "	13 9 7	
6,722 s. ft.	Pucca plastering	2 8 "	168 0 9	
1,207 "	Painting ceiling	1 8 "	18 1 7	
7,929 "	White-washing	0 6 "	29 11 8	
483 c. ft.	Timbering of sal wood	1 0 per c. ft.	483 0 0	
213 s. ft.	Woodwork in doors and windows in position.	0 8 per s. ft.	106 8 0	
18 No.	Verandah railings of sal wood in position	3 8 each	63 0 0	
3 "	Stair case ditto	3 8 "	10 8 0	
6 "	Window and door shades ditto	4 0 "	24 0 0	
2 "	Pankhas with ropes, &c., ditto	5 0 "	10 0 0	
	Green painting railings, posts and breast summers of verandah, window and door shades and exposed sides of doors and windows.	.....	50 0 0	
	Clearing timber and doors with oil and water.	.....	15 0 0	
	Nails, hooks, screws, &c.	.....	12 13 6	
	TOTAL	.....	2,500 0 0	
	Contingencies at 5 per cent.	.....	125 0 0	
	GRAND TOTAL	.....	2,625 0 0	

*Specification of 3rd class Rest-house.*

*General.*—The inner building to be 27' long by 21' broad in the clear on the ground-level, the floor level will be 1½' above the level of the ground. The accommodation to consist of two rooms each 12' x 8', a bathroom 10' x 8', and a store-room 10' x 8', as shewn in the drawing. The whole to be covered with a thatched shed, the flooring of which, 61½' x 37½', to be level with that of the inner building, the thatch projecting 2½' over the edge of the raised floor, making 66' x 42' from eave to eave. The thatch to be three feet above the tiles of the inner building.

*Inner building.*—The earth to be excavated to a depth of 1' 9", the foundation to plinth to be of burnt bricks when these are procurable, or, when well burnt bricks cannot be got, of concrete, which should be well rammed; the foundation will be composed of pila bricks or unburnt bricks with mud mortar, the concrete to be of well burnt bricks broken small in proportion of one-third of them to one of kankar-lime.

*Superstructure.*—The bricks to be unburnt of good clay earth, well dried, the mortar to be of mud.

*Flooring.*—To be either unburnt bricks laid flat and pucca plaster, or burnt bricks laid edge-wise set in lime mortar.

*Plaster.*—To be of mud mixed with cow-dung and bhūsa, and to be left in water three days before being used.

*Washing.*—White-wash to be in two coats inside the rooms, outside the house to be washed with mud and water.

*Tiled roof.*—To be supported on round sal saplings about 1' 3" mid-girth, over which will rest a good stout bamboo frame, over which mats and tiles laid in mud mortar. The tiles will be common country tiles well burnt.

*Sál work.*—In doors and windows to be of well seasoned sál or sissu. All the poles used in the inner building and in the shed should be soaked in water some weeks before erection to prevent their being attacked by insects, wood touching masonry to be well tarred. The sills of windows on the south side to be 3' from the floor and 3' x 4'.

*Outer shed.*—Will be supported on kutchá masonry pillars and sál uprights on the outside of the floor, and on sál posts fixed into the inner building in the middle; when the bricks used are very sandy the posts should be built up inside the pillars and walls and fixed in the solid ground. The flooring to be of earth supported on the outside by a kutchá wall 2' thick.

*Abstract of cost of 3rd class Rest-house.*

Quantity.	Items.	Rate.		Cost.		Total.	
		Rs.	As.	Rs.	As. P.	Rs.	As. P.
<b>INNER BUILDING.</b>							
520 c. ft.	Earth work in inner rooms	2	0 per 1000	1	0	0	
2,746 "	Kutchá masonry	3	0 100	82	6	0	
741 s. ft.	Tile roofing	7	0 "	51	13	11	
2,806 "	Plaster	0	8 "	14	0	5	
2,806 "	White-washing	0	3 "	5	4	2	
1178 c. ft.	Sál timber sawn	3	0 per c. ft.	35	5	5	
16 No.	Round timber for roof	0	14	4	0	0	
6 "	Doors	10	0 each	60	0	0	
3 "	Windows	5	0 "	15	0	0	
667 c. ft.	Digging foundation	0	2 per 100	0	13	4	
	Clearing site for chauki		...	15	0	0	
							284 11 3
<b>OUTER SHED.</b>							
1,255 c. ft.	Outer walling unburnt brick	2	8 per 100	31	6	0	
2,043 "	Earth work in verandah	2	0 1000	4	0	0	
75—14' middle girth	Saplings in position	0	4 100	18	12	0	
20—12' X 24' Do.	Uprights	0	4 "	5	0	0	
4—17' X 24' Do.	Long uprights	1	0 "	4	0	0	
24—20' X 14' Do.	Ridge poles and verandah breast summers	0	8 "	12	0	0	
10 No.	Unburnt brick masonry pillars	1	4 each	12	8	0	
1,000 "	Bundles of grass	3	0 per 100	30	0	0	
1 md. 20 seers	Iron nails	10	0 per md.	15	0	0	
1,000 No.	Bamboos	3	0 per 100	30	0	0	
3 mds. 13 seers 5 chs.	Ban string	3	0 per md.	10	0	0	
31—28 s. ft.	Thatching	2	0 per 100	62	9	0	
							235 3 0
	<b>TOTAL</b>		.....				519 14 3
	Add for contingencies		.....				30 1 9
	<b>GRAND TOTAL</b>		.....				550 0 0

### III.

SUGGESTIONS REGARDING THE MANAGEMENT OF THE FOREST NEAR IKAUNA IN THE BAHEAICH DISTRICT OF OUDH, BELONGING TO THE MAHARAJAH OF KAPURTHALA; BY D. BRANDIS, INSPECTOR GENERAL OF FORESTS,—DATED (CAMP DUDUA) THE 17TH FEBRUARY 1881.

1. THE Ikauna Forest was examined in February 1881 by Mr. Pinder, Sub-Assistant Conservator of Forests, Captain Wood, Conservator of Forests, and the writer. The following suggestions are submitted as the result of this inspection:—

The forests are situated in the Bahraich District, and the area is about 16,000 acres. They consist of a long and narrow belt, extending over a length of 20 miles, from Jankinagar in a southerly direction to Lál Bojhi, the south boundary (for a length of eight miles) being formed by the Koháni Nala.

The forest consists of two main blocks, the northernmost of which is north-west of the town of Ikauna, while the southern block extends from the Koháni Nala in the south to the village of Akbarpur in the north. There are also two outlying blocks north and south of the village of Balapur. It will be convenient to call the northern main block the Ikauna block, while the southern one should be designated as the Koháni block, the two outlying blocks on the west side being called the north and south Balapur blocks.



*Revenue.*

2. The revenue amounts to about Rs. 3,300 yearly, of which the following are the principal items :

- 1st—Lac—Rs. 1,000 per annum. Advances are made to the Maniárs, who put the lac insect on the trees twice during the year : once in Kartic (October) and once in Boysakh (April). Half the lac collected by the Maniárs is delivered to the landlord. The lac is chiefly produced on the palás (*Butea frondosa*), which is very common and attains a large size. We saw a large number of trees covered with lac. This item may be considerably increased by care and good management.
- 2nd—Mohwa—about Rs. 900. This tree is common in the Ikauna block, and more scattered in the Koháni one.
- 3rd—Wood for domestic and agricultural purposes. This is paid for by the inhabitants of the neighbouring villages at the rate of two annas per plough a year, and it is understood that about 200 villages avail themselves of this arrangement. It is for consideration whether this rate might not be raised. Black-smiths pay for the charcoal they require at the rate of six pies per annum for each plough for which they are responsible. Building wood is free. Firewood is free to all villagers of the Kapurthala Estates. Outsiders pay at the rate of six annas and ten annas per cart-load, which realizes about Rs. 150 a year. There is no demand as yet from outsiders for wood for building.
- 4th—Wax, fruits, harra, and kamela powder yield about Rs. 90 per annum. The collection of these articles is let to one contractor.
- 5th—Grazing and grass. The Kapurthala people pay only for buffaloes at the rate of six annas each per annum, which realizes about Rs. 200. Outsiders pay ten annas per buffalo, two annas per bullock, and one anna per cow; total realization Rs. 150 per annum. Permission to cut thatching grass has lately been let to a contractor, who pays about Rs. 30. There are extensive open plains well stocked with grass in the forest, and on one of them (Barki Jaghir) we saw a large number of people engaged in cutting the grass. This source of revenue ought to yield a great deal more than it does at present.

Recapitulating the above, we are of opinion that the revenue from lac, wood, grass and grazing may be very largely increased.

*Expenditure.*

3. The expenditure consists of the following items :—

	Rs.
Government assessment	3,600
Establishment (viz., Forest Munserim Rs. 30, Mohurrir Rs. 15, and 20 Chaprasis or Forest Guards at Rs. 3 each)	1,260
Total	4,860 a year.

*Future management: survey and demarcation.*

4. Many portions now included in the forest might be excluded and brought under cultivation, the rent from which would probably cover the whole of the Government assessment. The first point then to consider is, what portions of the forest are sufficiently valuable and important, for the surrounding population, to make it advisable to retain them permanently as forest; and in considering this question the greatest attention will have to be paid to the selection of convenient boundary lines. For this purpose it will be necessary to make a detailed survey and examination of the whole forest, and to enter the result of this survey on the copy of the manuscript map, on the scale of 4 inches=1 mile, which exists in the Deputy Commissioner's office. Simultaneously with this survey, the boundaries of those portions of the forest which it may be decided to maintain permanently, should be demarcated on the ground by boundary posts, with serial numbers, and continuous boundary ditches, as has been done in the reserved forests of Oudh.

The officer charged with this survey and examination should at the same time frame and submit proposals regarding the system of roads and cleared lines which should be laid through the forest, in order to facilitate its protection and working; and he should also make definite proposals regarding those blocks which should be absolutely closed for a time, no cattle and no cutting of any kind being permitted in them.

*Sál forests.*

5. Those portions of the forest in which sál is the chief tree are by far the most valuable; such are a portion of the Ikauna block and the south Balapur block. In the Ikauna block much damage has been done by a contract (given three years ago) for the collection of resin (rá). All sál trees above a certain size were ringed for that purpose. Such a contract should (as a matter of course) not be given again; but if the young sál is absolutely protected, it will grow into very useful trees.

In the south Balapur block most of the old sál trees were cut down about thirteen years ago, and since then the coppice-shoots have grown to a height of 35 feet, with a girth of 15 to 23 inches. This block will grow into a most valuable forest if completely protected.

*Protection.*

6. Throughout the forest examined by us we found evidence that fires had been kept out during the last few years, and this accords with the statement of the Forest Munserim in charge. Nor will this be difficult, because nearly the whole forest is surrounded by cultivation. Nevertheless, all necessary precautions should be taken; and in order to make fire-protection completely certain, a system of roads and cleared lines should be laid through the forest.

After the boundaries have been demarcated and straightened by the exclusion of corners, which may be given up for cultivation and otherwise, the number of persons employed on the protective establishment may be considerably reduced. At present there are 20 Forest Guards, but a much smaller number will be found to suffice. Each Forest Guard should be responsible for a separate beat, and if such an organization is made, we believe that less than half the number will suffice. We also recommend that the Guards, whose present pay is only Rs. 3 per mensem, may, with advantage, be divided into three grades on Rs. 8, Rs. 5, and Rs. 3 per mensem, so as to hold out some prospect of promotion. Most of the present Guards are men from other districts, and we would suggest that these men should be selected as much as possible from the villagers in the vicinity of the forest. For fire-protection contracts might be made with influential men of the neighbouring villages, who might undertake the responsibility of protecting certain blocks for a certain payment to be made at the end of the season in case the forest in their charge had not been burnt.

*Officer in charge.*

7. The question whether eventually the Forester in charge should be a man trained at the Forest School may be left for future consideration. The revenue of these forests is capable of considerable development; and after it has increased, and after the survey, demarcation, and examination of the forest has been completed, it will doubtless be well to select a professionally-trained officer for the charge. Under existing circumstances, local knowledge, energy, and faithful service are the chief requisites.

*Estimate of first outlay.*

8. The cost of the survey and demarcation here proposed cannot at present be exactly estimated, but the following figures may give an idea of what is contemplated. In these figures, however, is not included the pay and travelling allowance of the superior officer whose services will be required for this purpose, as a temporary measure, say for a period of six months:—

	Rs.
(1) Expenses of survey ... ..	600
(2) Demarcation ditch, with posts at prominent corners, at Rs. 30 per mile, for a length of boundary estimated at 100 miles.	3,000
(3) Thirty miles of roads and cleared lines, 15 feet broad, to replace the present meandering cart-roads, to serve as fire-lines, and to afford direct lines of communication between the principal villages on either side of the forest, at Rs. 75 per mile. ... ..	2,250
Total ...	5,850

*Control by Conservator of Oudh Forests.*

9. Should it be decided by Government to lend one of the officers of the Oudh Forest Department for the survey, demarcation, and the laying out of roads, this work should be placed under the control of the Conservator; and it would be well if, during the first few years at least, the Conservator of the Oudh Forests were requested to exercise a certain supervision over the management of these forests.

## IV.

## PURANPUR FORESTS.

Extract from a letter, No. 245 of the 19th October 1877, from E. G. Hardy, Esq., c.s., Deputy Collector, Pilibhit, to the Collector of Bareilly.

\* \* \* \* \*

8. Regarding the Púranpur Forests the Conservator<sup>(a)</sup> proposes that a thorough survey should be made by a Forest Surveyor in company with a Revenue Officer, in order that a "settlement favourable alike to the villagers and to Government might be made." After this the Conservator would enclose as Government forests "grants Nos. 7, 8, 9, 12, 18, and parts of grants 10, 14, 15, 17, 19, 20, 21."

9. As an explanation has been called for regarding these grants, I give it here. In 1848-49 the waste lands in Púranpur, about 75,000 acres, were mapped out and divided into 22 allotments of 3,000 or 4,000 acres each. One of these allotments was a small mouzah, Mustafabad, the remaining 21 were termed grants and were apart from the malguzari area. A large number of these grants were made in 1853-54 to grantees under certain conditions; at the present time five only are held, the rest having lapsed or having been thrown up. No. 1 is held in fee simple (by purchase) by Mr. Carew, and Deve Parshad, Bhikam Singh, and Lack Singh Manai, hold 16, 17, and 21 respectively. Grants 17 and 21 are the only two which are affected by the Conservator's proposals; and as far as the uncultivated lands of these grants are concerned, the grantees have forfeited all rights, they having failed to comply with the conditions under which they took the land. Government can, when it likes, resume all the uncultivated land in these grants.

10. By an order of the Commissioner of Rohilkhand, dated the 10th January 1850, extensive rights (detailed in paragraph 20 of the Conservator's letter) in all the waste lands were conferred on all Púranpur villagers, and have been enjoyed by them up to the present time, the amount of waste land being so large that no dispute appears to have arisen between them and the grantees. I have looked through several settlement papers of villages adjoining these waste lands, but find no estimate of these rights at time of assessment, so that the question, in case the forests are conserved, will be between Government and the tenants only, in which the zamindars will not be concerned.

11. As a matter of fact, the plots of land most valuable for purposes of conservation are those in which tenants have exercised scarcely any rights on account of the distance from their villages, grants 7, 8, 9, 12, 18 being all more or less remote from any villages and other forest lands lying between. The rights would of course grow more defined as the lands to be enclosed come nearer to villages, and in some of the grants mentioned in the Conservator's letter questions of grazing rights, &c., would arise and have to be settled.

12. The amount of waste land, however, is so large that I think it would be easy to secure a large area for the purpose of forest conservation without causing injustice to the villagers, and I do not see what objections could be raised to the survey proposed, in the course of which any difficulties that arise regarding rights could be heard and arranged.

## V.

## CONDITIONS OF WASTE LAND GRANTS, PURANPUR.

Agreement of Grant No 1, in pargana Púranpur, Zila Sháhjahánpur, entered into by Dal Sing, son of Achal Sing, caste Rajput Toman, and Sheo Shude, son of Komnul, caste Kayeth, from May 1852 to 1901 A. D., being 50 years.

1. THE grantee is to clear, according to the undermentioned proportions, the whole tract within the period of twenty years, with the exception of 27 acres of irremediably barren land, and one-fourth, or <sup>A. R.</sup> 782-1, of the remaining culturable land, which is left at the disposal of the grantee, if the conditions are fulfilled.

2. If no commencement be made to clear within the first year, the settlement is to be void, and the grant resumable by Government, who may dispose of it as they think proper.

3. If <sup>A. R. P.</sup> 586-2-20 be not cleared and cultivated within the first five years, the uncultivated land is to be at the disposal of Government, and the grantee is to be liable to a fine of four annas for every one of the <sup>A. R. P.</sup> 586-2-20 remaining uncultivated.

4. If <sup>A. R. P.</sup> 1,173-1-20 be not cleared and cultivated in ten years, the uncultivated land is to be at the disposal of Government, and the grantee is to be liable to a fine of four annas for every one of the <sup>A. R. P.</sup> 1,173-1-20 remaining uncultivated.

5. If <sup>A. R.</sup> 2,346-3 be not cleared and cultivated in twenty years, the uncultivated land is to be at the disposal of Government, and the grantee is to be liable to a fine of four annas for every one of the <sup>A. R.</sup> 2,346-3 remaining uncultivated.

(a) NOTE—Mr. G. Greig, whose Report was forwarded by Captain Wood, Conservator of the Oudh Circle, after the latter had taken over charge of the Pilibhit Division.

under any one of the three preceding clauses is to be leviable from the grant in the same way as any ordinary balance of land revenue, but the perty of the grantee are not to be liable for it.

to pay, according to the kistbandis in use in the North-Western yearly jummas, viz.,—

	Jumma.	Years, F. Ś.	Jumma.
	Rs.		Rs.
	<i>Nil.</i>	16 or 1274-75	934
	<i>Nil.</i>	17 " 1275-76	1,024
	<i>Nil.</i>	18 " 1276-77	1,114
	22	19 " 1277-78	1,205
	55	20 " 1278-79	1,295
	100	21 " 1279-80	1,385
	156	22 " 1280-81	1,475
	224	23 " 1281-82	1,565
	303	24 " 1282-83	1,634
	393	25 " 1283-84	1,690
	483	26 " 1284-85	1,736
	573	27 " 1285-86	1,770
	663	28 " 1286-87	1,793
	754	29 " 1287-88	} 1,805
	844	to	
		50 } 1308-09	

8. The right of the public road in the grant is not to be interfered with. The grantee is to pay a contribution of one per cent. per annum on the amount of his jumma for the year, in lieu of all demands of the State for aid in repairing the high roads. The grantee will have no claim on the Government for making or repairing private roads.

9. The standard of measurement is to be the British acre consisting of 4,840 square yards, and the Government shall be at liberty at any time to measure the land with the view of ascertaining that the conditions respecting the clearance of the specified portion of land, by each of the specified periods, have been fulfilled.

10. The grantee is to erect permanent boundary marks round his grant and to keep them in a state of repair.

11. The cultivated portion of the grant is to be considered a khálisha mahál, *i. e.*, an estate paying revenue to Government and subject to all conditions attaching by law to such tenures. The grantee is to be considered during the currency of the lease as the proprietor of such a mahál or estate, and subject to all the liabilities legally attaching to such persons.

12. This grant conveys a right to the land for the purposes of cultivation and to all the products of the cultivated land, but does not give a right of property in the spontaneous products of the land, or in the minerals which may lie upon or beneath the surface. Whenever any persons have been accustomed to use or consume these products, the grantee shall not interfere with them. So long as they do not trespass upon or otherwise injure the cultivated portion of the land where no customary right to such products exists, the Government, if it does not require the products itself, permits the grantee to use or to consume them, subject to such conditions as it may have imposed, or may see fit at any future time to impose.

13. For the preservation of the public peace, the grantee shall on the requisition of the Magistrate maintain a chaukidár for every 60 houses or families resident on the grant. The chaukidár shall receive for his support either 5 acres of good cleared land rent-free, or a monthly money allowance of not less than Rs. 2-8. For every three chaukidárs there shall also be maintained at the expense of the grantee a goriyat or reporter, with a jaghir of not less than three acres of good cleared land, or a monthly allowance of not less than Rs. 2.

14. The Government reserves the right which it everywhere possesses over all running streams of water, whether for purposes of irrigation or navigation, and, whenever it sees fit, can assume the control of the waters and distribute them in such manner and on such conditions as may seem most conducive to the public good. The right over these waters can only be obtained by individuals under special grant of the Government.

15. The lands included in this grant are shown in the subjoined table.

Number in Map	Name of Grant.	Name of Grantee	Total area.	Deduct irremediably barren areas.	Remainder use-ful area	Deduct one-fourth as approved by Government	Area to be engaged.
1	Dal Sing Valeh	Dal Sing and Sheo Shude.	Acres 3,156	Acres 27	Acres 3,129	Acres 782 1	Acres 2,346 3

Boundaries (as per map)

{ North—Grant No. 2.  
 { East—Madhopur, Ghoongchae, and Peraria Kurree.  
 { South—Dahona, pargana Bisulpur, zila Bareilly.  
 { West—Itowria, Subnagar, and Mundia.

STATEMENT OF BAMBOOS EXPORTED FROM THE KUMAUN FOREST DIVISION, AND REVENUE REALIZED THEREFROM, DURING THE TEN YEARS 1871-72 TO 1880-81.

CHAUKIA.	1871-72.		1872-73.		1873-74.		1874-75.		1875-76.		1876-77.		1877-78.		1878-79.		1879-80.		1880-81.		Forests-whence bamboos exported, and estimated area.
	Number of bamboos in scores.	Revenue realized, Rs.	Number of bamboos in scores.	Revenue realized, Rs.	Number of bamboos in scores.	Revenue realized, Rs.	Number of bamboos in scores.	Revenue realized, Rs.	Number of bamboos in scores.	Revenue realized, Rs.	Number of bamboos in scores.	Revenue realized, Rs.	Number of bamboos in scores.	Revenue realized, Rs.	Number of bamboos in scores.	Revenue realized, Rs.	Number of bamboos in scores.	Revenue realized, Rs.	Number of bamboos in scores.	Revenue realized, Rs.	
Ramnagar	27,743	1,289	23,714	1,429	25,170	2,312	25,851	1,661	35,951	1,313	23,240	3,012	33,062	3,047	33,090	3,010	10,760	739	21,520	2,372	The area from whence the bamboos are exported cannot be accurately given the Forest Survey keep any record of the area which bamboos grow, it would of great assistance in forming estimate, but we often from the same tract - bamboos are exported by different chaukias, according to the requirements of the merchants.
Laldhang	12,884	813	2,825	1,656	25,415	1,704	13,624	664	15,550	2,000	28,082	2,110	7,999	1,031	19,147	1,399	9,599	706	19,328	1,403	
Dhelá	15,273	950	23,885	1,505	18,498	1,180	13,364	831	13,465	1,461	22,540	1,398	793	767	297	210	4,917	340	18,333	1,618	
Sawaldeh	3,012	184	2,738	479	9,071	643	8,591	539	9,810	635	9,731	655	9,720	621	280	200	...	...	...	...	
Maldhan	...	...	...	...	3,539	223	1,800	124	2,530	241	1,323	133	2	...	...	...	3,067	228	2,470	184	
Patrámpör	...	...	...	...	6	...	5	1	655	33	720	48	...	...	...	...	...	...	...	...	
Barsoti	22	2	2,541	178	2,749	128	215	14	1,215	84	2,047	250	30,860	2,194	13,417	800	...	...	...	...	
Heldáwa	1,523	95	142	...	76	4	130	8	730	34	356	56	64	3	...	...	1,436	161	13,132	923	
Jaldám	22	1	2,571	165	7,011	432	1,429	89	1,023	89	2,818	296	85	40	900	50	1,322	102	1,582	131	
Binkheri	976	59	1,153	69	791	53	1,135	79	810	60	1,153	82	8	1	22	2	...	...	...	...	
Chunnakhán	69	4	384	19	3,740	243	778	48	730	53	482	35	...	...	...	...	...	...	...	...	
Kamotá	1,899	114	3,054	197	685	39	2,765	168	2,137	157	2,984	299	...	...	...	...	...	...	...	...	
Garapti	251	15	96	5	1,365	89	340	20	1,411	73	195	16	12	1	15	2	...	...	...	...	
Bourkháti	2,762	243	2,831	280	4,337	323	3,471	314	3,413	310	2,563	229	1,013	82	1,700	90	1,038	144	966	62	
Pupal Parao	298	215	6,096	483	10,036	1,112	4,239	333	4,836	334	5,596	381	8,667	1,135	6,167	1,285	3,153	227	1,421	96	
Haldwáni	83	31	1,214	69	3,630	277	1,781	107	3,301	370	6,127	1,076	356	58	900	50	347	24	52	3	
Tindá	2,775	184	3,584	262	4,689	325	3,018	210	3,969	300	3,674	250	1,805	129	348	129	1,029	89	39	2	
Láikuwá	301	21	1,337	100	1,825	137	1,139	82	1,634	131	1,335	84	356	54	520	60	187	33	3	1	
Horal	355	31	487	42	1,443	111	1,198	103	1,430	71	510	30	60	9	201	12	14	2	...	...	
Chorgalia	5,198	321	12,476	802	8,173	557	6,416	429	15,280	541	16,911	793	1,323	234	17,711	1,251	6,097	456	2,713	584	
Ransáli	1,050	105	4,158	275	27,165	511	6,781	524	7,999	715	4,057	1,311	1,900	120	3,249	135	3,631	277	2,857	257	
Sudlimat	6,183	553	6,107	1,099	1,063	739	5,069	351	4,178	302	3,448	303	2,256	196	3,011	211	2,298	246	3,536	354	
Kilpura	11,575	1,431	57,823	4,049	29,747	2,014	11,404	197	2,737	228	5,674	418	6,977	1,162	700	516	10,384	1,221	11,834	1,411	
Jamnagháti	21	1	527	32	983	61	221	19	454	37	548	39	1,308	245	280	198	717	59	384	31	
Chandani	27,246	1,782	32,077	2,228	15,829	1,135	6,459	441	14,059	1,011	19,077	1,262	6,884	465	6,841	614	9,556	768	16,307	1,365	
Toerath	...	...	...	...	8	1	28	10	44	3	...	...	...	...	...	...	...	...	...	...	
Barnides	...	...	6,918	498	4,852	337	4,143	246	4,625	330	6,817	42	2,251	368	7,008	458	7,713	459	4,713	493	
Chol Parao	...	...	...	...	98	9	3,514	313	3,514	313	...	...	...	...	...	...	...	...	...	...	
Káidhángi	290	127	1,981	124	1,089	71	2,010	127	2,821	129	1,881	137	...	...	...	...	...	...	...	6	
TOTAL	118,310	8,578	204,727	14,015	223,474	14,734	130,919	8,199	156,817	11,635	174,499	15,181	121,877	11,949	115,912	10,473	77,117	6,390	122,208	11,290	

## VII.

STATEMENT OF BAMBOOS EXPORTED FROM THE OLD GARHWAL FOREST DIVISION, AND REVENUE REALIZED THEREFROM, DURING THE TEN YEARS 1871-72 TO 1880-81.

CHAUKIS.	1871-72.		1872-73.		1873-74.		1874-75.		1875-76.		1876-77.		1877-78.		1878-79.		1879-80.		1880-81.		Forests whence bamboos exported, and estimated area.
	Number of bamboos in scores.	Revenue realized	Number of bamboos in scores.	Revenue realized	Number of bamboos in scores.	Revenue realized	Number of bamboos in scores.	Revenue realized	Number of bamboos in scores.	Revenue realized	Number of bamboos in scores.	Revenue realized	Number of bamboos in scores.	Revenue realized	Number of bamboos in scores.	Revenue realized	Number of bamboos in scores.	Revenue realized	Number of bamboos in scores.	Revenue realized	
	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Area in square miles.
Kothi Rao ...	19,869	1,145	23,325	1,441	30,353	1,860	12,315	774	19,968	1,043	11,640	529	24,954	1,625	26,376	1,755	23,399	1,849	26,424	1,715	The valleys of the Kothi Rao and Jhina Sot. 18
Dharon ..	24,762	1,547	64,747	3,946	26,851	1,640	20,552	1,244	30,975	1,878	29,881	1,817	6,953	457	17,375	1,157	58,613	3,726	60,900	3,909	The valley of the Dharon Rao 15
Kalagarh ...	174,516	11,993	250,402	17,066	446,245	9,946	110,677	7,449	154,819	10,528	146,987	9,956	136,552	9,462	66,095	4,394	116,235	7,661	124,663	8,334	The valleys of the Ramganga River and all its tributaries, excepting the upper portions of the Sona Nadi, Mandhali, and Kansur. 217
Kalushahid ...	39,269	2,375	58,758	3,552	39,724	2,406	29,827	1,807	65,208	3,943	55,345	3,348	19,935	1,215	5,500	345	20,722	1,258	35,672	2,158	The valley of the Kalushahid Rao, and the valley of the Sona Nadi above Mota Sal 40
Bhogpur ...	52,640	3,180	97,087	5,898	60,237	3,044	38,000	2,295	40,491	2,440	16,037	973	7,432	447	12,698	772	30,130	1,841	24,237	1,491	The valleys of Hatea, Nalkotta, Nim Kilaoli, and Sakha Sot. 12
Dholkhand ...	12,587	782	25,673	1,607	13,510	840	16,123	1,046	14,391	920	17,022	1,185	9,234	575	4,868	296	15,199	940	11,081	697	The valleys of the Moongadi, Dholkhand, and Goolsiga Sots. 9
Pakh Rao ...	42,362	2,635	61,435	3,817	25,350	1,592	23,703	2,032	51,600	3,215	40,917	2,582	11,215	747	1,058	85	19,537	1,385	19,404	1,380	The valleys of the Chupra, Kaniya, Pakhrao, and Chorpani Sot. 11
Gujar Sot ...	16,874	1,017	29,648	1,872	19,461	1,208	15,227	940	31,348	1,933	19,448	1,205	10, 17	630	722	55	13,432	844	16,659	1,108	The valleys of the Gajar Sot and Manik Rao. 9
Bagnala ...	16,813	1,081	35,594	2,227	31,740	1,975	21,571	1,322	17,766	1,118	15,177	975	16,332	1,041	2,552	212	11,393	806	13,156	963	The valleys of the Surkhair, Ganglor, and Am Sots. 7
Sanch ...	55,345	3,500	52,797	3,363	77,774	4,982	69,976	4,458	133,154	8,288	113,662	7,045	117,159	7,987	44,053	3,112	22,523	1,743	46,531	3,479	The valley of the Kohtri River, the upper halves of the Mandhali and Kansur and the left bank of the Koh River. 80
Kotdwara ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	3,387	244	6,221	652	Gonjada and Gewai Sot ... 9
Kaupla ...	32,674	2,010	53,297	3,293	46,233	2,843	31,508	1,942	40,984	2,513	23,342	1,756	27,948	1,747	10,937	708	8,549	574	13,441	1,146	Gewai and Sukrao ... 9
Haldakhata ..	17,249	1,015	25,920	1,578	24,268	1,468	18,416	1,089	11,369	688	16,517	974	10,826	666	1,607	122	11,723	768	15,452	1,032	Sukrao and Chowkeghata ... 5
Papidanda ...	108,771	6,554	161,872	9,754	96,202	5,809	62,383	4,960	68,661	4,543	61,341	3,700	55,785	3,377	29,288	1,873	31,698	4,074	63,802	3,944	Gewai, Sukrao, Chowkeghata, Teli Sigadi, and Nalgadi. 28
Laldhang ...	121,721	7,885	170,757	10,409	134,120	8,191	115,923	7,027	152,746	9,277	90,786	5,518	95,088	5,786	33,268	2,162	92,706	5,876	97,560	6,302	Rawasani, Sunpani, and Luni 25
Khara ...	60,532	3,694	88,397	5,412	84,339	5,225	79,357	4,985	92,762	5,732	62,802	5,137	66,554	4,124	26,516	1,658	18,483	2,109	29,338	2,084	Mudhal and Mithawali ... 15
Chula ...	13,829	1,005	14,816	1,100	37,793	2,735	17,405	1,251	26,098	1,900	22,217	1,602	13,924	1,007	7,203	592	18,292	1,755	21,628	1,895	Mudhal ... 9
Gori ...	93,277	6,785	70,591	5,225	105,948	7,887	93,470	6,872	92,580	6,778	76,251	5,582	76,024	5,487	24,367	1,894	55,777	5,791	66,842	5,236	Dogadda, Garapani, Bidansi, Kunnoli, and Tams Kha. 35
Luchmanjhuha	12,168	954	13,280	1,063	7,099	569	17,998	1,425	10,959	849	10,879	845	10,357	815	4,930	449	4,060	530	4,823	612	Basodhara and Khatkote ... 6
TOTAL	913,757	59,617	1,298,347	82,818	997,244	63,949	823,137	59,823	1,072,268	68,985	864,941	54,924	716,588	47,295	317,403	21,635	629,878	44,664	724,733	61,098	

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## VIII.

SUGGESTIONS REGARDING THE VALUATION SURVEY OF THE NAINI TAL PROTECTED FORESTS, BY D. BRANDIS, INSPECTOR GENERAL OF FORESTS,—DATED (DEHRA DUN) THE 16TH APRIL 1881.

THE valuation survey of the Naini Tal protected forests, the estimated area of which is given at 24,000 acres, was commenced in 1879, occupying the establishment engaged on it during a period of four months. No work was done in 1880. The enumeration was made with the aid of tickets, but Mr. Dansey is of opinion—and I agree with him—that the system since developed by him in the Nindhaur Forest should be adopted.

*Summary of results.*

2. The results of the examination made in 1879 are recorded in the Annual Progress Report for 1879-80, and the following is a summary of these results.

Altogether the forest in 43 compartments, aggregating 6,990 acres, has been examined; and it will be convenient to arrange these compartments in two great classes, *viz.*, compartments in which cuttings may be made, and such in which no cuttings are admissible at present; and to sub-divide the compartments of the first class according to the character of the forest. This gives, three classes,—forests in which cuttings may be made, and in which *Pinus longifolia* or oak predominates, and forests in which no cuttings are at present admissible.

*Statement showing the compartments in which Pinus longifolia predominates.*

Serial number of compartments.	Area of compartments.	NUMBER OF TREES PER ACRE.					Amount of grazing
		Chir ( <i>Pinus longifolia</i> ).			Oak and other species.		
		Above 2 feet in diameter.	Between 18 inches and 2 feet in diameter.	Between 6 inches and 18 inches in diameter.	Above 18 inches in diameter.	Below 18 inches in diameter.	
	Acres.						
1	133	12	75	89.9	15	96	Heavy.
2	104	08	48	32.8	19	26.3	Light.
3	300	17	64	33.3	22	22.5	Do.
4	80	15	97	23.3	20	7.6	Do.
5	122	13	70	35.4	35	38.7	Do.
6	292	05	27	15.2	21	12.8	Heavy.
9	248	04	12	13.9	16	8.7	Do.
10	321	05	22	24.5	14	7.7	Light.
20	139	04	38	18.1	18	3.9	Heavy.
21	136	08	28	33.1	38	36.7	Do.
22	71	09	67	41.1	13	8.8	Do.
Total ..	1,946						

*Statement showing the compartments in which oak and other species predominate.*

Serial number of compartments.	Area of compartments.	NUMBER OF TREES PER ACRE.					Amount of grazing.
		Chir.			Oak and other species.		
		Above 2 feet in diameter.	Between 18 inches and 2 feet in diameter.	Between 6 inches and 18 inches in diameter.	Above 18 inches in diameter.	Below 18 inches in diameter.	
	Acres.						
6	233	05	27	19.5	35	31.4	Light.
7	354	04	18	15.3	3.4	34.3	Heavy.
12	199	03	01	2.7	13.5	24.3	None.
13	237	...	0.2	3.2	18.8	51.8	Light.
24	116	01	13	11.8	5.2	27.2	Heavy.
29	87	12	26	34.8	6.6	34.9	Light.
30	144	01	01	0.7	23.0	47.6	None.
32	203	...	...	...	23.4	48.0	Do.
33	150	02	0.2	...	21.4	63.3	Do.
38	219	...	...	...	19.8	63.4	Light.
39	152	07	13	2.6	18.4	47.5	Heavy.
41	398	1.8	5.2	12.8	6.6	10.8	Do.
42	161	1.2	1.9	3.1	12.6	28.8	Light.
43	154	2.0	2.7	8.6	9.6	23.0	Do.
Total ...	2,802						

Statement showing the compartments where no fellings should be made on account of excessive pasture, blanks, precipices, or for other reasons.

Serial number of compartments.	Area of compartments.	NUMBER OF TREES PER ACRE.					Amount of grazing
		Chir.			Oak and other species.		
		Above 2 feet in diameter.	Between 18 inches and 2 feet in diameter.	Between 6 inches and 18 inches in diameter.	Above 18 inches in diameter.	Below 18 inches in diameter.	
	Acres.						
11	107	08	21	47	71	212	Light.
14	75	04	31	249	17	106	Heavy.
15	65	11	26	186	23	334	Do.
16	84	...	03	106	187	913	Do.
17	72	01	07	135	69	429	Do.
18	89	02	21	153	81	372	Do.
19	124	05	...	24	135	486	None.
23	89	01	12	132	73	65	Heavy.
25	171	...	03	27	34	161	None.
26	62	08	13	97	162	158	Heavy.
27	103	01	...	01	26	121	None.
28	156	09	06	43	52	162	Light.
31	74	02	02	03	227	443	None.
34	220	...	...	...	155	429	Heavy.
35	310	04	05	09	98	354	Do.
36	129	03	10	08	152	285	Do.
37	227	02	05	05	143	334	Do.
40	75	07	07	19	198	354	Do.
Total ...	2,242						

The object of making these valuation surveys has been, I understand, to determine approximately the quantity of wood which, under existing conditions, these forests may be expected to yield annually for the supply of Naini Tal.

#### Rights of villages.

3. The chief feature which influences the treatment of these forests is, that within them a large number of villages are enclosed, most of which, as well as a few of the adjoining villages, exercise the right of grazing, and, in most cases, also of cutting wood for their own domestic and agricultural requirements, including material for building purposes. They have also the right to lop branches, below a certain size, for winter fodder. All these rights are, I am informed, regularly recorded, and no standing tree, whether green or dead, may be cut without the permission of the Forest Officer. It may be well here to mention that these villages have no grass preserves, such as are found in other parts of the north-west Himalaya, and that during winter most of their cattle go down to graze in the Bhábar at the foot of the hills.

A small amount of grazing by the cattle belonging to the residents of Naini Tal is permitted free of payment, while the cattle kept near the station to supply it with milk and butter graze in the forests on payment of a nominal fee for the year. As may be expected, the extent to which the forest is grazed over varies extremely according to the nature of the ground and its accessibility.

Formerly, all these forests were burnt annually, but during the last five years they have been successfully protected by means of cleared fire-lines and the employment of fire-watchers.

#### Growing stock.

4. As regards the growing stock, it will suffice here to mention that over a large area chir (*Pinus longifolia*), pure or mixed with oak, is the chief tree; and that in other portions, oak, rhododendron, and ayár (*Andromeda ovalifolia*) predominate. Of the oaks, bánj (*Quercus incana*) is the principal tree. In a few localities the tilonj (*Quercus dilatata*) is common, and the kharsu (*Quercus semecarpifolia*) is met with at elevations above 7,000 feet. Much less common are rianj (*Quercus lanuginosa*) and *Quercus annulata*, which last is found near water-courses.

#### Reproduction of the forest.

5. As regards reproduction, Mr. Dansey reports that the young growth of chir is satisfactory, even in compartments which are grazed over; but that the young growth of the oaks and other species is, as a rule, kept down by grazing. Concerning the grazing question generally, the Conservator is of opinion that the Naini Tal Forests are very lightly grazed over. A very important point is that the number of cattle which each village has a right



to graze is being determined, and will, I am informed, be authoritatively recorded. The number of cattle required to supply the station with milk and butter may of course increase, but their owners have no grazing rights.

The quantity of the annual yield of these forests, while under conservancy management, must, in a great measure, depend upon the extent to which reproduction is interfered with by the cattle grazing in the forest; and in the present state of our knowledge in this respect, as well as in respect of the rate of growth of the oak, rhododendron, and ayár, it will be an extremely difficult task to form any estimate of the annual yield.

It seems desirable that I should now place on record a few suggestions which I hope will be found useful by the officer charged with completing the examination of the Naini Tal Forests. In framing these remarks I have had the privilege of consulting Dr. Schlich, Conservator of Forests in the Punjab, as well as the Conservator of the Central Circle

*Classification of trees.*

6. The existing plan of measuring the diameter should be maintained. As regards *chir*, it will suffice to count and record the following classes:—

Above 24 inches in diameter.		
Do.	18	do.
Do.	12	do.
Do.	6	do.

As regards oak and all other species, I consider that for the object in view at present two classes—above 18 inches and between 6 and 18 inches in diameter—will be sufficient. We have discussed the question whether it will be necessary to record separately all the species other than *chir* which constitute these forests; and the conclusion which I have formed is that the oaks (all species), as well as rhododendron and *Andromeda*, may with advantage be counted and recorded separately. The great variety of trees of other kinds which are scattered in these forests, and which are most commonly found fringing the valleys and ravines, may be omitted altogether; the chief reason for this being that for the present at any rate no cuttings ought, as a rule, to be made among the trees at the bottom of valleys.

*Forest at low elevations.*

7. In the valleys of the Balia, the Sat Tál, and the Kuria Nadis, the forest descends below the upper limit of sál, and consists of a variety of trees different from those of the hill forests, and of a large amount of thorny scrub. Much of this area will have to be excluded from the valuation; and regarding the system to be followed in valuing the remainder, the officer in charge must use his own discretion.

*Light selection fellings only are admissible.*

8. In a forest which, like the Naini Tal Forest, is subject to grazing throughout, no successive fellings by compartments are possible; but the only fellings that can be made are very light selection fellings, the extent of which in each compartment must chiefly depend on position, aspect, gradient, the soil, the nature of the growing stock, and the extent to which the forest is grazed over.

*In certain compartments no fellings can be made.*

9. I recommend that, when examining each compartment, a brief descriptive account of the same should be drawn up; and in this Report it should be stated whether, in the opinion of the officer in charge of the valuation, any selection cuttings during the next ten years may be made in that compartment. Compartments in which no fellings can be made may be either unproductive, as on precipices or poor soil, or they may be so poorly stocked that they cannot be worked for the present, or the growth may be too young for cutting, or they may be so grazed over that reproduction cannot be hoped for. The officer in charge of the work will of course use his own discretion in not enumerating the trees in compartments in which such enumeration is obviously not required.

*Estimate of annual yield for compartments which can be worked.*

10. In the case of those compartments in which selection fellings are admissible, an attempt should be made to estimate the annual yield per acre, either for the entire compartment or for such portions of it as may be fit to be worked. In making this estimate, it should be borne in mind that we are working upon data which are necessarily incomplete in several essential points. We can determine approximately the growing stock on the ground; we can also determine the rate of growth of *chir*; but in the absence of annual rings we are, and shall for some time to come remain, ignorant of the rate of growth of the different species of oak and most of the other kinds of trees. Further, we do not possess sufficient experience regarding the reproduction of any of these species under the conditions that prevail in these forests.

Under these circumstances, clearly the only safe plan is to frame the estimate at so low a figure that it is well within the possible yield of the forests. The estimate is open to many sources of error, and we must make sure that the error is on the safe side.

*Trial cuttings.*

11. In order to obtain a definite idea regarding the annual yield of those compartments in which it is thought that cuttings may be made during the next ten years, it may be found useful to make a number of trial cuttings in selected compartments or portions of compartments. These trial cuttings should only comprise such trees as, in the opinion of the officer in charge of the work, may during the next ten years be cut with due consideration to the regeneration of the forest. Obviously, the treatment of chir and oak forests will be entirely different, and it will therefore be necessary to make a number of trial cuttings in pure chir forests, in oak forests, and in forests in which chir and oak are mixed. The quantity obtained by these trial cuttings in each case should be measured, and upon it should be based the estimate of the maximum annual yield of the area under conservancy management.

*Order of cuttings.*

12. In examining each compartment it should be noted whether the reproduction of the growing stock, or other silvicultural considerations, render it desirable that the selection cuttings proposed to be made in it should be made at the beginning or at the end of the period of ten years,—this fact being recorded in the descriptive account of that compartment. But, in addition to this, the order in which the annual cuttings should be made in the Naini Tal Forests will have to be regulated by considerations of a more practical character, connected with the extraction of the wood and the convenience of working.

*Results of the valuation survey how recorded.*

13. The results of the valuation survey and examination of the Naini Tal Forests will consist of—

- First*,—A descriptive account of compartments, which should be specially full with regard to the state of the young growth and the effect of grazing on its development.
- Second*,—A brief account of the trial cuttings made and other observations taken, on which the estimate of the annual yield of the compartments to be worked has been based, and a statement of the result.
- Third*,—A summary statement of the recorded rights relating to the Naini Tal Forests, with a statement of the number of cattle grazing in the forest, and an estimate of the quantity of wood that will be taken from the forest in the shape of timber, fuel, and charcoal by the right-holders.
- Fourth*,—A summary account of the material of all kinds actually yielded by the forest and removed from it during the past three years, with explanations regarding any important fluctuations in their quantities, and with an estimate of the annual requirements which the forests will be called upon to meet during the next three years.
- Fifth*,—An abstract return giving a summary of the results of the valuation survey, with the estimated annual yield of each compartment in which cuttings may be made. In this abstract the compartments may be conveniently grouped in a manner similar to the statements in paragraph 2 of this memorandum; that is to say, the compartments in which cuttings are admissible will be divided into—(i) those in which chir and (ii) those in which oaks predominate.

*Conclusion.*

14. The above suggestions must not be regarded as intended in any way to fetter the discretion of the officer charged with the work. In the course of the examination of the forest and the trial cuttings proposed to be made, many ideas will suggest themselves to the officer, which he should develop and utilise in order to arrive at satisfactory conclusions regarding the questions at issue. But I cannot sufficiently urge the necessity of the greatest caution in framing the estimate of the annual yield, which should in all cases be well within the possible yield of the forest.

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## IX.

MEMORANDUM ON THE VALUATION SURVEY OF THE RANIKHET FORESTS, BY D. BRANDIS, INSPECTOR GENERAL OF FORESTS,—DATED (DEHRA DUN) THE 18TH APRIL 1881.

*Present Requirements.*

THE present requirements of the station of Ranikhet are stated to amount to 95,000 maunds (of 82 lbs.) of fuel per annum to be delivered to the Commissariat. The timber requirements are insignificant, and their quantity cannot be estimated at present.

The fuel and charcoal consumed by the residents and the bazar are supplied from the forests within cantonment limits, which are estimated to cover an area of about 2,000 acres.

Those forests within cantonment limits have been protected for the last seven or eight years; they are in good condition, and it is believed that they will suffice to meet the future requirements of the station. The present remarks, therefore, relate only to the provision of 95,000 maunds of fuel a year for the Commissariat. Under existing arrangements, this fuel is delivered by the Forest Department at two depôts within Cantonments, Ránikhet and Chaubattia, and is taken over by weighment. The Commissariat accept green wood of all kinds procurable in the vicinity of Ránikhet.

*Forest available.*

2. The forests under the Forest Department in the vicinity of Ránikhet, which must furnish this supply, are the following:—

I. The Ránikhet reserved forest, situated east of Cantonments and measuring 4,854 acres, of which it is believed that 4,500 acres may be classed as productive area.

I. The protected forests in the vicinity of Ránikhet, of which the following is an abstract:—

	Acres.
(a.) Airideo ... ..	16,640
(b.) Seahidevi ... ..	1,920
(c.) Padoli, Dwarsaon, and Chaubattia ...	3,840
(d.) Karchuli and Chilianao ... ..	843
(e.) Ganiadeoli, Kathalekh, Siun, and Seoni ...	8,320
(f.) Bellek ... ..	640
(g.) Batronj and Machor ... ..	5,971
Total ... ..	38,174

The Ránikhet Reserve is the only block which at present is protected against fire, grazing, and cutting.

*The protected forests open to pasture and cutting of wood by the adjoining villages.*

3. The whole of the protected forest, with the exception of two small closed blocks aggregating 640 acres, are open to pasture by the adjoining villages, particularly from April to November, and to the cutting of wood for the requirements of these villages, but not for trade; and they are burnt every year during the hot weather, generally after the 15th of May.

The number of cattle which each village is entitled to graze is being determined and recorded. As regards the wood taken from the forests by the adjoining villages in the exercise of their rights, no fixed quantity has been determined. Any person entitled to the same who requires timber for buildings and agricultural purposes makes an application to the Forest Officer, and the quantity applied for is granted in full, provided his requirements are reasonable.

The trees granted are all marked by the Forester in charge, and none but the trees marked may be cut. The number of trees cut by rightholders in 1879-80 was 6,066, aggregating about 68,000 cubic feet. About 700 trees were oak, and the remainder pine. The quantity granted in 1879-80 may be regarded as a fair annual average. The majority of trees granted for these purposes are poles from 18 to 30 inches in girth.

*Valuation survey of the reserve made by Mr. Brereton.*

4. With the view of determining whether the Ránikhet Reserve is capable of furnishing the whole fuel supply required by the Commissariat, Mr. Brereton, the officer in charge of the division, has made an elaborate valuation survey of the growing stock in this forest, which survey is based upon a complete enumeration of the trees of different girth classes and the determination of the cubical contents of sample trees for each class.

*Cubical contents of trees.*

5. In this manner the cubical contents of 116 trees have been determined, of which it will suffice to state the results as regards chr (Pinus longifolia).

Girth class in feet.	Number of trees.	AVERAGE CONTENTS IN CUBIC FEET.		
		Of logs.	Of branches.	Total.
Above 8' in girth ... ..	10	233	14	247
6' to 8' do ... ..	21	121	7	128
4' to 6' do ... ..	26	50	4	54
2' to 4' do. ... ..	27	17	1	18

It is to be regretted that Mr. Brereton has not adhered to the usual classification of 18 inches, 36 inches, 54 inches, and 72 inches in girth.

The cubical contents of the branch wood were determined by measuring all branches down to 8 inches in girth. The contents of the trunks or logs were calculated by multiplying the total length with the mean girth, which was obtained by taking the mean of the girth taken in three places—at the butt, at the top, and at the middle of the length. The figures given as the contents of the trunks are doubtless too high, and it will be readily understood that in order to obtain reliable approximate data, the trunk ought to have been measured in sections of not more than 10 feet in length. The cubical contents of the old trees above 6 feet in girth have been estimated as follows :—

Banj ( <i>Quercus incana</i> )	...	...	116	cubic feet.
Rhododendron and other trees	...	...	61	ditto.

*General results.*

6. The result of this survey may be abstracted as follows :—

				Acres.
Area stocked	...	...	...	4,281
Area planted up	...	...	...	172
Area blank	...	...	...	391
			Total	4,844

This area has been divided into four blocks, which are geographical divisions, and which comprise 58 compartments as follows :—

I.—Deolikhel block	832	acres	15	compartments.
II.—Dalmoti do.	2,107	"	19	"
III.—Jainoli do.	908	"	9	"
IV.—Jakhdeo do.	997	"	15	"
Total	4,844	acres.	58	compartments.

The following is an abstract statement of growing stock :—

Species.	Number of trees 6 feet in girth and upwards.	Number of trees from 2 feet to 6 feet in girth.
Chír	2,355	27,255
Oak	1,274	17,675
Other species	175	28,124
Total	3,804	73,054

The principal tree is chír, both pure and mixed with oak and rhododendron. The oak is almost entirely banj (*Quercus incana*), with a little phanat (*Quercus annulata*) near the ravines. Of the other trees, (*Rhododendron arboreum*) and ayár (*Andromeda ovalifolia*) are the chief, with a few utis (*Alnus nepalensis*) in ravines.

The total contents of the trees 6 feet in girth and upwards are given as follow :—

Chír	...	...	...	...	Cubic feet.
Chír	...	...	...	...	376,800
Oak	...	...	...	...	140,140
Other trees	...	...	...	...	10,300
			Total	...	527,240

*Cubic contents of trees 5 feet in girth and upwards.*

7. The examination of the rate of growth at different ages has led Mr. Brereton to the conclusion that it will be advantageous to cut the trees when they have attained a girth of 5 feet, and accordingly the total cubical contents of the trees above 5 feet in girth have been estimated, the result being as follows :—

Chír	...	...	...	...	Cubic feet.
Chír	...	...	...	...	950,326
Oak	...	...	...	...	146,432
Other trees	...	...	...	...	41,975
			Total	...	1,138,733

The very much larger aggregate cubical contents of the chír trees in girth above 5 feet is explained by the circumstance that the number of chír trees in girth between 5 and 6 feet is exceedingly large.

*Reduction of cubic feet to maunds.*

8. In order to reduce the cubical contents of solid wood into maunds, Mr. Brereton has made a series of experiments by which the weight of pieces of green wood was ascertained, the cubical contents of which were calculated by the square of the quarter-girth. The results obtained by him are as follows:—

<i>Weight of one cubic foot of green wood, in lbs.</i>						
Chír	...	...	...	...	...	39·4
Oak	...	...	...	...	...	57·5
Rhododendron	...	...	...	...	...	41·7
Ayár	...	...	...	...	...	40·2

These results agree fairly with what is otherwise known regarding the weight of these woods.

Before attempting to estimate the weight of fuel contained in the total quantity of wood in trees 5 feet in girth and upwards (1,138,733 cubic feet), two facts should be considered,—*first*, that the determination of the cubical contents of the different classes has given results which are probably somewhat too high; and *second*, that the cubical contents were calculated by the square of the quarter-girth, which gives less than the solid cubical contents of wood in the proportion of 3·14 to 4. We shall probably not be far wrong on the present occasion if we allow these two sources of error to compensate each other.

*Weight of wood to be yielded by the trees in girth 5 feet and upwards.*

9. Thus we will accept the cubical contents quoted above as representing the actual cubical contents of the trees in girth 5 feet and upwards contained in the reserved blocks. On this assumption, the material available in maunds will be as follows:—

			Cubic feet.	Weight per cubic foot in lbs.	Total maunds (82 lbs.).	
Chír	...	...	950,326	...	39	451,984
Oak	...	...	146,432	...	57	101,788
Other trees	...	...	41,975	...	40	20,475
			<hr/>			<hr/>
Total	...	...	1,138,733	...	...	574,247
			<hr/>			<hr/>

The annual demand during the last five years has, as already stated, been 95,000 maunds; hence it is evident that the present growing stock in the reserve, of trees above 5 feet in girth, can supply the needful quantity for a period of, say, six years.

*Proposals for cuttings.*

10. Mr Brereton proposes that the entire annual supply shall for the present be furnished from the reserve, and that when the existing stock in that forest is exhausted the protected forest should be drawn upon until the younger growth in the reserve has attained maturity. This assumes that the young growth throughout the reserved block is so complete and so far advanced that the cutting out of the whole of the larger trees within the next six years is admissible and desirable. From Mr. Brereton's description of the compartments I am inclined to doubt whether this is the case, and I feel sure that it will be safer to cut out the larger trees from the reserve more guardedly. The young growth of chír in many compartments is said to be fair, while in some it is said to be good; and chír certainly requires abundance of light while young. But even in the case of this tree it will probably be found that the removal of the large trees had better be done gradually. The young growth of oak and other trees is said to be, with few exceptions, scanty; and if it is intended to encourage the reproduction of these kinds, the shade of older trees is necessary.

Mr. Brereton does not indeed propose to cut down at present the whole of the trees five feet in girth and upwards, but to leave a portion standing for seed and in ravines; and he proposes to make up the deficiency in the annual yield from thinnings and by utilising windfalls and trees under five feet in girth which may be decaying. Nevertheless, the plan proposed by him contemplates the removal of the larger trees in a shorter time than I am inclined to think is justified by a due regard for the development of the young growth.

*The growing stock in the reserve must be made as complete as possible.*

11. There can be no doubt that when completely stocked with a perfect gradation of ages, 4,500 acres of productive forest on gentle slopes and upon the whole on good soil, at an elevation of 5,000 to 7,000 feet, should be capable of yielding 95,000 maunds, or (roughly speaking) 190,000 cubic feet, which amounts to 42 cubic feet

per acre per annum. But in order to ensure the whole area getting stocked completely, its treatment should be so arranged as to favour the development of the young growth as much as possible, and the annual cuttings in each compartment should be made with the special object of promoting the development of the young growth.

The rules and principles which should regulate these cuttings, so as to effect the object in view, must be based upon a further examination of each compartment in detail; and until that examination has been completed, it will be safest to fell sparingly.

*Cuttings must be made in protected forests.*

12. Under these circumstances, it is clear that until the reserved forests near Ránikhet have been brought to such a state as to furnish the whole supply permanently, it will be necessary chiefly to draw it from the protected forests.

*Seoni Forest.*

13. The most important of these forests for this purpose is that called Seoni. It is traversed by the cart-road, which enters it at a distance of 11 miles from the Ránikhet depôt and 15 miles from Chaubattia.

At present the whole fuel delivered at Ránikhet is carried upon men's backs, and with this mode of carriage a distance from the depôt of more than six miles is considered prohibitory at the present rate of sale, which is Rs. 34 for 100 maunds of 82 lbs. delivered at the Commissariat godown. Cart hire is as yet very expensive at Ránikhet, but it is probable that if matters are organised efficiently, with the aid at the outset of Government carts, it will be possible to deliver the fuel from the Seoni Forest at a rate not much higher than that paid for the wood from the reserve. It would not, however, be expedient to supply from this forest the Chaubattia depôt, which is four miles further than the Ránikhet depôt. Two-thirds of the total supply at present goes to the Ránikhet depôt and one-third to Chaubattia.

*Growing stock of Seoni Forest.*

14. The area of the Seoni Forest is 4,450 acres, and of this area a complete examination has been made on 3,200 acres, which has given the following results:—

Species.	Number of trees 6 feet in girth and upwards.	Number of trees from 2 feet to 6 feet in girth.
Chir ... ..	3,404	70,716
Oak ... ..	4,316	19,321
Other species ... ..	1,047	22,432
Total ... ..	8,767	112,469

These figures show that this forest is much better stocked with trees of all classes than the Ránikhet Reserve. The reproduction of chir and oak, however, is very poor at present on account of the heavy grazing and annual fires.

The quantity of wood given from the Seoni Forest to the adjoining villages is insignificant, it having amounted in 1879-80 only to 523 trees of chir and 396 trees of oak, all poles and small trees, aggregating only 8,448 cubic feet. A small quantity of timber has been felled annually during the last two years for the station, as well as for the Seoni Brewery, and all further requirements of building timber for Ránikhet must, it is expected, be supplied from this forest.

*If large cuttings are made, cattle and fire must be excluded.*

15. As regards soil and elevation, this forest is similar to the Ránikhet Reserve, and the species are the same. If it should be decided to make extensive fellings in the Seoni Forest, in order to provide Ránikhet with timber and fuel, its condition will deteriorate rapidly unless the compartments cut are closed against grazing and fire. Hence it is for consideration whether a portion of this forest may not be closed against grazing and fire, on the understanding that the villages entitled to pasture shall be at liberty to cut the grass in the closed portion. The experience of the small closed blocks in the adjoining forests and in the Ránikhet Reserve shows that the growth of grass under protection from fire is exceedingly heavy, and as far as the quantity of fodder available for their cattle is concerned, the villages in question would gain by the arrangement.

It is of course most desirable in all cases to make forest conservancy as little inconvenient as possible to the people concerned, so as to secure their co-operation in the work of protection,

instead of making them enemies. Under the arrangements proposed, the people will at least gain as much as they lose-

*The grass in the closed compartments might be cut and used for winter fodder.*

16. The increased supply of cattle fodder in the protected blocks in the Ajmere and Merwara Hills is now appreciated as a great advantage by the people in their vicinity. It is of course out of the question to close the entire area, and to expect all the villages in the vicinity to cut the whole grass which they require for their cattle; but by way of experiment it may perhaps be advisable to close those compartments in which cuttings have been made.

*Or the forests might be regarded as the village grazing grounds.*

17. I am not acquainted with the arrangements made by the villages near Ránikhet for providing their winter supply of cattle fodder, but it may not be out of place here to mention that in the Simla Hills each village has one or several grass preserves (ghain or ghasni). These preserves occupy extensive slopes on the hills; no cattle are permitted to graze in them until after the grass has been cut in autumn, and then the crop of grass is cut and stored for winter fodder. Perhaps it may be possible to induce the people in the Ránikhet Hills to utilize the grass in the closed blocks for winter fodder in a similar manner. If it should not be considered advisable to accept this suggestion, then the only alternative would be to treat these forests as grazing grounds, and to cut whatever wood or timber may be wanted for the station without regard for reproduction. The small requirements of the villages in the matter of wood or timber could always be provided for by reserving certain blocks, in which no cuttings for the station would be made. The consequence of accepting this alternative, however, would be that the forest would deteriorate and could not be depended on for providing the station with building wood in future. In that case the building wood for Ránikhet would have to be brought up from the sál forest of the Kosi valley. The villagers having vested rights in these forests, the supply of their requirements to the extent of these rights must be considered in the first instance; and rather than interfere with the exercise of these rights, it may be necessary to bring up the timber and fuel for the station from the forests of the Kosi valley.

*Other protected forests.*

18. Besides the Seoni Forest, those mentioned in the following statement are sufficiently near to Ránikhet to be regarded as convenient sources for the supply of fuel, and it will now be expedient to review the resources of all forests which are available for this purpose. In this statement the number and cubic contents of trees above 6 feet in girth have been estimated in the following manner:—

The total area of Seoni (4,480 acres) has been assumed to contain the same quantity of timber per acre of the different classes as the 3,200 acres of which a complete enumeration has been made. The other forests in the vicinity of Ránikhet (8,523 acres), being poorly stocked, have been assessed at half rates. The cubic contents of the trees above 6 feet in girth have been taken at the rates determined by Mr. Brereton for the Ránikhet Reserve.

*Cubical contents of trees above 6 feet in girth.*

Name of forest or block.	Area.	NUMBER OF TREES.		Average contents per tree in cubic feet.	Total contents.	Total contents of all species per forest or block.
		Species.	Number.			
	Acres.					
Seoni ... ..	4,480	{ Chír ... Banj ... Other species ...	4,766 6,042 1,465	160 100 50	762,560 604,200 73,250	1,440,010
Padoh, Dwarsaon, and Chhattia ... ..	3,840	{ Chír ... Banj ... Other species ...	4,534	160	725,440	
Karchuli and Chihanao ... ..	843		8,523	5,749	100	574,900
Ganiadeoli, Kathalekh, Siun ... ..	3,840		1,395	50	69,750	
Total ... ..	13,003		23,951			2,810,100

*Material available in the reserve and in the protected forests.*

19. From these figures the weight in maunds of the timber now standing on the ground, contained in the trees 5 feet in girth and upwards, has been calculated according to the proportions ascertained by Mr. Brereton in making the valuation survey of the Ránikhet

Reserve. The following figures include also the timber estimated to stand in the Ránikhet Reserve :—

*Growing stock of trees in girth 5 feet and upwards in maunds of 82 lbs.*

Name of forest.	Chír.	Oak.	Other species.	Grand total of all kinds.
Seoni ... ..	914,309	424,510	145,768	1,484,587
Other protected forests ... ..	870,528	404,925	138,803	1,414,256
Ránikhet Reserve ... ..	451,984	101,788	20,475	574,247
Total ... ..	2,236,821	931,223	305,046	3,473,090

*The present mature growing stock will furnish the requisite outturn for 36 years.*

20. The matter then stands thus—that the stock of timber in girth 5 feet and upwards in the forests mentioned may safely be estimated to contain 3,500,000 maunds of wood, which is sufficient to furnish 95,000 maunds a year during a period of 36 years. Thinnings, and the younger trees now on the ground, which during this period will attain a girth of 5 feet, will furnish the annual yield for a further period, the length of which however cannot now be estimated.

It is also out of the question at present to attempt any estimate of the number of years which will be required to bring the 4,500 acres of productive area in the Ránikhet Reserve into such a condition that the growing stock will be complete, and that the area will be equal by itself to furnish the wood required by the Commissariat. But it seems not unreasonable to expect that, at the expiration of 36 years, considerable progress will have been made in attaining this end. With strict protection combined with cautious and judicious cuttings, and sowing or planting where needed, there is no ground to doubt that within a few years the entire area of the reserve will be stocked with young growth of chír and oak; and this end once attained, the only question will then be, whether these trees grow with sufficient rapidity to form a complete forest before all the mature timber has been cut.

*Regarding the rate of growth of the oaks and other kinds of trees, nothing whatever is known at present.*

21. Regarding the rate of growth of chír, Mr. Brereton has examined the number of rings for each inch of radius from the centre to the circumference at the butt end of 12 trees. Three of these trees show a very irregular and erratic rate of growth. Excluding these and grouping the number of rings counted on sections of radius of three inches, the following results are obtained. In these figures the thickness of the bark has been assumed at half-an-inch throughout :—

Girth.	Age.
18 inches ... ..	33 years.
36 do. ... ..	68 do.
54 do. ... ..	114 do.
72 do. ... ..	164 do.

The details are shown in the statement below :—

*Examination of annual rings, chír, Ránikhet Reserve.*

Serial number of tree.	RINGS COUNTED ON SECTIONS FROM CENTRE TO CIRCUMFERENCE.			
	0-3 inches.	3-6 inches.	6-9 inches.	9-12 inches.
2	50	35	31	52
3	56	38	48	..
4	25	18	20	26
5	35	28	33	48
6	56	57	83	79
8	19	23	29	33
9	30	23	..	..
11	35	55	57	..
12	57	57	83	79
Total ... ..	363	334	384	317
AVERAGE ... ..	40 33	37 11	48 00	52 83

These figures indicate a much slower rate of growth than might be expected under the circumstances; but it must be remembered that the trees examined have grown up under the



influence of the annual fires, and that under protection from fire the soil will improve, and a much more rapid rate of growth may be expected.

*General considerations.*

22. The data now before us do not justify any but a very general view of the question ; but so much seems evident that, if cuttings can be extended to the whole of the forests mentioned above, and if cuttings in the reserve are made solely with regard to the development of the young growth in it, there is sufficient material within a reasonable distance of the station to provide for its requirements until the Ránikhet Reserve alone shall be capable of furnishing the whole supply. Undoubtedly it is preferable to organise the management of those protected forests in which cuttings are proposed to be made, so as to secure to them a complete growth of young timber. As already explained, such a system will be compatible with the interests of the villages having rights in these forests, and will at the same time provide a larger annual supply of timber and fuel than can ever be expected from the Ránikhet Reserve of 4,500 acres productive area. And this is of course a matter of very great importance in case it should hereafter be decided to increase the station of Ránikhet.

*Proposed arrangement of cuttings.*

23. Taking all these circumstances into consideration, it seems to me expedient that during the next two years (1881-82 and 1882-83), that is, to the 1st April 1883, the fuel required to supply the Commissariat should be cut in somewhat like the following proportions in each of the forests named :—

Name of forest.	Average distance from depôt in miles.	Quantity in maunds.
Reserved forest	3½	24,000
Seoni	13	50,000
Chaubattia	4	15,000
Padoli	3	6,000
Total		95,000

The wood from the Seoni Forest will have to be carted up to Ránikhet; that from the other forests will, as at present, be carried upon men's backs. This arrangement of cuttings seems at present the safest that can be desired. Mr. Brereton thinks that the supply contemplated to be drawn from the Ránikhet Reserve during the next two years, in accordance with these suggestions, may be provided by cutting out chir trees standing in the midst of good young growth, and hollow and decaying oak trees where they are not required to shed seed. Further, that these cuttings during the two years in question should commence in the Chaubattia block; and that if this block should be found not to yield a sufficient quantity, the cuttings should be extended to the Janauli block.

*Data to be collected for a regular working-plan.*

24. In order to prepare a regular working-plan for the period following the two years for which provision has been made, it will now be necessary to study the following questions :—

*First.*—As regards the protected forests, what portions may be closed against pasture, provided the villagers are permitted to cut grass.

*Second.*—In the reserved forest, how should the cuttings and management be arranged in order to secure the ground being completely stocked with young growth in as short a time as possible, and to form to some extent a regular gradation of ages.

With regard to the last point, it should be borne in mind that it may be necessary always to continue a system of well regulated selection fellings, and that it may not be advisable ever to adopt a system of successive fellings by compartments in this forest. What I mean is, that it may perhaps not be found necessary at all to establish a regular gradation of compartments, stocked with forest of different ages, in the Ránikhet Reserve. The consideration of this and other sylvicultural questions will doubtless suggest itself to the attention of the officer who may be deputed to make this enquiry in company with the officer in charge of the Division.

# X.

## MEASUREMENT OF RINGS, JAUNSAH, MAY 1881.

### Mohna Block.

#### SOUTH KATBAU COMPARTMENT.

##### *Spruce Fir.*

Aspect—N. E.  
Slope—gentle.  
Soil—deep.

Bark— $\frac{1}{2}$  inch.

Altitude—8,500 feet.  
Diameter—28 inches.  
Age—61 years.

##### *Spruce Fir.*

Aspect—N. E.  
Slope—gentle.  
Soil—deep.

Altitude—8,300 feet.  
Diameter—32 inches.  
Age—114 years.

##### *Blue Pine.*

Slope—moderate.  
Aspect—N. E.  
Soil—good.

Altitude—8,400 feet.  
Diameter—15 inches.  
Age—40 years.

#### EAST SNOW VIEW.

##### *Spruce Fir.*

Aspect—N.  
Slope—gentle.  
Soil—fairly deep.

Altitude—9,000 feet.  
Diameter—36 inches.  
Age—147 years.

##### *Silver Fir.*

Same conditions.  
Soil—somewhat rocky.  
Altitude—8,800 feet.

Bark— $\frac{3}{4}$  inches.  
Diameter—36 inches.  
Age—127 years.

### Hajawa Block.

#### COMPARTMENT 3.

##### *Spruce Fir.*

Aspect—N. W.  
Slope—gentle.  
Soil—deep.

Age—167 years.

Altitude—9,000 feet.  
Bark— $\frac{1}{2}$  inch.  
Diameter—33 inches.

#### COMPARTMENT 1.

##### *Spruce Fir.*

Aspect—N. E.  
Slope—rather steep.  
Soil—deep.

Altitude—8,500 feet.  
Diameter—22 inches.  
Age—131 years.

#### COMPARTMENT 2.

##### *Silver Fir.*

Aspect—N. E.  
Slope—gentle.  
Soil—deep.

Altitude—8,500 feet.  
Diameter—40 inches.  
Age—178 years.

## Maura Block.

## Deodar.

Aspect—W.  
Slope—44°.  
Soil—fair.

Altitude—8,000  
Diameter—13 inches.  
Age—56 years.

## XI.

NOTES ON AN INSPECTION OF THE MANDHOL FOREST MADE IN MAY 1881, BY E. McA. MOIR,  
DEPUTY CONSERVATOR OF FORESTS.

THE Mandhol first class Forest, situated in the Deogár Range of Jaunsár Bawár, consists of the following blocks—Pushrár, Lambidhár, Chumba, Morutách, and Burách; and comprises an area of 3,662 acres. The first of these blocks, which occupies the western slope of the Lambidhár ridge, possesses a much drier soil than is found in any part of the rest of the forest, with the exception of the lower portion of the Burách block, where similar soil is found.

The central portion, comprising Lambidhár, Chumba, and Morutách, consists of a well-defined basin drained by the Chándi Gádh; in the greater part of this area, as well as in the upper portion of Burách, the soil is extremely moist. The rock is principally clay-slate, gneiss, and shale. The elevation varies from 7,600 to 9,400 feet.

The forest vegetation in the large central basin and in the upper part of Burách consists principally of rai (*Abies Smithiana*), morinda (*Abies Webbiana*), deodar, and chil (*Pinus excelsa*) in about equal proportions, but, previous to the felling operations, deodar probably here formed a third part of the crop. The upper part of the Pushrár block is a pure deodar forest, while the lower parts of this block and of Burách are an open forest of deodar, bán (*Quercus incana*), ayár (*Andromeda ovalifolia*), and rhododendron. During 1868, 1869, and 1870 heavy fellings took place over the whole of the forest, except in the more inaccessible parts, and in the lower portions of Pushrár and Burách, where the trees were as a rule small and scattered. A considerable portion of the forest was examined by Mr. McA. Moir on the 21st, 22nd, and 23rd May 1881, when the following observations were made.

As already explained, the soil in the larger portion of the forest is very moist, and before fellings commenced there must have been a considerable growth of *Indigofera* and other shrubs on the ground. On the other hand, the soil in Pushrár and in the lower part of the Burách block being much drier, the conditions there were not so favourable for the springing up of a dense undergrowth.

As a rule, the fellings of 1868, 1869, and 1870, especially in the Morutách and Lambidhár blocks, seem to have been too heavy, there being few seed-bearing trees left, and it is not now known whether at the time the fellings were made the soil was in a fit condition to receive the seed. The result of this severe felling, added to the extreme dampness of the soil, has been that a dense growth of *Indigofera*, *Desmodium*, poplars, ayár, brambles, balsams, ferns, and grass has sprung up which has not only prevented the germination of deodar seed, but, as a rule, has effectually hindered the growth of spruce and other kinds. In some places, however, there is a fine show of young trees, consisting of deodar, spruce, and silver fir, probably about 12 or 15 years old, which must, therefore, have existed before the cuttings were made. In places, such as on dry rocky ridges, where the old trees are branchy and therefore not suitable for felling, a considerable growth of deodar seedlings from 3 to 5 years old may be seen. In the higher portions of these blocks, where the soil is drier, and also in Pushrár, a very vigorous growth of deodar is to be seen that has evidently greatly benefited by the cutting out of the old trees, but few young seedlings are to be met with, except in strawberry beds and other dry places. In the lower portion of Pushrár and Burách no fellings were made, there being only a few small scattered deodar trees mixed with oaks and rhododendron. In this part of the forest also the grass is not very dense, and a fine growth of seedlings, principally of 1878, is to be seen, the greater number being along the paths.

In the upper portion of Pushrár a place was examined where a severe conflagration took place in 1869 or 1870, in which it is stated that the chips, logs, and standing trees, and the soil, remained burning for at least a fortnight. The result now is that the little soil that was left is now covered with a dense growth of poplars, willows, and brambles, and only a few deodar plants near the edges are observed. The absence of deodar seedlings may be due to the fact that all the seed-bearing trees were burnt in the general conflagration.

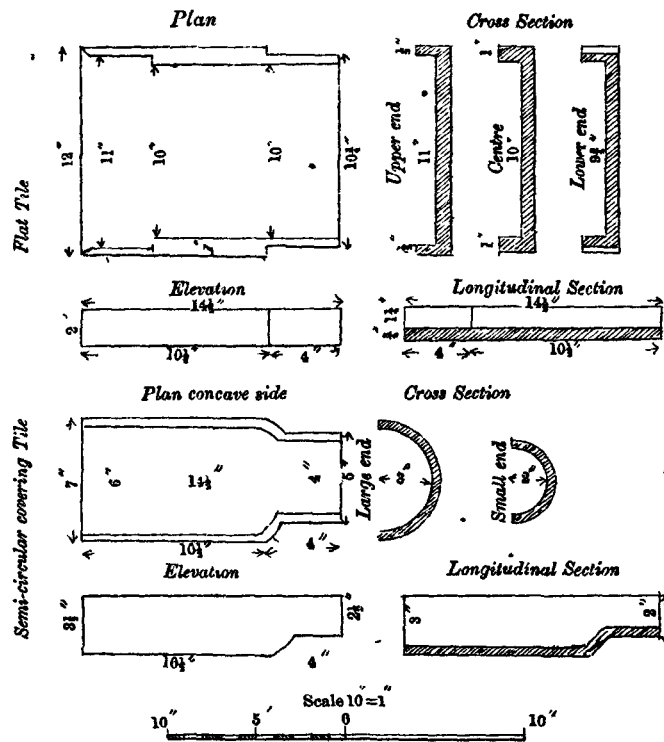
As regards cultural operations in this forest, the following work has apparently been done under the direction of Mr. Bagshawe.

