

Bengal Forest Dept.

WORKING PLAN

(REVISED)

FOR THE

RESERVED FORESTS

OF THE

JALPAIGURI DIVISION

BY

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INTRODUCTION.

This report is a revision of the working-plan for the Jalpaiguri Forest Division, sanctioned in the Government of Bengal's letter No. 4320, dated 5th December 1899, for ten years, with effect from the Forest year 1896-97, which consequently expires at the end of the Forest year 1905-06.

In the ordinary course the provisions of a revised plan would come into effect from the Forest year 1906-07, but doubts having arisen as to the suitability of the prescriptions of the plan under revision, the forests were visited by the Inspector-General of Forests, and in a note, dated 7th February, 1904, he advised that an alteration in treatment should be introduced without delay. In anticipation of orders, Improvement fellings were substituted for Coppice with Standards in the sâl bearing areas in the season of 1903-04, though the area worked over remained unchanged. In the following working season, 1904-05, fuller effect was given to the Inspector-General of Forests' recommendations. These alterations in treatment were sanctioned by the Local Government in their letter No. 999, dated the 28th May 1904. Some delay has occurred in the preparation of the revised plan owing to the writer having only assumed charge of the Division in November 1903, and being required to make a personal inspection of all portions of the area dealt with and to collect the necessary information in order to draw up the revised plan. The preliminary report on the working-plan was approved by the Inspector-General of Forests in his letter No. 5 W. P., dated the 26th July 1905, and the Government of Bengal have sanctioned the proposals therein being given effect to at once in their letter, No. 2950 T.R., dated the 11th September 1905.

The present plan should be read in conjunction with the original plan as it has not been considered necessary to reproduce all the information given therein.

No special outlay has been incurred in the preparation of this plan, the work having been done by the Divisional Forest Officer alone in addition to his own duties.

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PART I.

SUMMARY OF FACTS ON WHICH THE PROPOSALS ARE BASED.

CHAPTER I. DESCRIPTION OF THE TRACT DEALT WITH.

Section 1. General description.

1. There is hardly anything to add to the description given in the original plan. Severe frost was observed in February 1904. The extension of cultivation of all crops has changed the appearance of the country outside the forests and reduced the area available for grazing.

CHAPTER II. COMPOSITION AND CONDITION OF THE FORESTS.

Section 1. Distribution and area.

2. The area of the Forests is now 113,606 acres=177 square miles. Since 1896, 3,259 acres have been excluded from the forests as follows:—
 2609 acres, comprising the whole of the Tista Forest, have been disforested under Government of Bengal Notification, No. 2607 T. R., dated 28th August 1905.
 502 acres, comprising the area taken up for Railway construction are now under the control of the Bengal Duars Railway Company.
 148 acres, erroneously considered to be within the Reserved Forests, was found to have been included in the grant leased out to the Gaikhata Tea Company and was restored to this company in 1902.

Section 2. State of boundaries.

3. The only other changes of boundary not caused by the above change of area have been due to alterations in the courses of certain rivers previously gazetted as natural boundaries, notably the Dharla, Jaldáka and Dainah rivers. These rivers, by depositing boulders and stones in their own beds, raise the level of these beds until they overtop the surrounding country when the river changes its course; as the old beds soon get covered up with grass and tree growth, their courses are apt to become obliterated in a few years. In one instance a change of river bed has obliterated a demarcated boundary but it will not be so difficult to relay this at any future time as the artificial boundary runs straight for a considerable distance.

Section 3. Legal position.

4. No alterations have to be recorded.

Section 4. Rights.

5. No rights exist.

Section 5. Composition and condition of the crop.

6. The previous working-plan goes into this in great detail giving eight different types. For the purposes of this plan it will be sufficient to distinguish only four types which merge into one another and are found in many places inextricably combined. These are (a) Sâl, (b) Mixed (dry) (c) Evergreen (d) Savannah. The main changes which have taken place have been the spreading of sâl, mixed and evergreen forests into the savannah and the partial retrogression of the sâl forest. This has changed the appearance of the forests considerably in certain parts.

7. Besides this, owing to the past method of working, some 3,594 acres have been converted from High Sâl forests to Coppice with Standards, (see Appendix IV.) Of this area 896 acres was worked over before 1896-97. Had the prescriptions of the plan been fully worked up to, an area of 5,439 acres of sâl forest would have now become Coppice with Standards; owing to want of demand for firewood, however, an area of 1,845 acres escaped being exploited.

8. The condition of the area worked over under Coppice with Standards varies according to the age of the coupe. In the first two or three years after felling, the coppice shoots hold their own fairly well, but by the 4th year the dense mass of creepers which make their appearance as soon as light is let into the forest overtop and smother all coppice shoots. Coppice shoots of sâl get bent by the weight of the creepers above them and appear to lose their vitality. In the 6th year coppice shoots and seedlings of other species, such as *malota*, have overtopped the sâl coppice shoots and seedlings which, except in favourable localities, appear as half dead, suppressed saplings in the 10th year, and by the 12th year have almost disappeared, the forest having become a dense thicket of creepers and poles, 18" to 24" in girth and some 30' high, with a few standards of sâl scattered here and there. The first coppice felling took place in 1892-93.

9. This tendency is shown in a marked degree by a recounting in the Dumchi sâl area (244 acres) made after an interval of 10 years had elapsed after the first counting.

The following shows the result:—

Year of counting.	Seedlings under 3" diameter.	Diameter classes.				
		3"-6"	6"-9"	9"-12"	12"-15"	15"-18"
1894-95	Not recorded ...	2,212	2,636	2,832	2,732	1,870
1904-05	Very scarce ...	1,200	1,663	2,523	2,784	2,264
Increase	...	...	...	...	52	394
Decrease	...	1,012	973	309	...	...

This shows that, though there was ample room for an increased production of sâl, large number of seedlings and small poles have disappeared, and there must have been very few replacements. This area has been closed to the felling of sâl, and only dry trees have been removed.

10. Appendix II shows the results of measurements taken in sample Rate of growth given by sample plot measurement. } plots. They confirm the impressions already prevalent that the growth of sâl is more rapid the further east it grows in the Jalpaiguri Division, the growth in Muraghât being more rapid than that in Tondou and a long way ahead of the growth in Apalchand Forest. The difference in growth between trees in untouched forest and the standards in coppiced coupes is remarkable. This difference is not so great as one would be led to expect from the appearance of the position of the trees in both cases, particularly when it is taken into consideration that the standards selected are the best grown and healthiest trees, whereas no discrimination was made in the case of the trees in the untouched forest over half of which would have been removed. Had only trees which would have been reserved as standards been measured in the latter case, it would have been interesting to note the result.

11. The area statement is given in Appendix I.

Section 6. Injuries to which the crop is liable.

12. Fires. A list of fires which occurred during the last eight years is given in Appendix VII.

Creepers. The work done in cutting climbers is given in Appendix III.

Frost. Frost injured numbers of *malota* trees where they were exposed in grass areas during February 1905.

Hail. A hail storm in April 1900 defoliated all sâl trees in North Tondou forest.

Storm. A cyclonic storm in April 1904 uprooted some 3,000 sâl trees a large proportion being over 6 feet in girth.

Insects. Defoliators have constantly attacked sâl. The year 1899 being a particularly bad one; after the cyclone in 1904 a number of standing sâl trees were killed by beetles which attacked them, and many of the windfalls were found to be full of larvæ.

CHAPTER III. SYSTEM OF MANAGEMENT.

Section 1. Past and present system of management.

13. The past system of management is clearly explained in the working-plan now under revision and the present system of management is that laid down in Part II. below.

Section 2. Special works of improvement undertaken.

14. These are also prescribed in the plan under revision. Appendix III. shows the work done in creeper cutting.

Section 3. Past revenue and expenditure.

15. The revenue and expenditure of the Division from 1896-97 are detailed in Appendix V. and the averages of the 9 years were as follows:—

Average yearly revenue	...	58,251
" " expenditure	...	35,738
" " surplus	...	22,513

CHAPTER IV. UTILIZATION OF THE PRODUCE.

Section. 1. Marketable products and quantities consumed in past years.

16. The statement giving the main products consumed and their quantities is given in Appendix VI.

The averages for 9 years were as follows:—

Logs	39,626 cubic feet.
Poles	29,681 do.
Fuel	1,174,258 do.

Revenue from grazing	Rs. 6,178
Do. do. minor products and other sources.	„ 1,951

Section 2. Lines of export.

17. The working-plan under revision, (pages 26, 27,) goes fully into the lines of export which, with the exception of the railway which has extended eastwards from Mál to Madárhát, have not altered appreciably.

18. The Tista and the Dudua are the only rivers utilized for floating purposes. The former is practically open the whole cold weather but the latter, passing via the Jaldáka and Dhurla rivers into the Brahmaputra, is only open for a month or two after the end of the rains. The other rivers have too rapid a current to enable boats to be brought up stream without difficulty and the same objection applies to the first-named rivers during the rainy season.

19. Timber is mostly exported by rail owing to the convenience of rapid transit, but the rates are so high that export by cart to markets south of the district still obtains. Rámshai, Bárodighi and Látaguri on the Bengal Duars Railway are the main stations for the export of timber from the Tondu forest, and Binnaguri station would be the natural outlet for timber from the Muraghát forest, were it not that the rate on the northern section of the railway, that is 0·8 of a pie per maund, per mile, is too high to enable purchasers to profitably remove timber over the long length of line, viz., 44 miles, between Látaguri and Binnaguri, though the distance by road is only 24 miles.

The following figures show the export of timber from the District by rail over the Bengal Duárs Railway in the past five years:—

Years.	Tons.
1900	393
1901	514
1902	199
1903	459
1904	1,010

Section 3. Markets.

2. Nearly every station on the Eastern Bengal State Railway is the nucleus of a market for timber, the most important being Rangpur and Nattore. Mandalghát is the chief market on the Tista river, and Mathabhanga, where the Dudua meets the Jaldáka, is a market from which timber is subsequently carried by large boats to Eastern Bengal. Tea gardens, of which thirty-three now take fuel from the forests, are almost the only customers for firewood. 2,170,282 cubic feet of firewood were removed during 1904-05.

Section 4. Mode of extraction and its cost.

21. Timber is brought to the lines of export by cart at a rate of from two annas to three annas per cubic foot up to a distance of eight miles, according to the size of the logs and the distance they have to be carried. For small logs and scantlings the rate is -/2/- a cubic foot, and for metre gauge sleepers, which are easy to load and carry, the rate is two annas each up to the same distance, which represents a day's carting.

22. Firewood costs about Rs. 5/- a 100 maunds to cut, and from Rs. 5/- to Rs. 15/- to cart according to the lead and condition of the road. It costs from Rs. 18/- to Rs. 27/- a hundred maunds, including royalty, to land wood fuel at the different tea estates, but coal is now used to a great extent, the railway having now reduced the rates so that it can be delivered at railway stations from eight to ten annas per maund.

Section 5. Net value of each class of produce.

23. The net value of each class of produce depends on the position of the forest with reference to the lines of exports and market.

Sâl timber from 4 to 7 annas per cubic foot.

Other ,, from 9 pias to 3 annas per ,,

Sâl poles from 8 annas to 8 rupees each.

Other ,, from 1 anna to 8 annas ,,

Firewood 1/4/- per 100 cubic feet.

Grazing from 4 annas to 6 annas per head per month.

CHAPTER V. MISCELLANEOUS FACTS.

Section 1. The forest staff.

24. The following shows the forest staff at present on duty in the three Ranges.

Range.	Number.		Pay.
Apalchand ...	1	Ranger	50
	1	Forest Guard	12
	2	Do.	8
	2	Do.	7
Upper Tondou ...	1	Deputy Ranger	35
	3	Forest Guards	8
Lower Toudou ...	1	Ranger	80
	1	Deputy Ranger	30
	1	Forest Guard	10
	3	Do.	8
	3	Do.	7
Muraghât ...	1	Ranger	60
	1	Forester	25
	2	Forest Guards	10
	2	Do.	8
	3	Do.	7

The staff is sufficient in point of numbers except during the cold weather, when it is strengthened by the addition of temporary establishment consisting of overseers, special chowkidars and fire patrols. After the working season as much leave as possible is granted in turn to the permanent subordinates to enable them to recruit outside the malarious influences of the forests.

25. The pay of Forest Guards is, however, extremely low, compared with the prevailing rates for labour in the district and is a direct incentive to blackmailing and dishonesty. Frequent resignations amongst this class of subordinates tend to add to the difficulty of protection and improvement of the forest.

Section 2. Labour supply.

26. The greater part of the labour supply in the forests comes from outside the district and is consequently unreliable; Nooniah coolies from Behar do road work and Nepalis undertake creeper cutting, line clearing etc. The rates work out to about one anna per hour's work for daily labour, creeper cutting is done at -/2/- an acre, earthwork 3/- to Rs. 5/- per 1000 cubic feet and line clearing at Re. 1/- per foot wide (cleared) per mile of length. Settlers have been permitted to settle down in the forest and cultivate; they supply labour at -/4/- per day and are invaluable for fire protection.

CHAPTER VII. MISCELLANEOUS FACTS.
 Section 1. The forest staff.
 The following table shows the forest staff as present on duty in the

Pay.		Number	
50	Inspector	1	...
12	Forest Guard	1	
8	Do.	1	
7	Do.	1	...
50	Deputy Ranger	1	
8	Forest Guards	3	...
50	Inspector	1	
30	Deputy Inspector	1	...
10	Forest Guard	1	
8	Do.	1	
7	Do.	1	...
50	Inspector	1	
12	Forest Guard	1	...
10	Do.	1	
8	Do.	1	...

This table is intended to show the number of staff present during the cold weather season. It is supplemented by the addition of temporary establishments consisting of coolies, special constables and the police. After the winter season as much land as possible is granted in return to the Government and the land is returned to the cultivators.

PART II.

FUTURE MANAGEMENT DISCUSSED AND PRESCRIBED.

CHAPTER I. BASIS OF PROPOSALS.

Section I. Working-Circles.

27. It is necessary to make a broad distinction between:—

(a) Sâl producing areas, and

(b) Mixed forest containing little or no sâl

though this distinction cannot be absolute. The sâl producing areas can be conveniently divided into 3 Working-Circles, corresponding with the three ranges which contain sâl, and these are split up into felling series as shown in the following table:—

Sâl Forest.

Working-Circle.	Felling Series.	Block.	Sâl forest.	Mixed forest.	Total stocked area.	Total area.	Remarks.	
			Acres.	Acres.	Acres.			
Apalchand ...	I	Oodlabári ...	1,300	300	1,600	2,339		
		Sealduba ...	1,300	100	1,400	1,405		
		Churabhija ...	850	350	1,200	1,455		
		Hanskháli... ..	1,140	260	1,400	2,952		
		Phuljhora ...	1,000	200	1,200	3,081		
		Chel River ...	600	200	800	1,487		
		Apalchand... ..	1,200	200	1,400	2,042		
		Total ...	7,390	1,610	9,000	14,761		
		II	Chengmári ...	600	150	750	981	
			Malhâti ...	150	100	250	320	
			Total ...	750	250	1,000	1,301	
			Total of Working-Circle	8,140	1,860	10,000	16,062	
Lower Tondu...	Not sud-divided into felling series.	Lower Indong	1,200	100	1,300	1,770		
		Central ...	1,100	200	1,300	1,446		
		Gorumára ..	1,000	400	1,400	1,505		
		Medlajhora	1,600	400	2,000	2,520		
		Barohâti ...	1,200	400	1,600	2,223		
		Bichabanga 2 & 3	500	150	650	690		
		Lâtaguri 3 & 4	800	100	900	2,255		
		Dhupjhora	400	500	900	1,458		
		Tondu 1, 2 & 3	1,000	160	1,160	1,505		
		Bhokulmardi	1,100	300	1,400	1,825		
		Kâkurjhora (part)	400	350	750	800		
		Khairânti	.....	.....	.....	64	
		Total of Working-Circle	10,300	3,060	13,360	18,061		
Muraghât ...	I	North ...	1,000	700	1,700	2,690		
		Central ...	1,600	1,400	3,000	4,004		
		Total ...	2,600	2,100	4,700	6,694	*	
		II	South ...	1,500	1,000	2,500	5,046	
		III	Dalgaon ...	500	300	800	1,471	
		Unworked	Goshaihât	1,876	
	Salbâri ...		.....	.....	.....	16	
		Total of Working-Circle	4,600	3,400	8,000	15,103		

NOTE.—These Working-Circles will hereafter be referred to as the Sâl Working-Circles.

28. (b) Mixed Forest.

The Mixed Forests have been divided into two Working-Circles corresponding with the Ranges in which they occur. Owing to the disforestation of the Tista Block, there is not sufficient Mixed Forest in a compact area, in the Apalchand Range, to form a separate Working-Circle.