In certain blank spaces in the Lambidhár and Pushrár blocks, about 3,000 pits were sown with deodar seed in November 1878, but the result has not been satisfactory, for in 300 pits examined in Lambidhár only 10 or 12 plants were found. In the Pushrár block, the area sown was subsequently rooted up by pigs.

The ringing of about 3,000 or 4,000 spruce and silver fir was also undertaken in 1879, only trees standing over young advance growth of deodar having been operated upon. The result has been most satisfactory, and reflects great credit on the officers by whom it was executed. The lopping of young spruce was also effected where mixed with deodar, but the young trees have again thrown out vigorous shoots, which are now nearly as high as the deodar plants.

Suitable sites for two nurseries have been selected, and the rearing of seedlings for future planting operations will be taken in hand as soon as possible.

Detail of Verandah Tiles.



Drawn by Mr T S Marten Forest Department from original drawings by Captain Wood Conservator of Forests Oudh Circle

Photoincographed at the Office of the Trigonometrical Branch, Survey of India, Dehra Dún, August 1881.

C. F. Guthrie, Photo.

C. G. Ollendach, Enco.

# Government of Madras



DEVELOPMENT DEPARTMENT

G.O. No. 1478, 4th November 1922

Administration Report—Forest Department—1921-22—Reviewed.

READ—the following:—

Proceedings of the Chief Conservator of Forests No. 39,  
dated 14th September 1922.

H. TIREMAN, Esq.,

Acting Chief Conservator of Forests.

I have the honour to submit the progress report of Forest Administration in the Madras Presidency for the year ending 31st March 1922.

2. The present report covers a period of 12 months from 1st April 1921, and as the report for 1920-21 related to a period of nine months only, comparison of the results of the past year's working with those of the period preceding it will be of little value.

In the following remarks, I propose to review briefly the more important results of the Administration.

## CONSTITUTION OF STATE FORESTS.

### ALTERATION IN AREA.

3. Eighty-four square miles of reserved lands were finally settled under the Forest Act and 47 square miles were disforested in order to provide for the extension of cultivation chiefly in Guntūr (10 square miles), Vellore North (5 square miles), Salem East (14 square miles) and Palghat (9 square miles). The net result was an increase of 37 square miles in the area of the reserved forest which at the end of the year amounted to 18,863 square miles. The area of reserved lands, owing to the operation of forest settlement, decreased from 501 to 441 square miles.

### FOREST SETTLEMENT.

4. Of the 84 square miles constituted as reserved forests during the year, 75 square miles were in the Lower Gōdāvāri division. Two hundred and fifty square miles in the Nugur taluk of the Bhadrachalam Agency were settled during the year, but reservation took effect only after the close of the year. Settlement operations in respect of 144 square miles, 75 of which are situated in the Nilgiri district, were in progress at the close of the year.

### DEMARCATIION.

5. About 162 miles of boundaries were demarcated during the year chiefly in Lower Gōdāvāri, Bellary, Guntūr and Madura at a cost of Rs. 7,224. Seven hundred and fifty-three miles remained to be demarcated at the close of the year principally in South Salem, Kollegal, North Coimbatore and Madura. This figure includes 242 miles in Madura omitted from the previous year's return. Want of funds prevented the resurvey of boundaries in the Nilgiris referred to in last year's report.

### FOREST SURVEYS.

6. The survey of India Party worked in West Cuddapah where an area of about 44 square miles was surveyed on the scale of 2" to the mile, in Madura where the reserves in the Palni and Sholavandan ranges were resurveyed, and on the verification of a portion of the Mysore-Malabar boundary.

## MANAGEMENT.

### WORKING PLANS.

7. Some progress was made in the preparation of simple working schemes for the extraction of fuel, small timber and bamboos. Regular working plans for the large timber forests must await the formation of an engineering branch of the department. The question of revising the figures relating to working plans referred to in last year's report appears to have been overlooked; the figures are still misleading.

### ROADS AND COMMUNICATIONS.

8. Two hundred and seventy-nine miles of new roads were constructed at a cost of Rs. 96 lakh and 1,267 miles were repaired at a cost of Rs. 1.06 lakhs. Government have ordered that the scheme of road development in the Javadi Hills should be limited to the completion of two roads only, viz., the Amerdi-Nadanur road and the Komattiyeri-Patradak road; the expenditure on these two works during the year under review was Rs. 10,029 and Rs. 5,104 respectively. The construction of the new Mount Stuart Ghat road at a cost of Rs. 2.02 lakhs was sanctioned but owing to delay on the part of the contractor the expenditure during the year amounted only to Rs. 21,437 against the allotment of Rs. 60,000. In connexion with the exploitation of the Chenat Nair forest the construction of the road leading to the Sappal station was completed at a cost of Rs. 17,494.

### BUILDINGS.

9. The most important works undertaken during the year were the saw-mill buildings at Russellkonda, the buildings (rest-house, subordinates' quarters and coolie lines) in the Chenat Nair forest and the circuit house at Nilambur. The first named was completed, Rs. 23,593 were spent on the partial construction of the buildings in Chenat Nair and the Nilambur circuit house was completed at a cost of Rs. 13,847, only to be burnt by the Mappillas almost immediately afterwards. Miscellaneous building works, such as inspection bungalows, range offices, rangers' quarters and subordinates' lines, were carried out in various parts of the Presidency. The total expenditure on buildings amounted to Rs. 2.52 lakhs against Rs. 1.87 lakhs during the previous nine months.

### OTHER WORKS.

10. A sum of Rs. 12,337 was spent on the construction and repairs of tanks and wells and on the improvement of water-supply in the forests. It is hoped that the problem of the Mount Stuart water-supply in South Coimbatore will shortly be solved as an excellent perennial spring has been discovered.

The question of improving grazing grounds is now engaging the attention of Government.

### LIVESTOCK.

#### ELEPHANTS.

11. The number of elephants in charge of the department at the beginning of the year was 125, including four baggage elephants working in Gōdāvari and Kurnool. Twenty-two elephants were captured, two were born in captivity, 11 died and one ran away at the outbreak of the Mappilla rebellion, the net result being a stud of 137 at the end of the year, with a book value of Rs. 3,96,900.

Capturing operations were conducted in South Coimbatore, Wynaad and the Nilgiris and resulted in 22 captures, viz, 11 in the Nilgiris, 6 in Wynaad and 5 in South Coimbatore. There was one accidental death due to capture. The number of captures would probably have been larger if it had been possible to carry on operations in Nilambur division, but this was out of the question owing to the Mappilla rebellion. The cost of the operations in the Nilgiris was Rs. 3,205 and in Wynaad Rs. 1,720. The cost incurred in South Coimbatore division has not been reported. Two captures in Nilambur and Wynaad were due to the ingenuity of the local rangers. In each case a wild tusker had been giving trouble to the tame elephants and coolies working in the neighbourhood. Two pits were dug and tame

females tied up close to them with the result that the wild tuskers fell into the pits. These two animals are probably worth Rs. 8,000 and were captured at a cost of something under Rs. 100.

CATTLE.

12. A stud of 281 bullocks and buffaloes was maintained during the year. Thirty-two died, 75 were butchered by the Mappillas during the rebellion, 13 were transferred to the account of the saw-mill at Russellkonda and 106 were added by purchase. The stock at the end of the year stood at 267 with a book value of Rs. 20,177.

FOREST CONSERVANCY.

GENERAL PROTECTION.

13. Organised defiance of the forest law brought about by the non-co-operation campaign rendered forest protection impossible for a time in the Guntūr district where 58 cases of assault on forest officials occurred. There was much lawlessness also in the Gōdāvāri, Kistna, Cuddapah, Nellore, Chittoor and North Vellore divisions, in the last of which three forest guards were murdered.

Unlicensed cattle seized in the forests were forcibly rescued, cairns marking the forest boundaries were destroyed and much damage was done to the forest growth. One curious development of the movement is reported from Salem (South) where the villagers were deluded into the belief that the receipts for collections made for the Congress gave them the right to graze in the reserves adjoining their villages. The Mappilla rebellion, though not directly connected with the Forest Department, resulted in very considerable loss. All the principal forest buildings in the Nilambur division were looted and burnt, records were destroyed and work was dislocated for six months, rendering it impossible to float any timber down to the coast or to carry out the annual fellings. It is impossible to assess with any accuracy the loss attributable to the activities of the non-co-operators and to the Mappilla rebellion. In Guntur a special magistrate was appointed temporarily for the prompt disposal of forest cases and an Assistant Conservator of Forests was posted to Palnad to work in conjunction with the punitive Police with a view to secure obedience to the forest laws. In the Cuddapah district punitive Police under the command of a forester are reported to have had an excellent effect.

BREACHES OF THE FOREST ACT.

14. The following table compares the forest offences of all kinds reported during the year with those of the previous nine months:—

	Injury to forests by fire.		Unauthorised felling.		Unauthorised grazing.		Other offences.		Total.		Average of three years ending 1920-21.
	1920-21	1921-22.	1920-21.	1921-22.	1920-21	1921-22	1920-21.	1921-22.	1920 21.	1921-22.	
Cases taken to Court.	26	25	4,288	5,356	1,873	1,776	333	383	6,520	7,540	6,665
Cases recommended for composition	29	37	10,343	13,610	4,950	5,134	74	810	16,116	19,591	17,755
Cases undetected	905	1,349	343	493	46	45	17	22	1,311	1,909	1,461
Total ..	960	1,411	14,974	19,459	6,869	6,955	1,144	1,215	23,947	29,040	25,881

Unauthorized felling as usual forms the largest head of forest crime throughout, the Fourth Circle contributing nearly 31 per cent of the total. Grazing offences were again comparatively numerous in the Third Circle which contributed 36 per cent of the total number. Nearly 71 per cent of the cases that remained undetected related to offences connected with injury to forest by fire.

Of the 27,503 cases disposed of during the year (including the pending cases of the previous year), 8,465 were dealt with by magistrates, 17,061 were compounded and 1,977 cases were withdrawn. Of the cases disposed of by magistrates, 7,394 ended in conviction and 1,071 in acquittal. The percentage of failure in the cases.



brought to trial was 12·6 per cent. It was highest in the Third Circle where out of 2,269 cases taken to Court, 24 per cent ended in acquittal: this large percentage of failure has not been explained. The total amount of compounding fees was Rs. 2,29,633. The average compounding fee paid in respect of 17,061 cases was Rs. 13-7-4 as against Rs. 12-13-0 in the previous year.

#### FIRE PROTECTION.

15. In 258 square miles of reserves in Upper Gōdāvāri and 1,197 in three Kurnool divisions, 10 in Kollegal and 20 in North Coimbatore, the system of early burning under departmental supervision was continued with satisfactory results. This system consists of setting fire to the grass as soon as it is dry enough to burn, the resulting fire being much less severe than if it occurred later in the season and doing very little damage; the cost of the work is appreciably less than that of the orthodox system of attempting to prevent fires. As regards the Sixth Circle, the Conservator states that it was decided to introduce this system in portions of the Nilgiris, Wynaad and South Mangalore divisions during 1922 and the work was commenced towards the end of 1921.

Protection from fire in Cuddapah is still unsatisfactory and the question of changing the present system and introducing early burning is now engaging the attention of the local officers.

The total area over which special protection was attempted during the year was 5,844 square miles; 407 square miles (7 per cent) being burnt. This result is fairly satisfactory.

#### SUPPLY.

##### TIMBER.

16. The output of timber during the year under review was 103,400 tons against 98,450 tons in the previous year. Twenty thousand eight hundred and twenty-five tons were extracted by departmental agency and 81,675 tons by purchasers.

About four thousand cubic feet of timber chiefly *Terminalia tomentosa* were sent to Messrs. Howard Brothers, London, but the prices obtained were considerably lower than we had been led to expect. The timber appears to vary very considerably in the qualities desired by the furniture trade and this is a matter which requires further investigation.

Seven hundred tons of miscellaneous timber, consisting chiefly of species unknown to the market, were extracted and sent to the Kolar Gold Field, the authorities there having agreed to test their suitability for mining purposes; it was found that only certain species were suitable. A fresh arrangement was made during the year under which certain species only are to be supplied at various prices.

##### FUEL.

17. Forty-nine thousand three hundred and sixteen tons of fuel were removed departmentally and 273,950 tons by purchasers. Prices of fuel in the large towns showed a tendency to increase due either to increased wages and transport charges or short supplies or to both. The prices were highest at Anantapur (Rs. 22-4-0 per ton), Tanjore (Rs. 22-8-0 per ton), Trichinopoly (Rs. 23 per ton) and Madura (Rs. 24-1-0 per ton).

##### BAMBOOS.

18. The total receipts for the year under review were Rs. 3·21 lakhs against Rs. 2·64 lakhs in the previous nine months.

##### SANDALWOOD.

19. In the auction sale held at Satyamangalam in December last, 218 tons of sandalwood were sold for Rs. 2,48,425, while in the sales held at Tirupattur and Vellore in November and December, 303 tons were sold for Rs. 3,56,913. The total average price secured was Rs. 1,160 against Rs. 1,599 per ton in the previous year. The sandalwood market is a very uncertain one.

## GRAZING.

20. About 21 per cent of the total area of forests in the Presidency was closed to grazing either wholly (16 per cent) or for part of the year (5 per cent) against 23 per cent in the previous year. The decrease in the closed areas occurred chiefly in the districts of Kurnool East, Kollegal and Wynaad. In Kurnool East all the reserved forests were thrown open to grazing on account of scarcity of fodder, and 57 square miles in Kollegal and Wynaad were thrown open to grazing as there appeared to be no good reason for closing them. In Guntūr all the reserves which were closed to grazing from March to July are now thrown open for grazing throughout the year and Government have ordered that the old restriction should not be reimposed until further orders.

To the open area of over 16,000 square miles permits were issued for the grazing of 1,703,124 animals against 2,018,083 animals, yielding an incidence of 6.01 acres per animal against 4.71 acres in the previous year. These figures do not include 76,865 animals which were allowed free grazing, and if these are also taken into account, the incidence works out to 5.75 acres per animal. The decrease in incidence is partly due to the policy which has been steadily pursued in recent years of enhancing grazing fees in order to restrict grazing to the more valuable cattle needed for agricultural purposes; it is also possibly due in part to the refusal to take out permits in the districts most affected by the non-co-operation movement. The incidence is still high in some forests where it is below one acre to the cow unit. Inaccessible areas or areas in which there is really no grazing and which are not therefore resorted to have not been taken into account in calculating the average possibility.

The revenue realized from grazing and fodder grass was Rs. 7,89,731 against Rs. 8,16,589. The kancha system of grazing was continued in Nellore and Chingleput. In Chingleput protection of kanchas was on the whole satisfactory; in Nellore a number of kanchas remained unsold owing to non co-operation.

## HAY.

21. The Military Farms department confined its operations during the year to Bellary, Anantapur, Kurnool South, Kurnool West and North Vellore and removed 2,834 tons of baled hay, paying seigniorage to the department at Rs. 2 per ton.

## NUX-VOMICA.

22. There was a serious fall in the price of this produce, and in most districts the lessees failed to pay their dues and their contracts were cancelled. In more than one case which came to my notice the lessees had under-estimated the difficulty of preventing unauthorized people from collecting and selling the produce.

## MOHWA FLOWERS.

23. After providing for distillation and domestic consumption by the Khonds, it is estimated that the quantity of this produce available for export will not exceed 2,000 tons which is insufficient for commercial purposes. We cannot therefore look for much revenue from this source.

## PAPER PULP.

24. The extension of the flowering of the bamboo mentioned in last year's report makes it useless to investigate this subject at present.

## REMOVAL OF FOREST PRODUCE BY RIGHT HOLDERS AND FREE GRANTEES.

25. The estimated value of forest produce removed by right holders or free-grantees amounted to Rs. 55,028 against Rs. 52,337 in the previous year.

## SYLVICULTURE.

## GENERAL.

26. The chief sylvicultural problems with which the department has to deal are those connected with the regeneration of the deciduous teak forests, the evergreen forest of the Western Ghats, and the Sal forests of Ganjam. It is now more or less universally recognized that the only efficient method of regenerating teak forests is

by clear-felling followed by sowing or planting, and considerable progress has been made in converting by this method the degraded forests at Mount Stuart in South Coimbatore where 26 acres were sown with teak in the year and 133 acres cleared for sowing during the current year. The method has also been introduced into the valuable teak forests of the Wynaad where some 85 acres were clear-felled. In the evergreen forest the goal to be aimed at is the removal of the entire crop in one year as, if exploitation is spread over more than one year, it is impossible for modern logging machinery to work economically. These forests contain, as a rule, a prolific crop of young seedlings and if advantage is to be taken of this fact, it is impossible to carry out orthodox clear fellings; that is to say, suddenly to remove the overhead cover, as experience has shown that the result of doing so is the death of the young crop. It is thought that the difficulty can be got over by girdling and so killing a proportion of the mature crop during the first year and thus stimulating the growth of the young crop by the admission of a moderate quantity of light, the remainder of the old crop being felled as soon as the young seedlings have become established, i.e., are strong enough to stand complete exposure to the light. It was intended to carry out the work on these lines in the Chenat Nair forest in varying degrees of intensity in order to ascertain what proportion of the crop can be girdled in the first year and how long it is necessary to keep the rest of the crop standing to provide shelter, but the District Forest Officer has had so much work to do in connexion with the construction of roads and buildings and general exploitation that he has not had sufficient time to devote to experimental work on these lines. On the whole the young seedlings have not suffered from exposure of light even where fellings have been more or less severe during the first year, and it is hoped that the whole operation can be completed in two years; the result of this would be that the whole crop could be felled at one operation. Sowing of *Hopea parviflora*, a valuable evergreen species has been carried out during the last two years in South Kanara on a considerable scale, some 2,300 acres having been sown; the result has been markedly successful. A certain amount of shade is necessary for raising a crop of this species, but the quantity of shade required is not great and it is possible that the best solution of the problem of regenerating the evergreen forest will be found in clear felling, leaving the land fallow for say two years, and then introducing *Hopea* under the shade of the re-growth which by that time should have sprung up sufficiently to provide cover.

The regeneration of the Sal forests in Ganjam is a comparatively simple matter and the question of the best means of regeneration to adopt may be said to have been solved by the adoption of clear felling; no sowing or planting in this case is necessary as a prolific crop of young Sal springs up after the old one has been removed.

In the Nilambur division, the Mappilla rebellion seriously interfered with the work of regenerating the areas which had been felled, as it was impossible to carry out any weeding or tending; the young crop however has not suffered as much as might have been anticipated. The worst portions were burnt and re-sown.

#### RESEARCH AND EXPERIMENTS.

27. Mr. J. M. Sweet, Assistant Conservator of Forests, took over charge of the post of Forest Research Officer from Mr. K. E. Venkataramana Ayyar at the end of February 1922. Experimental work was continued in the Sixth Circle: it consisted of nursery experiments to ascertain the period during which seeds (chiefly of the evergreen species) retain their power of germinating and treatment of seed. Further study was devoted in South Kanara to the behaviour of young *Hopea* crops after exposure to varying degrees of light. At and near Nilambur experimental under-planting of *Hopea parviflora* and *Artocarpus hirsuta* under the young teak crops was continued, but owing to the Mappilla rebellion it was impossible to tend the seedlings and in most cases they have disappeared. On a recent visit, however, I found that a fair number of *Hopea* seedlings have survived and were growing well, the best results being in a plantation where the teak was ten years old when the *Hopea* was sown. The second bulletin on research was issued early this year giving details of the work done in 1920-21.

### DEVELOPMENT.

28. The Russellkonda saw-mill was completed during the year and in the Chenat Nair forests two Holt five ton Caterpillar Tractors were purchased. The work of constructing roads and buildings in the lastnamed locality was practically completed during the year and it is hoped, that considerable progress will be made in exploitation during the current year ; but experience has shown that efficient exploitation is impossible without a specially trained staff. Government have sanctioned the appointment of a Chief Forest Engineer and since the close of the year under report proposals have been submitted for the formation of an Engineering branch of the department.

### FORE T PANCHAYATS.

29. With some notable exceptions chiefly in the Fifth Circle, the work of panchayats has been more or less unsatisfactory. Since the close of the year a new organization for the management of panchayats has been formed to work directly under the Chief Conservator.

### FINANCE.

30. The total gross revenue during the year amounted to Rs. 47.97 lakhs against Rs. 46.16 lakhs in the previous nine months. The expenditure under A. Conservancy and Works and B. Establishments amounted to Rs. 48.42 lakhs. The result is a deficit of Rs. 45 lakh as compared with a surplus of Rs. 11.94 lakhs during the previous year. The Fourth and Fifth Circles show a surplus of Rs. 4.88 lakhs and Rs. 3.92 lakhs, respectively : in the remaining circles, the expenditure exceeded the receipts. The deficit is due to the heavy expenditure incurred during the year on development and to increased salaries and travelling allowances. About Rs. 3.66 lakhs were spent on the Russellkonda saw-mill and about Rs. 1.33 lakhs on the purchase of tractors and tools, and the construction of roads and buildings in the Chenat Nair forest.

### ADMINISTRATION.

#### GENERAL.

31. With a view to keep the Government in touch with non-official opinion in regard to forest policy a Forest Advisory Committee was formed consisting of non-official members of the Legislative Council presided over by the Honourable Member in charge of the Forest portfolio.

In furtherance of the policy of enlisting public opinion in measures of local forest conservancy, a committee was appointed by Government to inquire into forest grievances in the Coimbatore district. The Government accepted their recommendations and effect is being given to them. Another conference of certain gentlemen of South Kanara including the permanent Chief Conservator and the local forest officers was held at Mangalore on 9th December 1921 to discuss forest grievances, and action has been or is being taken on the several matters discussed. In Guntur Mr. Cox held an inquiry into local forest grievances under the orders of Government with the assistance of two members of the Legislative Council of the district: Government have recently passed orders on the Chief Conservator's report to the effect that the scale of grazing fees should be reduced, that the forest reserves should be thrown open to grazing throughout the year instead of for seven months, and that the problem of accelerating the rate of progress in the disforestation of land which is more valuable for cultivation than for grazing should engage the close attention of the Special Forest Officer and the District Revenue authorities.

#### MADRAS FOREST SERVICE.

32. Government have passed orders on the memorials of the Madras Forest officers and have sanctioned a revised scale of pay, viz., Rupees 250—25—900 (with efficiency bar at Rs. 600) with effect from 1st January 1922. All Extra Assistant Conservators who were permanent on 23th February 1922 were given three advance increments.

## FOREST COLLEGE.

33. Mr. C. C. Wilson acted as the Principal of the college throughout the year. Of the 35 students who passed out of the college in June 1922, six were from Bombay, four from the Central Provinces, one from the Rewa State, one from Keonjhar, five from Ceylon two from Coorg, two from Hyderabad and fourteen from Madras (two private students and twelve Government stipendiary students). Five students were granted Honours certificates, fifteen obtained Higher Standard certificates and fifteen Lower Standard certificates. There were no failures.

The college sustained a great loss in the death on 29th March 1922 of M.R.Ry. M. R. Sundaram Ayyar, B.A., Extra Assistant Conservator, an efficient and popular Instructor.

## VERNACULAR TRAINING SCHOOLS.

34. Four schools were held and the Conservators testify to the good work done in training students. Five Oriya students from Bihar and Orissa were trained in the school at Russellkonda in the Ganjam district. The opening of two additional schools was deferred in the interests of economy.

(True extract)

H. TIREMAN,  
*Acting Chief Conservator of Forests.*

To the Secretary to Government, Development Department.

## Order—No. 1478 Development, dated 4th November 1922.

Recorded.

2. The report under review covers a period of twelve months ending 31st March 1922; the figures and statistics reported are consequently not easy of comparison with those in the preceding report, which only related to a period of nine months.

3. The prevailing political unrest was markedly displayed during the year under report in connexion with the forest administration and is to some extent responsible for the unsatisfactory financial results of the year's working. The campaign for non-co-operation was directed to organizing deliberate defiance of the forest laws in numerous districts, particularly the central and northern areas of the Presidency; and ignorant villagers were incited, not merely to refuse obedience to the laws, but to offer lawless and forcible resistance to the forest staff, which resulted in more than one forest district, in the murder of Government subordinates who attempted to do their duty. Extensive damage was done to the forests in these areas, cattle were driven in large numbers to graze without licence and when seized were forcibly rescued. An interesting light is thrown upon the methods adopted by those responsible for this agitation, in the fact, which is noted by the Chief Conservator, that in one district, where collections had been made for the support of these political movements, the villagers were led to suppose that the receipts granted to them covered also the right to graze in the reserves adjoining their villages. In the Sixth Circle the Mappilla rebellion has been responsible for extensive loss to Government in the Forest Department both direct and indirect. In the Nilambur division all the principal forest buildings were destroyed altogether with the records, while the work of extracting teak from Nilambur, which is usually a lucrative branch of the department's activities, was found impossible for half the year.

4. In reviewing the administration for 1920-21 allusion was made to the need for systematic exposition of the aims and objects of forest conservation and to the creation of a standing committee of the Legislative Council as an agency of special value for the purpose of dispelling misconceptions and of fostering the spirit of co-operation with the department. The Government have much satisfaction in recording that the efforts which have been made to secure these ends during the year under review, have been continued and promise to yield results of increasing value as time goes on. Not only have the Government been sensible of the benefits

of the discussion of forest matters with the advisory committee, but also, during the year under report, the Chief Conservator has had the opportunity of investigating, in association with Members of the Legislative Council, various forest grievances on the spot, both in the Coimbatore and in the Guntur districts. In the former district an extensive tour was carried out by the special committee, grievances were discussed with the villagers on the spot; the main conclusions of the committee have been accepted by the Government and steps have been taken to give effect to them. The tour of the committee appointed for the Guntur district had unfortunately to be curtailed owing to the unsettled condition of the district as a consequence of the agitation already referred to. But the Chief Conservator was able, as a result of his tour, to make certain important recommendations to Government with the object of meeting some of the grievances complained of. The Government have since issued orders on the Chief Conservator's recommendations and a special inquiry has been in progress, the results of which have still to be considered, with the object of devising satisfactory and lasting remedies.

5. The question of instituting a more forward policy in respect of the development and exploitation of the very valuable ever-green forests in the Presidency has received the careful attention of the Government during the period under review. The general result of the examination of the subject has been to convince the Government that, while the Presidency possesses in these forests a property whose present and potential value can scarcely be estimated too highly, it would be neither prudent nor economical to enter upon its development without obtaining the most skilled assistance available and without the employment of the most up to date methods of lumbering and forest engineering. The experience of the last year or two, when a small beginning has been made in exploitation by more up to date methods than had hitherto been attempted, has confirmed this conviction; and, while taking steps to secure the services of a thoroughly qualified and expert adviser in the person of Mr. C. S. Martin, at present Consulting Forest Engineer to the Government of India, it was decided, at the close of 1921-22, to suspend the inception of any large new exploitation schemes until the Forest Department should have been equipped with a proper staff of expert advisers. This decision was reached at the close of the year under report, after the fullest discussion with the Finance Committee of the Legislative Council, and in Council itself, and has been given effect to in the estimates for the current year. Of the two schemes of exploitation which were already on foot during the year under report, namely, the Chenat Nayar and Russellkonda Saw Mill schemes, the construction of the latter was only completed at the end of the year, while the Chenat Nayar scheme has still to develop beyond the initial and experimental stage. The question of placing the accounts of these undertakings upon a commercial basis, which had been taken up in the year 1920-21 has been examined by a commercial accountant, specially deputed for the purpose from the staff of the Auditor-General, and the Government hope that from the current year it will be possible to present the balance sheet, and profit and loss statements of these concerns in a form which will clearly indicate their financial success or otherwise.

6. The Government regret to notice from the Chief Conservator's report that during the year 1921-22 little progress was made in the work of forming panchayats of villagers for the management of reserves. The policy of the Government in this matter is to encourage the formation of such panchayats to the greatest extent possible with the object, not only of encouraging a spirit of self-help and co-operation among villagers, but also, of relieving the Forest Department of the ungrateful task of conserving extensive areas which, however valuable they may be to the villager for every day purposes, for grazing, for supplying leaf manure and other requirements of the agriculturist, are yet, from the strictly forest point of view, not of great value. It was decided at the close of the year under review, with the support of the Forest Committee and with the consent of the Legislative Council, to embark upon a more active policy in the matter of forming new village panchayats and of affording assistance and guidance to those already existing; and with this object the Government have since appointed a special staff entrusted with this duty. They believe that, given time and patience, most valuable results in this direction may be

achieved. Under this head the Government have read with interest the account which is given by the Conservator, Third Circle, of the successful experiment which has been made in the leasing of a fuel coupe to a co-operative society, which it is stated, has not only made profit itself, but has incidentally reduced the sale price of fuel in the town of Vellore. Government trust that further efforts will be made elsewhere to apply co-operative methods to forest undertakings, wherever the conditions are favourable.

7. The improvement of grazing lands is a matter which has several times come up for discussion in Council, but has not been specially noticed in the Chief Conservator's review. The reports of circles, however, show that attention has continued to be given to this subject although in varying degree.

8. In the Second Circle, the efforts which are being made to reform the criminal tribe of Chenchus, are deserving of notice particularly in respect of the progress which these people appear to be making in the matter of education, both for boys and girls. There are now 14 schools: and 8 Chenchu boys are drawing scholarships at the Board Middle School, Markapur. It is noted with satisfaction that there has been a decided improvement in respect of Chenchu crime.

9. Notwithstanding much misrepresentation, and in the face, as has been observed, of much deliberately organized and lawless opposition, the department continued to render loyal and valuable service during the year under review. The Government have much pleasure in once more recording their appreciation of those services and their indebtedness to the Chief Conservator Mr. S. Cox, C.I.E., for the devotion and ability which he has displayed in the conduct of the affairs of his department.

(By order of the Governor in Council)

H. G. STOKES,  
*Acting Secretary to Government.*

To the Chief Conservator of Forests.  
 " Accountant-General, Madras.  
 " Publicity Officer.  
 " Secretary to the Government of India, Department of Revenues and Agriculture (with C.I.).  
 " Inspector-General of Forests (with C.I.).  
 Editors' Table.

# ANNUAL ADMINISTRATION REPORT OF THE FOREST DEPARTMENT

FOR THE  
YEAR ENDING 31st MARCH 1922.

## FIRST CIRCLE.

### CHAPTER I.—CONSTITUTION OF STATE FORESTS.

#### 1. ALTERATION IN AREA.

*Reserved forests and reserved lands.*—The year opened with 2,182 and 337 square miles, respectively. Seventy-five square miles of reserved lands were transferred to reserved forests, and there was a small reduction in the area of reserved forests due to disafforestation and rectification of area. The balance on 31st March 1922 was 2,256 square miles of reserved forests and 262 square miles of reserved lands. *First Circle.*

#### 2. FOREST SETTLEMENT.

2. 75.192 square miles were notified under section 16 of the Forest Act and 259.161 remained under settlement.

#### 3. DEMARCATION.

3. Twenty-four miles were demarcated. Sixteen miles were specially repaired at a cost of Rs. 197, while 3,079 miles were repaired by subordinates free of cost. The total length of demarcated lines was 4,069 miles. The students of the vernacular training school helped in the building of cairns and verification of boundaries in  $5\frac{3}{4}$  of the nine miles permanently demarcated in *Ganjam*.

#### 4. FOREST SURVEYS.

4. Nil.

### CHAPTER II.—MANAGEMENT OF STATE FORESTS.

#### 1. REGULATION OF MANAGEMENT.

5. *Preparation and control of working plans.*—No new working plans were prepared or sanctioned. *Ganjam*—The prescriptions of Mr. Minchin's working plan for the sal forests of Ghumsur were carried out. Mr. Minchin's interim working plan for the forests of Berhampur range continued to be in force. *Vizagapatam*—Mr. Raju Nayakkar's working plan for the forests of Palakonda Range which was pending sanction of the Chief Conservator, was returned as being too lengthy. It will be re-written in a simpler and briefer form by the present District Forest Officer. *Godavari Lower*—A proposal was made for the preparation of a revised working scheme for the Coringa mangrove forests and was approved by the Chief Conservator. The work will be taken up during the current year. A simple working scheme for working the teak areas in Bedadavole reserve, Polavaram Range, was sanctioned by the Conservator. A tentative working scheme was also sanctioned for working a few pole forest coupes in Vatangi reserve, Peddapore Range, so as to provide sufficient data for the preparation of a regular scheme for the Peddapur Range. The prescriptions of the sanctioned working plans were generally adhered to, but for want of demand four fuel coupes in Gokavaram Range and three in Rajahmundry Range, and two fuel and two bamboo coupes in Peddapur Range, remained unsold.



## 2. COMMUNICATIONS, AND BUILDINGS.

First  
Circle.

6. *Roads and bridges*.—Rupees 7,929 were spent on new works and Rs. 12,176 on repairs. Much progress was not made under new works as most of the works proposed had to be stopped during the course of the year to reduce expenditure. The existing roads were kept in repair.

7. *Buildings*.—Rupees 73,645 were spent on new works and Rs. 15,185 on repairs. The sawmill buildings at Russellkonda were completed. The other important works that were carried out were :—*Vizagapatam*—Forest lines at Vedurupalli and Regupalem; *Upper Godavari*—Range quarters at Chintur and Forester's quarters at Tunikicheruvu; *Lower Godavari*.—Forester's quarters at Mulagalampalli; *Kistna*.—Forest lines at Gollalamoda and Range Office at Bezwada.

8. *Other works*.—A well at Balinkia in Ganjam.

## 3. PROTECTION OF FORESTS.

## (a) General protection.

9. The following statement compares the number and classification of forest offences reported during the year with those of the preceding year and the average of the three preceding years :—

Cases.	Injury to forests by fire.		Unauthorized felling.		Unauthorized grazing.		Other offences.		Total.		Average for three years ending with 1920-21.
	1920-21.	1921-22.	1920-21.	1921-22.	1920-21.	1921-22.	1920-21.	1921-22.	1920-21.	1921-22.	
Cases taken to court.	1	5	301	281	47	78	33	42	332	401	435
Cases compounded.	5	3	829	1,079	203	389	129	67	1,166	1,538	1,477
Cases undetected.	178	266	40	53	6	..	3	7	227	326	181
Total	184	274	1,170	1,413	256	467	165	116	1,775	2,265	2,093

*New cases of the year*.—Except under 'other offences' the figures show an increase compared with those of the previous year, the reason for the increase being that the previous year was one of nine months. The cases under 'injury by fire' and 'grazing' show an increase compared with the proportionate figures of last year. The reason in the former is ascribed to the exceptionally dry season which characterized this year.

*Cases—old and new—dealt with during the year*.—The percentage of cases convicted was slightly less than in the previous year. This was due partly to several cases having been withdrawn after they were taken to court as the accused paid compounding fees in the court. The punishments inflicted by the Magistrates are reported to have been adequate. Beyond the usual notice of warning published in the District Gazettes to the villagers against setting fire to the reserved forest, no other special steps were taken, such as suspension of privileges, closure of reserves to grazing, enhancement of grazing fees and so forth. In *Kistna*, a patrol party, consisting of one forester, two forest guards and two watchers, was appointed in Ellore range in October 1921 and worked till the first week of April 1922. During this period they detected eighteen cases, of which fourteen were compounded, two convicted and two are pending with Sub-Magistrates. The party was disbanded as the importance and number of cases detected did not justify its retention. A similar patrol party which is still working was formed on the same lines in Bezwada range. In *Vizagapatam* two patrol parties of six subordinates each were formed in Narasapatam and Palakonda Ranges. The system is reported not to have worked satisfactorily in Narasapatam Range. There was a good deal of trouble in Bezwada and Ellore Ranges on account of followers of the non-co-operation movement advocating that forest laws should be ignored. Two non-co-operators in Bezwada and one in Ellore Ranges were charged and convicted with imprisonment for periods varying from six to twelve months.

10. Rupees 65 were granted to subordinates and informers as rewards.

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### (b) Protection from fire.

11. Form 72 shows the area attempted to be protected and that actually protected. Of the total area of 2,256 square miles of reserved forests no fire protection was undertaken in about 15 per cent of the area. Of the area subject to fire protection 14 per cent was burnt. The fires were worst in *Ganjam*. *Forest Circle.*

In the unprotected area in *Ganjam* there were 48 fires extending over an area of 75 square miles. The fire season was unusually severe and in spite of fire protection works carried out before the fire season started the area burnt was excessive. *Godavari Upper*—The early burning system was introduced in four ranges of this division and 258 square miles of reserves were treated in this way. The results are reported to be satisfactory in Bhadrachellam range as there were no subsequent fires. In the other three ranges the results were not so satisfactory. The remaining area of 327 square miles of reserves was protected under the ordinary system of fire lines.

Taking the circle as a whole the area burnt was 175,731 against 129,138 acres of the previous year.

The average cost of special and general protection was Rs. 11-4-7 per square mile attempted and that of early burning in *Upper Godavari* was Rs. 9-14-11 per square mile. The number and origin of fires are compared in Appendix A.

### (c) Protection from cattle.

12. The area open to grazing was 2,064 against 1,996 of the previous year and formed 91.5 per cent of the forests. Goats were excluded from all reserves. The number of cattle impounded showed an increase compared with that of last year and the average of the three preceding years, but last year's figures were for nine months. Viewed proportionately the figures for the two years are more or less the same. In *Upper* and *Lower Godavari* there was an increase in the number of cattle impounded. In *Ganjam* the grazing incidence fell from 6.8 acres in 1920-21 to 7.44 acres in 1921-22. In *Lower Godavari* it fell from 2.63 to 2.98 acres, whereas in *Upper Godavari* it rose from 1.64 to 1.23 acres. In *Vizagapatam* the grazing fees were enhanced from 1st July 1921; some of the cattle in *Narasapatam Range* were in consequence sent to graze in *Mokhasa forests* and in the *Golconda Agency*.

### (d) Protection against injuries from natural causes.

13. Nothing of importance was done.

## CHAPTER III.—SYLVICULTURE.

### (a) Natural reproduction.

14. In *Ganjam* natural regeneration of sal was good in the clear felled coupes. In *Lower Godavari* the natural regeneration of casuarina in the *Kandikuppa plantation* is reported to be thriving; some fresh seedlings are reported to have sprung up in the felled areas. In *Lower Godavari* and *Vizagapatam*, including *Madgole*, *Dendrocalamus strictus* and *Bambusa* continued to seed and die gregariously, but they have not yet started doing so in *Ganjam*. During the year under report both *Dendrocalamus* and *Bambusa* have started dying wholesale in *Polavaram Range of Lower Godavari*. As a rule *Dendrocalamus* is dying before *Bambusa* in *Lower Godavari*.

### (b) Artificial reproduction.

15. *Regular plantation*.—*Godavari Upper*—48 acres were felled in 1920-21 in six different places in four different ranges and treated under the taungya system with the object of raising teak. The results are very poor indeed as there are very few seedlings and the best of those are under eight inches when a year old. Fresh teak seedlings are now germinating and they may do better in the absence of any food crop.

16. *Cultural operations*.—*Ganjam*—Red sanders in the *Napier's Park reserve* continued to thrive. In the *Rambha Ravine coupe* II compartments 16 (a) and (b) an area of ten acres was planted with *Cedrela toona*, *Pterocarpus marsupium*, *Teak* and *Eugenia jambolana* seedlings raised in nursery beds. A good number of plants were

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living up to the end of the year under report. *Vizagapatam*—Sandal was sown in Sanivaram and Dharakonda reserves and teak seed in Busilikota plateau, but both were unsuccessful. It is proposed to sow them again in 1922-23. Numerous attempts have been made for years past to sow sandal in different reserves in *Upper* and *Lower Godavari*, *Vizagapatam* and *Kistna* but with practically no success. This year the results were equally poor. It is suggested that the combined heat and drought in the plains is too great for this species. Occasionally an isolated tree is found thriving in the compound of some residence.

(c) *Operations for improvement of growing stock.*

17. *Ganjam*.—In the plains sal timber working circle cleanings were done in the clear felled coupes felled in the spring of 1921 in both the felling series. Undesirable shoots were, as far as possible, bent and broken by hand, but not severed instead of being cut. This method discourages the production of fresh, fast-growing shoots. Subsidiary operations were carried out in Periodic Block 2 in both felling series and consisted of the removal of mature trees to the Sawmill followed by an improvement felling to favour that portion of the crop which ought, theoretically, to become ripe for the axe during the second period. In felling series I the work is much in arrears owing to the amount of inferior material to be cut out exceeding the demand.

*Thinnings*.—A thinning was carried out in two adjacent one-acre plots in which the re-growth was five years old. These plots which are in Suradevi block of Galleri reserve were originally observation plots for studying the best method of regenerating the forests. Mr. Wimbush reports:—"Within a few weeks of the completion of the thinnings it was noticed that serious damage was occurring to the saplings left standing. The damage consisted of the partial girdling by white ants of a very large percentage of the saplings usually within two feet of ground level. Available evidence points to there having been no fire in the area since the new crop came into existence."

In the ravine working circle cleanings and subsidiary operations on the lines described above in connexion with the plains sal timber working circle were carried out in the Ghogodo reserve of Bontha Range. The operations are falling considerably in arrears owing to the difficulty of extracting timber from so remote a locality. From the Kalimaba reserve of Russellkonda Range dead sal poles were extracted and auctioned. From the various reserves of Mojjogoda Range a large number of dead and wind-fallen trees were converted into logs and carted to the Sawmill.

*Upper Godavari*.—Improvement fellings were carried out over fifty acres in Tunikicheruvu reserve and over fifty acres in Seetharampuram reserve. The operation consisted of removing all the useless and crooked trees and those that were interfering with the growth of the more valuable species. These areas were also freed from climbers.

#### CHAPTER IV.—EXPLOITATION.

##### (a) *System of management.*

###### (i) MAJOR PRODUCE

18. The different silvicultural systems in force were:—

*Clear or regeneration fellings*.—These were carried out in *Ganjam* in the two felling series of the plains sal timber working circle and also in the ravine working circle as prescribed in the working plan. Fifty-seven thousand six hundred and eight cubic feet were extracted. Thirty-eight acres of Kandikuppa casuarina plantations in *Godavari Lower* and 1,791 acres in *Kistna* were felled. One coupe of twenty acres was clear felled departmentally in Tunikicheruvu reserve of Bhadrachalam Range and another of twenty acres in Ramachandram reserve of Marrigudem Range. After extracting the saleable poles, the refuse collected in heaps was burnt. Teak seeds were then sown. The average cost of the whole operation, including carting for a short distance, was Rs. 33-9-7 per acre. The cost of burning in Marrigudem Range was excessive. The net profit on the Marrigudem coupe was Rs. 20-1-0 per acre and that on the Bhadrachellam coupe is likely to be not less than Rs. 31, but the produce has not yet been sold. These are the first clear fellings made in *Upper Godavari*. The areas dealt with contained a fair percentage of inferior teak, but the

growth is never likely to be good enough to be treated under any high forest system. *First Circle.* In a couple of years time it should be possible to get contractors to work similar but larger coupes in these two ranges.

*Selection fellings.*—*Ganjam*—In the selection fellings area in Dhimirijoli reserve a small timber slide was constructed at a cost of Rs. 50. Several hundred logs were brought down it at a cost of about one anna per cubic foot. Without the slide it is doubtful whether the timber would have been extracted as a preliminary attempt to trace a line for a cart-track showed that the construction of such a track would be very difficult and also very costly. Two thousand and twenty-nine logs of 28,236 cubic feet were extracted in the current year. These, together with 500 logs of 9,720 cubic feet, being the balance of last year's fellings, were carted to the Russelkonda depot. *Godavari Upper*—These fellings were confined to the unreserved lands under the control of the Forest Department and trees of and above the prescribed minimum girth were felled. Five hundred and thirty-three logs of 11,150 cubic feet were extracted. The coupes in Nugur, Bhadrachellam, Pulusumamidi and Lakkavaram ranges were not worked this year as the timber felled in the previous year's coupes was not sold.

*Improvement fellings.*—These were carried out on fifty acres in Tunikicheruvu reserve and fifty acres in Seetharampuram reserve of Bhadrachellam and Marrigudem Ranges respectively. Four hundred and twenty-two cubic feet of timber were extracted and sold for Rs. 990.

*Simple coppice and coppice with standards.*—The fuel coupes in all the divisions were worked under these systems.

*Unregulated fellings.*—These were as usual confined to unreserved lands and to the Rampa forests. In *Ganjam* permits for classified timber from unreserves continued to be issued on payment of seigniorage fees. The demand, however, was not great.

(ii) MINOR PRODUCE

19. *Bamboos and miscellaneous produce.*—Three methods of extraction were in vogue, viz., departmental collection, leasing the right of collection and collection on permits. The first method was resorted to only to meet the petty requirements of the department for repairs to rest-houses, etc. Bamboos and other important produce, including tanning barks, were leased out to contractors. The right to collect seigniorage from purchasers at certain shandies for minor produce purchased from hill tribes was leased in *Vizagapatam*.

Permits were given for extraction of all produce from the Agency tracts in *Godavari Lower* and from some of the forests in the *Upper division* which were not leased out.

*Strychnos Nux-vomica.*—*Ganjam* and *Kistna*—The three-year lease was cancelled as the lessees failed to pay the instalments. In *Vizagapatam* and the two *Godavaris* the produce was sold for one year.

*Fodder grass and hay.*—*Ganjam.*—The right to cut grass in Napier's Park reserve was leased out. In *Godavari Lower* the removal of fodder and thatch grass was allowed on permits as usual. The right to cut grass in the Cantonment ground at Samalkot was leased. *Kistna*—The Military Department continued to make hay on payment of a royalty of Rs. 2 per ton. The collection of fodder grass from the closed areas was leased out.

(b) Agency of exploitation.

(i) DEPARTMENTAL AGENCY.

20. The outturn of major produce by departmental agency is compared below with that of last year :—

—						Timber in thousands of cubic feet.	Fuel in thousands of cubic feet.	Bamboos.	Minor produce.
1920-21	::	::	::	::	::	420	215	Rs. 465	Rs. 876
1921-22	::	::	::	::	::	240	132	620	972

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The quantity of major produce exploited was 10.06 per cent of the total outturn and chiefly consisted of timber felled in *Ganjam* for the Sawmill and the outturn from selection fellings in *Upper Godavari*. The decrease under timber was due in *Ganjam* to the greater number of dead sal-poles cut last year and in *Upper Godavari* to the non-working of coupes in four ranges as the timber extracted in them last year remained unsold. The decrease under fuel was due to no departmental thinnings in *Ganjam*.

## (ii) BY PURCHASERS.

21. The clear and improvement fellings referred to in paragraph 18 supra and the fellings in fuel coupes, were carried out by contractors except in the case of timber for the Sawmill in *Ganjam*.

The quantity of major produce and the value of minor produce removed by purchasers during the year are compared with those of the preceding year in the following abstract:—

	Timber in thousands of cubic feet.	Fuel in thousands of cubic feet.	Bamboos.	Grass and grazing.	Other minor produce.
1920-21	478	2,733	Rs. 1,11,766	Rs. 46,856	Rs. 63,171
1921-22	398	3,207	Rs. 65,390	Rs. 52,231	Rs. 72,613

The decrease under timber was due to less removals of timber from unreserves in *Lower Godavari* owing to the enhancement of seigniorage rates. The decrease under bamboos was due to an abnormal demand for sugarcane props in the previous year. The slight increases under other heads were due to the fact that the figures of last year represented only nine months.

(iii) and (iv) *By right holders and under privileges and free grants.*

22. The quantity and value of forest produce removed under this head were as follow:—

	Timber in thousands of cubic feet.	Value	Fuel in thousands of cubic feet.	Value.	Bamboos.	Grazing.	Other minor produce.	Total outturn.
Right holders		Rs. 500		Rs. 592		Rs. 500		Rs. 1,092
Free grantees	87	4,096	81	852	351	11,781	64	17,744

*Rights.*—The Khonds in *Ganjam* were granted concessions in the shape of building material and free grazing for services rendered by them in fire protection and general protection of forests. The estimated value of the produce enjoyed was Rs. 1,092 against Rs. 4,040 in the previous year.

*Free grants.*—Such grants were made to the villagers chiefly for rebuilding their houses destroyed by fire. The estimated value of all grants was Rs. 17,744 against Rs. 14,932 of the previous year.

(c) *Outturn and sources of forest produce.*

23. The total outturn from all classes of forests from all agencies is compared with similar details of last year in the following statement:—

	Timber in thousands of cubic feet.	Fuel in thousands of cubic feet.	Bamboos.	Gross value of minor produce including grass and grazing.
1920-21	1,001	3,074	Rs. 1,12,461	Rs. 1,24,160
1921-22	725	3,470	Rs. 86,361	Rs. 1,88,764

The total number of cattle for which grazing was provided was 269,400 against 263,611 in the previous year.

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CHAPTER V.—FINANCIAL RESULTS.

24. The financial position of the year is compared with that of the previous year and the average of the preceding quinquennium in the following abstract :— *First Circle.*

	1921-22.	1920-21.	Average of the previous quinquennium.
	RS.	RS.	RS.
Revenue .. .. .	4,15,062	4,11,475	4,76,493
<i>Expenditure.</i>			
A.—Conservancy and works .. .. .	4,74,914	2,43,771	1,49,689
B.—Establishments .. .. .	3,96,125	2,79,061	2,62,931
Total ..	8,71,039	5,22,832	4,12,620
Surplus ..	- 4,55,987	- 1,11,357	+ 63,873

The results show a deficit of over 4½ lakhs of rupees. Most of it occurred in *Ganjam*. The Saw mill at Russellkonda started working only at the close of the year, so no revenue from timber could be realized within the year. Rupees 2,28,459 of the deficit represent the cost of Saw mill machinery adjusted by the Accountant-General in the March 1922 final accounts of this Circle.

40.80 per cent of the revenue was derived from major produce, 38.32 per cent from minor produce, 12.28 per cent from grass and grazing, and 8.60 per cent from miscellaneous items. Of the expenditure 46.50 per cent was spent on the exploitation of forests, 24.95 per cent on their upkeep and improvement and 28.55 per cent on miscellaneous items. The revenue outstanding at the end of the year was Rs. 11,981, of which Rs. 10,133 fell due within the year.

The estimated value of the produce at sale depots was Rs. 141. The important variations under 'revenue' and 'expenditure' are explained below.

RECEIPTS.

(i) *By departmental Agency.*

*Timber* + 5,087.—The increase was in *Upper Godavari* due to revenue from timber sold to Public Works Department and from clear fellings in Manigudem range.

(ii) *By purchasers.*

*Timber* — 9,714.—The decrease was in *Ganjam* and *Lower Godavari*. In the former it was due to the windfallen trees in Mojjagoda Range being worked departmentally instead of being sold to contractors and in the latter it was due to less demand for timber from unreserves as the seigniorage rates were enhanced during the year.

*Bamboos* — 22,952.—The decrease occurred in the two *Godavari* divisions and was chiefly due to the abnormal demand for sugarcane crops in the previous year.

*Grass and grazing* + 5,356.—Partly due to increased grazing fees in the plains of *Vizagapatam* and to the fact that the previous year's revenue dealt with only nine months.

	RS.	} Due to twelve months' figures dealt with against nine months in the previous year.
Minor produce .. .. .	+ 14,593	
(iii) Miscellaneous (including confiscated drift and waifwood).	+ 9,199	

Expenditure—

A. Conservancy and works .. .. .	+ 2,31,143
B. Establishments .. .. .	+ 1,17,064

The increase under "A. Conservancy and Works" was chiefly due to the debit under A VI (c) of the cost of Saw mill machinery referred to in the commencement of this chapter. The increase under "B. Establishments" was due to increased rates of salaries and travelling allowances. Moreover the figures under review relate to twelve months against nine months of the previous year.

## CHAPTER VI.—RESEARCH AND EXPERIMENTS.

Forest  
Circle.25. *Research.*—Nil.

26. *Experiments.*—In *Ganjam* the experiments in connexion with seasoning timbers which had been in progress at Russellkonda for over two years under the auspices of the Forest Research Institute, Dehra Dun, were completed. The seasoning expert from Dehra Dun, accompanied by the Burma Seasoning Officer, examined the timber in January 1922 and recorded the facts and information required, but no report on the final results has yet been published.

## CHAPTER VII.—ADMINISTRATION.

27. *Tours.*—The charge of the circle was held by—

Mr. J. S. Scot till 14th April 1921.

Mr. A. Wimbush from 15th April 1921 to 25th May 1921.

Mr. D. T. Barry from 26th May 1921 to 7th December 1921.

Mr. H. C. Bennett from 8th December 1921 to end of the year.

All the the District Forest Officers except *Upper* and *Lower Godavari* did more than the prescribed minimum of touring during the year. The short touring in *Upper* and *Lower Godavari* was due to the frequent changes of officers and the illness of Mr. Rigold.

The Chief Conservator and the Conservator of Forests visited Russellkonda. The buildings in connexion with the Saw mill at Russellkonda were completed and the Saw mill commenced its work. The Board of Control was inaugurated and met for the first time at Russellkonda in February 1922.

28. *Inspections.*—The Conservator inspected all the District Forest offices and found them in good order. Some of the forests in *Vizagapatam* and *Upper* and *Lower Godavari* were inspected by Mr. D. T. Barry and some of those in *Kistna* by Mr. H. C. Bennett. Inspection notes on the above forests were written.

29. *List of offices audited.*—All the offices except *Upper Godavari* were inspected by the Local Fund staff of the Accountant-General's office with satisfactory results.

30. *Vernacular Training School.*—The school was held in *Ganjam* for the fifth time and 35 subordinates were trained; of whom five were from Bihar and Orissa. The school lasted from 6th January 1922 to 18th June 1922. The school was inspected by the Chief Conservator. It was also inspected once by Mr. H. C. Bennett and once by Mr. D. T. Barry. The health, discipline and instruction were found satisfactory.

31. *Health of the establishment including an account of measures of sanitation and casualties.*—*Upper Godavari* and some of the Agency portions of the other divisions continued to be unhealthy. Three subordinates died of fever, twenty went on sick leave and one Assistant Conservator, Mr. O. H. C. Shelswell, was invalided Home on account of malaria contracted in Balinkia.

## CHAPTER VIII.—GENERAL.

32. *Formation and management of Panchayats (to include Forest Village System).*—In *Kistna* the three reserves referred to in last year's report continued to be under panchayat management. The District Forest Officer reports that he inspected them in January 1922 and found signs of goat browsing in some and overgrazing in all the reserves, that lines and cairns were being neglected and there was practically no check on the removal of fuel, etc. No panchayats were in existence in the other divisions.

The Forest Village System is not in force in this Circle.

33. *Measures for improving local supplies and facilities (includes water supply, fuel, manure leaves, etc.).*—*Ganjam*—Permission was given to the ryots of Singapur to keep the bund on the west of Pendura Bandho on Malati reserve line in good repair so as to divert water into Pendura Ghai and prevent damage to the Berhampore-Kalingia road near mile 36/4. Lakshmana Gonda of Hariharasai village was permitted to construct a well beside Kurlangi-Gangupur cart track (which was admitted

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as a right of way inside Dhumi Dhumi reserve) on condition that the well should be free to all who use the right of way. Permission was granted to Kapila Majhi of Palasupalli to construct a tank not more than half an acre in extent near the place which adjoins the reserve line in the north-eastern block of Dhumi Dhumi reserve on condition that no damage is done to the tree growth and that free access to the water of the tank is allowed to cattle, having permits to graze in Dhumi Dhumi reserve. *Vizagapatam*—There is scarcity of water in the Busilikota plateau and it is proposed to sink a well here for the use of settlers, cattle and wayfarers. A trial pit was dug at a cost of Rs. 20 and a well and masonry reservoir is proposed to be constructed in 1922-23. *Kistna*—The spring near Dongamarlabhavi in Kondapalli reserved forest and Veerankuta tank in Ellore Range were repaired. Permission was granted to private persons for digging two tanks in Nachugunta Block II on the express condition that they have no claim for the tank, but work had not commenced for want of labour. First Circle.

The wants of people in the matter of fuel were fully met in all the divisions and there were no complaints. There was scarcity for fodder in Sarvasidhi and Narasapatam Ranges of Vizagapatam and free cutting and removal of grass was permitted temporarily in Madalammakonda, Karaka, Arlova and Pedimikonda, Dharakonda and Sarugudu reserves until the monsoon broke. There was no demand for manure leaf from the forests of the circle.

34. *Timber transit rules*.—The rules are reported to be working satisfactorily on the whole, but proposals to modify the Rampa transit rules have been submitted to the Chief Conservator. A considerable number of tana stations in *Lower Gōdāvāri*, *Vizagapatam* and *Kistna* were considered unnecessary and abolished.

35. *Jungle tribes*—These are found in all the divisions except *Kistna*. The District Forest Officer, *Ganjam*, reports :—“The Department continued to be on very good terms with the Khonds. It was found that in recent years the latter had begun to look upon the concessions allowed to them by the department as rights. It was necessary to correct this mistaken impression more especially as the fire season of 1921 was a disastrous one. Accordingly, instead of allowing unlimited free grazing to the Khonds, orders were issued that no individual should be allowed to graze more than six cattle free of charge, the supposition being that anyone owning more cattle than this could well afford to pay a small grazing fee. This order and the consequent explanations of the position to such of the Khonds as expressed surprise at it had a salutary effect.”

*Vizagapatam*—The hill tribes availed themselves of the privileges conferred upon them without complaint. One or two were selected from among them and appointed Forest Guards. The long contemplated Busilikota settlement was formed during the year and 25 families settled in it. Two hundred acres of forest land were set apart for them and the settlers have constructed houses at the place and cultivated 100 acres during the year.

The *Koyas* and *Reddis* of the *Gōdāvāri* divisions continued to be serviceable as usual. They were employed on the general fire protection of forests as well as on the construction of roads and buildings, on demarcation works, etc. They were granted rewards in addition to the usual wages for the successful protection of forests from fire and were also allowed the concession of free grazing and free removal of forest produce for their domestic and agricultural requirements.

36. *Mining and quarrying*.—Rupees 1,230 were realized from quarrying rough stone in the reserves and unreserves of *Kistna*.

37. *Live stock—Elephants*.—There were two baggage elephants in *Upper Gōdāvāri* one of which, viz., ‘Surat Pari’ developed an abscess on the knee-cap of the left hind leg in July 1921 and had to be kept at the Bhadrachallam Veterinary Hospital under treatment for five months before she was fit for work again. The other elephant was in good condition.

*Other animals*.—These exist only in *Ganjam*. The year opened with 47 buffaloes and six bullocks. Fifteen buffaloes were purchased during the year. Ten buffaloes and one bullock died and eight buffaloes and five bullocks were transferred to the Sawmill. The balance at the end of the year was 44 buffaloes. These are used for dragging and carting timber.



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38. *Veterinary establishment.*—Nil.

39. *Tigers.*—A man-eating tiger has been roaming about Kaliamba and Tiliki reserves of Ganjam and has killed a few people in the neighbouring villages. The Board has since offered a reward of Rs. 150 for its destruction.

40. *Civil suits.*—Of the three pending suits referred to in the last year's report, the first (driftwood appeal case) was decided in favour of Government and the third (for recovery of seigniorage on metal and gravel quarried) against Government. The second (a boundary case) was still pending disposal in the Court of the Agency Commissioner, Waltair. A fresh suit was filed against a defaulting contractor in Vizagapatam for recovery of loss due to re-sale of coupe and was decided in favour of Government. The decree is pending execution. Another civil suit of small importance was brought against Government and is pending disposal in the principal District Munsif's Court, Ellore.

41. *Control of unreserved lands by the Forest Department.*—In Ganjam, the Revenue and Forest Departments are jointly responsible for protection of the unreserves. The District Forest Officer reports that 'the usual disadvantages of dual control are not absent, but, considering the vast area of unreserves, no better arrangement is obvious and the results on the whole are fair.' In Upper Godavari the unreserved lands are under the control of the Forest Department and the local supply of timber, fuel, etc., is met from these lands. Timber of prescribed dimensions is extracted under definite sanctioned schemes and sold in auction.

29th July 1922.

D. T. BARRY,  
Acting Conservator of Forests, First Circle.

# ANNUAL ADMINISTRATION REPORT OF THE FOREST DEPARTMENT

FOR THE  
YEAR ENDING 31ST MARCH 1922.

## SECOND CIRCLE.

### CHAPTER I—CONSTITUTION OF STATE FORESTS.

#### 1. ALTERATION IN AREA.

*Reserved forests.*—An area of 49 acres was added and 9,600 acres excluded in the year under report. The addition was the outcome of final settlement of the enclosures in Bellary and Guntūr districts which were referred to in the previous year's report, and the exclusion was due to the disforestation of (1) 2,658 acres in Bellary, (2) 6,631 acres in Guntūr, (3) 257 acres in Kurnool South and (4) 37 acres in Kurnool West, and to the reduction of 17 acres in the area of Tummala reserve of Anantapur district owing to the revision of the boundary of that reserve in order to exclude some patta lands. The disforestation in all cases was for the purpose of throwing open lands fit for cultivation except in West Kurnool, where out of the 37 acres, 4 acres near Honkaram were disforested for the use of pilgrims visiting Srisailam shrine during Sivarathri festival and the remaining 33 acres in Veldurti reserve were disforested in order to afford a larger area of unreserved land for the grazing of village cattle. These alterations resulted in a total reduction of 16 square miles; thus the area at the end of the year was 4,687 square miles against 4,703 square miles at its commencement. *Second Circle.*

2. *Reserved lands.*—Thirty-eight acres in Mutukur Extension No. 4 Reserve of Guntūr district were added during the year.

Forty-nine acres of reserved land in Bellary and Guntūr districts having been constituted reserved forests, the total area of reserved land at the end of the year was 2.96 square miles against 3.0045 square miles, at its commencement.

#### 2. FOREST SETTLEMENT.

3. The settlement of 49 acres being the area of three enclosures in Bellary and one in Guntūr, reported as having been under progress in the previous year, was completed.

The Daroji foreshore of 1,853 acres was in progress of settlement and is reported to have been finally settled since.

#### 3. DEMARCATION.

4. Five miles of line between the disforested and existing reserves in Bellary were temporarily demarcated at a cost of Rs. 74. Fifty-six and a half miles in Bellary and 13½ miles in Guntūr were permanently demarcated at a cost of Rs. 2,925 and Rs. 231 respectively. Twelve and a half miles of frontier boundary between British and Sandur State in Bellary were demarcated at a cost of Rs. 61.

Four thousand nine hundred and thirty-six miles of boundary in all districts were maintained by the departmental subordinates. Forty-five miles were re-cleared by panchayatdars in *Kurnool East* and 140 miles in *Anantapur* and the three *Kurnool* divisions were repaired at a total cost of Rs. 829

## 4. FOREST SURVEYS.

Second  
Circle.

5. (a) Sixteen reserves aggregating 185.50 square miles in *West Kurnool* and five reserves of 61.79 square miles in *South Kurnool* were surveyed by the Survey of India Department, of which 5.96 square miles of Dudyala reserve in *West Kurnool* was on the 1" = one mile scale, and the rest of the areas in the two divisions was on the 2" = one mile scale. The value of the areas surveyed and the method adopted is the same as that given in the previous year's report. As in the previous year the surveys were classed as ordinary and not paid for by the Forest department.

(b) In *Bellary*, the survey of a portion of the disforested areas and rectification of frontier boundary lines was done by the departmental subordinates at a cost of Rs. 105. Local Forest officers as in the previous year surveyed coupes, enclosures and other minor items.

(c) The reference and other maps referred to in section 80 of the Code were maintained in all districts with the exception of range reference maps in *South Kurnool* where materials are being collected for completing their posting.

## CHAPTER II.—MANAGEMENT OF STATE FORESTS.

## 1. REGULATION OF MANAGEMENT.

## (a) Preparation and Control of Regular Working Plans.

## (i) PREPARATION

6. A simple working plan for the Daroji tank bed reserved land submitted by the District Forest Officer, *Bellary*, has been returned for revision. Its completion is soon expected.

The revised prescriptions of the working plan for Madakasira range of *Anantapur* district were sanctioned during the year by the Chief Conservator of Forests. The revision of the plan for Gooty range has not yet been completed.

In *Guntur*, the preparation of a working plan for Venkatayapalem timber forest, was taken up by the Probationary Extra Assistant Conservator M.R.Ry. S. Ramaswami Ayyar, but could not be progressed with, as his services had to be directed in combating the non-co-operation movement.

In *East Kurnool*, a preliminary working scheme for supply of small timber and agricultural implements to the villagers in Cumbam range, was drawn up and approved by the Conservator, the method of treatment prescribed being "simple coppice."

In *West Kurnool*, a new scheme for the working of Gazulapalli reserve was drawn up and approved by the Conservator. The scheme consists in the division of the reserve into two felling series each to be worked on a rotation of 40 years, the size of the coupes being 50 acres each. Coupes will be clear-felled and "Kumaried" the following season. Forest species will be raised with field crops. The patch of sandal existing, probably as the result of sowing in the past, in one of the series, will be tended, and fresh sandal seeds sown in the other, where there is no sandal at present.

The plan for Yerramalais and the Terai portions of Nallamalais require revision. Experiments on a small scale are being conducted to test the best methods of regeneration for these forests. The plan for Gundlabrahmeswaram plateau is kept in abeyance as its working did not bring about the desired results in regeneration and here also experiments are being undertaken with the object of discovering the cheapest and most effective methods of inducing regeneration.

## (ii) CONTROL.

In *Bellary*, the prescriptions of the plans were generally adhered to, except that some of the coupes in the Adoni and Harpanahalli working plans could not be sold and worked for want of demand, and that the grazing prescriptions had to be deviated from, on account of drought and consequent scarcity of fodder.

In *Anantapur*, the working plans were in force.

In *Guntūr*, the existing plans were in force, except that for *Guntūr* baqul areas wherein the tree-growth is being rapidly cleared prior to being handed over to the Revenue department for assignment to ex-sepoys, depressed classes, etc. . . . Three coupes of 178 acres in Kondavid reserve and one coupe of 111 acres in Tak-kellapad reserve, were not sold for want of demand. In Repalle mangrove reserves, out of seven coupes of 577 acres, only two measuring 102 acres were sold and there was no demand for the others. In the Bollapalle and Guttikonda block II, the full number of coupes prescribed could not be sold and the area sold was not fully worked for lack of demand.

*Second  
Circle.*

In *East Kurnool*, the prescriptions of the plan for Gudem range were adhered to, so far as bamboo fellings were concerned.

In *South Kurnool*, as the revision of the Owk range plan has not been taken up pending the formation of the fourth division, the bamboos and minor produce were worked under the old prescriptions.

In *West Kurnool*, the interim working scheme for the Veldurti reserve was put into operation, coupes I and II were thinned and cultural operations were conducted in some of the blank areas.

## 2. COMMUNICATIONS AND BUILDINGS.

### (a) Roads and bridges.

7. Rupees 5,574 were spent in the year on the construction of twenty-five miles and seven furlongs of new communications against Rs. 2,335 for twenty-seven miles spent in the previous year (of 9 months). The higher rate per mile this year is due to the construction of more pucca roads.

The Chief works done were—

Roads	Distance.		Amount. RS.
	MILES.	FURLONGS.	
<i>In East Kurnool—</i>			
(1) Regatikunta-Katamraju road (completed).	2	3	428
(2) Narthadikala-Guttalachenu road (in progress)	3	5	1,183
(3) Regatikunta-Eguvacherlapalli road, part (in progress).	0	6	360
<i>In South Kurnool—</i>			
(1) Perikalapenta-Obulesunipenta road ...	1	1	1,562
(2) Connecting Buggy road to Eber Hardie road.	4	3	1,000

The other works consisted of alignment for new roads and construction of bridle-paths and conversion of working circle lines into bridle-paths. One hundred and sixty-six and a half miles of the existing communications were repaired and maintained at a cost of Rs. 13,118 against 148 miles for Rs. 10,207 in the previous year. As in the previous year contributions of Rs. 1,050, Rs. 2,200 and Rs. 650 were contributed to the Local Fund department for the maintenance of roads passing through reserves in *Kurnool East*, *South* and *West* divisions respectively.

### (b) Rivers—Nil.

### (c) Buildings.

The total amount expended on the construction of new buildings was Rs. 11,753 and that on maintenance and repairs was Rs. 12,724 as against Rs. 12,139 and Rs. 11,039 respectively in the previous year.

The following were the chief buildings constructed—

<i>In Bellary—</i>			
Construction of Range office at Kudligi	...	...	(In progress)
<i>In Anantapur—</i>			
Construction of Range office at Gooty	...	...	(Completed)
<i>In Guntūr—</i>			
Construction of subordinates' quarters at Remidicherla	...	...	(In progress)

*Second  
Circle.*

*In Kurnool East—*

- (1) Construction of a rest-house at Eguvacherlopalli in Markapur range. (Completed)
- (2) Construction of foresters' quarters and shop at Guttalachenu in Morricheruvu range. (In progress)
- (3) Construction of a rest-house at Yerragondapalem ... ( Do. )

*In Kurnool South—*

- (1) Construction of a rest-house at Obulesunipenta in Gundlakamma range. ( Do. )
- (2) Construction of a kitchen to the rest-house at Diguvametta. ( Do. )
- (3) Construction of a compound wall to the Range office and quarters at Giddalore. (Completed)

*In Kurnool West—*

- (1) Construction of a kitchen to outhouses at Pecheruvu ... ( Do. )
- (2) Construction of a kitchen and stables to Range quarters at Atmakur. (In progress)
- (3) Improvements to Range Officer's quarters at Dhone ... ( Do. )

(d) *Miscellaneous.*

Rupees 2,649 and Rs. 161 were spent on new works and repairs as against Rs. 1,488 and Rs. 1,097 respectively in 1920-21. The expenditure was all on construction and repairs of wells, and digging of trial pits for wells.

3. PROTECTION OF FORESTS.

(a) *General Protection.*

8. The total number of new cases for the year was 4,524. As the cases of last year cover a period of nine months, useful comparison cannot be made. The average, however, for nine months of the year comes to 3,393 showing a decrease of 32 per cent as compared with last year's figures. The decrease was due to the helplessness of the subordinates in *Guntūr* to detect cases and also their fear to report them even when detected, on account of lawlessness of the people and the disturbed state of the district, in consequence of the activities of the non-co-operation movement, and to allowing free grazing in *Bellary* and *Kurnool* divisions.

The number of cases taken to court was 2,131, of which convictions were obtained in 1,559, and 179 acquitted. The percentage of acquittals was 8.4, and 393 cases were pending disposal by court.

The number of cases offered to be compounded in the several districts of the circle was 3,841, of which 2,634 were actually compounded, 671 withdrawn and 536 pending at close of the year. The amount of compounding fees realized was Rs. 36,108.

The total number of cases pending at close of the year was 929 against 1,671 at its commencement.

The accused in the case of murder of a forest guard in Anantapur district referred to in last year's report were acquitted in the Sessions Court for want of sufficient evidence. The widow of the forest guard was, however, granted by Government a pension of Rs. 8 per mensem. Fifty-eight cases of assault on forest officials occurred in *Guntūr*, and the usual mob violence was resorted to when Forest laws were enforced by isolated subordinates. To quell this lawlessness and the organized social boycott of Forest officers, the protective staff was concentrated into one large party for each range.

There were two sensational cases of forced rescue of cattle found illicitly grazing in reserves and of assault of subordinates. On account of this state of affairs, punitive police were appointed by Government. In one case 40 men were arrested, of which 19 were subsequently sentenced to terms of imprisonment varying from 3 to 6 months besides a total fine of Rs. 4,000; in another, after repeated warnings against the violence of rioters, the police had no alternative but to open fire. Two of the rioters and the syce of the Sub-Inspector who had got mixed up in the crowd were killed. Thirty-seven arrests were made and the case is under trial. The effect was on the whole salutary resulting in the payment of grazing fees. A Special Magistrate was appointed temporarily for the more prompt disposal of forest offences in

this district, and punitive police, with motor transport, under the control of Mr. Kaye, Assistant Superintendent of Police, to work in co-operation with the Assistant Conservator of Forests, Mr. Connolly, were posted to the Palnad to enforce obedience to Forest laws. *Second Circle.*

Punishments awarded by Magistrates were generally adequate in all divisions, except in *Guntūr*. Leniency of punishments in *Guntūr* was brought to the notice of the District Magistrate, who took necessary action in the matter.

Rewards to subordinates for detection of offences in deserving cases to the extent of Rs. 240 in *Anantapur* and *Guntūr* districts were sanctioned by the Conservator.

(b) *Protection from fire.*

As per orders now in force the area under *General Protection*, *Special Protection*, and *Early Burning*, shown in Form No. 72 covers a period of only nine months from April to December. This prevents a satisfactory comparison of the results of fire-protection in this and the previous year. The total area attempted in the circle under the three systems (*Special Protection*, *General Protection* and *Early Burning*) amounts to 2,767,186 acres or 4,324 square miles, of which 20,538 acres or 32 square miles were burnt. In the area of 353,740 acres under *Special Protection* in all the districts and of 765,626 acres under *Early Burning* (confined to the three *Kurnool* divisions), 7,244 acres and 7,953 acres respectively were burnt. The percentage of acres burnt to area attempted under *Special Protection* and *Early Burning* in the three *Kurnool* divisions, are 3.2 and 1.3 respectively, which points to the conclusion that the latter system is more effective in its results than the former.

In *East Kurnool* 15,596 acres kept under *Special Protection* in the previous year, was transferred to *General Protection*, as fire lines were not cleared, as there was no necessity for it, owing to absence of grass, the heavily grassed area having been taken up for *Early Burning*.

The total expenditure on fire-protection operations in the period under report is Rs. 11,426.

(c) *Protection against cattle.*

Three thousand four hundred and sixty-one square miles for the whole year were thrown open to grazing for all animals except goats, and 866 square miles were closed to all animals in all divisions of the circle. In *Bellary* and *Anantapur*, areas proposed to be closed, were thrown open to grazing on permits, for part of the year, and subsequently to free grazing, owing to scarcity of fodder due to the failure of monsoons. In *Guntūr*, all forests which were notified for closure were thrown open for cattle, except goats, as a temporary measure to realize the grazing revenue. In *Kurnool East*, the whole division was thrown open, except to goats, owing to the failure of monsoons, and in *Kurnool South* an area of 3,300 acres, of the area notified for closure was also thrown open in Cumbum reserve of Gundlakamma range.

The number of cattle impounded is 54,243 against 52,476 in the previous year, resulting in an increase of 1,767, which was contributed by *Bellary*, *Anantapur* and *Kurnool West* divisions. In the first and the last named divisions, the increase is attributed to scarcity of fodder outside the reserved areas owing to drought, and to some extent to non-co-operation propaganda.

(d) *Protection against injuries from natural causes.*

There is nothing to report under this head.

### CHAPTER III—SYLVICULTURE.

(a) *Natural reproduction.*

9. Sandal is spreading in Adoni reserve of *Bellary* district, and in all the reserves of Madakasira range, and in the Amagondapalayam reserve of Bukkapatnam range, of *Anantapur* district, and also to some extent in Sivapuram extension in Kudligi range of *Bellary* division.

In the western taluks of *Bellary*, *Hardwickia binata* regeneration is fairly good, but it is very poor in *Guntūr* and *Kurnool* districts. In *Guntūr* the regeneration of Mangrove was satisfactory on the coast, and coppice shoots in the felled

Second  
Circle.

coupes were fairly good. In *West Kurnool*, yepi (*Pterocarpus Marsupium*) in the Terai portions of Nallamalais, rosewood (*Dalbergia latifolia*), and *Terminalia Tomentosa* in the plateau portions of Nandyal and Gundlabrahmeswaram ranges and *Ohloroxylon swietania* in Guvvala Kunta block of Sivapuram range regenerated fairly satisfactorily.

(b) *Artificial reproduction.*

Fresh plantations were not started in any district.