The following table shows the constitution of Working-Circles and felling series:—

Working Circle.	Series.	Block or Forest.	Mixed Forest.	Sâl Forest.	Total including unstocked areas.
			Acres.	Acres.	
Upper Tondü.	Sursuti.	Sursuti 1 to 4	900	700	3,693
		Indong 2 ...	900	100	1,000
		Kákurjhora ...	400	...	510
		Total ...	2,200	800	5,203
	Neora.	Látaguri 1 & 2	240	670	1,302
		Neora Nadi...	420	300	731
		Bicháhlánga	480	300	878
		Sursuti 5 ...	60	100	1,137
		Total ...	1,200	1,370	4,048
	Bámaudauga.	Dainah (part)	1,200	...	4,000
		Tondü 4 & 5	240	100	1,519
		Jaldáka ...	160	...	950
		Total ...	1,600	100	6,469
	Tondü.	Dainah	1,500	...	4,000
		Jaldáka	300	...	950
		Sulkapára	1,200	350	1,830
		Total ...	3,000	350	6,780
	Grassmore.	Dainah	3,000	...	4,000
	Cheugmári.	Dainah	2,000	...	3,855
	Hathinala.	Jaldáka	600	...	880
Hilajhora		2,400	50	3,526	
Total ...		3,000	50	4,406	
Pangjhora.	Pangjhora ...	3,750	300	4,440	
	Upper Indong	1,250	...	1,352	
	Total ...	5,000	300	5,792	
Chapramári.	Chapramári	1,800	350	2,735	
	Udlajhora	1,500	...	1,560	
	Nagrakata	1,500	...	1,730	
	Total ...	4,800	350	6,025	
Sipchu.	.....	1,400	...	1,542	
	Total Working-Circle		27,200	3,320	48,120
Muraghát.	Dumchi.	Dumchi	2,400	244	3,018
	Rehti.	Rehti	2,800	...	3,263
	Khairbári.	Khairbári	1,400	...	1,812
	Titi.	Titi ...	8,000	...	8,167
		Total Working-Circle		14,600	244	16,260

NOTE—These Working-Circles will hereafter be referred to as the Mixed Working-Circles.

Section 2. Compartments; justification of the sub-division adopted.

29 No change is proposed from the sub-division adopted in the plan under revision.

Section 3. Analysis of the crop.

30 The working plan map prepared for the plan under revision has been compared, with the crop on the ground. In some places, progress in natural afforestation has been slow, but in others it is fairly clear that considerable changes have taken place. In the Apalchand Range, areas in the Udlabári, Phuljhora, Chel river and Apalchand Blocks, shown as savannah in the old stock maps, now contain mixed forest, whereas in Hanskháli and Churabhija there is no marked alteration. These types not only merge into one another but are constantly changing, and a stock map is constantly getting out of date. An attempt has been made to rectify the areas given in the old stock map to a slight extent. No sál, for instance, was shown as existing in Indong compartment 2; whereas there are at least 100 acres of sál in this block in the north-east corner alone, not to speak of small patches in the interior. There is also more than 60 acres of grass and 70 acres of unproductive land in Dumchi. For purposes of working, the Dainah Forest has been estimated to contain 7,700 acres and the Jaldáka Forest 1,060 acres of mixed *khair* and *sissu* forest, capable of being worked over for firewood, the balance being river bed, savannahs and grassy churs covered with *khair* and *sissu* seedlings.

CHAPTER II. METHOD OF TREATMENT.

Section 1. Object sought to be attained.

31 Sál Working-Circles. The object aimed at is to produce as much sál timber of large size and good quality as possible, and it is decided to utilise for fuel and other purposes trees of inferior kinds which can be cut out so as to benefit the sál.

32. Mixed Working-Circles. The object is to obtain a sustained yield of firewood and produce as large a supply as possible of trees which yield timber for box planking and other purposes.

Section 2. Method of treatment adopted.

33. Sál Working-Circles. As the number of mature sál trees is comparatively small, and as trees of inferior species are numerous and, in many places tend to get the upper hand, Improvement fellings are prescribed. In the 8,320 acres of mixed forest included in these Working-Circles the Improvement felling will closely resemble a Coppice with Standards felling.

34. Mixed-Working Circles. Coppice with Standard fellings are prescribed, as this is the only treatment likely to secure the objects aimed at.

Section 3. The exploitable age.

35. Sál Working-Circles. As in neighbouring forests the minimum exploitable diameter for sál may be assumed to be 2'; judging from the rate of growth indicated in Appendix II a sál tree of this size should be 75 years old.

36. Mixed Working-Circles. From observations made on the oldest coupes, it is fairly evident that a fair amount of fuel in good sized billets could be obtained from coppice 16 years old. To allow a sufficient margin and to give a better class of fuel, 20 years has been adopted as the exploitable age for coppice. As regards the standards, which will merely consist of different kinds of superior species, no age can be fixed upon, but all trees which have reached a girth of seven feet will be considered ripe for felling.

CHAPTER III. THE FELLINGS.

Section 1. The general working schemes and calculation of the possibility.

37. *Timber.* Sâl Working-Circle—From estimates based on markings made by the writer in the Sealduba block, Apalchand forest and Látaguri block, Lower Tondú forest, it is anticipated that the yield in timber will amount to about 55 cubic feet of sâl per acre in the former and 40 cubic feet in the latter. The latter block has, however, suffered in the past from fires so that the trees which have been removed are frequently short and stunted.

38. *Firewood.* The quantity of firewood available varies so much that it is difficult to make an estimate, but the yield may safely be taken at 500 cubic feet per acre where there is sufficient demand to warrant its extraction.

39. *Mixed Working-Circles*—It is not anticipated that the yield of timber will be appreciable. The outturn of fuel varies according to the character of the crop. Taking the figures for 1904-05, the densely stocked Sipehu block yielded 1,400 cubic feet per acre, whereas, in the thinly stocked Pangjhora block, the firewood obtained worked-out to only 300 cubic feet per acre. The average yield of all coupes worked under Coppice with Standards amounted to 700 cubic feet per acre.

Section 2. Period for which fellings are prescribed.

40. The most important fellings are the Improvement fellings which will take 15 years to traverse the area under treatment. Consequently fellings in all Working-Circles are prescribed for 15 years.

Section 3. Areas to be felled annually or periodically: order of their allotment.

41. In each of the Sâl Working-Circles the average yearly coupe will be $\frac{1}{15}$ th of the productive area of the Working-Circle, *i.e.*, of the area stocked with sâl and mixed forest, except in the case of Series II of Apalchand and the whole of the Lower Tondú Working-Circle where the annual coupe will be about $\frac{1}{15}$ th of the sâl area. In the Mixed Working-Circles $\frac{1}{20}$ th of the productive area will be worked over annually. The whole area of every Working-Circle will be open to the extraction of dry timber at the discretion of the divisional forest officer.

42. The order of the allotment of the fellings is given in the tabular statement at the end of this chapter and for Improvement fellings, the position of the areas to be worked over is clearly shown in the map annexed to this report.

Section 4. Nature and mode of executing the fellings.

43. Sâl Working-Circles:—In these the exploitation of sâl will include the removal of:—

- (a) all sâl trees over 2 feet in diameter,
- (b) all sâl trees which show signs of deterioration being dead, hollow, crooked, or top-broken and—

to be taken
II vide 115
List of coupes
of 1906

(c) all large spreading sâl trees with short boles and surrounded with a good growth of young sâl saplings.

In addition to this, thinnings will be made amongst dense sâl poles, some of which must be suppressed in the course of the next fifteen years. These latter must be marked with great care. The exploitation of other kinds of trees will consist in the removal of all trees over 18" girth where there is a demand for them, but where there is no such demand, only those trees which dominate advance growth of sâl should be cut. As the cutting of the inferior species of trees cannot benefit the advance growth of sâl unless it is followed by the successive weedings and cleanings prescribed in para. 48 it is necessary to prescribe that the cutting of such trees in sâl areas shall not continue unless the weedings, are up to date. It may be noted that it is anticipated that there will be a large demand for inferior trees for fuel in the Muraghât Sâl Working-Circle and in Series I of the Apalchand Sâl Working-Circle, but there will probably be little demand for fuel in the Lower Tondû Sâl Working-Circle and Series II of the Apalchand Sâl Working-Circle.

The Improvement fellings will practically be Coppice fellings in those areas devoid of sâl and containing only evergreen or mixed species of trees.

44. Mixed Working-Circle.—Standards should be selected before coppice felling starts. All promising trees of the following species of less than 7 feet in girth being marked for reservation, i. e., sâl, *sisu*, *châmp*, *tun*, *goguldhup*, *mallagiri*, *kainjal*, *simal* and *kadam*.