The existing three plantations in Bellary are reported to be thriving. In *Guntūr*, the lease for one area of 288 acres, which had been granted for cultivation on condition that *Casuarina* and *Cashew* plantations were raised, was surrendered by the lessee; but on another similar area of about 300 acres the operations of the lessee, who lives close to the reserve, were very successful. Consequently many applications are now being received for the grant of such areas for cultivation, the understanding being that plantations should be raised.

In *East Kurnool* division, 800 teak seedlings were raised at Chinnamantrala in the emergency coupe but only 25 per cent of them survived at the end of the year. Fresh nurseries were opened in three other reserves to raise teak seedlings.

(c) *Cultural operations.*

*Acacia sundra*, *Hardwickia binata* and *Santalum album* were dibbled in Somalapuram and the sandalwood reserves of Jettinakatta and Chilkanahatti of *Bellary* district. The operation was fairly successful in Somalapuram while in other places it was a failure.

In *Anantapur*, sandal seeds were dibbled in six reserves, over two acre plots, to an aggregate extent of 28 acres and about 30 per cent of the seedlings germinated and survived the hot weather.

In *East Kurnool*, tangedu sowings were carried out in various emergency coupes and though the seeds germinated satisfactorily, the seedlings perished subsequently on account of the drought. These experiments have now been stopped.

In *Guntūr*, six bags of yepi (*Hardwickia binata*) seeds were dibbled in the felled coupes of 1920-21. Fifty per cent of the seeds germinated, but the seedlings nearly all died subsequently. In the Repalle mangrove forests sowing of mangrove seeds as per prescriptions of the working plan was not carried out owing to pressure of other work. So also the operations prescribed in the working plan for Tekkalapad reserve could not be done owing to the opposition of non-co-operators. Sandal-seeds (*Santalum album*) sown in Kondavid and Remedicherla did not germinate.

In *South Kurnool*, red-sanders (*Pterocarpus santalinus*) was sown in seed-beds at Baireni. The seedlings were attacked by insects and were treated with arsenic solution. Six hundred seedlings survived. In Owk extension, Devagudipad and Peapalli reserves, small nurseries were started for red-sanders and 300 seedlings were raised in baskets.

(d) *Operations for the improvement of the growing stock.*

In *Guntūr*, timber areas are being walled in to ensure better protection. Seven miles and 28 chains of Bollapalli working plan area were enclosed with stone wall, prickly-pear and aloe-fencing. Climber cutting was done in the coupes to be felled during 1922-23 and two coupes of 169 acres were worked under improvement fellings to secure regeneration of important timber species.

In *East Kurnool*, creepers were cut over 1,122 acres in Gudem range; prickly pear was cut and burnt over  $4\frac{1}{2}$  acres at Chintala and Pedda Chama.

In *West Kurnool*, cleaning in seven plantations and thinning in two were done; dead trees were cut out in four plantations and trees marked for thinning felled, and big trees which were interfering with the growth of teak, girdled.

Concentrated fellings are now being started in *Kurnool West* and *South* where two small areas of high forest are being clear-felled. After removal of all saleable timber and bamboos, the remainder of the stuff is burnt, and experiments are being made to regenerate the areas by artificial means.

## CHAPTER IV.—EXPLOITATION.

Second  
Circle.(a) *System of management.*

## (1) MAJOR FOREST PRODUCE.

10. The total area under working plans during the year was 1,805 square miles and the various silvicultural systems adopted are as given below :—

Method.	Area in square miles.	Percentage of total area under each method.
1. Clear-felling ... ..	13	·72
2. Coppice with standards ... ..	55	3·04
3. Improvement fellings ... ..	149	8·25
4. Selection ... ..	97	5·37
5. Area for which working plans have expired and in which fellings are closed or no definite system is laid down ... ..	1,491	82·62
Total ...	1,805	100·00

Besides the above, 89 square miles in *Bellary*, and 54 square miles in *Guntur* are covered by tentative schemes of working.

The working plans of the three *Kurnool* divisions which have almost all of them expired, require revision.

*Clear fellings.*—These were adopted in the working of fuel coupes in Adoni Range of *Bellary* district and in Nandyal range of *Kurnool West* district.

*Coppice with standard.*—This system was largely adopted in *Bellary* and *Kurnool West* districts.

*Improvement fellings.*—These were carried out in *Kurnool East* district alone.

*Selection fellings.*—Bamboo coupes in *Kurnool South* were worked under this system.

*No definite system laid down.*—This was as usual in all districts. The areas are worked either as simple coppice or coppice with standards.

## (2) MINOR FOREST PRODUCE.

Except in *East Kurnool* and in the Nallamalais of *West Kurnool* where bamboos and other minor forest produce were collected departmentally through Chenchus, the produce in other districts was leased to contractors.

(b) *Agency of exploitation.*

## (i) DEPARTMENTAL AGENCY.

*Major produce.*

In *East* and *West Kurnool*, 91 per cent and 98 per cent, respectively of the total yield of major produce was worked out departmentally through the agency of Chenchus, in order to provide work for them. In *Guntur* 885 cubic feet of timber was extracted departmentally for repairs to rest-houses and a boat.

In other districts, the small collection of timber and fuel was from clearing lines, and the top ends of trees felled illicitly by forest offenders in reserves.

*Minor produce.*

In the Nallamalais of *East* and *West Kurnool* divisions, bamboos and other minor forest produce were collected departmentally through the agency of Chenchus for the same reasons explained in the last paragraph.

In *West Kurnool*, owing to the failure of the south-west monsoon, a severe fodder famine was anticipated and under the instructions of the Collector, departmental collection of hay was undertaken and 12½ tons were collected and baled at a cost of Rs. 486. This was subsequently disposed of for Rs. 518 as the season improved and famine was averted.



Second  
Circle.

## (ii) BY PURCHASERS.

## Major produce.

Except in cases referred to in the above paragraphs, timber and fuel were extracted by contractors who purchased coupes standing.

In *East* and *South Kurnool* divisions, a point worthy of note is that a demand is springing up for soft woods among the merchants of Cumbum, Markapur and Tarulapad for making slates. For this industry 3,420 cubic feet of buruga (*Bombax Malabaricum*) was removed from the reserves of Cumbum range in *East Kurnool*, on a seigniorage of four annas a cubic foot, and 2,995 cubic feet of poliki and buruga logs (*Gineta rotleriiformis*, *Sterculia*, and *Bombax Malabaricum*) were removed from *South Kurnool* division. The demand for soft wood will have to be met by systematic working. With this view a coupe has been ordered to be opened and put up for auction.

## Minor Forest Produce.

The right to collect nux-vomica seeds in all the districts of the circle was leased to one P. Sreenivasa Rao of Madras; the lease has however been cancelled since the lessee failed to pay the security deposit in time.

The prices fetched for the leases of tangedu (*Cassia auriculata*) bark during the year were low as the market value fell.

The right to make hay from the closed compartments of Bellary range was leased out to contractors.

The military grass farms made hay in the *Bellary*, *Anantapur*, *South and West Kurnool* divisions paying seigniorage to the department at Rs. 2 a ton.

In Kudligi and Adoni ranges of Bellary district, stone quarries in seven reserves were leased.

For grazing, stone, gravel and earth, and other produce, permits were issued.

## (iii) BY RIGHT AND PRIVILEGE HOLDERS.

As usual the existing rights are those possessed by the Chenchus of the *Guntur* and *Kurnool* districts to the usufruct of tamarind trees at a nominal rate, to other minor produce and materials for huts free of charge, and to free grazing. (The value of the latter comes to about Rs. 5,067).

In *Kurnool South*, the trustees of the Ahobilam temple have a right to timber, fuel, bamboos and fibre for the construction of huts for those visiting the temple. The value of the materials utilized under this right is estimated at about Rs. 30.

## (iv) BY FREE GRANTEES.

Free grants of timber in *Anantapur* and *Guntur*, and timber, bamboos, thatch grass and palmyra leaves in the *three Kurnool* divisions were made, mostly for rebuilding of houses destroyed by fire.

In *Guntur*, free grant of date leaves for the settlers of Jayapuram Industrial Home was made to an estimated value of Rs. 3,659.

The quantity and estimated value of the different kinds of produce removed by right and privilege holders and free grantees are as shown in the subjoined statement:—

	Timber in thousands of cubic feet.	Value.	Bamboos — number in thousands.	Value.	Value of other minor produce including grass and grazing.	Total.
Right holders	..	Rs. 30	..	Rs. 163	Rs. 5,067	Rs. 5,097
Free grantees	.. 20	2,795	.. 15	.. 163	3,659	6,647

N.B.—This excludes the value of the rights and privileges enjoyed by the Chenchus of *Guntur* and *Kurnool* divisions.

(c) *Outturn and Sources of Forest Produce.*

The total outturn from all classes of forests by all agencies is compared with similar details of last year in the following statement :—

Second  
Circle.

	Timber in thousands of cubic feet.	Fuel in thousands of cubic feet.	Bamboos.	Gross value of minor produce including grass and grazing.
1920-21 .. .. .	482	2,572	54,269	Rs. 5,37,798
1921-22 .. .. .	580	2,926	47,006	4,23,072

The fall in bamboos occurred on account of the seeding and consequent death of bamboos in *East Kurnool* division.

The fall in grazing and minor produce is caused by allowing free grazing on account of the adverse season in the *three Kurnool* divisions and to the non-co-operation movement in *Guntūr* district.

The quantity of hay extracted by the Military Grass Farms is shown below :—

	TONS.
Bellary ... ..	826
Anantapur ... ..	143
Kurnool South ... ..	362
Kurnool West ... ..	900

## CHAPTER V.—FINANCIAL RESULTS.

11. The subjoined statement compares the results of the year with those of the previous year and the average of the preceding quinquennium :—

Particulars.	1921-22.	1920-21 (twelve months).	Average of the preceding five years.
	RS.	RS.	RS.
Revenue ... ..	6,31,601	8,51,772	9,26,883
Expenditure—			
“A” Conservancy and Works ... ..	1,61,743	1,62,865	1,96,173
“B” Establishment ...	4,86,479	3,84,829	2,68,331
Total of “A” and “B” ...	6,48,222	5,47,694	4,64,554
Net results ... ..	—16,621	+3,04,078	+4,62,329

The year under report closed with a net deficit of Rs. 16,621 for the whole circle. The deficit occurred in the *three Kurnool* divisions. There was a surplus of Rs. 1,02,573 in the remaining three divisions of the circle.

During the year the revenue decreased by Rs. 2,20,171 and Rs. 2,95,282 respectively as compared with that of the previous financial year and that of the preceding quinquennial average, and the expenditure increased by Rs. 1,00,523 and Rs. 1,83,668 respectively.

The decrease under Revenue was largely due to a considerable fall in the realization of grazing fees owing to free grazing being allowed on account of the unfavourable nature of the season in almost all divisions, to the non-co-operation movement in the *Guntūr* district, and to the low prices obtained for tangedu bark and general minor produce leases. There was little demand for fuel and bamboo coupes and consequently many coupes remained unsold, and prices obtained for those sold were poor.

Of the revenue—

PER CENT.

17.1	was derived from major produce.
7.3	do. from bamboos.
33.1	do. from grass and grazing.
26.9	do. from minor forest produce.
15.6	do. from Miscellaneous.

100.0

Second  
Circle.

Of the expenditure under "A" Conservancy and Works, 33.3 per cent was spent on exploitation, 58.8 per cent on up-keep and improvements and 7.9 per cent on Miscellaneous items. The revenue outstanding at the close of the year was Rs. 12,464 against Rs. 40,935 in the previous year, of which Rs. 7,589 fell due within the year. The estimated value of timber and other produce at the end of the year at sale depots was Rs. 1,058 against Rs. 921 at the end of the previous year.

The expenditure under "A" Conservancy and Works decreased by Rs. 1,122 which decrease in consideration of the financial stringency calls for no remarks, while there was a considerable rise in expenditure under "B" Establishment owing to the increase in pay and rates of travelling allowance of all ranks.

## CHAPTER VI.—RESEARCH AND EXPERIMENTS.

### (a) Research.

12. The following researches were made in *Anantapur* district :—

(1) The bark of a *Cassia auriculata* plant, 15 years old, was sent for analysis to the Research Institute, Dehra Dun, last year. It is reported that the bark was found to be quite up to the average and useful for direct tannage.

The results of analysis are as follows :—

	PER CENT.
Tannin absorbed by chrome hide power ... ..	18.95
Soluble non-tannins ... ..	15.01
Insoluble matter ... ..	66.04
	<hr/>
	100.00

(2) As per instructions of the Chief Conservator of Forests, samples of soils from the Golla Demonstration area, were sent for analysis to the Government Agricultural Chemist, Coimbatore, who reported that the soils were particularly poor in total and available phosphoric acid and also in organic matter.

### (b) Experiments.

*Cassia auriculata* in the Golla reserve of *Anantapur* district.—There were no fresh sowings in the year and it is reported that "the operations were confined to countings in sample plots treated under methods II to V described already in previous reports. The seedlings continue to do well although there are a good many casualties."

The total quantity of rainfall during the year was 26.96 inches against 12.25 inches of the previous year showing that the season was better than the previous year, which is reported to have resulted in better growth.

The countings of seedlings in the one-eighth acre plot of the four methods referred to in the report for 1920-21 are as shown below :—

Method.	Number of seedlings in February 1921.	Number of seedlings in March 1922.	Remarks.
II ... ..	573	462	8" high.
III ... ..	8,522	3,568	2' "
IV ... ..	7,443	2,793	3' 6" "
V ... ..	*20,189	8,104	2' 9" "

\* Erroneously entered as 6,205 in last year's report.

The countings of seedlings on one-tenth acre sample plots instituted in August and September 1920, and reported on in the Administration Report of the last year are compared below :—

Plot number.	Number of seedlings in February 1921.	Number of seedlings in March 1922.
I ... ..	1,681	632
II ... ..	368	173
III ... ..	1,894	1,825
IV ... ..	1,036	1,056
V ... ..	1,921	1,324
VI ... ..	115	56
VII ... ..	197	78
VIII ... ..	381	296
IX ... ..	157	88

Remarks.—The seedlings are only 18 months old and vary in height from between 6" and 20" and are healthy.

Many of the seedlings shed their leaves during the dry period, and the leading shoots withered, but after the rain in October and November some of those that were thought to be dead threw out fresh leaves and branchlets. The most satisfactory method of raising tangedu is found to be sowing broadcast and subsequent ploughing. The density of the crop varies very slightly with the quantity of seed sown above five seers per acre. Plot No. III above was sown with five seers of seed in this manner and cost Rs. 2 per acre.

*Second Circle.*

*Cassia fistula*.—The experiment carried out with a view to arriving at the best age at which the tree should be felled for its bark was continued. Of the 109 trees cut back in the I Block in the year 1919, 18 died and the shoots of the remaining ones are on an average over 10' in height and 7" in girth. Of the 271 trees that were cut back in 1920 in Block II, 36 died and the shoots of the remainder are on an average six feet high, with a girth of five inches. In Block III, 445 trees were cut back in November 1921.

From observations it is probable that *Cassia fistula* coppice shoots are ready for exploitation for bark after four years. The trees that were felled in this district during the lease period of 1918, were found fit for exploitation and have in consequence been leased during 1922. This experiment will be given up, as the Kutagulla reserved forest in Kadiri range, wherein it was carried out, is one of the areas earmarked for disforestation.

In *South Kurnool* 31½ lb. of *Boswellia serrata* gum was sent to Forest Economist, Dehra Dun, for distillation of turpentine, and the result is awaited.

In *West Kurnool*, a scheme for thinning the teak plantations has been drawn up based on the information supplied by Mr. Bourne, I.F.S., from the Nilambur plantation records.

The sample plots in the teak plantations at Nagaluty are being maintained. No other experiments worth mentioning were carried out.

CHAPTER VII.—ADMINISTRATION.

13. The circle comprised the same district charges as last year. The officers who held the circle and the district charges during the period under report are shown hereunder:—

CIRCLE CHARGE.			
Name of Officer.	Period.		
	From	To	
Mr. C. E. C. Fischer	1-4-21	1-9-21	...
Mr. A. B. Jackson	2-9-21	31-3-22	...

DISTRICT CHARGE.			
District.	Name of Officer.	Period.	
		From	To
Bellary	Mr. L. S. Janes	Whole year.	
Anantapur.	Mr. A. B. Myers	Do.	
Guntūr	Mr. D. L. Sathe	1-4-21	8-10-21
	Mr. T. Clear	9-10-21	31-3-22
Kurnool, East	Mr. D. A. Stracey	Whole year.	
Do. South	Mr. H. W. A. Gandoin	Do.	
Do. West	Mr. E. M. Crothers	Do.	

There was no change in the number of range charges, but a proposal to abolish the Adoni range of Bellary district was advocated by me in my inspection note C. No. 716 of 1921, dated 6th December 1921, submitted to the Chief Conservator of Forests.

14. *Tours*—*Chief Conservator's tour*:—The Chief Conservator visited the *Guntūr* district in January 1922, in connexion with the enquiry into the complaints of the people against the Forest department, but an extended tour in the district was given up owing to the difficulties anticipated on account of the non-co-operation propaganda in the upland taluks. He also made a brief halt at Diguvaletta attached to *Kurnool South division* and met the Conservator there.

*Second  
Circle.*

*Conservator's tour.*—The Conservator Mr. C. E. C. Fischer, visited *Guntur* district in July 1921, in connection with the agitation against the department. I inspected (1) Adoni range and Rayadrug section in *Bellary* district (2) Tangedu Demonstration area in the Golla reserve and some of the reserves in Kalyandrug range of *Anantapur* district, (3) Sirvel, Chelama and Gundlakamma ranges of *Kurnool South* division and (4) Gundlabrahmeswaram, Pecheruvu and Bairluti ranges in *Kurnool West* division.

I again visited *Anantapur* in December 1921 and discussed with the District Forest Officer the "*Forest conditions of the district*" which resulted in the disforestation of isolated areas for which genuine demand for cultivation existed. I visited *Guntur* in January 1922 to confer with the Chief Conservator in connexion with the inquiry into forest grievances in the district.

*District Forest Officer's tour.*—All the District Forest officers spent more than the prescribed minimum period in camp, except the District Forest Officer, *Guntur*, who avoided unimportant marches in compliance with the orders of Government in G.O. No. 1149, Finance, dated 19th November 1921.

15. *Inspection.*—All the District Forest offices in the circle were inspected by the Conservator during the year and the result was generally satisfactory.

All the Range offices except Markapur range of *East Kurnool* division were inspected by District Forest officers. This Range office has since been inspected by the District Forest Officer.

16. *Audit of the District Forest offices.*—The accounts of all the divisions of the circle for the year 1920-21 were audited by the Auditing staff of the Accountant-General and no serious irregularities were brought to notice.

17. *Recruitment.*—Three Assistant Conservators, Messrs. J. D. Connolly, H. R. M. K. Law and J. C. Wrench were posted to the circle. Mr. Connolly was posted to *Guntur* and he joined the district on 20th December 1921 for training under Mr. T. Clear, District Forest Officer. Mr. Law arrived in *Bellary* on 8th December 1921 and Mr. Wrench on 31st January 1922 and both of them have been kept under my supervision.

18. *Recruitment to the Forest College, Coimbatore.*—Nil.

19. *Vernacular Training School.*—No school was sanctioned for the circle during the past year. Sanction has been obtained to train twenty men next year in the schools of the First and Third Circles.

Since there are as many as 90 foresters and guards to be trained in this circle, the provision that will be made in other circles will not adequately meet the situation. The training of foresters and guards being a very important matter in making them useful members of the department, a separate school for the circle is a necessity.

20. *Health of establishment, including an account of measures of sanitation and casualties.*—The health of the establishment was fairly satisfactory in all districts, except in the Nallamalais of *Kurnool West* division. Two forest guards died of fever in *Anantapur* district, and guineaworm and Malaria caused occasional trouble in *Guntur*. The financial condition did not permit measures being taken to improve the health conditions of subordinates in the Nallamalais by providing them with quarters in comparatively healthy localities where good drinking water is available.

21. *General.*—A noticeable feature, which retarded the progress of the department in many ways was the non-co-operation movement. It was strongest in *Guntur* and the work of the department was much handicapped there. It took the form of refusing to pay grazing fees and of boycotting and assaulting forest subordinates. I am glad to say, that the strenuous and tactful measures taken by the Collector and by Mr. T. Clear, the District Forest Officer, have now resulted in comparative peace and respect for lawful authority. The executive staff in the district worked hard in the face of great opposition and under trying conditions, and the name of Mr. S. Ramaswami Ayyar, Extra Assistant Conservator, deserves special mention for efficient disposal of offence work in the three Upland ranges.

## CHAPTER VIII.—GENERAL.

Second  
Circle.

## (i) FORMATION AND MANAGEMENT OF PANCHAYATS.

22. There was no addition to the number of panchayats that were in existence at the beginning of the year, but 9 (1 in *Bellary*, 7 in *Anantapur* and 1 in *Guntūr*) were dissolved, owing to mismanagement in the first two districts and to the machinations of the non-co-operators in the last district.

The panchayat management on the whole cannot be said to be satisfactory except for isolated cases.

## (ii) MEASURES FOR IMPROVING LOCAL SUPPLIES AND FACILITIES.

23. In *Bellary*, fuel coupes in reserves were opened and sold wherever there was local demand.

In *Anantapur*, concessions were granted to ryots to sink wells and repair ponds in 4 reserved forests. Twelve coupes in 12 reserves were offered for supplying fuel and small timber to adjoining villagers, but only two of them were sold as there was no demand for the others.

In *Guntur*, permission was granted to private persons to repair existing tanks, spring channels, and construct new tanks in reserves. Forty-six fuel coupes were opened in various reserves and advertised for sale, but only 17 could be sold. Provision for sale of small timber to the ryots was made in the agreements for coupes but it was not availed of. The difficulty of obtaining manure leaves and fodder leaves is a charge levelled against the department mainly from the Upland taluks though there is little or no demand for the former and the latter can be met to a certain extent during the working of fuel coupes, but uncontrolled cutting of foliage during the hot weather cannot be permitted unless all attempts to protect tree growth are abandoned.

In *Kurnool East*, emergency coupes were worked by Chenchus and the yield was available to the people in the surrounding villages, but there is little demand for fuel owing to the existence of extensive unreserved lands. In some places the timber found on these coupes pays expenses, but the fuel is a waste product. Experiments are being made in charcoal burning and if a market can be developed, this may relieve the situation. At present, as it is absolutely necessary to keep the Chenchus in work, they are employed on regenerating the coupes cut as much as possible, rather than on cutting more.

A scheme for supply of agricultural implements to ryots through the agency of the Revenue department was sanctioned during the year and sample plots were felled preliminary to regular felling.

In *Kurnool South*, local demands were met by the working of timber, fuel and bamboo coupes.

In *Kurnool West*, financial conditions did not permit undertaking any scheme to improve the water-supply for cattle in reserves. Fuel was sold from emergency coupes at concession rates to ryots on the certificates of Tahsildar or Deputy Tahsildar that the fuel demanded was for bona fide domestic use. Manure leaf was supplied on the issue of permits at Rs. 2 per cart-load.

## (iii) TIMBER TRANSIT RULES.

24. There are no timber transit rules in *Bellary and Anantapur* districts, and in *Guntūr*, the rules could not be enforced owing to non-co-operation trouble. Breaches of the rules occurred in Giddalore range of *South Kurnool* district owing to the negligence of the special gang posted on that duty and measures were taken to set matters right by punishing the defaulting subordinates.

## (iv) JUNGLE TRIBES.

25. There are none in the *Bellary and Anantapur* divisions.

In *Guntur*, the Chenchus who are settled in the reserved forests of Palnad range, enjoy rights to the usufruct of tamarind trees at a nominal rate, to other

*Second  
Circle.*

minor produce and building materials for huts free of charge and to free grazing. The scheme approved for extinguishing these concessions and for the abolition of their settlement has not been given effect to during the year in consequence of the attitude of the people in Palnad range towards the Forest department. The District Forest Officer intends to take up the question again after respect for the administration of the Forest department has been completely restored.

The Chenchus, in *South Kurnool*, are very few in number and comparatively harmless in character. They are useful to the Forest department in fire-protection operations and the Ahobilam Chenchus do a certain amount of farm labour in the villages.

In the *West Kurnool* division, enough work was provided for the Chenchus to keep them in food throughout the year, but unfortunately this was not so in the *East Kurnool* division owing to inadequate budget provision made in the division, and the result was that some complaints were made by the Chenchus of Regatikunta that they were being starved. If Chenchus are not given sufficient work to earn their food throughout the year, there is naturally a tendency to resort to crime.

With a view to encourage the Chenchus to take to cultivation and give them a training in agriculture, a sum of Rs. 1,009-4-0 was sanctioned by the Collector for cultivating dry and wet lands in 18 gudem of the *East* and *West* divisions, the extent to be cultivated being  $142\frac{1}{2}$  acres. The crops raised were distributed free among the Chenchus themselves. The Special Chenchu Officer during the year was the District Forest Officer, *West Kurnool*. He reported that the cultivation in Pangidi gudem failed, on account of bad fencing, with the result that deer damaged the area, and that the Chenchus of Indreswaram deserve special mention for co-operative spirit in having set aside a sum of Rs. 140 from their earnings for lining a well which they have dug in their gudem without any assistance from Government.

The number of existing schools for the Chenchus was 14 and the average daily attendance in them ranged from 7 to 24 boys and from 6 to 25 girls. The biggest school is in Pecheruvu having on its rolls 27 boys and 26 girls. The number of boys drawing scholarships at the Markapur Board Middle School is 8, of whom 4 are studying in the Fourth Standard and 4 in the First Form. There has been a decided improvement in the conduct of the Chenchus. They have to be provided with departmental work to keep them under control and away from the temptation to commit crime. Of the total number of 16 cases registered against them, 9 cases related to forest offences, and 4 cases related to assaults on public servants.

#### (v) MINING AND QUARRYING.

26. In *Bellary*, licences for prospecting for manganese ore were granted for a period of one year, (1) in Thummurguddi reserve of Kudligi range over an area of 1,557 acres, and (2) in Alagilwada reserve of Harpanahalli range over an area of 601 plus 405 = 1,006 acres. An application for mining black and red earth is under correspondence with the Board. Twenty thousand tons of manganese ore left unremoved by the South Indian Manganese Company and which were forfeited to Government has been sold with two years' time for removal at 12 annas per ton.

In *Anantapur*, three prospecting licences for a period of one year to prospect for Karytes were granted in Muchukota and Nerijamupalli reserves. Licences to prospect for Asbestos in Yadiki reserve and for Stearite in Muchukota reserve were also granted for a period of one year. Although prospecting licences were granted, the parties have done very little in Muchukota and nothing in other places.

In *Guntūr*, the licence to prospect for diamonds granted in 1920-21 having expired, it was renewed for another year by the Collector. Nothing has been stated about the result of working but it is believed to be negative. There is great scarcity of water in the neighbourhood which is a great obstacle to regular work in prospecting. Another licence was granted for prospecting galena in Guttikonda Block II and in Ludikonda in Bollapalli parcelle No. 61 but no work was done.

In *West Kurnool*, the right to quarry and remove slabs and building stone from 15 blocks in Dhone and Kurnool ranges, was leased out at an annual rental of Rs. 13,054 for 3 years. A tract of about 390 square miles in the Yerramalais has been granted for collection of slabs and material for cement on a royalty basis.

In *South Kurnool*, a licence to prospect for barytes in plot 19 "A" of Jaladur-gam reserve, and another for mining in plots I, II, III, in the same reserve for a period of 30 years was issued.

*Second Circle.*

(vi) LIVE-STOCK.

(a) *Elephants.*

27. Two baggage elephants are maintained in the *West Kurnool* division and they are in good condition.

(b) *Other animals.*

Of the 12 bulls that were in stock in *West Kurnool* at the beginning of the year, one bull has been disposed of being too old to work, and another died. Only 4 of the remaining 10 bulls are serviceable and the remainder are too old. The old ones are given rest as no expenditure is incurred on their maintenance as they get grazing free.

There is no live-stock in the other divisions of the circle.

(vii) SUITS.

28. There were no suits during the period.

(viii) CONTROL OF UNRESERVED LANDS BY THE FOREST DEPARTMENT.

29. There are no such lands in charge of the department, except in *East Kurnool* where, it is reported, that the unreserves in three villages, Bonulingam, Velagalapaya and Papinenipalli, continued to be under the general control of the department to prevent smuggling of minor forest produce. The right to collect tangedu bark and nux-vomica seeds in the unreserves of all divisions was leased out by the department.

In *West Kurnool*, the District Forest Officer reports that he has two cases of unreserved areas to be clear-felled by the department before the areas are assigned for cultivation by the Revenue department. The District Forest Officer proposes to carry this out by arrangement with the Collector so that he may keep the Chenchus employed on the work.

BELLARY,  
29th July 1922.

A. B. JACKSON,  
*Conservator of Forests, Second Circle.*



# ANNUAL ADMINISTRATION REPORT OF THE FOREST DEPARTMENT

FOR THE  
YEAR ENDING 31st MARCH 1922.

## THIRD CIRCLE.

### CHAPTER I.—CONSTITUTION OF STATE FORESTS.

#### 1. ALTERATION IN AREA.

*Reserved forests.*—There is a net decrease of five square miles due to the dis-  
reservation of six square miles and the reservation of about one square mile. *Third  
Circle.*

The reduction is mainly in the *North Vellore* division, where the whole of the Vellore and Sattur reserves were notified under section 24, but also to a smaller extent in the *Chittoor, Chingleput, Nellore* and *West Cuddapah* divisions.

Further disreservation has been proposed but will take effect only during the current year.

All the existing 'concession areas' are being investigated with a view to disreservation or reabsorption in the reserves they pertain to. This matter has been dragging on for a long time; the attention of the District Forest Officers has been called to this subject recently and it is hoped to complete the investigation during the current year.

2. *Reserved lands.*—There is a decrease of 677 acres made up of several items all of which are below one square mile. Eight hundred acres were removed from the list and 123 added.

#### 2. FOREST SETTLEMENT.

3. There is only one item of importance pending: the settlement of the Rapur Veligondas proposed reserve of 11 square miles in the *Nellore* district. This has been under settlement for three years owing to disputes, acquisitions and incorrect maps. It is expected to be finally settled in the current year.

The reservation of an area of about five square miles in the Chitvel range of the *South Cuddapah* division, has been proposed and is still under investigation.

#### 3. DEMARCATIION.

4. No new boundaries were demarcated during the year except in regard to small lengths requiring rectification, and these have been considered as repairs.

Existing boundaries were repaired and improved by widening and planting of demarcation pillars. The chief work of the year in this direction was the investigation of the Mysore-Chittoor boundary by a special surveyor lent by the Madras Survey department. The line as laid out by him has been accepted by the Mysore officers and will now be definitely redemarcated wherever necessary.

As usual considerable lengths, aggregating to 5,604 miles, are reported to have been maintained by the subordinates.

#### 4. FOREST SURVEYS.

5. A *Survey of India* party was at work in the *West Cuddapah* division and surveyed five reserves and part of another on the 2" = one mile scale. The aggregate area surveyed was 44.77 square miles.

6. The coupes of the year, road alignments, etc., were surveyed by the local staff.

The prescribed *reference maps* have been posted.

Third  
Circle.

## CHAPTER II.—MANAGEMENT OF STATE FORESTS.

### 1. REGULATION OF MANAGEMENT.

#### (a) Preparation and control of regular working plans.

7. The working plan for the *North Cuddapah* division referred to in last year's report was submitted by Mr. Mahony, but had to be returned for revision on certain points and is still pending.

There has been some revision of existing plans in the same division either in the reallocation of coupes or in the reduction of areas owing to the prescribed coupes being too large. In two cases the system of working has been changed from coppice with standards to simple coppice and one working circle has been abandoned as there is no demand for the produce.

In *South Cuddapah* some rearrangement of coupes was necessary for various reasons.

The working plan for the Palkonda Hills in *West Cuddapah* prepared by the late Mr. M. R. Sundaram Ayyar was revised by Mr. J. A. Master and was submitted for approval just after the close of the year.

Reconnaissance reports for similar plans for other parts of this division were submitted and discussed and the preparation of plans will now go forward.

A tentative working scheme for the Kosinapalli reserve was approved.

The preliminary report for the revision of the Sriharikota reserve working plan was fully discussed with the District Forest Officer, *Nellore* and also with the Chief Conservator during the year. It has been decided to start with a tentative working scheme for three years and the preparation of this scheme is now in the hands of the District Forest Officer and should be ready very shortly.

The District Forest Officer, *Chittoor* has not succeeded in completing any of the three working plans that were already in hand at the beginning of the year. As a special officer is about to be attached to the district, the completion may be expected at an early date.

Work in connexion with the revised Chandragiri working plan has started however as a tentative scheme pending the completion of the regular plan.

The revision of the working plan in the *North Vellore* division is proceeding. A special duty Ranger was attached to the division to help the District Forest Officer.

Work was continued as far as possible under the prescriptions of the existing sanctioned plans which have not been cancelled pending the submission of revised ones.

### 2. COMMUNICATIONS AND BUILDINGS.

#### (a) Roads and bridges.

8. During the year Rs. 21,630 was spent under this sub-head as against Rs. 19,727 in the previous nine months. Of this amount Rs. 13,300 was spent on 32½ miles of new work against Rs. 9,056.

9. Most of the new work was carried out in the Seshachellam Hill block of *South Cuddapah* where the system of roads and bridle-paths was extended by 6½ miles and 9½ miles respectively.

About two miles of cart road were constructed in the Palkonda Hills of *West Cuddapah* and in *Chittoor* divisions the road linking up Bhakarapet, the future headquarters of the Chamala range, with Chandragiri was completed by an extension of three miles.

In other divisions there was either no new work or the items are insignificant.

In the *Nellore* division the tramway materials were used for the transport of fuel.

The existing stock was overhauled, an inventory made and missing articles were written off during the year.

The balance of stock is now inadequate and it is proposed to supplement it in the current year.

*(b) Rivers.**Third  
Circle.*

10. There is nothing to report under this head.

*(c) Buildings.*

11. The total expenditure was Rs. 47,536 against Rs. 25,675 in the previous nine months.

Of this amount Rs. 30,041 was on new work, Rs. 9,978 for repairs and the cost of establishment under the sub-head was Rs. 7,517.

12. The important items of new construction were,

*North Cuddapah division—*

- (1) Completion of a rest-house at Mangannabhavi.
- (2) Part construction of range quarters at Badvel.
- (3) Part construction of permanent camps for the vernacular training school.

*South Cuddapah division—*

- (1) Completion of range quarters at Kodur.
- (2) Completion of combined range quarters and range office at Chitvel.

*West Cuddapah division—*

- (1) Completion of a rest-house at Pullalamadugu.
- (2) Completion of a rest-house at Chintarajupalli.

*Nellore division—*

- (1) Completion of subordinates' lines at Gudur.
- (2) Completion of subordinates' lines at Venkatapuram.

*Chingleput division—*

- (1) Completion of range quarters at Sriperumbudur.
- (2) Completion of range quarters at Sathavedu.
- (3) Part construction of subordinates' lines at Kambakkam.

*Chittoor division—*

- (1) Part construction of range office at Bhakarapet.
- (2) Part construction of range office at Mamandur.

*North Vellore division—*

Construction of subordinates' lines at Arungaldrug.

*(d) Miscellaneous.*

13. The total expenditure amounted to Rs. 2,363 against Rs. 2,625 for the previous nine months. Of this Rs. 1,263 was on new works, none of them of much importance. The expenditure was entirely concerned with the construction, repair and improvement of wells and other sources of water-supply.

## 3. PROTECTION OF FORESTS.

*(a) General protection.*

14. A satisfactory comparison with the previous year's figures is not possible as the period concerned only nine months and to increase the figures proportionately does not tend to accuracy.

The total number of new cases reported in the past twelve months is 7,286 against 6,329 in the previous nine months, giving proportionately 8,439 for twelve months. This indicates a decrease in number of cases reported. This decrease is under all the classes of offences except under injury by fire. Of this latter class a total of 340 cases are reported, of which 336 undetected, against 95 (87 undetected) in the previous nine months (proportionately 127 for twelve months).

15. It is difficult to assign any clear reason for this proportionate decrease. Undoubtedly the spirit of non-co-operation, and the active results thereof as regards infraction of the Forest Law, that prevailed in certain tracts, notably *Cuddapah*, the *Vayalpad taluk of Chittoor* and the *Kanigiri taluk of Nellore*, affected the number of offences. But the effect of this cause operated in a two-fold way, the one contrary to the other, as regards the number of cases reported.

*Third Circle.*

There is no doubt whatever that many offences were committed under the non-co-operation influence and that if all had been reported there would have been a very large increase in the period under report over previous periods, but firstly the subordinates in many cases were terrorised and would not report cases they knew of and secondly some cases that were detected and reported though they concerned a large number of offenders were treated as single cases, whereas under normal conditions they would have been detected as separate cases.

The subordinates could hardly be blamed for their failure to bring organized bands into court since a few men were faced with large bands of men imbued with the idea that the Gandhi Raj was either in being or about to be established and that the forests were theirs to work their will upon. There was much open defiance and but little support by the village officers, though there were honourable exceptions.

The assistance of the Police had to be sought and this was freely granted, especially in *Cuddapah*.

Very considerable loss to Government has resulted from the activities of non-co-operators.

This loss is partly direct loss in revenue through the failure to sell *Kanchas* in the *Nellore* district, and falling off in grazing revenue because cattle were grazed without permit and indirectly through the wrecking of cairns and other boundary marks in the *Cuddapah*, *Chittoor* and *North Arcot* (*North Vellore* division) districts and actual organized destruction of the forests.

It is impossible to assess correctly the money value of the loss, but it amounts to many thousands of rupees.

16. This state of affairs in the *West Cuddapah* division led to the imposition of a punitive police force in the *Rayachoti* taluk, a Forester being specially deputed to command it. This has had an excellent calmative effect not only in the locality itself but throughout the district and it may be said that organized forest degradation under this unlawful spirit is at an end in the district.

The non-co-operation spirit spread from the *Rayachoti* taluk into the adjoining taluk of *Vayalpad* in the *Chittoor* district, where there were three serious cases of assault on forest subordinates while in the discharge of their duties.

In one of these a forester, an ex-military non-commissioned officer, used a gun and injured one of his assailants. He possessed, however, only two cartridges and these being expended he was severely beaten and left unconscious. Some 20 of his assailants have been apprehended and they have been committed for trial to the ensuing sessions.

17. On the whole there has been a distinct if not very pronounced increase in the number of cases reported in the tracts affected by the non-co-operation agitators which is compensated, in the Circle figures, by a distinct fall in the *Changleput* district, where a large proportion of the forest area was leased to panchayats or to 'kanchadars'.

18. There have been a number of cases of rescue of cattle after seizure and before impounding, mostly in the *Chittoor* and *North Vellore* districts. In the latter district three forest guards were murdered, one accidentally as the bullet discharged at one man after passing through that individual penetrated him also as he lay asleep close by.

The third man was beaten to death by a party of men he had detected in the act of illicitly removing manure leaves. Unfortunately the murderers in both cases remain unknown, at least there is no legal evidence against any person. The murder by shooting took place at night and the guard beaten to death was unaccompanied at the time. The three widows have been granted compassionate pensions.

19. The number of cases compounded was 4,766 for an aggregate of Rs. 68,685 against 4,279 for Rs. 64,575 for the previous nine months.

20. Rewards to an aggregate of Rs. 539 were granted against Rs. 721 in the previous year.

*(b) Protection from fire.*Third  
Circle.

21. It is impossible to make a comparison with the figures from previous years, at least as regards results, since the present figures are for the calendar year 1921, whereas previous figures were compiled for either the forest or the financial year.

There was no appreciable change in the area attempted and no change in the method of protection.

The total area burnt was very slightly larger than in the previous year. It was less in the three *Cuddapah* divisions but this was compensated by increases in the *Chittoor* and *North Vellore* divisions and a slight increase in *Nellore*.

22. The problem of fire protection, especially in the *Cuddapah* district, is still unsolved and it is now being considered whether the whole system should not be changed and early burning resorted to.

With the rise in prices and cost of labour the expenditure in some cases is greater than the value of the forest justifies and it is proposed to investigate the whole question division by division and even range by range.

23. The current calendar year has been particularly dry so far and during the first three months disastrous and widespread fires have occurred, particularly in the *Cuddapah* district, but the figures are not included in this report which pertains solely to the calendar year 1921.

*(c) Protection against cattle.*

24. The area closed to grazing for the whole year rose from 825 to 831 square miles. The increase is due mainly to the closure of coupes worked only partly counterbalanced by the throwing open of areas previously closed, either worked coupes now out of danger from grazing or areas opened as their closure was not justified, especially in the *North Vellore* division.

The area open to grazing for the whole year to all animals but goats was 2,518 square miles against 2,493 in the previous year.

25. In the *Chingleput* and *Nellore* districts most of the reserves are leased as 'Kanchas.' The sales suffered in *Nellore* through the non-co-operation agitation and a number of kanchas remained unsold.

There have been complaints against the kanchadars of late in the *Nellore* district, but the system, on the whole, is the best suited to local conditions. Every endeavour is made to induce villagers to lease the kanchas instead of allowing private speculators to do so, definite privileges and concessions being allowed in the former leases.

26. Goats were excluded from all reserves except from 2 square miles in the *Chingleput* district where the artillery practice ground is open to those animals.

27. There has been a falling off in the total number of animals grazed on licence of about 17,000 (13,000 cow units). (These figures exclude the kancha and panchayat forests.) This has occurred mainly in the *Cuddapah* divisions and is due partly to non-co-operation and partly to the *Nellore* cattle coming in fewer numbers owing to the penning in the interior of the forests being prohibited during the year and also to the levy of toll fees at the Dornal pass. The toll for cattle at that place has since been removed.

In the *North Vellore* division there was a small increase due mainly to the throwing open of some areas previously closed.

28. The number of cattle impounded fell from 38,455 for nine months to 36,805. The fall was shared by all divisions except *North Cuddapah* and *Nellore* where there were increases of 75 per cent and 30 per cent respectively. The increase in these divisions is ascribed to non-co-operation.

*(d) Protection against injuries from natural causes.*

29. The work done under this heading was as follows:—

Over about 20 acres in the *Sriharikota* reserve viscum bushes were removed from *Nux Vomica* trees in the *Sriharikota* reserve of the *Nellore* district. This was by

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way of experiment to ascertain the probable cost and to obtain general data concerning this parasite. Further lines of experiment were laid down during the Conservator's visit. There is reason to believe, however, that the effect of the parasite is not as harmful as was thought at first. It is too early to come to any conclusion.

The District Forest Officer *Chittoor* (Mr. Littlewood) has been conducting interesting experiments on a useful scale regarding the effect of 'Atlas' preservative on thorny climbers, lantana and prickly-pear. In the first two cases the bark of the plant to be killed is scraped just above ground level and the poison brushed on; with prickly-pear the solution is sprayed on the bushes. The first method effectively kills the plants in a large proportion of cases, and with prickly-pear the above ground portion is killed which facilitates the digging up and burning of the roots.

It is too early to lay down any definite conclusions, but as far as the experiments have gone they tend to show that this method is likely to accelerate and cheapen the eradication of noxious growth.

There is one point for grave consideration and that is the possibility of cattle grazing in the areas treated being poisoned as Atlas preservative is believed to contain a large, if not preponderating, proportion of arsenic.

Climber cutting was carried out in all felled coupes either at the time of marking by the subordinate staff or during felling by the contractors.

### CHAPTER III.—SYLVICULTURE.

#### (a) *Natural reproduction.*

30. The year, generally speaking, is reported to have been a good one for natural regeneration.

*Pterocarpus santalinus*, *Hardwickia binata*, *Anogeissus latifolia* and *Santalum album* particularly are mentioned. In the absence of a standard, however, it is impossible to give definite value to these generalities. Seedlings spring up, but established saplings are more conspicuous by their absence than their presence and all that can be confidently stated is that for those species it was a good seed year.

#### (b) *Artificial reproduction.*

31. No new regular plantations were made. The so-called 'river side plantations' along the Palar river in the *North Vellore* division were maintained. But here, as nearly everywhere else, dibblings of seeds even when temporarily successful came to nothing eventually as the seedlings generally succumbed in the ensuing hot weather.

As usual sandal has to be excepted from this discouraging statement and 21 small topes that were started in the *Chittoor* district appear to be satisfactorily established. These areas are approximately 2 acres each in extent and are walled or fenced to protect them against cattle.

These 'topes' are scattered over the reserves of three ranges and are intended to become foci for the natural spread of the species as soon as the trees in them bear fruit.

#### (c) *Cultural operations.*

32. No operations under this head other than those mentioned above were undertaken.

#### (d) *Operations for the improvement of the growing stock.*

33. Besides some of the operations described above, which might also be included here, the following works of improvement were carried out.

In the three *Cuddapah* and the *Chittoor* divisions forty coupes, with an aggregate area of 4,451 acres, were worked under the so-called 'improvement felling' system, the main object of which is the improvement of the existing growing stock.

In the *Palmaner* range of the *Chittoor* district operations were undertaken to assist the existing sandal trees by freeing their heads of overhead shade and cover in two reserves at a cost of Rs. 338. A similar operation on a smaller scale in the *Vayalpad* taluk of the same district cost Rs. 68.

In the *Nellore* district experiments were continued to arrive at the best method of clearing thorny noxious growth in the fodder reserves so as to increase and improve the fodder. *Third Circle.*

Lantana was cleared over an area of about 15 acres in the Horsleykonda reserve of the *Chittoor* district.

All worked fuel coupes are fenced against cattle.

#### CHAPTER IV.—EXPLOITATION.

##### (a) *System of management.*

##### (i) MAJOR FOREST PRODUCE.

34. The areas under working are classified as follows:—

System.	Area in sq. miles.	Percentage.
Simple coppice ... ..	152	17.13
Coppice with standards ... ..	227	25.59
Improvement fellings ... ..	130	14.66
*Not under any definite system of working ... ..	378	42.62
Total ... ..	887	100

This is 12 square miles less than in the previous report and there are changes in the areas under each item. This is due in part to wrong figures in the previous report but also to disreservation and to the alteration in the working for some areas from coppice with standards to simple coppice.

##### (ii) MINOR FOREST PRODUCE.

##### (1) *Bamboos.*

35. Bamboo blocks were worked as usual by lessees.

##### (2) *Miscellaneous.*

36. It is to be regretted that the three year lease for nux-vomica seed collection suffered a set-back in all the divisions except *Chittoor* owing to the financial failure of the lessee whose lease had to be cancelled for failure to pay the second half of the year's instalment. The *Chittoor* district was leased to a separate contractor who is carrying on satisfactorily. The cancelled leases are to be resold.

The price of nux-vomica fell rapidly during the year and this accounts, no doubt, for the failure.

37. In the Sriharikota Range of the *Nellore* division minor produce, including nux-vomica seeds, was collected departmentally; elsewhere all items were leased to contractors.

The demand for tanning barks remained poor but there are indications of a rising tendency. For this reason the leases were restricted to one year.

Only in the *North Vellore* division was hay extracted by the Military Grass Farms establishment and there was no departmental working.

Grass was removed free from most of the areas and the concession was extended during the year to removals from closed coupes in the *Cuddapah* district with the object of getting rid of the danger due to fire and the injury to woody growth by choking when abundant grass stands on the area.

In the closed coupes attached to the "Kanchas" of the *Nellore* and *Chingleput* districts the Kanchadars are allowed the privilege of removing the grass in return for the protection of the coupes against grazing, fire and theft.

38. Grazing and the removal of manure leaves (except in the *North Vellore Division*), minerals and thatching grass, was permitted on permit.

In the *Cuddapah* district the seigniorage fee for manure leaves was reduced from Rs. 2 to Re. 1 per cart-load.

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## (b) Agency of Exploitation.

## (i) DEPARTMENTAL AGENCY.

## (1) Major Produce.

39. In the *South Cuddapah* division one improvement felling coupe was worked departmentally as no purchaser could be found for it.

All other areas worked during the year were sold standing to contractors.

Small quantities of produce were extracted here and there by departmental agency either for specific purposes, such as the construction of buildings, or in cutting boundaries and clearing road alignments.

## 2. Minor Forest Produce.

40. As usual the minor forest produce in the Sriharikota Reserve of the *Nellore* district was collected by departmental agency.

Insignificant quantities were also collected in the *North Vellore* division prior to the areas being leased; thereafter and in all other tracts the produce was leased to contractors.

## (ii) BY PURCHASERS.

41. There is nothing to add to the information in the two preceding paragraphs; the great bulk of exploitation is carried out by purchasers.

## (iii) FREE GRANTEES.

42. Free grants were made only to indigent people for the purpose of rebuilding dwellings destroyed by fire.

The quantities, which are shown in forms 76 and 77 are somewhat in excess of the previous year, except as regards fuel of which there was no grant during the year; but the figures under report cover a period of 12 months as against 9 for the previous reports and proportionately there is a difference of about 10 per cent in favour of the period under report.

## (iv) RIGHTS AND PRIVILEGES.

43. Under the terms of the Forest settlement the inhabitants of *Settigunta* village in *South Cuddapah* have the right to graze a limited number of cattle free in the reserve of that name.

	Timber in thou- sands of cubic feet.	Value.	Fuel in thou- sands of cubic feet.	Value.	Bamboos in number.	Value.	Grass and grazing.	Other miner produce.	Total.
Free grantees ..	59	RS. 8,740	..	..	30,715	RS. 392	174	770	RS. 10,076
Right holders ..	..	..	..	..	..	..	86	..	86
Total ..	59	8,740	..	..	30,715	392	260	770	10,162

## (c) Outturn and sources of forest produce.

44. The change in the period of report makes comparison in outturn of no value and hence it is omitted.

It was hoped that the lease of nux-vomica separately would lead to the collection of trustworthy information of yield but the failure of the lessee has rather frustrated these hopes.

In any case there are no figures of past yield for comparison except in Sriharikota where a good season resulted in 589½ candies of nux-vomica being collected against 462 in the previous season and the previous maximum of 515 candies. The increase is partly due to the more or less complete stoppage of smuggling by private owners, and also to the yield of privately-owned trees being collected departmentally under a new arrangement. This latter step was taken by way of putting a stop to smuggling. The owners are paid the actual selling price less a small percentage to cover cost of collection, storage and sale.



## CHAPTER V.—FINANCIAL RESULTS.

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45. As the last report covered only a period of nine months and as there have been territorial changes since the last full year's figures were compiled no useful comparison with past figures can be made.

The outstanding feature is that the considerable net surplus of previous years has been converted into a deficit of Rs. 41,818. This is due practically entirely to the rise in cost of work and of labour for the fall in revenue as compared with the figure of the previous reports is about Rs. 4,000, and Rs. 7,500 less than the average for the previous quinquennium, whereas the total expenditure is greater than that of the previous period by Rs. 1,18,778 and exceeds the average of the previous five years by Rs. 2,02,093.

46. The fall in revenue is accounted for mainly by decrease in grazing revenue in the *Cuddapah* division and in *Nellore* partly due to the influence of the non-co-operation spirit and also to the non-advent of *Nellore* cattle in *Cuddapah* as previously explained. There was also some fall in the prices realized for tanning bark leases.

The aggregates seem to indicate that the rise in expenditure is entirely under salaries and allowances and undoubtedly this is mainly accountable. Nevertheless the rise in cost of material and labour is also a material point for though, the aggregate under the budget head A does not greatly exceed past figures, the actual work carried out was less as the programme was pruned down heavily owing to the financial stress.

47. Only two divisions—*Nellore* and *North Vellore*—showed a surplus (Rs. 1,08,271 and Rs. 60,779 respectively) and all the others contributed towards the deficit in varying degrees.

## CHAPTER VI.—RESEARCH AND EXPERIMENTS.

48. *Red sanders*—(*Pterocarpus santalinus*).—The experiments referred to in the last report were continued. They must be persisted in for a series of years before conclusion of any value can be derived from them. It would be waste of space to enter into details at the present stage.

No new experiments with this species were inaugurated.

49. *Hardwickia binata*.—It is matter of common observation that promising regeneration of this species in suitable localities disappears for the most part before reaching the sapling stage.

To ascertain the cause of this failure an area of 5 acres in the *Sancherla Fuel* series in the *Porumamilla* range of *North Cuddapah* was walled in. A note of the consistency and the condition of the existing crop was made and the area is to be kept under observation. On a small sample plot within the walled enclosure the *Hardwickia* seedlings were enumerated and their future progress will be watched.

50. *Sandal* (*Santalum album*).—The two isolated groups of sandal saplings on the tank bund at *Horsleykonda* described in the last report were kept under observation. There can be no doubt that these have existed for nearly three years without a host plant of species other than sandal and yet they do not appear to have suffered materially.

Dibblings of sandal seeds in order to spread the species where it does not occur at present continued in all divisions with varying results, but mostly successful.

Generally speaking, this species comes up readily in suitable localities and failure is due to specific causes; usually either unsuitable locality or the destruction of seeds by animals.

In this connection it may be mentioned that the District Forest Officer, *Chittoor* (Mr. Littlewood) experimented with red oxide of mercury and corrosive sublimate to try and protect the seeds of sandal against rodents, but the poison did not prevent their destruction. There was no news of the rodents. This experiment was reported in the *Indian Forester* of April 1922.

It is believed that another occasional cause of failure is due to the local people pulling up the seedlings through apprehension that the forest will be closed and their privileges otherwise restricted if the propagation proves successful.

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51. *Miscellaneous.*—Experiments on several other species are under observation in other localities: notably *Shorea Tumbuggaia* on the Kambakkam Hill in the *Chingleput* district and on bamboos, teak and *Hardwickia* in the Pichanur tope in the *North Vellore* division.

52. *Rooting of coppice.*—Advantage was taken of the Vernacular Training School to start some observations on the power of coppiced stumps to produce new roots and the incidence of such roots being formed. The importance of this phenomenon is obvious since the life of pure coppice depends on it and also the necessity or otherwise of securing new seedlings in a pure coppice area. No conclusions can be come to yet but the observations made so far indicate that new roots are formed only after the old roots begin to decay.

Observations on a large scale, in all localities and with all species are necessary. The Vernacular Training Schools offer a good opportunity for such research as they work under selected officers.

53. *Eradication of noxious growth.*—Experiments with Sodium arsenate on thorny climbers in the *South Cuddapah* division (Mr. Master) proved unsuccessful, but, as previously stated, considerable success was obtained in the *Chittoor* district by Mr. Littlewood with Atlas preservative.

A primus blow lamp was also experimented with in the *South Cuddapah* division to see if it could be used for killing thorny growth and grass; but it was found that the flame is not sufficiently hot for the purpose and also it is too fitful under the conditions it would have to be used in for this purpose.

In the *Nellore* district (Mr. V.-N. Seshagiri Rao) experiments were conducted in fodder reserves with the object of arriving at the best method of eradicating thorny growth so as to increase the available pasture. The greatest success was attained by exposing and cutting the side roots and then burning the stumps by firing heaped dry brushwood over them. Of 161 stumps so treated all but 9 were killed outright and the survivors threw up a few weak shoots. The cost was Rs. 2-2-0 per acre, which is well within the economic limit.

Better results still and at a lower cost, however, seem likely by employing a whole-time Forest Guard whose sole work is eradication and who is given extra help at special seasons. He is provided with the necessary tools and lives in a hut on the area and spends his time in rooting up the noxious growth which is then burnt or sold if there is demand.

54. Experiments, already referred to in an earlier chapter, are being carried out in the Sriharikota reserve of the *Nellore* district to obtain information regarding the amount of damage done by parasitic *Loranthaceae* (mainly *Viscum orientale*) to *Strychnos Nux-vomica* and the best way of dealing with the pest. The observations are being directed particularly towards the following points:—

- (a) The species of plants other than *Strychnos Nux-vomica* commonly attacked.
- (b) Whether the parasites die off of themselves and if so when and how.
- (c) How soon reinfection takes place after a tree has been cleared of the parasite.
- (d) Whether infection takes place at a definite season.
- (e) Whether new shoots of the parasite grow up after the bush has been pulled off from roots left in the host.

55. A research and experiment register has been opened in the Circle office. In this the 'approved' experiments in the several districts are posted in order to ensure continuity. In the absence of such a Circle record experiments started are apt to be neglected or lost sight of altogether on the transfer of the officer who has started them and much useful work has come to nothing in this way in the past.

#### CHAPTER VII.—ADMINISTRATION.

56. There has been no change in distribution during the period under report.

57. *Health and sanitation.*—Parts of the *Cuddapah* district, the Mamandur range of the *Chittoor* district and Sriharikota in the *Nellore* district maintained their evil reputation for malaria. It is necessary in this connection not to retain officers for too long in these tracts; as they comprise more than half the total number of ranges-

in the Circle, however, it is a matter of considerable difficulty to effect transfers at reasonable intervals, but some arrangement is necessary if the efficiency of the staff *Third Circle* is not to be very seriously impaired.

Mamandur especially is particularly unhealthy and proposals for the improvement of the sanitation of that place have been in contemplation for several years. Financial considerations have stood in the way and it is only in the year under report that definite steps have been taken. Range quarters in a healthier site were nearly completed and the clearing of prickly-pear and other bushy growth over a wide belt all round the dwellings has been started. It is also proposed to breach an insanitary tank near the village and thus oblige the people to resort to draw wells for their water. So long as the tank exists their sloth will prompt them to get water from it, however bad that may be.

The proposal for a pipe line from the hills adjoining to bring good water to Mamandur was investigated by the Forest Utilization Officer, but the cost was found to be prohibitive. Fortunately, however, it has been ascertained that the belief that all the existing wells ran dry during the hot weather is unfounded and the solution seems to lie in finding a good site for a new and large well.

The *casualties* reported in the Circle are :—

From *malaria* three Foresters, five Forest Guards, one Range clerk and two children.

From *plague* one Forester (North Vellore).

From *fever* (undefined), one Forest guard.

58. *Tours of inspecting officers. Conservator.*—All the divisions were visited and all the District Forest offices were inspected during the year. 306 days were spent on tour.

*District Forest Officers.*—All the officers spent more than the prescribed minimum on tour. All the Range offices but 3 were inspected during the year, and 2 of the latter soon after its close.

59. *Audit of District Forest Office accounts.*—All the offices were audited with satisfactory results.

60. *Madras Forest College.*—Three students returned from training and were posted as Probationary Rangers.

Two Foresters were deputed for training and will complete their course in June 1923.

One Forester was deputed in July 1920 and was at the College throughout the year.

61. *Vernacular Training School.*—The 1921 session terminated successfully in August. The current session began with 31 students in January 1922 and will terminate on 31st July. The Vernacular Training School is now located permanently in the *North Cuddapah* division and this permits of permanent camps being constructed, instead of tents having to be provided.

62. *Conduct of establishment.*—On the whole the Rangers have behaved and worked well, a few excellently, though there are some quite unsatisfactory individuals.

The Protective staff is commended in some districts, but is generally very unsatisfactory in the *Cuddapah* district, more particularly in the *West Cuddapah* division where lack of control brought about great laxness in every direction until recently. The present District Forest Officer (Mr. Mahony) is continuing the work of tightening up control and weeding out undesirables started by his predecessor (Mr. Master) who was in additional charge of the division during part of the year.

## CHAPTER VIII.—GENERAL.

### (i) FORMATION AND MANAGEMENT OF PANCHAYATS.

63. Eight panchayats were dissolved in the *North Vellore* division as the reserve in their charge is to be disafforested for cultivation.

In the *Chittoor* district 2 panchayats that were dissolved 2 or 3 years ago are proposed for reinstatement for which sanction was received just after the close of the year.

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Circle.*

There were no other changes.

In the *North Vellore* and *Chingleput* divisions the panchayats are reported to have worked satisfactorily, but, of these in the *West Cuddapah*, *Chittoor* divisions and 2 out of 3 in the *Nellore* division the reverse is complained of.

(ii) CONFERENCES AND MEETINGS.

64. The Conservator requested Collectors to admit Forest officers to conferences held with their Revenue officers and several such were held. The Conservator was present at one each in the *Cuddapah*, *Chittoor* and *Chingleput* districts and is convinced that much good comes of the free exchange of opinion, the explanation of reasons for certain measures and the exposition of the difficulties in the way of effecting reforms that seem so eminently desirable to those who are not familiar with the practical results.

There is, at present, far too little real solidarity between the officers of the several departments and not only such more or less public meetings are necessary but a much greater measure of informal meetings between individual officers and co-operation in the local administration. This refers not only, or even so much, to the higher officers as to those of the rank of Rangers and corresponding ranks in other departments.

A circular recommendation on this subject was issued to all District Forest Officers just after the close of the year and Collectors have been requested to co-operate.

65. The Conservator has also endeavoured to meet the Members of the Legislative Council for the several districts and has had several useful discussions and has to thank the Members concerned for a patient hearing and for useful advice and information.

66. Opportunity has been taken when occasion offered to meet deputations of ryots and to explain to them the reasons for unpopular measures and the difficulties in the way of the grant of greater privileges.

The greatest difficulties met with are the stubborn prejudice in the minds of ignorant villagers and their unwillingness to accept any responsibility in return for concessions.

(iii) MEASURES FOR THE IMPROVEMENT OF LOCAL SUPPLIES AND FACILITIES.

67. The concluding sentence of the last section indicates why concessions cannot be more widely granted.

Some wells and watering places were repaired and ryots were encouraged to effect improvements at their own cost. The financial situation prevents very much work being done in this direction. Certain villagers have been encouraged in the *West Cuddapah* division to construct a cart-track that will be useful to them through a reserved forest and a similar undertaking is under contemplation in the *North Cuddapah* division.

In the *North Vellore* division a fuel coupe was leased to a co-operative society at the average selling rate for the previous three years. The arrangement has worked very well. The society has made a profit and has incidentally reduced the sale price of fuel in Vellore town. The members are devoting part of their profits to construction of an export track to the working circle.

It is proposed to continue the lease annually for the future coupes of the working circle and it is also contemplated to lease a bamboo block to the same society.

This arrangement offers promise of smoother working and improved relations with the local population. It owes its inception to M.R.Ry. O. Ramaswami Ayyar, lately Assistant Registrar of Co-operative Societies at Vellore. It is very desirable to extend such operations and the Assistant Registrars of Co-operative Societies in other parts of the circle have been requested to lend their good offices for this purpose.

68. The question of the supply of the forest products required in the daily life of the population living close to the forests has been under detailed investigation during the year and provision is being made wherever it is required and possible to meet these demands by the opening of coupes for manure leaves, fencing thorns, fuel, etc. *Third Circle.*

(iv) TIMBER TRANSIT RULES.

69. The necessity for revised rules in the *Chittoor* district for the better protection of sandal was mentioned in the previous reports. Rules on the model of the South Kanara ones have been framed. Owing to the necessity of co-operation with the adjoining North Arcot district it was deemed essential to frame combined rules for the two districts. As this involves four forest divisions lying in two different forest circles there has been some delay. The draft rules were considered and revised at a conference of the two Conservators and two of the Divisional Officers concerned and will have to be further considered. It is hoped, however, to be able to submit them to Government before long.

Elsewhere there is no complaint against the existing rules.

(v) JUNGLE TRIBES.

70. The Yenadis in Sriharikota were employed, as usual, on the collection of minor forest produce. There has been a small increase in their numbers and it is proposed to still further increase them as they are useful for this and other departmental works.

The *North Vellore* division was added to the circle just before the beginning of the year under report. During the year the provisions of the Malayalee Hill village system prevailing in the *South Vellore* division have been extended to the Malayalis of the Thellai section of *North Vellore*. It is too early to comment on the result.

(vi) MINING AND QUARRYING.

71. The only item under this head, besides the usual quarrying of stone for construction and for road works, is the mica mining in the *Nellore* district. As this latter mining is no longer the concern of the Forest Department, no further mention will be made of it here.

(vii) LIVE-STOCK.

72. The numbers remain at two buffaloes at Horsleykonda and one bullock at Palmaner in the *Chittoor* district and one buffalo at Kambakkam in the *Chingleput* district. All are used for the carrying of water and are reported to be in good condition. As they are looked after by the local subordinates and obtain their provender by grazing in the forests, they do not entail any specific cost.

(viii) VETERINARY ESTABLISHMENT.

73. Is conspicuous by its absence.

(ix) SUITS.

74. The property of the defendant in the Pameleru suit in the *South Cuddapah* division who was adjudged insolvent was seized and put up for sale. No purchaser being then forthcoming it is to be offered for sale again.

The appeal of the Shrotriendar of Putlampalli in *West Cuddapah* against the decision of the District Judge was successful in the High Court and a sum of Rupees 2,229-11-9 was paid to him.

The Jaghirdar has not yet filed his threatened suit in the Pamur case in the *Nellore* district, referred to in the last report.

The matter of the claim to a portion of the Udayagiri Veligonda block B of the *Nellore* district has been dropped pending the production of the boundary decision made in 1864 by Mr. Kanchi Subba Rao, which cannot be traced.

The result of the appeal of the Zemindar of Bangarapalayam in the *Chittoor* district is still awaited.

C. E. C. FISCHER,  
Conservator of Forests, *Third Circle.*

9th July 1922.

# ANNUAL ADMINISTRATION REPORT OF THE FOREST DEPARTMENT

FOR THE  
YEAR ENDING 31st MARCH 1922.

## FOURTH CIRCLE.

### CHAPTER I.—CONSTITUTION OF STATE FORESTS.

#### 1. ALTERATION IN AREA.

*Reserved forests and reserved lands.*—About 15 square miles of the reserved *Fourth Circle.* forest were disafforested during the year mostly to allow of extension of cultivation: with some small additions, the net area at the end of the year was 2,702 square miles as against 2,711 of last year. Under reserved lands, the area increased from 44 to 57 square miles mostly in South Salem as a result of taking up lands to try and preserve the head waters of the southern arm of the Vasisthanadi.

#### 2. FOREST SETTLEMENT.

2. Eight blocks with an area of  $7\frac{1}{2}$  square miles were finally settled during the year.

#### 3. DEMARCATION.

3. Three miles of boundaries in South Salem division were finally demarcated.

#### 4. FOREST SURVEYS.

(a) *By the Survey of India Party.*

4. *Nil.*

(b) *By Madras Survey.*

5. The outer boundaries of reserves in Vriddhachalam taluk, East Salem division, were surveyed, while in South Salem the party completed the survey of reserves in Lalgudi and Musiri taluks and were at work on reserves in other taluks.

(c) *By Departmental Survey.*

6. Coupe surveys were carried out as usual departmentally.

### CHAPTER II.—MANAGEMENT OF STATE FORESTS.

#### 1. REGULATION OF MANAGEMENT.

*Preparation and control of regular working plans.*

7. *Preparation.*—No regular working plan was sanctioned during the year.

Revised schemes for working the bamboo areas in the Chitteri North Working Circle in East Salem and in the Perambalur, Musiri and Namakkal ranges of South Salem as also one for the "Kassan" (*Memecylon*) forests in the Udayarpalayam section of the latter division were approved by the Chief Conservator during the year. The proposals for working the Class II forests of Gingee Range in South Vellore, and bamboo areas in West Vellore are still awaited. The revised working plan for Kallavi-Elavambadi group of reserves in East Salem is under correspondence.

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A tentative arrangement for fuel working near Arasalur in the South Salem was sanctioned by the Conservator and a scheme for the six reserves around Thoppur submitted by the District Forest Officer, Central Salem, is under consideration.

8. *Control.*—The prescriptions of the following working plans were adhered to:—

- (1) Sandalwood working plan for the Javadis and Yelagiris in South and West Vellore divisions;
- (2) Sandalwood working plan for the Hosur Taluk, North Salem division except in areas affected by spike;
- (3) Preliminary working plan for the sandalwood areas in the other three Salem divisions;
- (4) Working Plan for the Kavaramalai working circle in Central Salem;
- (5) Working plan for bamboos and minor forest produce in South Vellore, and
- (6) Working plan for the fuel areas in Vaiyampatti and Namakkal Ranges in South Salem.

The other working plans are either obsolete or defective and require revision.

## 2. COMMUNICATIONS AND BUILDINGS.

### (a) Roads and Bridges.

9. During the year, the expenditure on new works and repairs, was Rs. 16,555 and Rs. 4,537 respectively.

There was little progress on road works on the Javadis. The *Amerdi-Nadamar road* was not completed as expected last year, the amount spent during the year was Rs. 10,029. *Komattiyeri-Patrakad road*—very little progress was made owing to investigations being made as to the way in which measurements had been made and paid for in the past. The amount spent was Rs. 5,104. Other road works on the Javadis are not likely to be carried out for several years as they will not pay their way yet a while (Chief Conservator's Proceedings, Mis. No. 437, dated 5th October 1921.)

The Gillman road hitherto maintained by the Forest Engineer was handed over at the close of the year to the District Forest Officers, South and West Vellore divisions, for future maintenance.

The chief items of new works were the extension of the Kottapatti-Veeramalai road, the completion of a culvert across the Venkatachalapuram supply channel on the Uppiliapuram-Sengattupatti road, the construction of a portion of the cart-track from Andjmadam-Vriddhachalam Local Fund road to Kanguli reserved forest and the conversion of a portion of the Malayalapatti-Pandal bridle path into a cart-track in the South Salem division. No new work was undertaken in other divisions.

### (b) Buildings.

10. The cost of new buildings and the maintenance of existing ones (including the pay of watchers) during the year under review was Rs. 6,634 and Rs. 12,009 respectively. The important new buildings constructed were—

*North Salem—*

Sandalwood godown at Sivanapalli.

*South Salem—*

- (1) Rest houses at Puliyansholai, and Mayambadi;
- (2) Inspection shed at Mettunagur;
- (3) Outhouses to the Malayalapatti rest house.

A building for the Thammampatti Range office was purchased at a cost of Rs. 1,750 in South Salem division. The rest house with outhouses and subordinates quarters at Kavalur was handed over during the year to the District Forest Officer, West Vellore, by the Forest Engineer.

### (c) Miscellaneous.

11. The cost of new works and repairs was Rs. 273 and 497 respectively. The expenditure was entirely on the digging of new wells or the repairs of the existing sources of water-supply.

## 3. PROTECTION OF FORESTS.

## (a) General Protection.

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12. The following statement shows the offences registered during the year under report:—

	1921-22.	Proportionate number for the corresponding period of 1920-21.	
	NO.	NO.	
Injury to forests by fire ... ..	349	172	increase.
Unauthorized felling .. ..	6,883	6,633	"
Unauthorized grazing ... ..	1,333	1,632	decrease.
Other offences ... ..	352	196	increase.
<b>Total ... ..</b>	<b>8,920</b>	<b>8,632</b>	

The increase under injury to forests by fire is due generally to a drier season in the early part of 1922 (this portion of the report refers to the financial year). The increase under unauthorised felling and other offences is attributed partly to the trouble caused by the 'non-co-operators' and partly to the better detection by the patrol parties and by the panchayatdars under the 'Forest village system' in Tiruvannamalai range of South Vellore who did very well.

## CASES BROUGHT TO TRIAL.

Year.	Number.	Convictions.	Acquittals.	Percentage of failures.
1920-21 (nine months) .. ..	1,834	1,768	66	3.69
1921-22 (one year) .. ..	2,454	2,331	123	5.52

The number of cases brought to trial, viz., 2,454 is, only slightly higher than the proportionate number for the corresponding period of last year (2,445) and calls for no remarks.

13. A sum of Rs. 62,658 was collected as compounding fees during the year against Rs. 39,603 in the previous year. The variation is chiefly due to the 12 months' figures taken up for the year as against 9 months of last year. The instructions issued in G.O. No. 1990, Revenue, dated 13th June 1910, were generally followed in fixing compounding fees.

## PATROL SYSTEM.

14. The patrol system was in force in South Vellore, East, Central and South Salem districts during the year and is stated to have given good results, the only specific information given is that in South Salem the revenue collected for the removal of leaves for manure has risen from Rs. 2,400 in 1918-19 and Rs. 4,200 in 1919-20 to Rs. 15,800 in 1920-21 and Rs. 28,062 in this year, and this in spite of the fact that owing to the seditious non-co-operation movement raids were made by large gangs of villagers in various parts in the north of the division. The men who obtained these results were given special promotion.

## REWARDS.

15. A sum of Rs. 520 was distributed as rewards in South Vellore, East Salem and South Salem in important cases mostly of sandalwood smuggling and goat-browsing.

## (b) Protection from fire.

(Calendar year 1921.)

16. *Special protection.*—The area which was under special protection was 1,066 square miles as compared with 1,101 square miles in the previous year. An area of 1,050 square miles was successfully fire-protected at a cost of Rs. 6,152 during the year. The percentage of failure being 1.53 against 0.96 in the previous year.



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Circle.

The increase is due to a dry season, to the flowering and death of *Bambusa* having rendered the North Salem forests exceptionally inflammable, and to 'non-co-operation' in the East, Central and South Salem divisions. In South and West Vellore, the protection was good.

17. *General protection*.—The area under general protection during the year was 1,564 square miles against 1,586 square miles in the previous year, the percentage of failure being 1.44 against 0.67 in the previous year. The reasons given for the failure under special protection hold good here also. The area burnt was 22.06 square miles.

Appendix A shows details and origin of fires.

(c) *Protection from cattle.*

18. There is an increase in the number of cattle impounded in South and West Vellore, East and North Salem divisions, and Appendix B shows details. The special patrol party and the consequent increased vigilance of beat subordinates and the panchayatdars under the forest village system in Tiruvannamalai range had led to the increase.

The incidence of grazing fell during the year from 5.20 to 5.55 acres per cow unit. The figure is however misleading as in North Salem, the figure is in some parts as high as 20 acres and in other localities is down below 1 acre to the cow unit.

(d) *Protection against injuries from natural causes.*

19. *Prickly-pear*.—The clearance of prickly-pear in Morappur reserve in East Salem was given up, as it was thought that the operation was economically unsound. As reported last year, the regrowth of this pest was cleared free of cost by the Malayalees in the Upper slopes and Plateau of the Chitteris in East Salem. *Acacia intsia* and *Zizyphus aenoplia* were cut to some extent by subordinates in Central Salem during their patrol.

*Lantana*.—Eradication of this plant was continued in Chengam range till September 1921 when it was stopped. The pest occurs everywhere almost and it is hopeless to try and keep it out of the areas cleared when reinfection occurs at once from the adjoining lands.

*Creepers cutting*.—This was as usual done in all sandalwood areas and also in grazing blocks by the Malayalees under the forest village system.

*Loranthus*.—The branches of young sandal trees in Karavallikombai on the Namakkal-Kollimalais affected with this pest were cut off. The dead and dying trees were also removed.

*Spike*.—This is dealt with under research work.

*Bison and sambhur*.—These levied their usual toll of the young sandal in South and West Vellore divisions, and of other species in the Amerdi plantation.

### CHAPTER III.—SYLVICULTURE.

(a) *Natural reproduction.*

20. Natural reproduction of sandal was good throughout, but very large numbers of the seedlings die off in the hot weather. The scratching of soil under mother trees and dibbling of seeds in small blanks seems to give no results. The seeding of sandal in the Yelagiris was fair this year, but failed in the Central and East Salem divisions.

21. *Bamboos*.—The regeneration of *Bambusa arundinacea* is good as a result of the general flowering and seeding in all the districts except North and Central Salem where the seedlings were burnt by the unusually heavy fires this year.

*Hardwickia binata*.—Regeneration of this species is specially noteworthy in Pavunjipatti reserved forest in South Vellore, good in Bathनावadi reserve in Central Salem, and in areas closed to grazing in North Salem, but was poor in the West Vellore Javadis.

*Other species.*—Natural regeneration of *Anogeissus latifolia*, *Chloroxylon swietenia*, *Albizzia amara*, and *Acacia sundra* was good in the felled coupes closed to grazing in South and West Vellore, East and South Salem. *Avicennia officinalis* is coming up profusely in the swamp forests of Pichavaram in East Salem. Natural seedlings of *Schleichera triyuga* were observed on the plateau of the Bodamalais and the Shevaroyis in Central Salem. *Dalbergia latifolia* and *Albizzia odoratissima* are coming up on the Kollimalais and Musiri-Pachamalais and seedlings of *Agadirachta indica* were noticed in the Udayarpalayam section forests of South Salem division.

(b) *Artificial reproduction.*

22. The only regular plantation of importance is the one at Amerdi in the South Vellore division. During the year the work was confined to filling up failures in the previous year plantation by sowing seeds of, *Hardwickia binata*, *Gmelina arborea* and *Pterocarpus marsupium* in the hilly portion and planting out direct Teak, Sissoo, *Chloroxylon swietenia* in the level bits, but the operation proved a failure owing to want of rains after planting and the exceptionally long dry weather of last year; Sissoo and *Gmelina* did best. Rupees 422 was spent during the year on the upkeep of the old plantation and Rs 178 on the completion of the work started in the previous year. An area of 5 acres was selected in Muttakadu reserve in Gingee range for regular plantation purposes. Seedlings of Teak, *Albizzia Lebbek* (Vagai), *Melia dubia* and *Gmelina arborea* were raised in a nursery and transplanted in 5 acres in Kurumbapatti reserved forest in Central Salem but the plantation was overrun by fire, and the surviving plants are Teak (254), *Gmelina arborea* (159), and Vagai (25).

In South Salem, seeds of different timber species were sown, but very few germinated and even these did not survive the hot weather.

*Taungya plantation.*—The only plantation was the small experimental teak plantation in Pakkam reserved forest in South Vellore division. As the area was found unsuitable for teak, it was given up.

*Cultural operations.*—Regeneration operation in sandal areas was undertaken but the result of sandal sowing was on the whole a failure. As proposed last year, sandal seeds mixed with red lead and water, red lead and kerosene oil and red lead and linseed oil were sown, but without result.

(c) *Operations for improvement of the growing stock.*

23. Tending was undertaken in all sandalwood coupes. Creepers and climbers were cut and sandal trees were freed from overhead shade. The worked fuel coupes were fenced. In the Harur range reserve in East Salem division, *Zizyphus ænophia*, *Pterolobium indicum*, Jasmine, Convolvulaceous creepers were cut to favour the growth of sandal. In West Vellore, Rs. 328 was spent on cutting back hollow, crooked trees, and useless species interfering with the growth of better species. The area gone over is 140 acres. In the East Salem division, the improvement fellings were executed over an area of 83 acres in Coupe II of Tagarai Hill Timber working circle at a cost of Rs. 41. The operation was stopped as it was ascertained that there was no real timber to improve and was not likely to be any.

#### CHAPTER IV.—EXPLOITATION.

(a) *System of Management.*

24. The total area under working-plan during the period was 1,707 square miles and various sylvicultural systems in force are detailed below :—

	Area in square miles.	Percentage to the total area under working-plan.
Clear fellings ... ..	49	2.87
Simple coppice ... ..	25	1.47
Coppice with standards ... ..	683	40.01
Selection fellings .. ..	338	19.80
Improvement fellings ... ..	375	21.97
Pastoral methods ... ..	195	11.42
Forests for which working plans have been prepared but are not subject to any definite system of working ... ..	42	2.46
Total ... ..	1,707	100.00

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Circle.(b) *Exploitation by departmental agency.*

25. The chief item of departmental extraction was sandalwood. A quantity of 304 tons was sold against 237 tons in the previous year, the average rate being Rs. 1,174 per ton against Rs. 1,595 in the previous year and against Rs. 1,402 in the year previous to the last. Two of the Mysore Government representatives attended our sales.

*Timber.*—Eight hundred and seventy-five cubic feet were removed from the areas under improvement fellings in West Vellore and 501 cubic feet of timber was extracted in the unreserves in North Salem for supply to the Remount depot and for departmental buildings.

*Fuel.*—Six hundred cubic feet of dead fuel were collected and sold to the pilgrims who attended the Audi festival at Hoganikal, North Salem division.

*Bamboos.*—With the exception of a small quantity for departmental use and a few supplied to the Remount depot from unreserves in North Salem, bamboos were extracted by lessees.

*Manure leaves.*—Twenty-four head loads (48 quarters) of manure leaves was cut in plot II of the Jadayagounden manure leaf experimental area in East Salem and sold.

(c) *Exploitation by purchasers.*

26. *Timber, fuel and bamboo.*—No useful comparison can be drawn between the figures of this year and those of last year as the latter related to nine months.

*Grazing.*—Of the total area of reserved forests and reserved lands, 87.17 per cent was opened to grazing against 87.47 per cent in the previous year. The incidence of grazing in the several districts of the circle is given below:—

Divisions.	Acres.	Cow units.	Number of acres per cow unit.
South Vellore .. .. .	259,200	46,298	5.59
West Vellore .. .. .	285,520	60,163	3.91
East Salem .. .. .	296,320	40,019*	7.40
North Salem .. .. .	302,080	36,123	8.36
Central Salem .. .. .	243,200	57,766	4.21
South Salem .. .. .	202,880	37,039	5.47
Total .. .. .	1,539,200	277,387	5.55

1 buffalo = 2 cows = 4 sheep.

\* Does not include cattle under the forest village system in the Chitteri and Atur ranges and cattle grazed in provisional class IV reserves which were leased out.

The number of cattle grazed during the year shows a reduction of 19,052 cow units and the area opened to grazing a decrease of 2,560 acres. The decrease in the number of cattle is chiefly in South Vellore and is attributed to the enhancement of grazing fees with effect from 1st July 1921. The decrease in the area is due to areas disafforested in East Salem. The number of animals permitted to graze was 305,770 against 331,597 in the previous year. The revenue from grazing was Rs. 1,67,929 against Rs. 1,64,231 in the previous year.

*Minor produce—Nux vomica.*—In order to regulate and stimulate the harvesting, this item was separated from the rest and the right to collect this seed from reserves and unreserves was leased out separately for a period of three years. The principal purchaser failed to pay the second instalment and his contracts were cancelled. The value of minor produce leased out during the year was Rs. 1,43,037. There was not much demand for tanning bark this year.

(d) *Exploitation by right-holders.*

27. The rights admitted at settlement in South Salem are reported not to have been availed of during the year.

(e) *Exploitation by free grantees.*

28. The quantity and value of produce removed under the head is noted below. The free grants were made chiefly from unreserves for rebuilding houses destroyed by fire. The usual 5 tons of fuel were utilized in East Salem. *Fourth Circle.*

	Timber in thou- sands of cubic feet.	Value.	Fuel.		Bamboo. Value.	Grazing	Other minor forest produce.	Total.
			In thou- sands of cubic feet.	Value.				
Right holders .. .. .	..	Rs. ..	..	Rs. ..	Rs. ..	Rs. ..	Rs. ..	Rs. ..
Free grantees .. .. .	22	1,839	0.2	30	24	95	11	1,999
Grants at reduced rates .. .. .	..	..	..	..	..	..	..	..
Total .. .. .	22	1,839	0.2	30	24	95	11	1,999

## CHAPTER V.—FINANCIAL RESULTS.

29. The following statement compares the financial results of 1921-22 with that of 1920-21 (financial year):—

	1921-22.	1920-21.	Average of the preceding five years.
<i>Revenue</i> .. .. .	Rs. 10,41,976	Rs. 10,82,934	Rs. 10,99,620
<i>Expenditure.</i>			
A. "Conservancy" Works .. .. .	1,25,016	2,26,546	2,00,013
B. Establishment .. .. .	4,20,851	3,91,553	3,07,187
Total expenditure .. .. .	5,45,867	6,18,099	5,07,200
Surplus .. .. .	4,96,109	4,64,835	5,92,420

There was a decrease in revenue as compared with that of the previous year of Rs. 40,958 and this was mainly under II (b) due to the fact that the sale of land and growth in the *cashew* areas in South Arcot district (East Salem division) was stopped temporarily. As compared with the average of the preceding five years, there was a decrease in revenue of Rs. 57,644.

Under A. Conservancy and Works the expenditure during the year was only a little over half of that of last year and was due to want of progress on road works by the Forest Engineer, the reason for which is explained in paragraph 9 *supra*.

The increase of Rs. 29,298 under B. Establishment over last year's expenditure is due to the introduction of the time-scale of pay for the clerical establishment, and to the full strength of foresters and guards under the reorganization having been entertained during 1921-22 and to the enhanced rate of travelling allowance sanctioned at the end of the previous year.

Under revenue, 51.92 per cent was from major produce, 39.26 per cent from minor produce and 8.82 per cent from miscellaneous items.

Under expenditure, "A. Conservancy and Works," 21.09 per cent was on exploitation, 59.41 per cent on upkeep and improvement of forests and 19.50 per cent on other miscellaneous items.

30. The important variations are explained below:—

## RECEIPTS.

(i) *By departmental agency.*

*Sandalwood.*—Minus Rs. 18,088. Though the quantity of sandalwood sold during the year was greater, the average price per ton fell from Rs. 1,595 of the previous year to Rs. 1,174 during the year. This is due to the dullness of the market and partly perhaps to the fact that the Coorg sales where the largest quantity

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was put up were the last and bidders held back to buy the Coorg wood which the market prefers for its name, and deferred their purchases until the last; they paid higher prices there than in this circle.

*Minor produce.*—Minus Rs. 8,047. Due to non-supply of hay to the Military Department.

(ii) *By purchasers.*

*Timber.*—Plus Rs. 24,088. This is a fluctuating item, the source being mainly from darkbast tree valuation.

*Kuel.*—Minus Rs. 90,280. The decrease has been explained in paragraph 29 *supra*.

*Bamboos.*—Plus Rs. 6,161. Due mainly to the high prices obtained in the sale of bamboo coupes in Central and East Salem divisions.

*Minor produce.*—Minus Rs. 10,300. Due to the dullness of market for tanning barks and also due to the unusual drought in West Vellore.

*Miscellaneous.*—V (a) Plus Rs. 15,788. Due to larger amount of compounding fees realized in South and West Vellore, and East and South Salem divisions.

#### EXPENDITURE.

##### A. Conservancy and Works.

The chief variation is under roads (minus Rs. 1,27,203) and it has been explained in paragraph 9 *supra*.

##### B. Establishment.

The increase under this head is explained at the commencement of this chapter.

### CHAPTER VI.—RESEARCH AND EXPERIMENT.

31. *Sandal.*—The recording of notes on “spike” in the observation areas in the Denkanikota range of North Salem division was continued by Ranger S. Nageswara Ayyar and has, I think, been done regularly.

In the observation areas taken up in 1916, the *spread* of the disease and the *casualties* have been as follows up to the 31st March:—

Locality.		Enumerated.	Spiked.	Dead.
		no.	no.	no.
Mahadeswarangudi (near Aiyur)	...	352	275	115
Cairn 53 area (near Jowlagiri)	...	513	252	120
Jowlagiri bungalow area	...	451	443	356

It has not been possible to trace any special *direction* here in the spread of the disease.

There has been no *recurrence* in South Thalli or at Nelkunthi both in North Salem, but there has been at Mukkankere; at Nellivasal on the Javadis, four trees altogether were attacked in December 1921 and were taken out—the first attack here was in 1917 and the disease has not spread elsewhere.

We are this year (1922–23) confining our sandal extraction to the removal of spiked trees in the hope of preventing its spread to other localities. It may be necessary to cut out *Zizyphus aenoplia* also.

The *pruning experiments* so far have given on result, the trees dying just as soon when pruned as when unpruned, but it is doubtful if the pruning was done regularly. The period between the appearance of spike and the death of the tree has varied from  $8\frac{1}{2}$  to  $23\frac{1}{2}$  months at “Mahadeswarangudi,” 8 to 24 months at “cairn 53” and 7 to 27 months at “Jowlagiri Bungalow”. The trees are largest at “Mahadeswarangudi” and smallest at “cairn 53.”

An attempt has been made to see if *spraying* with kerosene oil emulsion will have any effect on the spread or cure of the disease at Mahadeswarangudi.

South Vellore, East and Central Salem are so far *free from the disease* which is however spreading in North and South Salem.

Tying branches of spiked trees on to healthy trees has after six months given *Fourth Circle* no result.

So far as *obligate parasitism* is concerned, it was found in South Vellore that one of the trees which had been under observation for five years had attached itself to the roots of a Satin wood, an *Eugenia jambolana* and an *Albizzia amara*. The roots of the two former had passed under the trench; in the latter case, the sandal had done so. In the case of a single seedling grown in a masonry trough, the plant died in January 1922 in spite of constant attention, having lived for only just over a year and a half without a host.

In West Vellore, out of four trees under observation (trenched), three are going back.

Sandal reproduces itself well by *root-suckers* and *coppice shoots* and experiments are being carried on to see whether it is worth while to work on these lines. It is too early to say if these give heartwood within a reasonable time or will grow to large size.

*Yield of leaf manure.*—The cutting of 23 acres in East Salem gave 224 cwt. but from what I saw all was not taken out. In South Salem (Musiri Range), the outturn per acre of leaves of shrubs and creepers only from two plots averaged 5½ head loads (weight is not given).

*Myrabolams.*—No further specimens appear to have been sent from East Salem though four distinct kinds at least are known to exist on the Chitteri hills.

*Bamboos.*—The measurements prescribed in the Working Plan to ascertain the life of culms, how often, and how much to cut, etc., are being continued, and we now have four years' measurements.

## CHAPTER VII. —ADMINISTRATION.

32. The chief feature in the administration during the year under report is the introduction of a revised scale of pay of all non-gazetted services with effect from 1st March 1921, simplified new leave rules, and fundamental rules were also introduced.

Mr. H. A. Latham was in charge of the circle throughout the year.

33. *Tours.*—All District Forest officers spent more than the prescribed number of days on tour, except those of West Vellore and North Salem which districts were for some time coupled with South Vellore and Central Salem respectively.

34. *Inspections—By Conservator—Office.*—All offices were inspected during the year.

*Forests.*—The forests of South Vellore, East Salem and South Salem were inspected and inspection notes were submitted.

*By District Forest Officers.*—All the range offices were inspected during the year. The sandal sale depot at Tiruppattur was inspected by the District Forest officer, West Vellore, and that at Vellore was not inspected.

35. *List of offices audited.*—All the District Forest offices were audited and the result was generally satisfactory.

36. *Vernacular Training School.*—The school was held in North Salem division from 1st February 1922, and it started with 29 students. Three of the 29 students in the 1921 session got first-class certificates that class being below the average in ability.

37. *Health of establishment including an account of the measures to improve sanitation and casualties*—(a) The Circle consists mostly of ranges of hills which are notoriously malarious especially in the hot weather and the health of the establishment has as usual been far from satisfactory involving much dislocation of work.

Orders have been issued to District Forest Officers to arrange work so as to allow of a change of duties from the hills to the plains at the feverish season to foresters employed on Sandalwood operations. (Chief Conservator's Proceedings No. 1522, dated 25th August 1921.)

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(b) *Sanitation*.—The camp cots and mosquito nets have been purchased for supply to foresters in South Vellore with a view to see if this will improve their health.

*Casualties*.—Four foresters, two forest guards, and two watchers succumbed to malaria during the year.

#### CHAPTER VIII.—GENERAL.

##### 1. FORMATION OF AND MANAGEMENT BY PANCHAYATS (TO INCLUDE FOREST VILLAGE SYSTEM).

###### (a) *Formation and Management of Panchayats.*

38. *Formation*.—Panchayats have been formed in all districts except North Salem. In West Vellore, one panchayat was formed during the year.

*Management*.—The management of "Class II" areas in the Tiruvannamalai range of South Vellore division has been good; of the "Class V" areas, generally the less said the better, though there are honourable exceptions. It is understood that a special inspection staff for the latter is under consideration.

###### (b) *Forest Village System.*

39. A report on the working in Tiruvannamalai range of South Vellore district for three years was submitted to Government after the close of the year. A report has also been submitted in C. No. 399-22, dated 19th February 1922, as a result of meetings with the panchayatdars at various camps in Tiruvannamalai range. Working seems to have been quite satisfactory except in one locality where the "non-co-operation" disease broke out.

##### 2. MEASURES FOR IMPROVING LOCAL SUPPLIES AND FACILITIES FOR OBTAINING FOREST PRODUCE—INCLUDE WATER-SUPPLY, FUEL, MANURE LEAVES, ETC.

###### (a) *Improvement of water-supply in state forests.*

###### (i) BORING OPERATIONS.

Orders having been received to discontinue this work, nothing was done, in the expectation that a special boring branch would be formed in the Agricultural Department.

###### (ii) IMPROVEMENT OF WATER-SUPPLY IN GRAZING GROUNDS.

Nothing was done during the year.

###### (b) *The supply of forest produce to meet the wants of the people.*

40. This was as usual attended to by coupe contractors. Co-operative Societies continued to work some coupes in Tiruvannamalai range, South Vellore division, and did the work well.

###### (c) *Supply of manure leaves.*

41. Steps are being taken to grow Daincha seed (*Sesbania aculeata*) in East, Central, and South Salem divisions. The demand for manure leaves has become keen in South Salem division and some of the reserves in Musiri range have been thrown open for the removal of manure leaves. A report on the supply of manure leaf has been submitted to the Chief Conservator in this office C. No. 1920-21, dated 5th February 1921.

##### 3. TIMBER AND SANDALWOOD TRANSIT RULES.

42. There are no *timber transit rules* in force in this circle. It is reported that they are necessary in East Salem division and steps may be taken for their introduction.

*Sandalwood transit rules*.—There has been no change in the rules. The rules in North Arcot district do not cover the Kangundi zamindari, consequently sandalwood has been finding its way illicitly to Kuppam and from there to other places, and a revision of the rules is under contemplation.

## 4. JUNGLE TRIBES.

*Fourth Circle.*

43. The Malayali hill village system in force on the Chitteris in East Salem division, Javadis in South and West Vellore divisions, is reported to have worked well. The opposition to this system by the Malayalis of Tiruppattur Javadis is declining and some of the villages are reported to have expressed their willingness to join the system again.

The co-operative society established at Komattiyeri, South Vellore division, for the amelioration of the economic condition of the Malayalis is reported to be in a flourishing condition and a store has also been opened. Two schools for the children of the Malayalis have been started by the Taluk Board at Komattiyeri and Kelur and they are reported to be working satisfactorily.

In South Salem division, the Malayalis of Namakkal Kollimalais were allowed the exclusive right to graze their cattle on payment of fee being given a refund in return for good protection. The result is reported to be not satisfactory as some of them did not dispose of their goats and resorted to illicit removal of fuel and manure leaves.

## 5. MINING AND QUARRYING.

44. A licence to prospect for copper nitrate and other allied minerals in the Periamalai reserve of Polur range, South Vellore division, was granted to M.R.Ry. R. K. Subbaraghava Ayyar of Siruvallur. He has done no work during the year.

## 6. CIVIL SUITS.

45. A second appeal has been preferred to the High Court during the year against the decision of the District Court, Salem, regarding the ownership of the Arana and Thirthagiri blocks of East Salem division and it is still pending.

## 7. CONTROL OF UNRESERVED LANDS BY THE FOREST DEPARTMENT.

46. The Land Revenue Administration of Javadi Hill villages in Tiruppattur taluk, North Arcot district, continued under the District Forest Officer, West Vellore division, and a report on the working was forwarded to the Chief Conservator in this office C. No. 2072 of 1921, dated 27th November 1921. The Collector has recommended that our management should continue for another year.

The unreserves of the Pachamalais and Kollimalais of South Salem division continued to remain under the partial control of the Forest Department.

## 8. DISTURBANCE CAUSED BY NON-CO-OPERATORS DURING THE YEAR.

47. There was some trouble on a small scale in South Vellore and Central Salem divisions, while in South Salem there was serious trouble in more than one locality; cattle being rescued, cairn demolished, wholesale raids for green leaf for manure occurred, and cow boys were provided with trumpets for use when any official appeared, the subordinates were also assaulted. The trouble appears to have started directly after abortive abkari auctions at Atur and was eventually stopped with the assistance of the Police and Magistracy, several individuals being bound over and others convicted and sentenced to terms of imprisonment, rigorous, and otherwise: Mr. Ellappa Chettiyar, M.L.C., came and helped by giving good advice. The general lawlessness induced by the "Non-co-operation" lecturers also led to an increase in forest fires, and to other offences. The receipts given for collections made for Congress purposes were alleged by the ignorant payees to cover the right to graze in the reserve in one neighbourhood and there was no doubt similar misrepresentation elsewhere. In Tiruvannamalai, three non-co-operating villagers were dealt with by transferring the grazing privileges conferred on them to their neighbours.

26th July 1922.

H. A. LATHAM,  
Conservator of Forests, Fourth Circle.



# ANNUAL ADMINISTRATION REPORT OF THE FOREST DEPARTMENT

FOR THE

YEAR ENDING 31<sup>ST</sup> MARCH 1922.

## FIFTH CIRCLE

### CHAPTER I.—CONSTITUTION OF STATE FORESTS.

#### 1. ALTERATION IN AREA.

*Reserved forests.*—The area at the commencement of the year was 3,187 square miles. With the transfer of the old Central Coimbatore Division to VI Circle in August last, Mettupalayam range consisting of an area of 175·76 square miles was added on to North Coimbatore district; the Bargur range of the latter division with an area of 207·04 square miles being at the same time transferred to *Kollegal* district. In *Tinnevelly* district the Mahendragiri Estate of 9·88 acres—an enclosure in the Nanguneri range—was constituted as a reserved forest; and an area of 7 cents in Kuttalam forests near the waterfalls and the conservancy area of 12 acres in Vallanad reserved forest, were disafforested during the year. Thus the area at the close of the year was 3,363 square miles. In *North Coimbatore* district an area of 568·33 acres in Nellimalai reserve was disafforested for cultivation purposes; but this was given effect to only after the close of the last official year. In *Madura* the Bryant park reserve of 18·34 acres was disafforested during the year and handed over to the Agricultural department from 1st April-1922.

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Circle.*

2. *Reserved land.*—The only alteration is the transfer to reserved forests of a small area—9·88 acres—in *Tinnevelly* district it having been finally notified during the year. The area of reserved land at the close of the year was 2 square miles.

#### 2. FOREST SETTLEMENT.

3. The settlement of the eight unlocated rights in the Gutialathur reserve of *North Coimbatore* district referred to in the last report, was completed during the year and the notification under section 16 has been published after the close of the year. A portion of one of the four blocks in *Tinnevelly* district shown as remaining to be settled in the last report was completed and notification under section 16 was published during the year.

#### 3. DEMARCATION.

4. Thirteen miles of new boundaries were artificially demarcated with stone cairns in *Kollegal* at a cost of Rs. 573 and 39 miles in *Madura* at a cost of Rs. 2,698.

In *Kollegal* seven miles of the previously existing boundaries were repaired at a cost of Rs. 196. For the rectification of the reserve boundary lines Rs. 19 was spent in *North Coimbatore*. For the preparation and fixing of forest pillars and for clearing beat boundary lines Rs. 381 was spent in *South Coimbatore*. Rupees 147 was spent in *Madura* for the repair of cairns along the old boundary lines. In *Tinnevelly* the demarcation of Kalakad-Singampatti boundary (3 miles 4 furlongs) referred to in the last year's report was completed the cost incurred during the year being Rs. 228.

5. The reclearing of boundaries was as usual done by subordinates in all the districts. In *Madura* the clearing of the boundary between that district and the Travancore territory was not undertaken during the year as its maintenance was ordered to be discontinued.

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Coupe.*

6. The total length of the boundaries remaining to be cleared and demarcated at the close of the year was 559 miles against 285 miles shown in the last year's report, the difference being due to the correct length having been ascertained and shown in the return by the District Forest Officer, Madura, as per special orders issued by me last year. In *North Coimbatore* no permanent demarcation was done during the year, for, it is said, want of funds though a length of 170 miles have to be done.

#### 4. FOREST SURVEYS.

##### (a) *By the Survey of India Party.*

7. In *Madura* the Survey of India Party were re-surveying the reserves in the Palni and Sholavandan ranges. The maps made by the Survey of India Party in Udamalpet range of *South Coimbatore* district referred to in the last year's report have not yet been published.

##### (b) *Local Surveys.*

8. The survey of fuel coupes, forest enclosures and regeneration area, rectification of reserve boundaries and other minor works were as usual done by the local Forest Officers and draughtsmen.

9. *Reference maps.*—These are reported to have been maintained and posted up in all the districts.

## CHAPTER II.—MANAGEMENT OF STATE FORESTS.

### 1. REGULATION OF MANAGEMENT.

#### (a) *Preparation and control of regular working plans.*

10. *Kollegal.*—No new working plan was prepared and sanctioned during the year. New areas were however opened for the supply of fuel and agricultural implements for the benefit of the local ryots and a temporary scheme for their working is under preparation. The deviations required for the Araipalayam fuel working plan in respect of coupe allotments, grazing regulations, etc., were sanctioned. The sandalwood areas of the Bailur and Madeswaranmalai working circles continued to be worked for the extraction of spiked and dead trees and stumps.

*North Coimbatore.*—The working plan for Godaipalayam fuel working circle referred to in the last report was sanctioned during the year. The old working plan sanctioned for the extraction of the spiked sandal trees in Satyamangalam and Talamalal ranges lapsed and consequently new schemes were prepared and sanctioned, for the extraction of only spiked trees. The provisions of the sanctioned working plans have been followed as far as practicable.

*South Coimbatore.*—No new working plan was prepared or sanctioned during the year but the District Forest Officer is revising the old working plan for the Anaimalai outer slopes. Work continued under the Mount Stuart working plan and the extraction of the accumulated old stock felled under a former working plan was completed. The quantity of timber felled from the Mount Stuart working plan area during the year is 116,681 cubic feet. A summary of prescriptions was sanctioned for the working of the fuel coupes in Pollachi and Udamalpet ranges and the coupes are being worked accordingly. The Tekadi leased forests and Punachi timber coupes were worked under regular working plans and the fuel felling series under temporary schemes. The regeneration prescriptions in the working plan for the Punachi working circle are however out of date and it has been decided to discontinue the improvement fellings prescribed therein and to substitute a system of concentrated artificial regeneration which has proved successful on an experimental scale in the locality.

*Madura.*—A ranger was deputed to collect materials for the preparation of working plans for the reserves of Kodaikanal and Sholavandan ranges. He has reconnoitered and drafted simple working plans for an area covering 15 square miles and they are under scrutiny.

The prescriptions of the working plans were followed. The large working plan arrears were partly worked during the year. The deviations in respect of the working order of coupes were sanctioned. To increase the fuel supply of the Madura town, two additional coupes in the Ayyalur range were sold under proper sanction.

*Tinnevely.*—To do the field work for the revision of the working plan a ranger was deputed on special duty as the first rotation of most of the existing working circles expired some time ago and as it was found necessary to extend the rotation in most cases. Additional areas were selected and inspected by the District Forest officer. The drawing of the working plan was taken up, though not completed during the year. *Fifth Circle.*

## 2. COMMUNICATIONS AND BUILDINGS.

### (a) Roads and Bridges.

The details for the new works are given below:—

	M.	F.
Construction of roads . . . . .	19	...
Inspection path . . . . .	91	4
Alignment of roads . . . . .	8	2
Total . .	118	6

and their total cost amounted to Rs. 38,322.

*Kollegal.*—A road trace over a distance of four miles and two furlongs and the alignment of a new bridle path to a distance of four miles four furlongs and six chains were undertaken.

*North Coimbatore.*—The new works done were the metalling of roads to a distance of five miles, extension of a road by one mile three furlongs and alignment of cart tracks to fuel coupes over a distance of two miles and four furlongs.

*South Coimbatore.*—Government sanction for the construction of the new Mount Stuart Ghat road was received in August last. The work in the lower section of the road was given on contract by the Forest Engineer. The contractor's work was very disappointing although given every assistance and advice by Mr. Marshall, the Forest Engineer. A good deal of earthwork and the greater part of the revetment work was done in the first three miles. A start was also made with the masonry work at the commencement of the road. The expenditure on this road was Rs. 21,437, whereas the contractor ought to have earned Rs. 60,000. Some minor works undertaken by the District Forest Officer were (1) laying new tram lines (six furlongs), (2) extension of Aliar road (three furlongs), and opening a new cart track to a fuel working circle (four furlongs).

The bullock tramway continued to work during the year and the timber transported was 13,613-17/32 ton miles, the average lead of tramping being only 3½ miles. As the tramway is the only means of extraction between the worked coupes and the beginning of the carting road, no comparison can be made as regards cost and no data exist on which to base an estimate.

*Madura.*—The important road works done are—

Vannathiparai-Guruvanuthu road (four miles).

Rajadani-Uthappanacikanur road (four miles five furlongs), and

Senkurichi-Manakattu road to the timber coupes (two miles one furlong).

The first two are in progress.

The Palamalai Missionaries were by executive order permitted to construct a bridle path free from all encumbrances in the Permalalai reserve of the Kodaikanal range to connect with the ghat road, and they are reported to have constructed the same over five miles at a cost of about Rs. 800. A few roads and bridle paths in the district were as usual maintained out of funds contributed by the Local Fund Department.

*Tinnevely.*—The new roads constructed were the road leading to coupe No. I of Kuttalam working circle (seven furlongs) and the extension of the Northern road in Kalakad working circle (seven furlongs); and these are reported to have more than paid themselves by the increase in the amount realised for the coupes. Seventy-five miles of inspection paths were made in Kodamadi and Kannikatti ranges by the Temporary Extra Assistant Conservator in connection with the development scheme for the shola forests at a cost of Rs. 1,119.

### (b) Buildings.

12. The total expenditure on new works during the year was Rs. 14,404 and on repairs Rs. 15,674.

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Circle.*

The important new works carried out were: in *Kollegal* the continuation of the construction of the rest house at Cowdalli and the Tannah shed at Kamagarai.

In *Madura* conversion of the old Cumbum Rest house into a Range Office, construction of the Nattam Range Office and the re-roofing of the subordinates lines and inspection sheds.

In *Tinnevelly* the construction of the rest house at Kannikatti, and the inspection sheds beyond Kannikatti and Kodamadi and sheds for rangers and coolies beyond Kuttalam Kalaruvi were undertaken by the temporary Extra Assistant Conservator and are in progress at the close of the year. Cooly lines at Kodamadi and Kannikatti were also undertaken by the Extra Assistant Conservator and completed during the year at a cost of Rs. 1,979.

(c) *Miscellaneous.*

13. The expenditure on new works under this head was Rs. 1,820; the important works being the sinking of three wells in *Kollegal* (not completed), one in *North Coimbatore*, one in *South Coimbatore* and improving one in *Madura*. In *South Coimbatore* Rs. 400 was spent on sinking borings at or near Mount Stuart in the hopes of getting a good and adequate supply of water there during the hot weather, but no perennial source could be tapped. Recently, however, an excellent perennial source has been discovered in Karian shola about two miles from Mount Stuart and 500 feet above that settlement. The District Forest Officer thinks that this will finally settle the problem of Mount Stuart water-supply and will go far to help in improving the conditions of life of the staff stationed there during the hot weather. He is therefore arranging to submit proposals for leading the water source in pipes to the settlements.

14. *Telephone.*—The line between Anamalai, Sethumadai and Mount Stuart in *South Coimbatore* was, it is said, working well and was very useful. A proposal has been made by the District Forest Officer to dismantle the branch line from Sethumadai to Tekadi and to relay it between the Range Office at Anamalai and Pollachi sale depot, and also, if possible, to connect Pollachi depot with the District Forest Office at Coimbatore.

3. PROTECTION OF FORESTS.

(a) *General Protection.*

15. The total number of new cases reported during the year under the four different heads was 4,718. As the last year's report, covered only for a period of nine months, no useful comparison can be made with the number of cases mentioned in that report. Proportionately, however, there was an increase in the number of cases reported and detected in the year under report. The increase is reported to be due to better protection. Of the said 4,718 new cases, only 4,393 were detected; and these, together with the 1,279 cases pending at the beginning of the year, *i.e.*, 5,672 cases, were dealt with during the year. Two thousand and thirteen cases were taken to Court and 3,659 compounded. The number of cases disposed of during the year was 4,156, leaving a balance 1,516 at the close of the year.

Out of 2,013 cases taken to Court 1,239 were convicted and 76 were acquitted, leaving a balance of 696 cases pending disposal by the Court. The percentage of acquittals, however, rose from three in the previous to six in the year, the increase being chiefly in *Kollegal* and *Madura*; and the reason therefor has not been clearly explained.

16. The number of cases compounded in several districts for which compounding fees were collected is shown below:—

District.	Number of cases compounded.	Amount of compounding fees. Rs.
Kollegal ... ..	326	4,806
North Coimbatore ... ..	560	5,086
South Coimbatore ... ..	313	5,216
Madura ... ..	463	5,184
Tinnevelly ... ..	465	6,174
Total ... ..	2,127	26,466

17. The special patrol party in *Madura* continued to work throughout the year and is reported to have done very good service in the Cumbum range. The protection of forests and the collection of grazing revenue improved and illicit fellings considerably stopped. The party did some useful work such as planting and weeding in the Vannathiparai teak plantation. Forty-two cases were detected by the party and many old warrantees who were successfully evading arrest for years were arrested. *Fifth Circle*

In *Tinnevely* the patrol party system was introduced for the first time during the year under report. A small party worked in the Nanguneri range from 30th August to 22nd October last and as a result the revenue from grazing and manure leaves increased from Rs. 728 and Rs. 1,091 in 1920-21 to Rs. 1,899 and Rs. 2,743 respectively during the year. Another small party was organized in Srivilliputtur range and this has improved the protection of forests from illicit removals.

18. A reward of Rs. 35 was paid to the subordinates in *Kollegal* for the detection of an important illicit-grazing case. Rupees 2 was paid as rewards in *South Coimbatore*.

(b) *Protection from fire.*

19. *Special protection.*—Early burning of about 10 square miles of grassy area was done in *Kollegal* during the year for the protection of the neighbouring sholas in the Doddasampagai reserve and it was a success as the sholas escaped from fire. In *North Coimbatore* the yearly burning system continued and 20½ square miles were burnt at a cost of Rs. 74 and the result is reported to be satisfactory.

Excepting the above, there was no material change in the system of fire protection.

20. The area attempted to be specially protected during the calendar year ending with 31st December last was 277, 170 acres and the total cost therefor was Rs. 22,296. The last year's return (Form 72) was for the period of nine months ending with the official year 1920-21. And so no useful comparison can be made with the previous year's figures in area and cost. The area said to have been burnt under special protection was 15,625 acres and the percentage of successful protection was 94.3 against 95.2 in the previous year. This difference is attributed to the exceptionally dry weather last year.

The shola forests of Minchiguli valley in *North Coimbatore* were well protected during the year and they are said to be improving. In *Madura* the pine plantations of the Kodaikanal range were successfully protected during the year under an improved system and consequently there was no fire. The fire protection of sholas in the Amphill Downs reserve was continued as per the old sanctioned scheme, but the results were not satisfactory as almost the whole of the Downs was burnt. Early burning will be considered for the next year.

21. *General protection.*—The area under this head was 1,785, 409 acres and the area burnt 32,700 acres, the percentage of successful protection being 98.2 against 98.1 in the previous year.

22. The total number of fires that occurred from various causes both in the areas under special and general fire protection was 315, the aggregate area burnt being 48,325 acres.

(c) *Protection against cattle.*

23. An area of 2,309 square miles, i.e., 68.6 per cent of the total area, was open to grazing of all animals except goats and an additional small area of 323 square miles, i.e., 9.6 per cent, was open to all animals except browsers (sheep and goats).

24. *Incidence of grazing.*—In *Kollegal* the incidence was said to be 8.66 acres per cow unit against 6.7 in the previous year. Most of the remote areas by the side of the Cauvery and Palar rivers, interior of Doddasampagai reserve by the side of the Gundal valley and many thousand acres of steep and precipitous slopes were free from grazing and consequently the incidence was actually more than what is given above. In *South Coimbatore* the incidence was 18.8 per cow unit when calculated from the area open to grazing, but the latter includes much of the shola forests and grass hills of the Upper Anamalais where cattle are seldom or never taken for grazing. In *Madura* the average grazing incidence was 10 acres per cow unit as against 7.5 acres in the previous year and in *Tinnevely* 2.8 acres per cow unit.

*Fifth  
Circle.*

25. The total number of cattle impounded during the year was 17,131 against 10,822 in the previous year and 14,145, the average for the past three years. There was an increase in all the divisions and it was partly due to the fact that the previous year's report covered a period of nine months only and partly to the increase in the number of grazing offences.

26. *Introduction of the forest village system.—Kollegal.* The areas were completely visited by the District Forest Officer for the submission of fresh proposals relative to the introduction of the system; but before the submission of the scheme, the sitting of the Special Forest Committee appointed to remedy the grievances of the ryots of Coimbatore district was awaited. Though the Committee did not sit in the district in accordance with the resolution passed at its sittings in North Coimbatore, the block system of grazing was done away with in this division.

*(d) Protection against injuries due to natural causes.*

27. *Spike disease of sandal.—Spike continues in North Coimbatore and Kollegal,* the forests are being worked on a three-years rotation to harvest the dead trees.

28. *Weeds and climbers—South Coimbatore.—*The 1921 teak regeneration area of about 26 acres and the 1920 rosewood area of about 6 acres were weeded, the method adopted being the clean-scraping of all weeds. The 1920 teak plot required no weeding. The coppice growth in the worked fuel coupes was kept free of weeds and climbers, *Tinnevelly.* Climber-cutting in two coupes of Kalakad Working Circle (378 acres) and weeding the teak plantation at Kariar (5 acres) were done. The beat subordinates during their patrols also did the climber-cutting work in scattered localities.

In the sandalwood working circle of *Kollegal* division climber-cutting was done over an area of 2,000 acres.

29. *Prickly-pear, lantana and strobilanthes.—*The work of eradicating prickly-pear was confined to 13 acres in *Madura* at a cost of Rs. 26, further work having been stopped for want of funds. The results of the operation do not, it is said, seem to be hopeful. Prickly-pear is said to be rarely found in *Tinnevelly* except in some of the plain VI class reserves which are proposed to be disafforested.

Nothing was done for the destruction of lantana in *Madura* for want of funds.

30. *Damage by animals—South Coimbatore.—*Bison and sambur did some damage in the Mount Stuart teak regeneration area by trampling the young seedlings. Sambur damaged also the teak saplings in the experimental plots in *Puachi* range. *Madura.* Elephants have begun to damage the teak plantations in *Vannathiparai* reserve by trampling down seedlings and barking several promising teak plants. The question of starting elephant-capturing operations in conjunction with the Travancore Forest Department is under consideration. *Tinnevelly.* With a view to reduce the damage done by Sambur to coppice shoots, the restriction about shooting sambur hinds was removed with the permission of the Collector, but none was shot during the year. The damage caused to the sandalwood and other saplings in *Alagarkoil* Valley by elephants continued during the year. The elephants uproot trees and damage the crops in the patta lands at the foot of the ghat forest in *Srivilliputtur* range.

31. *Damage by frost and drought.—*There has been unusual drought in *Madura* during the year. There were it is said long breaks with pouring rains at the end with the result that the teak plants in the *Cumbum* Valley suffered much and casualties were heavy. The severe frost caused heavy damage to the *Accacia decurrens* seedlings in *Kodaikanal*, destroying 50 to 60 per cent of the seedlings.

## CHAPTER III.—SYLVICULTURE.

*(a) Natural reproduction.*

32. *South Coimbatore.—*In the timber forests natural reproduction is very poor as the seedlings cannot compete against the weeds for which reason, the concentrated regeneration method has been adopted generally.

*Madura district.—*Natural reproduction of *Vengai (Pterocarpus marsupium)* is said to be fair in the *Cumbum* range and that of *Chloroxylon swietenia* to be good

in Pillairnatham reserve and also that of Mahogany in the Thirthathotty Valley of the Alagar hills reserve but elsewhere reproduction from seed is generally not satisfactory. Fifth Circle.

*Tinnevelly district.*—In the Padarimalai and Koilteri working circles of the Kannikatti and Kodamadi ranges natural regeneration is much suppressed by strobilanthes, where this pest is not so rampant some regeneration of teak, *Pterocarpus marsupium*, *Albizia amara* and *Hardwickia binata* is found. Sandal seeds are said to be found in abundance in Kuttalam range where the species is spreading as it is also in Srivilliputtur range. Natural regeneration in the shola forests is good.

*Kollegal division.*—Sandal seeded well during the year and satisfactory regeneration has been observed in the less dry part of the districts as it has of satinwood and *Hardwickia binata*.

In *North Coimbatore* sandalwood is reported to be spreading gradually down to the plains as in the Ennamangalam fuel working circle of Bhavani range about 400 saplings have been found in coupes 1—4. There is some regeneration of rosewood and Vengai (*Pterocarpus marsupium*) in the Minchiguli Valley where fine trees of these species are found and steps are being taken to increase them by concentrated operations.

(b) *Artificial reproduction.*

33. *South Coimbatore.*—At Mount Stuart, *South Coimbatore*, 26 acres which had been cleared of all growth and burnt in 1920-21 were sown with teak 3' × 3'. These 26 acres consisted of 10 acres in which Pillamarudu (*Terminalia paniculata*) had been sown the previous year, which sowing had been a complete failure, so that we lost the benefit of the burn, which made a great difference in the initial rate of growth of the new teak seedlings compared with that on that of the seedlings on the remaining 16 acres. These 26 acres should have been sown in March 1921, but the work could not be done in time. The whole area is now practically fully stocked 3' × 3' and although the rate of growth in the first year is not as much as it would have been with a more normal monsoon the plot should do excellently. An effort was made during the year to increase the area of concentrated regeneration and 133 acres were cleared and burnt during the year. These should have been sown by the end of March 1922, but the sowing was completed a little later. Of these 80 acres will be weeded by contract labour and the balance by the local mulcers. If this contract labour proves to be successful, it is hoped that we shall be able to establish 250 acres of regeneration per annum in future and convert the whole of the working circle into a first-class forest in fifty years.

A start was made to carry out the provision of the working plan as regards finding a suitable underwood for teak by putting out in the first plots sown in 1920 a number of rosewood seedlings. The plot is 25 acres in extent and the balance has been sown with rosewood since the close of the year.

In *Madura district* 33 acres were cleared, burnt and planted with teak at Vannathiparai in the Cumbum Valley. The locality will produce fine teak but the incidence of the rainfall is not so favourable as at Mount Stuart so it is more difficult to get plantations started. Elephants descending from Travancore do some damage and the Conservator of Travancore is being addressed to see if combined operations cannot be taken against them. Five acres were added to the teak plantation at Velancombai. Thirty-one acres were sown as a fire belt round the pine plantations at Kodaikanal but only 40 per cent survived the long drought and frosts.

In the *Tinnevelly district* a commencement was made with experiments on an extended scale to establish regeneration of superior species in the shola forests whose working is under consideration. Two plots of approximately 100 acres each were selected at Kannikatti and Kodamadi and trial operations were conducted combined with planting and sowings. A good deal of experience is being gained but I cannot express an opinion on the results until I have inspected them again. Regeneration after the final clearing will be a much more desirable method in these forest where we can sell both timber and fuel. This can be brought about by the Macaranga system for the present we are gaining useful knowledge which will assist us later if the latter system is eventually adopted. Arrangements have been made for extending the Kodamady and Kariar teak plantations during 1922-23 by 50 acres. The

*Fifth  
Circle.*

growth on this area was sold to a contractor for clearing for nearly Rs. 10,000. A good deal of sowing has been carried out in the Teri forest and other parts with varying success.

In the *Kollegal division* sandal seeds were dibbled by beat guards free of cost, in this way some 3,000 seedlings have been established but many died. In lieu of general dibbling where water is available in streams all through or well in the hot weather the forest guards will clear and fence small plots and sow them with sandal and water the resultant seedlings. Some good results have already been obtained in this way and such plots will form centres for the spread of seeds in the future.

In *North Coimbatore* some experimental work was done in trying to extend the Ainagiri shola above the Minchiguli valley but so far no marked success has been achieved; the District Forest Officer has been instructed to see if Macaranga will succeed.

(c) *Operations for the improvement of the growing stock.*

34. *South Coimbatore.*—It has been decided to abandon the operations in the Punachi range prescribed in the working-plan in favour of extended concentrated regeneration which is a more profitable method of securing regular forest of superior species.

*Madura.*—Thinnings of *Albizzia amara* coppice shoots were carried out in coupe IV Sirumalai South series of the Sholavandan range and in coupe 2 of the Poona-malai series of Ayyalur range. Removal of thorny creepers was undertaken in coupe 7 of Methugamalai South series of Nattam range and in coupe 7 of Panchan-thangi series in the Ayyalur range. Creeper cutting on standards and superior species was carried out in all coupes free of charge by forest guards and all felled coupes were fenced.

*Kollegal Division.*—Soft wood trees useless for fuel were cut out by the coupe contractors and a certain amount of freeing of suppressed sandal trees was undertaken.

*North Coimbatore.*—In sandal coupe No. II of Talammalai range and in the Chikkalli coupe climbers on sandal trees were cut over an area of 13,880 acres at a cost of Rs. 200. In Mettupalayam range improvement fellings were carried out over 710 acres according to the working-plan prescription at a cost of Rs. 670, but it is doubtful if this is worth while continuing and it will be abandoned under the financial stress.

## CHAPTER IV.—EXPLOITATION.

### 1. SYSTEM OF MANAGEMENT.

#### (a) Major Forest Produce.

35. The total area under working-plan during the year was 1,066 square miles and the statement below indicates the various silvicultural systems in force:—

	Area in square miles.	Percentage of total area under each silvicultural system.
Selection method ... ..	47	4.41
Simple coppice ... ..	396	37.14
Coppice with standards ... ..	125	11.73
Unregulated fellings ... ..	272	25.51
Bamboo fellings ... ..	45	4.22
Forests for which working-plans have been prepared but not subjected to any definite system of working.	161	16.99
	<u>1,066</u>	<u>100.00</u>

36. Selection fellings were carried out in South Coimbatore, 'simple coppice' in all the districts, 'coppice with standards' in Madura and Tinnevely. The unregulated fellings were in *North Coimbatore* and *Kollegal* and refer to the removal of spiked sandal trees. The old working-plan lapsed and at present spiked sandal trees are removed on a three years' plan. To that extent the felling is regulated on a short rotation plan. The 161 square miles in the last item merely refers to a shola working circle in *Tinnevely* which under a sanctioned working-plan is leased for minor produce. There is no timber or other extraction prescribed.



37. In *South Coimbatore* an area of 133 acres was clear-felled for regeneration by dibbling. In *North Coimbatore*, eight fuel coupes of 636 acres and ten bamboo coupes of 21,166 acres not covered by sanctioned working-plan were worked under a preliminary working scheme. *Fifth Circle.*

(b) *Minor Forest Produce.*

(i) BAMBOOS.

38. In two ranges of *Kollegal district* the bamboos continued to be removed under the unregulated permit system, there being no demand for the located coupe fellings. In the remaining range five coupes of 9,800 acres were sold standing to contractors.

The bamboo coupes in the other districts were as usual leased out to contractors.

(ii) MISCELLANEOUS PRODUCE.

39. The right to collect all other minor produce (except honey and wax collected departmentally in *Kollegal*) was as usual sold to contractors in all the divisions.

40. Free removal of grass was permitted in *Kollegal* from areas where there were no fires in the previous year. One thousand three hundred and sixty-five tons of fodder grass were removed on permits in *North Coimbatore*.

Stones, thorns and earth were allowed to be removed in *Madura* to a limited extent on permits.

In *Tinnevelly* the right to cut and remove strobilanthes in fuel working circles was leased out for the first time during the year.

41. Grazing was as usual controlled by permits; and the number of animals permitted to graze and the amount of grazing fee realized were 240,491 and Rs. 1,17,189 respectively.

2. AGENCY OF EXPLOITATION.

(i) *Departmental Agency.*

42. *Major produce.*—The extraction of timber and sandalwood was as usual mainly by departmental working. Drag poles also were collected departmentally in *North Coimbatore* and sold to the public.

43. *Minor produce.*—Collection of honey and wax was undertaken departmentally in *Kollegal*, so also the seeds required for sowing. One hundred and seventy-six bags of teak and other seeds were collected in *South Coimbatore* for sowing in that district and also for supply to other Forest officers.

(ii) *By purchasers.*

44. *Major produce.*—The fuel coupes in all the districts were as usual sold to contractors. One timber coupe in *Madura* and the right to collect spokes and felloes from the top ends of trees felled departmentally in *South Coimbatore* were also leased out to contractors.

45. *Minor produce.*—Thirteen bamboo coupes in *North Coimbatore*, 5 in *Kollegal*, 5 in *South Coimbatore* and 10 in *Madura* and a few coupes in *Tinnevelly* were leased out as usual to contractors. The dead bamboos in *Udamalpet* range of *South Coimbatore* were sold to a contractor. The other minor produce also was leased out to contractors in all the districts.

(iii) *By right and privilege holders and free grantees.*

46. The quantity and estimated value of produce removed by right and privilege holders and free grantees are shown below:—

	Timber in thousands of cubic feet.	Value.	Fuel in thousands of cubic feet.	Value.	Bamboos in value.	Grazing value.	Other minor produce.	Total.
Right and privilege holders.	..	Rs. ..	..	Rs. ..	..	Rs. 1,502	Rs. 859	Rs. 2,361
Free grantees .. ..	12	2,499	3	.380	..	..	151	2,737

*Fifth Circle.*

47. *By right and privilege holders.*—In *Madura* the concession to quarry stone and road materials free of charge from the reserved forests and unreserved lands to the departments of Government and local bodies was continued during the year.

48. *By free grantees—North Coimbatore.*—Fourteen palmyra trees of 280 cubic feet and 40 cubic feet of third-class timber were removed from unreserves by free grantees. Two hundred and ninety-one palmyra trees, four long posts and eight short posts amounting in value to Rs. 735 were granted in *South Coimbatore* for rebuilding houses burnt by fire. In *Madura* free grazing in the Amphill Downs reserve was allowed as usual and for the reconstruction of houses destroyed by fire 931 cubic feet of timber worth Rs. 233 were granted free by the Collector. In *Tinnevelly* the free grants of timber and fuel valued at Rs. 1,841 were made from the unreserves.

### 3. OUTTURN AND SOURCES OF FOREST PRODUCE.

49. The following statement shows the total outturn of major produce and the total value of minor produce from all classes of forests by all Agencies during the year under report :—

Agency of exploitation.	Timber and sandalwood in thousands of cubic feet.		Fuel in thousands of cubic feet.		Bamboos in value.		Minor produce including grazing in value.	
	1920-21. (9 months)	1921-22.	1920-21. (9 months)	1921-22.	1920-21. (9 months)	1921-22.	1920-21. (9 months)	1921-22.
By Government agency ..	51 [68]	169	15 [20]	6	131 [175]	641	933 [1,244]	535
By purchasers .. ..	225 [300]	594	3,381 [4,508]	2,612	15,810 [18,413]	37,343	1,95,115 [2,60,153]	2,08,826
By right and privilege holders.	..	..	..	..	31 [41]	..	881 [1,174]	2,361
By free grantees .. ..	2 [3]	12	3 [4]	3	1 [1]	..	936 [1,248]	161
Total ..	278 [371]	775	3,399 [4,532]	2,621	18,973 [18,630]	37,984	1,97,865 [2,63,819]	2,11,883

NOTE.—The figures in brackets denote the proportionate amounts for one full year of 1920-21 and are given for purposes of comparison with the figures for the year under report.

50. *By Government agency.*—The increase under *timber* was mainly in *South Coimbatore* due to the timber fellings under the Mount Stuart working plan done during the year whereas nothing was done in the previous year on account of the non-disposal of the old accumulated stock. The extraction of a larger quantity of wood for the use of departmental works in *Kollegal* and the collection in *Madura* of dead and windfallen trees as a regular operation also contributed to the increase under this head. The decrease under *fuel* was chiefly in *Kollegal* due to there being no departmental extraction or confiscation of contractors' fuel as was the case in the previous year. The increase under *Bamboos* also was in *Kollegal* due to the extraction of a greater quantity for departmental works than in the previous year. The decrease under *minor produce* was in *Kollegal* due to a smaller quantity of honey and wax collected during the year and in *South Coimbatore* to the quantity of elephant tusks sold being less than that in the previous year.

51. *By purchasers.*—The increase under *timber* was chiefly in *Madura* due to the sale of one timber coupe to a contractor. There was an increase in *Kollegal* also due to a better collection made in the year by Revenue authorities. The decrease under *fuel* was in *South Coimbatore* due to a smaller number of coupes leased out to contractors, in *Madura* to the non-working or part working only of a few coupes sold to contractors and in *Tinnevelly* to the non-working of tank bed coupes owing to the transfer of unreserved lands to the Revenue Department. The increase under *bamboos* was in all the districts and was due to the increased demand therefor and consequently to the additional number of coupes sold during the year. Under *minor produce* the decrease was in *Madura* and *North Coimbatore* due to a fall in the prices realised for this produce.

52. The figures under *right and privilege-holders* and *free grantees* are small and fluctuating and therefore call for no remarks.

## CHAPTER V.—FINANCIAL RESULTS.

Fifth  
Circle.

53. The following statement compares the financial results of the year with those of last year :—

	1921-22.	1920-21.*
	RS.	RS.
<i>Revenue.</i>		
Revenue (deducting refunds) ... ..	11,79,770	11,25,798
<i>Expenditure.</i>		
A. 'Conservancy and Works' ... ..	3,47,029	2,53,155
B. Establishments ... ..	4,36,422	4,08,180
	7,83,451	6,61,335
Surplus ... ..	3,96,319	4,64,463

\* For purposes of comparison the revenue and expenditure for the whole year is taken instead of for the period of nine months only dealt with in the last year's report.

## REVENUE.

54. Sixty-seven per cent of the revenue was derived from major produce, 11 per cent from minor produce, 10 per cent from grazing and 12 per cent from miscellaneous items. Of the expenditure 27 per cent was spent on the exploitation of forest 31 per cent on their upkeep and improvement and 42 per cent on miscellaneous items.

55. The increase under revenue was chiefly under I(a) *Timber* (Rs. 1,34,657) due to large increase in the quantity of timber extracted and sold in *South Coimbatore* and II(b) *Firewood and Charcoal* (Rs. 28,144) owing to better prices fetched for fuel coupes and sale of larger arrear areas in *Madura* to bring the working plans up to date. There was a decrease under I(d) *Sandalwood* (Rs. 135,482) owing to the fall in the prices, the money market being very tight.

56. The revenue outstanding at the end of the year was Rs. 2,34,566, of which Rs. 85,907 fell due within the year. The latter sum includes Rs. 60,389 representing the amount of sale of Arguli tope in *Tinnevely* district; the purchaser having failed to pay the amount the Board of Revenue has in its Proceedings Mis. No. 906, dated 31st May, last ordered the Collector of *Tinnevely* to resell the tope by 1st December 1922. The estimated value of the produce at sale depots was Rs. 82,369 against Rs. 1,03,740 in the previous year.

## EXPENDITURE.

57. A. *Conservancy and Works*.—(Plus 93,874). Transport charges on the increased outturn of timber from Mount Stuart forest, commencement of the construction of the new Mount Stuart ghat road, alignment of bridle paths and construction of buildings for development of *Ambasamudram* range forests and feed and keep of larger number of live-stock account for the increase.

B. *Establishments*.—(Plus 28,242) Chiefly under Pay and Travelling Allowance of establishments. The transfer of *Mettupalayam* range with its establishment to this circle from 1st July 1922, the revision of pay of the executive and protective establishments and the introduction of the time scale of pay among the clerical establishment with effect from 1st March 1921 contributed to the increase.

## CHAPTER VI.—RESEARCH AND EXPERIMENT.

58. *Kollegal*.—Experiments with shola extension operations were carried out during the year but no marked success has so far been achieved.

*North Coimbatore*.—To avoid excessive damage by fire to the forests early burning of grassy areas on hilly slopes in *Satyamangalam* and *Talamalai* ranges was done with a very successful result. In this operation special attention has been paid to prevent the fire approaching any shola.

*South Coimbatore*.—Dibbling of neem and other fuel species seeds was carried out on a small scale in *Udamalpet* fuel coupes, but without success.

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Circle.**

*Tinnevelly.*—The experiments with shola regeneration have been mentioned elsewhere and there is little doubt that success will be achieved. Experiments have been made during the year to get rid of Strobilanthes but no real success has been yet attained.

*Madura.*—(1) *Experimental Thinning of coppice shoots.*—These observations are continued to be made in the Ayyalur, the Sholavandan and the Nattam Ranges. As reported last year no decided conclusion can be drawn from these experiments at this stage.

(2) *Prickly-pear clearing and burning.*—This was done over 13 acres in coupe XI Pillaiyarnatham at a cost of Rs. 26 as in previous years. The work had to be left incomplete for want of funds. The result of prickly-pear clearing for the past five years as now prescribed in the working plan must be regarded as a waste of money. One clearing is not at all enough to eradicate the pest and it is doubtful if several clearances are, seeing that the pest is everywhere in the unreserves for seed, to be dispersed by birds and men. However in the area first cleared in coupe XVI in 1917-18, the pest is as bad as before and going stronger.

The experiment to have the stools of Albizzia amara untrimmed as prescribed in the working plan to study its effect on the production of coppice shoots was continued in coupe IV Rajadani and the result is being watched. So far, it shows in a general way that trimmed or untrimmed shoots come up equally well.

**CHAPTER VII.—ADMINISTRATION.****CHANGES.**

59. The Mettupalayam range of the old Central Coimbatore division transferred to Sixth Circle, was added on to North Coimbatore division with effect from 1st August last, and the Bargur range of the latter division was transferred to that of Kollegal. The Ambasamudram range of Tinnevelly division was divided into two ranges, viz., Kannikatti and Kodamady as the work was too heavy for one ranger. To relieve Range Officer, Pollachi, of a portion of his heavy work, a new Depot range was formed in South Coimbatore division with effect from August 1921.

A list of officers who were in charge of the Circle and of the several divisions is appended to this Chapter.

**HEALTH OF THE ESTABLISHMENT AND SANITATION.**

60. The health of the establishment was reported to have been fairly satisfactory in Kollegal and Tinnevelly. Smallpox and fever were reported to be very severe in Madura. The casualties reported in all the five divisions together are one forester, eight forest guards, one clerk and one watcher.

*Sanitation.*—The surroundings of the Mount Stuart settlement in South Coimbatore division were re-cleared and burnt and pools were drained, baled and kerosined as far as possible. Fever however was not defeated and was bad during the hot weather.

**TOURS.—**

61. The Chief Conservator with Mr. Martin, the Consulting Forest Engineer with the Government of India and the Conservator visited the shola forests of Ambasamudram in April 1921 with a view to make preliminary proposals for the exploitation of the shola forests. Again in October last he with Hon'ble Sir Lionel Davidson inspected the regeneration operations in Mundanthorai and Kodamadi forests. The Chief Conservator with the Conservator also visited the South and North Coimbatore districts and in the latter he convened conferences at Satyamangalam and Andiyur with the Members of the Forest Advisory Committee and leading ryots in November and December last.

The Conservator visited all the districts and made inspection of forests during the year. The total number of days spent in camp was 357.

All the District Forest Officers in this Circle toured more than the prescribed number of days during the year under report.

## INSPECTIONS.

Fifth  
Circle.

62. *By Conservator of Forests.*—All the District Forest offices were inspected during the year.

*By District Forest Officers.*—All the Range offices in each of the five divisions were inspected during the year by the respective District Forest Officers.

## AUDIT OF DISTRICT FOREST OFFICE ACCOUNTS.

63. The accounts of Kollegal, North and South Coimbatore District Forest offices for the years 1919-20 and 1920-21 and those of Madura and Tinnevelly for 1920-21 were audited by the Assistant Inspector of Local Fund Accounts and the results are reported to be satisfactory.

## VERNACULAR TRAINING SCHOOL.

64. The school, opened in North Coimbatore division from 1st February 1921 and of which mention was made in the last year's report, was wound up on 1st August 1921. Out of the 28 students (8 foresters and 20 forest guards) who underwent training, twelve (six foresters and six forest guards) secured first class and 15 second class certificates, the remaining one (a forest guard) absconded, became insane and subsequently died.

## OFFICERS IN CIRCLE CHARGE.

Mr. H. F. A. Wood ... .. Throughout the year.

## OFFICERS IN DISTRICT CHARGE.

Kollegal	...	...	...	...	Mr. Woodhouse Adolphus, Extra Assistant Conservator, 1st to 13th April 1921.
					Mr. J. Sadasiva Ayyar, Extra Assistant Conservator, throughout the remaining period.
North Coimbatore	...	...	...	...	Mr. C. DuPre Thornton, Deputy Conservator, throughout the year.
South Coimbatore	...	...	...	...	Captain W. G. Dyson, Deputy Conservator, throughout the period except for 23 days in February when Mr. C. DuPre Thornton, District Forest Officer, North Coimbatore was in charge.
Madura	...	...	...	...	Mr. K. A. Chengappa, Extra Assistant Conservator, throughout the year.
Tinnevelly	...	...	...	...	Mr. D. T. Barry, Deputy Conservator from 1st April 1921 to 17th May 1921.
					Mr. George Venugopal, Extra Assistant Conservator, from 18th May 1921 to 31st March 1922.

## CHAPTER VIII.—GENERAL.

## I. FORMATION AND MANAGEMENT OF PANCHAYATS.

65. The formation of the new panchayats was effected only in *Madura* and three new ones of 3,087 acres in extent were formed there during the year. Of the six reserves in class V all are under the panchayat management except Karadikuttu reserve of 1,382 acres. Attempts to place the latter also under a panchayat proved a failure. The panchayat management in the district is reported to have been on the whole satisfactory.

The four panchayats in *Tinnevelly* district continued to work during the year.

In *Kollegal* no area has been placed under the management of forest panchayats. This division would be a most suitable one for the formation of panchayats if one could secure efficient panchayatdars as there are immense areas of forests and no commercial demand.

*Fifth.  
Circle.*

*North Coimbatore.*—The working of the Andiyur village panchayat was investigated by the Forest Committee and the result recorded in their report. The 12 grazing panchayats in the Mettupalaiyam range transferred to this district are reported to have worked well during the year.

*South Coimbatore.*—The panchayats in Dharapuram taluk were inspected by the District Forest Officer. It has been reported that the forests in question are so miserable, that no amount of careful management could make them anything but bad.

## 2. MEASURES FOR IMPROVING LOCAL SUPPLIES AND FACILITIES.

66. *Manure leaf supply.*—The demand for green manure leaf in *Kollegal* is only limited and this was as usual met from private forests and unreserves. In *Madura* nothing was done by the Forest department in this direction; but steps are being taken by the Revenue officials to encourage the growth of leaf manure by the ryots themselves on their patta lands. In *Tinnevelly* permits for the removal of manure leaves from the reserves of Nanguneri range were issued as usual.

67. *Supply of fuel and Agricultural implements.*—In *Kollegal* the fuel coupes were sold standing to contractors for the supply of fuel for the people of *Kollegal*. These contractors are bound under a clause in the agreement to supply head loads of brushwood, small timber, and agricultural implements at fixed prices to the villagers. Two working circles were opened for the benefit of the neighbouring villagers and the first coupe in each was sold during the year as an experimental measure. Attempts to open certain agricultural implement coupes are also being made to meet the wants of ryots where they are required; but there are still large areas of unreserves available and there will be no difficulty in meeting any real demand from the extensive areas of reserved forests when it arises.

In *North Coimbatore* the fuel demand was met from the regular coupes under working plans. A trial will be made of dividing each coupe into two to see if it will help local villagers to purchase coupes for themselves as recommended by the Forest Committee.

The supply of agricultural implements has been a perpetual difficulty in this division, but a trial will be made of a new system as soon as a scheme for it can be made out whereby a ryot will be able to send his own men to cut them under supervision for a small fee.

In *South Coimbatore* the spokes and felloes made out of the top ends of teak trees felled in timber coupes were sold. Drag poles also were collected and sold. Steps are being taken to open the agricultural implement coupes in two of the ranges on the hill slopes under a new system. The fuel demand was met from the fuel coupes under regular working plans.

*Madura.*—The supply of fuel to *Madura* town was considerably increased during the year by working more arrear coupes and as a result the price of fuel went down at *Madura* appreciably to the great loss of the coupe contractors in several instances.

68. *Improvement of water-supply in grazing grounds.*—In *Kollegal* a ruined well in *Chikailur* reserved forest was deepened at a cost of Rs. 724 for the use of cattle in the neighbouring villages. Nothing was done in the other divisions as no funds were available. There is a good deal that can be usefully done were funds available.

## 3. TIMBER TRANSIT RULES.

69. There has been no change in the rules during the year and they are reported to have worked satisfactorily. There were a few cases detected under these rules in all the divisions except *Tinnevelly*.

The sandalwood transit rules for *Kollegal* and *North Coimbatore* districts are also reported to have worked well.

## 4. JUNGLE TRIBES.

70. There were nine sholaga settlements in *Kollegal*, the total area occupied by them being 142·15 acres. The actual area under occupation was not determined by survey. A scheme is being prepared for fixing definitely the extent of land to be brought under cultivation in reserved forests. The sholaga settlements continued to supply labour to the department and they were allowed free cultivation in the areas occupied by them.

*North Coimbatore.*—The two schools opened to educate the sholaga children had to be closed for want of funds. Free leases have been granted to hillmen to help the department with labour and to protect the forests from fire. *Fifth Circle.*

*South Coimbatore.* The mulcers and Kadirs at Mount Stuart are all as usual employed on Forest works: but no inducement, it is said, seems sufficient to make more families settle there.

*Madura.* The attempts made in the previous year to settle some Paliyans to help planting work in the Vannathiparai plantation have been more or less a failure.

#### 5. MINING AND QUARRYING—Nil.

#### 6. LIVE STOCK.

##### *Elephants.*

71. There were 22 elephants in the *South Coimbatore* district at the commencement of the year. Five elephants were captured during the year and one was born. Out of these 28 elephants two died leaving a balance of 26 and their estimated value is Rs. 89,500. Arrangements were made in North Coimbatore district to commence the capturing operation in Mettupalayam range, but want of funds prevented the operation being carried out.

##### *Other Animals.*

72. *Bullock and Buffaloes.*—There were 38 bulls and 26 buffaloes at the commencement of the year. Eight buffaloes were purchased during the year at a cost of Rs. 860 and to feed a young elephant a she buffalo was purchased for Rs. 75. Two old bulls were sold and two bulls and one buffalo were shot being quite unserviceable thus leaving a balance of 34 bulls, 33 buffaloes and one she buffalo at the close of the year. The book value is Rs. 5,095.

#### 7. VETERINARY ESTABLISHMENT.

73. The Assistant Veterinary Inspector was in charge of the live stock in South Coimbatore division. The Inspector of Live stock did not inspect the live stock in this district during the year.

#### 8. CIVIL SUITS.

74. *Madura.*—The suit filed by a coupe contractor claiming damages referred to in the last year's report is still pending in court and it is reported that it is not likely that it will be proceeded with as the man is dead.

A suit has been filed in the Sub Court against one Alagiri Chetti of Thoppampatty for encroaching an extent of ten acres in Sirumalai north west slopes reserve. The defence pleader has proposed some terms for compromising the suit and the matter is under examination.

One contractor has given notice of suit for the alleged wrong forfeiture of his security deposit and the matter is pending.

#### 9. CONTROL OF UNRESERVED LANDS BY THE FOREST DEPARTMENT.

75. There was no control over unreserved land except the sandalwood working circles of Bailur, Madeswaranmalai and Bargur of Kollegal district consisting mostly of unreserved lands and also an area of 866.8 acres of unreserves included in the Bargur sandalwood working circle and exploited for bamboos along with the Thamarakarai bamboo working circle.

22nd July 1922.

H. F. A. WOOD,  
Conservator of Forests, Fifth Circle.

# ANNUAL ADMINISTRATION REPORT OF THE FOREST DEPARTMENT

FOR THE

YEAR ENDING 31<sup>ST</sup> MARCH 1922.

## SIXTH CIRCLE

### INTRODUCTION.

The outstanding event of the year as far as this Circle is concerned was the Mappilla rebellion. One forest guard, a plantation watcher and a tapal peon were killed and though the District Forest Officer and the rest of the establishment managed to escape with their lives, they experienced much hardship and lost all their belongings. With one exception, the Mappilla subordinates remained true to their salt, one of them a peon named Ahamed very pluckily taking a message to Malappuram through country which was entirely in the hands of the rebels. This man was wounded but escaped. The District Forest Officer reports that with a few exceptions the subordinates behaved exceedingly well, and he especially brings to notice the conduct of Rangers Rowland and Kunhiroyan. It was to the latter's staying in the neighbourhood of Nilambur at great risk to himself (he is a Mappilla) that the recovery of the Forest elephants was due, all but one—a recent capture which ran away and joined a wild herd—being recovered. A party of mahouts led by Mada, now an acting forest guard in Mudumalai range, showed very creditable initiative by marching five elephants through infrequented jungle paths up to Kargudi in Mudumalai range. Practically all the forest buildings in Nilambur division were looted and burnt and 75 of the 85 buffaloes were killed by the rebels. The Range office at Mannarghat (Palghat division) was burnt, and the Ranger's quarters were looted. In the Nilambur division and the Mannarghat range, all records were burnt and work was entirely dislocated for about 6 months and it was impossible to float any timber down to the coast ; hence very little revenue was realised during the year.

Sixth  
Circle.

### CHAPTER I.—CONSTITUTION OF STATE FORESTS.

#### 1. ALTERATION IN AREA.

1. *Reserved forests*.—The area of the reserved forests decreased from 2,030 square miles to 1,846 square miles chiefly due to the transfer of the Mettupalaiyam range to the North Coimbatore division of the Fifth Circle and to the disforestation of eight reserves in Erode taluk.

2. *Reserved lands*.—Three thousand acres in the Sigur range of the Nilgiri district which were disforested in 1920-21 for assignment for cultivation were re-notified under section 4 during the year. The area at the end of the year was 106 square miles.

#### 2. FOREST SETTLEMENT.

3. No forests were finally settled during the year. Eighty square miles in the Nilgiris were under settlement.

#### 3. DEMARCATION.

4. Seven miles of new boundaries were demarcated in Wynaad. Some work was done in Nilambur, but details are not available. The usual reclearing of boundaries



*South  
Circle.*

was done by subordinates free of cost except in Wynaad and Nilambur. It is reported from South Mangalore that the Mysore-South Kanara boundary commission have finally settled the boundary between Mysore and that division.

#### 4. FOREST SURVEYS.

5. In Wynaad, the Mysore-Malabar boundary adjoining Begur reserved forest from Bavali to Murkal was surveyed by a Revenue Survey Party, while the verification of the remaining portion of the boundary was partly done by the India Survey Party No. VIII. The survey of coupes and plantations was done by the departmental staff in North and South Mangalore, Wynaad and Palghat. The reference maps were maintained.

### CHAPTER II.—MANAGEMENT OF STATE FORESTS.

#### 1. REGULATION OF MANAGEMENT.

6. *Preparation and control of working plans.*—No new working plans were sanctioned during the year, but the new working plan for the Nilambur teak plantations and the adjoining forests has been printed and awaits sanction.

The prescriptions of the existing working plans were worked up to as far as possible with small exceptions.

Most of the working plans in the Circle are out of date and require entire revision.

#### 2. COMMUNICATIONS AND BUILDINGS.

7. *Roads and bridges.*—Rs. 14,723 were spent on new works and Rs. 33,562 on repairs. The only division in which any new work of importance was carried out was Palghat where the Sappal hill road leading to the Sappal station in Chenat Nair forest was completed at a cost of Rs. 17,494, Rs. 7,057 being spent during the year. In this division, an inspection path connecting Sappal with Muthikulam in the Attapadi Valley was aligned and roughly constructed at a cost of Rs. 1,539, and 21½ miles of inspection paths in two of the Attapadi blocks were aligned and partly constructed at a cost of Rs. 1,243. The chief repairs carried out were the remetal-ling of the Olavakode-Dhoni road and the metalling and repair of the Chinnar-Iruttupallam road; Rs. 10,973 were spent on the former which is now in excellent condition and Rs. 2,871 on the latter.

8. *Buildings.*—Rs. 40,223 were spent on new works and Rs. 12,632 on repairs. The most important works were—

##### *Palghat division—*

(1) Buildings at Sappal station. These consist of rest-house, rangers', foresters' and guards' quarters and cooly lines; Rs. 23,593 were spent on their partial construction.

(2) An inspection shed at Olavakode on which Rs. 2,526 were spent.

##### *Nilambur division—*

The Nilambur Circuit house was completed at a cost of Rs. 13,847, Rs. 6,934 being spent during the year. It had scarcely been completed when it was burnt by the Mappillas.

##### *Nilgiri division—*

A range office at Kargudi was partly constructed at a cost of Rs. 1,068, and the Bangi Tappal rest-house was enlarged at a cost of Rs. 895.

9. *Miscellaneous.*—No important works were undertaken by the Department. The Public Works Department commenced work on the improvement of the Paishwani river, and carried out a considerable amount of blasting. I understand that about Rs. 14,000 were spent on this work.

## 3. PROTECTION OF FORESTS.

## (a) General protection.

Sixth  
Circle.

10. The following statement compares the number and classification of forest offences reported during the period under review with those of the previous nine months :—

Cases.	Injury to forests by fire.		Unauthorized felling.		Unauthorized grazing.		Other offences.		Total.	
	9 months of 1920-21.	1921-22.	9 months of 1920-21.	1921-22.	9 months of 1920-21.	1921-22.	9 months of 1920-21.	1921-22.	9 months of 1920-21.	1921-22.
Cases taken to court ..	10	15	146	78	86	17	38	22	280	132
Cases compounded ..	21	24	741	855	291	146	125	76	1,178	1,101
Cases undetected ..	94	82	6	7	..	..	..	5	100	94
Total ..	125	121	893	940	377	163	163	103	1,558	1,327

11. It will be seen that the number of offences during the year under review is considerably less than the total for the nine months of the previous year.

The decrease occurred chiefly in South Mangalore and Palghat. In South Mangalore, it is attributed (1) to impounding cattle straying in reserves instead of treating such cases as offences as was done in previous years, (2) to the fact that more timber and regeneration work was in progress than heretofore with the result that rangers and foresters had less time to supervise the protective work of the guards, and (3) to the levy of heavier compounding fees. The District Forest Officer, Palghat, has not explained the fall.

12. The percentage of cases prosecuted was 12.7 and the percentage of convictions in prosecuted cases was 82.5. The amount of compounding fees realized was Rs. 23,848 as compared with Rs. 10,509 in 1920-21. This large increase is chiefly accounted for by the realization in The Nilgiris of a heavy compounding fee in a case of illicit removal of a large quantity of sandalwood.

A sum of Rs. 167 was distributed as rewards to informers and subordinates in North and South Mangalore and The Nilgiris.

## (b) Protection from fire.

13. The period dealt with is the calendar year 1921. The system of protection remained unchanged. The area over which protection was attempted was 881.85 square miles as compared with 865 square miles during the previous year. The year was a favourable one and 98.58 per cent of the above area was successfully protected. The cost per square mile successfully protected was Rs. 24. Seven thousand nine hundred and seventy-two acres were burnt, the only serious fire being one which was evidently started maliciously in the Cairnhill plantation (Nilgiris) and which burnt 75 lots of firewood.

14. It was decided during the year that in the Mudumalai and Sigur ranges of The Nilgiris, the Chedleth range of Wynaad and the Uppinangadi range of South Mangalore the system of early burning should be introduced for 1922, and early burning in some of these localities was commenced towards the end of 1921. The results will be dealt with next year.

*General protection.*—The area under general protection was 653,946 acres of which 5,439 acres were burnt.

## (c) Protection against cattle.

15. There was a decrease in the area closed to grazing from 405 to 340 square miles, chiefly due to the opening to grazing of 57 square miles in Wynaad previously closed. This area was thrown open to grazing as no possible good was done by keeping it closed in a country where there are so few cattle. Twenty-nine per cent of the total area was open to all animals except goats and 53.5 per cent was closed to browsers.

16. The incidence of grazing has not been referred to by District Forest Officers except those of South Mangalore and Palghat. In the former it is 15 and in the

South  
Circle.

latter 9.4 acres per cow unit. In Palghat, however, the incidence is by no means accurate as the calculation takes into account inaccessible areas which are not resorted to.