Where the forest consists of almost pure *khair*, not less than forty poles to the acre should be reserved. Where there is any considerable amount of sâl, the fellings should, as far as possible, resemble the Improvement fellings prescribed in the sâl areas. It will probably be unnecessary to work over the sâl forest included in these Working-Circles. Should it, however, be found necessary to do so, it must be worked over under the method of Improvement fellings laid down for Sâl Working-Circles. It is not anticipated that any exploitation will take place in the Muraghât mixed Working-Circle owing to want of demand at present, as tea gardens in the vicinity have sufficient firewood in their grants to last them another ten years.

Section 5. Forecast of the condition of the crop at the conclusion of the fellings.

45. Sâl Working-Circles. Where trees of inferior species are saleable, there should be a considerable increase in the stand of sâl timber. Trees of all ages will be well represented, and there should be a good stock of sâl saplings to form an extension of sâl forest wherever the soil is suitable for the growth of sâl. Trees of miscellaneous species will all be of comparatively small dimensions. Where inferior trees cannot be disposed of, improvements will probably be less marked.

46. Mixed Working-Circles. This will contain forest of coppice shoots and seedlings, chiefly of miscellaneous species, but with a higher proportion of sâl, *châmp* and other more valuable species. The coppiced forest will range in age from 1 to 20 years and each of the age classes will occupy approximately equal areas unless there are fluctuations in the demand. There will also be patches of high forest of sâl, particularly in the Lower Tondû, as the demand will not, in these series, reach the supply available. The sâl area in Dumchi will also be held in reserve. It is possible that the remote portions of the forest in the Upper Tondû series may not be completely worked over owing to the increasing use of coal of which the price already low may fall still lower.

Section 6.

47 TABLE OF FELLINGS.

Apalchand Sâl Working-Circle.					Remarks.	Lower Tondur Sâl Working-Circle.	
Series I.			Series II.			Compartment.	Area to be worked over. (sâl only.)
Year.	Compartment.	Area to be worked over.	Block.	Area to be worked over. (sâl only.)			
1904-05	Sealduba (1.)	560	Chengmâri.	50	Fellings only to be carried out so long as cleanings prescribed in para 48 are up to date.	Lâtaguri (3) & (4)	800
1905-06	Chel (1.)					570	"	50	{ Bichabhanga (3)	790
1906-07	Churabhija (1.)	630	"	50		{ Barohâti (2) & (3)	
	Churabhija (2.) and (3.)					{ Barohâti (1)	770
1907-08	Apalchand (1.)	550	"	50		{ Bichabhanga (2)		540
	and (2.)					{ Barohâti (4)	
1908-09	Apalchand (3.)	500	"	50		{ Medlajhora (4)	600
	and (4.)					Medlajhora (3)	
1909-10	Do. (5.)	750	"	50		Medlajhora (1) & (2)	600
	Phuljhora (1)					Central (1)	500
1910-11	Do. (2.)	600	"	50		" (2)	600
1911-12	Do. (3.)					"	700
1912-13	Hauskhâli (2.)	730	"	50		Indong (3)	500
1913-14	Do. (1.)					" (1) & (4)	
1914-15	Udlabâri (2.)	550	"	50		{ Dhupjhora	700
	and (3.)				{ Bhokulmardi (1)		
1915-16	Do. (2.)	620	"	50	" (2)	550	
	Sealduba (4.)				" (3)		
1916-17	Udlabâri (1.)	600	Malhâti.	50	{ Kâkurjhora	650	
1917-18	Sealduba (2.)				Tondur (1) (2) & (3) part		
		570	"	50	{ " (3) part	750	
1918-19	Do. (3.)				{ Gorumâra		1,250
	Chel (1.)	500	"	50			

Muraghât Sâl Working-Circle.

Year.	Series I.		Series II.		Series III.		Remarks.
	Block.	Area.	Block.	Area.	Forest.	Area.	
1904-05	Central	300	South	150	Dalgaon	50	Fellings only to be carried out so long as cleanings prescribed in § 48 are up to date.
1905-06	"	300	"	150	"	50	
1906-07	"	300	"	150	"	50	
1907-08	"	300	"	150	"	50	
1908-09	"	300	"	150	"	50	
1909-10	"	300	"	150	"	50	
1910-11	"	300	"	150	"	50	
1911-12	"	300	"	150	"	50	
1912-13	"	300	"	150	"	50	
1913-14	"	300	"	150	"	50	
1914-15	North (old coupes)	340	South (old coupes)	200	Dalgaon (old coupes.)	60	
1915-16	"	340	"	200	"	60	
1916-17	"	340	"	200	"	60	
1917-18	"	340	"	200	"	60	
1918-19	"	340	"	200	"	60	

TABLE OF FELLINGS.
Tondu mixed Forest Working-Circle.

YEAR.	Neora Series.		Sursuti Series.		Bámandanga Series.		Tondu Series.		Grassmore Series.	
	Block.	Area	Block.	Area	Block.	Area	Block.	Area	Block.	Area
1904-05	Lutaguri.	60	Sursuti.	110	Dainah.	80	Dainah.	150	Dainah.	150
1905-06	"	60	"	110	"	80	"	150	"	150
1906-07	Bichabanga.	60	"	110	"	80	"	150	"	150
1907-08	"	60	"	110	"	80	"	150	"	150

1908-09	"	60	"	110	"	80	"	150	"	150
1909-10	"	60	"	110	"	80	"	150	"	150
1910-11	"	60	"	110	"	80	"	150	"	150
1911-12	"	60	"	110	"	80	"	150	"	150
1912-13	"	60	"	110	"	80	"	150	"	150
1913-14	"	60	"	110	"	80	"	150	"	150
1914-15	"	60	"	110	"	80	"	150	"	150
1915-16	"	60	"	110	"	80	"	150	"	150
1916-17	"	60	"	110	"	80	"	150	"	150
1917-18	"	60	"	110	"	80	"	150	"	150
1918-19	"	60	"	110	"	80	"	150	"	150
1919-20	"	60	"	110	"	80	"	150	"	150
1920-21	"	60	"	110	"	80	"	150	"	150
1921-22	"	60	"	110	"	80	"	150	"	150
1922-23	"	60	"	110	"	80	"	150	"	150
1923-24	"	60	"	110	"	80	"	150	"	150

Correction No.	Page No.	Paragraph No.	Correction.
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Under Tondu Mixed Forest Working Circle, Grassmore Series, Dainah Block, against each of the years 1909-10 to 1923-24 inclusive—
For "150" acres, read "120" acres.

And in Chengmari Series, Dainah Block, against each of the years 1909-10 to 1923-1924 inclusive—
For "100" acres, read "⁶⁰50" acres.

[Note.—These alterations were ordered in Eastern Bengal and Assam Government Order No. 1127 F, dated 8th March 1910, owing to part of the Dainah Block being washed away].

YEAR.	Block.	Area	Block.	Area	Block.	Area	Block.	Area	Block.	Area
1904-05	Lutaguri.	60	Sursuti.	110	Dainah.	80	Dainah.	150	Dainah.	150
1905-06	"	60	"	110	"	80	"	150	"	150
1906-07	Bichabanga.	60	"	110	"	80	"	150	"	150
1907-08	"	60	"	110	"	80	"	150	"	150
1908-09	"	60	"	110	"	80	"	150	"	150
1909-10	"	60	"	110	"	80	"	150	"	150
1910-11	"	60	"	110	"	80	"	150	"	150
1911-12	"	60	"	110	"	80	"	150	"	150
1912-13	"	60	"	110	"	80	"	150	"	150
1913-14	"	60	"	110	"	80	"	150	"	150
1914-15	"	60	"	110	"	80	"	150	"	150
1915-16	"	60	"	110	"	80	"	150	"	150
1916-17	"	60	"	110	"	80	"	150	"	150
1917-18	"	60	"	110	"	80	"	150	"	150
1918-19	"	60	"	110	"	80	"	150	"	150
1919-20	"	60	"	110	"	80	"	150	"	150
1920-21	"	60	"	110	"	80	"	150	"	150
1921-22	"	60	"	110	"	80	"	150	"	150
1922-23	"	60	"	110	"	80	"	150	"	150
1923-24	"	60	"	110	"	80	"	150	"	150

Section 6.

47 TABLE OF FELLINGS.

Apalchand Sâl Working-Circle.					Remarks.	Lower Tondû Sâl Working Circle.	
Series I.			Series II.			Compartment.	Area below over (sâl only.)
Year.	Compartment.	Area to be worked over.	Block.	Area to be worked over. (sâl only.)			
1904-05	Sealduba (1.) Chel (1.)	560	Chengmâri.	50	Under Apalchand Sâl Working Circle in Series I the Coupes of 1910-11 and of subsequent years should fall one year later respectively.	Lâtaguri (3) & (4) [Bichabhangâ (3)]	
1905-06		570		50			
1906-07	Churabh	14	47 1/2				
1907-08	Apalcha						
1908-09	Apalcha						
1909-10	Do.				[Note.—This alteration was ordered in Eastern Bengal and Assam Government Order No. 4443 F.M., dated 25th July 1910, owing to windfall trees being extracted in 1910-11 in place of exploiting the Coupe assigned to that year].		
1910-11	Phuljhor						
1911-12	Do.						
1912-13	Chel						
1913-14	Hans						
1914-15	Do.						
1915-16	Udla						
1916-17	Do.						
1917-18	Seald						
1918-19	Udlab						
	Seald						
	Do.						
	Chel						

Maragnat Sâl Working-Circle.

Year.	Series I.		Series II.		Series III.		Remarks.
	Block.	Area.	Block.	Area.	Forest.	Area.	
1904-05	Central	300	South	150	Dalgaon	50	
1905-06	"	300	"	150	"	50	
1906-07	"	300	"	150	"	50	
1907-08	"	300	"	150	"	50	
1908-09	"	300	"	150	"	50	
1909-10	"	300	"	150	"	50	
1910-11	"	300	"	150	"	50	
1911-12	"	300	"	150	"	50	
1912-13	"	300	"	150	"	50	
1913-14	"	300	"	150	"	50	
1914-15	North (old coupes)	340	South (old coupes)	200	Dalgaon (old coupes.)	60	
1915-16	"	340	"	200	"	60	
1916-17	"	340	"	200	"	60	
1917-18	"	340	"	200	"	60	
1918-19	"	340	"	200	"	60	

TABLE OF FELLINGS.
Tondu mixed Forest Working-Circle.

YEAR.	Neora Series.		Sursuti Series.		Bámandanga Series.		Tondu Series.		Grassmore Series.	
	Block.	Area	Block.	Area	Block.	Area	Block.	Area	Block.	Area
1904-05	Lataguri.	60	Sursuti.	110	Dainah.	80	Dainah.	150	Dainah.	150
1905-06	"	60	"	110	"	80	"	150	"	150
1906-07	Bichabanga.	60	"	110	"	80	"	150	"	150
1907-08	"	60	"	110	"	80	"	150	"	150
1908-09	"	60	"	110	"	80	"	150	"	150
1909-10	"	60	"	110	"	80	"	150	"	150
1910-11	"	60	"	110	"	80	"	150	"	150
1911-12	"	60	"	110	"	80	"	150	"	150
1912-13	"	60	"	110	"	80	"	150	"	150
1913-14	"	60	Indong.	110	"	80	"	150	"	150
1914-15	{ Lataguri old Coupes.	60	"	110	"	80	Sulkapára.	150	"	150
1915-16	"	60	"	110	"	80	"	150	"	150
1916-17	Neora.	60	"	110	"	80	"	150	"	150
1917-18	"	60	"	110	"	80	"	150	"	150
1918-19	"	60	"	110	"	80	"	150	"	150
1919-20	"	60	"	110	Tondu 4.	80	"	150	"	150
1920-21	"	60	Kákurjhora.	110	"	80	"	150	"	150
1921-22	"	60	"	110	Tondu 5.	80	"	150	"	150
1922-23	"	60	"	110	Jaldáka.	80	Jaldáka.	150	"	150
1923-24	Sursuti.	60	"	110	"	80	"	150	"	150

YEAR.	Chengmári Series.		Hátinala Series.		Pangjhora Series.		Chapramári Series.		Sipchu Series.	
	Block.	Area	Block.	Area	Block.	Area	Block.	Area	Block.	Area
1904-05	Dainah.	100	Jaldaka.	150	Pangjhora.	250	Chapramári.	240	Sipehu.	70
1905-06	"	100	"	150	"	250	"	240	"	70
1906-07	"	100	"	150	"	250	"	240	"	70
1907-08	"	100	"	150	"	250	"	240	"	70
1908-09	"	100	Hilajhora.	150	"	250	"	240	"	70
1909-10	"	100	"	150	"	250	"	240	"	70
1910-11	"	100	"	150	"	250	"	240	"	70
1911-12	"	100	"	150	"	250	{ Chapramári Udlajhora.	120	"	70
1912-13	"	100	"	150	"	250	Udlajhora.	240	"	70
1913-14	"	100	"	150	"	250	"	240	"	70
1914-15	"	100	"	150	"	250	"	240	"	70
1915-16	"	100	"	150	"	250	"	240	"	70
1916-17	"	100	"	150	"	250	"	240	"	70
1917-18	"	100	"	150	"	250	{ Udlajhora Nagrakata.	180	"	70
1918-19	"	100	"	150	"	250	Nagrakata.	240	"	70
1919-20	"	100	"	150	Upper Indong.	250	"	240	"	70
1920-21	"	100	"	150	"	250	"	240	"	70
1921-22	"	100	"	150	"	250	"	240	"	70
1922-23	"	100	"	150	"	250	"	240	"	70
1923-24	"	100	"	150	"	250	"	240	"	70

Muraghát Mixed Forest Working-Circle.

YEAR.	Dumchi Series.		Rehti Series.		Khairbari Series.		Titi Series.	
	Block.	Area	Block.	Area	Block.	Area	Block.	Area
		acres.		acres.		acres.		acres
1904-1905	Dumchi	120	Rehti	140	Khairbari	70	Titi	400
1905-1906	"	120	"	140	"	70	"	400
1906-1907	"	120	"	140	"	70	"	400
1907-1908	"	120	"	140	"	70	"	400
1908-1909	"	120	"	140	"	70	"	400
1909-1910	"	120	"	140	"	70	"	400
1910-1911	"	120	"	140	"	70	"	400
1911-1912	"	120	"	140	"	70	"	400
1912-1913	"	120	"	140	"	70	"	400
1913-1914	"	120	"	140	"	70	"	400
1914-1915	"	120	"	140	"	70	"	400
1915-1916	"	120	"	140	"	70	"	400
1916-1917	"	120	"	140	"	70	"	400
1917-1918	"	120	"	140	"	70	"	400
1918-1919	"	120	"	140	"	70	"	400
1919-1920	"	120	"	140	"	70	"	400
1920-1921	"	120	"	140	"	70	"	400
1921-1922	"	120	"	140	"	70	"	400
1922-1923	"	120	"	140	"	70	"	400
1923-1924	"	120	"	140	"	70	"	400

CHAPTER IV. MISCELLANEOUS REGULATIONS.

Section 1. Thinnings, cleanings & weedings See Appendix VIII (c) :

48. Sál Working-Circles : After a felling has been made it will be necessary to weed the parts of the coupe which are not already well stocked with sál or do not contain merely mixed or evergreen forests in which there is no sign of sál reproduction. This weeding or clearing will be annually repeated until the sál is established. On the areas to be weeded there is usually a good or fair supply of small sál seedlings, and past experience makes it certain that large numbers of additional sál seedlings will germinate in the year following the fellings. Though the cover of the numerous reserved sál trees will restrain the growth of inferior trees and plants to some extent, the latter would, nothing being done to help the sál seedlings, rapidly get the better of the latter which will either die or form straggling bushes by the end of the felling rotation. Sál seedlings hold their own fairly well during the year following the improvement felling. In the second year, however, the coppice of inferior species, small creepers, *malota* seedlings etc., get the better of them and though they do not necessarily suffer greatly up to the end of the second year, they are by that time covered over, pinned down by small, creepers and generally doomed, failing assistance. Nothing being done, they are, by the end of the third year, hopelessly out of the struggle and from that time onwards the survivors only form an undergrowth.

A number generally live on till the tenth or twelfth year, and may possibly be capable of surviving much longer, but such survivors make no headway. The question as to the frequency of these weedings and clearings can best be determined by experiment, but there is no doubt

that they should be begun not more than two years after the improvement felling and should be continued till the fifth year, (inclusive) after that felling. It will probably be found to cost less if a preliminary thinning and weeding, consisting of a cutting back of the neighbouring coppice shoots and rooting up of small seedlings of less valuable species, is made in the first year after felling. It is accordingly prescribed that after an improvement felling, each coupe so dealt with, should be weeded and cleaned every year for five years in accordance with the table given in Appendix VIII. C. These cleanings will hardly be necessary or possible in those coupes where there is no demand for trees of inferior species. The results of these weedings should be considered after the fifth year, i. e., in 1909-10 when a supplementary table of weedings or cleanings should, if necessary, be prescribed.