17. Two thousand one hundred and seventy-one cattle were impounded during the year as against 2,189 for the nine months of the previous year.

(d) *Protection against injuries from natural causes.*

18. The only work undertaken was the collection of information regarding the attacks of teak defoliators in the Nilambur plantations, but the reports made by the foresters deputed for this work were burnt in the Mappilla rebellion.

### CHAPTER III.—SYLVICULTURE.

(a) *Natural reproduction.*

19. The seeding of most of the deciduous species is reported to have been good, *Dalbergia latifolia* in South Mangalore having produced a prolific crop. *Hopea parviflora* in Chenat Nair and in Kanara, and *Artocarpus hirsuta* in the latter district seeded well.

20. A heavy improvement felling in the Jalsur East forest in South Mangalore which was undertaken in the interests of the natural crop of young *Hopea* and *Artocarpus* found there has had a wonderful effect, some 200 acres now being stocked with a dense crop of established *Hopea* seedlings; a small portion of this area is thickly covered with *Artocarpus hirsuta* seedlings some 5 feet high. The fellings in the Chenat Nair forest in Palghat could not be carried out to the extent intended, partly owing to the Mappilla rebellion and partly because it was found that the cost of extraction without mechanical means of haulage was too heavy to permit of the sale of the timber at a profit, but the seedlings on the area felled over in the previous year have derived great benefit from removal of the canopy and are in promising condition. The casualties in the dry season were light. I discovered a large area fairly fully stocked with young *Hopea* varying in height from 1 foot to 20 feet in the eastern and drier part of the Chenat Nair forest; this is interesting as showing that it should not be difficult to raise this valuable tree even on the lower slopes, provided that there is sufficient shade. A plot of some 15 acres in the felled area in this forest which was burnt in 1920 in order to get rid of felling debris has during the year become stocked with a natural young crop of *Aerccarpus frazini-folius*; the young trees are exceedingly vigorous and many of them are upwards of 15 feet in height.

(b) *Artificial reproduction.*

21. *Regular plantations.*—Eighty-three acres of old teak plantation and 80 acres of natural forest in Nilambur division which were clear felled in the previous year were planted with teak. The outbreak of the Mappilla rebellion however prevented the execution of weeding and tending operations and practically the whole area had to be resown or replanted since the close of this year. Twenty-one acres of natural forest in this division were also clear felled and sown up as an experiment with various species other than teak. This area could not be weeded; the District Forest Officer has not reported whether the seedlings have survived or not.

22. In the Nilgiri division, 100 acres were prepared for planting during the current year with *Eucalyptus eugenioides* and *paniculata*.

23. In the Palghat division, 155 acres on the lower slopes of the Chenat Nair forest previously felled for firewood were sown with *Hopea parviflora* and *Artocarpus hirsuta*. Germination was excellent, but the mortality was very high in the dry weather which was unusually long, and the percentage surviving at the end of the season was only about five. The slopes in question are very hot and the soil is shallow; it will be necessary to wait a few years longer in order to obtain more shade from the coppice growth before attempting to introduce these species, though, as stated in paragraph 20, the fact that on a similar and drier slope further east there is plenty of natural regeneration of *Hopea* points to the suitability of the slopes in question for raising this species.

24. In North and South Mangalore, sowing of *Hopea parviflora* and *Artocarpus hirsuta* was continued. A good deal of seed failed to germinate and vacancies were replaced with *Hopea* seedlings from neighbouring forests. The results have been very favourable except in one locality where the forest was maliciously burnt by adjoining villagers; 390 acres were treated in the Parappa, Porkala and Padnur forests of South Mangalore, and 645 acres in the Jattukattumalai and Someshwar forests in North Mangalore. For sowing during the current year the soil was prepared over a somewhat larger area by digging with mamotties the patches to be sown. This has resulted in very much better germination. Sixth Circle.

25. *Taungyas*.—No taungya plantations were made during the year.

26. *Cultural operations*.—Sandal seed was sown over an area of 27½ acres at Kargudi in the Nilgiri division, 25 acres having been sown during the previous year. The growth of the seedlings—which have all been fenced—is satisfactory.

(c) *Operations for the improvement of the growing stock.*

27. Owing to the Mappilla rebellion, no thinnings were undertaken in the Nilambur teak plantations, where this work is now in considerable arrears: Thinnings and clearings were undertaken in some of the teak plantations in Wynaad division; the work here is gradually being brought up to date. The Pilarkan forest in North Mangalore where the crop is practically a pure forest of *Hopea parviflora* in the pole stage was marked for a fairly heavy thinning and the marked trees are now being felled. In South Mangalore, an improvement felling was carried out over some 350 acres of the Nalkur forest where there is a valuable young crop of *Hopea parviflora* seedlings which only require admission of light to become established. In the Chenat Nair forest of Palghat division, young seedlings of the valuable species in the area felled over in 1920–21 were freed from suppression. In the Nilgiris, an improvement felling was carried out in the Burliyar sandalwood block with good results to the sandal crop, and the usual improvement fellings were undertaken in the Mudumalai forest, though in a much heavier degree than hitherto. The Mudumalai teak plantation was thinned, as were also coupe 5 of Newman (*Eucalyptus globulus*), compartment 6 of Muthinad (*Eucalyptus globulus*), compartment 9, Block VI of Aramby (*Eucalyptus punctata*) and the *Pinus longifolia* plantation in Cairn Hill. The *Cryptomeria Japonica* plantation in the same forest was cleaned.

#### CHAPTER IV.—EXPLOITATION.

##### (a) *System of Management.*

##### (i) MAJOR FOREST PRODUCE.

28. Exploitation looms large in the politics of the sixth circle and has been the subject of continued discussion and careful attention during the year. The State possesses in this circle about 875 square miles of high forest which it has been very roughly estimated contains some ten million tons of exploitable timber. The world is short of timber and yet when—as happened during the year—work is dislocated in the Nilambur Valley which, owing to the facility with which timber can be extracted by floating, is the only locality in which exploitation on any considerable scale has hitherto been attempted, the circle works at a loss. This anomaly is due to the almost total absence of facilities for the extraction of timber more especially in the evergreen forests of the Western Ghats. With a view to tapping the resources of the most accessible of the Ghat tracts (the Chenat Nair forest), a scheme which had been sanctioned in the previous year was put into execution in 1920–21 and work was commenced on the construction of roads, dragpaths, slides and buildings for the staff, and some 700 tons of timber (much of it of species unknown to the market) were extracted and sent to the Kolar Gold Fields, the authorities there having agreed to test the suitability of the various timbers for mining purposes. Mr. C. S. Martin, the Consulting Forest Engineer to the Government of India, visited the forest in March 1921 and gave it as his opinion that provided modern methods of logging were installed the exploitation of the forest was likely to prove a paying proposition. The work begun in 1920–21 was therefore proceeded with during the year under

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Circle.*

report, and at its close a considerable length of roads and dragpaths had been constructed, and the buildings to house the staff were nearing completion. The extraction of timber was continued, but after the more accessible portions of the forest had been worked out it became apparent that with the gradually increasing lead the cost of extraction by manual and animal power was prohibitive. For this reason and also on account of the scare occasioned by the Mappilla rebellion, the quantity of timber extracted was considerably less than had been intended. Eighty-six thousand four hundred and eight cubic feet of timber were extracted, 61,896 cubic feet of which were supplied to the mines. The balance was found on extraction to be unfit for mining purposes; part of it was converted and sold locally and part remains to be disposed of. The agreement with the mines under which they accepted all the timber extracted came to an end during the year, and a fresh arrangement was made under which certain timbers only are supplied at various prices. Two Holt five-ton caterpillar tractors—one of which is fitted with a winch—were purchased towards the end of the year as well as a large quantity of logging tools and gear. Owing to sickness among the staff it was not possible to commence serious work with the tractors during the year.

29. The results of the work hitherto carried out have conclusively proved that it is impossible to undertake exploitation on any considerable scale in such difficult country (especially when it is necessary to work with expensive machinery) by means of the ordinary divisional forest organization, and proposals have since been submitted for the formation of an exploitation division or unit which shall be entirely separate from the forest division.

30. The refusal of the mines to continue to accept all the timber extracted has resulted in our being unable to dispose of certain timbers, which constitute some two-thirds of the forest crop, as they are unknown to the local market. It is obvious that in such difficult country as the slopes of the Western Ghats where expensive machinery is essential for moving the timber exploitation cannot prove profitable unless the whole crop can be disposed of. Our efforts must therefore now be concentrated on proving that the timbers hitherto regarded as useless are suitable for certain purposes. There is a huge demand in India for sleepers and boxes, one oil concern in South India requiring 30,000 boxes per month. Steps are now being taken to have certain of the commonest timbers tested at Dehra Dun as to their suitability for sleepers, and it is hoped shortly with the help of a local sawmill to test the market by placing on it considerable quantities of the various softwoods in the shape of box shooks. Pending the results of these experiments, it is not intended as was originally proposed to set up a sawmill at Olavakode, and for the present capital expenditure will be confined to the gradual improvement of the means of transport.

31. The different sylvicultural systems in force were—

*Clear fellings.*—In Wynaad, 50 acres in the Chedleth range and 39 acres in the Begur range were clear felled; these areas were sown with teak after the close of the year. The usual clear fellings in the Nilambur division were not carried out owing to the Mappilla rebellion.

*Uniform method.*—The fellings in the Chenat Nair forest come under this category and are of the nature of final fellings. The area felled over was 66 acres.

*Selection method.*—About 300 acres were felled under this method in North and South Mangalore.

*Improvement fellings.*—Fellings of this nature were carried out over an aggregate area of 1,010 acres in North and South Mangalore and the Nilgiris.

*Simple coppice and coppice with standards.*—About 1,136 acres were worked under the former and 224 acres under the latter system.

*Unregulated fellings.*—These were confined to unreserved lands. About 10 tons of sandalwood were extracted in North and South Mangalore and the Nilgiris.

#### (ii) MINOR FOREST PRODUCE.

32. *Bamboos and miscellaneous produce.*—As usual these were leased out with certain exceptions. In Wynaad, a small quantity of bamboos was cut departmentally in Kanoth range and carted to Tellicherry to test the market with a view to

future working, and in Nilambur the bamboos required for floating timber were extracted departmentally. In the Mudumalai range of the Nilgiris, minor produce was collected departmentally. Permits for the removal of bamboos and reeds were issued in South Mangalore and Wynad. The right of collecting nux-vomica seed was leased out in North and South Mangalore divisions. Sixth Circle.

*Fodder grass and hay.*—Fodder grass was leased out in Bolampatti and Palghat ranges of Palghat division. No hay was made.

*Grazing.*—This was, as usual, regulated by the issue of permits. The revenue realized was Rs. 29,144 as compared with Rs. 36,211 during the previous nine months. The fall in this revenue is chiefly due to the transfer of the Mettupalaiyam range to the Fifth Circle.

(b) Agency of exploitation.

(i) DEPARTMENTAL AGENCY.

33. The quantity of major produce exploited was 30 per cent of the total outturn and would have been greater had it not been for the closure of operations in Nilambur. A larger quantity of timber was extracted in Wynaad, Palghat and the Nilgiris; in Wynaad clear fellings were undertaken departmentally, in Palghat the Chenat Nair exploitation operations yielded an increased outturn, and in the Nilgiris the improvement fellings were conducted more intensively than in previous years.

About 5½ tons of *Myristica canarica* seed were collected in South Mangalore for the supply to the Eastern Development Corporation at their cost for research purposes.

(ii) BY PURCHASERS.

34. *Major produce.*—The extraction was mainly confined to fuel from coupes sold standing to contractors.

(iii) and (iv) BY RIGHT HOLDERS AND UNDER PRIVILEGES AND FREE GRANTEES.

35. The quantity and value of forest produce removed under this head are given below:—

	Timber in thousands of cubic feet.	Value.	Fuel in thousands of cubic feet.	Value.	Bamboos.	Grazing and fodder grass.	Other produce.	Total value.
Right holders .. ..	18	Rs. 7,180	..	..	Rs. ..	Rs. 811	Rs. ..	Rs. 7,180
Free grantees .. ..	2	185	..	..	4	811	9	1,009

(c) Outturn and sources of forest produce.

36. The total outturn of *major produce* and the value of *minor produce* extracted from all classes of forests by all agencies during the year under report were:—

	Timber in thousands of cubic feet.	Fuel in thousands of cubic feet.	Bamboos.	Gross value of minor produce including grass and grazing.
1921-22 .. .. .	823	2,330	Rs. 17,897	Rs. 65,143

The fall in the quantity of timber and bamboos is chiefly due to the stoppage of work in Nilambur. No useful comparison can be made with the figures of the previous year relating to other produce as the latter include the Mettupalaiyam range which is no longer in the circle.

The total number of cattle for which grazing was provided in the various classes of forests was 106,335.

## CHAPTER V.—FINANCIAL RESULTS.

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Circle.

37. The revenue and expenditure for the year are compared below with those of 1920-21 (whole year).

	*1920-21.	1921-22.
	RS.	RS.
Revenue ... ..	10,19,975	8,40,759
Refunds ... ..	2,358	1,305
Net ...	<u>10,17,617</u>	<u>8,39,454</u>
Expenditure—		
Conservancy and Works ... ..	6,47,908	6,56,378
Establishment ... ..	3,60,081	4,40,358
	<u>10,07,989</u>	<u>10,96,736</u>

\* Includes figures of Mettupalayam range transferred to Fifth Circle.

38. The decrease under revenue is chiefly due to the stoppage of operations in Nilambur.

The increase of expenditure under Conservancy and Works would have been greater if normal conditions had obtained in Nilambur. It is due partly to the purchase of tractors and tools for exploitation work in Palghat, and partly to extended timber operations in Wynaad.

The increase under establishments is due to the revision of pay and travelling allowance and to the formation of the Sixth Circle towards the end of the previous year.

39. Eighty-two per cent of the revenue was derived from major produce, 7 per cent from minor produce, 4 per cent from grazing and 7 per cent from miscellaneous sources.

Fifty-three per cent of the expenditure was incurred on exploitation, 30 per cent on upkeep and improvement of forest and 17 per cent on miscellaneous items.

The revenue outstanding at the close of the year was Rs. 1,84,909.

## CHAPTER VI.—RESEARCH AND EXPERIMENTS.

40. Experimental work was continued at Dhoni, Nilambur, Nedungayam, Parappa and Nalkur. At Dhoni, the work chiefly consisted of nursery experiments in connection with the period during which seeds (chiefly of the evergreen species) can retain their power of germination, and with the treatment of seed. At Nilambur and Nedungayam where the underplanting experiments conducted in 1920 had proved a failure, they were repeated, *Hopea* and *Artocarpus hirsuta* being sown under young teak crops. Owing to the Mappilla rebellion it was impossible to keep the plots under observation. In Parappa and Nalkur (in South Kanara) further study was devoted to the behaviour of young *Hopea* crops after exposure to varying degrees of light, and some interesting results in regard to the increase in height growth due to removal of part of the canopy were obtained. The experiments in connexion with the germination and treatment of seed have not been long enough in progress to yield any definite results.

41. In the Nilgiris, the District Forest Officer sowed the seed of seven species of Burmese oaks in the Keti plantation, and raised a few seedlings of *Juniperus procera* (seed obtained from Kenya) to be planted out during the current year. In South Mangalore stumps of *Hopea parviflora* and *Artocarpus hirsuta* were prepared at the end of the year to be planted out in the current year. The period laid down for the experimental seasoning of the timber of *Hopea Wightiana*, *Eugenia Garderi*, *Hardwickia pinnata*, *Vateria Indica*, *Alstonia scholaris*, and *Ficus asperifolia* in South Mangalore and Wynaad expired during the year, and the experiments were examined

## CHAPTER VII.—ADMINISTRATION.

Sixth  
Circle.

42. During the year under report, the Central Coimbatore and South Malabar divisions were rearranged, the Mettupalayam range being transferred to the Fifth Circle, and the Mannarghat range to Central Coimbatore which was renamed the Palghat division. The South and North Malabar divisions were renamed the Nilambur and Wynaad divisions respectively.

43. *Tours.*—I inspected all the divisions in the Circle as well as some of the Coorg forests. District Forest Officers spent more than the prescribed number of days on tour except those of North and South Mangalore, Nilambur and the Nilgiris. The short touring in North and South Mangalore is due to the fact that for nearly four months both divisions were in charge of one officer, and that in Nilambur to the Mappilla rebellion. The period of six months' minimum touring does not apply to the Nilgiris.

44. The Chief Conservator visited the Chenat Nair forest in Palghat and the Nilambur teak plantations. He also held a conference at Mangalore in December 1921 attended by the members of the Legislative Council, other leading gentlemen of the South Kanara District and the local officials, in which certain questions relating to forest grievances and the future development of the forests were discussed.

45. *Inspection.*—All the District Forest Offices in the Circle except Nilambur—where all the records were destroyed—were inspected by me. All the range offices were inspected except two viz., Puttur (in South Mangalore), and Mannarghat (in Palghat). Puttur range office was inspected after the close of the year.

46. *List of offices audited.*—The accounts of North and South Mangalore and the Nilgiri divisions were audited, and the results were generally satisfactory.

47. *Vernacular Training School.*—No school was held in this circle.

48. *Health of the establishment and sanitation.*—Three Foresters, two guards and six elephant-men died of malaria, and two guards of cholera. The stations at Benne and at Kargudi in the Nilgiris were cleared of tree growth to improve the sanitation, and a new well was dug near the Coolie lines at Kargudi. A scheme for installing a hydraulic ram at Kargudi is under consideration.

Anti-malarial works were undertaken in the Dhoni Valley with markedly good results, very little malaria being reported there. The health of the men living at Sappal in Palghat division which it was hoped would be free from malaria was very unsatisfactory, practically the whole establishment being prostrated by malaria. No anopheles have been found there however, and in spite of strenuous denials I strongly suspect that the malaria was contracted during visits to the villages at the foot of the hill.

## CHAPTER VIII.—GENERAL.

## (i) FORMATION AND MANAGEMENT OF PANCHAYATS (TO INCLUDE FOREST VILLAGE SYSTEM).

49. The panchayat system is confined to Palghat division. The management by the Ettimadai, Madukkarai and Sundakkamuthur panchayats is reported to have been unsatisfactory, while the eight panchayats formed under the Forest Village System in the Erode taluk are reported to be working satisfactorily. Proposals for the formation of panchayats under the Forest Village System in South Kanara are still under consideration.

## (ii) MEASURES FOR IMPROVING LOCAL SUPPLIES AND FACILITIES.

50. In North and South Mangalore where the chief demand is for leaf manure, the question will be considered in connexion with the proposals for the formation of panchayats. In the latter division, as during the previous year a contractor has been found to purchase fuel in the forest coupes and to sell it at Mangalore at a fixed rate in order to control the prices in that town. No measures were called for in the other divisions.



*Sixth  
Circle:*

No measures for the improvement of water-supply were called for, practically the whole circle being blessed with a copious rainfall.

(iii) **TIMBER TRANSIT RULES.**

51. These are reported to have worked satisfactorily.

(iv) **JUNGLE TRIBES.**

52. There is nothing of any importance to report.

(v) **MINING AND QUARRYING.**

53. The District Forest Officer, Nilgiris, has not reported on the result of prospecting for mica in the Mudumalai forest referred to in the last report.

(vi) **LIVESTOCK.**

(a) *Elephants.*

54. There were 99 elephants in stock at the beginning of the year. Seventeen were captured and one was born in captivity. Nine died and one—a recent capture—ran away at the outbreak of the Mappilla rebellion and has not been traced. Of the elephants which died, four were young calves, and one—a fine mukna—died of wounds received during the rebellion. The number on hand at the end of the year was 107.

(b) *Other animals.*

55. There were 137 buffaloes and 11 bullocks on hand at the beginning of the year. Seventy-two buffaloes and 12 bullocks were purchased during the year. Sixteen buffaloes died and 75 were butchered by the Mappillas during the rebellion leaving the stock at the end of the year at 118 buffaloes and 23 bullocks. The buffaloes were employed in the Chenat Nair forest and in the Wynaad division for dragging timber.

(vii) **VETERINARY ESTABLISHMENT.**

56. The Veterinary Assistant stationed at Nilambur was transferred owing to the rebellion and no one has yet been posted in his place. The Assistant at Gudalur continued to be in charge of The Nilgiris and Wynaad stud.

(viii) **CIVIL SUITS.**

57. There were no new suits during the year. The two referred to in the last year's report in Wynaad and Nilambur are still pending. In South Mangalore, an appeal was filed by Government before the High Court against the decision of the Sub-Judge, South Kanara, in favour of a contractor whose timber was confiscated as it was not removed within the time allowed.

(ix) **CONTROL OF UNRESERVED LANDS BY THE FOREST DEPARTMENT.**

58. There is nothing to report.

OOTACAMUND,  
28th July 1922.

H. TIREMAN,  
Conservator of Forests, Sixth Circle.

ENCLOSURE

Statement showing sanctions for works exceeding Rs. 5,000 accorded under the powers delegated in G.O. No. 1755, Development, dated 17th September 1921.

Name of work	Total cost.	Expenditure incurred in the year.	Remarks showing how the cost was met—portion met from the budget allotment and portion met from other sources.
Regeneration operations in Chenat Nair reserve, Palghat division, during 1921-22	RS. 6,000 + 300	RS. 6,302	Rupees 2,600 provided in the budget. Balance met by reappropriation from other sources. Excess expenditure, Rs. 2.

**ADMINISTRATION REPORT OF THE MADRAS FOREST COLLEGE,  
COIMBATORE, FOR THE PERIOD FROM 1st APRIL 1921 TO  
31st MARCH 1922.**

**CHAPTER I.**

**CONSTITUTION.**

*Staff.*—Mr. F. L. C. Cowley Brown, the permanent Principal of the College who was on long leave has now retired from service.

The writer of this report was Principal throughout the year under review.

*Senior Instructors.*—The posts of Senior Instructors were held by the following officers during the year under report :—

Name of officer.	Period.
Mr. J. H. Longrigg ... ..	From 1st April 1921 to 11th July 1921.
Mr. W. C. Hart ... ..	From 12th July 1921 to 31st March 1922.
Mr. R. B. Cornwell ... ..	From 1st April 1921 to 15th July 1921.
Mr. G. C. Robinson ... ..	From 6th August 1921 to 31st March 1922.

Mr. W. C. Hart reported himself for duty at the College on the forenoon of 2nd July 1921, whereas he took charge of the office of Instructor on the afternoon of 11th July 1921. The officer was considered during the intervening period to have been attached to the Forest College.

*Junior Instructors.*—The following officers held the posts of Junior Instructors during the year under report for the periods noted against each :—

Name of officer.	Period.
Mr. Muhammad Abdul Karim ... ..	From 1st April 1921 to 19th July 1921.
Mr. E. K. Krishnan ... ..	From 20th July 1921 to 31st March 1922.
Mr. M. R. Sundaram Ayyar ... ..	From 1st April 1921 to 18th January 1922.
Mr. A. R. Brand ... ..	From 23rd February 1922 to 31st March 1922.

*Sub-Assistant Surgeons.*—The two posts of Sub-Assistant Surgeons were held by Messrs. Yawseen Khan Lodi, K. Narayana Nayar, V. Govindakutti Nayar and S. Manjunatha Baliga. These officers delivered lectures in First Aid and Camp Hygiene in camp. First-aid lectures were delivered in Headquarters to the students of the Senior Division by the Medical Officer in charge of the Lawley Road Dispensary.

Instruction in physical training, gymnastics and drill were, as usual, given to the students of both the divisions by the College Havildars.

In addition to the ordinary bi-weekly drills during the year under report the students did physical training every day for 15 minutes with beneficial results, between the second and third lectures in the cold weather, and before lectures in the hot weather.

*Board of Visitors.*—Mr. S. Cox, C.I.E., I.F.S., the Chief Conservator of Forests was ex-officio President of the Board of Visitors throughout the year under report.

The following officers were on the Board during the year :—

Mr. H. A. Latham	Mr. H. Tireman
„ H. F. A. Wood	„ C. E. C. Fischer
Mr. A. B. Jackson ... ..	On 1st April 1921 and from 2nd September 1921 to 31st March 1922.
„ J. S. Soot ... ..	From 1st to 15th April 1921.
„ D. T. Barry ... ..	From 26th May 1921 to 7th December 1921.
„ H. C. Bennett ... ..	From 8th December 1921 to 31st March 1922.

## CHAPTER II.

## INSTRUCTION.

(1) *Teaching.*

Lectures were delivered to the students in accordance with the College timetable.

The 1919-21 division who were examined in June 1921 were below the average in intelligence and efficiency. No Honours certificates were awarded and none were deserved. One or two men were indeed lucky to get their higher standard certificates. Details are given later.

The revised time table introduced on 1st August 1921 has worked well, as also has the revised system of touring, by which the first long headquarters term is relieved by a three weeks camp in the middle, at which the theory already learnt is put into practice.

The 1920-22 division, the present senior year, is a promising one; in general ability, commonsense and efficiency the students are well above the average, and we may confidently expect several of them to obtain Honours certificates. In this year are two private students and both are considerably above the average. It has usually been my experience that the private students are the best, and this is natural as they choose Forestry as their profession of their own free will. We must look forward to the time when we have worked through our Deputy Rangers, and are able to promise Government appointments to such private students as do well at the College. Then we may expect to get a really clever and efficient class of Range officer.

At the commencement of the year under review there were in this division 34 students. Of these one was withdrawn from the College for incapacity. Two students of the 1919-21 division who had been withdrawn from the College in November 1920, were re-admitted under the orders of the Chief Conservator of Forests to undergo their second year course. Thus the strength of the division has been 35 since August 1921.

The final examination in physical science for this, the 1920-22 division, was held in June 1921.

The Chief Conservator's Prize for the best student of this division was awarded to P. Sithapathi Ayyar.

The 1921-23 division, the present juniors, have improved considerably since their arrival. It has been necessary to dismiss one of them for misdemeanour and to send down three for inefficiency. One has been withdrawn by the deputing authority.

The year commenced with a strength of 34 and this has therefore now been reduced to 29. Severer disciplinary measures than usual were necessary before they realized their position, responsibilities, and privileges. They are however now settling down well.

An innovation introduced in August last was the constitution of a Demonstration Theatre in Beddome Lecture Hall, for greater facility in imparting instruction in Utilization and Botany. At these lectures the Curator of the Museum has assisted as Demonstrator with very beneficial results.

(2) *Results of Examinations.*

The Board of Visitors met at Coimbatore on 28th June 1921, and remained till 30th June 1921, on which date the prizes and certificates gained by the students of the 1919-21 division were given away.

The final examination for these students was held in June 1921. Twenty-eight students appeared for the examination and the following list shows the certificates awarded in the order of merit:—

Rank.	Name of student.	Name of Circle, State or Province to which attached.
<i>Madras Ranger Honours—Nil.</i>		
<i>Madras Ranger Higher.</i>		
1.	T. P. Palanikumar	Fourth Circle, Madras.
2.	K. R. Murjani	Bombay.
3.	N. M. Karumbayya	Coorg.
4.	K. Raghuraman	Third Circle, Madras.
5.	D. Krishnāswami Ayyar	Second Circle, Madras.
6.	V. N. Subrahmanya Ayyar	Do.
7.	C. S. Ganapathi (N.C.)	First Circle, Madras.
8.	A. Sitharamayya	Third Circle, Madras.
9.	C. K. Abyankar	Bombay.
10.	P. Sankunni Nayar	Fifth Circle, Madras.
11.	O. S. Ganapathi	Coorg.
12.	C. K. Gulrajani	Bombay.
13.	A. R. Manual	Fifth Circle, Madras.
14.	K. Venkatesan	First Circle, Madras.
15.	M. P. Philip	Fifth Circle, Madras.
16.	B. S. F. Lebbai	Ceylon.
17.	K. Raghavan	Sixth Circle, Madras.
18.	T. Perumal	Fifth Circle, Madras.
19.	V. R. Kamalapur	Bombay.
20.	T. L. F. Perera	Ceylon.
21.	B. Krishna Rao	Second Circle, Madras.
<i>Madras Ranger Lower.</i>		
22.	T. M. Krishnamachari	Second Circle, Madras.
23.	G. Venkatasubba Rao	Do.
24.	S. Nageswara Ayyar	Fourth Circle, Madras.
25.	S. Ramalingam	Do.
26.	I. Ramamurthi	First Circle, Madras.
27.	Nur Ahmed	Hyderabad.
28.	B. N. Dev.	Bombay.

The Government and other prizes were awarded as follows:—

- (1) Best second year student (gold medal)—T. P. Palanikumar.
- (2) The Campbell Walker Prize for the best all round ranger.—K. R. Murjani.
- (3) The Brasier Prize for the best out-door ranger—N. M. Karumbayya.
- (4) The Lodge Prize for the best second year student in forest engineering—T. P. Palanikumar.
- (5) The Madras Conservator's Prize for the best second year student in Forestry—T. P. Palanikumar.
- (6) The "Indian Forester" Prize for the best essay by past students—L. T. Taylor.
- (7) The "Indian Forester" Prize for the best essay by present students—B. S. F. Lebbai.
- (8) The Pentland Shield for the best athlete in the College—S. Ramalingam.
- (9) The Fischer Cup for the best Gymnast in the College—S. Ramalingam.

Messrs. A. Wimbush, T. A. Whitehead, F. A. Seager, E. M. Crothers, S. V. Devadasan, Capt. H. Irwin, M.C., and Capt. M. G. Platts, M.C., O.B.E., were the examiners at the final examinations in June 1921.

The examiners' reports were on the whole good.

Mr. J. Morrit of the Police department examined the students in gymnastics.

As pointed out in previous administration reports the want of text-books in range administration and engineering is a heavy handicap to the instructors in these subjects.

Practical training in the Demonstration Forest and in the Engineering Park continued throughout the year to form an important part of the College curriculum:

The Prizes and Certificates were very kindly given away by Lady Davidson on speech day, June 30th, on which occasion the Hon'ble Sir Lionel Davidson, K.C.S.I., I.C.S., presided. Amongst the officers who were present at the function the College was glad to welcome Mr. P. H. Clutterbuck, C.I.E., the Inspector-General of Forests to the Government of India.

After the prize distribution, a garden party was held in the College grounds to which a large number of guests were invited by the Board of Visitors and staff of the College.

The students of the 1920-22 division were examined in First Aid at the end of March 1922, Major John Forrest and his Assistant, Doctor Peters, conducted the examination. Out of 35 students who sat for the examination 21 gained the Saint John's Ambulance Certificates for proficiency.

The periodical and half-yearly examinations held as usual show that satisfactory progress is being made by both divisions.

### CHAPTER III.

#### ADMINISTRATION, TOURING, HEALTH AND CONDUCT.

*Administration.*—The Board of Visitors met at the College on the 28th June 1921 and the following important matters were discussed:—

- (1) The erection of a new pump and engine-house over the municipal well acquired.
- (2) The revision of the College calendar.
- (3) The construction of semi-permanent quarters to replace tents in students' camps.
- (4) The Madras Forest College Magazine.
- (5) The Curator to serve as Demonstrator.
- (6) The Demonstration Forest and the revision of its working plan.

The resolutions passed have since been given effect to in the majority of cases; but we are still without our very necessary auxiliary engine and pump over the "municipal" well recently acquired.

*Cost of education.*—The cost of education per student has not altered appreciably during the year. It is hoped, however, that shortly a fall will be apparent owing to various economies that are being introduced, the chief among which is the substitution of sheds for tents when the College is in camp.

*Touring.*—The camping during the year under review has been in accordance with the sanctioned programme except that owing to the Mappilla rising in Malabar, which made it unsafe, the senior division camped at Topslip and Sethumadai during November and December instead of at Nilambur and Nedungayam.

The programme of tours followed by the students and the works carried out by them are given below:—

#### *Senior Division.*

*April and May, Arambyshola (Ootacamund).*—The students of the 1919-21 division were employed in the study of the evergreen forests, measurement and valuation of sample plots, and formation of "model forests" in the Frenella undergrowth to give practical instruction in the various systems of treatment. Lectures on silviculture, working plans and botany were delivered. A temporary nursery was formed. The final survey examination was held.

*September and October (Komattiyeri).*—The students of the 1920-22 division entered their second year in August 1921, and became the senior division. They were employed in the study of the silviculture of sandal, in checking reserve boundaries, in road alignment, construction of culverts and botany excursions.

*November and December—Sethumadai and Topslip (South Coimbatore division).*—The students were engaged in the study of fuel coupes under working, concentrated regeneration of teak plots, and the natural growth of teak; in the construction of a suspension bridge; in laying tram lines, and road construction; and in botany excursions.

*January and February 1922 (Dhoni camp).*—The students were engaged in the measurement of sample trees, enumeration work, the preparation of stock maps, drawing up their annual reconnaissance reports; and in the alignment of a timber slide which has subsequently been constructed.

*Junior Division.*

*April and May 1921—Bandyshola (Coonor).*—The students of the 1920–22 division were engaged in silviculture and botany excursions, the construction of bridges, checking the boundaries of reserves, laying out sample plots and designing camp quarters.

*September and October 1921 (Sativayal).*—In August, the new 1921–23 students arrived and constituted the new Junior Division. They were engaged in the survey of fuel coupes, inspection of shola forests, checking reserve boundaries, construction of temporary bridges and in botany excursions.

*November and December 1921—Sethumadai and Topslip (South Coimbatore division).*—Time was occupied in the study of teak regeneration areas and plantations, visits to the shola forests, the inspection of elephant pits, construction of a charcoal kiln, study of fuel coupes, laying of a tramway, study of the method of tramping timber, construction of a suspension bridge and in botany excursions.

*January and February 1922 (Kargudi).*—Marking for improvement fellings, fire-line cutting, construction of kilns, inspection of elephant kraals, inspection of bridges and botanical excursions occupied the students' time.

As usual all operations on tour have been recorded in the College journals, extracts or special notes relating to works of direct value to the District being communicated to the District Forest officers concerned through the Conservators.

The thanks of the College are due to the District Forest officers of the districts visited and to such of their subordinates as have taken trouble to make the College touring comfortable and instructive, and for their co-operation and assistance.

Messrs. H. F. A. Wood and H. Tireman, the Conservators of the Fifth and Sixth Circles, respectively visited the College camps at Sethumadai and Dhoni.

While at Kargudi the students of the 1921–23 Division were tested in swimming. Twenty out of the 29 students passed the test.

*Health.*—The general health of the students while at headquarters, was, on the whole, satisfactory. In camp the health of the students was better than usual. The students of the 1921–23 Division were especially free from sickness and this was largely attributed to a wonderful quinine tonic with which the officer commanding dosed them regularly.

Just at the close of the year there was an outbreak of smallpox on the estate. By prompt action and careful segregation of those affected and largely owing to the efforts of Mr. W. C. Hart, the house tutor, the disease was prevented from spreading.

A most painful episode of the year under review was the death of Mr. M. R. Sundaram Ayyar, an Instructor attached to the Senior Division of the College, on the 29th March 1922. He was a willing and efficient worker, was keen on his job, was popular with the students and was always courteous and tactful and a pleasant man to work with. By his death the College has lost an efficient Instructor and the Department an able officer.

*Conduct and Discipline.*—The discipline at the College was, during the year, satisfactory and the general tone good. One student of the Junior Division had to be withdrawn for misdemeanour.

At the beginning of the College year we had an unruly element to deal with amongst a certain clique, largely confined to the newly arrived Juniors, and it was dealt with quite satisfactorily.

Apart from this the conduct of both years has been good. On the whole the students have shown themselves to be self-respecting, courteous and manly young men.

## CHAPTER IV.

## THE GASS FOREST MUSEUM ; COLLEGE AND STUDENTS' LIBRARIES.

Mr. G. Viswanatha Ayyar, B.A., the Curator, was in charge of the Museum throughout the year.

Several contributions were made during the year to the Museum by Forest officers and others and the gratitude of the college is due to the donors. Among the more important contributions were:—

(a) About 25 timber panels (22 of which were presented by the Forest Research Officer, M.R.Ry. Rao Sahib K. R. Venkataramana Ayyar Avargal).

(b) Two hundred botanical specimens presented by C. E. C. Fischer, Esq.

(c) About 25 seedlings and 150 botanical specimens presented by the Forest Research Officer.

(d) A French hunting horn presented by F. L. C. Cowley Brown, Esq.

(e) Four tool handles from the Barielly Wood-working Institute.

(f) Thirty-five timber samples from the Imperial Forest Economist, Dehra Dun.

That the Museum is becoming more popular is evident from the fact that the number of visitors during the year rose to 21,905 from 21,173 of the previous year.

Prominent among those that paid a visit during the year, were:—

Sir Lionel Davidson, K.C.S.I., I.C.S.,

P. H. Clutterbuck, Esq., C.I.E., C.B.E., V.D.,

H. G. Stokes, Esq., C.I.E., I.C.S.,

C. W. E. Cotton, Esq., C.I.E., I.C.S.,

W. H. Robertson, Esq., I.F.S., and

Dr. Alfred Hay of the Indian Institute of Science, Bangalore.

We continue to receive specimens for identification, chiefly timber samples, and do our best to furnish the necessary information.

*General Library.*—One hundred and eighty books were added to the Library.

*Students' Library.*—Ten books were presented to the library by Mr. N. R. Subrahmanian Pillai, a clerk of this office and our thanks are due to him for his kind gift.

## CHAPTER V.

## SUPERVISION, WATER-SUPPLY, ROADS AND BUILDINGS, ETC.

*Supervision.*—The post of the Estate Overseer was held by Mr. A. Marudachallam Pillai throughout the year. He is an untrained man, and though he at first tried hard to pick up the work, it seems unlikely that he can prove a permanent success. Unless the pay of this responsible post is raised, however, it will not be possible to get a suitable man. This question is now before Government.

*Water-supply.*—The project of connecting the Municipal Well with the College well was completed by the Public Works Department during the year and we have now a water supply that is just enough for our present needs. We are, however, as already pointed out above, still without the essential auxiliary engine; it is hoped that it will be installed shortly by the Public Works Department.

One of the two rain-water tanks constructed by the Public Works Department on the College estate is found to be defective and endeavours have been made by them to rectify it.

*Roads.*—The scheme for the re-lay of roads on the estate was sanctioned during the year. The roads on the north side of the main building were relaid.

All the existing roads were kept in repair.

*Buildings.*—Necessary repairs to the hostels and other buildings under the control of the Principal were executed during the year. In accordance with the resolution of the Board of Visitors in June 1921, semi-permanent sheds to replace

tents in the College camps were constructed at Topslip (Mount Stuart) and at Kargudi during the year. Estimates for the construction of wooden huts at Arambyshele were sanctioned rather late in the year and the work is almost completed.

*Students' club.*—The Students' Club has now become the centre of social life in the College and attracts the students in large numbers.

*Athletic ground.*—Rupees 1,580 was sanctioned by the Chief Conservator for repairing a third of the College Athletic ground and the work was carried out at a cost of Rs. 1,437-5-11.

*Establishment.*—The office was inspected in July 1921 and the general results of inspection were not satisfactory. The work improved for a little but then went off again. The Manager continually complained of ill-health and neglected his work, and the rest of the office as would be expected, followed suit.

Immediately after the close of the year under review a sudden unexpected inspection by the Principal disclosed many grave irregularities and defalcations, and the Manager of the office disappeared and has not yet been apprehended.

None of the clerical staff worked really well during the year, but this is only to be expected when the Manager of the office is not trustworthy. It is hoped that great improvement will be shown in the current year.

The Storekeeper in especial has been bad. He has been changed four times in the past 12 months, and the present incumbent is useless. There have undoubtedly been losses in the stores which are now being checked. Unless the pay of this post is raised it will be quite impossible to get any one capable of undertaking the work entailed, which is difficult, responsible and monotonous. The question of increasing the pay of this appointment is also before Government.

*Deputation of staff.*—Mr W. C. Hart, the Engineering Instructor was deputed in July 1921 to the Sappers' and Miners' School of Field Engineering at Bangalore to undergo a short course of training.

The Principal was deputed in January 1922 to attend the Forest Utilization Conference held at Dehra Dun and also to visit the Central Utilization Institute at Bareilly. He submitted, to the Chief Conservator of Forests a separate report on his work shortly after his return.

## CHAPTER VI.

### GENERAL.

*Stock-taking.*—The stock of the College was checked in detail in July 1921 by the staff of the College and several irregularities were brought to light.

*Athletics.*—The annual athletic sports of the College were held on the 7th September in the College Athletic Grounds and proved a great success. The "Victor Ludorum" was M. B. Ayanna who won the Challenge cup presented by Mr. R. D. Richmond for the athlete obtaining the greatest number of marks for various events in the sports.

Hockey is our recognized game, and at this six matches were played and five won. In the local tournament we reached the finals but were beaten by the Agricultural College after a good game.

The inter-divisional hockey match for the Cowley-Brown Challenge Cup was won by the 1920-22 division.

The Marathon race was won in November by M. B. Ayanna. It was over seven miles in length and he ran it in the very good time of 48 minutes.

The Inter Divisional Challenge Cup presented by the late Risaldar Major Amir Muhammad Khan Sahib for this race was won by the Senior Division. During the year M. R. Ry. K. Rama Raja Mannarghat Moopil Nair Avargal very generously



founded a fund to provide a personal prize for the winner of the Marathon race, it being one in which all students in the College have to compete and an athletic event of some importance. For his generosity the thanks of the whole College are due. He has no direct connexion with the College and his action can have had no other aim but to foster a sporting spirit among the young Rangers.

The Pentland Shield for the best all-round athlete in the College awarded in June 1921 was won by S. Ramalingam with 25·5 marks. C. S. Ganapathi was second with 23·1 marks and K. A. Bhandari third with 22·5 marks.

All the staff have taken part, to the best of their ability, in the College Athletics and this has done a lot to encourage the students to make themselves proficient and to stimulate their keenness.

Mr. Cornwell was the Vice-President of the Athletic Club up to 15th July 1921 and Mr. G. C. Robinson from 6th August 1921 to the end of the year; under their supervision the Athletics have been managed with efficiency.

MADRAS FOREST COLLEGE, COIMBATORE,  
27th July 1922.

C. C. WILSON,  
*Principal.*

APPENDIX I.

Statement of revenue and expenditure for the forest year 1921-22.

Receipts—	Head of account.								Amount.			
	RS.	A.	P.							RS.	A.	P.
I (b) ... ..	199	13	5									
II (d) ... ..	121	4	9									
V (b) ... ..	38,978	4	8									
Total ..	39,299	6	10									

Expenditure—

A. Conservancy and works.													
A. VI. c. ... ..	6,345	5	3										
A. VII. a. ... ..	2,578	5	6										
A. VII. b. ... ..	12,015	6	8										
A. VII. c. ... ..	2,080	4	2										
A. VIII. e. ... ..	2,930	12	1										
A. VIII. g. ... ..	2,158	11	0										
A. IX. c. ... ..	2,380	4	9										
Total A ...	30,489	1	5										
B. Establishment.													
B. i. b. ... ..	33,460	13	3										
B. i. c. ... ..	35	7	9										
B. i. d. ... ..	12,955	2	8										
B. i. e. ... ..	21,665	1	5										
B. i. f. ... ..	6,908	7	5										
B. i. g. ... ..	6,147	15	3										
B. ii. b. ... ..	10,898	10	5										
B. ii. c. ... ..	8,184	1	8										
B. ii. d. ... ..	2,163	9	11										
B. iii. b. 2 ... ..	14,847	14	9										
Total B ...	1,17,267	4	6										
Total A and B ...	1,47,756	5	11										

APPENDIX II.

Abstract showing the live-stock, stores, tools, etc., of the Madras Forest College, Coimbatore, for the year ending 31st March 1922.

Description of stock.	On hand at the commencement of the year.			On hand at the end of the year.			Difference in value in favour of the year.	Difference in value against the year.			
	Number.	Amount.		Number.	Amount.						
<i>Madras Forest College, Coimbatore district.</i>		RS.	A.	P.		RS.	A.	P.			
Survey and other instruments.	2,100	7,561	10	3	2,204	7,346	9	4			
Tools .. ..	763	1,351	15	8	776	1,310	7	0			
Furniture .. ..	1,637	23,230	14	1	1,617	23,187	8	8			
Tents .. ..	139	18,811	1	6	79	13,508	3	0			
Uniform and accoutrements ..	92	408	3	7	92	400	11	1			
Scientific apparatus .. ..	1,538	696	11	5	1,505	578	9	6			
Photographic apparatus .. ..	12	381	4	5	20	385	13	3			
Gymnasium .. ..	9	367	14	7	9	864	3	0			
Machinery (oil engine, etc.) ..	2	2,439	4	10	2	2,396	12	11			
Miscellaneous .. ..	1,555	3,668	4	2	1,571	3,702	4	2			
Total ..	7,847	58,917	4	6	7,875	53,181	1	11			
							38	8	10		
									5,774	11	5

## APPENDIX III

## List of Students, Madras Forest College, Coimbatore, 1921-23 division.

Serial number and name of student.	Circle or State to which attached.
1. V. Sundaresan ... ..	First Circle.
2. A. Suryarao Nayudu ... ..	Do.
3. N. Ayyanna ... ..	Second Circle.
4. P. K. Kuttappan Pillai ... ..	Third Circle.
5. S. Sankaran ... ..	Do.
6. T. Venkatasubbayya ... ..	Do.
7. J. S. Vedanyakam ... ..	Fourth Circle.
8. I. Z. Robert Paul ... ..	Do.
9. C. Thiruvengadam Pillai ... ..	Fifth Circle.
10. P. A. Venkataraman ... ..	Do.
11. P. Madhavan Nayar ... ..	Sixth Circle.
12. K. Shankaranarayana Rao ... ..	Do.
13. K. S. Timmayya ... ..	Coorg.
14. A. R. Samarawickrama ... ..	Ceylon.
15. W. D. C. Perera ... ..	Do.
16. P. T. Jayakodi ... ..	Do.
17. A. A. Arunachalam ... ..	Do.
18. S. Abeyawickrama ... ..	Do.
19. Biram Singh ... ..	Central Provinces.
20. Gurucharan Singh ... ..	Do.
21. Saiyid Hadi Husain ... ..	Do.
22. Pirithi Chand ... ..	Do.
23. Anil Kumer Basu ... ..	Bihar and Orissa.
24. Chakradhar Behera ... ..	Do.
25. Patras Kandir ... ..	Do.
26. Amos Demta ... ..	Do.
27. Brishavo Bar Panda ... ..	Do.
28. Muhammad Rahamatulla Khan ... ..	Hyderabad.
29. Do. Wazir Khan ... ..	Do.
30. Do. Taiyab Khan Nizami ... ..	Rewa.
31. Mumtaz Husain ... ..	Do.
32. Brajo Kishore Joshi ... ..	Patna.
33. K. Appukuttan Vellodi ... ..	Court of Wards.
34. Dorairaja Pillai ... ..	Private student.

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APPENDIX A.—Comparative statement of number and origin of fires that occurred during the calendar year 1921.

District.	C. Fires beginning inside the reserves or fire-traced areas.																									Total of A, B and C and causes unknown.
	A. Fires caused by accident or through carelessness in burning fire lines.		B. Fires entering forests by crossing exterior fire lines.		Owing to carelessness or accident.								By intentional firing.						Total.		Causes unknown.					
					By workmen engaged in the forests or by purchasers of forest produce and by hay cutters.		By villagers, travellers, etc., passing through the forests.		By railway engines.		By lightning or by fire balloons.		In order to obtain new grass.		In order to turn out game or to reduce cover.		Maliciously fired.									
					Number of fires.	Area burnt in acres.	Number of fires.	Area burnt in acres.	Number of fires.	Area burnt in acres.	Number of fires.	Area burnt in acres.	Number of fires.	Area burnt in acres.	Number of fires.	Area burnt in acres.	Number of fires.	Area burnt in acres.					Number of fires.	Area burnt in acres.	Number of fires.	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)	(25)		
<i>First Circle.</i>																										
Ganjam .. ..	1	25	27	14,571	1	1,200	34	16,665	..	..	..	..	13	8,118	37	69,629	5	1,240	90	91,852	27	6,088	145	(a) 112,636		
Vizagapatam ..	1	3	27	348	4	348	21	2,345	..	..	..	..	12	846	2	30	..	..	39	8,569	2	35	44	3,634		
Godavari, Upper..	1	300	26	36,269	1	450	8	15,902	..	..	..	..	..	..	14	25,898	1	150	24	42,400	16	23,988	67	102,957		
Do. Lower..	..	..	..	..	..	..	54	5,497	..	..	..	..	..	..	..	..	..	..	54	5,497	..	..	54	5,497		
Kistna .. ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..		
Total ..	3	328	55	50,867	6	1,998	117	40,409	..	..	..	..	25	3,964	53	95,557	6	1,390	207	143,318	48	80,152	313	224,665		
<i>Second Circle.</i>																										
Bellary .. ..	..	..	..	..	..	..	18	4,635	..	..	..	..	..	..	..	..	..	..	18	4,635	..	..	18	4,635		
Anantapur ..	1	2	2	65	..	..	1	300	..	..	2	9	8	631	..	..	..	..	11	940	..	..	14	1,007		
Guntur .. ..	..	..	..	..	..	..	4	96	..	..	..	..	..	..	..	..	..	..	4	96	..	..	4	96		
Kurnool, East	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	200	..	..	1	200	2	88	3	288		
Do. South ..	..	..	..	..	3	5,300	1	6	..	..	..	..	4	3,101	..	..	5	2,213	13	10,620	5	2,840	18	13,460		
Do. West ..	..	..	..	..	..	..	3	190	..	..	..	..	..	..	..	..	..	..	3	190	..	..	3	190		
Total ..	1	2	2	65	3	5,300	27	5,227	..	..	2	9	12	3,732	1	200	5	2,213	50	16,681	7	2,878	60	19,626		
<i>Third Circle.</i>																										
Cuddapah, North.	1	1,685	11	1,404	2	88	7	102	..	..	..	..	21	8,667	..	..	1	5	31	8,662	27	19,608	70	(b) 31,559		
Do. South.	2	4,005	6	4,176	..	..	11	3,348	..	..	..	..	64	29,667	..	..	5	3,844	80	36,859	4	4,291	92	(b) 49,331		
Do. West.	1	20	4	519	3	130	..	..	..	..	..	..	20	4,246	2	125	60	13,452	85	17,953	14	2,099	104	20,591		
Nellore .. ..	..	..	..	..	..	..	1	100	..	..	..	..	5	1,430	..	..	2	350	8	1,880	7	592	15	(b) 2,472		
Chingleput ..	..	..	..	..	..	..	..	..	..	..	2	42	..	..	..	..	..	..	2	42	..	..	2	42		
Chittoor .. ..	1	15	5	301	6	244	14	455	..	..	..	..	65	22,080	..	..	..	..	85	22,779	13	1,970	104	25,065		
Vellore, North ..	14	316	..	..	..	..	5	1,805	2	1	..	..	..	..	..	..	18	909	25	2,715	28	2,057	67	5,083		
Total ..	19	6,041	26	6,400	11	462	38	5,810	2	1	2	42	175	66,090	2	125	86	18,560	316	91,090	93	80,617	454	134,143		

(a) Includes areas burnt in unprotected tracts.

(b) Do. do. forest tracts—

	Acres.
North Cuddapah .. ..	355
South Cuddapah .. ..	3,683
Nellore .. ..	4
Total ..	4,042

Appendix A.—Comparative statement of number and origin of fires that occurred during the calendar year 1921—cont.

District.	O. Fires beginning inside the reserves or fire-traced areas.																				Causes unknown.		Total of A, B and C and causes unknown.	
	A. Fires caused by accident or through carelessness in burning fire lines.		B. Fires entering forests by crossing exterior fire lines.		Owing to carelessness or accident.								By intentional firing.				Total.							
					By workmen engaged in the forests or by purchasers of forest produce and by hay cutters.		By villagers, travellers, etc., passing through the forests.		By railway engines.		By lightning or by fire balloons.		In order to obtain new grass.		In order to turn out game or to reduce cover.				Maliciously fired.					
					Number of fires.	Area burnt in acres.	Number of fires.	Area burnt in acres.	Number of fires.	Area burnt in acres.	Number of fires.	Area burnt in acres.	Number of fires.	Area burnt in acres.	Number of fires.	Area burnt in acres.			Number of fires.	Area burnt in acres.				
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)	(25)
<i>Fourth Circle.</i>																								
Yellore, South ..	..	..	1	48	1	14	2	6	..	..	..	..	12	741	..	..	22	696	37	1,457	1	10	39	1,515
Do. West ..	..	..	..	..	1	50	8	81	..	..	..	..	6	380	5	424	2	114	17	949	11	389	28	1,338
Salem, East ..	..	..	2	3	..	..	3	1	..	..	..	..	5	95	..	..	2	290	10	886	14	577	26	966
Do. North ..	5	2,362	..	..	..	..	9	590	..	..	..	..	14	3,465	9	3,050	..	..	32	7,105	20	9,823	57	19,090
Do. Central ..	..	..	..	..	3	62	4	95	..	..	..	..	16	369	..	..	4	208	27	734	20	625	47	1,359
Do. South ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	26	672	26	672
Total ..	5	2,362	3	51	5	126	21	773	..	..	..	..	53	4,950	14	3,474	30	1,308	123	10,631	92	11,896	233	24,940
<i>Fifth Circle.</i>																								
Kollegal ..	2	80	..	..	3	460	3	120	..	..	..	..	9	2,314	1	400	2	98	18	3,392	6	852	26	4,354
Coimbatore, North ..	4	135	4	1,108	2	225	4	217	..	..	..	..	..	..	..	..	..	..	6	442	37	12,100	51	13,780
Do. South ..	..	..	4	610	5	292	2	1,060	..	..	..	..	1	5	..	..	..	..	8	1,357	4	490	16	2,457
Madura ..	6	1,806	35	4,230	1	7	4	207	..	..	..	..	41	6,262	1	20	20	858	67	7,352	60	2,895	168	16,283
Winniveilly ..	2	61	6	1,226	7	1,228	4	53	..	..	5	1,337	4	1,020	15	5,711	2	102	37	9,521	9	643	54	11,451
Total ..	14	2,082	49	7,169	18	2,282	17	1,657	..	..	5	1,337	55	9,601	17	6,131	24	1,056	136	22,064	116	17,010	315	43,325
<i>South Circle.</i>																								
Mangalore, North ..	4	280	14	136	1	15	13	197	..	..	..	..	..	..	13	593	..	..	32	805	4	9	59	1,230
Do. South ..	1	1	20	211	4	32	10	179	..	..	..	..	8	211	4	216	5	488	31	1,119	18	679	70	2,010
Wynad ..	1	15	3	205	..	..	1	25	..	..	..	..	1	100	..	..	..	..	2	125	..	..	6	345
Nilembur ..	..	..	1	770	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	170
The Nilgiris ..	4	593	3	744	1	6	10	287	2	5	..	..	19	2,840	3	800	2	5	37	3,943	1	2,752	52	8,033
Palghat ..	2	45	4	43	..	..	2	101	..	..	..	..	..	..	..	..	3	1,416	5	1,517	3	18	14	1,623
Total ..	12	934	50	1,510	6	53	36	782	2	5	..	..	28	3,151	25	1,609	10	1,909	107	7,509	33	3,458	202	13,411
Grand total for 1921-22.	54	11,749	185	66,062	49	10,221	256	54,658	4	6	9	1,388	348	91,488	112	107,096	161	24,435	939	291,293	389	96,011	1,567	465,115
Grand total for 1920-21.	51	7,210	183	143,113	38	8,933	178	18,459	22	3,443	4	52	226	59,595	89	96,752	100	14,106	657	201,840	470	125,304	1,351	477,966

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APPENDIX B.—Comparative statement of impounded cattle during 1921-22.

District.	Number of cattle impounded.		Average for three years ending 1920-21.
	1920-21.	1921-22.	
<i>First Circle.</i>			
Ganjam .. .. .	890	706	1,442
Vizagapatam .. .. .	1,037	970	839
Godavari, Upper .. .. .	..	1,058	522
Do. Lower .. .. .	284	942	417
Kistna .. .. .	3,676	3,718	3,576
Total ..	5,887	7,394	6,796
<i>Second Circle.</i>			
Bellary .. .. .	5,498	7,462	6,824
Anantapur .. .. .	5,954	12,792	8,784
Guntur .. .. .	17,788	13,136	20,464
Karnool, East .. .. .	5,415	3,904	5,736
Do. South .. .. .	10,888	5,748	6,013
Do. West .. .. .	6,933	11,201	7,342
Total ..	52,476	54,243	55,163
<i>Third Circle.</i>			
Cuddapah, North .. .. .	1,570	2,752	2,130
Do. South .. .. .	1,635	1,033	1,585
Do. West .. .. .	6,953	6,064	7,155
Nellore .. .. .	7,855	10,177	9,698
Chingleput .. .. .	3,540	2,357	3,597
Chittoor .. .. .	9,909	7,401	10,483
Vellore, North .. .. .	6,993	7,021	6,937
Total ..	38,455	36,805	40,485
<i>Fourth Circle.</i>			
Vellore, South .. .. .	6,443	6,841	6,212
Do. West .. .. .	2,563	3,123	3,097
Salem, East .. .. .	4,996	3,800	4,893
Do. North .. .. .	433	867	878
Do. Central .. .. .	2,715	2,616	2,712
Do. South .. .. .	3,892	2,895	6,707
Total ..	21,042	25,142	25,199
<i>Fifth Circle.</i>			
Kollegal .. .. .	2,438	4,539	3,089
Coimbatore, North .. .. .	2,556	3,947	3,604
Do. South .. .. .	300	732	442
Madura .. .. .	3,811	4,876	4,707
Tinnevely .. .. .	1,717	3,037	2,323
Total ..	10,822	17,131	14,145
<i>Sixth Circle.</i>			
Mangalore, North .. .. .	342	330	363
Do. South .. .. .	587	281	435
Wynaad .. .. .	15	86	55
Nilambur .. .. .	..	..	243
The Nilgiris .. .. .	330	1,009	354
Palghat .. .. .	(a) 915	(a) 465	(a) (b) 1,283
Total ..	2,189	2,171	2,783
Grand total, Presidency ..	130,871	142,886	144,571

(a) Excludes Mettupalayam range.  
 (b) The average is only for two years 1919-20 and 1920-21.

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Forest Department, Madras Presidency.

Area of reserved forests and reserved lands during 1921-22

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Districts.	Area of reserved forests.						Area of reserved lands.						Total area of reserved forests and reserved lands in square miles.
	Area on 1st April 1921.		Added during the year.	Excluded during the year.	Area on 31st March 1922.		Area on 1st April 1921.		Added during the year.	Excluded during the year.	Area on 31st March 1922.		
	Acres	Equivalent in square miles.	Acres.	Acres.	Acres.	Equivalent in square miles.	Acres.	Equivalent in square miles.	Acres.	Acres.	Acres.	Equivalent in square miles.	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
<i>First Circle.</i>													
Ganjam .. .. .	400,235	626	..	(a) 238	399,997	625	67	..	45	..	112	..	625
Vizagapatam .. .. .	196,921	308	..	(a) 34	196,957	308	{ (g) 1,313 (d) 14 }	2	..	..	{ (g) 1,313 (d) 14 }	2	310
Godavari, Upper .. .. .	374,435	585	..	..	374,435	585	157,833	247	..	..	1,57,833	247	832
Do. Lower .. .. .	255,409	399	48,122	..	303,531	474	53,088	87	..	(b) 48,122	7,966	12	486
Kistna .. .. .	169,196	264	..	..	169,196	264	(d) 381	1	..	..	(d) 381	1	265
Total .. .. .	1,396,266	2,182	48,122	272	1,444,116	2,256	215,696	237	45	48,122	167,619	262	2,518
<i>Second Circle.</i>													
Bellary .. .. .	865,766	572	46	(a) 2,658	863,154	567	1,899	3	..	(b) 46	1,853	3	570
Anantapur .. .. .	477,770	747	..	(g) 17	477,753	747	..	..	..	..	..	..	747
Guntur .. .. .	511,667	789	3	(a) 6,631	504,939	789	..	3	..	38	(b) 3	38	789
Kurnool, East .. .. .	620,784	970	..	..	620,784	970	..	..	..	..	..	..	970
Do. South .. .. .	486,864	760	..	(a) 257	486,407	760	..	..	..	..	..	..	760
Do. West .. .. .	547,867	855	..	(a) 37	547,330	855	..	..	..	..	..	..	855
Total .. .. .	3,009,918	4,703	49	9,600	3,000,357	4,688	1,902	3	38	49	1,891	3	4,691
<i>Third Circle.</i>													
Cuddapah, North .. .. .	381,229	596	253	..	381,492	596	324	1	(k) 13	{ (d) 263 4 }	70	..	596
Do. South .. .. .	295,554	452	..	..	295,554	452	60	..	..	..	60	..	452
Do. West .. .. .	480,778	751	{ (e) 508 15 }	(a) 83	481,218	752	508	1	..	..	508	..	752
Nellore .. .. .	459,461	718	..	{ (a) 52 (i) 2 }	459,407	718	6,785	11	..	(m) 10	6,775	11	729
Chingleput .. .. .	130,076	203	..	(a) 149	129,927	203	..	..	..	..	..	..	203
Chittoor .. .. .	528,313	825	15	(a) 441	527,887	824	15	..	40	..	40	..	824
Vellore, North .. .. .	293,287	458	..	{ (a) 3,398 (i) 1 }	289,888	458	..	..	70	..	70	..	458
Total .. .. .	2,568,698	4,013	801	4,196	2,565,373	4,008	7,692	13	123	800	7,015	11	4,019

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(a) Disafforested.  
 (b) Transferred to reserved forests.  
 (c) Leased forests.  
 (d) Notified under section 26 of the Forest Act.  
 (e) Rectification of area.  
 (g) Reduction due to revision of boundary.  
 (i) Correction of errors.  
 (k) Error in previous year's opening balance corrected.  
 (l) Shortage due to measurement as per settlement.  
 (m) Given up as the cost of acquisition was prohibitive.



Area of reserved forests and reserved lands during 1921-22—cont.

Districts.	Area of reserved forests.						Area of reserved lands.						Total area of reserved forests and reserved lands in square miles.	
	Area on 1st April 1921.		Added during the year.	Excluded during the year.	Area on 31st March 1922.		Area on 1st April 1921.		Added during the year.	Excluded during the year.	Area on 31st March 1922.			
	Acres.	Equivalent in square miles.	Acres.	Acres.	Acres.	Equivalent in square miles.	Acres.	Equivalent in square miles.	Acres.	Acres.	Acres.	Equivalent in square miles.		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	
<i>Fourth Circle.</i>														
Vellore, South .. ..	308,172	481	(b) 354	(a) 50	308,476	482	358	1	(c) 65	(d) 354	69	..	482	
Do. West .. ..	244,858	383	..	..	244,858	383	42	..	..	..	42	..	383	
Bale, East .. ..	867,778	575	..	(a) 9,209	858,569	560	7,485	12	..	..	7,485	12	573	
Do. North .. ..	333,778	521	..	..	333,775	521	18	..	..	..	18	..	521	
Do. Central .. ..	263,724	412	..	..	263,724	412	7,884	12	..	..	7,884	12	424	
Do. South .. ..	(e) 216,897	339	(b) 4,480	(a) 1,394	219,983	344	12,081	19	(c) 13,321	(d) 4,480	20,822	33	377	
Total ..	1,785,204	2,711	4,834	10,653	1,729,385	2,702	27,868	44	13,286	4,834	36,320	57	2,759	
<i>Fifth Circle.</i>														
Kollegal .. ..	467,708	731	(f) 132,509	..	600,212	938	..	..	..	..	..	..	938	
Coimbatore, North ..	{ (e) + 795 } 586,670	917	(h) 112,492	(f) 132,509	567,448	836	..	..	..	..	..	..	836	
Do. South .. ..	290,388	454	..	..	290,388	454	..	..	..	..	..	..	454	
Madura .. ..	422,349	660	..	..	422,349	660	..	..	..	..	..	..	660	
Finnevelly .. ..	271,874	425	..	(a) 12	271,872	425	1,302	2	..	(d) 10	1,292	2	427	
Total ..	2,039,779	3,187	245,011	132,521	2,152,269	3,363	1,302	2	..	10	1,292	2	3,365	
<i>Sixth Circle.</i>														
Mangalore, North ..	229,976	360	..	(v) ..	229,976	360	..	..	..	..	..	..	360	
Do. South .. ..	280,891	439	..	..	280,891	439	..	..	..	..	..	..	439	
Wynaad .. ..	168,424	263	..	..	168,424	263	..	22	..	..	..	22	263	
Nilambur .. ..	92,231	144	(f) 78	(k) 23,334	68,975	108	12,854	20	..	..	12,854	20	128	
The Nilgiris .. ..	263,818	412	..	(a) 10	263,808	412	{ (m) 2,851 } 49,727	78	3,000	17	130	{ 52,597 } 2,868	82 } 4	498
Palghat .. ..	263,784	412	23,334	{ (a) 5,775 } { (j) 112,409 }	168,934	264	..	..	..	..	..	..	264	
Total ..	1,299,124	2,030	25,412	141,528	1,181,008	1,846	65,454	102	3,017	130	68,341	106	1,952	
Grand total, Presidency ..	12,048,989	18,826	322,229	298,700	12,072,518	18,863	319,914	501	16,510	53,945	282,479	441	19,304	

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(a) Disafforested.  
 (b) Notified under section 16.  
 (c) Do. 4.  
 (d) Transferred to reserved forests.  
 (e) Correct figure.  
 (f) Area of Burgur range transferred from North Coimbatore to Kollegal.

(h) Area of Mettupalayam range transferred from Central Coimbatore.  
 (i) The correct area of reserves in Burgur range is reported to be 132,509 and not 131,714 acres.  
 (j) As per correct calculation.  
 (k) Transferred to Palghat.  
 (l) Transferred to North Coimbatore.  
 (m) Toda patta lands.

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Appendix to Form No. 65.

Details of classification of forests in the several districts for 1921-22.

District.	Area of reserved forests.	Details of classification in square miles.						
		I	II	I and II.	III	IV	V	VI
<i>First Circle.</i>								
Ganjam .. .. .	625	348	230	..	(a) ..	7	..	..
Vizagapatam .. .. .	308	211	72	..	(a) ..	7	18	..
Godavari, Upper .. .. .	585	217	368	..	..	..	..	..
Do. Lower .. .. .	474	84	(b) 256	..	..	(b) 134	(b) ..	..
Kistna .. .. .	264	22	86	..	(a) ..	8	153	..
Total .. .. .	2,266	922	1,013	..	(a) ..	161	171	..
<i>Second Circle.</i>								
Bellary .. .. .	567	36	256	..	18	128	134	..
Anantapur .. .. .	747	..	306	..	..	388	53	..
Guntur .. .. .	789	..	..	..	5	690	94	0-32
Kurnool, East .. .. .	970	178	186	249	..	231	126	..
Do. South .. .. .	760	282	287	..	..	190	2	..
Do. West .. .. .	855	488	298	..	..	64	6	..
Total .. .. .	4,688	982	1,333	249	18	1,691	415	0-32
<i>Third Circle.</i>								
Cuddapah, North .. .. .	596	568	..	..	3	25	..	..
Do. South .. .. .	482	431	2	..	..	29	..	..
Do. West .. .. .	752	270	226	..	1	212	42	..
Nellore .. .. .	718	172	164	..	4	326	52	..
Chingleput .. .. .	203	..	40	..	..	148	17	..
Chittoor .. .. .	824	266	831	..	1	17	209	..
Vellore, North .. .. .	453	67	319	..	4	7	55	..
Total .. .. .	4,008	1,774	1,082	..	15	762	376	..
<i>Fourth Circle.</i>								
Vellore, South .. .. .	482	31	(a) 392	..	..	4	(a) and (c) 53	..
Do. West .. .. .	383	23	342	..	..	..	7	..
Salem, East .. .. .	560	316	(c) 133	..	..	50	61	..
Do. North .. .. .	521	..	419	..	..	102	..	..
Do. Central .. .. .	412	86	214	..	1	90	(c) 21	..
Do. South .. .. .	344	(d) 210	55	..	..	..	74	(c) ..
Total .. .. .	2,702	666	1,555	..	1	246	216	1
<i>Fifth Circle.</i>								
Kollegal .. .. .	938	748	143	..	..	43	4	..
Coimbatore, North .. .. .	886	669	171	..	..	46	..	..
Do. South .. .. .	454	(a) 375	62	..	..	12	5	..
Madara .. .. .	600	(b) 247	398	..	..	..	(b) 15	..
Tinnevely .. .. .	425	196	197	..	..	14	(c) 9	(c) ..
Total .. .. .	3,363	2,235	971	..	..	115	83	..
<i>Sixth Circle.</i>								
Mangalore, North .. .. .	360	276	85	..	1	48	..	..
Do. South .. .. .	439	254	67	..	..	118	..	..
Wynaad .. .. .	263	226	37	..	..	..	..	..
Nilambur .. .. .	108	100	8	..	..	..	..	..
The Nilgiris .. .. .	(a) 412	337	57	..	4	12	..	..
Palghat .. .. .	(b) 264	141	82	..	..	24	7	..
Total .. .. .	1,846	1,144	286	..	5	202	7	..
Grand Total, Presidency .. .. .	18,863	7,918	6,239	249	37	3,167	1,218	1

Note for First Circle. (a) Less than half a square mile.  
 (b) The figures furnished last year have been corrected. 100 square miles, consisting of Coringa extension and Kandikuppa, have been shown under II although they are classed under "II and IV."

Note for Fourth Circle. (a) Three square miles of class V was wrongly added to class II last year.  
 (c) Two square miles disafforested during the year.  
 (d) Seven square miles of reserved lands notified under section 16 adjoining class I reserves added to class I.  
 (e) In rounding off.  
 \* Revised figures owing to transfer of Burgur range from North Coimbatore to Kollegal and Mettupalayam range from Central to North Coimbatore.

Note for Fifth Circle. (a) Includes 27 square miles of leased forests (Ikkadi forests).  
 (b) Revised figures due to the transfer of about one square mile from class II to V.  
 (c) Do. do. three square miles from class VI to V.

Note for Sixth Circle. (a) Two square miles of forests in scattered bits not classified.  
 (b) Three reserves with an area of 10 square miles have not yet been classified.

FOREST DEPARTMENT

ANNUAL FORM No. 66.

Forest Department, Madras Presidency.

Progress made in forest settlements during the year 1921-22.

Forest district.	Name of forest.	Area in square miles			Cost during the year.		Entire cost per square mile of areas finally settled.	Government notification of settlement.	
		Finally settled during the year.	In hand at commencement of the year.	Taken in hand during the year.	In forest accounts	In other accounts.		Number.	Date.
<i>First Circle.</i>									
Ganjam	Chendragiri extension (Ktintukuppa but A/2).	sq. mls. ..	sq. mls. 0.105	sq. mls. ..	rs. ..	..	..	..	..
	Addition to Dowgam Reserve.	..	..	0.071	1,040	..	..	..	..
Godavari, Upper.	Nugur ..	..	246 610	..	..	..	..	..	..
Godavari, Lower.	Coringa extension ..	75.192	..	..	..	..	..	36	5th Feb. 1921.
	Birampalli ..	..	2.804	..	..	..	..	..	..
	Vemulakonda ..	..	5.244	..	..	..	..	..	..
	Palam ..	..	2.083	..	..	..	..	..	..
	Nurupudi ..	..	2.315	..	..	..	..	..	..
	Total ..	75.192	259.161	0.071	1,040	..	..	..	..
<i>Second Circle.</i>									
Bellary	Daraji Foreshore ..	..	2.89	..	..	..	..	..	..
	Addition of enclosures in Jangikalutta, Jittinakatta and Sogi R.F.	0.072	0.072	..	..	..	..	G.O. 113	25th Jan. 1922. (Chief Conservator's Proceedings No. 34 M.S., dated 2nd Feb. 1922.)
Guntur	Enclosures to Nizampatnam R.F.	0.0045	0.0045	..	..	..	..	G.O. Mis 1972	20th Oct. 1921. (Chief Conservator's Proceedings No. 469 M.S., dated 24th Oct. 1921.)
	Muttukur extension 4 ..	..	..	0.06	..	..	..	G.O. Mis 272	21st Feb. 1922. (Chief Conservator's Proceedings No. 92 M.S., dated 28th Feb. 1922.)
	Total ..	0.0765	2.9665 or 3 square miles.	0.06	..	..	..	..	..
<i>Third Circle.</i>									
Cuddapah, North.	Dasaripalli ..	0.16	..	..	..	..	..	99	13th May 1921.
	Kalaspada extension ..	0.027	..	..	..	..	..	147	4th July 1921.
	Dasaripalli extension ..	0.20	0.10	..	..	..	..	147	Do.
	Lankamalai extension ..	0.02	..	..	..	..	..	99	13th May 1921.
Cuddapah, South.	Lankamalai ..	0.002	..	..	..	..	..	251	Do.
	Kodiyengammabavi R.F. ..	..	0.547	..	..	..	..	..	13th Oct. 1921.
	Seshaiahallam Rollamadugu R.F. ..	..	0.038	..	..	..	..	..	..
	Fields of Hasanapuram village within Palakonda R.F.	0.349	..	..	..	..	..	9	12th Feb. 1921.
Cuddapah, West.	Fields of Vangimalla within Palakonda extension C.	0.209	..	..	..	..	..	9	Do.
	Fields of Hasanapuram village within Palakonda extension C.	0.065	..	..	..	..	..	9	Do.
	Fields of Gopagudipalli village within Idupulapaya R.F.	0.012	..	..	..	..	..	9	Do.
	Fields of Guvalcheruva village within Idupulapaya R.F.	0.007	..	..	..	..	..	9	Do.
	Fields of Chilakampalli village within Idupulapaya R.F.	0.006	..	..	..	..	..	9	Do.
	Fields of Chenobuvaripenta village within Idupulapaya R.F.	0.014	..	..	..	..	..	9	Do.
	Fields of Brahmana Erragudipalli within Idupulapaya R.F.	0.031	..	..	..	..	..	9	Do.
	Do. do.	0.062	..	..	..	..	..	9	Do.
	Fields in Chintarajupalli in Vontimitta extension R.F.	0.045	..	..	..	..	..	191	11th Aug. 1921.
	Addition to Tummalapenta, West.	..	(a) 0.016	..	..	..	..	..	..
Nellore	Bapur Veligandla A-1 extension.	..	10.586	..	736	..	..	..	..

(a) Given up.