Section 2. Creeper cutting. See Appendix VIII (d).

49. Sâl Working-Circles. The large trees in the Muraghát Working-Circle, Series I of the Apalchand Working-Circle and a great part of the Lower Tondü Working-Circle, have been cleared of climbers, and it will be sufficient if, in these areas, climbers are cut in the year preceding the felling and this may well be done at the time of marking the coupe. In the Cheñgmári (Apalchand,) Gosaihát and that part of the Tondü forest in which climbers have been untouched, they will be cut as soon as possible. The whole of this work is prescribed for the first year and any balance not cut must be worked over as early as possible in succeeding years.

50. Mixed Working-Circles.—The mere cutting of creepers in coupes recently felled is hopeless, and though it has been tried over and over again in the coppice coupes, owing to the vigour of the regrowth, no trace of it is apparent. The killing out of creepers cannot be accomplished until there is a fairly complete canopy overhead. A systematic attempt to eliminate creepers altogether should, therefore, be deferred till the tenth year after the coupe has been worked out. Where, as in the Chapramári coupe, there is a fair amount of sâl reproduction, though there are few mature sâl trees, measures should be taken to keep these cleaned annually.

Section 3. Grazing and other rights.

51. Grazing will be allowed in all areas where it is at present permitted. The chief grazing grounds are the Dainah and Jaldáka forests, and the value of the grazing is probably far greater than that of the wood produced on these areas. There are no grazing or other rights requiring control.

Section 4. Sowings, planting, or other works special to each Circle.

52. The sowing of *lampatia* and *tun* in the annual coupe in the Sipchu series will be continued and, if labour can be obtained, similar sowings may be carried out in other coupes of the Tondü Mixed Forest Working-Circle. There are no very suitable sites for forest villages in this Working-Circle, even if it was not infested by wild elephants, and local labour is very difficult to obtain during the rainy season. Experiments should be made to get over the difficulty of the cleared soil in beds, prepared for sowing, being washed down by heavy rain, before the seedlings become properly established, without throwing too heavy a shade over them.

53. The planting of bamboos along roads and boundaries should be continued and the creation of natural fire lines by ploughing up savannah lands and sowing *malota* and other quick growing species should be carried out in all Working-Circles, where grass lands form a menace to adjoining sál reproduction owing to their liability to be burnt.

54. The sowing in lines of sál in pure *malota* pole forest on old village sites in Muraghát may also be carried out as it is not an expensive operation. Care should be taken that abandoned fields in Garo villages are sown with *malota* before grass reappears on them.

An experiment in the way of sowing sál in lines in 10 year old coupes may also be tried.

Section 5. Improvements common to the whole area.

55. *Roads.* The existing roads where they pass through swampy ground should be embanked and where necessary Ranigunj pipe culverts should be inserted to allow of the passage of water where the flow is not too great. The object is to make such roads passable after winter or spring showers when there is sufficient water to make carting difficult and troublesome, but not impossible. To keep such roads open throughout the rains would mean expensive bridging and, as carts are difficult to obtain, at this season, it would serve no useful object. In clearing lines for paths and fire-lines, large sized shady trees should be preserved and the upper canopy of the forest left as dense as possible as the grass and undergrowth fill up a road every rains when the road is much exposed to the light. Regard should be had to this when a road happens to traverse a coupe open for felling. The construction of heavy strong low bridges over which elephants could pass and which would be under water in the rainy season should be undertaken, as ordinary high light wooden bridges last a very short time in the evergreen forest which lines the streams. The cutting of more paths for inspection and fire protection purposes is required. The detailed prescriptions will be found in appendix VIII (a).

56. *Buildings.* Another rest house is required in the Apalchand Range near Udlabári and more rest houses for Rangers and Foresters are required. Mat walls are objectionable in many ways and should be done away with; roofs which will keep out the rain and heat without being liable to danger from fire should be introduced. When a bungalow is situated on high ground, where piles are unnecessary, the latter should be avoided as they may necessitate the pulling down and reconstruction of the whole bungalow when they decay. Buildings suggested are entered in Appendix VIII b.

Protection from fire.

57. *Sál Working-Circles.* There are still large savannahs in nearly all Working-Circles, and it is desirable they should be filled in with forest as early as possible, and to this end they should be protected in whole or in part. Savannahs will only be burnt for definite reasons given below. From the point of view of fire protection the fire protected area may be divided into three classes:—

- (a) Savannahs of almost pure grass;
- (b) Edges of savannah where the forest is encroaching on to the grass and forest with a grassy undergrowth, and—
- (c) Dense forest with perhaps a few tussocks of grass but with ordinarily no more combustible material than dry leaves.

It may be laid down that fire does no considerable damage in (a) and that (b) is the area which should be preserved with especial care. Savannahs will only be burnt in part where they adjoin (1) boundaries (2) railway lines (3) public roads and (4) forest settlements when an extension of cultivation is wanted. In all cases a line will be cut and beaten down by elephants, so as to avoid the possibility of the area (b) being burnt. Natural fire lines will be made by ploughing up lines across savannahs

and sowing them with seeds of quick growing species, such as *malota*. Broad lines of trees so formed will be invaluable for counterfiring, an impossible operation at present in the large savannahs, and a series of such lines would soon render a savannah harmless. The introduction of forest settlements will considerably minimize the risks from fire, as such settlements cover large savannah areas and afford labour on the spot for extinguishing fires. With the exception of savannahs of almost pure grass the whole area of each of these Working-Circles will be specially protected as described above.

58. Mixed Working-Circles. For the purposes of fire protection these may be split up into two classes (a) grazing grounds and (b) other mixed forest.

(a) The revenue from grazing being more important than the damage done by grazing or fires, areas in which grazing chiefly takes place i. e., Dainah and Jaldáka forest will be burnt as early in the fire season as possible.

In (b) other mixed forests protection from fire will be carried out by the ordinary staff.

59. Boundaries. The external artificial boundaries will be improved by running a shallow ditch along where the line passes through savannah. This will facilitate inspection and render it easy to clear the line year after year. The planting up of these lines with rows of bamboos would, in course of time, do away with the unprofitable expense of line clearing in heavy grass. The replacement of wooden boundary pillars, which are liable to rot, by numbered iron posts should be continued.

CHAPTER V. MISCELLANEOUS.

Section 1. Miscellaneous prescriptions.

60. The measurement of trees in sample plots should be continued and, if necessary, more sample plots laid out.

Section 2. Changes proposed in the forest staff.

61. The only change proposed is that the lower class of subordinates should be better paid, in accordance with proposals which have been submitted to Government.

Section 3. Financial results of proposed working.

62.—REVENUE,				Rs.
Timber	160,000	cft. at	0 4 0	... 40,000
Fuel	2,400,000	„	1 4 0 %	... 30,000
Grazing and miscellaneous	...	...	...	... 12,000
				82,000
EXPENDITURE.				
Works of Improvement and maintenance	...	...	...	... 14,000
Establishment	...	...	...	... 23,000
				37,000
Surplus	...	...	...	... 45,000

JALPAIGURI :
The 3rd December 1905, }

F. TRAFFORD,
Deputy Conservator of Forests,
Jalpaiguri Division.

APPENDIX I.

Area Statement.