## Progress made in forest settlements during the year 1921-22—cont.

Forest district.	Name of forest.	Area in square miles.			Cost during the year.		Entire cost per square mile of areas finally settled.	Government notification of settlement.	
		Finally settled during the year.	In hand at commencement of the year.	Taken in hand during the year.	In forest accounts.	In other accounts.		Number.	Date.
<i>Third Circle—cont.</i>									
Chittoor	Addition to Santhapet extension A.	0.005	..	..	..	..	..	66	4th April 1921.
	Palamaner reserve extension ..	0.012	..	..	250	..	..	49	7th Feb. 1922.
	Peddanaidrug reserve extension.	0.006	..	..	44	..	..	54	Do.
	Extension to Musalmadugu extension.	..	..	0.003	..	..	..	248	11th Oct. 1921.
	Addition to Peddur extension reserve.	..	..	0.003	..	..	..	230	20th Sep. 1921.
	Extension to Melmoyi R.F. ..	..	..	0.04	..	..	..	241	4th Oct. 1921.
	Addition to Toriganda reserve.	..	..	0.02	..	..	..	283	7th Nov. 1921.
Vellore, North.	Addition to Musalimadugu extension.	..	..	0.001	..	..	..	268	25th Oct. 1921.
	Block No. 72, Arasampattu ..	..	..	0.01	..	..	..	205	17th Aug. 1921.
	Block No. 94, Karapattu ..	..	..	0.10	..	..	..	816	7th Dec. 1921.
	Total ..	1.232	11.286	0.177	1,030	..	..	..	..
<i>Fourth Circle.</i>									
Vellore, South.	Malayalam .. ..	0.40	..	..	..	..	..	51	31st Mar. 1921.
	Santavasal .. ..	0.15	..	..	..	..	..	51	Do.
	Erayurmalai .. ..	..	0.0072	..	..	..	..	..	Chief Conservator's No. 439, dated 27th Aug. 1920.
Vellore, West.	Kavutbimalai .. ..	0.0072	..	..	..	..	..	265	25th Oct. 1921.
	Mulakad .. ..	..	..	0.0405	..	..	..	91	14th Mar. 1922.
	Nattampalli .. ..	..	..	0.0092	..	..	..	124	6th June 1921.
Salem, East.	Pennagolathur Swamimalai ..	..	..	0.0524	..	..	..	..	..
	Varatanapalli extension ..	..	0.07	..	..	..	..	..	..
	Arana and Tirthagiri .. ..	..	5.92	..	..	..	..	..	..
Salem, North.	Pallipatti extension .. ..	..	5.77	..	..	..	..	..	..
	Pennagaram extension .. ..	..	0.0280	..	..	..	..	..	..
Salem, Central.	Jarugumalai .. ..	..	11.94	..	..	..	..	..	..
	Kanjeri extension .. ..	..	0.38	..	..	..	..	..	..
	Methalamalai .. ..	0.01	0.01	..	..	..	..	8	15th Feb. 1921.
	Vedambium .. ..	4.85	4.85	..	..	..	..	47	25th Jan. 1922.
	Vanjarai .. ..	0.51	0.51	..	..	..	..	211	30th Aug. 1921.
	Perisholai .. ..	1.31	1.31	..	..	..	..	168	29th June 1921.
	Vengamudi .. ..	0.33	0.33	..	..	..	..	54	5th April 1921.
	Veppadi .. ..	..	5.38	..	..	..	..	305	28th July 1919.
Salem, South.	Atturmanmalai .. ..	..	6.49	..	..	..	..	76	No. 1426, Rev. (Spl.), dated 28th July 1919.
	Shemmalai additions .. ..	..	..	0.03	..	..	..	115	17th Feb. 1920.
	Pathur .. ..	..	..	20.63	174	..	..	136	No. 348, Rev. (Spl.), dated 17th Feb. 1920.
	Total ..	7.5672	42.9957	20.7621	174	..	..	..	..
<i>Fifth Circle.</i>									
Tinnevely.	Karumandiamman Shola estate	..	0.15	..	1,309	..	..	..	..
	Mahendragiri estates .. ..	0.01	0.01	..	..	..	..	163	6th July 1921.
	Mulakadu block .. ..	..	1.48	..	..	..	..	..	..
	Hare Island for Tuticorin harbour.	..	0.22	..	..	..	..	..	..
	Punayadi Island for Tuticorin harbour.	..	0.16	..	..	..	..	..	..
	Total ..	0.01	2.02	..	1,309	..	..	..	..
<i>Sixth Circle.</i>									
The Nilgiris.	Mudumalai .. ..	..	74.69	..	..	..	..	..	..
	Addition to Kalhatti .. ..	..	0.17	..	..	..	..	..	..
	Do. to Wenlock downs.	..	(a) 0.20	..	..	..	..	..	..
	Do. to Nedugula .. ..	..	0.06	..	..	..	..	..	..
	Do. to Nadukaduhalla. ..	..	0.27	..	..	..	..	..	..
	Do. to Attukkadu Shola. ..	..	0.06	..	..	..	..	..	..
	Do. to Doddakavu .. ..	..	0.08	..	..	..	..	..	..
	Do. to No. III to Kodanad Valley Shola.	..	0.13	..	..	..	..	..	..
Addition No. II to Madanad.	..	0.16	..	..	..	..	..	..	
Do. to Sigur .. ..	..	..	4.69	..	..	..	..	..	
	Total ..	..	75.64	4.69	..	..	..	..	..
	Grand total, Presidency ..	84	324	25	3,553	..	..	..	..

\* Correct area after settlement.

(a) Excluded at settlement.

FOREST DEPARTMENT

ANNUAL FORM No. 67.

Forest Department, Madras Presidency.

Record of demarcation and maintenance of boundaries during 1921-22.

District.	Length of boundaries artificially demarcated during the year.	Length of previously existing boundaries repaired.	Length of previously existing boundaries not repaired.	Total length of artificially marked boundaries at the close of the year.	Length of boundaries still to be demarcated at the close of the year.	Length of natural boundaries not requiring artificial marks.	Total length of boundaries at the close of the year.	Expenditure on demarcation during the year.	
								On new work.	On repairs.
<i>First Circle.</i>									
	MILES.	MILES.	MILES.	MILES.	MILES.	MILES.	MILES.	RS.	RS.
Ganjam .. ..	9	(a) 1,868 (b) 2	..	1,375	..	80	1,455	208	..
Visagapatam .. ..	..	(a) 564	..	564	..	19	583	..	..
Godavari, Upper .. ..	..	(b) 484	..	484	..	161	625	..	(e) 1,298
Do. Lower .. ..	15	(a) 723	..	738	..	71	809	..	(e) 122
Kistna .. ..	..	18 (a) 426	106	547	..	40	587	..	197 (e) 15
Total .. ..	24	16 (b) 484 (a) 3,079	106	3,708	..	361	4,069	208	197 (e) 1,435
<i>Second Circle.</i>									
Bellary .. ..	62	(a) 1,433 (b) 59	..	(b) 1,495	..	..	1,495	2,999	61
Anantapur .. ..	..	(a) 1,728	..	1,787	..	34	1,821	..	482
Guntur .. ..	14	..	1,245	(b) 1,259	..	..	1,259	231	..
Kurnool, East .. ..	..	(a) 520 (b) 45 (c) 6	40	611	1	48	660	..	46
Do. South .. ..	..	(a) 5 (b) 599 (c) 70	28	632	..	5	637	..	20
Do. West .. ..	(a) 14 chains or $\frac{1}{2}$ mile.	(a) 656	190	916	..	100	1,016	..	281 (f) 228
Total .. ..	76	5,121	1,503	6,700	1	187	6,888	3,230	890 (f) 228
<i>Third Circle.</i>									
Cuddapah, North .. ..	..	(a) 188	372	560	..	13	573	..	..
Do. South .. ..	..	(a) 287	39	326	..	40	366	..	..
Do. West .. ..	..	(a) 383	1,016	1,399	..	22	1,421	5	9
Nellore .. ..	..	(a) 1,637	321	1,958	4	84	2,046	..	1,699
Chingleput .. ..	..	(a) 30 824	..	854	..	..	854	..	1,412
Chittoor .. ..	..	(a) 65 1,239	142	1,446	..	60	1,506	69	2,074
Vellore, North .. ..	..	(a) 23 1,046 (b) 21	..	1,048	..	11	1,059	..	67
Total .. ..	..	5,701	1,890	7,591	4	230	7,825	74	5,265

Note for First Circle.

- (a) Cleared by subordinates free of cost.
- (b) Cleared by hill tribes for fire protection, the cost being debited to VIII (f).
- (c) Cost of works other than boundaries of forests finally notified.
- (d) Deduction on account of disafforestation.

Note for Second Circle.

- (a) Omitted in column 5 as it is less than half mile.
- (b) The variation between column 8 of last years return and column 5 of this year's is due to the disafforestation of 20 miles of forest boundary in Bellary district and 50 miles in Guntur district.
- (c) Cleared by subordinates free of cost.
- (d) Cleared by panchayatdars.
- (e) Length of line repaired at Government cost.
- (f) Represents the cost of coupe demarcation.

Note for Third Circle.

- (a) Cleared by subordinates free of cost.
- (b) Deduction owing to disafforestation.

Record of demarcation and maintenance of boundaries during 1921-22—cont.

District.	Length of boundaries artificially demarcated during the year.	Length of previously existing boundaries repaired.	Length of previously existing boundaries not repaired.	Total length of artificially marked boundaries at the close of the year.	Length of boundaries still to be demarcated at the close of the year.	Length of natural boundaries not requiring artificial marks.	Total length of boundaries at the close of the year.	Expenditure on demarcation during the year.	
								On new work.	On repairs.
<i>Fourth Circle.</i>									
	MILES	MILES.	MILES.	MILES.	MILES.	MILES.	MILES.	RS.	RS.
Vellore, South ..	..	915	..	915	..	15	930	..	86
Do. West ..	..	585	44	629	..	13	642	(c) 144	..
Salem, East ..	..	1,221	..	1,167	..	5	1,172	..	892
Do. North ..	..	(a) — 54	..	..	..	116	600	..	(d) — 38
Do. Central ..	..	428	56	484	..	15	699	..	(d) + 47
Do. South ..	..	(b) + 285	(b) — 329	(b) 684	..	..	699	21	143
Do. South ..	3	917	67	987	67	..	1,054	32	(d) + 250
Total ..	3	4,871	(b) 590	4,866	67	164	5,097	197	1,427
		(b) + 231	— 329						
<i>Fifth Circle.</i>									
Kollegal ..	13	(a) 7	..	296	147	162	595	573	196
Coimbatore, North ..	..	(a) 276	..	582	170	106	858	..	19
Do. South ..	..	(a) 510	72	228	..	72	300	..	381
Madura ..	39	(a) 107	118	1,324	242	171	1,737	2,098	147
Tinnevely ..	..	(b) 3	158	448	..	34	482	..	228
Madura ..	..	(a) 1,106	179	448	..	..	..	..	..
Tinnevely ..	..	(a) 290	158	448	..	..	..	..	..
Total ..	52	(a) 7	527	2,878	559	535	3,972	3,271	971
		(b) 2,289	3						
<i>Sixth Circle.</i>									
Mangalore, North ..	..	..	1,228	1,228	..	103	1,331	..	..
Do. South ..	..	..	1,135	1,135	46	101	1,282	..	..
Wynaad ..	7	45	1,116	1,168	40	86	1,244	231	360
Nilambur ..	..	67	28	95	20	55	(a) 170	..	313
The Nilgiris ..	..	(d) 226	1,285	1,511	..	299	1,810	..	459
Palghat ..	..	52	250	302	16	39	(b) 357	(c) 13	..
Total ..	7	390	5,042	5,439	122	633	6,194	244	1,132
Grand total, Presidency.	162	21,692	9,328	31,182	753	2,110	34,045	7,224	11,535

- Note for Fourth Circle.*
- (a) Fifty-four miles disafforested during the year.
  - (b) Correct figures furnished by the District Forest Officer.
  - (c) Cost of delimitation work in the Tirupattur Javadis.
  - (d) Added or subtracted to tally with Accountant-General's audited figures.
- Note for Fifth Circle.*
- \* Revised figures owing to transfer of Burgur range to Kollegal and Mettupalaiyam range to North Coimbatore
  - † Revised figures furnished by the District Forest Officer.
  - (a) Cleared by subordinates free of cost.
  - (b) Cleared for fire protection, the cost being debited to A-VIII (f).
- Note for Sixth Circle.*
- (a) Decrease due to transfer of Mannarghat range to Palghat division.
  - (b) Difference due to addition of Mannarghat range and transfer of Mettupalaiyam range to North Coimbatore.
  - (c) Cost of demarcation of Pundi temple.
  - (d) One hundred and seventy-eight miles cleared by subordinates free of cost.
  - \* Usual line clearing was done by subordinates free of cost.

**FOREST DEPARTMENT**  
**ANNUAL FORM No. 69.**  
*Forest Department, Madras Presidency.*  
**Progress made in working-plans during 1921-22.**

District.	Areas for which working-plans have been completed and approved by the Chief Conservator.		Areas for which working-plans are being compiled or have been compiled but not sanctioned.		Areas for which working-plans have still to be taken in hand.	Areas for which working-plans are not at present required.	Total forest area as per Form No. 65.			
	At commencement of the year.	During the year.	At commencement of the year.	Taken in hand during the year.						
<i>Reserved forests.</i>										
<i>First Circle.</i>	SQ. MLS.	SQ. MLS.	SQ. MLS.	SQ. MLS.	SQ. MLS.	SQ. MLS.	SQ. MLS.			
Ganjām .. ..	625	..	..	..	..	..	625			
Vizagapatam ..	184	..	..	..	104	18	308			
Godāvari, Upper ..	165	..	..	..	420	..	585			
Do. Lower ..	292	..	..	..	182	..	474			
Kistna .. ..	240	..	..	..	..	24	264			
Total ..	1,508	..	..	..	706	42	2,256			
<i>Reserved lands.</i>										
Vizagapatam ..	..	..	..	..	..	2	2			
Godāvari, Upper ..	..	..	..	..	..	247	247			
Do. Lower ..	..	..	..	..	12	..	12			
Kistna .. ..	..	..	..	..	..	1	1			
Total ..	..	..	..	..	12	250	262			
<i>Reserved forests.</i>										
<i>Second Circle.</i>										
Bellary .. ..	(a) 50	..	88	..	290	(b) 189	(b) 567			
Anantapur .. ..	400	49	..	..	(a) 298	..	747			
Guntūr .. ..	22	..	235	..	529	3	(b) 789			
Kurnool, East ..	147	..	178	..	614	33	970			
Do. South ..	679	..	81	..	..	..	760			
Do. West ..	458	..	..	..	..	897	855			
Total ..	1,756	49	580	?	1,731	572	4,688			
<i>Reserved lands.</i>										
Bellary .. ..	..	..	2	..	..	1	3			
<i>Reserved forests and lands.</i>										
<i>Third Circle.</i>										
Cuddapah, North ..	{ (a) 46 } - 6	..	17	..	533	6	596			
Do. South ..	96	..	..	..	..	366	462			
Do. West ..	35	..	65	2	..	650	752			
Nellore .. ..	95	..	112	..	882	129	718			
Chingleput ..	184	..	..	..	..	19	203			
Chittoor .. ..	33	..	264	..	527	..	824			
Vellore, North ..	{ (a) 410 } - 6	..	2	..	..	47	453			
Total ..	887	..	460	2	1,442	1,217	4,008			
<i>Reserved forests.</i>										
<i>Fourth Circle.</i>	Regular working-plans.	Schemes.	Revised or new working-plans.	Revised or new schemes.	Existing working-plans.	New working-plans or schemes.	Existing working-plans.	New working-plans or schemes.		
Vellore, South ..	415	..	..	..	(a) 213	..	(a) 127	..	67	482
Do. West ..	382	..	..	..	..	..	..	..	1	383
Salem, East ..	(b) 334	47	(a) 12	..	(a) 15	(c) 74	..	..	..	105
Do. North ..	96	..	..	..	..	216	..	..	209	521
Do. Central ..	(d) 263	..	..	..	..	..	..	(e) 36	113	412
Do. South ..	134	(a) 4	..	36	..	2	..	26	104	344
Total ..	1,634	47	..	36	..	292	..	62	494	147
Grand total ..	(a) 1,671	..	36	..	292	..	62	..	494	147

*Notes for Second Circle.*—(a) Revised figure.  
(b) Difference due to disafforestation.

*Notes for Third Circle.*—(a) Area cancelled or disafforested.

*Notes for Fourth Circle.*—(a) These figures are excluded from the total arrived at vertically as they have already been included in the respective figures in sub-column 1 of column 2.  
(b) This figure includes 18 square miles under panchayat.  
(c) Of this 10 square miles are also worked for sandal under working-plan sanctioned in B.P. Mis. No. 170, Forest, dated 6th May 1918.  
(d) This figure includes—  
(i) Twenty square miles under panchayat and (ii) fifteen square miles worked for sandal under sanction conveyed in B.P. Mis. No. 170, Forest, dated 6th May 1918.  
(e) This figure excludes 18 square miles of the scheme as it is already included in the figure in sub-column 1 of column 2.

## Progress made in working-plans during 1921-22—cont.

District.	Areas for which working-plans have been completed and approved by the Chief Conservator.		Areas for which working-plans are being compiled or have been compiled but not sanctioned.		Areas for which working-plans have still to be taken in hand.	Areas for which working-plans are not at present required.	Total forest area as per Form No. 65.
	At commencement of the year.	During the year.	At commencement of the year.	Taken in hand during the year.			
<i>Reserved forests.</i>							
<i>Fifth Circle.</i>	SQ. MLS.	SQ. MLS.	SQ. MLS.	SQ. MLS.	SQ. MLS.	SQ. MLS.	SQ. MLS.
Kollegal *	(a) 5 (b) 57 (c) 30	..	..	..	161	685	938
Coimbatore, North. *	(a) 51 (b) 25 (c) 242	(a) 5	..	..	267	296	886
Coimbatore, South. *	(a) 20 (b) 20	..	..	..	50	337	427
Madura .. ..	(a) 351	..	..	15	282	12	660
Tinnevely .. ..	233	..	..	..	16	176	425
Total ..	1,084	5	..	15	776	1,506	3,336
<i>Reserved lands.</i>							
Tinnevely .. ..	..	..	..	..	..	2	2
<i>Leased forests.</i>							
Coimbatore, South.	(a) 27	..	..	..	..	..	27
Grand total ..	1,061	5	..	15	776	1,508	3,365
<i>Reserved forests.</i>							
<i>Sixth Circle.</i>							
Mangalore, North.	355	..	..	..	5	..	260
Do. South.	439	..	..	..	..	..	439
Wynaad .. ..	178	..	..	..	85	..	263
Nilambur .. ..	(d) 8	..	96	..	..	..	(a) 104
The Nilgiris .. ..	63	..	..	..	..	249	412
Palghat .. ..	70	..	..	..	98	96	(b) 264
Total ..	1,113	..	96	..	188	445	1,842
<i>Reserved lands.</i>							
The Nilgiris .. ..	75	..	..	..	5	6	(c) 86
<i>Leased forests.</i>							
Nilambur .. ..	24	..	..	..	..	..	24
Total ..	1,212	..	96	..	193	451	1,952
Grand total, Presidency.	8,095	90	1,480	79	5,354	4,188	(e) 19,236

*Notes for Fifth Circle.*—\* Revised figures—

Kollegal includes area of Burgur working circle transferred from North Coimbatore.

North Coimbatore includes area of Thadagam and Mettupalayam working-plans transferred from old Central Coimbatore district.

(a) Areas of regular working-plan which are in force.

(b) Areas of temporary working schemes.

(c) Areas of lapsed working-plans worked, however, for extraction of dead and spiked sandal trees.

*Notes for Sixth Circle.*—(a) Difference due to transfer of Mannarghat range to Palghat.

(b) Difference due to transfer of Mannarghat range from Nilambur and transfer of Mettupalayam range to North Coimbatore.

(c) Includes Todapatta lands, 4 square miles.

(d) Increase due to rounding of figures.

(e) Details are not given in respect of 11 square miles of reserved lands in the III Circle and 57 square miles of reserved lands in the IV Circle.



ANNUAL FORM No. 70.

Forest Department, Madras Presidency.

Communications and Buildings during 1921-22..

District.	Roads (including hidle-paths and culverts).				Buildings.		Other works.	
	New works.		Repairs.		Cost of new works.	Cost of repairs.	Cost of new works.	Cost of repairs.
	Length.	Cost.	Length.	Cost.				
<i>First Circle.</i>								
	M. P. CH.	RS.	M. P. CH.	RS.	RS.	RS.	RS.	RS.
Ganjam .. .. .	5 6 0	4,581 6	64 5 5	9,519	56,574	(a) 4,976 (a) 1,991	600	..
Vizagapatam .. .	7 2 0	353 7	13 1 0	540	1,339 35	(a) 612 (a) 1,075	20	..
Godavari, Upper ..	9 3 0	2,337	10 6 0	373	3,436	(a) 1,965 (a) 829	..	79
Do. Lower .. .. .	1 1 6	440	36 0 0	1,450	364	(a) 2,318 (a) 1,493	18	228
Kistna .. .. .	6 6 0	231	6 6 0	264	1,663	(a) 26	..	49
Total .. .. .	30 2 6	7,929	131 2 5	12,176	63,341	15,185	638	356
<i>Second Circle.</i>								
Bellary .. .. .	..	..	..	..	1,813	(a) 1,028 (b) 733	..	20
Anantapur .. .. .	..	..	5 7 0	245	865	(a) 1,098 (b) 1,977	..	..
Guntur .. .. .	3 5 0	466	..	..	720	(a) 929 (b) 1,216	493	..
Kurnool, East .. .	6 6 0	2,332	48 5' 0	2,515	4,402	(a) 670 (b) 1,230	1,256	65
Do. South .. .. .	5 4 0	2,582	83 0 0	4,644	1,987	(a) 3,374 (b) 226	..	64
Do. West .. .. .	10 0 0	214	26 7 1/2 0	5,714	1,966	(a) 280 (b) 963	900	12
Total .. .. .	25 7 0	5,574	164 3 1/2 0	13,118	11,753	12,724	2,649	171
<i>Third Circle.</i>								
Cuddapah, North ..	..	..	..	..	4,416	(a) 1,415 (a) 756	..	404
Do. South .. .. .	15 7 2	10,124	15 4 0	1,884	7,191	(a) 895 (a) 349	828	48
Do. West .. .. .	2 0 13	1,292	5 4 27	303	2,813	(a) 853 (a) 1,050	109	..
Nellore .. .. .	8 0 50	321	89 0 0	197	3,731	(a) 724 (a) 1,348	29	117
Chingleput .. .. .	2 4 0	515	18 0 0	1,971	6,149	(a) 680 (a) 1,436	61	355
Chittoor .. .. .	3 0 0	1,045	42 8 5	2,951	4,532	(a) 4,156 (a) 1,693	236	163
Vellore, North .. .	..	..	14 0 1	1,027	1,209	(a) 1,255 (a) 885	..	18
Total .. .. .	32 1 5	13,297	194 6 3	8,333	30,041	9,978 (a) 7,517	1,263	1,100

Note for First Circle. (a) Cost of establishment.  
 — Deducted to agree with the Accountant-General's figures.  
 (a) Cost of repairs.  
 Note for Second Circle. (a) Cost of establishment.  
 (b) Cost of establishment.  
 Note for Third Circle. (a) Cost of establishment.

Communications and Buildings during 1921-22—cont.

District.	Roads (including bridle-paths and culverts)				Buildings.		Other works.	
	New works.		Repairs.		Cost of new works.	Cost of repairs.	Cost of new works.	Cost of repairs.
	Length.	Cost.	Length.	Cost.				
<i>Fourth Circle.</i>								
	M. F. CH.	RS.	M. F. CH.	RS.	RS.	RS.	RS.	RS.
Vellore, South .. ..	..	..	11 3 0	132	43	2,348	97	318
Do. West .. ..	..	..	..	..	400	(a) 958 (b) 525 (c) 3	(b) 86	..
Salem, East .. ..	..	..	6 6 0	162	..	(a) 1,589 (c) 1	170	..
Do. North .. ..	..	..	29 1 0	859	2,196	(a) 950 (c) 108	..	52
Do. Central .. ..	..	..	16 2 0	598	30	(a) 1,639 (c) 535	..	97
Do. South .. ..	2 2 0	1,284	38 0 0	{ 1,505 (c) -1,461	3,965	(a) 1,093 (c) 495 (c) 10	..	..
Forest Engineer .. ..	22 1 0	15,271	13 6 0	2,742	..	(c) 654	..	..
Total .. ..	24 3 0	16,555	109 2 0	4,537	6,634	12,009	273	497
<i>Fifth Circle.</i>								
Kollegal .. ..	8 5 0	900	101 6 0	4,328	1,150	(a) 617 (c) 390	644	181
Coimbatore, North .. ..	8 7 0	2,139	115 0 0	8,910	..	(a) 3,119 (c) 390	294	161
Do. South .. ..	1 5 0	{ 1,163 (b) 1,477	29 5 0	{ 4,340 (a) 584	..	(a) 1,930 (c) 289	735	173
Madura .. ..	15 1 0	4,951	200 4 0	12,628	4,930	(a) 2,253 (c) 1,922	237	301
Tinnevely .. ..	6 4 0	2,992	42 3 0	3,170	541	(a) 4,004 (c) 617	..	40
Forest Engineer .. ..	3 0 0	(c) 23,568	..	..	..	..	..	..
Direction .. ..	(d) 75 0 0	1,132	3 0 0	33	7,783	183	..	3
Total .. ..	118 6 0	38,322	492 2 0	33,992	14,404	15,674	1,820	858
<i>Sixth Circle.</i>								
Mangalore, North .. ..	1 1 0	608	24 3 0	624	5,954	729	189	43
Do. South .. ..	1 6 0	153	10 8 0	453	294	845	52	243
Wynaad .. ..	..	..	110 0 0	3,984	1,978	1,939	189	92
Nilambur .. ..	(a) ..	..	..	1,492	1,943	2,724	..	35
The Nilgiris .. ..	..	..	66 0 0	9,623	2,185	4,256	503	713
Palghat .. ..	47 3 0	13,762	26 2 0	{ 16,095 (b) +1,291	27 869	1,921	622	45
Forest Research office .. ..	..	..	..	..	..	200	..	..
Direction .. ..	..	..	..	..	..	18	..	..
Total .. ..	50 2 0	14,723	237 0 0	33,562	40,223	12,632	1,556	1,171
Grand Total, Presidency.	279 0 0	96,400	1,267 0 0	1,05,718	1,66,396	85,719	8,199	4,138

*Notes for Fourth Circle.* (a) Cost of establishment.  
(b) Added or subtracted to tally with Accountant-General's audited figures.  
(c) Cash recovery of service payments.

*Notes for Fifth Circle.* (a) Cost of establishment.  
(b) Expenditure on improvements to tram line.  
(c) Includes expenditure for the earthwork and revetment wall on the new Mount Stuart Ghat Road over a distance of three miles and that on the investigation of the branch road from Topshp to Mount Stuart and water-supply scheme.  
(d) Alignment of inspection paths in Kodamadi and Kannikatty ranges in the Tinnevely district.

*Notes for Sixth Circle.* (a) Exact details of new works and repairs not available; also expenditure during part of the year has not been included in the return owing to loss of records in the Moplah rebellion.

FOREST DEPARTMENT

ANNUAL FORM No. 71.

Forest Department, Madras Presidency.

Register of breaches of Forest Rules during 1921-22.

District.	Cases pending from 1920-21.	New cases of the year.					Total cases.	Disposed of during the year.						Cases pending at close of year.	
		Injury to forest by fire.	Unauthorized felling.	Unauthorized grazing.	Other offences.	Total new cases of the year.		Convictions.		Acquittals.		Total.			
								Cases.	Persons.	Cases.	Persons.	Cases.	Persons.		
<i>First Circle.</i>															
Ganjam ..	A ..	42	1	42	4	12	59	101	46	136	23	99	69	235	32
	B ..	48	1	320	22	19	362	410	323	1,336	18	110	341	1,446	69
	C ..	..	100	35	..	..	135	..	..	..	..	..	..	..	..
Total ..		90	102	897	26	31	556	511	369	1,472	41	209	410	1,681	101
Visagapatam.	A ..	26	2	83	11	20	116	142	88	284	9	39	97	323	45
	B ..	45	1	269	59	8	337	382	333	570	17	82	350	652	32
	C ..	..	41	..	..	1	42	..	..	..	..	..	..	..	..
Total ..		71	44	352	70	29	495	524	421	854	26	121	447	975	77
Godavari, Upper.	A ..	12	1	20	1	..	22	34	27	149	3	9	130	158	4
	B ..	5	1	61	10	..	72	77	64	136	8	30	72	166	5
	C ..	..	65	..	..	..	65	..	..	..	..	..	..	..	..
Total ..		17	67	81	11	..	159	111	91	285	11	39	102	324	9
Godavari, Lower.	A ..	30	1	36	4	4	45	75	61	170	10	25	71	195	4
	B ..	107	..	196	43	14	253	360	299	668	2	2	301	670	59
	C ..	..	47	10	..	6	63	..	..	..	..	..	..	..	..
Total ..		137	48	242	47	24	361	435	360	838	12	27	372	865	63
Kistna	A ..	53	..	100	53	6	159	212	176	658	12	23	188	681	24
	B ..	41	..	233	255	26	514	565	375	1,001	51	99	426	1,100	129
	C ..	..	13	8	..	..	21	..	..	..	..	..	..	..	..
Total ..		94	13	341	308	32	694	767	551	1,659	63	122	614	1,781	153
Total, First Circle.	A ..	163	5	281	73	42	461	564	398	1,397	57	195	455	1,592	109
	B ..	246	8	1,079	389	67	1,538	1,784	1,394	3,711	96	323	1,490	4,034	294
	C ..	..	266	53	..	326	..	..	..	..	..	..	..	..	..
Grand Total, First Circle.		409	274	1,413	462	116	2,265	2,348	1,792	5,108	153	518	1,945	5,626	403
<i>Second Circle.</i>															
Bellary ..	A ..	60	..	46	44	9	99	159	137	893	9	46	146	439	13
	B ..	180	..	243	232	16	491	671	385	930	190	504	575	1,434	96
	C ..	..	18	5	2	3	28	..	..	..	..	..	..	..	..
Total ..		240	18	294	278	28	618	830	522	1,323	199	550	721	1,873	109
Anantapur.	A ..	78	..	276	115	9	400	478	364	1,025	10	54	374	1,079	104
	B ..	96	..	282	200	18	500	596	483	976	50	134	533	1,110	63
	C ..	..	14	39	..	..	53	..	..	..	..	..	..	..	..
Total ..		174	14	597	315	27	953	1,074	847	2,001	60	188	907	2,189	167
Guntur ..	A ..	893	..	224	148	19	391	784	526	2,178	125	436	651	2,614	133
	B ..	639	..	324	240	36	600	1,239	900	2,283	188	715	1,088	2,998	151
	C ..	..	..	21	4	4	29	..	..	..	..	..	..	..	..
Total ..		1,032	..	569	392	59	1,020	2,023	1,426	4,461	313	1,151	1,739	5,612	284

A = Cases taken to Court. B = Cases compounded. C = Cases undetected.

\* The variations between the closing balance of last year and these figures are due to transfers from B to A.

Register of breaches of Forest Rules during 1921-22—cont.

District.	Cases pending from 1920-21.	New cases of the year.					Total new cases of the year.	Total cases.	Disposed of during the year.						Cases pending at close of year.
		Injury to forest by fire.	Unauthorized felling.	Unauthorized grazing.	Other offences.	Total new cases of the year.			Convictions.		Acquittals.		Total.		
									Cases.	Persons.	Cases.	Persons.	Cases.	Persons.	
<i>Second Circle—cont.</i>															
Kurnool, East.	A	38	42	68	1	111	144	68	198	19	72	87	270	57	
	B	24	233	109	7	349	373	142	348	141	433	283	781	90	
	C	10	7	1	..	18	..	..	..	..	..	..	..	..	
Total	57	10	282	178	8	478	517	210	546	180	505	370	1,051	147	
Kurnool, South.	A	15	75	22	6	103	118	104	379	..	7	104	386	14	
	B	25	211	115	5	331	356	282	973	44	151	306	1,124	50	
	C	..	42	..	..	42	..	..	..	..	..	..	..	..	
Total	40	..	328	137	11	476	474	386	1,352	44	158	410	1,510	64	
Kurnool, West.	A	58	272	62	26	560	448	380	901	16	45	376	946	72	
	B	40	409	125	32	566	606	462	928	56	259	520	1,187	86	
	C	..	53	..	..	53	..	..	..	..	..	..	..	..	
Total	128	..	734	187	58	979	1,054	822	1,829	74	304	896	2,133	158	
Total, Second Circle.	A	667	935	459	70	1,464	2,181	1,559	5,074	179	660	1,738	5,734	393	
	B	1,004	1,702	1,021	114	2,837	3,841	2,634	8,448	671	2,196	3,305	8,534	536	
	C	42	167	7	7	223	..	..	..	..	..	..	..	..	
Grand Total, Second Circle.	1,671	42	2,804	1,487	191	4,524	5,972	4,193	11,512	850	2,856	5,043	14,368	929	
<i>Third Circle.</i>															
Cuddapah, North.	A	7	141	14	4	160	167	126	533	12	32	138	565	29	
	B	98	280	70	10	310	408	336	595	84	187	370	762	88	
	C	..	33	2	..	133	..	..	..	..	..	..	..	..	
Total	105	99	404	86	14	603	575	462	1,128	46	169	508	1,297	67	
Cuddapah, South.	A	54	157	69	6	234	288	149	432	36	275	235	707	62	
	B	2	29	29	4	132	134	100	226	16	103	115	329	19	
	C	..	..	..	..	..	..	..	..	..	..	..	..	..	
Total	56	2	256	98	10	366	422	249	658	101	378	350	1,036	72	
Cuddapah, West.	A	149	204	84	15	303	452	373	873	25	94	398	967	54	
	B	129	416	156	15	587	716	604	1,260	91	337	695	1,597	21	
	C	..	57	2	..	59	..	..	..	..	..	..	..	..	
Total	278	..	677	242	30	949	1,168	977	2,133	116	431	1,093	2,564	75	
Nellore	A	132	108	210	27	345	477	227	876	38	194	365	1,070	212	
	B	517	415	602	58	1,076	1,593	1,107	2,509	115	549	1,222	3,058	371	
	C	..	38	..	..	38	..	..	..	..	..	..	..	..	
Total	649	1	561	812	85	1,459	2,070	1,334	3,385	153	743	1,487	4,128	582	
Chingleput.	A	48	96	30	..	126	174	134	313	11	30	145	343	29	
	B	73	354	174	3	521	604	536	1,110	39	51	575	1,161	29	
	C	..	2	..	..	3	..	..	..	..	..	..	..	..	
Total	121	1	452	204	3	660	778	670	1,423	50	81	720	1,504	58	
Chittoor.	A	121	211	181	54	446	567	225	432	177	444	502	876	65	
	B	58	452	307	68	827	885	709	1,092	123	215	832	1,307	52	
	C	..	28	5	..	203	..	..	..	..	..	..	..	..	
Total	179	170	691	493	122	1,476	1,452	934	1,524	400	659	1,334	2,183	116	

A = Cases taken to Court. B = Cases compounded. C = Cases undetected.  
 \* The variations between the closing balance of last year and these figures are due to transfers from B to A.  
 † Includes cases in which compounding Fees were paid by the accused after the cases were taken into court—G.O. No. 2097, Revenue, dated 12th July 1917, and B.P. No. 86, dated 11th August 1917.

Register of breaches of Forest Rules during 1921-22 — cont.

District.	Cases pending from 1920-21.	New cases of the year.						Total cases.	Disposed of during the year.						Cases pending at close of year.
		Injury to forest by fire.	Unauthorized felling.	Unauthorized grazing.	Other offences.	Total new cases of the year.	Convictions.		Acquittals.		Total.				
							Cases.		Persons.	Cases.	Persons.	Cases.	Persons.		
<i>Third Circle—cont.</i>															
Vellore, North.	{ A .. 268	..	212	110	1	323	591	482	1,451	104	276	586	1,727	5	
	{ B .. 181	..	916	462	5	1,383	1,564	1,186	2,245	21	105	1,207	2,350	357	
	{ C .. ..	67	..	..	..	67	..	..	..	..	..	..	..	..	
Total ..	449	67	1,128	572	6	1,773	2,155	1,668	3,696	125	381	1,793	4,077	362	
Total, Third Circle.	{ A .. 779	3	1,129	698	107	1,937	2,716	1,716	4,910	563	1,345	2,269	6,255	447	
	{ B .. 1,058	1	2,882	1,800	163	4,846	5,904	4,578	9,037	438	1,497	5,016	10,534	888	
	{ C .. ..	336	158	9	..	503	..	..	..	..	..	..	..	..	
Grand Total Third Circle.	1,837	340	4,169	2,507	270	7,286	8,620	6,294	13,947	991	2,842	7,285	16,789	1,335	
<i>Fourth Circle.</i>															
Vellore, South.	{ A .. (a) 117	..	354	45	47	446	563	315	750	23	64	338	814	225	
	{ B .. (a) 448	..	1,104	302	157	1,568	2,011	1,370	2,981	55	215	1,425	3,196	586	
	{ C .. ..	90	21	..	..	111	..	..	..	..	..	..	..	..	
Total ..	565	90	1,479	347	204	2,120	2,574	1,685	3,731	78	279	1,763	4,010	811	
Vellore, West.	{ A .. 125	..	159	9	5	173	301	222	465	13	35	235	500	66	
	{ B .. 64	..	652	128	6	786	850	656	1,565	41	100	697	1,865	153	
	{ C .. ..	..	15	1	..	16	..	..	..	..	..	..	..	..	
Total ..	192	..	826	138	11	975	1,151	878	2,030	54	135	932	2,165	219	
Salem, East.	{ A .. (a) 616	1	574	145	18	733	1,349	851	2,515	31	132	882	2,647	467	
	{ B .. (a) 204	..	838	249	2	1,189	1,343	806	1,800	(b) + 9	219	876	2,019	467	
	{ C .. ..	94	6	..	..	100	..	..	..	..	..	..	..	..	
Total ..	820	95	1,468	394	15	1,972	2,692	1,657	4,315	101	351	1,758	4,666	934	
Salem, North.	{ A .. (a) 17	..	25	17	13	55	72	26	84	11	18	37	52	35	
	{ B .. (a) 50	2	192	78	29	301	851	226	420	45	81	271	501	30	
	{ C .. ..	97	..	..	2	99	..	..	..	..	..	..	..	..	
Total ..	67	99	217	95	44	455	423	252	454	56	99	308	553	115	
Salem, Central.	{ A .. 94	..	417	68	18	503	597	396	1,178	(b) + 23	85	429	1,263	168	
	{ B .. 536	..	228	86	18	332	868	354	785	(b) + 10	65	377	850	491	
	{ C .. ..	39	..	..	..	39	..	..	..	..	..	..	..	..	
Total ..	630	39	645	154	36	874	1,465	750	1,963	56	150	806	2,113	659	
Salem, South.	{ A .. (a) 488	..	436	51	8	495	983	521	1,730	(b) + 22	177	582	1,907	401	
	{ B .. (a) 447	..	1,755	154	37	1,956	2,403	1,660	3,251	(b) + 39	233	1,720	3,484	683	
	{ C .. ..	26	47	..	..	73	..	..	..	..	..	..	..	..	
Total ..	935	26	2,248	205	45	2,524	3,386	2,181	4,981	121	410	2,302	5,391	1,084	
Total, Fourth Circle.	{ A .. 1,460	1	1,965	335	104	2,405	3,865	2,331	6,672	172	511	2,503	7,183	1,369	
	{ B .. 1,749	2	4,829	997	249	6,077	7,326	5,072	10,802	294	913	5,366	11,715	2,460	
	{ C .. ..	346	89	1	2	438	..	..	..	..	..	..	..	..	
Grand Total Fourth Circle.	3,209	349	6,883	1,333	355	8,920	11,691	7,403	17,474	466	1,424	7,869	18,898	3,822	

A = Cases taken to Court. B = Cases compounded. C = Cases undetected.  
 (a) Revised figures furnished by the District Forest Officer. (b) Cases withdrawn.

Register of breaches of Forest Rules during 1921-22—cont.

District.	Cases pending from 1920-21.	New cases of the year.					Total cases.	Disposed of during the year.						Cases pending at close of the year.
		Injury to forest by fire.	Unauthorized felling.	Unauthorized grazing.	Other offences.	Total new cases of the year.		Convictions.		Acquittals.		Total.		
								Cases.	Persons.	Cases.	Persons.	Cases.	Persons.	
<i>Fifth Circle.</i>														
Kollegal.	A .. 21	..	2	2	1	5	26	21	88	4	15	25	103	1
	B ..	..	203	127	29	359	359	326	750	23	48	349	798	10
	C ..	26	..	..	..	26	..	..	..	..	..	..	..	..
Total	21	26	205	129	30	390	385	347	838	27	63	374	901	11
Coimbatore, North.	A .. 20	..	32	14	2	48	68	64	131	2	6	66	137	2
	B .. 12	5	489	204	12	710	722	650	1,034	82	87	682	1,131	40
	C ..	42	..	26	..	68	..	..	..	..	..	..	..	..
Total	32	47	521	244	14	826	790	714	1,165	84	93	748	1,258	42
Coimbatore, South.	A .. 25	..	40	9	7	56	81	69	155	2	7	71	162	10
	B .. 30	1	273	40	28	342	379	294	754	19	63	313	817	69
	C ..	12	4	..	..	16	..	..	..	..	..	..	..	..
Total	55	13	317	49	35	414	453	363	909	21	70	384	979	69
Madurai.	A .. 711	..	695	124	23	842	1,553	841	3,746	56	629	897	4,376	655
	B .. 256	1	705	121	12	839	1,095	463	1,332	244	450	707	1,782	883
	C ..	167	7	..	1	175	..	..	..	..	..	..	..	..
Total	967	168	1,407	245	36	1,856	2,648	1,304	5,078	300	1,079	1,604	6,158	1,044
Tiranevelly.	A .. 35	1	199	45	5	250	285	244	629	14	32	258	661	27
	B .. 169	..	593	289	60	942	1,111	774	1,852	14	48	788	1,900	323
	C ..	30	8	2	..	40	..	..	..	..	..	..	..	..
Total	204	31	800	336	65	1,232	1,396	1,018	2,481	28	80	1,046	2,561	350
Total, Fifth Circle.	A .. 812	1	968	194	35	1,201	2,013	1,239	4,749	78	689	1,317	5,439	698
	B .. 467	7	2,263	781	141	3,192	3,659	2,507	5,722	332	696	2,839	5,418	820
	C ..	277	19	28	1	325	..	..	..	..	..	..	..	..
Grand Total, Fifth Circle.	1,279	285	3,250	1,003	180	4,718	5,672	3,746	10,471	410	1,385	4,156	11,857	1,518
<i>Sixth Circle.</i>														
Mangalore, North.	A .. 41	11	17	4	1	33	74	41	75	11	18	52	93	23
	B .. 35	15	416	21	12	464	499	375	663	44	76	419	739	80
	C ..	29	..	..	..	29	..	..	..	..	..	..	..	..
Total	76	55	433	25	13	526	573	416	738	55	94	471	822	103
Mangalore, South.	A .. 42	4	23	2	10	39	81	44	103	19	37	68	140	14
	B .. 24	8	195	3	10	214	238	155	419	27	45	162	464	56
	C ..	19	..	..	..	19	..	..	..	..	..	..	..	..
Total	66	31	216	5	20	272	319	199	522	46	82	245	604	74
Wynaad.	A ..	..	..	..	..	..	..	..	..	..	..	..	..	..
	B .. 2	..	9	4	8	21	23	..	..	19	28	..	29	..
	C ..	..	..	..	..	..	..	..	..	1	1	..	..	..
Total	2	..	9	4	8	21	23	..	..	20	29	20	29	..
Nilambur	Information not furnished by the District Forest Officer as the records were all destroyed in the Moplah rebellion.													
The Nilgiris.	A .. 7	..	6	4	8	18	25	20	79	2	6	22	85	1
	B .. 19	..	115	76	26	217	235	133	484	36	105	219	539	..
	C ..	33	..	..	2	35	..	..	..	..	..	..	..	..
Total	26	33	121	80	36	270	261	203	563	38	111	241	674	2
Palghat.	A .. 18	..	32	7	3	42	60	41	215	..	..	46	215	1
	B .. 25	1	124	42	20	185	210	77	196	19	..	182	196	2
	C ..	1	7	..	3	11	..	86	..	..	..	..	..	..
Total	(b) 43	2	161	49	26	238	270	209	411	19	..	228	411	4
Total, Sixth Circle.	A .. 108	15	78	17	22	132	240	151	472	32	61	183	533	5
	B .. 105	24	855	146	76	1,101	1,206	876	1,762	146	255	1,022	2,017	18
	C ..	82	7	..	5	94	..	..	..	..	..	..	..	..
Grand Total, Sixth Circle.	213	121	940	163	103	1,327	1,446	1,027	2,234	178	316	1,206	2,550	24
Total, Presidency.	A .. 3,989	25	5,356	1,776	383	7,540	11,529	7,394	23,274	1,071	3,461	8,465	26,786	3,06
	B .. 4,629	37	13,610	5,134	810	19,591	24,220	17,061	37,472	1,977	5,880	13,038	43,352	5,18
	C ..	1,349	493	45	22	1,909	..	..	..	..	..	..	..	..
Grand Presidency.	8,618	1,411	19,459	6,955	1,215	29,040	35,749	24,455	60,746	3,048	9,341	27,503	70,088	8,24

A = Cases taken to Court

B = Cases compounded.

C = Cases undetected.

FOREST DEPARTMENT

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ANNUAL FORM No. 72.

Forest Department, Madras Presidency.

Area of forest tracts protected from fire during 1921-22.

District.	Forest tracts.	Area protected during the previous year.	During the year under report.			Cost during the year under report.
			Area attempted to be protected.	Fires.	Actually protected.	
<i>First Circle.</i>						
Ganjam ..	Special protection ..	acs. 45,772	acs. 45,839	acs. 3,048	acs. 43,791	Rs. 2,992
	General do. ..	219,709	220,039	61,461	158,578	3,158
						(a) - 87
Total, Ganjam ..		265,481	266,878	64,509	202,369	6,063
Vizagapatam.	Special protection ..	102,622	94,181	2,727	91,454	1,479
	General do. ..	65,061	5,485	..	5,485	(a) - 122
						39
Total, Vizagapatam ..		167,683	99,666	2,727	96,939	1,396
Godavari Upper.	Special protection ..	516,659	532,269	102,957	429,312	2,562
						(a) + 4,778
Godavari, Lower.	Special protection ..	150,680	152,636	5,069	147,567	4,246
	General do. ..	81,710	82,668	428	82,140	708
Total, Godavari, Lower..		232,390	235,204	5,497	229,707	4,954
Kistna ..	Special protection ..	11,710	14,220	41	14,179	420
	General do. ..	30,727	32,811	..	32,811	655
Total, Kistna ..		42,437	47,031	41	46,990	1,075
Total, First Circle.	Special protection ..	827,443	840,145	113,842	726,303	16,355
	General do. ..	397,207	340,903	61,889	279,014	4,473
Grand total ..		1,224,650	1,181,048	175,731	1,005,317	20,828
<i>Second Circle.</i>						
Bellary ..	Special protection ..	50,082	36,754	898	95,856	164
	General do. ..	184,169	252,392	3,737	248,655	..
Total ..		234,251	289,146	4,635	244,511	164
Anantapur ..	Special protection ..	125,140	139,008	541	138,467	418
	General do. ..	333,547	338,762	466	338,296	..
Total ..		458,687	477,770	1,007	476,763	418
Guntur ..	Special protection ..	..	Nil.	..	..	..
	General do. ..	511,425	504,939	96	504,843	..
Total ..		511,425	504,939	96	504,843	..
Kurnool, East.	Special protection ..	15,596	Transferred to general protection.			..
	Early burning ..	297,920	201,690	238	201,452	728
	General protection ..	304,647	419,093	1,042	418,051	1,247
	Total ..	618,163	620,783	1,280	619,503	1,975
Kurnool, South.	Special protection ..	137,478	147,987	5,745	142,242	5,001
	Early burning ..	186,128	215,653	7,715	207,938	1,561
	General protection ..	122,914	122,766	..	122,766	Nil
Total ..		446,520	486,406	13,460	472,946	6,562
Kurnool, West.	Special protection ..	33,288	29,991	60	29,931	775
	Early burning ..	321,494	348,283	Nil	348,283	1,532
	General protection ..	25,297	9,858	Nil	9,868	Nil.
Total ..		380,079	388,142	60	388,082	2,307
Total, Second Circle.	Special protection ..	331,665	353,740	7,244	346,496	6,358
	Early burning ..	805,542	765,626	7,953	757,673	3,821
	General protection ..	1,481,999	1,647,820	6,341	1,642,479	1,247
Grand total ..		2,649,106	2,767,166	20,538	2,746,648	11,426
<i>Third Circle.</i>						
Cuddapah, North.	Special protection ..	264,227	275,246	29,614	245,632	5,939
	General do. ..	54,936	55,107	1,590	53,517	..
Total ..		319,163	330,353	31,204	299,149	5,939
Cuddapah, South.	Special protection ..	200,929	218,072	42,837	175,235	4,604
	General do. ..	45,223	45,231	2,311	42,420	945
Total ..		246,152	263,303	45,648	217,655	5,549

(a) Added or subtracted as per Accountant-General's figures.

Notes.—This return deals with a period of only 9 months as per Chief Conservator's Proceedings Routine No. 1049, dated 7th July 1921 as three months have already been included in the last year's report.

## Area of forest tracts protected from fire during 1921-22—cont..

District.	Forest tracts.	Area protected during the previous year.	During the year under report.			Cost during the year under report.
			Area attempted to be protected.	Fires.	Actually protected.	
	<i>Third Circle—cont.</i>	ACS.	ACS.	ACS.	ACS.	RS.
Cuddapah, West.	Special protection ..	205,579	211,495	11,786	199,709	3,964
	General do. ..	259,345	269,283	8,805	260,478	96
	Total ..	464,924	480,778	20,591	460,187	4,060
Nellore ..	Special protection ..	149,184	149,469	2,468	147,001	1,971
	General do. ..	..	..	..	..	..
	Total ..	149,184	149,469	2,468	147,001	1,971
Chingleput..	Special protection ..	25,523	15,975	42	15,933	1,115
	General do. ..	104,553	113,951	..	113,951	..
	Total ..	130,076	129,926	42	129,884	1,115
Chittoor ..	Special protection ..	114,361	120,686	17,347	103,339	6,056
	General do. ..	403,737	407,020	7,718	399,302	..
	Total ..	518,398	527,706	25,065	502,641	6,056
Vellore, North.	Special protection ..	29,919	31,038	1,540	29,548	604
	General do. ..	261,632	262,197	3,548	258,649	..
	Total ..	291,551	293,235	5,088	288,197	604
Total ..	Special protection ..	990,022	1,022,031	105,634	916,397	24,258
	General do. ..	1,129,426	1,152,789	24,472	1,128,317	1,041
	Total, Third Circle ..	2,119,448	2,174,820	130,106	2,044,714	25,294
	<i>Fourth Circle.</i>					
Vellore, South.	Special protection ..	99,043	100,998	137	100,861	860
	General do. ..	191,662	193,280	1,378	191,902	..
	Total ..	290,905	294,278	1,515	292,763	..
Vellore, West.	Special protection ..	102,791	103,762	931	102,831	221
	General do. ..	138,233	140,872	407	140,465	..
	Total ..	241,024	244,634	1,338	243,296	..
Salem, East..	Special protection ..	190,017	190,332	383	189,949	868
	General do. ..	172,056	145,650	583	145,067	+(a) 247
	Total ..	362,073	335,982	966	335,016	..
Salem, North.	Special protection ..	74,317	52,565	7,142	45,423	1,563
	General do. ..	257,768	281,223	11,948	269,280	..
	Total ..	332,085	333,793	19,090	314,703	..
Salem, Central.	Special protection ..	104,799	118,863	1,216	117,647	1,461
	General do. ..	147,416	136,082	143	135,939	(a)+ 218
	Total ..	252,215	254,945	1,359	253,586	..
Salem, South.	Special protection ..	(b) 115,303	116,086	671	115,415	714
	General do. ..	(b) 100,810	103,897	1	103,896	..
	Total ..	216,113	219,983	672	219,311	..
Total ..	Special protection ..	686,270	682,606	10,480	672,126	5,637
	General do. ..	1,008,145	1,001,009	14,460	986,549	465
	Total, Fourth Circle ..	1,694,415	1,683,615	24,940	1,658,675	6,102
	<i>Fifth Circle.</i>					
Kollegal ..	Special protection ..	38,380	34,127	908	33,319	3,495
	General do. ..	559,521	565,100	3,446	561,654	..
	Total ..	597,901	599,227	4,354	594,973	3,495

(a) Expenditure incurred for clearing top lines.

(b) Revised figures furnished by District Forest officers.



FOREST DEPARTMENT

XXB

Area of forest tracts protected from fire during 1921—cont.

District.	Forest tracts.	Area protected during the previous year.	During the year under report.			Cost during the year under report.
			Area attempted to be protected.	Fires.	Actually protected.	
	<i>Fifth Circle—cont.</i>	acs.	acs.	acs.	acs.	rs.
Coimbatore, North.	Special protection ..	22,020	19,463	504	18,959	5,187
	General do. ..	511,674	530,816	13,276	517,540	805
	Total ..	533,694	550,279	13,780	536,499	5,992
Coimbatore, South.	Special protection ..	47,350	47,350	911	46,439	2,674
	General do. ..	200,993	200,993	1,546	199,447	..
	Total ..	248,343	248,343	2,457	245,886	2,674
Madura ..	Special protection ..	176,461	140,542	11,385	129,157	4,099
	General do. ..	245,746	281,788	4,898	276,890	(a)+ 1709
	Total ..	421,207	422,330	16,283	406,047	5,808
Tinnevely ..	Special protection ..	32,235	35,688	1,917	33,771	5,132
	General do. ..	201,749	206,712	9,534	197,178	..
	Total ..	233,984	242,400	11,451	230,949	5,132
Total ..	Special protection ..	315,446	277,170	15,625	261,545	22,296
	General do. ..	1,719,683	1,785,409	32,700	1,752,709	805
	Total, Fifth Circle ..	2,035,129	2,062,579	48,325	2,014,254	23,101
	<i>Sixth Circle.</i>					
Mangalore, North.	Special protection ..	32,752	32,812	206	32,606	1,475
	General do. ..	196,689	197,134	1,024	196,140	1,662
	Total ..	229,441	229,973	1,230	228,746	3,137
Mangalore, South.	Special protection ..	106,577	107,342	972	106,370	1,899
	General do. ..	170,454	171,458	1,038	170,420	1,089
	Total ..	277,031	278,800	2,010	276,790	2,988
Wynaad ..	Special protection ..	109,546	139,596	345	139,251	5,349
Nilambar ..	Special protection ..	81,743	81,743	170	81,573	2,822
The Nilgiris.	Special protection ..	45,114	76,657	734	71,923	5,017
	General do. ..	237,301	242,616	3,299	239,317	..
	Total ..	282,415	319,273	8,033	311,240	5,017
Palghat ..	Special protection ..	91,308	126,227	1,545	124,682	4,119
	General do. ..	64,825	42,707	78	42,629	322
	Total ..	146,133	168,934	1,623	167,311	4,441
Total ..	Special protection ..	467,040	564,385	7,972	556,413	20,681
	General do. ..	659,269	653,946	5,439	648,507	3,073
	Total, Sixth Circle ..	1,126,309	1,218,331	13,411	1,204,920	23,754
Total, Presidency.	Special protection ..	3,617,786	3,740,077	260,797	3,479,280	95,630
	General do. ..	6,395,729	6,581,876	144,301	6,437,575	11,104
	Early burning ..	805,542	765,628	7,953	767,673	3,821
	Grand total, presidency ..	10,819,057	11,087,579	413,051	10,674,528	110,555

(a) Amount spent on fire protection of common boundary between Zamin and State forests.  
*Sixth Circle Note.*—The figures in column 3 are those reported by the District Forest officers as the area protected during the previous calendar year.

## ANNUAL FORM No. 73.

Forest Department, Madras Presidency.

Area closed and open to grazing during 1921-22.

District.	Closed to all animals.		Open to grazing			
	Whole year.	Part of year.	Of all animals except goats.		Of all animals except browsers (sheep and goats).	
			Whole year.	Part of year.	Whole year.	Part of year.
<b>FIRST CIRCLE.</b>						
<i>Reserved forests.</i>						
	SQ. MLS.	SQ. MLS.	SQ. MLS.	SQ. MLS.	SQ. MLS.	SQ. MLS.
Ganjam .. .. .	88	..	537	..	..	..
Visagapatam .. .. .	16	2	288	2	..	..
Godavari, Upper .. .. .	..	..	685	..	..	..
Do. Lower .. .. .	24	..	450	..	..	..
Kistna .. .. .	54	8	202	..	..	..
Total .. .. .	182	10	2,062	2	..	..
<i>Reserved lands.</i>						
	SQ. MLS.	SQ. MLS.	SQ. MLS.	SQ. MLS.	SQ. MLS.	SQ. MLS.
Visagapatam .. .. .	..	..	2	..	..	..
Godavari, Upper .. .. .	..	..	247	..	..	..
Do. Lower .. .. .	..	..	12	..	..	..
Kistna .. .. .	..	..	1	..	..	..
Total .. .. .	..	..	262	..	..	..
<b>SECOND CIRCLE.</b>						
<i>Reserved forests.</i>						
	SQ. MLS.	SQ. MLS.	SQ. MLS.	SQ. MLS.	SQ. MLS.	SQ. MLS.
Bellary .. .. .	51	..	516	..	..	..
Anantapur .. .. .	20	62	665	..	..	..
Guntur .. .. .	82	..	417	..	290	..
Kurnool, East .. .. .	..	..	970	..	..	..
Do. South .. .. .	551	..	209	..	..	..
Do. West .. .. .	162	8	685	..	..	..
Total .. .. .	866	70	3,462	..	290	..
<i>Reserved lands.</i>						
	SQ. MLS.	SQ. MLS.	SQ. MLS.	SQ. MLS.	SQ. MLS.	SQ. MLS.
Bellary .. .. .	3	..	0.06	..	..	..
Guntur .. .. .	..	..	..	..	..	..
Total .. .. .	3	..	0.06	..	..	..
<b>THIRD CIRCLE.</b>						
<i>Reserved forests.</i>						
	SQ. MLS.	SQ. MLS.	SQ. MLS.	SQ. MLS.	SQ. MLS.	SQ. MLS.
Cuddapah, North .. .. .	78	..	518	..	..	..
Do. South .. .. .	90	..	372	..	..	..
Do. West .. .. .	67	..	685	..	..	..
Nellore .. .. .	248	399	71	..	..	..
Chingleput .. .. .	68	131	14	..	..	..
Chittoor .. .. .	160	123	541	..	..	..
Vellore, North .. .. .	130	6	317	..	..	..
Total .. .. .	831	659	2,518	..	..	..
<i>Reserved lands.</i>						
	SQ. MLS.	SQ. MLS.	SQ. MLS.	SQ. MLS.	SQ. MLS.	SQ. MLS.
Nellore .. .. .	11	..	..	..	..	..

Area closed and open to grazing during 1921-22—cont.

District.	Closed to all animals.		Open to grazing			
			Of all animals except goats.		Of all animals except browsers (sheep and goats).	
	Whole year.	Part of year.	Whole year.	Part of year.	Whole year.	Part of year.

FOURTH CIRCLE.

Reserved forests.

	SQ. MLS.	SQ. MLS.	SQ. MLS.	SQ. MLS.	SQ. MLS.	SQ. MLS.
Vellore, South	77	..	405	..	..	..
Do. West	15	..	368	..	..	..
Salem, East	103	6	445	6	..	..
Do. North	49	..	472	..	..	..
Do. Central	34	4	270	4	..	..
Do. South	60	..	284	..	..	..
Total	338	10	2,344	10	..	..

Reserved lands.

Vellore, South	(a) ..	..	(a) ..	..	..	..
Do. West	..	..	..	..	..	..
Salem, East	..	..	12	..	..	..
Do. North	..	..	..	..	..	..
Do. Central	6	..	6	..	..	..
Do. South	(a) ..	..	33	..	..	..
Total	6	..	51	..	..	..

FIFTH CIRCLE.

Reserved forests.

Kollegal	3	..	935	..	..	..
Coimbatore, North	49	..	837	..	..	..
Do. South	251	..	190	..	13	..
Madura	102	..	248	..	210	..
Tinnevely	292	34	99	..	..	..
Total	697	34	2,309	..	323	..

Reserved lands.

Tinnevely	2	..	..	..	..	..
Grand total	699	34	2,309	..	323	..

SIXTH CIRCLE.

Reserved forests.

Mangalore, North	10	..	..	..	350	..
Do. South	8	..	..	..	431	..
Wynaad	..	..	..	..	206	57
Nilambur	108	..	..	..	..	..
The Nilgiris	23	..	389	..	..	..
Palghat	162	..	102	..	..	..
Total	311	..	491	..	987	57

Reserved lands.

Nilambur	20	..	..	..	..	..
The Nilgiris	9	..	77	..	..	..
Total	29	..	77	..	..	..
Grand total, Presidency	3,276	783	13,576	12	1,600	57

(a) Below one square mile.

ANNUAL  
Forest Department,  
Return of grazing in the

District.	At enhanced or special rates.					Grazing on payment.				
						At full rates.				
	Buffaloes.	Cows and bullocks.	Goats and sheep.	Other animals.	Fees received.	Buffaloes.	Cows and bullocks.	Goats and sheep.	Other animals.	Fees received.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
<b>FIRST CIRCLE.</b>					Rs.					Rs.
<i>Reserved forests.</i>										
Ganjam .. ..	(a) 603	(a) 6,829	(a) S 912	..	4,246	6,634	32,858	S 92	..	8,657
Vizagapatam ..	(b) 1,427	(c) 839	..	..	1,385	22	4,057	S 1	..	769
Godavari, Upper..	(c) 7,808	(c) 7,882	..	..	5,875	..	..	..	..	..
Do. Lower.	..	..	..	..	5	..	..	..	..	..
..	(b) 591	(b) 5,578	(b) S 1,052	..	4,047	4,959	17,716	S 15,864	..	6,669
Kistna .. ..	..	(d) 1,315	..	..	..	..	..	..	..	1,100
..	..	..	..	..	..	..	..	..	..	1,303
..	..	..	..	..	..	..	..	..	..	150
<b>Total ..</b>	<b>10,429</b>	<b>22,443</b>	<b>S 1,964</b>	<b>..</b>	<b>15,553</b>	<b>11,615</b>	<b>54,631</b>	<b>S 15,957</b>	<b>..</b>	<b>16,095</b>
..	..	..	..	..	5	..	..	..	..	1,100
..	..	..	..	..	28	..	..	..	..	1,303
..	..	..	..	..	..	..	..	..	..	150
<i>Reserved lands.</i>										
Godavari, Upper ..	..	..	..	..	..	..	..	..	..	..
<i>Unreserved lands.</i>										
Ganjam .. ..	..	..	..	..	..	..	..	..	..	13
Godavari, Lower ..	(e) 10,065	(e) 10,221	..	..	7,588	..	..	..	..	1,377
Kistna .. ..	..	..	..	..	..	1,002	255	..	..	423
..	..	..	..	..	..	..	..	..	..	66
<b>Total ..</b>	<b>10,065</b>	<b>10,221</b>	<b>..</b>	<b>..</b>	<b>7,588</b>	<b>1,002</b>	<b>255</b>	<b>..</b>	<b>..</b>	<b>423</b>
..	..	..	..	..	..	..	..	..	..	1,455
<b>Grand Total ..</b>	<b>20,494</b>	<b>32,664</b>	<b>S 1,964</b>	<b>..</b>	<b>23,141</b>	<b>12,617</b>	<b>54,886</b>	<b>S 15,957</b>	<b>..</b>	<b>16,518</b>
..	..	..	..	..	5	..	..	..	..	1,100
..	..	..	..	..	28	..	..	..	..	2,758
..	..	..	..	..	..	..	..	..	..	150
<b>SECOND CIRCLE.</b>										
Bellary .. ..	(a) 589	4,989	2,477	..	7,406	7,014	36,943	79,966	..	17,055
..	..	..	..	..	..	..	..	..	..	(g) 2,384
..	..	..	..	..	..	..	..	..	..	(h) 6,614
..	..	..	..	..	..	..	..	..	..	43,017
Anantapur .. ..	..	..	..	..	..	(b) 1,690	51,350	62,608	..	(g) 288
..	..	..	..	..	..	..	..	..	..	(h) 636
..	..	..	..	..	..	..	..	..	..	4,733
Guntur .. ..	(e) 3,859	17,561	35,501	..	39,772	1,181	2,760	27,623	..	(g) 5,936
..	..	..	..	..	..	..	..	..	..	(h) 2,895
..	..	..	..	..	..	..	..	..	..	13,445
Kurnool, East ..	(d) 1,517	16,933	..	..	19,967	1,315	16,253	17,320	..	(g) 13
..	..	..	..	..	..	..	..	..	..	(h) 2,325
Do. South .. ..	(e) ..	354	..	..	354	1,370	12,846	10,379	..	10,045
..	28	7,783	20	..	7,849	4,753	26,915	31,251	..	24,835
Do. West .. ..	(f) ..	..	..	..	..	..	762	..	..	(g) 191
..	..	..	..	..	..	..	..	..	..	(h) 230
<b>Total ..</b>	<b>5,993</b>	<b>57,620</b>	<b>37,998</b>	<b>..</b>	<b>75,348</b>	<b>17,323</b>	<b>147,539</b>	<b>229,147</b>	<b>..</b>	<b>1,34,641</b>

Notes for First Circle. —

S = Sheep.

G = Goats.

\* Sale-proceeds of fodder grass.

† Sale-proceeds of mangrove leaves.

† Revenue from forests handed over to panchayat management.

(1) The full rates are 6 annas per buffalo, 3 annas per cow or bullock and 1 anna 6 pies per sheep.

(2) The enhanced or special rates are— (a) Re. 1 per buffalo, 8 annas per cow or bullock and 4 annas per sheep.

(b) 12 annas per buffalo, 6 annas per cow and 3 annas per sheep.

(c) 8 annas per buffalo, 4 annas per cow or bullock and 2 annas per sheep.

(d) Re. 1 per plough bull.

(e) 4 annas per buffalo, 2 annas per cow or bullock and 1 anna per sheep.

(3) The privileged rates are—

(f) 1 anna per buffalo, cow or bullock.



Return of grazing in the

District.	Grazing on payment.									
	At enhanced or special rates.					At full rates.				
	Buffaloes.	Cows and bullocks.	Goats and Sheep.	Other animals.	Fees received.	Buffaloes.	Cows and bullocks.	Goats and Sheep.	Other animals.	Fees received.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
THIRD CIRCLE.										
Cuddapah, North	..	(a) 6,768	..	..	6,768	4,701	12,081	48,433	..	8,589
Do. South	..	(a) 1,992	..	..	1,992	285	15,711	12,556	..	4,230
Do. West	..	(a) 6,446	..	..	6,446	2,786	23,623	65,114	..	11,578
Nellore .. ..	(f) 44	787	95	..	900	..	..	..	..	2
Chingleput .. ..	..	..	..	..	..	..	..	..	..	1,438
Chittoor .. ..	(h) 100 (i) 1,038	1,585 62,457	102 24,035	..	1,836 38,275	..	..	21	..	1,092
Vellore, North .. ..	(i) 361	84,850	23,902	..	23,762	32	935	..	..	78,830
Total ..	1,543	114,885	48,134	..	79,979	7,804	52,350	126,124	..	23,884
FOURTH CIRCLE.										
Vellore, South .. ..	..	..	..	..	..	(a) 65 (b) 249	5,736 24,564	3,183 6,774	..	7,458 14,224
Do. West .. ..	..	..	..	..	..	(a) .. (b) 204 (c) .. (d) .. (e) .. (f) ..	11,802 22,924 422 5,859 625	.. 774 .. 2,737 ..	..	11,802 11,860 158 3,443 158
Do. North .. ..	..	..	..	..	..	(n) 50 (o) 121 (p) 162	2,762 4,375 31,029	4,438 1,022 2,561	..	(j) + 1 958 5,128 18,356
Do. Central .. ..	..	..	..	..	..	..	..	..	..	(h) 8,511 (i) 706 (j) 4 (k) 12 (l) - 164
Do. South .. ..	..	..	..	..	..	(m) 793 (n) 4 (o) .. (p) 256	34,239 12,450 36,701	596 2,695 ..	..	17,863 7,765 18,350 2,719
Total ..	..	..	..	..	..	..	..	..	..	(k) 14 (l) + 229 2,593 13,141 1,266
Total ..	..	..	..	..	..	2,286	215,876	66,011	..	1,46,545

Notes for Third Circle.—

Notes.—The full rates are 6 annas per buffalo, 3 annas per cow, bullock or other animal and 1½ annas per sheep.

Cuddapah, North.—(a) Rupee 1 per cow.  
(b) Penning licence fees.  
(c) Privileged rates—1 anna per cow and 6 pies per sheep.  
Do. South.—(a) Rupee 1 per cow.  
Do. West.—(a) Rupee 1 per cow.  
(d) Panchayat fees.  
(e) Privileged rate—1½ annas per cow.  
Nellore.—(f) Rupees 1-8-0 per buffalo, 1 rupee per cow and 8 annas per sheep.

Nellore.—(g) Kanoha rent.  
Chittoor.—(h) Rupees 2 per buffalo, rupee 1 per cow and 8 annas per sheep.  
(i) Rupee 1 per buffalo, 8 annas per cow and 4 annas per sheep.  
(j) Royalty on hay.  
Vellore, North.—(i) Rupee 1 per buffalo, 8 annas per cow and 4 annas per sheep.  
(k) Fees collected for hill village grazing blocks.

State forests during 1921-22—cont.

Number of animals					Grazing free. Number of animals.											Grand total of value at full rates	
At privileged rates.					By right under settlement.					During pleasure of Government or otherwise than under settlement.							
Buffaloes.	Cows and bullocks.	Goats and Sheep.	Other animals.	Fees received.		Buffaloes.	Cows and bullocks.	Goats and Sheep.	Other animals.	Value of fees at full rates.	Buffaloes.	Cows and bullocks.	Goats and Sheep.	Other animals.	Value of fees at full rates.		Total value of fees at full rates.
				Actual.	Value at full rates.												
(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)	(25)	(26)	(27)	(28)	(29)
..	(a) 200	330	..	Rs. 28	Rs. 68	..	..	..	..	..	190	45	850	..	159	159	15,590
..	..	..	..	..	..	..	461	..	..	86	..	..	..	..	..	..	6,335
..	(e) 260	..	..	24	49	..	..	..	..	..	..	..	..	..	..	..	19,513
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	75,322
..	..	..	..	..	..	..	..	..	..	..	..	81	..	..	15	15	25,658
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	40,342
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	27,482
..	460	330	..	47	117	..	461	..	..	86	190	126	850	..	174	174	2,10,242
(n) 1,451	7,396	183	..	1,948 (o) 3,403	5,195 9,075	..	..	..	..	..	..	..	..	..	..	..	35,952
(m) 1,665	7,678	1,156	..	2,116	5,643	..	..	..	..	..	..	..	..	..	..	..	34,016
(b) ..	472	60	..	251	502	..	..	..	..	..	..	..	..	..	..	..	..
(n) 20	1,718	..	..	329	987	..	..	..	..	..	..	..	..	..	..	..	45,514
..	..	..	..	(o) 4,452	11,472	..	..	..	..	..	..	..	..	..	..	..	17,863
..	..	..	..	..	..	..	..	..	..	..	..	190	..	..	95	95	29,172
..	..	..	..	(o) 8,885	23,693	..	..	..	..	..	..	..	..	..	..	..	40,690
3,031	17,162	1,399	..	2,1384	56,567	..	..	..	..	..	..	190	..	..	95	95	2,03,207

Note for Fourth Circle.—

1 buffalo = 2 cows = 4 sheep.

- (a) Rupee 1 per cow unit.
- (b) 3 annas per cow unit.
- (c) Panchayat fees.
- (d) 6 annas per cow unit.
- (e) 8 annas per cow, 12 annas per buffalo and 3 annas per sheep.
- (f) 4 annas per cow unit.
- (g) 9 annas per cow unit.
- (h) Grazing lease amount.

- (i) Grazing fees realized in Tanjore district.
- (j) Grazing assessment in the chitteris and Atur ka-royans.
- (k) Penning fees.
- (l) Added or subtracted to tally with Accountant-General's audited figures.
- (m) 12 annas a buffalo, 8 annas a cow and 4 annas a sheep.
- (n) 3 annas per cow unit.

Return of grazing in the

District.	Grazing on payment.									
	At enhanced or special rates					At full rates.				
	Buffaloes.	Cows and bullocks.	Goats and Sheep.	Other animals.	Fees received.	Buffaloes.	Cows and bullocks.	Goats and Sheep.	Other animals.	Fees received.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
<b>FIFTH CIRCLE.</b>										
					rs.					rs.
Kollegal .. ..	(a) 3,102	(a) 62,285	(a) 1,866	..	34,711	..	..	..	..	..
Coimbatore, North ..	(a) 4,522	(a) 69,163	(a) 20,799	..	44,303	..	..	..	..	..
	..	(b) 1,647	(b) 956	..	2,125					
Do South ..	(b) 73	(b) 305	..	..	(g) 1,831	..	..	..	..	..
	(a) 54	(a) 6,319	(a) 162	..	451					
Madura .. ..	(a) 216	(a) 4,502	(a) 2,843	(c) 270	(g) 485	..	..	..	..	..
	(a) 23	(a) 11,517	(a) 1,004	..	1,656					
Tinnevely .. ..	(a) 10	(a) 13,388	..	..	(g) 6,033	..	..	..	..	..
	(a) 427	(a) 9,970	(a) 3,601	..	10,056					
	..	..	..	..	(g) 2,780	131	5,561	16,045	..	2,596
Total ..	8,427	1,79,096	31,231	270	1,14,593	131	5,561	16,045	..	2,596
<b>SIXTH CIRCLE.</b>										
<i>Reserved forests.</i>										
Mangalore, North ..	(a) 1,261	12,351	..	..	5,420	..	..	..	..	..
Do. South ..	(a) 2,030	13,935	..	..	6,494	..	..	..	..	..
Wynaad .. ..	(b) 2,365	4,420	..	..	4,575	..	..	..	..	..
Nilambur .. ..	(c) ..	..	..	..	..	..	..	..	..	..
The Nilgiris .. ..	..	(b) 529	36	..	274	12,113	17,721	1,782	..	5,072
Palghat.. ..	..	(b) 625	180	..	715	(k) 158	(h) 106	..	..	(j) 92
	(d) 29	5,350	1,200	..	3,019	..	..	..	..	(j) 145
Total ..	5,685	37,240	1,416	..	20,497	12,271	17,827	1,782	..	12,751
<i>Reserved lands.</i>										
The Nilgiris .. ..	..	(b) 634	..	..	817	143	503	..	..	148
Total, VI Circle ..	5,685	37,874	1,416	..	20,814	12,414	18,330	1,782	..	12,899
Grand total, Presidency ..	42,142	422,139	120,743	270	3,18,908	52,575	494,842	455,066	..	4,47,093

Note for Fifth Circle.—

The figures given in columns 4, 9 and 11 denote sheep.

Full rates.—As. 6 per buffalo, As. 3 per cow or bullock and As. 1-6 per sheep.

- (a) Rs. 1 per buffalo, As. 3 per cow or bullock and As. 4 per sheep.
- (b) Rs. 2 per buffalo, Re. 1 per cow or bullock and As. 8 per sheep.
- (c) As. 8 per buffalo, As. 4 per cow or bullock, As. 2 per sheep and As. 4 per other animal.
- (d) Rs. 1-8-0 per buffalo, As. 12 per cow or bullock and As. 6 per sheep.
- (e) Sale-proceeds of fodder grass.
- (f) Value of permits exchanged.
- (g) Revenue from forests handed over to panchayat management.

Note for Sixth Circle.—

\* Full rates.—Buffaloes As. 6, cows As. 3 and sheep As. 1-6.

- (a) Buffaloes As. 10 and cows As. 6.
- (b) Buffaloes Re. 1, cows As. 8 and sheep As. 4.
- (c) No grazing allowed in the district.
- (d) Buffaloes Rs. 2, cows Re. 1 and sheep As. 8.
- (e) 2,750 cows for 2 days at 6 As. per 100 per day.
- 22,527 sheep for 2 days at 3 As. per 100 per day.
- 300 sheep for 3 days at do. do.
- 1,475 sheep for 1 day at do. do.
- (f) Lease amount of fodder grass.
- (g) Revenue from forests under panchayat management
- (h) Elephant.
- (k) Calves—half rates.



State forests during 1921-22--cont.