Forest.	Block.	Sál Forest.	Mixed Forest.	Total.	Total area.	REMARKS.	
Apalchand	Udlabári ...	1,300	300	1,600	2,339		
	Sialduba ...	1,300	100	1,400	1,405		
	Churabhija ...	850	350	1,200	1,455		
	Hanskháli ...	1,140	260	1,400	2,952		
	Phuljhora ...	1,000	200	1,200	3,081		
	Chel River ...	600	200	800	1,487		
	Apalchand ...	1,200	200	1,400	2,042		
Chengmári <i>Malhati</i>	Chengmári ...	600	150	750	981		
	Malhati ...	150	100	250	320		
Tondu	Sursuti ...	800	960	1,760	4,830		
	Lower Indong	1,300	1,000	2,300	2,770		
	Central „ ...	1,100	200	1,300	1,446		
	Gorumára ...	1,000	400	1,400	1,505		
	Medlajhora ...	1,600	400	2,000	2,520		
	Baroháti ...	1,200	400	1,600	2,223		
	Neora Nadi ...	300	420	720	731		
	Bicha bhanga	800	630	1,430	1,568		
	Látaguri ...	1,470	340	1,810	3,704		
	Dhupjhora ...	400	500	900	1,310		
					1,458	(148 acres under Bengal Duárs Railway.)	
		Tondu ...	1,100	400	1,500	3,024	
		Bhokulmardi	1,100	300	1,400	1,825	
		Sulkapara ...	350	1,200	1,550	1,830	
	Kákurjhora ...	400	750	1,150	1,310		
	Sipchu ...	..	1,400	1,400	1,542	
	Chapramári ...	350	1,800	2,150	2,735		
	Udlajhora ...	...	1,500	1,500	1,560	
	Nagrakáta ...	...	1,500	1,500	1,730	
	Upper Indong	...	1,250	1,250	1,352		
	Pangjhora ...	300	3,750	4,050	4,440	(102 acres under Bengal Duárs Railway.)	
	Hilajhora ...	50	2,400	2,450	3,526	(70 acres under Bengal Duárs Railway.)	
	Jaldáka ...	...	1,060	1,060	2,780	
Khyranti	Khyranti ...	42	2	44	64		
Dainah	Dainah ...	...	7,700	7,700	15,855	(151 acres under Bengal Duárs Railway.)
Muraghát	Northern ...	1,000	700	1,700	2,690		
	Central ...	1,600	1,400	3,000	4,004		
	Southern ...	1,500	1,000	2,500	5,046		
<i>Dalgaon</i>	Goshaihát ...	370	...	370	1,876		
	Dalgaon ...	500	300	800	1,471		
Dumchi	Dumchi ...	244	2,400	2,644	3,018		
Rehti	Rehti ...	...	2,800	2,800	3,263	
Khairbári	Khairbári	1,400	1,400	1,812	(31 acres under Bengal Duárs Railway.)	
Titi	Titi	8,000	8,000	8,167		
<i>Salbari</i>	<i>Salbari</i>	16		

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APPENDIX II.

Results of Measurements in Sample Plots showing the average annual increment.

LOCALITY.	Diameter.	Kind.	Number of trees measured.	Interval after which measurements were made.	Total increment.	Average annual increment.	REMARKS.
Apalchand	Class. II	Dominant	2	Years. 4	Inches. 6.96	Inches. 0.87	
		Suppressed	1	4	1.75	0.44	
	III	Dominant	7	4	29.98	1.07	
		Suppressed	2	4	3.31	0.41	
	IV	Dominant	15	4	44.06	0.73	
		Suppressed	10	4	15.46	0.36 → 0.39	
Apalchand	II	.....	2	5	9.19	0.92	
	III	Dominant	15	5	59.58	0.80 0.79*	
		Suppressed	2	5	3.68	0.37	
	IV	Dominant	15	5	53.32	0.71	
Muraghát	I	.....	6	5	30.77	1.02 1.03*	
		Dominant	48	5	282.54	1.17 → 1.18	
	III	Dominant	52	5	260.40	1.00	
		Suppressed	3	5	6.37	0.42	
	IV	Dominant	31	5	167.10	1.08	
		Suppressed	4	5	7.87	0.39	
Tondeu ...	II	.....	2	10	27.13	1.36	Coupe coppiced in 1893-1894 near Gorumára.
	III	.....	13	10	153.31	1.18	
	IV	.....	5	10	48.88	0.97 } 0.98	
	III	Dominant	3	10	28.49	0.95	Untouched forest adjoining the above coupe.
		Suppressed	1	10	4.19	0.42	
		IV	Dominant	5	10	30.75		0.61
	IV	Suppressed	4	10	15.50	0.39	

APPENDIX III.

Creepers Cutting done between 1896-97 and 1904-05.

Year of cutting.	Range.	High forest.	Total cost.	Coppice with Standards.	Cost.	REMARKS.
1896-97	Tondeu	Acres. 796	Rs. 48	Acres.	Rs.	
	Muraghát	320	20	.....	.....
187-98	Apalchand	200	10	.....	.....
	Tondeu	960	60	.....	.....
1898-99	Muraghát	809	60	.....	.....
	Apalchand	594	50	.....	.....
	Tondeu	250	25	.....	.....
1899-1900	Muraghát	1,218	107	.....	.....
	Apalchand	1,257	265	180	19	
	Tondeu	4,140	388	445	114	
1900-1901	Muraghát	420	39	540	107	
	Apalchand	912	97	392	36	
	Tondeu	1,721	361	874	157	
1901-1902	Muraghát	1,643	162	798	110	
	Apalchand	.....	.....	312	364	Work confined to old coppiced coupes.
	Tondeu	.....	.....	477	1,278	
Muraghát	.....	.....	395	385		
1902-1903	Apalchand	655	95	347	350	
	Tondeu	4,718	565	150	43	
	Muraghát	2,023	240	648	96	
1903-1904	Apalchand	225	28	.....	.....
	Tondeu	2,629	329	.....	.....
1904-1905	Muraghát	520	65	.....	.....
	Apalchand	412	*	.....	.....
	Tondeu	2,348	293	.....	.....
	Muraghát	.....	.....	.....	.....

* Done at time of marking in coupe.

v. v. 187 1/2 inch at connection

APPENDIX IV.

Areas worked over under Coppice with Standards between 1896-97 and 1902-03.

Working circle.	Block.	1896-97.	1907-98.	1998-99.	1899-00.	1900-01.	1901-02.	1902-03.	Total.
		Aeres.	Aeres.	Aeres.	Aeres.	Aeres.	Aeres.	Aeres.	Aeres.
Udlabári ...	Sialduba ...	87	86	92	85	86	86	78	600
	Chel River ...	12	15	20	16	16	13	8	100
	Apalohand ...	16	...	28	24	52	17	15	152
Chengmári ...	Malhádi ...	4	...	...	20	...	...	...	24
	Chengmári ...	...	...	...	...	...	...	...	...
Lower Tondú	Gorumára ...	29	33	35	44	81	43	52	317
	Sursuti ...	10	15	10	8	25	25	28	121
	Látaguri ...	81	23	14	22	21	36	18	215
Upper Tondú	Tondú ...	43	19	26	22	28	33	27	198
Muraghát ...	North ...	87	91	88	90	84	99	85	624
	South ...	44	31	18	20	43	77	40	273
Dalgaon ...	Dalgaon ...	1	12	...	22	13	30	7	85
Northern Tondú	Northern Tondú	13	14	126	91	135	296	362	1,037
	Total ...	427	339	457	464	584	755	720	3,726 → 4

APPENDIX V.

Financial Statement for 9 years 1896-1897 to 1904-1905.

Year.	Timber.	Firewood including drift.	Other sources.	Total.	AI. Timber removed by Government Agency.	AVII. Roads and Bridges.	AVII(f). Fire Protection.	Other charges under A, except AII.	Establishment B, AII and AIII.	Total.
	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
1896-97 ...	25,213	17,336	5,136	47,685	...	2,308	1,307	5,143	21,929	30,687
1897-98 ...	17,133	17,061	6,586	40,780	...	1,727	1,338	6,063	17,771	26,899
1898-1899 ...	26,924	20,229	7,405	54,558	65	1,471	1,532	4,921	16,142	24,131
1899-1900 ...	27,088	22,567	7,125	56,780	623	1,080	1,346	14,528	16,801	34,378
1900-1901 ...	27,798	21,289	6,258	55,345	1,729	869	2,121	11,988	20,394	37,101
1901-1902 ...	19,755	28,700	8,319	56,774	4,681	823	1,596	17,426	20,392	44,918
1902-1903 ...	32,927	26,897	8,797	68,621	6,237	934	1,889	10,671	21,358	41,089
1903-1904 ...	26,412	18,923	9,864	55,199	2,598	1,586	1,445	6,440	19,669	31,738
1904-1905 ...	34,587	38,085	15,849	88,521	17,740	3,179	924	7,282	21,573	50,698
Total ...	2,37,837	2,11,087	75,339	5,24,263	33,673	13,977	13,498	84,462	1,76,029	3,21,639
Average ...	26,426	23,454	8,371	58,251	374	1,553	1,500	9,385	19,559	35,738

APPENDIX VI.

Statement of Outturn.