Number of animals.						Grazing free. Number of animals											Grand total of value at full rates.			
At privileged rates.						By right under settlement.					During pleasure of Government or otherwise than under settlement.					Total value of fees at full rates.				
Buffaloes. (12)	Cows and bullocks. (18)	Goats and Sheep. (14)	Other animals (15)	Fees received.		Buffaloes. (18)	Cows and bullocks. (19)	Goats and Sheep. (20)	Other animals. (21)	Value of fees at full rates (22)	Buffaloes. (23)	Cows and bullocks. (24)	Goats and Sheep. (25)	Other animals. (26)	Value of fees at full rates. (27)			Total value of fees at full rates. (28)		
				Actual. (16)	Value at full rates. (17)															
..	..	..	..	Rs.	Rs.	..	..	..	..	..	..	..	..	..	..	..	Rs.	Rs.	Rs.	
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	34,711
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	43,255
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	4,265
..	..	..	..	..	..	..	..	..	..	..	618	4,554	435	..	1,502	..	..	..	..	22,027
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	9,433
..	..	..	..	..	..	..	..	..	..	..	618	4,554	435	..	1,502	..	..	..	..	1,18,691
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	5,420
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	6,494
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	4,665
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	2,750	24,302	..	(e) 110	(e) 2,794	..	..	..	..	..	80	..	..	..	30	2,824	..	..	..	11,262
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	8,321
..	2,750	24,302	..	110	2,794	..	..	..	..	..	80	..	..	1	120	2,914	..	..	..	36,162
..	..	..	..	..	..	..	..	..	..	..	1,788	113	..	..	691	691	..	..	..	1,156
..	2,750	24,302	..	110	2,794	..	..	..	..	..	1,868	113	..	1	811	3,606	..	..	..	37,318
10,074	77,726	32,547	..	30,073	73,482	1754	2,881	5,700	..	5,745	7,944	57,259	1,326	1	14,363	20,108	..	..	..	8,54,591

Abstract of animals permitted to grazing on payment in reserved forests and reserved lands in the Presidency.

Circle.	Buffaloes.	Bullocks and cows.	Sheep.	Other animals.	Total.
First Circle	40,149	144,904	24,437	..	209,490
Second "	23,316	205,459	267,145	..	495,920
Third "	9,847	167,695	174,588	..	361,630
Fourth "	5,322	233,038	67,410	..	305,770
Fifth "	8,568	184,657	47,276	270	240,761
Sixth "	18,099	53,954	27,500	..	104,553
Grand total	104,791	994,707	608,356	270	1,708,124

## ANNUAL FORM No. 75.

Forest Department, Madras Presidency.

Area under artificial reproduction, 1921-22.

District.	Area in acres.				Expenditure during the year.		Total expenditure from commencement.		Revenue during the year.	Total revenue from date of creation of plantation.
	On 1st April 1921.	Added during the year.	Excluded during the year.	Area on 31st March 1922.	Creation.	Upkeep.	Creation.	Upkeep.		

## FIRST CIRCLE.

## A.—Regular Plantations.

	ACS.	ACS.	ACS.	ACS.	RS.	RS.	RS.	RS.	RS.	RS.
Visagapatam ..	51	..	..	51	..	120	2	(a) 2,208	75	(a) 5,189
Godavari, Lower ..	114	..	38	76	..	72	31,150	15,645	5,048	(a) 84,983
Kistna ..	39	..	5	34	..	114	1,785	7,732	562	4,215
Total ..	204	..	43	161	..	306	32,887	25,583	5,685	94,387

## B.—Taungya Plantations.

Ganjam ..	2	..	..	2	..	..	3	..	..	..
Godavari, Upper ..	43	74	..	117	423	..	659	..	..	..
Total ..	45	74	..	119	423	..	662	..	..	..

## C.—Cultural Operations.

Ganjam ..	111	10	..	121	200	202	275	896	..	..
Visagapatam ..	28	11	23	16	6	..	(b) 226	..	..	..
Godavari, Upper ..	22	2	..	24	9	1	110	1	..	..
Do. Lower ..	2,553	56	..	2,609	218	..	3,024	1,022	..	..
Kistna ..	102	10	8	104	127	94	706	152	..	719
Total ..	2,816	89	31	2,874	560	297	4,841	2,081	..	719
Grand total ..	3,065	163	74	3,154	933	603	37,890	27,664	5,685	95,106

## SECOND CIRCLE.

## A.—Regular Plantations.

Bellary ..	579	..	..	579	..	260	9,423	63,346	191	6,765
Guntur ..	569	..	419	150	..	..	(c) 11,195	(c) 7,866	1,368	(c) 6,155
Kurnool, East ..	130	..	..	130	..	..	38,471	26,045	..	..
Do. West ..	1,430	..	..	1,430	..	909	2,94,254	67,681	637	19,240
Total ..	2,708	..	419	2,289	..	1,169	3,51,343	1,64,838	2,196	32,160

## B.—Taungya Plantations—Nil.

## C.—Cultural Plantations.

Bellary ..	6,790	..	..	6,790	..	..	27,981	3,008	..	..
Anantapur ..	140	28	8	160	135	..	(d) 498	80	..	..
Guntur ..	..	..	..	..	..	..	1,844	6	..	..
Kurnool, East ..	536	195	..	731	807	..	11,752	3,561	..	..
Do. South ..	527	..	..	527	165	..	5,465	1,765	..	..
Do. West ..	5,302	706	..	6,008	1,532	615	(e) 25,006	3,757	..	..
Total ..	13,295	929	8	14,216	2,639	615	72,546	12,175	..	..

## THIRD CIRCLE.

## A.—Regular Plantations.

Cuddapah, North ..	10	..	..	10	..	..	560	..	..	..
Do. South ..	38	..	..	38	..	237	23	(f) 1,258	1,714	6,852
Do. West ..	..	..	..	..	..	..	..	..	..	..
Nellore ..	1,680	..	..	1,680	..	45	1,56,709	17,299	23,395	3,07,139
Chingleput ..	..	..	..	..	..	..	..	..	..	..
Chittoor ..	61	..	..	61	..	508	..	2,546	..	51
Vellore, North ..	325	..	..	325	..	1,701	24,287	1,42,052	2,024	94,186
Total ..	2,114	..	..	2,114	..	2,491	1,81,579	1,63,155	26,133	4,08,228

(a) Revised figures furnished by the District Forest Officer.

(b) Excludes figures on areas abandoned.

(c) The figures shown in columns 8, 9 and 10 exclude amounts relating to the areas excluded last year.

(d) Revised figures (due to wrong totals reported in 1920-21).

(e) Wrong total last year.

(f) Revised figure.

Area under artificial reproduction, 1921-22—cont.

District.	Area in acres.				Expenditure during the year.		Total expenditure from commencement.		Revenue during the year.	Total revenue from date of creation of plantation.
	On 1st April 1921.	Added during the year.	Excluded during the year.	Area on 31st March 1922.	Creation.	Upkeep.	Creation.	Upkeep.		

THIRD CIRCLE—cont.

B.—Taungya Plantations—Nil.

O.—Cultural Operations.

	ACS.	ACS.	ACS.	ACS.	RS.	RS.	RS.	RS.	RS.	RS.
Cuddapah, North ..	..	..	..	..	..	..	..	..	..	..
Do. South ..	51	..	(a) 51	..	..	..	..	..	..	..
Do. West ..	..	..	..	..	..	..	..	..	..	..
Nellore ..	(b) 416	..	..	416	..	..	2,767	..	..	..
Chingleput ..	..	..	..	..	..	..	..	..	..	..
Chittoor ..	4,539	1,480	239	5,780	2,504	603	(b) 4,990	(b) 1,524	..	..
Vellore, North ..	1,537	129	..	1,666	795	..	1,734	154	..	579
Total ..	6,543	1,609	290	7,862	3,299	603	9,491	1,678	..	579
Grand total ..	8,667	1,609	290	9,976	3,299	3,094	1,91,070	1,64,833	26,133	4,08,807

FOURTH CIRCLE.

A.—Regular Plantations.

Vellore, South ..	92	5	..	97	178	510	3,102	1,203	40	5,680
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B.—Taungya Plantations.

Vellore, South ..	8	..	..	8	..	..	50	..	..	..
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O.—Cultural Operations.

Vellore, South ..	23,127	3,927	..	27,054	289	..	1,502	..	..	..
Do. West ..	1,141	..	..	1,141	..	..	137	..	..	..
Salem, East ..	13,919	645	..	14,464	207	39	3,389	3,572	..	..
Do. Central ..	1,563	668	50	2,181	342	141	10,136	544	..	..
Do. South ..	302	..	302	..	..	..	63	..	..	..
Total ..	40,052	5,140	352	44,840	838	180	15,227	4,116	..	..
Grand total ..	40,152	5,145	352	44,945	1,016	690	18,379	5,319	40	5,680

FIFTH CIRCLE.

A.—Regular Plantations.

Coimbatore, South ..	81	133	..	214	2,141	1,086	3,510	1,861	..	..
Madura ..	1,446	69	..	1,515	2,473	164	67,021	8,867	87	9,611
Tinnevely ..	5,362	..	..	5,362	9	44	7,929	3,292	2,725	24,605
Total ..	6,889	202	..	7,091	4,623	1,294	78,460	14,020	2,812	34,216

B.—Taungya Plantations.

Tinnevely ..	23	..	..	23	..	99	47	237	..	..
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O.—Cultural Operations.

Kollegal ..	363	(a) 121	..	484	..	..	1,003	196	..	..
Coimbatore, North ..	1,044	12	(a) 121	935	158	135	3,001	983	..	..
Do. South ..	46	5	..	51	140	27	(a) 391	(d) 161	..	..
Tinnevely ..	4,599	311	..	4,910	1,454	466	7,232	7,199	60	215
Total ..	6,052	449	121	6,380	1,752	628	11,635	8,489	60	215
Grand total ..	12,964	651	121	13,494	6,375	2,021	96,142	22,746	2,872	34,431

SIXTH CIRCLE.

A.—Regular Plantations.

Mangalore, North ..	..	..	..	..	..	..	..	..	..	..
Do. South ..	52	..	..	52	..	..	10,357	..	..	516
Wynaad ..	379	14	..	393	552	858	(a) 16,543	21,884	1,035	15,696
Nilambur ..	6,881	21	..	6,902	7,795	6,040	5,88,393	5,79,629	2,64,222	41,64,727
The Nilgiris ..	1,743	92	..	1,835	3,551	701	10,013	3,15,467	33,137	8,91,052
Palghat ..	..	..	..	..	..	..	..	..	..	..
Total ..	9,055	127	..	9,182	11,905	7,599	6,30,306	9,16,980	2,98,394	50,71,991

(a) Burnt by forest fires. (b) Revised figure.  
 (c) Particulars relating to Bargur range transferred from North Cambatore to Kollegal.  
 (d) Rs. 36 expenditure under creation was wrongly included by the District Forest Officer under cost of upkeep in the return of last year.  
 (e) Revised figure furnished by the District Forest Officer.

## Area under artificial reproduction, 1921-22—cont.

District.	Area in acres.				Expenditure during the year.		Total expenditure from commencement.		Revenue during the year.	Total revenue from date of creation of plantation.
	On 1st April 1921.	Added during the year.	Excluded during the year.	Area on 31st March 1922.	Creation.	Upkeep.	Creation.	Upkeep.		
<b>SIXTH CIRCLE—cont.</b>										
<i>B. Taungya Plantations.</i>										
Mangalore, South ..	ACS. 57	ACS. ..	ACS. ..	ACS. 57	RS. ..	RS. 75	RS. 37	RS. 75	..	..
Wynaad ..	635	..	..	635	..	..	..	10,895	..	..
The Nilgiris ..	32	..	..	32	..	338	504	4,771	..	..
Palghat ..	54	..	..	54	..	105	..	234	..	..
Total ..	778	..	..	778	..	518	541	15,975	..	..
<i>C. Cultural Operations.</i>										
Mangalore, North ..	583	1,270	143	1,710	1,839	93	3,410	107	..	..
Do. South ..	1,069	610	..	1,679	1,974	1,018	5,998	1,618	..	..
Wynaad ..	4,602	15	..	4,617	804	..	5,608	8,598	..	..
Nilambur ..	..	..	..	..	..	..	..	..	..	..
The Nilgiris ..	45	..	..	45	797	18	1,024	18	..	..
Palghat ..	583	217	242	558	6,813	164	* 10,720	1,361	..	..
Total ..	6,882	2,112	885	8,609	12,227	1,293	26,760	11,102	..	..
Grand total, Regular Plantations.	21,062	334	462	20,934	16,709	13,369	12,67,677	12,85,779	3,35,260	56,46,662
Taungya Plantations.	854	74	..	928	423	617	1,300	16,212	..	..
Cultural Operations.	75,640	10,328	1,187	84,781	21,315	3,616	1,40,000	39,641	60	1,518
Grand total for the Presidency.	97,556	10,736	1,649	106,643	38,447	17,602	14,08,977	13,41,632	3,35,320	56,48,175

\* Excludes Rs. 167 on account of 242 acres excluded during the year.

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ANNUAL FORM No. 76.

*Forest Department, Madras Presidency.*

Outturn (in thousands of cubic feet solid) of timber and fuel during the year 1921-22  
and agency of exploitation.

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## Outturn (in thousands of cubic feet solid) of timber and fuel

Division.	Timber in the rough logs.					Timber in the rough poles.					Sawn or square timber.				
	Government.	Purchasers.	Free-grantees.	Right-holders.	Total.	Government.	Purchasers.	Free-grantees.	Right-holders.	Total.	Government.	Purchasers.	Free-grantees.	Right-holders.	Total.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
(In thousands of cubic feet.)															
FIRST															
I. Reserved															
Ganjam .. .. .	185	84	22	..	291	8	81	..	..	39	..	..	4	..	4
Vizagapatam .. .. .	1	1	..	..	2	..	2	..	..	2	..	..	..	..	..
Godavari, Upper .. .. .	10	..	..	..	10	2	..	..	..	2	..	..	..	..	..
Do. Lower .. .. .	6	36	..	..	42	..	..	..	..	..	..	..	..	..	..
Kistna .. .. .	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Total .. .. .	202	121	22	..	345	10	33	..	..	43	..	..	4	..	4
II. Leased															
III. Reserved															
IV. Unreserved															
Ganjam .. .. .	3	30	6	..	39	..	..	..	..	..	..	..	..	..	..
Vizagapatam .. .. .	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Godavari, Upper .. .. .	10	1	..	..	11	1	10	..	..	11	..	..	..	..	..
Do. Lower .. .. .	..	105	20	..	125	..	1	..	..	1	..	5	..	..	5
Kistna .. .. .	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Total .. .. .	13	136	26	..	175	1	11	..	..	12	..	5	..	..	5
Grand total .. .. .	215	257	48	..	520	11	44	..	..	55	..	5	4	..	9
SECOND															
I. Reserved															
Bellary .. .. .	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Anantapur .. .. .	..	22	..	..	22	..	..	..	..	..	..	..	..	..	..
Guntur .. .. .	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Kurnool, East .. .. .	2	3	..	..	5	1	..	1	..	2	6	..	..	..	6
Do. South .. .. .	4	67	..	..	71	1	10	1	..	12	..	..	..	..	..
Do. West † .. .. .	16	..	..	..	16	80	..	3	..	83	2	..	..	..	2
Total .. .. .	22	92	..	..	114	82	10	5	..	97	8	..	..	..	8
II. Leased															
III. Reserved															
IV. Unreserved															
Bellary .. .. .	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Bellary .. .. .	..	..	..	..	..	..	35	..	..	35	..	..	..	..	..
Anantapur .. .. .	..	118	4	..	117	..	..	..	..	..	..	..	..	..	..
Guntur .. .. .	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Kurnool, East .. .. .	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Do. South .. .. .	..	62	..	..	62	..	..	..	..	..	..	..	..	..	..
Do. West § .. .. .	..	71	..	..	71	..	..	..	..	..	..	..	..	..	..
Total .. .. .	..	246	4	..	250	..	35	..	..	35	..	..	..	..	..
Grand total .. .. .	22	338	4	..	364	82	45	5	..	132	8	..	..	..	8
THIRD															
I. Reserved															
Cuddapah, North .. .. .	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Do. South .. .. .	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Do. West .. .. .	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Nellore .. .. .	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Chingleput .. .. .	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Chittoor .. .. .	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Vellore, North .. .. .	..	2	..	..	3	..	..	..	..	..	..	..	..	..	..
Total .. .. .	..	3	..	..	3	..	..	..	..	..	..	..	..	..	..

## Note for the First Circle.

REMARKS.—The figures are actuals except in the following cases:—

- (1) Ganjam—Unreserved lands—Column 3.—This includes an estimated quantity of 10,160 cubic feet arrived at by conversion of value at 20 cubic feet per rupee realised by the Revenue department.
- (2) Godavari, Lower—Unreserved lands—Column 3.—This includes 25,000 cubic feet of timber obtained by conversion of sale amount into outturn at one cubic foot per one anna.
- (3) Kistna—Unreserved lands—Column 3.—Estimate calculated at one cubic foot per one anna on the value realised and two annas per cubic foot in case of palmyra trees granted free.

## Note for Second Circle.

- (1) Bellary—The figure in column 8 under "Unreserved lands" is an estimate worked on the revenue under II (a) from unreserved lands. Two-thirds of the revenue was taken to first class timber and one-third to second class timber and the quantity in cubic feet was arrived at by calculating at Re. 0-4-0 per cubic foot for the former and Re. 0-2-0 per cubic foot for the latter as was done in previous years.
- (2) Anantapur.—Timber is taken at Re. 2-8-0 a cart-load = 20 cubic feet and fuel at Re. 1-4-0 a cart-load = 40 cubic feet.

\* Actuals furnished from coupe contractor's accounts.  
 (a) Actuals estimates.

† Actuals.

‡ Actuals from coupe contractor's accounts.

§ Compiled from taluk chitta figures.

FORM No. 76.

Madras Presidency.

during the year 1921-22 and agency of exploitation.

Miscellaneous.					Total timber.					Fuel.					Total outturn.
Government.	Purchasers.	Free-grantees.	Right-holders.	Total.	Government.	Purchasers.	Free-grantees.	Right-holders.	Total.	Government.	Purchasers.	Free-grantees.	Right-holders.	Total.	
(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)	(25)	(26)	(27)	(28)	(29)	(30)	(31)	(32)

CIRCLE.

Forests. (In thousands of cubic feet.)

..	..	..	..	..	193	115	26	..	334	135	233	81	..	449	783
7	..	..	..	7	1	3	..	..	4	4	179	..	..	183	187
..	..	..	..	..	19	..	..	..	19	..	..	..	..	..	19
..	..	..	..	1	6	36	..	..	42	23	1,297	..	..	1,320	1,362
..	1	..	..	..	..	1	..	..	1	11	484	..	..	495	496
7	1	..	..	8	219	155	26	..	400	173	2,193	81	..	2,447	2,847

Forests—Nil.

Lands—Nil.

Lands.

..	..	..	..	..	3	30	6	..	39	2	128	..	..	130	169
1	41	1	..	43	1	41	1	..	43	..	31	..	..	31	74
6	15	4	..	25	17	26	4	..	47	5	40	..	..	45	92
..	..	..	..	..	..	111	20	..	131	2	729	..	..	731	862
..	35	30	..	65	..	35	30	..	65	..	86	..	..	86	151
7	91	35	..	133	21	243	61	..	325	9	1,014	..	..	1,023	1,348
14	92	35	..	141	240	398	87	..	725	182	3,207	81	..	3,470	4,195

CIRCLE.

Forests.

..	..	..	..	..	..	..	..	..	..	16	208	..	..	224	224
1	12	..	..	13	1	22	..	..	22	..	76	..	..	76	98
..	..	..	..	..	9	12	..	..	13	5	140	..	..	145	158
..	..	..	..	..	6	3	1	..	13	64	3	..	..	67	80
1	..	1	..	2	6	77	2	..	85	..	102	..	..	102	187
..	..	..	..	..	98	..	3	..	101	1,863	46	..	..	1,909	2,010
2	12	1	..	15	114	114	6	..	234	1,948	575	..	..	2,523	2,757

Forests—Nil.

Lands.

Lands.

..	..	..	..	..	..	..	..	..	..	..	9	..	..	9	9
..	..	..	..	..	..	35	..	..	35	..	128	..	..	128	163
..	..	..	..	..	..	113	4	..	117	..	68	..	..	68	185
..	40	(a) 8	..	48	..	40	8	..	48	..	130	..	..	180	178
..	11	2	..	13	..	11	2	..	13	..	5	..	..	5	18
..	..	..	..	..	..	62	..	..	62	..	33	..	..	33	95
..	..	..	..	..	..	71	..	..	71	..	30	..	..	30	101
..	51	10	..	61	..	333	14	..	346	..	394	..	..	394	740
2	63	11	..	76	114	446	20	..	580	1,948	978	..	..	2,926	3,506

CIRCLE.

Forests.

1	40	..	..	41	1	40	..	..	41	..	728	..	..	728	769
5	82	3	..	40	5	32	3	..	40	73	1,178	..	..	1,251	1,291
1	18	8	..	27	1	18	8	..	27	2	513	..	..	515	542
1	..	..	..	1	1	..	..	..	1	20	1,652	..	..	1,672	1,673
..	..	..	..	..	..	..	..	..	..	1	139	..	..	140	140
1	52	..	..	53	1	52	..	..	53	51	938	..	..	992	1,045
..	..	..	..	..	..	3	..	..	3	2	204	..	..	206	209
9	112	11	..	162	9	145	11	..	165	152	5,352	..	..	5,504	5,839

Note for the Third Circle.

Ouddapah, West.— { Reserved forests.—Actuals.  
 Unreserved lands.—Estimated at 1 anna per cubic foot of timber and 3 pies per cubic foot of dead wood.

Ohinglogut.— { Reserved forests.—Actuals.  
 Unreserved lands.—Free grants of timbers are actuals. Timber and fuel by purchasers are based on money value.

Vallora, North.— { Timber.—Re. 0-2-0 per cubic foot.  
 Fuel.—Re. 0-1-0 do.  
 Palmyra tree.—25 = cubic feet.

Outdoor.—All figures in this statement except those under purchasers' Timber and fuel against unreserves are actuals. The excepted items are estimates calculated on the money value obtained from sale of trees on darkhast lands at 1 anna per cubic foot of timber and 3 pies per cubic foot of fuel.

Outturn (in thousands of cubic feet, solid) of timber and fuel

Division.	Timber in the rough logs.					Timber in the rough poles.					Sawn or square timber.				
	Government.	Purchasers.	Free-grantees.	Right-holders.	Total.	Government.	Purchasers.	Free-grantees.	Right-holders.	Total.	Government.	Purchasers.	Free-grantees.	Right-holders.	Total.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)

(In thousands of cubic feet.)

																THIRD
																II. Leased
																III. Reserved
																IV. Unreserved
Cuddapah, North ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Do. South ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Do. West ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Nellore ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Chingleput ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Chittoor ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Vellore, North ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Total ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Grand total ..	..	3	..	..	3	..	..	..	..	..	..	..	..	..	..	..

																FOURTH
																I. Reserved
Vellore, South ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Do. West ..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Salem, East ..	..	..	6	..	..	..	..	..	..	..	..	..	..	..	..	..
Do. North ..	..	..	..	..	..	..	..	..	..	..	6	..	..	..	..	6
Do. Central ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Do. South ..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	1
Total ..	1	6	..	..	7	..	..	..	..	..	7	..	..	..	..	7

																FOURTH
																II. Leased
																III. Reserved
																IV. Unreserved
Vellore, South ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Do. West ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Salem, East ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Do. North ..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	1
Do. Central ..	..	..	..	..	..	..	..	1	1	..	2	..	..	..	..	..
Do. South ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Total ..	..	..	..	..	..	..	1	1	..	2	1	..	..	..	..	1
Grand total ..	1	6	..	..	7	..	1	1	..	2	8	..	..	..	..	8

																FIFTH
																I. Reserved
Kollegal ..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Coimbatore, North ..	..	2	..	..	..	..	..	..	..	..	7	..	..	..	..	7
Do. South ..	..	6	..	..	..	..	..	..	..	..	28	2	..	..	..	30
Madura ..	..	4	..	..	..	..	..	..	..	..	..	1	..	..	..	1
Tinnevely ..	..	..	33	..	..	..	2	..	..	2	..	..	..	..	..	..
Total ..	13	33	..	..	46	..	2	..	..	2	35	3	..	..	..	38

																II. Leased
																III. Reserved
																IV. Unreserved
Coimbatore, South ..	117	..	..	..	117	..	..	..	..	..	..	..	..	..	..	..

																FIFTH
																I. Reserved
Kollegal ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Coimbatore, North ..	..	..	42	..	..	..	..	..	..	..	..	..	..	..	..	..
Madura ..	..	..	..	11	..	..	..	..	..	..	..	..	..	..	..	..
Tinnevely ..	..	..	7	..	..	..	..	..	..	..	..	..	..	..	..	..
Total ..	..	49	11	..	60	..	..	..	..	..	..	..	..	..	..	..
Grand total ..	130	82	11	..	223	..	2	..	..	2	35	3	..	..	..	38

Notes for the Fourth Circle.

Removals by Government Agency.—Actuals.  
(Sandalwood—Factor of conversion 1 ton = 40 cubic feet.)

Free grants—Actuals.

Purchasers—timber and fuel.—Estimate based on money value collected.

Notes for the Fifth Circle.

Reserved and leased forests.—The figures given are actuals.

Unreserved lands.—Estimate based on money value collected.



during the year 1921-22 and agency of exploitation--cont.

Miscellaneous.					Total timber.					Fuel.					Total outputs.
Government.	Purchasers.	Free-grantees.	Right-holders.	Total.	Government.	Purchasers.	Free-grantees.	Right-holders.	Total.	Government.	Purchasers.	Free-grantees.	Right-holders.	Total.	
(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)	(25)	(26)	(27)	(28)	(29)	(30)	(31)	(32)

CIRCLE--cont.

Forests--Nil.

(In thousands of cubic feet.)

Lands--Nil.

Lands.

..	2	..	..	2	..	2	..	..	2	..	82	..	..	82	84
..	2	..	..	2	..	2	..	..	2	..	4	..	..	4	6
..	24	..	..	24	..	24	..	..	24	..	430	..	..	430	464
..	55	8	..	63	..	55	8	..	63	..	47	..	..	47	110
..	37	3	..	40	..	37	3	..	40	..	229	..	..	229	269
..	241	14	..	255	..	241	14	..	255	..	543	..	..	543	798
..	126	23	..	149	..	126	23	..	149	..	65	..	..	65	212
..	487	48	..	535	..	487	48	..	535	..	1,398	..	..	1,398	1,983
9	629	59	..	697	9	632	59	..	700	152	6,750	..	..	6,902	7,602

CIRCLE.

Forests.

3	5	..	..	8	3	5	..	..	8	1	248	..	..	249	257
2	..	..	..	2	3	6	..	..	9	1	96	..	..	97	103
1	..	..	..	1	1	..	..	..	1	..	97	..	..	97	98
..	..	..	..	..	6	..	..	..	6	1	54	..	..	55	41
..	..	..	..	..	..	..	..	..	..	..	90	..	..	90	90
..	1	..	..	1	1	1	..	..	2	8	185	..	..	193	195
6	6	..	..	12	14	12	..	..	26	11	770	..	..	781	807

Forests--Nil.

Lands--Nil.

Lands.

..	106	5	..	111	..	106	5	..	111	..	57	..	..	57	168
..	23	1	..	24	..	23	1	..	24	..	8	..	..	8	82
..	159	2	..	161	..	159	2	..	161	..	186	..	..	186	347
..	51	11	..	62	..	51	11	..	63	..	64	..	..	64	127
..	85	..	..	85	..	85	..	..	87	..	13	..	..	13	100
..	243	2	..	245	..	243	2	..	245	..	122	..	..	122	367
..	667	21	..	688	1	668	22	..	691	..	450	..	..	450	1,141
6	673	21	..	700	15	680	22	..	717	11	1,220	..	..	1,231	1,948

CIRCLE.

Forests.

2	1	..	..	3	3	1	..	..	4	..	262	..	..	262	266
..	..	..	..	..	9	..	..	..	9	..	692	..	..	692	701
2	2	..	..	4	86	4	..	..	40	..	823	..	..	823	363
..	18	..	..	18	4	18	..	..	22	3	579	..	..	582	604
..	..	..	..	..	..	36	..	..	36	3	538	..	..	541	577
4	21	..	..	25	52	59	..	..	111	6	2,394	..	..	2,400	2,511

Forests.

..	..	..	..	..	117	..	..	..	117	..	..	..	..	..	117
----	----	----	----	----	-----	----	----	----	-----	----	----	----	----	----	-----

Lands--Nil.

Lands.

..	254	..	..	254	..	254	..	..	254	..	7	..	..	7	261
..	..	..	..	..	..	42	..	..	42	..	22	..	..	22	64
..	232	1	..	233	..	232	1	..	233	..	112	..	..	112	345
..	..	..	..	..	..	7	11	..	18	..	77	3	..	80	98
..	486	1	..	487	..	485	12	..	547	..	218	3	..	221	763
4	507	1	..	512	169	594	13	..	775	6	2,612	3	..	2,621	3,396

Outturn (in thousands of cubic feet solid) of timber and fuel

Division (1)	Timber in the rough logs.					Timber in the rough poles.					Sawn or square timber.				
	Government. (2)	Purchasers. (3)	Free-grantees. (4)	Right-holders. (5)	Total. (6)	Government. (7)	Purchasers. (8)	Free-grantees. (9)	Right-holders. (10)	Total. (11)	Government. (12)	Purchasers. (13)	Free-grantees. (14)	Right-holders. (15)	Total. (16)
(In thousands of cubic feet.)															
SIXTH															
I. Reserved															
Mangalore, North ..	25	..	..	..	25	..	..	..	..	..	..	..	..	..	..
Do. South ..	21	1	..	..	22	..	..	..	..	..	2	..	..	..	2
Wynad ..	..	..	..	..	..	4	..	..	..	4	77	30	..	..	107
Nilambur (a) ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
The Nilgiris ..	..	..	..	..	..	..	1	..	..	1	..	..	..	..	..
Palghat ..	103	8	..	..	111	..	..	..	..	..	..	..	..	..	..
Total ..	149	9	..	..	158	4	1	..	..	5	79	30	..	..	109
II. Leased															
Nilambur (a) ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
III. Reserved															
The Nilgiris ..	..	..	..	..	..	49	..	..	..	49	5	..	..	..	5
IV. Unreserved															
Mangalore, North ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Do. South ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Wynad ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Nilambur (a) ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
The Nilgiris ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Palghat ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Total ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Total, VI Circle ..	149	9	..	..	158	53	1	..	..	54	84	30	..	..	114
Grand Total, Presidency.	617	695	63	..	1,275	146	93	6	..	245	135	38	4	..	177

Notes for Sixth Circle.

Reserved forests and lands :—

Government Agency.—Actuals.

Purchasers—Timber.—Actuals. Fuel based on contractor's accounts.

Unreserved lands.—Estimates based on money value.

(a) Figures not available, owing to the destruction of records during the Mappilla rebellion.

during the year 1921-22 and agency of exploitation—cont.

Miscellaneous.					Total timber.					Fuel.					Total output.
Government.	Purchasers.	Free-grantees.	Right-holders.	Total.	Government.	Purchasers.	Free-grantees.	Right-holders.	Total.	Government.	Purchasers.	Free-grantees.	Right-holders.	Total.	
(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)	(25)	(26)	(27)	(28)	(29)	(30)	(31)	(32)

CIRCLE.

Forests.

(In thousands of cubic feet).

..	..	..	..	..	25	..	..	..	25	64	470	..	..	534	559
..	..	..	..	..	23	1	..	..	24	138	43	..	..	179	203
..	8	..	..	8	81	28	..	..	119	..	..	..	..	..	119
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	5	..	..	5	..	6	..	..	6	390	198	..	..	588	594
..	..	..	..	..	103	8	..	..	111	70	543	..	..	613	724
..	18	..	..	13	232	53	..	..	285	660	1,254	..	..	1,914	2,199

Forests.

..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	1	..	..	1	54	1	..	..	55	..	..	..	..	..	55

Lands.

..	359	1	15	875	..	359	1	15	375	..	286	..	..	286	661
..	45	..	3	48	..	45	..	3	48	..	32	..	..	32	80
..	18	..	..	13	..	13	..	..	13	..	6	..	..	6	19
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	6	..	..	6	..	6	..	..	6	..	12	..	..	12	18
..	40	1	..	41	..	40	1	..	41	..	80	..	..	80	121
..	463	2	18	483	..	463	2	18	483	..	416	..	..	416	899
..	477	2	18	497	286	517	2	18	823	640	1,670	..	..	2,330	3,153
35	2,441	129	18	2,623	833	3,267	202	18	4,320	2,959	16,437	84	..	19,480	23,800

ANNUAL REPORT OF THE

ANNUAL FORM No. 77.

Forest Department, Madras Presidency.

Outturn of minor forest produce during the year 1921-22.

Circle.	Description of produce.	Produce removed or utilized					Total.
		By Government agency.	By purchasers.	By free grantees.	By right-holders.		
		Quantity.	Value.	Value.	Value.	Value.	
	<i>Reserved Forests.</i>	no.	rs.	rs.	rs.	rs.	rs.
	Bamboos .. .. .	23,531	554	52,390	290	..	53,174
	Grazing and fodder grass ..	..	..	41,654	11,781	692	54,027
	<i>Other produce.</i>	qrs.					
	Grass (hay, thatch, korai, etc.)	4,190	25	675	..	..	700
	Tamarind, soapnuts, galnuts, nux-vomica, shekoi, etc.	24	27	3,796	..	500	4,323
	Horns, honey, wax, resin, gum, skins, etc.	..	..	513	..	..	513
	Tangedu, etc., barks and fibres.	32	..	1,560	..	..	1,560
	Stone, gravel, earth, etc. ..	35,286	69	731	..	..	800
	Leaves for platter .. .. .	..	..	1	..	..	1
	Date and palmyra leaves, stalks, etc.	..	..	19	..	..	19
	Miscellaneous including tree-tapping and tree-owners' fees.	75	2	14,464	..	..	14,466
	Total, minor produce ..	39,537	123	21,759	..	600	22,382
	Total, Reserved forests ..	..	677	1,15,803	12,011	1,092	1,29,583
	<i>Reserved lands.</i>	no.					
	Bamboos .. .. .	400	2	78	..	..	72
	Grazing and fodder grass ..	..	..	1,112	..	..	1,112
	<i>Other produce.</i>	qrs.					
	Grass (hay, thatch, korai, etc.)	..	..	1	..	..	1
	Miscellaneous including tree-tapping and tree-owner's fees.	..	..	26	..	..	26
	Total, minor produce ..	..	..	27	..	..	27
	Total, Reserved lands ..	..	2	1,209	..	..	1,211
	<i>Unreserved lands.</i>	no.					
	Bamboos .. .. .	6,615	64	32,930	121	..	33,115
	Grazing and fodder grass ..	..	..	9,466	..	..	9,466
	<i>Other produce.</i>	qrs.					
	Grass (tharbi, korai, etc.) ..	5,612	21	499	..	..	520
	Tamarind, soapnuts, galnuts, nux-vomica, shekoi, etc.	358	361	22,776	..	..	23,137
	Horns, honey, wax, resin, skins, etc.	..	..	496	..	..	496
	Tangedu, etc., barks and fibres.	..	..	1,196	..	..	1,196
	Stone, gravel, earth, etc. ..	337,204	459	1,280	..	..	1,789
	Leaves for platters .. .. .	..	..	380	..	..	380
	Date and palmyra leaves, stalks, etc.	..	..	30	64	..	94
	Manure leaves and thorns ..	400	1	6	..	..	7
	Miscellaneous, including tree-tapping and tree-owners' fees.	196	7	24,164	..	..	24,171
	Total, minor produce ..	343,770	849	50,827	64	..	51,740
	Total, Unreserved lands ..	..	913	93,223	185	..	94,321
	<i>Abstract for the circle.</i>						
	Bamboos in number .. .. .	30,546	620	85,390	351	..	85,361
	Grazing and fodder grass ..	..	..	52,232	11,781	592	64,605
	Other produce in quarters ..	383,307	973	72,613	64	500	74,149
	Grand total, First Circle ..	..	1,592	2,10,235	12,196	1,092	2,25,115

First Circle

Outturn of minor forest produce during the year 1921-22—cont.

Circle.	Description of produce.	Produce removed or utilized					Total.	
		By Government agency.		By purcha-sers.	By free grantees.	By right-holders.		
		Quan-tity.	Value.	Value.	Value.	Value.		
Second Circle	Bamboos .. .. .	no.	rs.	rs.	rs.	rs.	rs.	
		639,612	12,181	34,662	163	..	47,006	
	Grazing and fodder grass ..	qrs.	..	2,09,989	..	5,067	2,15,056	
	Grass (hay, thatch and grass) ..	..	..	1,840	30	..	1,870	
	Tamarind, soapnuts and nux-vomica.	1,610	1,894	15,295	..	..	17,189	
	Stone, gravel and earth ..	..	..	2,045	..	..	2,045	
	Date, palmyra and platter leaves.	1,023	282	617	3,659	..	4,558	
	Manure leaves and thorns ..	..	..	2,382	..	..	2,382	
	Thumhari leaves .. .. .	..	..	420	..	..	420	
	Honey, wax, resin, gum, and galnuts.	..	..	532	..	..	532	
	Tangeda bark, fibre and seeds ..	26	3	90,310	..	..	90,313	
Miscellaneous, including tree-tapping fees and amarol.	9,728	8,033	80,674	..	..	88,707		
Total ..	12,337	10,212	1,94,115	3,689	..	2,08,016		
Third Circle	Bamboos .. .. .	no.	rs.	rs.	rs.	rs.	rs.	
		14,296	133	27,859	892	..	28,384	
	Grazing and fodder grass ..	qrs.	..	2,09,912	174	86	2,10,172	
	Grass (thatch, korai, etc.) ..	qrs.	2,451	225	527	10	..	762
	Honey, wax, etc. .. .. .	..	..	..	..	..	..	
	Tangeda, etc., barks .. .. .	50	263	26,200	..	..	26,463	
	Date, palmyra and leaves ..	..	..	2,246	652	..	2,898	
	Stones, gravel and earth ..	..	..	6,308	108	..	6,416	
	Manure leaves, tooki and plate leaves, etc.	..	..	14,899	..	..	14,899	
	Tamarind, soapnuts and nux-vomica.	11,558	63,264	35,300	..	..	98,564	
	Other miscellaneous produce, including tree-owners' fees.	2,272	4,518	59,200	..	..	63,718	
Total ..	16,331	68,270	1,44,680	770	..	2,13,720		
Total of grass and grazing and minor produce.	no.	16,331	68,270	3,54,592	944	86	4,23,892	
Fourth Circle	Bamboos .. .. .	no.	rs.	rs.	rs.	rs.	rs.	
		1,645	588	1,03,076	24	..	1,03,688	
	Grass and grazing .. .. .	..	..	1,67,929	95	..	1,68,024	
	Grass (thatch, korai, etc.) ..	qrs.	15	19	2,919	..	..	2,938
	Tamarind, soapnuts, galnuts, nux-vomica, etc.	..	..	23,165	..	..	23,165	
	Avaram, vembadam, barks ..	..	..	25,995	..	..	25,995	
	Stone, gravel earth, etc. ..	..	..	7,042	..	..	7,042	
	Manure leaves, etc. .. .. .	..	..	30,090	..	..	30,090	
	Date, palmyra, etc., leaves ..	..	..	1,416	11	..	1,427	
	Honey, wax, etc. .. .. .	..	..	50	..	..	50	
	Miscellaneous, including tree-owners' fees.	1,066	551	52,360	..	..	52,911	
Total ..	1,081	570	1,43,037	11	..	1,43,618		
Grand total ..	..	1,158	4,14,042	130	..	4,15,330		
Fifth Circle	<i>Reserved forests.</i>		no.	rs.	rs.	rs.	rs.	
	Bamboos .. .. .	11,979	641	37,343	..	..	37,984	
	Grazing and fodder grass ..	..	..	1,17,189	..	1,502	1,18,691	

## Outturn of minor forest produce, during the year 1921-22—cont.

Circle.	Description of produce.	Produce removed or utilized					Total.
		By Government agency.		By purchasers.	By free grantees.	By right-holders.	
		Quantity.	Value.	Value.	Value.	Value.	
	<i>Other produce.</i>	QRS.	RS.	RS.	RS.	RS.	RS.
	Grass (thatch, korai, etc.) ..	2,400	..	5,676	..	..	5,676
	Dammer, turmeric, pepper, cardamoms, etc.	..	..	14,869	..	..	14,869
	Tamarind, soapnuts, galnuts, nux-vomica, shekoi, etc.	..	..	18,548	..	..	18,548
	Horns, honey, wax, gum, resin, skin, etc.	162	535	7,755	..	..	8,290
	Avaram, vembadam, etc., barks and fibres.	..	..	19,185	..	..	19,185
	Stones, earth, gravel, etc.	..	..	813	..	..	813
	Manure leaves, thorns, etc.	..	..	2,923	..	..	2,923
	Date and palmyra leaves	..	..	5,270	..	859	6,129
	Miscellaneous .. .. .	..	..	10,477	..	..	10,477
	Total ..	2,562	535	85,516	..	859	86,910
Fifth Circle—cont.	<i>Unreserved lands.</i>						
	<i>Other produce.</i>						
	Miscellaneous .. .. .	..	..	4,560	..	..	4,560
	Gravel, stones, earth, etc.	..	..	1,569	161	..	1,730
	Date and palmyra leaves	..	..	2	..	..	2
	Total ..	..	..	6,121	161	..	6,282
	<i>Abstract for the Fifth Circle.</i>						
	Bamboos .. .. .	no. 11,979	641	37,843	..	..	37,984
	Grazing and fodder grass	..	..	1,17,189	..	1,602	1,18,691
	Other produce .. .. .	2,562	535	91,637	161	859	93,192
	Grand total ..	..	1,176	2,46,169	161	2,361	2,49,867
	<i>Reserved forests.</i>						
	Bamboos .. .. .	no. 2,011	607	16,968	2	..	17,577
	Grazing and fodder grass	..	..	33,858	120	..	33,478
	<i>Other produce.</i>						
	Elephant tusks .. .. .	5	1,009	..	..	..	1,009
	Grass (thatch, etc.) ..	..	..	105	5	..	110
	Blue gum leaves, seeds, etc.	106	484	50	..	..	534
	Manure leaves .. .. .	..	..	348	..	..	348
	Avaram bark .. .. .	..	..	550	..	..	550
	Stones, gravel, etc.	..	..	791	4	..	795
	Tree-owners' fees .. ..	..	..	12	..	..	12
	Cardamoms, pepper, etc., rents.	..	..	1,141	..	..	1,141
	Miscellaneous .. .. .	..	..	10,245	..	..	10,245
Sixth Circle	Total ..	111	1,493	18,242	9	..	14,744
	<i>Reserved lands.</i>						
	Bamboos and reeds .. ..	..	..	53	..	..	53
	Grazing and fodder grass	..	..	465	691	..	1,156
	<i>Other produce.</i>						
	Honey, wax, etc. .. ..	216	540	..	..	..	540
	<i>Unreserved lands.</i>						
	Bamboos .. .. .	..	..	265	2	..	267

## Outturn of minor forest produce during the year 1921-22—cont.

Circle.	Description of produce.	Produce removed or utilized.					Total.
		By Government agency.		By purchasers.	By free grantees.	By right-holders.	
		Quantity.	Value.	Value.	Value.	Value.	
	<i>Other produce.</i>	qrs.	rs.	rs.	rs.	rs.	rs.
Sixth Circle—cont.	Nux-vomica, pindicai, etc., seeds.	218	240	4,140	..	..	4,380
	Manure leaves .. .. .	..	..	14	..	..	14
	Barks, etc. .. .. .	..	..	219	..	..	219
	Stone and gravel .. .. .	..	..	482	..	..	482
	Tree-owners' fees .. .. .	..	..	579	..	..	579
	Miscellaneous .. .. .	..	..	9,551	..	..	9,551
	Total ..	218	240	14,985	..	..	15,225
	<i>Abstract for the Sixth Circle.</i>						
	Bamboos .. .. .	NO. 2,011	607	17,286	4	..	17,897
	Grazing and fodder grass ..	..	..	33,823	811	..	34,634
Other produce .. .. .	qrs. 545	2,273	28,227	9	..	30,509	
Grand total ..	..	2,880	79,336	824	..	83,049	
Total, Presidency..	Bamboos .. .. .	700,089	14,770	305,616	934	..	3,21,320
	Grazing and fodder grass ..	..	..	7,91,074	12,861	7,247	8,11,182
	Other produce .. .. .	416,213	82,832	6,74,309	4,704	1,359	7,63,204
	Grand total, Presidency ..	..	97,602	17,70,999	18,499	8,606	18,95,706

NOTE:—This excludes Nilambur division as figures are not available.

ANNUAL FORM No. 78.

Forest Department, Madras Presidency.

Account of timber, fuel, bamboos and minor produce cut or collected by Government Agency and brought to depot, sold locally or otherwise disposed of during 1921-22.

Name of district.	Balance at commencement of the year in forest and sale depots.	Received during the year.	Total.	Disposed of during the year.	Balance in hand at close of the year in forest and sale depots.
<b>TIMBER (IN THOUSANDS OF CUBIC FEET).</b>					
<i>First Circle.</i>					
Ganjam .. .. .	819	196	515	{ (a) 112 (b) 85 }	365
Visagapatam .. .. .	..	2	2	{ (a) 1 (b) 3 }	1
Godavari, Upper .. .. .	59	36	95	{ (a) 47 (b) 4 }	44
Do. Lower .. .. .	1	6	7	{ (a) 6 (b) 1 }	1
<b>Total ..</b>	<b>379</b>	<b>240</b>	<b>619</b>	<b>208</b>	<b>411</b>
<i>Second Circle.</i>					
Ballary .. .. .	..	..	..	..	..
Anantapur .. .. .	..	..	..	..	..
Guntur .. .. .	..	1	1	1	..
Kurnool, East .. .. .	5	9	14	12	2
Do. South .. .. .	4	6	10	8	2
Do. West .. .. .	28	98	126	53	73
<b>Total ..</b>	<b>37</b>	<b>114</b>	<b>151</b>	<b>74</b>	<b>77</b>
<i>Third Circle.</i>					
Cuddapah, North .. .. .	..	1	1	1	..
Do. South .. .. .	..	5	5	5	..
Do. West .. .. .	1	1	2	1	1
Nellore .. .. .	..	1	1	1	..
Chingleput .. .. .	..	..	..	..	..
Chittoor .. .. .	1	1	2	1	1
Vellore, North .. .. .	..	..	..	..	..
<b>Total ..</b>	<b>2</b>	<b>9</b>	<b>11</b>	<b>9</b>	<b>2</b>
<i>Fourth Circle.</i>					
Vellore, South .. .. .	2	3	5	4	1
Do. West .. .. .	8	3	6	5	1
Salem, East .. .. .	..	1	1	1	..
Do. North .. .. .	2	6	8	6	2
Do. Central .. .. .	..	..	..	..	..
Do. South .. .. .	1	1	2	1	1
<b>Total ..</b>	<b>8</b>	<b>14</b>	<b>22</b>	<b>17</b>	<b>5</b>
<i>Fifth Circle.</i>					
Kollegal .. .. .	1	3	4	{ (a) 1 (b) 1 }	2
Coimbatore, North .. .. .	4	{ (a) 9 (b) 1 }	14	{ (a) 11 (b) 1 }	2
Do. South .. .. .	120	153	273	{ (a) 148 (b) 27 }	96
Madura .. .. .	3	4	7	{ (a) 6 (b) 1 }	1
Tinnevely .. .. .	1	..	1	{ (a) 1 (b) .. }	..
<b>Total ..</b>	<b>129</b>	<b>170</b>	<b>299</b>	<b>198</b>	<b>101</b>
<i>Sixth Circle.</i>					
Mangalore, North .. .. .	6	25	31	{ (a) 28 (b) 1 }	1
Do. South .. .. .	82	23	105	{ (a) 19 (b) 1 }	85
Wynaad .. .. .	4	82	86	{ (a) 16 (b) 3 }	67
Nilambur .. .. .	480	..	480	{ (a) 81 (b) 1 }	6
The Nilgiris .. .. .	(d) 34	54	88	{ (a) 81 (b) 1 }	6
Palghat .. .. .	56	103	159	{ (a) 81 (b) 1 }	78
<b>Total ..</b>	<b>662</b>	<b>287</b>	<b>949</b>	<b>232</b>	<b>237</b>
<b>Grand total, Presidency ..</b>	<b>1,217</b>	<b>834</b>	<b>2,051</b>	<b>738</b>	<b>833</b>

(a) Used departmentally. (b) Written off the accounts.  
 (c) Transferred from Kollegal to North Coimbatore. (d) Revised figures furnished by the District Forest Officer.  
 \* Details not available owing to destruction of records during the rebellion.



FOREST DEPARTMENT

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Account of timber, fuel, bamboos and minor produce cut or collected by Government Agency and brought to depot, sold locally or otherwise disposed of during 1921-22—cont.

Name of district.	Balance at commencement of the year in forest and sale depots.	Received during the year.	Total.	Disposed of during the year.	Balance in hand at close of the year in forest and sale depots.
<b>FUEL (IN THOUSANDS OF CUBIC FEET).</b>					
<i>First Circle.</i>					
Ganjam .. .. .	32	137	169	{ (a) 100 (b) 45 }	7
Vizagapatam .. .. .	5	4	9	{ (b) 17 5 }	4
Godavari, Upper .. .. .	9	5	14	{ (a) 8 1 }	5
Do. Lower .. .. .	2	25	27	{ 24 11 }	3
Kistna .. .. .	..	11	11	..	..
Total ..	48	182	230	211	19
<i>Second Circle.</i>					
Bellary .. .. .	..	16	16	16	..
Anantapur .. .. .	..	..	..	..	..
Guntur .. .. .	12	5	17	17	..
Kurnool, East .. .. .	67	64	131	57	74
Do. South .. .. .	..	..	..	..	..
Do. West .. .. .	1,162	1,863	2,965	343	2,622
Total ..	1,181	1,948	3,129	433	2,696
<i>Third Circle.</i>					
Cuddapah, North .. .. .	..	..	..	..	..
Do. South .. .. .	2	73	75	71	4
Do. West .. .. .	1	2	3	3	..
Nellore .. .. .	26	20	46	45	1
Chingleput .. .. .	..	1	1	1	..
Chittoor .. .. .	2	54	56	54	2
Vellore, North .. .. .	1	2	3	3	..
Total ..	32	152	184	177	7
<i>Fourth Circle.</i>					
Vellore, South .. .. .	..	1	1	1	..
Do. West .. .. .	..	1	1	1	..
Salem, East .. .. .	..	..	..	..	..
Do. North .. .. .	..	1	1	1	..
Do. Central .. .. .	..	..	..	..	..
Do. South .. .. .	3	8	11	6	5
Total ..	3	11	14	9	5
<i>Fifth Circle.</i>					
Kollegal .. .. .	..	..	..	..	..
North Chumbatore .. .. .	..	..	..	..	..
Madura .. .. .	1	3	4	3	1
Tinnevely .. .. .	1	3	4	4	..
Total ..	2	6	8	7	1
<i>Sixth Circle.</i>					
Mangalore, North .. .. .	1	64	65	{ 58 184 }	7
Do. South .. .. .	107	136	243	{ (b) 8 .. }	51
Wynad .. .. .	..	..	..	..	..
Nilambur .. .. .	1	..	1	..	..
The Nilgiris .. .. .	225	390	615	{ (a) 371 (b) 3 }	231
Palghat .. .. .	5	70	75	{ (b) 10 73 }	2
Total ..	339	660	999	707	301
Grand total, Presidency ..	1,605	2,959	4,564	1,544	2,021

(a) Used departmentally. (b) Written off the accounts.

\* Details not available owing to destruction of records during the rebellion.

Account of timber, fuel, bamboos and minor produce cut or collected by Government Agency and brought to depot, sold locally or otherwise disposed of during 1921-22—cont.

Name of district.	Balance at commencement of the year in forest and sale depots.	Received during the year.	Total.	Disposed of during the year.	Balance in hand at close of the year in forest and sale depots
<b>BAMBOOS (IN NUMBER).</b>					
<i>First Circle.</i>					
Ganjam .. .. .	..	5,820	5,820	(a) 5,820	..
Visagapatam .. .. .	100	2,435	2,535	(a) 161	..
Godavari, Upper .. .. .	..	9,261	9,261	(a) 2,374	..
Do. Lower .. .. .	700	13,030	13,730	(a) 9,261	..
				(a) 500	..
				(a) 11,380	1,850
<b>Total ..</b>	<b>800</b>	<b>30,546</b>	<b>31,346</b>	<b>29,496</b>	<b>1,850</b>
<i>Second Circle.</i>					
Bellary .. .. .	..	..	..	..	..
Anantapur .. .. .	..	..	..	..	..
Guntur .. .. .	..	163	163	163	..
Kurnool, East .. .. .	19,366	130,839	150,205	120,346	29,859
Do. South .. .. .	..	398	338	398	..
Do. West .. .. .	45,500	508,212	553,712	512,764	40,948
<b>Total ..</b>	<b>64,866</b>	<b>639,612</b>	<b>704,418</b>	<b>633,671</b>	<b>70,807</b>
<i>Third Circle.</i>					
Cuddapah, North .. .. .	..	4,714	4,714	3,519	1,195
Do. South .. .. .	..	4,830	4,830	3,830	1,000
Do. West .. .. .	..	2,690	2,690	2,440	250
Nellore .. .. .	..	..	..	..	..
Chingleput .. .. .	..	..	..	..	..
Chittoor .. .. .	620	2,046	2,666	2,526	140
Vellore, North .. .. .	..	16	16	16	..
<b>Total ..</b>	<b>620</b>	<b>14,296</b>	<b>14,916</b>	<b>12,331</b>	<b>2,585</b>
<i>Fourth Circle.</i>					
Vellore, South .. .. .	..	..	..	..	..
Do. West .. .. .	..	..	..	..	..
Salem, East .. .. .	..	51	51	51	..
Do. North .. .. .	5	960	965	860	105
Do. Central .. .. .	..	..	..	..	..
Do. South .. .. .	..	634	634	634	..
<b>Total ..</b>	<b>5</b>	<b>1,645</b>	<b>1,650</b>	<b>1,545</b>	<b>105</b>
<i>Fifth Circle.</i>					
Kollegal .. .. .	..	505	505	505	..
North Coimbatore .. .. .	332	11,474	11,806	(a) 7,320	68
				(a) 4,420	..
<b>Total ..</b>	<b>332</b>	<b>11,979</b>	<b>12,311</b>	<b>12,245</b>	<b>68</b>
<i>Sixth Circle.</i>					
Mangalore, North .. .. .	..	151	151	(a) 151	..
Do. South .. .. .	{ 4,754	280	4,779	(a) 321	..
	(c) 255	..	..	(a) 450	1,577
				(b) 2,431	..
Wynad .. .. .	..	250	250	250	..
Nilambur .. .. .	419,706	..	419,706	..	..
The Nilgiris .. .. .	..	..	..	..	..
Palghat .. .. .	437	1,330	1,767	1,654	113
<b>Total ..</b>	<b>424,642</b>	<b>2,011</b>	<b>426,653</b>	<b>5,257</b>	<b>1,690</b>
<b>Grand total, Presidency ..</b>	<b>491,265</b>	<b>700,089</b>	<b>1,191,354</b>	<b>694,545</b>	<b>77,103</b>

(a) Used departmentally. (b) Written off the accounts.  
(c) Revised figures furnished by the District Forest Officer.  
\* Details not available owing to destruction of records during the rebellion.

Account of timber, fuel, bamboos and minor produce cut or collected by Government Agency and brought to depot, sold locally or otherwise disposed of during 1921-22—cont.

Name of district.	Balance at commencement of the year in forest and sale depots.	Received during the year.	Total.	Disposed of during the year.	Balance in hand at close of the year in forest and sale depots.
<b>MINOR FOREST PRODUCE (IN QUARTERS OF 28 LB.).</b>					
<i>First Circle.</i>					
Ganjam .. .. .	..	371,842	371,842	(a) 371,842	..
Vizagapatam .. .. .	92	1,232	1,324	(b) 204	1,094
Godavari, Upper .. .. .	286	9,370	9,656	(a) 26	1,418
Do. Lower .. .. .	4,335	835	5,170	(a) 29	2,916
Kistna .. .. .	4	28	32	(a) 124	1
				(a) 2,130	
				(a) 31	
Total ..	4,717	383,307	388,024	382,595	5,429
<i>Second Circle.</i>					
Bellary .. .. .	(a) 1,600,016	..	1,600,016	8	1,600,008
Anantapur .. .. .	(d) 12	62	74	64	10
Guntur .. .. .	4	28	30	15	15
Kurnool, East .. .. .	5,017	10,689	15,706	14,572	1,134
Do. South .. .. .	102	..	102	102	..
Do. West .. .. .	641	1,610	2,251	1,354	897
Total ..	1,605,792	12,587	1,618,179	16,118	1,602,064
<i>Third Circle.</i>					
Cuddapah, North .. .. .	2	..	2	2	..
Do. South .. .. .	129	1,734	1,863	1,503	360
Do. West .. .. .	5	804	809	805	4
Nellore .. .. .	2,227	12,883	15,110	13,622	1,488
Chingleput .. .. .	..	..	..	..	..
Chittoor .. .. .	227	67	294	216	78
Vellore, North .. .. .	325	843	1,168	904	264
Total ..	2,915	16,331	19,246	17,052	2,194
<i>Fourth Circle.</i>					
Vellore, South .. .. .	185	274	459	242	217
Do. West .. .. .	228	612	840	394	446
Salem, East .. .. .	148	48	196	196	..
Do. North .. .. .	72	112	184	120	64
Do. Central .. .. .	87	14	51	40	11
Do. South .. .. .	3,743	21	3,764	3,741	23
Total ..	4,413	1,081	5,494	4,733	761
<i>Fifth Circle.</i>					
Kollegal .. .. .	87	(e) 49	167	(b) 10	31
		(e) 31		(a) 3	
North Coimbatore .. .. .	190	2,400	2,590	(a) 123	..
South Coimbatore .. .. .	(f) ..	(g) 1	3	(e) 31	..
Madura .. .. .	18	(g) 2	..	2	1
Tinnevely .. .. .	..	(h) 112	130	(h) 126	4
		(h) ..	(h) ..	(h) ..	
Total ..	295	2,595	2,890	2,854	36
<i>Sixth Circle.</i>					
Mangalore, North .. .. .	1	..	1	..	1
Do. South .. .. .	9,463	218	9,681	9,678	3
Wynad .. .. .	..	4	4	..	4
Nilambur .. .. .	..	..	..	..	..
The Nilgiris .. .. .	41	321	363	(a) 154	63
				(a) 118	
Palghat .. .. .	4	1	5	(b) 28	..
				(b) 5	
Total ..	9,509	545	10,054	9,983	71
Grand total, Presidency ..	1,627,641	416,246	2,043,887	433,332	1,610,555

(a) Used departmentally. (b) Written off the accounts.  
 (c) Revised figure. The quantity given in the last review is incorrect.  
 (d) Revised figures furnished by the District Forest Officer owing to the correct conversion into quarters.  
 (e) Transferred from North Coimbatore to Kollegal. (f) Less than one quarter.  
 (g) Received from Palghat and the Nilgiris.  
 (h) Represents seeds of different seeds; their weight in quarters of 28 lbs. is not given by the District Forest Officer.

\* Details not available owing to destruction of records during the rebellion.

Statement showing the value of timber and other produce at sale depots for the year 1921-22

District.	Description of timber or produce.	On hand at commencement of the year.			On hand at close of the year.			Difference in value.	
		Number.	Cubic feet.	Value	Number.	Cubic feet.	Value.	In favour of the year.	Against the year.
	<i>First Circle.</i>			RS.			RS.	RS.	RS.
Ganjam ..	Timber .. ..	..	3,700	7,821	..	198	141	..	7,680
	<i>Second Circle.</i>								
Bellary ..	Timber .. ..	..	..	..	..	..	..	..	..
	Fuel .. ..	..	..	..	..	..	..	..	..
	Minor produce ..	..	..	..	..	..	..	..	..
Anantapur ..	..	..	..	..	..	..	..	..	..
Guntur ..	..	..	..	..	..	..	..	..	..
Kurnool, East.	..	..	..	..	..	..	..	..	..
Kurnool, South.	Timber .. ..	..	3,682	921	..	2,116	1,058	187	..
	Fuel .. ..	..	..	..	..	..	..	..	..
	Minor forest produce.	..	..	..	..	..	..	..	..
Kurnool, West.	..	..	..	..	..	..	..	..	..
	<i>Third Circle.</i>								
Nellore ..	Timber .. ..	..	110	27	..	..	..	..	27
	Fuel .. ..	..	26,007	1,625	..	1,270	79	..	1,546
	Minor forest produce.	QRS.	2,227	16,591	QRS.	1,488	4,482	..	11,609
Vellore, North.	Timber .. ..	..	..	..	..	..	..	..	..
	Fuel .. ..	..	530	32	..	..	..	..	32
	Minor forest produce.	QRS.	325	400	QRS.	264	490	90	..
	<i>Fourth Circle.</i>								
Vellore, South.	Timber .. ..	..	891	36,286	..	..	..	..	36,286
Vellore, West.	Timber .. ..	..	1,325	45,528	..	..	..	..	45,528
Salem, East ..	Timber .. ..	..	..	..	..	16	561	561	..
	Timber .. ..	..	1,982	24,576	..	2,120	26,286	1,710	..
Salem, North.	Bamboos ..	NO. 5	..	2	NO. 105	..	3	1	..
	Minor forest produce.	QRS. 72	..	77	QRS. 63	..	115	38	..
Salem, Central.	Timber .. ..	..	1	24	..	..	31	7	..
Salem, South.	Timber .. ..	..	430	755	..	270	482	..	273
Total value.	..	..	..	1,07,248	..	..	27,478	..	79,770
	<i>Fifth Circle.</i>								
Coimbatore, North.	Timber .. ..	..	3,630	57,757	..	1,825	24,808	..	62,949
	Fuel .. ..	..	440	27	..	..	..	..	27
	Bamboos ..	332	..	3	66	..	1	..	2
	Minor produce ..	QRS. 190	..	28	..	..	..	..	28
Coimbatore, South.	Timber .. ..	..	10,728	14,708	..	38,384	56,785	42,077	..
	Minor produce ..	..	..	35	QR. 1	..	214	179	..

FOREST DEPARTMENT

XLIX

Forest Department, Madras Presidency--cont.

Statement showing the value of timber and other produce at sale depots for the year 1921-22--cont.

District.	Description of timber or produce.	On hand at commencement of the year.			On hand at close of the year.			Difference in value.	
		Number.	Cubic feet.	Value.	Number.	Cubic feet.	Value.	In favour of the year.	Against the year.
	<i>Fifth Circle--cont.</i>			RS.			RS.	RS.	RS.
Madura	Timber .. ..	..	2,009	892	..	1,226	418	..	474
	Fuel .. ..	..	1,400	88	..	1,260	79	..	9
	Minor produce ..	QRS. 18	..	6	QRS. 3	..	2	..	4
Tinnevely..	Timber .. ..	..	624	136	..	(a) 248	41	..	95
	Fuel .. ..	..	1,063	41	..	191	19	..	22
	Minor produce ..	QRS. 1	..	19	(b)	..	2	..	17
	<i>Sixth Circle.</i>								
Mangalore, North.	Timber .. ..	..	4,646	2,904	..	10	191	..	2,713
Mangalore, South.	Timber .. ..	..	4,816	4,816	..	37,364	32,568	27,752	..
	Fuel .. ..	..	396	59	..	..	..	..	59
Wynaad ..	Timber .. ..	..	95	142	..	..	..	..	142
Nilambur	Timber .. ..	..	88,718	180,408	..	11,978	15,745	..	1,64,663
	Fuel .. ..	..	442	88	..	1,694	268	180	..
	Bamboos .. ..	53,263	..	2,125	2,308	..	50	..	2,075
The Nilgiris.	Timber .. ..	..	13,663	21,800	..	6,000	6,000	..	15,800
	Fuel .. ..	..	6,340	817	..	35,000	5,584	4,767	..
	Minor produce ..	QRS. 41	..	400	QRS. 63	..	620	220	..
Palghat ..	.....	..	..	..	..	..	..	..	..
	Total value ..	..	..	2,13,559	..	..	61,026	..	1,52,533

ABSTRACT.

First Circle.	Timber .. ..	..	2,933	4,880	..	3,700	7,821	2,932	..
Second Circle.	Timber .. ..	..	3,682	921	..	2,116	1,058	137	..
	Fuel .. ..	..	..	..	..	..	..	..	..
	Minor produce ..	..	..	..	..	..	..	..	..
	Total value ..	..	3,682	921	..	2,116	1,058	137	..
Third Circle.	Timber .. ..	..	110	27	..	..	..	..	27
	Fuel .. ..	..	26,537	1,657	..	1,270	79	..	1,578
	Minor produce ..	MDS. 2,552	..	16,991	MDS. 1,488	..	5,472	..	11,519
	Total value ..	..	..	18,675	..	..	5,551	..	13,124
Fourth Circle.	Timber .. ..	..	2,349	38,767	..	4,629	1,07,169	68,402	..
	Bamboos .. ..	102	..	51	5	..	2	..	49
	Minor forest produce.	QRS. 952	..	447	72	..	77	..	370
	Total value ..	..	..	39,265	..	..	1,07,248	67,983	..
Fifth Circle.	Timber .. ..	..	17,991	1,03,493	..	41,680	82,052	..	21,441
	Fuel .. ..	..	2,903	156	..	1,451	98	..	58
	Bamboos .. ..	332	..	3	66	..	1	..	2
	Minor produce ..	QRS. 209	..	88	QRS. 4	..	218	130	..
	Total value ..	..	..	1,03,740	..	..	82,369	..	21,371
Sixth Circle.	Timber .. ..	..	111,938	2,10,070	..	55,352	54,504	..	1,55,566
	Fuel .. ..	..	7,178	964	..	36,694	5,852	4,888	..
	Bamboos .. ..	53,263	..	2,125	2,308	..	50	..	2,075
	Minor produce ..	QRS. 41	..	400	QRS. 63	..	620	220	..
	Total value ..	..	..	2,13,559	..	..	61,026	..	1,52,533
	Grand total, Presidency.	..	..	3,81,049	..	..	2,65,073	..	1,15,976

(a) Excludes sandalwood valued Rs. 55.

(b) Represents seeds of different species; weight in quarters of 28 lb. is not given by the District Forest Officer.

ANNUAL REPORT OF THE

ANNUAL  
Forest Department,  
Summary of revenue of the different districts

Budget heads.	First Circle.							Second		
	Direction.	Ganjam.	Visagapatam.	Godavari, Upper.	Godavari, Lower.	Kistna.	Total.	Direction.	Bellary.	Anantapur.
<i>Receipts.</i>	RS.	RS.	RS.	RS.	RS.	RS.	RS.	RS.	RS.	RS.
I. Timber and other produce removed from the forests by Government Agency—										
(a) Timber .. .. .	1	9,385	686	23,778	63	..	33,913	..	..	..
(b) Firewood and charcoal ..	..	2,337	78	461	877	140	3,893	..	117	2
(c) Bamboos .. .. .	..	..	..	..	16	..	16	..	..	..
(d) Sandalwood .. .. .	..	..	..	..	..	..	..	..	..	..
(e) Grass and other minor produce.	76	..	88	152	24	..	340	..	8	88
II. Timber and other produce removed from the forests by consumers or purchasers—										
(a) Timber .. .. .	..	4,763	2,410	3,088	24,048	2,184	36,488	..	6,463	15,818
(b) Firewood and charcoal ..	12	28,931	8,491	421	49,457	11,933	99,245	..	9,589	4,621
(c) Bamboos .. .. .	..	4,928	14,611	8,120	53,421	5,785	86,865	..	67	825
(d) Grazing and fodder grass ..	..	8,869	4,995	6,257	18,533	13,758	52,212	..	82,908	43,941
(e) Other produce .. .. .	1,249	1,900	18,715	906	27,111	7,922	52,803	..	21,473	81,164
(f) Rents for trees tapped ..	..	977	1,042	4	6,987	13,917	22,927	..	20,455	11,781
(g) Other items .. .. .	..	..	..	..	..	..	..	..	..	..
(h) Commutation .. .. .	..	..	..	..	..	..	..	..	..	..
III. Confiscated drift and waif-wood ..	..	175	65	1,337	2,657	98	4,332	..	239	397
IV. Revenue from forest not managed by Government—										
(a) Revenue from shared and private forests.	..	..	..	..	..	..	..	..	..	..
V. Miscellaneous—										
(a) Fines and forfeitures ..	..	3,884	2,713	678	5,046	7,071	19,392	..	5,893	10,678
(b) Other sources .. .. .	12	3,117	467	771	6,739	1,750	12,856	15	903	1,327
Total ..	1,350	69,066	49,361	45,968	1,94,979	64,558	4,25,282	15	98,110	1,70,037
Deduct 'Refunds'—Voted ..	..	560	24	..	5,287	4,359	10,230	..	1,096	158
Total, Receipts ..	1,350	68,506	49,337	45,968	1,89,692	60,199	4,15,052	15	97,014	1,69,879

Budget heads.	Fourth Circle.									
	Direction.	Forest Engineer.	Vellore, South.	Vellore, West.	Salem, East.	Salem, North.	Salem, Central.	Salem, South.	Total.	Direction.
<i>Receipts.</i>	RS.	RS.	RS.	RS.	RS.	RS.	RS.	RS.	RS.	RS.
I. Timber and other produce removed from the forests by Government Agency—										
(a) Timber .. .. .	..	..	..	158	..	612	..	116	886	..
(b) Firewood and charcoal ..	..	..	122	6	25	70	..	126	349	..
(c) Bamboos .. .. .	..	..	..	..	..	168	..	..	168	..
(d) Sandalwood .. .. .	(a) 2,290	..	98,197	86,134	19,675	1,46,133	10,161	11,591	3,74,161	2,15,921
(e) Grass and other minor produce.	..	..	4	2	..	2	..	..	8	..
II. Timber and other produce removed from the forests by consumers or purchasers—										
(a) Timber .. .. .	..	..	13,296	2,799	20,746	8,229	11,369	22,857	74,296	..
(b) Firewood and charcoal ..	..	..	11,878	3,911	35,902	2,681	12,202	81,726	98,300	..
(c) Bamboos .. .. .	..	..	30,524	12,281	18,880	7,137	23,520	7,605	98,947	..
(d) Grazing and fodder grass ..	..	..	27,033	30,489	37,750	17,863	29,152	25,882	1,68,169	..
(e) Other produce .. .. .	..	..	18,608	10,880	23,163	11,056	17,701	51,831	1,37,739	..
(f) Rents for trees tapped ..	..	..	3,826	507	1,016	994	66	19	6,428	..
(g) Other items .. .. .	..	..	..	..	37	455	..	..	492	..
(h) Commutation .. .. .	..	..	..	..	..	..	1,148	..	1,148	..
III. Confiscated drift and waif-wood ..	..	..	245	497	273	32	260	889	2,196	..
IV. Revenue from forest not managed by Government—										
(a) Revenue from shared and private forests.	..	..	..	..	..	..	..	..	..	..
V. Miscellaneous—										
(a) Fines and forfeitures ..	..	..	20,530	8,814	14,868	2,683	6,136	20,195	73,226	..
(b) Other sources .. .. .	(b) 16	67	764	789	3,907	1,209	7,667	1,144	7,749	86
Total ..	2,306	67	2,25,027	1,57,267	1,73,428	1,94,324	1,18,382	1,73,481	10,44,282	2,16,007
Deduct 'Refunds'—Voted ..	..	..	4,718	2,510	591	141	676	1,328	9,864	..
Total, Receipts ..	2,306	67	2,20,309	1,54,757	1,72,837	1,94,183	1,17,706	1,72,153	10,34,318	2,16,007

Note for the I Circle—  
The revenue under direction is distributed as follows:—  
I—E. Godavari upper Rs. 5 and Godavari Lower Rs. 71.  
II—E. " lower Rs. 1,160, direction Rs. 89.  
V Ganjam Rs. 12.

The revenue under direction is distributed as follows:—  
(a) South Cuddapah 442, Chittoor 435 and Tinnevely 1,413.  
(b) South Malabar 16.  
Rupees 1,81,087 relates to North Coimbatore and the balance to Kollegal.

FORM No. 80.  
Madras Presidency.  
for the year 1921-22.

Circle.					Third Circle.									
Guntur.	Kurnool, East.	Kurnool, South.	Kurnool, West.	Total.	Direction.	Cuddapah, North.	Cuddapah, South.	Cuddapah, West.	Nellore.	Chingleput.	Chittoor.	Vellore, North.	Total.	
Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	
34	5,500	620	2,597	15,751	..	39	2,303	130	49	7	25	86	2,639	
108	473	13	3,462	4,165	..	86	290	10	1,485	52	1,532	115	3,570	
..	2,424	..	9,689	12,113	..	..	..	..	..	..	10	4	14	
..	..	..	..	..	..	..	..	..	..	..	17	..	17	
..	8,230	5	1,578	9,904	..	..	..	..	67,591	10	4	626	68,231	
3,305	1,785	8,067	6,356	41,795	..	1,605	4,167	9,179	8,062	4,719	19,252	15,703	62,688	
17,885	343	10,627	8,270	46,335	..	8,009	4,653	8,368	50,527	14,793	11,157	17,106	1,14,618	
..	874	33,396	..	34,662	..	4,716	2,360	2,409	..	502	6,156	8,305	24,438	
53,336	85,738	10,399	33,105	2,09,427	..	15,337	6,249	19,489	74,450	25,562	40,342	27,482	2,08,911	
16,954	4,825	7,462	29,747	1,61,625	..	6,823	8,525	17,386	10,393	8,855	37,481	28,508	1,17,971	
4,424	752	1,520	4,720	43,652	..	444	1,121	2,600	6,403	3,938	4,597	5,678	24,776	
..	..	..	..	..	..	..	..	..	..	..	..	..	..	
..	..	..	..	..	..	..	..	..	..	..	..	..	..	
168	269	2,167	1,022	4,262	..	314	413	610	372	294	121	144	2,268	
..	..	..	..	..	..	..	..	..	..	..	..	..	..	
10,096	2,318	6,631	4,433	40,044	..	3,587	4,585	9,425	17,605	4,673	14,427	19,998	74,300	
1,946	1,913	1,925	2,918	10,847	..	584	666	1,217	2,086	615	941	1,171	7,280	
1,08,256	65,445	82,832	1,09,887	6,34,582	..	41,545	85,322	70,823	2,39,623	64,015	1,36,062	1,24,926	7,11,716	
1,172	106	208	241	2,981	..	384	158	628	3,353	60	5,828	337	10,748	
1,07,084	65,339	82,624	1,09,646	6,31,601	..	41,161	85,164	70,195	2,35,670	63,955	1,30,234	1,24,589	7,00,968	

Fifth Circle.							Sixth Circle.									
Kollegal.	North Coimbatore.	South Coimbatore.	Madura.	Tinnevely.	Forest Eng- neer.	Total.	Directions.	North Mangalore.	South Mangalore.	Wynaad.	Nilambur.	Palghat.	The Nilgiris.	Forest Resear- ch Office.	Total.	
Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	
6	400	2,28,847	1,796	52	..	2,31,101	..	13,755	17,149	95,209	2,63,722	65,038	35,900	..	4,90,773	
..	16	..	859	462	..	837	..	1,091	6,576	..	46	3,722	83,137	13	44,585	
..	..	..	..	..	..	..	..	..	5	146	5,296	436	..	..	5,883	
..	32,510	..	..	..	..	2,48,431	..	5,606	2,874	..	..	..	3,422	..	11,902	
232	13	..	87	..	..	332	..	..	6	30	5	879	894	..	1,814	
1,597	8,520	8,339	15,844	1,537	..	35,837	..	22,510	8,583	23,844	5,074	10,319	559	..	70,889	
2,819	27,813	14,933	82,481	1,43,354	..	2,71,400	..	34,181	1,419	731	7	31,207	6,816	..	74,361	
3,818	19,627	7,796	5,165	1,569	..	37,975	..	991	2,299	468	3	12,533	845	..	17,139	
34,711	48,255	4,255	20,525	9,433	..	1,17,189	..	5,420	6,494	4,575	..	8,321	9,013	..	33,823	
5,416	9,561	6,788	36,662	34,105	..	92,532	..	6,180	7,225	2,147	1,028	9,162	1,364	..	28,106	
35	17	..	..	..	..	52	..	361	230	..	..	..	..	..	591	
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	
72	220	109	2,741	449	..	3,584	..	396	294	99	446	144	9	..	1,358	
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	
5,413	9,935	5,366	12,271	10,314	..	43,299	..	4,563	4,396	1,001	1,323	5,526	10,865	..	27,644	
5,433	3,809	73,988	9,028	2,851	203	95,398	18	1,220	3,170	5,743	4,563	9,512	7,622	13	81,861	
59,552	1,60,696	3,50,431	1,86,959	2,04,119	203	11,77,967	18	96,244	60,720	1,34,993	2,82,013	1,56,799	1,09,946	26	8,40,759	
366	1,313	130	563	115	33	2,460	..	42	235	20	..	672	336	..	1,305	
59,246	1,59,383	3,50,301	1,86,396	2,04,004	170	11,75,507	18	96,202	60,485	1,34,973	2,82,013	1,56,127	1,09,610	26	8,39,454	

\* Excludes Rs. 2,850 credited in the Nilgiri district accounts.

† Excludes Rs. 1,413 credited in the South Vellore accounts.

The revenue for Fifth Circle including the amounts credited in Nilgiris and South Vellore districts comes to Rs. 11,79,767.

Summary of expenditure of the different districts for the Forest year 1921-22.

Head of account.	First Circle.							Second		
	Direction.	Ganjam.	Vizaga- patam.	Godavari, Upper.	Godavari, Lower.	Kistna.	Total.	Direction.	Bellary.	Ananta- pur.
	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
<b>A. Conservancy and Works.</b>										
I. Timber and other produce removed from the forests by Government Agency—										
(a) Timber .. .. .	..	51,785	124	2,460	..	..	54,369	..	..	..
(b) Firewood and charcoal ..	..	2	..	109	72	..	183	..	..	4
(c) Bamboos .. .. .	..	..	..	..	6	..	6	..	..	..
(d) Sandalwood .. .. .	..	..	..	..	..	..	..	..	..	..
(e) Grass and other minor produce.	..	..	27	800	35	..	862	10	..	43
II. Timber and other produce removed from the forests by consumers or purchasers.	..	5,883	5,459	3,248	15,812	1,259	31,556	..	2,193	2,173
III. Confiscated drift and waifwood ..	..	104	..	476	1,101	3	1,684	..	..	13
IV. Forests not managed by Government—										
(a) Shared and private forests.	..	..	..	..	..	..	..	..	..	..
V. Rent of leased forests and payments to shareholders in forests managed by Government.	..	..	478	..	..	..	478	..	..	..
VI. Live-stock, stores, tools and plant—										
(a) Purchase of cattle .. .. .	..	50	..	..	..	..	50	..	..	..
(b) Feed and keep of cattle ..	..	..	..	2,024	..	..	2,024	..	..	..
(c) Stores, tools and plant ..	-7,807	2,37,292	212	1,576	6,002	3,115	2,40,390	3,330	156	382
VII. Communications and buildings—										
(a) Roads and bridges .. .. .	..	14,094	886	2,710	1,920	495	20,105	..	..	245
(b) Buildings .. .. .	..	68,541	2,891	6,230	4,175	1,689	78,526	..	3,574	3,940
(c) Other works .. .. .	..	600	20	79	246	49	894	..	20	..
VIII. Demarcation, improvement and extension of forests—										
(a) Demarcation .. .. .	..	208	..	1,298	123	212	1,840	..	3,060	481
(b) Cost of forest settlement, compensation for land and rights.	..	786	3	..	..	..	789	..	..	..
(c) Surveys—										
(1) Local .. .. .	..	1	837	1,921	1,306	1,116	5,179	..	105	..
(2) India .. .. .	..	..	..	..	..	..	..	..	..	..
(d) Working-plans .. .. .	502	1,516	..	..	..	..	2,018	..	..	..
(e) Sowing and planting .. ..	192	402	6	430	271	381	1,682	..	..	231
(f) Protection from fire .. ..	..	6,180	1,488	5,337	5,837	1,184	20,076	..	1,292	561
(g) Other works .. .. .	..	4,853	..	1,749	45	4,371	11,018	..	1,234	3,962
IX. Miscellaneous—										
Non-voted—										
(a) Rates and taxes .. .. .	..	..	1	..	156	39	196	..	..	..
Voted—										
(b) Law charges .. .. .	..	..	28	..	..	..	28	..	7	..
(c) Other charges .. .. .	..	629	56	12	561	3	1,261	..	..	170
<b>Total, A. Conservancy and Works</b> ..	<b>-7,113</b>	<b>3,87,924</b>	<b>12,516</b>	<b>30,004</b>	<b>37,667</b>	<b>13,916</b>	<b>4,74,914</b>	<b>3,320</b>	<b>11,641</b>	<b>12,205</b>
<b>B. Establishments.</b>										
I. Salaries—										
Non-voted—										
(a) Conservators .. .. .	18,718	..	..	..	395	..	19,113	13,400	..	..
(b) Superior officers appointed by the Secretary of State.	-3,363	24,006	..	3,812	11,540	..	35,995	2,823	- 625	..
(c) Deputation and other allowances.	..	..	..	236	..	..	236	..	..	..
Voted—										
(d) Superior officers appointed in India.	..	4,582	5,422	3,498	10,162	3,908	27,572	..	4,905	9,864
(e) Subordinate forest and depot establishments.	..	49,979	18,556	24,798	32,166	17,467	1,42,966	..	35,644	38,854
(f) Office establishments .. .. .	8,101	13,332	6,177	8,037	10,899	5,764	52,310	7,776	8,016	8,094
(g) Deputation and other allowances.	..	4,079	..	7,060	226	..	11,365	..	..	..
II. Travelling allowances—										
(a) Conservators .. .. .	3,952	..	146	266	36	..	4,400	860	..	100
(b) Superior officers .. .. .	1,342	8,491	3,407	2,452	3,054	3,427	22,208	662	1,937	2,141
(c) Subordinate forest and depot establishments.	-164	15,631	5,266	6,948	10,692	5,417	43,780	..	7,584	8,963
(d) Office establishments .. .. .	1,906	4,044	1,728	2,057	4,208	1,120	15,063	1,427	1,861	1,635
III. Contingencies—										
Non-voted—										
Rates and taxes .. .. .	190	286	272	..	..	75	823	..	245	168
Voted—										
(a) Contract items—										
(1) Service postage and tele-gram charges.	500	1,206	1,003	951	1,369	876	5,905	603	721	958
(2) Other contract contingencies.	3,001	2,456	1,422	1,187	3,017	1,321	12,404	4,970	2,092	1,721
(b) Non-Contract items—										
(1) Rents, rates and taxes ..	340	46	10	129	69	120	714	600	57	20
(2) Sundries .. .. .	..	298	92	242	601	43	1,276	..	..	51
<b>Total, B. Establishments</b> ..	<b>34,523</b>	<b>1,28,430</b>	<b>43,501</b>	<b>61,763</b>	<b>88,424</b>	<b>39,538</b>	<b>3,96,125</b>	<b>33,121</b>	<b>62,437</b>	<b>72,559</b>
<b>Grand Total of Expenditure, A and B</b> ..	<b>27,410</b>	<b>5,16,350</b>	<b>56,017</b>	<b>91,767</b>	<b>1,26,091</b>	<b>53,454</b>	<b>8,71,039</b>	<b>38,441</b>	<b>74,078</b>	<b>84,764</b>



FOREST DEPARTMENT

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Summary of expenditure of the different districts for the Forest year 1921-22—cont.

Circle.					Third Circle.									
Guntur.	Kurnool, East.	Kurnool, South.	Kurnool, West.	Total.	Direction.	Cuddapah, North.	Cuddapah, South.	Cuddapah, West.	Nellore.	Chingleput.	Chittoor.	Vellore, North.	Total.	
RS.	RS.	RS.	RS.	RS.	RS.	RS.	RS.	RS.	RS.	RS.	RS.	RS.	RS.	
..	2,238	88	5,756	8,077	..	..	423	..	..	..	106	..	529	
..	897	..	10,202	11,103	..	..	..	..	12	..	187	9	208	
..	2,044	..	5,678	7,722	..	..	..	..	..	..	..	..	..	
..	..	..	..	..	..	..	51	..	..	..	212	32	295	
..	3,270	83	1,038	4,444	..	..	..	..	7,440	12	..	94	7,546	
2,822	3,744	3,250	6,822	22,504	..	3,347	2,287	4,171	2,758	1,251	8,588	2,113	24,515	
..	5	197	12	227	..	30	11	28	..	..	..	..	69	
..	..	..	..	..	..	..	..	..	..	..	..	..	..	
..	..	..	..	..	..	..	..	..	..	..	..	..	..	
..	..	..	2,948	2,948	..	..	..	..	..	20	3	..	23	
673	1,129	878	2,081	8,124	32	1,607	1,416	44	1,390	531	377	198	5,595	
466	4,847	7,206	5,928	19,692	..	..	12,008	1,595	515	2,486	3,996	1,027	21,630	
2,865	6,902	4,587	3,209	24,477	..	6,587	8,435	4,716	5,803	8,265	10,453	3,349	47,608	
493	1,321	64	912	2,810	..	404	871	109	146	416	399	18	2,363	
231	46	20	509	4,347	..	..	..	14	1,693	1,412	2,143	67	5,329	
..	..	..	..	..	..	..	..	..	1,073	..	358	..	1,431	
..	1,026	..	443	1,574	529	..	..	..	1,483	..	..	605	2,617	
..	..	..	..	..	..	..	..	..	..	..	..	..	..	
17	..	..	..	17	..	..	..	..	..	..	..	..	..	
62	840	165	3,055	4,353	..	5	870	44	8	21	2,211	1,988	4,647	
..	4,558	10,227	5,501	22,119	..	5,939	6,549	4,060	1,971	1,115	6,056	604	25,294	
8,712	2,764	..	6	16,688	..	109	3,304	3,952	2,381	1,598	12,373	8,274	31,986	
7	..	..	..	7	..	..	..	..	..	..	4	..	4	
..	..	16	58	81	..	..	1	..	..	..	8	9	18	
70	313	..	896	1,449	6	65	493	5	3	..	384	282	1,148	
15,918	35,314	26,271	57,074	1,61,743	567	13,093	35,129	18,738	26,679	17,122	47,858	18,669	1,82,865	
..	..	..	..	13,400	29,095	..	..	..	..	2,021	..	..	31,116	
16,119	..	..	..	18,317	..	..	14,098	..	8,952	..	1,150	..	24,200	
..	..	..	..	..	..	..	..	..	..	..	..	..	..	
1,890	5,513	8,664	12,024	42,860	..	3,533	800	4,463	6,658	4,668	10,590	4,247	34,962	
34,888	31,282	40,630	41,127	2,22,425	480	36,176	40,138	34,321	53,811	30,585	58,741	24,128	2,78,380	
9,376	9,118	9,983	12,687	65,050	10,213	8,133	9,113	9,708	8,793	6,229	9,328	6,271	67,788	
..	1,942	3,864	4,695	10,501	..	125	..	4	..	..	..	..	129	
280	..	200	406	1,846	2,195	1,385	..	..	191	..	1,062	90	4,923	
2,836	1,966	2,507	3,424	15,473	..	2,306	2,178	687	4,431	2,791	3,494	2,570	18,457	
7,827	8,808	10,320	12,728	56,215	..	11,182	8,072	8,958	12,832	6,415	10,949	5,022	63,430	
1,785	2,297	3,431	3,243	15,679	1,591	1,836	1,705	2,310	2,254	2,164	3,512	1,294	16,666	
26	13	47	79	578	..	40	12	..	30	40	170	107	399	
793	1,133	877	841	5,926	901	574	611	527	1,051	538	983	692	5,877	
1,341	2,182	2,000	2,678	16,984	2,425	1,979	1,295	1,276	1,923	1,506	1,931	720	13,055	
48	269	22	73	1,089	..	..	55	160	59	540	84	..	898	
..	85	..	..	136	68	234	137	38	72	..	74	..	475	
77,209	64,603	82,545	94,005	4,86,479	46,968	67,506	78,214	62,452	1,01,057	57,497	1,01,920	45,141	5,60,755	
12 7	99,917	1,08,816	151,079	6,48,222	47,535	85,599	113,343	81,190	1,27,736	74,619	1,49,778	63,810	7,43,610	

Summary of expenditure of the different districts for the Forest year 1921-22—cont.

Budget heads.	Fourth Circle.									Fifth	
	Direction.	Forest Engi- neer.	Vellore, South.	Vellore, West.	Salem, East.	Salem, North.	Salem, Central.	Salem, South.	Total.	Direction.	Kollegal.
	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
I. Refunds and Drawbacks ..	..	..	..	..	..	..	..	..	..	..	..
<b>Voted—</b>											
<i>Conservancy and Works.</i>											
I. Timber and other produce re- moved from the forests by Government Agency—											
(a) Timber ..	..	..	..	829	..	152	..	..	481	..	..
(b) Firewood and charcoal ..	..	..	..	..	..	32	..	..	32	..	..
(c) Bamboos ..	..	..	..	..	..	..	..	..	..	..	..
(d) Sandalwood ..	66	..	4,875	4,210	2,226	11,910	1,445	1,189	25,789	707	8,011
(e) Grass and other minor produce ..	..	..	..	2	27	17	6	..	40	..	107
II. Timber and other produce re- moved from the forests by consumers or purchasers.	..	..	843	1,162	1,634	970	3,187	4,265	12,061	..	3,370
III. Confiscated, drift and waif- wood.	..	..	2	18	..	..	2	30	62	..	..
IV. Forests not managed by Government.	..	..	..	..	..	..	..	..	..	..	..
(a) Shared and private forests.	..	..	..	..	..	..	..	..	..	..	..
V. Rent of leased forests and pay- ments to shareholders in forests managed by Govern- ment.	..	..	..	..	..	19	..	..	19	..	..
VI. Live-stock, stores, tools and plant—											
(a) Purchase of cattle ..	..	..	..	..	..	..	..	..	..	1,247	..
(b) Feed and keep of cattle.	..	..	..	..	..	..	..	..	..	..	..
(c) Stores, tools and plant.	2,032	92	601	125	156	623	203	122	3,954	1,928	77
VII. Communications and build- ings—											
(a) Roads and bridges ..	..	18,013	132	..	162	859	598	1,328	21,092	1,165	5,228
(b) Buildings ..	..	654	2,291	1,880	2,817	3,254	2,204	5,543	18,643	7916	2,187
(c) Other works ..	..	..	445	6	170	52	97	..	770	3	825
VIII. Demarcation, improvement and extension of forests—											
(a) Demarcation ..	..	..	36	144	856	51	164	873	1,624	..	769
(b) Cost of Forest Settle- ment; compensation for land and rights.	..	..	..	..	81	281	..	174	536	..	..
(c) Surveys .. [Local ..	..	..	..	446	458	..	..	1,362	2,366	..	..
[India ..	..	..	..	..	..	..	..	..	..	..	..
(d) Working-plans ..	86	..	..	..	..	..	..	..	86	67	..
(e) Sowing and planting ..	..	..	977	183	246	2,123	483	102	4,114	..	9
(f) Protection from fire ..	..	..	715	1,458	753	1,247	1,640	869	6,682	..	1,657
(g) Other works ..	..	..	3,422	2,893	6,427	5,923	4,970	2,205	25,540	..	1,622
IX. Miscellaneous—											
Non-voted.											
(a) Rates and taxes ..	..	..	..	10	..	..	10	3	17	..	..
Voted.											
(b) Law charges ..	..	..	..	6	2	..	..	41	33	..	..
(c) Other charges ..	..	..	140	129	177	123	..	392	661	67	29
<b>Total, Conservancy and Works ..</b>	<b>2,052</b>	<b>18,759</b>	<b>14,479</b>	<b>13,001</b>	<b>16,192</b>	<b>27,636</b>	<b>14,997</b>	<b>17,900</b>	<b>1,25,016</b>	<b>13,094</b>	<b>18,841</b>
<i>Establishments.</i>											
I. Salaries—											
Non-voted.											
(a) Conservators ..	25,308	..	..	..	..	..	..	..	25,308	24,693	..
(b) Superior officers appointed by the Secretary of State.	11,827	630	..	1,750	1,450	5,615	..	..	21,272	..	..
(c) Deputation and other allowances.	..	..	..	..	..	..	..	..	..	..	..
Voted—											
(d) Superior officers appointed in India.	..	4,206	7,463	2,887	6,987	4,855	9,417	5,480	41,295	3,044	4,896
(e) Subordinate Forest and depot establishments.	52	4,865	28,479	25,338	34,630	26,455	25,722	32,349	1,77,890	2,965	29,593
(f) Office establishments ..	10,735	2,354	8,135	8,653	7,257	8,525	9,281	9,673	64,613	9,887	7,298
(g) Deputation and other al- lowances.	..	1,370	..	100	..	130	..	457	2,057	13	1,350
II. Travelling allowances—											
(a) Conservators ..	2,434	..	225	..	..	..	..	121	2,780	5,031	..
(b) Superior officers ..	1,176	1,297	1,893	1,319	2,012	2,195	2,732	3,320	15,944	1,172	2,516
(c) Subordinate forest and depot establishments.	19	1,274	6,250	5,323	7,484	8,548	4,725	7,412	41,035	574	4,181
(d) Office establishments ..	1,080	609	1,188	1,050	1,498	1,073	775	1,756	9,029	1,273	1,158
III. Contingencies—											
Non-voted.											
(a) Rates and taxes ..	..	..	205	20	55	23	2	9	314	68	53
Voted.											
(a) Contract items—											
(1) Service postage and telegram charges ..	554	250	876	784	870	1,099	1,055	1,358	6,346	998	462
(2) Other contract con- tingencies.	1,515	..	1,606	947	1,710	1,305	1,680	1,695	10,458	2,535	2,393
(b) Non-contract items—											
(1) Rents ..	..	588	..	..	79	2	..	121	790	..	5
(2) Sundries ..	8	1,234	31	..	180	148	109	15	1,720	138	93
<b>Total, Establishments ..</b>	<b>54,703</b>	<b>18,177</b>	<b>56,351</b>	<b>48,171</b>	<b>64,212</b>	<b>59,973</b>	<b>55,498</b>	<b>63,766</b>	<b>4,20,851</b>	<b>52,391</b>	<b>54,008</b>
<b>Grand Total of Expenditure ..</b>	<b>56,755</b>	<b>36,936</b>	<b>70,830</b>	<b>61,172</b>	<b>80,404</b>	<b>87,609</b>	<b>70,495</b>	<b>81,666</b>	<b>6,45,887</b>	<b>65,325</b>	<b>72,849</b>

Summary of expenditure of the different districts for the Forest year 1921-22—cont.

Circle.							Sixth Circle.									
North Coimba- lore.	South Coimba- lore.	Madura.	Tinne- velly.	Forest Engi- neer.	Total.	Direction.	North Manga- lore.	South Manga- lore.	Wynad.	Nilambur.	Palghat.	The Nil- giris.	Forest Research Officer.	Total.		
Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.		
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..		
120	75,975	1,207	8	..	77,310	..	4,599	22,065	18,514	25,132	72,579	6,189	..	1,49,078		
..	..	..	2	..	2	..	750	2,835	..	..	244	25,927	..	29,756		
14,199	..	71	168	..	18,156	..	479	406	90	18,937	81	16	..	19,123		
..	..	..	..	..	107	..	..	248	..	..	..	590	..	1,053		
4,258	1,702	2,727	4,438	..	16,495	..	1,777	1,713	431	1,818	2,534	2	..	8,275		
2	10	2	..	..	14	..	43	1	..	..	8	..	..	52		
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..		
..	2,500	..	..	..	2,500	..	..	..	90	1,500	..	..	..	1,590		
..	4,103	..	39	..	5,389	..	..	8	3,920	498	6,310	5,162	..	15,898		
153	45,751	..	..	..	45,904	..	..	6,239	27,771	26,914	29,663	55,644	..	1,46,261		
1,163	5,286	238	813	92	9,597	2,544	151	347	6,229	2,338	72,291	3,140	2,944	89,984		
11,049	7,563	17,579	6,162	23,568	72,314	..	1,432	608	3,984	1,492	31,148	9,623	..	48,285		
3,509	2,219	9,085	5,162	..	30,078	18	6,683	1,139	3,917	4,667	29,790	6,441	200	52,855		
865	908	538	40	..	2,673	..	232	296	281	35	667	1,216	..	2,727		
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..		
19	381	2,845	228	..	4,242	..	..	..	591	313	13	459	..	1,376		
..	..	799	6,673	..	7,472	..	..	..	..	..	..	..	..	..		
708	..	..	..	..	708	..	..	18	13	..	1,182	679	..	1,892		
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..		
..	..	10	..	..	77	..	..	..	..	..	5,077	..	..	5,077		
894	749	3,723	2,072	..	6,947	..	2,095	5,375	2,541	13,983	7,081	5,406	..	36,481		
8,900	1,916	6,586	3,898	..	17,997	..	3,508	3,853	2,950	2,822	3,004	3,545	..	19,682		
6,480	5,799	10,601	2,768	..	27,170	..	170	1,257	2,461	943	4,306	2,689	..	11,776		
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..		
20	15	..	..	..	35	..	..	1	..	..	..	291	..	292		
..	..	1	..	..	1	..	79	2	11	..	15	..	..	107		
145	1,515	3	72	..	1,841	..	576	592	388	294	2,149	7,302	2,404	13,705		
46,484	156,392	56,015	32,543	23,660	3,47,029	2,562	22,574	47,030	74,187	1,06,973	2,63,065	1,34,439	5,548	6,56,378		
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..		
19,200	9,944	..	2,673	630	24,693	22,901	..	5,430	..	..	2,500	18,750	625	22,901		
..	..	..	..	..	32,447	1,521	..	..	..	..	..	..	..	28,826		
..	..	6,022	6,072	4,806	24,840	..	4,168	3,911	5,207	9,328	13,199	..	13,155	48,966		
37,873	28,632	40,238	40,097	4,831	1,84,229	1,526	29,433	22,207	17,246	18,105	28,374	30,825	4,998	1,52,714		
9,692	10,789	9,709	10,111	2,354	59,833	8,750	7,631	7,291	7,399	9,182	8,579	9,478	1,981	60,291		
431	6,228	644	..	1,370	10,036	1,748	..	..	10,843	360	12	11,823	..	24,786		
..	..	..	738	..	5,769	5,497	..	..	..	..	..	..	..	5,497		
2,410	1,807	2,651	2,130	1,296	13,982	894	1,270	2,653	3,552	3,411	5,094	2,223	3,754	22,849		
12,900	7,210	10,440	9,918	1,289	46,512	380	6,655	6,342	4,002	3,633	8,895	7,822	2,215	39,954		
3,091	1,998	2,888	1,432	609	12,457	1,556	1,251	1,642	1,209	1,806	2,287	1,845	704	12,300		
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..		
19	32	93	121	..	386	9	..	25	..	170	112	149	..	465		
1,077	977	1,085	947	150	5,696	989	700	1,243	750	450	615	890	263	5,900		
2,515	1,379	1,670	1,551	..	12,343	3,332	1,920	1,464	1,005	1,615	1,458	1,773	626	13,193		
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..		
87	..	300	150	588	1,130	..	..	..	..	43	37	..	..	80		
146	674	..	184	834	2,069	116	69	21	114	1,218	30	66	..	1,634		
89,741	69,663	75,738	76,124	18,757	4,36,422	49,217	53,107	52,229	51,327	49,321	71,192	85,644	28,321	4,40,358		
136,225	226,055	131,753	108,607	42,417	783,451	51,779	75,681	99,269	125,514	1,56,294	3,34,267	2,20,083	33,869	10,96,736		

Summary of receipts and expenditure during 1921-22 for each circle and for the Presidency compiled in the Chief Conservator's office from Conservators' statements.

Budget heads.	First Circle.	Second Circle.	Third Circle.	Fourth Circle.	Fifth Circle.	Sixth Circle.	Grand total, Presidency.	
	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	1921-22.	1920-21.
<b>RECEIPTS.</b>								
<b>I. Timber and other produce removed from the forests by Government agency—</b>								
(a) Timber .. .. .	33,918	15,751	2,639	886	2,31,101	4,90,773	7,75,063	5,78,739
(b) Firewood and charcoal ..	3,893	4,165	3,670	349	637	44,585	57,399	55,997
(c) Bamboos .. .. .	16	12,113	14	168	..	5,883	18,194	30,413
(d) Sandalwood .. .. .	..	..	17	3,74,151	2,48,431	11,902	6,34,651	7,38,231
(e) Grass and other minor produce.	340	9,904	68,231	8	332	1,814	80,629	64,462
Total, I ..	38,162	41,933	74,471	3,75,592	4,80,701	5,54,957	15,65,816	14,65,843
<b>II. Timber and other produce removed from the forests by consumers or purchasers—</b>								
(a) Timber .. .. .	36,488	41,795	62,688	74,296	85,837	70,889	8,21,993	3,81,996
(b) Firewood and charcoal ..	99,245	46,335	1,14,613	98,300	2,71,400	74,361	7,04,254	6,60,970
(c) Bamboos .. .. .	86,865	34,662	24,438	98,947	37,975	17,139	8,00,026	2,61,326
(d) Grazing and fodder grass..	52,212	2,09,427	2,08,911	1,68,169	1,17,189	33,823	7,89,731	8,16,589
(e) Other produce .. .. .	52,803	1,61,625	1,17,971	1,37,739	92,532	28,106	5,90,776	6,28,566
(f) Tree-owners' fees .. .. .	22,927	43,652	24,776	6,428	52	591	98,426	1,03,076
(g) Other items .. .. .	..	..	..	492	..	..	492	280
(h) Commutation fees .. .. .	..	..	..	1,148	..	..	1,148	900
Total, II ..	3,50,540	5,37,496	5,53,397	5,85,519	5,54,985	2,24,909	28,06,846	27,53,143
III. Confiscated drift and waifwood ..	4,332	4,262	2,268	2,196	3,584	1,388	18,030	11,473
IV. Revenue from forests not managed by Government.	..	..	..	..	..	..	..	..
<b>V. Miscellaneous—</b>								
(a) Fines and forfeitures .. ..	19,392	40,044	74,300	73,226	43,299	27,644	2,77,905	2,17,664
(b) Other sources .. .. .	12,856	10,847	7,280	7,749	95,398	31,861	1,65,991	1,78,661
Total, V ..	32,248	50,891	81,580	80,975	1,38,697	59,505	4,43,896	3,96,325
Deduct refunds—voted ..	10,230	2,981	10,748	9,964	2,460	1,305	37,688	98,900
Grand Total, Receipts ..	4,16,052	6,31,601	7,00,968	10,34,318	11,75,507	8,39,454	47,96,900	46,16,184
<b>EXPENDITURE.</b>								
<i>A. Conservancy and Works.</i>								
<b>I. Timber and other produce removed from the forests by Government agency—</b>								
(a) Timber .. .. .	54,869	8,077	529	481	77,310	1,49,078	2,89,844	2,34,004
(b) Firewood and charcoal ..	183	11,103	208	32	2	29,756	41,284	30,354
(c) Bamboos .. .. .	6	7,722	..	..	..	19,123	26,851	34,134
(d) Sandalwood .. .. .	..	..	295	25,789	18,156	1,053	45,293	84,055
(e) Grass and other minor produce.	362	4,444	7,546	40	107	1,053	13,552	9,448
Total, A-I ..	54,920	31,346	8,578	26,342	95,575	2,00,063	4,16,824	3,41,995
II. Timber and other produce removed from the forests by consumers or purchasers.	31,656	22,504	24,515	12,061	16,495	8,275	1,15,506	1,11,629
III. Confiscated drift and waifwood ..	1,684	227	69	52	14	52	2,098	1,289
IV. Forests not managed by Government—								
(a) Shared and Private forests.	..	..	..	..	..	..	..	..
V. Rent of leased forests by payments to shareholders in forests managed by Government.	478	..	..	19	2,500	1,590	4,587	3,929
VI. Live-stock, stores, tools and plant—								
(a) Purchase of cattle .. .. .	50	..	..	..	5,389	15,898	21,337	8,766
(b) Feed and keep of cattle ..	2,024	2,948	23	..	45,904	1,45,261	1,97,160	1,55,325
(c) Stores, tools and plant ..	2,40,390	8,124	5,595	3,954	9,597	83,984	3,57,644	66,719
Total, A-VI ..	2,42,464	11,072	5,618	3,954	60,890	2,52,143	6,76,141	2,30,810
VII. Communications and buildings—								
(a) Roads and bridges .. .. .	20,105	18,692	21,630	21,092	72,314	48,285	2,02,118	2,93,950
(b) Buildings .. .. .	78,526	24,477	47,608	18,643	30,078	52,855	2,52,187	1,86,870
(c) Other works .. .. .	994	2,810	2,363	770	2,673	2,727	12,337	11,177
Total, A-VII ..	99,625	45,979	71,601	40,505	1,05,065	1,03,867	4,66,642	4,91,997

FOREST DEPARTMENT

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Summary of receipts and expenditure during 1921-22 for each circle and for the Presidency compiled in the Chief Conservator's office from the Conservators' statements—cont.

Budget heads.	First Circle.	Second Circle.	Third Circle.	Fourth Circle.	Fifth Circle.	Sixth Circle.	Grand total, Presidency.	
							1921-22.	1920-21.
<b>EXPENDITURE—cont.</b>	RS.	RS.	RS.	RS.	RS.	RS.	RS.	RS.
<b>A. Conservancy and Works—cont.</b>								
<b>VIII. Demarcation, etc.—</b>								
(a) Demarcation .. ..	1,810	4,347	5,329	1,624	4,242	1,376	18,758	14,242
(b) Cost of forest settlement compensation for land and rights.	789	.	1,431	536	7,472	..	10,228	11,199
(c) Surveys. { (1) Local ..	5,179	1,574	2,617	2,256	708	1,892	14,226	11,614
(2) India ..	..	..	..	..	..	..	..	..
(d) Working-plans .. ..	2,018	17	..	86	77	5,077	7,275	1,465
(e) Sowing and planting ..	1,682	4,353	4,647	4,114	6,947	36,481	58,224	43,429
(f) Protection from fire ..	20,076	22,119	25,294	6,882	17,997	19,682	1,11,850	1,03,521
(g) Other works .. ..	11,018	16,668	31,986	25,840	27,170	11,776	1,24,458	1,20,948
Total, A-VIII ..	42,602	49,078	71,304	41,138	64,613	76,284	3,45,019	2,84,020
<b>IX. Miscellaneous—</b>								
Non voted—								
(a) Rates and taxes .. ..	196	81	4	17	35	292	625	736
Voted—								
(b) Law charges .. ..	28	1,449	18	38	1	107	1,570	1,407
(c) Other charges .. ..	1,261	7	1,148	961	1,841	13,705	18,923	11,876
Total, A-IX ..	1,485	1,537	1,270	945	1,877	14,104	21,118	3,811
Total, A. Conservancy and Works	4,74,914	1,61,743	1,82,855	1,25,016	3,47,029	6,56,378	19,47,935	(a) 15,68,380
<b>B. Establishment.</b>								
<b>I. Salaries—</b>								
Non-voted—								
(a) Conservators .. ..	19,113	12,400	31,116	25,308	24,693	22,901	1,86,531	99,357
(b) Superior officers appointed by Secretary of State	35,995	13,317	24,200	21,272	32,447	28,826	1,61,057	2,69,081
(c) Deputation and other allowances.	236	..	..	..	..	..	236	8,53,710
Voted—								
(d) Superior Officers appointed in India.	27,572	42,860	34,962	41,295	24,840	43,968	2,20,497	2,68,005
(e) Subordinate forest and Depot establishment.	1,42,966	2,22,425	2,78,380	1,77,890	1,84,229	1,52,714	11,58,604	42,358
(f) Office establishments ..	52,310	65,050	67,788	64,613	59,833	60,291	3,69,885	512
(g) Deputation and other allowances.	11,365	10,501	129	2,057	10,036	24,786	58,874	34,364
Total, B-I ..	2,89,557	3,72,553	4,36,575	3,32,435	3,36,078	3,38,486	21,05,684	14,97,635
<b>II. Travelling allowance—</b>								
(a) Conservators .. ..	4,400	1,846	4,923	2,780	5,769	5,497	25,215	8,366
(b) Superior officers .. ..	22,203	15,473	18,457	15,944	13,982	22,849	1,08,908	56,864
(c) Subordinate Forest and Depot establishments.	43,780	56,215	63,430	41,035	46,512	39,954	2,90,926	1,61,955
(d) Office establishment ..	15,069	15,679	16,666	9,029	12,457	12,300	81,194	50,770
Total, B-II ..	85,446	89,213	1,03,476	68,788	78,720	80,600	5,06,243	2,77,955
<b>III. Contingencies—</b>								
Non-voted—								
Rates and taxes .. ..	823	578	399	314	386	465	2,965	66,968
Voted—								
(a) Contract items—								
(1) Service postage and telegrams charges.	5,905	5,926	5,877	6,346	5,896	5,900	35,650	..
(2) Other contract contingencies.	12,404	16,984	13,055	10,458	12,343	13,193	78,437	11,586
(b) Non-contract items—								
(1) Rents, rates and taxes.	714	1,089	898	790	1,130	80	4,701	..
(2) Sundries .. ..	1,276	136	475	1,720	2,069	1,634	7,310	..
Total, B-III ..	21,122	24,713	20,704	19,628	21,624	21,272	1,29,068	78,552
Total, B. Establishment ..	3,96,125	4,86,479	5,60,755	4,20,851	4,36,422	4,40,358	27,40,990	18,54,142
Grand Total of Expenditure A and B ..	8,71,039	6,48,222	7,43,610	5,45,867	7,83,451	10,96,736	48,42,366	34,22,522
Surplus ..	4,55,987	16,621	42,642	4,88,451	3,92,056	2,57,282	45,466	11,93,662
Total ..	4,16,052	6,31,601	7,00,968	10,34,318	11,75,507	8,39,454	47,96,900	46,16,184

\* Pay of Chief Conservator, his office establishment, contingencies, etc.  
(a) Includes Refunds (Rs. 98,900.)

ANNUAL FORM No. 81.

Forest Department, Madras Presidency.

Outstandings and liabilities on account of contractors and disbursers for the period from 1st April 1921 to 31st March 1922.

District.	Department debtor.			Department creditor.			Balance due.	
	At commencement of year.	Recoveries in cash and value of supplies and work done during the year.	At close of year.	At commencement of year.	Payments made during year.	At close of year.	To department (outstandings).	By department (liabilities).
<i>First Circle.</i>								
Chief Conservator's Office .. .. .	65 0 11		865 0 11	865 0 11	..	865 0 11	..	..
Direction .. .. .	1,219 6 6	1,219 6 6	22 9 5	1,206 9 3	1,229 2 8	9 12 2	..	..
Ganjam .. .. .	2,64,619 13 9	2,64,619 13 9	1,857 12 8	2,64,681 14 5	2,66,539 10 8	1,919 12 11	..	..
Vizagapatam .. .. .	43,328 13 10	43,328 13 10	348 5 6	43,363 10 3	43,709 15 9	345 1 11	..	..
Godavari, Upper .. .. .	79,273 0 8	79,273 0 8	191 13 9	82,469 5 3	82,661 3 0	191 13 6	..	..
Do. Lower .. .. .	94,850 10 3	94,850 10 3	973 18 9	94,058 10 0	95,032 7 9	973 18 9	..	..
Kistna .. .. .	39,967 15 7	39,967 15 7	667 15 10	39,948 0 4	40,616 0 2	668 15 7	..	..
Total .. .. .	5,23,259 12 7	5,23,259 12 7	4,060 6 6	5,25,728 1 6	5,29,788 8 0	6,528 11 5	..	..
<i>Second Circle.</i>								
Direction .. .. .	2,170 7 8	2,170 7 8	..	2,240 9 5	2,240 9 5	70 1 9	..	..
Guntur .. .. .	67,844 8 9	67,844 8 9	440 1 6	67,918 8 6	68,358 10 0	440 1 6	..	..
Kurnool, East .. .. .	89,566 3 8	89,566 3 8	1,078 14 11	89,267 1 11	90,346 0 10	1,078 14 11	..	..
Do. South .. .. .	91,291 7 10	91,291 7 10	329 18 2	91,206 14 8	91,636 11 10	329 18 2	..	..
Do. West .. .. .	1,26,148 8 3	1,26,148 8 3	955 4 8	1,25,826 14 8	1,26,782 3 4	955 4 8	..	..
Bellary .. .. .	60,898 5 5	60,898 5 5	62 2 11	61,127 10 0	61,189 12 11	62 2 11	..	..
Anantapur .. .. .	67,436 15 10	67,436 15 10	283 0 1	67,452 3 11	67,735 4 0	283 0 1	..	..
Total .. .. .	5,05,356 9 5	5,05,356 9 5	3,149 5 3	5,05,039 15 1	5,08,189 4 4	2,832 10 11	..	..
<i>Third Circle.</i>								
Direction .. .. .	2,829 9 8	2,829 9 8	25 15 8	2,816 14 2	2,842 13 10	25 15 8	..	..
North Cuddapah .. .. .	74,482 15 6	74,482 15 6	30 14 4	74,564 6 4	74,595 4 8	30 14 4	..	..
South do. .. .. .	95,923 12 9	95,923 12 9	457 7 0	96,186 15 6	96,644 6 5	457 7 0	..	..
West do. .. .. .	77,347 4 6	77,347 4 6	334 8 4	80,406 12 2	80,741 4 6	334 8 4	..	..
Nellore .. .. .	97,502 7 9	97,502 7 9	9 13 9	97,784 14 7	97,724 12 4	9 13 9	..	..
Chittoor .. .. .	1,48,079 4 6	1,48,079 4 6	3,532 8 2	1,44,942 4 9	1,48,474 12 11	3,532 8 2	..	..
North Vellore .. .. .	52,179 7 9	52,179 7 9	392 0 9	51,341 15 2	52,233 15 11	392 0 9	..	..
Chingleput .. .. .	54,020 10 3	54,020 10 3	620 8 0	53,635 14 11	54,266 6 11	620 8 0	..	..
Total .. .. .	6,02,365 8 8	6,02,365 8 8	5,403 12 0	6,02,180 1 6	6,07,583 13 6	5,218 4 10	..	..
<i>Fourth Circle.</i>								
Direction .. .. .	1,235 11 9	1,235 11 9	37 15 1	1,231 0 3	1,268 15 4	37 15 1	..	..
South Vellore .. .. .	52,860 14 9	52,860 14 9	598 2 7	52,606 13 1	53,104 15 8	598 2 7	..	..
West do. .. .. .	49,501 8 8	49,501 8 8	293 5 10	49,357 13 9	49,651 3 7	293 5 10	..	..
East Salem .. .. .	59,134 0 2	59,134 0 2	1,524 12 8	58,277 15 3	59,802 11 11	1,524 12 8	..	..
North do. .. .. .	82,830 2 1	82,830 2 1	208 12 7	83,373 5 5	83,640 2 0	208 12 7	..	..
Central do. .. .. .	56,971 14 1	56,971 14 1	666 7 4	56,747 3 0	57,413 10 4	666 7 4	..	..
South do. .. .. .	74,798 9 10	74,798 9 10	936 1 6	74,622 7 2	75,558 8 8	936 1 6	..	..
Forest Engineer's Office .. .. .	22,074 9 5	22,074 9 5	1,202 11 2	21,400 3 4	22,602 14 6	1,202 11 2	..	..
Total .. .. .	3,99,407 6 9	3,99,407 6 9	5,526 4 9	3,97,516 13 3	4,03,043 2 0	3,635 11 3	..	..
<i>Fifth Circle.</i>								
Direction .. .. .	17,887 0 2	17,887 0 2	7 3 9	19,486 15 5	19,494 3 2	7 3 9	..	..
Madura .. .. .	1,44,556 3 10	1,44,556 3 10	755 10 10	1,45,679 5 3	1,46,435 0 1	755 10 10	..	..
Tinnevely .. .. .	96,839 13 6	96,839 13 6	2,989 11 2	95,019 3 7	98,008 14 9	2,989 11 2	..	..
Kollegal .. .. .	68,505 5 8	68,505 5 8	333 4 9	68,196 6 1	68,629 10 10	333 4 9	..	..
Coimbatore, North .. .. .	1,26,954 14 7	1,26,954 14 7	483 14 5	1,26,561 11 10	1,27,045 10 3	483 14 5	..	..
Do. South .. .. .	2,08,331 14 2	2,08,331 14 2	564 12 1	2,09,901 8 2	2,10,466 4 3	564 12 1	..	..
Total .. .. .	6,63,076 3 11	6,63,076 3 11	5,134 9 0	6,64,845 2 4	6,69,979 11 4	6,904 7 5	..	..
<i>Sixth Circle.</i>								
Direction .. .. .	11,891 0 10	11,891 0 10	12,558 3 6	(a) 628 3 6	11,930 0 0	12,558 3 6	..	..
the Nilgiris .. .. .	1,67,184 14 7	1,67,184 14 7	1,165 4 10	1,67,393 13 7	1,68,559 2 5	1,165 4 10	..	..
Wynad .. .. .	94,846 7 11	94,846 7 11	497 6 5	94,770 5 6	95,267 11 11	497 6 5	..	..
Nilambur .. .. .	1,21,025 2 8	1,21,025 2 8	6,119 12 9	1,24,353 3 5	1,30,473 0 2	6,119 12 9	..	..
Mangalore, North .. .. .	77,098 7 0	77,098 7 0	185 7 7	76,931 10 5	77,117 2 0	185 7 7	..	..
Do. South .. .. .	87,366 3 5	87,366 3 5	1,399 3 3	86,257 11 1	87,656 14 4	1,399 3 3	..	..
Forest Research office .. .. .	10,597 11 3	10,597 11 3	1,029 10 11	10,013 11 3	11,043 6 2	1,029 10 11	..	..
Palghat .. .. .	2,15,593 3 1	2,15,593 3 1	3,396 13 2	2,13,716 13 2	2,17,113 10 4	3,396 13 2	..	..
Total .. .. .	7,85,603 2 9	7,85,603 2 9	26,351 14 5	7,72,809 0 11	7,99,160 15 4	13,557 12 7	..	..
Grand total, Presidency .. .. .	34,79,132 13 0	34,79,932 13 0	50,491 4 10	34,68,119 2 7	35,18,610 9 5	38,677 10 5	..	..

(a) Due to the transfer to Nilambur division of a debit of Rs. 1,944-5-1, being balance of advance paid to the Inspector of Livestock, Calicut, for the purchase of bulls for Government at Dharwar.

ACCOUNTANT-GENERAL'S OFFICE,  
MADRAS, 16th August 1922.

C. SUBRAHMANYA AYYAR,  
Deputy Accountant-General.

ANNUAL FORM No. 82.

Forest Department, Madras Presidency.

Revenue received and outstandings on account of revenue during 1921-22.

District,	Particulars.	Outstandings at commencement of year.			Value of sales and other revenue during year.			Total.			Amount realized during year.			Balance due the depart at end of year
		RS.	A.	P.	RS.	A.	P.	RS.	A.	P.	RS.	A.	P.	
<i>First Circle.</i>														
Direction .. .. .	Timber and other forest produce.	..	..	..	1,350	0	0	1,350	0	0	1,350	0	0	..
Ganjam .. .. .	Do.	3,098	2	6	69,057	5	9	72,155	8	8	{ 68,442	0	0	3,696
Visagapatam .. .. .	Do.	12,090	10	8	40,006	5	10	52,097	0	6	{ (a) 17	0	0	
Godavari, Upper .. .. .	Do.	274	14	3	48,327	15	2	48,602	13	5	{ 49,721	0	0	2,376
Do. Lower .. .. .	Do.	5,803	4	0	1,85,192	14	10	1,90,496	2	10	{ 45,968	0	0	2,634
Kistna .. .. .	Do.	1,379	2	4	61,498	8	0	62,787	5	4	{ 1,89,692	0	0	804
	Total ..	22,146	1	9	4,05,342	12	7	4,27,488	14	4	{ 60,318	0	0	2,469
<i>Second Circle.</i>														
Direction .. .. .	Timber and other forest produce.	..	..	..	15	0	0	15	0	0	15	0	0	..
Bellary .. .. .	Do.	5,019	7	0	92,809	4	0	98,328	11	0	{ 97,014	0	0	1,314
Anantapur .. .. .	Do.	19,002	10	6	1,54,838	11	5	1,73,841	5	11	{ (a) 1,69,879	0	0	8,911
Guntur .. .. .	Do.	1,594	10	0	1,06,646	14	0	1,08,241	8	0	{ 50	11	2	
Kurnool, East .. .. .	Do.	50	0	0	69,569	4	0	69,619	4	0	{ (a) 1,07,084	0	0	1,157
Do. South .. .. .	Do.	101	8	0	84,277	12	0	84,379	4	0	{ (a) 65,339	0	0	4,230
Do. West .. .. .	Do.	15,166	7	3	1,07,727	0	9	1,22,893	8	0	{ (a) 50	0	0	
	Total ..	40,984	10	9	6,16,383	14	2	6,57,818	8	11	{ 82,624	0	0	(c) 1,755
											{ (a) 1,09,646	0	0	95
											{ (d) 13,152	8	0	
<i>Third Circle.</i>														
Cuddapah, North .. .. .	Timber and other forest produce.	{ 7,700	12	0	40,141	4	10	47,732	0	10	{ 6,30,263	0	0	12,464
Do. South .. .. .	Do.	{ (a) — 110	0	0	36,850	11	6	52,239	11	6	{ (a) 70,823	9	2	
Do. West .. .. .	Do.	{ 7,928	11	6	71,769	5	5	79,698	0	11	{ (a) 13,253	3	2	
Nellore .. .. .	Do.	{ 52,016	6	10	2,37,051	14	4	2,88,970	9	2	{ 6,44,854	3	2	
Chingleput .. .. .	Do.	{ (a) — 97	12	0	63,580	11	11	68,774	4	2	{ 41,545	2	4	6,186
Chittoor .. .. .	Do.	{ 5,267	0	3	1,43,515	5	5	1,45,970	5	5	{ 35,321	9	6	16,918
Vellore, North .. .. .	Do.	{ (a) — 73	8	0	1,57,561	14	5	1,71,399	14	5	{ 70,823	9	2	8,874
	Total ..	{ 17,270	4	5	7,50,471	3	10	8,54,784	14	5	{ 2,39,023	1	7	49,947
		{ (b) — 14,815	4	5							{ 64,014	10	2	4,759
		{ (c) — 14,331	14	1							{ 1,36,062	5	6	9,907
		{ (a) — 151	6	10							{ 1,24,926	0	10	46,473
		{ (c) — 392	7	3							{ 1,19,954	1	1	1,43,068
		{ — 15,640	6	6							{ 7,11,716	7	1	
<i>Fourth Circle.</i>														
Direction .. .. .	Timber and other forest produce.	..	..	..	2,306	0	0	2,306	0	0	2,306	0	0	..
Vellore, South .. .. .	Do.	57,590	4	8	1,91,777	4	5	2,49,307	9	1	{ 2,25,027	0	0	21,437
Do. West .. .. .	Do.	9,803	2	11	1,55,401	2	5	1,65,204	5	4	{ (a) 2,843	0	0	
Salem, East .. .. .	Do.	18,010	2	5	1,63,750	4	5	1,81,760	6	10	{ 1,57,267	0	0	7,237
Do. North .. .. .	Do.	7,185	15	8	2,02,578	9	5	2,09,764	9	1	{ (a) 1,73,428	0	0	7,389
Do. Central .. .. .	Do.	24,010	13	4	1,05,223	4	3	1,29,234	1	7	{ (a) 943	2	0	
Do. South .. .. .	Do.	10,084	14	5	1,69,185	1	7	1,79,270	0	0	{ (a) 1,94,324	0	0	13,211
Forest Engineer .. .. .	Do.	..	..	..	67	0	0	67	0	0	{ (a) 2,229	0	0	7,186
	Total ..	1,26,685	5	5	9,90,228	10	6	11,16,913	15	11	{ (a) 3,665	9	9	
											{ (a) 1,73,481	0	0	5,779
											{ (a) 10	0	0	..
											{ (a) 67	0	0	

Note for First Circle. (a) Out of total outstandings of Rs. 11,980-14-4 the amount actually due on or before 31st March 1922 was Rs. 10,132-12-6. (a) Written off the accounts.

Note for Second Circle. (b) Out of the amount Rs. 755 alone fell due within the year. (c) Out of the amount Rs. 375 alone fell due within the year. (d) (Rs. 13,152-8-0) written off by Government in their Proceedings Mis. No. 2280, dated 14th December 1921.

Note for Third Circle. (a) Elimination on account of erroneous demand. (b) Written off as irrecoverable under G.O. Mis. No. 2044, Development, dated 1st November 1921. (c) Do. under Chief Conservator's Proceedings No. 1053-Rout., dated 8th July 1921.

Note for Fourth Circle. (a) Written off the accounts

## Revenue received and outstandings on account of revenue during 1921-22—cont.

District.	Particulars.	Outstandings at commence- ment of year.	Value of sales and other revenue during year.	Total.	Amount realized during year.	Balance due to the department at end of year.
<i>Fifth Circle.</i>						
Kollégál .. .. .	Timber and other forest produce.	Rs. A. P. 3,913 0 0	Rs. A. P. 91,310 1 11	Rs. A. P. 95,223 1 11	Rs. A. P. 94,080 4 8	Rs. A. P. 1,142 13 8
Coimbatore, North .. .. .	Do.	4,285 0 0	3,74,242 2 10	3,78,527 2 10	3,40,471 7 0	38,056 11 10
Do. South .. .. .	Do.	92,486 3 4	3,81,557 7 4	4,24,043 10 8	3,52,150 4 6	70,893 6 2
Madura .. .. .	Do.	76,455 7 1	1,61,499 0 1	2,37,954 7 2	1,86,393 5 8	51,161 14 7
Tinnevely .. .. .	Do.	69,911 15 0	2,08,817 2 2	2,78,729 1 2	2,05,416 13 2	73,812 4 0
Direction .. .. .	Do.	..	86 2 1	86 2 1	86 2 1	..
Forest Engineer .. .. .	Do.	..	169 6 2	169 6 2	169 6 2	..
	Total ..	2,47,051 9 5	11,67,681 6 7	14,14,733 0 0	11,79,767 10 10 399 3 4	2,84,566 1 10
<i>Sixth Circle.</i>						
Mangalore, North .. .. .	Timber and other forest produce.	19,852 7 6	95,232 11 0	1,15,085 2 6	96,243 10 10 (a) 1,071 3 7	17,770 4 1
Do. South .. .. .	Do.	10,374 14 5	60,551 10 3	70,926 8 8	60,719 15 3 (a) 5,919 9 7	4,286 16 10
Wynaad .. .. .	Do.	1,63,218 2 7	75,698 11 3	2,38,916 13 10	1,34,992 7 5 (a) 885 0 0	1,03,539 6 5
Nilambur .. .. .	Do.	1,48,522 5 0	1,68,701 5 11	3,17,223 10 11	2,82,012 14 7 (a) 1,09,946 6 1	35,210 12 4
The Nilgiri .. .. .	Do.	12,712 8 2	1,05,377 8 2	1,18,090 0 4	194 15 1 (a)	7,948 11 2
Palghat .. .. .	Do.	17,879 0 3	1,62,102 0 9	1,72,962 7 7	1,56,799 2 0	16,153 5 7
Forest Research Office Direction .. .. .	Do.	* — 7,028 9 5	25 13 5	25 13 5	25 13 5	..
	Do.	..	18 0 0	18 0 0	18 0 0	..
	Total ..	3,65,530 12 6	6,67,707 12 9	10,33,238 9 3	8,40,758 5 7 (a) 7,570 12 3	1,84,909 7 5
Grand total, Presidency ..		9,06,662 2 5	45,97,815 12 5	55,04,477 14 10	48,53,197 6 0	6,51,260 8 10

Note for Fifth Circle. { \* Written off the accounts.  
Note.—Of the total outstandings of Rs. 2,34,556-1-10 the amount actually due on or before 31st March 1922 was Rs. 85,907-3-6.

Note for Sixth Circle. { (a) Amounts written off or removed from demand, owing to cancellation of sales.  
\* Transferred to V Circle on account of Mettupalaiyam range.  
Note.—Out of the total outstandings of Rs. 1,84,909-7-5, the amount actually due on or before 31st March 1922, was Rs. 1,67,533-7-5.



FOREST DEPARTMENT

lxi

ANNUAL FORM No. 83.  
Forest Department, Madras Presidency.  
Financial results of the year 1921-22.

District.	Timber and other produce removed from the forests by Government Agency.		Other revenue.		Formation, protection and improvement of forests.	Total.	
	Receipts.	Charges.	Receipts	Charges.	Charges.	Receipts.	Charges.
<i>First Circle.</i>							
	RS.	RS.	RS.	RS.	RS.	RS.	RS.
Ganjam .. ..	11,722	3,73,309	57,363	25,000	1,22,961	69,085	5,21,270
Vizagapatam .. ..	852	1,644	48,533	47,137	11,592	49,385	60,173
Godavari, Upper .. ..	24,397	15,641	21,679	31,159	47,867	45,976	97,667
Do. Lower .. ..	1,051	9,460	1,95,213	1,04,938	20,225	1,96,264	1,34,623
Kistna .. ..	140	4,940	64,432	37,460	14,936	64,572	57,306
Total .. ..	38,162	4,04,994	3,87,120	2,48,694	2,17,351	4,25,282 (a) -10,230	8,71,039
<i>Second Circle.</i>							
Bellary .. ..	120	..	96,896	54,397	24,236	97,016	78,633
Anantapur .. ..	90	47	1,69,792	64,372	27,177	1,69,882	91,596
Gunthur .. ..	142	..	1,03,944	66,307	31,575	1,07,086	97,682
Kurnool, East .. ..	16,627	6,449	48,715	65,001	33,299	65,342	1,06,749
Do. South .. ..	638	166	81,988	75,943	38,401	82,626	1,14,510
Do. West .. ..	24,316	22,674	85,333	96,339	40,039	1,09,649	1,59,052
Total .. ..	41,933	31,336	5,89,668	4,22,359	1,94,527	6,31,601	6,48,222
<i>Third Circle.</i>							
Caddapah, North .. ..	125	..	41,420	63,630	27,911	41,545	91,541
Do. South .. ..	2,593	475	32,729	77,889	40,920	35,322	1,19,284
Do. West .. ..	140	..	70,833	60,979	29,122	70,823	90,101
Nellore .. ..	69,126	7,451	1,69,897	89,862	39,336	2,39,023	1,36,649
Chingleput .. ..	69	12	63,946	53,876	25,188	64,015	79,076
Chittoor .. ..	1,588	504	1,34,474	99,912	58,277	1,36,062	1,58,693
Vellore, North .. ..	830	135	1,24,096	42,000	26,131	1,24,926	63,266
Total .. ..	74,471	8,577	6,37,245	4,88,148	2,46,885	7,11,716 (a) -10,748	7,43,410
<i>Fourth Circle.</i>							
Vellore, South .. ..	98,323	8,235	1,26,771	69,299	40,783	2,25,094	1,16,317
Do. West .. ..	86,300	7,856	70,967	49,125	12,939	1,57,267	69,920
Salem, East .. ..	19,700	3,556	1,53,728	69,175	17,332	1,73,428	90,063
Do. North .. ..	1,46,985	24,295	47,339	45,490	27,430	1,94,324	97,215
Do. Central .. ..	10,161	2,433	1,08,221	60,790	15,791	1,18,382	79,014
Do. South .. ..	11,833	2,028	1,61,648	72,271	17,039	1,73,481	91,338
Total .. ..	3,73,302	48,403	6,68,674	3,66,150	1,31,314	10,41,976 (a) - 9,964 (c) - 2,306	5,45,867
<i>Fifth Circle.</i>							
Kollegal .. ..	35,072	6,732	59,059	57,210	23,470	94,131	87,412
Coimbatore, North .. ..	2,13,370	26,610	1,27,151	82,029	44,642	3,40,521	1,51,281
Do. South .. ..	2,31,632	1,71,866	1,21,570	39,083	55,260	3,53,202	2,66,229
Madura .. ..	2,242	2,371	1,84,206	72,507	71,333	1,86,448	1,46,211
Tinnevely .. ..	1,927	1,945	2,03,541	81,407	48,966	2,05,468	1,32,318
Total .. ..	4,84,243	2,09,544	6,95,527	3,32,236	2,41,671	(d) 11,79,770 (a) - 2,460	7,83,451
<i>Sixth Circle.</i>							
Mangalore, North .. ..	20,452	9,923	75,795	49,278	22,845	96,217	82,047
Do. South .. ..	26,590	56,241	34,133	27,626	22,415	60,723	1,06,282
Wynnad .. ..	95,335	80,088	39,611	24,052	28,708	1,34,996	1,31,848
Nilambur .. ..	2,69,069	1,07,375	12,947	10,437	44,401	2,82,016	1,62,213
The Nilgiris .. ..	73,853	1,55,158	56,598	26,221	48,968	1,09,949	2,30,347
Palghat .. ..	70,075	1,66,600	85,727	49,962	1,27,247	1,56,802	3,43,809
Forest research office .. ..	13	..	13	..	37,345	26	37,345
Total .. ..	5,54,937	5,75,385	2,85,822	1,86,576	3,31,970	8,40,759 (a) - 1,305	10,93,891 (b) + 2,845
Grand total, Presidency.	15,67,048	12,78,239	32,64,056	20,44,163	13,63,678	47,93,491	46,48,925

(a) Refunds.

(b) Added as per Accountant-General's audited figures.

(c) Excludes Rs 2,306 being revenue realized from other circles.

(d) Includes amounts credited in the Nilgiri and South Vellore divisions.

\* The figures under total—Receipts do not tally with those given in Form No. 80.

ANNUAL FORM No. 84.

PART I.

Forest Department, Madras Presidency.

Statement of elephants and other live-stock during 1921-22.

District.	On hand at the commencement of the year.		Number received during the year.	Number disposed of during the year.	On hand at the end of the year.		Total expenditure on maintenance during the year.
	Number.	Value.			Number.	Value.	
(1) ELEPHANTS.							
<i>First Circle.</i>							
Godavari, Upper .. ..	2	Rs. 3,700	..	..	2	Rs. 3,700	Rs. A. P. 2,023 14 8
<i>Second Circle.</i>							
Kurnool, West .. ..	2	5,000	..	..	2	5,000	2,036 2 2
<i>Third Circle—Nil.</i>							
<i>Fourth Circle—Nil.</i>							
<i>Fifth Circle.</i>							
Coimbatore, South .. ..	22	75,500	6	2	26	89,500	19,924 13 11
<i>Sixth Circle.</i>							
Mangalore, South .. ..	2	10,000	..	..	2	10,000	2,833 4 7
Wynaad .. ..	29	79,900	7	15	21	74,800	23,014 9 5
Nilambur .. ..	24	92,000	9	26	7	81,600	(a) 26,914 5 9
The Nilgiris .. ..	86	76,700	50	9	77	1,82,900	49,487 1 4
Palghat .. ..	8	27,300	..	8	..	..	..
Total ..	99	2,85,900	66	58	107	2,98,700	1,02,199 5 1
Grand Total—Elephants—Presidency.	125	3,70,100	72	60	137	3,96,900	1,26,184 8 5
(2) OTHER LIVE-STOCK.							
<i>First Circle.</i>							
Genjam .. ..	53	1,937	15	24	44	2,281	5,419 12 4
<i>Second Circle.</i>							
Kurnool, West .. ..	12	780	..	2	10	715	911 11 1
<i>Third Circle.</i>							
Chingleput .. ..	1	35	..	..	1	35	20 0 0
Chittoor .. ..	3	122	..	..	3	122	3 0 0
Total ..	4	157	..	..	4	157	23 0 0
<i>Fourth Circle—Nil.</i>							
<i>Fifth Circle.</i>							
Coimbatore, South .. ..	64	4,440	9	5	68	5,095	22,200 0 1
<i>Sixth Circle.</i>							
Mangalore, South .. ..	12	1,015	..	2	10	845	3,294 8 1
Wynaad .. ..	..	..	50	8	42	3,201	4,599 3 2
Nilambur .. ..	85	6,196	..	77	8	..	(a) .. ..
The Nilgiris .. ..	11	1,324	12	..	23	(b) 3,369	7,524 6 3
Palghat .. ..	40	2,793	72	54	58	4,564	26,927 12 0
Total ..	148	11,328*	134	141	141	11,979	42,345 13 9
Grand Total—Other Live-stock—Presidency.	281	18,642	168	172	267	20,177	70,900 5 0

(a) Includes expenditure on maintenance of buffaloes.  
 (b) Information is not available.

FOREST DEPARTMENT

PART II.

Forest Department, Madras Presidency.

Statement of elephants gone off the list during the year 1921-22.

District.	Names.	When purchased or otherwise obtained by Government.	Age.	How disposed of.
<i>First Circle—Nil.</i>				
<i>Second Circle—Nil.</i>				
<i>Third Circle—Nil.</i>				
<i>Fourth Circle—Nil.</i>				
<i>Fifth Circle.</i>				
Coimbatore, South.	1. Nandan ..	Captured on 25th September 1920 ..	5	Died on 22nd May 1921. Do. 21st March 1922.
	2. Ambal ..	Do. 19th September 1920 ..	25	
<i>Sixth Circle.</i>				
Mangalore, South.	....	....	..	....
Wynaad	1. Sampson ..	Purchased 1885 ..	49	Died on 26th Feb. 1922.
	2. Pooch ..	Born on 17th November 1918 ..	3	
	3. Haig ..	Born on 26th November 1918 ..	3	
	4. Ganesh ..	Captured in 3rd August 1919 ..	10	
	5. Narayani ..	Do. 11th September 1919 ..	10	
	6. Sundar ..	Do. 7th July 1919 ..	4	
	7. Kukmani ..	Do. 22nd December 1919 ..	8	
	8. Mohan ..	Do. 23rd December 1919 ..	6	
	9. Lilly ..	Do. 14th October 1918 ..	47	
	10. Paru ..	Do. 24th February 1921 ..	10	
	11. Kalyani ..	Do. 27th February 1921 ..	8	
	12. Sundari ..	Do. Do. ..	1	
	13. Rathi ..	Do. 5th April 1921 ..	6	
	14. Rahu ..	Do. Do. ..	7	
	15. Banu ..	Do. 8th June 1921 ..	2	
Nilambur	1. Togo ..	Captured on 19th June 1905 ..	18	Transferred to the Nilgiris
	2. Murree ..	Do. 20th March 1905 ..	24	
	3. Moola Baksh ..	Do. 6th April 1911 ..	21	
	4. Kamala ..	Do. 3rd February 1912 ..	28	
	5. Shankar ..	Do. 21st May 1907 ..	18	
	6. Caesar ..	Do. 12th February 1910 ..	16	
	7. Rholly ..	Do. 17th April 1906 ..	19	
	8. Bhavani ..	Do. 9th April 1913 ..	18	
	9. Jhelum ..	Do. 27th June 1902 ..	33	
	10. Godavari ..	Do. 12th March 1915 ..	30	
	11. Kurokki ..	Do. 19th February 1905 ..	23	
	12. Lira ..	Do. 7th March 1909 ..	28	
	13. Norah ..	Do. 12th March 1906 ..	24	
14. Sita ..	Do. 13th September 1895 ..	32		
15. Kuttiparu ..	Do. 25th August 1907 ..	22		
16. Sulej ..	Do. 27th February 1902 ..	31		
17. Tamburatti ..	Do. 3rd February 1913 ..	22		
18. Sirdar ..	Do. 7th August 1906 ..	21		
19. Jhelum ..	Captured in January 1886 ..	44		
20. Jampari ..	Purchased in March 1903 ..	47		
21. Padmini ..	Captured on 10th February 1896 ..	53		
22. Damayanti ..	Do. 21st January 1915 ..	31		
23. Savitri ..	Do. 14th May 1912 ..	42		
24. Forester ..	Do. 16th March 1906 ..	22		
25. Dostijehan ..	Born on 3rd February 1912 ..	20		
26. Tara ..	Captured on 19th January 1921 ..	1		
The Nilgiris	1. Norah ..	Captured on 12th March 1906 ..	24	Transferred to Nilambur on 13th May 1921. Died on 22nd May 1921. Transferred to Wynaad. Died on 15th Nov. 1921. Died on 30th Jan. 1922 Died on 8th Feb. 1922. Died on 27th March 1922. Died on 13th Feb. 1922. Died on 19th Jan. 1922.
	2. Moyar ..	Born on 28th November 1919 ..	2	
	3. Caesar ..	Captured on 12th February 1910 ..	17	
	4. Banu ..	Do. 8th June 1921 ..	2	
	5. Kalyani ..	Do. 27th February 1921 ..	3	
	6. Lilly ..	Do. 14th October 1918 ..	47	
	7. Nakula ..	Do. 18th June 1921 ..	8	
	8. Sukumara ..	Captured in infancy on 1st February 1922 ..	..	
	9. Calf of Parvati ..	Born on 2nd January 1922 ..	..	
Palghat	1. Murree ..	Captured on 20th March 1905 ..	24	Transferred to Nilambur in May 1921.
	2. Chaukar ..	Do. 21st May 1907 ..	18	
	3. Kamala ..	Do. 3rd February 1922 ..	28	
	4. Moola Baksh ..	Do. 6th April 1911 ..	24	
	5. Kurokki ..	Do. 19th February 1905 ..	23	
	6. Togo ..	Do. 19th June 1905 ..	18	
	7. Caesar ..	Do. 12th February 1910 ..	16	
	8. Rholly ..	Do. 17th April 1906 ..	19	

**L REPORT OF THE**  
**ANNUAL FORM No. 85.**  
**Statement of Stores, Tools and Plant for 1921-22.**  
**Madras Presidency.**

	Stores								Tools				Difference in value.	
	On hand at the commencement of the year.		On hand at the end of the year.		On hand at the commencement of the year.		On hand at the end of the year.		In favour of the year.	Against the year.				
	Number	Value	Number	Value	Number	Value	Number	Value						
<b>First Circle.</b>														
Direction ..	1	Rs. 400	1	Rs. 400	371	Rs. 4,357	369	Rs. 4,350	372	Rs. 4,757	370	Rs. 4,750	..	7
Ganjam ..	122	47,239	123	50,938	4,398	6,910	4,803	11,152	4,520	54,149	4,928	54,090	7,941	..
Vizagapatam ..	62	10,641	66	13,466	1,724	4,343	1,768	4,486	1,786	14,984	1,834	17,952	2,966	..
Godavari, Upper ..	128	33,449	126	38,480	3,564	13,247	3,652	15,183	3,692	46,696	3,778	53,613	6,917	..
Godavari, Lower ..	157	45,250	157	45,250	2,281	4,820	2,341	5,348	2,438	50,070	2,498	50,598	528	..
Kistna ..	36	5,708	36	6,656	1,824	3,954	2,257	17,607	1,860	19,660	2,293	24,263	4,603	..
<b>Total ..</b>	<b>506</b>	<b>1,42,686</b>	<b>509</b>	<b>1,55,140</b>	<b>14,162</b>	<b>47,631</b>	<b>35,190</b>	<b>58,126</b>	<b>14,668</b>	<b>1,90,316</b>	<b>15,699</b>	<b>2,13,266</b>	<b>22,950</b>	<b>7</b>
<b>Second Circle.</b>														
Direction ..	..	..	..	..	20	481	231	7,084	20	481	231	7,084	6,603	..
Bellary ..	40	45,597	38	41,578	3,242	13,258	3,688	14,667	3,282	58,855	3,726	58,245	..	3,610
Anantapur ..	32	47,676	32	50,629	2,850	5,763	3,593	5,974	2,882	53,439	3,625	56,603	3,164	..
Guntur ..	27	12,155	28	14,215	2,701	7,299	6,037	9,653	2,728	19,454	6,065	23,868	4,414	..
Karnool, East ..	91	70,180	82	72,292	4,082	11,076	3,995	11,800	4,173	81,258	4,073	84,092	2,830	..
Do. South ..	70	52,208	68	51,802	2,664	7,665	2,555	7,702	2,684	59,872	2,623	59,604	..	369
Do. West ..	70	91,817	67	93,795	4,257	21,692	4,274	23,008	4,327	1,13,509	4,541	1,16,553	3,344	..
<b>Total ..</b>	<b>330</b>	<b>3,19,633</b>	<b>315</b>	<b>3,24,311</b>	<b>19,716</b>	<b>67,234</b>	<b>24,574</b>	<b>79,988</b>	<b>20,046</b>	<b>3,86,867</b>	<b>24,889</b>	<b>4,04,249</b>	<b>17,382</b>	<b>..</b>
<b>Third Circle.</b>														
Direction ..	..	..	..	..	337	1,788	319	3,802	337	1,788	319	3,802	2,014	..
Cuddapah, North ..	47	21,145	47	22,784	1,497	3,628	1,513	4,520	1,544	24,673	1,560	27,304	2,631	..
Cuddapah, South ..	53	36,218	54	52,085	1,844	8,539	2,669	10,631	1,897	44,757	2,723	62,776	17,959	..
Cuddapah, West ..	34	14,046	34	13,276	1,869	7,356	2,276	6,121	1,903	21,402	2,310	19,397	..	2,005
Nellore ..	50	29,001	47	26,463	56,005	43,824	39,640	39,139	56,055	72,825	39,687	65,602	..	7,223
Chingleput ..	25	10,861	26	15,635	2,348	3,687	2,436	3,807	2,373	448	2,462	19,442	4,594	..
Chittoor ..	41	30,565	47	33,713	4,015	10,648	4,112	11,621	4,056	41,218	4,159	45,334	4,121	..
Vellore, North ..	37	19,438	36	19,793	1,549	4,514	2,501	4,975	1,586	23,952	2,537	24,774	822	..
Vernacular Training School ..	..	..	..	..	668	1,166	670	1,644	668	1,166	670	1,644	478	..
<b>Total ..</b>	<b>287</b>	<b>1,61,274</b>	<b>291</b>	<b>1,83,755</b>	<b>70,132</b>	<b>85,050</b>	<b>56,136</b>	<b>86,260</b>	<b>70,419</b>	<b>2,46,324</b>	<b>56,427</b>	<b>2,70,015</b>	<b>23,691</b>	<b>..</b>
<b>Fourth Circle.</b>														
Direction ..	..	..	..	..	220	1,753	225	1,681	220	1,753	225	1,681	..	72
Vellore, South ..	53	41,555	49	39,716	2,404	5,843	2,403	5,643	2,467	47,398	2,452	45,379	..	2,019
Do. West ..	(b) 36	2,878	38	30,029	2,751	7,611	2,376	6,065	2,787	36,396	2,516	36,094	..	302
Salem, East ..	62	33,588	61	31,111	2,205	13,836	2,721	14,048	2,267	47,424	2,782	45,159	..	2,265
Do. North ..	53	26,175	57	29,670	2,854	5,282	2,257	30,325	2,912	58,997	2,314	59,995	998	..
Do. Central ..	69	54,621	71	53,103	2,686	15,106	2,743	12,563	2,755	69,727	2,814	65,666	..	4,061
Do. South ..	54	30,841	55	33,795	4,768	9,328	5,061	10,220	4,822	40,629	5,116	44,015	3,346	..
Vernacular Training School ..	..	..	..	..	996	1,990	946	4,356	996	1,990	946	4,356	2,366	..
<b>Total ..</b>	<b>332</b>	<b>2,15,565</b>	<b>331</b>	<b>2,17,424</b>	<b>18,884</b>	<b>88,789</b>	<b>19,234</b>	<b>84,921</b>	<b>19,216</b>	<b>3,04,354</b>	<b>19,565</b>	<b>3,02,345</b>	<b>..</b>	<b>2,009</b>
<b>Fifth Circle.</b>														
Direction ..	1	54	1	52	427	3,924	388	3,664	428	3,978	389	3,716	..	262
Kollegal ..	34	20,591	43	33,298	20,417	5,667	50,764	5,805	20,451	26,253	50,807	39,103	12,850	..
Coimbatore, North ..	77	95,427	92	1,01,867	2,656	10,582	2,392	10,153	2,733	1,05,964	2,484	1,12,023	6,056	..
Do. South ..	71	55,389	71	53,299	25,350	48,799	23,465	49,594	25,421	1,04,488	23,536	1,02,893	..	1,595
Palghat ..	124	1,02,769	126	1,08,670	3,231	6,029	3,194	4,778	3,355	1,08,798	3,320	1,11,448	2,650	..
Do. South ..	..	52,338	109	55,856	1,776	4,431	1,769	5,709	1,889	66,769	1,878	61,555	4,790	..
..	..	..	..	..	539	2,190	484	2,346	539	2,190	484	2,346	156	..
Vernacular Training Office ..	..	..	..	..	256	1,503	256	1,503	256	1,503	256	1,503	..	..
<b>Total ..</b>	<b>420</b>	<b>3,26,868</b>	<b>442</b>	<b>3,51,042</b>	<b>54,652</b>	<b>83,075</b>	<b>82,712</b>	<b>83,552</b>	<b>55,072</b>	<b>4,09,943</b>	<b>83,154</b>	<b>4,34,594</b>	<b>24,651</b>	<b>..</b>
<b>Sixth Circle.</b>														
Direction ..	..	..	..	..	173	4,702	173	4,702	..	..	173	4,702	4,702	..
Mangalore, North ..	51	29,100	51	29,300	(c) 808	4,979	755	4,770	(c) 859	34,079	816	34,570	491	..
Do. South ..	29	26,625	35	34,875	871	3,671	873	4,262	900	30,296	908	30,137	8,841	..
Wynad ..	59	55,909	94	68,514	2,504	6,310	2,645	9,747	2,593	62,219	2,729	78,261	16,042	..
Nilambur ..	(d) ..	..	..	..	..	..	..	..	..	..	..	..	..	..
The Nilgiris ..	74	38,621	75	39,723	2,613	10,492	2,646	12,053	2,687	49,113	2,722	51,776	2,663	..
Palghat ..	(e) 45	29,351	50	16,747	2,031	22,313	2,990	94,343	2,076	48,664	3,040	1,11,290	62,628	..
The Forest Research officer ..	(f) 4	760	3	732	228	5,248	132	3,580	231	6,008	186	4,312	..	1,696
<b>Total ..</b>	<b>291</b>	<b>1,77,966</b>	<b>309</b>	<b>1,90,391</b>	<b>9,055</b>	<b>53,013</b>	<b>10,274</b>	<b>1,23,657</b>	<b>9,346</b>	<b>2,30,379</b>	<b>10,583</b>	<b>3,24,048</b>	<b>95,365</b>	<b>1,696</b>
<b>Grand total, Presidency ..</b>	<b>2,166</b>	<b>13,43,391</b>	<b>2,197</b>	<b>14,22,063</b>	<b>1,86,601</b>	<b>4,24,792</b>	<b>2,08,120</b>	<b>5,26,454</b>	<b>1,88,767</b>	<b>17,71,183</b>	<b>2,16,317</b>	<b>19,47,517</b>	<b>1,80,327</b>	<b>..</b>

\* Difference between the closing balance of 1920-21 and the present opening balance is due to the adoption of correct figures furnished by the District Forest Officer. (a) East Kurnool.—The difference between the closing balance of previous year and the opening balance of this year is due to the adoption of correct figures furnished by the District Forest Officer. (b) The difference in the number of buildings in the opening balance is due to grouping of 10 separate buildings into 3 joint buildings. (c) Revised figure furnished by the District Forest Officer. (d) The statement has not been furnished by the District Forest Officer as the records were all destroyed in the Mappilla rebellion. (e) Excludes buildings and stores of the Mettupalaiyam range transferred to North Coimbatore division and includes those of the Mannarghat range transferred from the Nilambur division. (f) Figures furnished by the Forest Research Officer.