YEAR.	FROM YIELD OF TREES.			From grazing.	From minor products and other sources.
	Logs.	Poles.	Fuel.		
	c. ft.	o. ft.	c. ft.	Rs.	Rs.
1896-97 ...	43,580	18,600	666,000	4,341	651
1897-98 ...	24,600	22,700	703,000	5,231	1,326
1898-99 ...	45,220	25,060	855,000	5,795	1,402
1899-1900 ...	41,400	26,200	1,068,000	4,767	2,240
1900-1901 ...	20,960	19,300	991,000	4,592	1,550
1901-1902 ...	23,500	28,100	1,146,000	5,125	2,936
1902-1903 ...	27,560	12,700	1,246,000	5,705	2,651
1903-1904 ...	36,396	53,701	1,723,044	7,415	2,069
1904-1905 ...	93,420	60,833	2,170,282	12,628	2,730
Total ...	356,636	267,134	10,568,326	55,599	17,555
Average ...	39,626	29,681	1,174,258	6,178	1,951

APPENDIX VII.

Results of Fire Protection.

YEAR.	Area of which protection was attempted after deducting areas burnt departmentally.	Area burnt.	Percentage of failure.	Cost of protection.
	Acres.	Acres.	Acres. %	Rs.
1896-97 ...	74,253	320	0.4 0.5	1,307
1897-98 ...	74,253	938	1.2	1,338
1898-1899 ...	73,961	100.	0.1	1,532
1899-1900 ...	75,292	393	0.5	1,346
1900-1901 ...	79,775	5,970	7.5	2,121
1901-1902 ...	89,939	68	..... %	1,476
1902-1903 ...	83,649	1,081	1.2 0.4	1,712
1903-1904 ...	92,971	1,580	0.2 1.7	1,445

* vide 1st list of correction of 1906.

APPENDIX VIII (a).

Suggested construction of Roads and Forest Rides to be taken up in the order named as funds permit.

Range.	Roads to be embanked drained and bridged.	Rides to be cut through Forest.
Apalohand	Road No. 1 " No. 4 " No. 22	<i>North and South.</i> —A line to be cut running north and south from a point on Road No. 4 midway between the point where it meets Road No. 1 and where it emerges from the forest at Gazleduba. <i>East and West.</i> —Two lines to be cut roughly parallel with Road No. 4 between the west boundary and Road No. 22 and lying roughly equidistant between Road No. 4 and the north and south boundaries respectively.
Lower Tondur	Road No. 6 " No. 8 " No. 25 " No. 26	<i>East and West.</i> —Road No. 23 to be continued up to east boundary. Road No. 24 to be continued up to west boundary. A ride to be made parallel to roads Nos. 24 and 26 equidistant between them.
Upper Tondur	Nil	<i>East and West.</i> —Road No. 14 to be continued due west up to road No. 28. A ride equidistant between road No. 14 and the railway to be inserted running east and west. A ride equidistant between the railway and the Hilla-Chalsa Road to be inserted running east and west, and another between the Hilla-Chalsa Road and the north boundary. <i>North and South.</i> —Road No. 10 to be continued up to north boundary. A ride to be inserted between Mukadam and Udlajhora north of railway roughly parallel with Road No. 10. A ride to be inserted between Road No. 28 and road No. 10 south of the railway up to road No. 29.
Muraghat	Road No. 17 " No. 32 " No. 33	<i>East and West.</i> —A ride between boundary pillars Nos. 1 and 23. A ride roughly midway between Road No. 16 and Public Works Department road.

APPENDIX VIII (b).

Buildings suggested.

	Cost.	Locality.
<i>Apalohand Range.</i>		
1 Divisional Officer's rest-house	Rs. 1,000	Udlabári.
1 Forester's quarters	500	Ditto.
<i>Lower Tondur Range.</i>		
1 Forester's quarters	500	Bárodighi.
1 Ditto	500	Ambári.
<i>Upper Tondur Range.</i>		
1 Forester's quarters	500	Chalsa.
<i>Muraghat Range.</i>		
1 Forester's quarters	500	Kuntimári.
1 Ditto	500	Mogolkata.

APPENDIX VIII(c).

Table of weedings and cleanings in all S&T Working Circles, i.e., Apakhand, Lower Tondur and Muragh&t.

[Prescribed.]

YEAR.	Area to be worked over.	YEAR.	Area to be worked over.
1904-1905 ...	Coupe of 1902-1903.	1912-1913 ...	Coupe of 1907-1908.
	„ 1903-1904.		„ 1908-1909.
1905-1906 ...	Coupe of 1902-1903.		„ 1909-1910.
	„ 1903-1904.		„ 1910-1911.
	„ 1904-1905.		„ 1911-1912.
1906-1907 ...	Coupe of 1902-1903.	1913-1914 ...	Coupe of 1908-1909.
	„ 1903-1904.		„ 1909-1910.
	„ 1904-1905.		„ 1910-1911.
	„ 1905-1906.		„ 1911-1912.
1907-1908 ...	Coupe of 1902-1903.		„ 1912-1913.
	„ 1903-1904.	1914-1915 ...	Coupe of 1909-1910.
	„ 1904-1905.		„ 1910-1911.
	„ 1905-1906.		„ 1911-1912.
	„ 1906-1907.		„ 1912-1913.
1908-1909 ...	Coupe of 1903-1904.		„ 1913-1914.
	„ 1904-1905.	1915-1916 ...	Coupe of 1910-1911.
	„ 1905-1906.		„ 1911-1912.
	„ 1906-1907.		„ 1912-1913.
	„ 1907-1908.		„ 1913-1914.
1909-1910 ...	Coupe of 1904-1905.		„ 1914-1915.
	„ 1905-1906.	1916-1917 ...	Coupe of 1911-1912.
	„ 1906-1907.		„ 1912-1913.
	„ 1907-1908.		„ 1913-1914.
	„ 1908-1909.		„ 1914-1915.
1910-1911 ...	Coupe of 1905-1906.		„ 1915-1916.
	„ 1906-1907.	1917-1918 ...	Coupe of 1912-1913.
	„ 1907-1908.		„ 1913-1914.
	„ 1908-1909.		„ 1914-1915.
	„ 1909-1910.		„ 1915-1916.
1911-1912 ...	Coupe of 1906-1907.		„ 1916-1917.
	„ 1907-1908.	1918-1919 ...	Coupe of 1913-1914.
	„ 1908-1909.		„ 1914-1915.
	„ 1909-1910.		„ 1915-1916.
	„ 1910-1911.		„ 1916-1917.
			„ 1917-1918.

Note.—This table should be reconsidered by the Conservator of Forests in the year 1910-1911 and if necessary revised.

APPENDIX VIII(d).

Prescriptions regarding Cutting of Creepers by Ranges.

YEAR.	RANGES.			
	Apalchand.	Lower Tondou.	Upper Tondou.	Muraghát.
1904-1905	Malhátí ... Chengmári Block	Blocks. Sursuti ... 1,000 Medlajhora ... 1,400 Barohátí ... 400 Gorumára ... 600 Dhupjhora ... 300 Neora Nadi ... 400 Coupe 1904-1905. " 1905-1906. " 1892-93. " 1893-94. " 1894-95.		Coupes 1904-1905. " 1906-1906. " 1893-94. " 1894-95.
1905-1906	Coupe 1906-1907. " 1895-96			
1906-1907	" 1907-1908 " 1896-97.		Coupe 1896-97.	
1907-1908	" 1908-1909 " 1897-98.		" 1897-98.	
1908-1909	" 1909-10 " 1898-99	Same as for Apalchand	" 1898-99.	Same as for Apalchand.
1909-10 ...	" 1910-11 " 1899-1900.		" 1899-1900.	
1910-11 ...	" 1911-12 " 1900-1901.		" 1900-1901.	
1911-12 ...	" 1912-13 " 1901-1902		" 1901-1902.	
1912-13 ...	" 1913-14		" 1902-1903.	
1913-14 ...	" 1914-15		" 1903-1904.	
1914-15 ...	" 1915-16		" 1904-1905.	
1915-16 ...	" 1916-17		" 1905-1906.	
1916-17 ...	" 1917-18		" 1906-1907.	
1917-18 ...	" 1918-19		" 1907-1908.	
1918-19 ...	.....	.....	" 1908-1909.	

APPENDIX VIII(e).

Summary of Prescriptions and Suggestions.

Fellings ...	...	As per Table of Fellings, Part II, Chap. III, Sec. 6.
Cleanings ...	...	As per Appendix AVIII(c).
Creepers cutting ...	...	Ditto AVIII(d).
Fire protection ...	...	As per prescriptions, Part II, Chap. IV, Sec. 5.

Suggestions.

Sowing and planting ...	...	As per suggestions, Part II, Chap. IV, Sec. 4.
Roads ...	...	As per Appendix AVIII(a).
Buildings ...	...	Ditto AVIII(b).